Blue Shield Plan Physician Participation

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Many Blue Shield Plans offer participation agreements to physicians that are structurally similar to the participation provisions of Medicaid programs. This paper examines physicians' participation decisions in two such Blue Shield Plans where the participation agreements were on an all-or-nothing basis. The major results show that increases in the Plans' reasonable fees or fee schedules significantly raise the probability of participation, and that physicians with characteristics associated with "low quality" are significantly more likely to participate than are physicians with characteristics associated with "high quality." In this sense the results highlight the tradeoff that must be faced in administering governmental health insurance policy. On the one hand, restricting reasonable and scheduled fees is the principal current tool for containing expenditures on physicians' services. Yet these restrictions tend to depress physicians' willingness to participate in government programs, thereby reducing access to high quality care by the populations those programs were designed to serve.

Introduction

Blue Shield Plan physician participation agreements serve both as a marketing device to attract subscribers and as a short-run cost-containment strategy. In most Blue Shield Plans a participating physician agrees to accept the Plan's allowance for a procedure as payment in full. In return, the physician may be reimbursed by the Plan rather than being paid directly by the patient. The advantages to the physician are smaller accounts receivable, fewer bad debts, and, of course, extra attractiveness to Blue Shield Plan subscribers. Participation does not necessarily imply a zero copayment by patients even after deductibles, if any, are met. However, since the amounts of reimbursement for procedures are predetermined in the short-run, participation makes it less risky for a Plan to offer policies with low or zero copayment. Moreover, even when copayment is not eliminated, subscribers benefit both in terms of the ceiling on out-of-pocket costs and by being relieved of the interest and liquidity costs of direct payment.

Governmental health insurance programs—specifically Medicare for the elderly and disabled and Medicaid for the indigent—use similar cost-containment strategies. Physicians who treat Medicaid patients must accept as full payment the amount allowed for each procedure by the State's program. Under the Medicare regulations physicians may participate (accept assignment) on a claim-by-claim basis. Administrators of both programs are vitally concerned with how sensitive physician participation (assignment) is to the amounts allowed for procedures. In the case of Medicaid, allowances that are too low can mean insufficient suppliers of medical care for the poor. In the case of Medicare, allowances that are too low can mean low physician assignment levels and higher out-of-pocket costs for the elderly and disabled. Obviously, striking a desirable balance between allowance levels and participation rates is of major importance to Medicare and Medicaid management.

Unfortunately, we did not have access to Medicaid or Medicare assignment data for this study. However, we did have extensive data on the private market business from two Blue Shield Plans with physician participation arrangements. All Blue Shield Plans market one or more of three types of basic health insurance contracts: (1) usual-customary-and-reasonable (UCR), (2) partial service, and (3) indemnity. Although participation agreements do not apply to indemnity policies, the other two lines of private business do have certain strong parallels with Medicare and Medicaid. In particular, as in Medicaid, a Blue Shield subscriber is eligible for a partial service contract only if his/her family income is below a ceiling level. Also, the procedure used in setting allowances (but not the levels) is

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basically the same for Medicare enrollees as it is for Blue Shield Plan UCR subscribers. Therefore, analysis of physician participation in private Blue Shield business should be helpful to Medicare and Medicaid program administrators as well as to Blue Shield Plans themselves.

Determination of Allowance Levels

Claims presented to Blue Shield Plans identify the services rendered by the physician and the amount charged for each service. The Plan then sets the maximum amount allowed for each service. In partial service and indemnity business, the amount allowed is the lesser of the amount charged and a scheduled fee which is the same for all physicians. In UCR business the maximum amount allowed is called the "reasonable fee" and is ordinarily the minimum of the amount charged and the amounts set by one or both of the two fee screens.[1] The first screen, called the "usual fee" or Level 1 screen, is the physician's mean, median, modal, or listed charge for the procedure during some prior time-period fixed by the Plan. The second screen, called the "customary fee" or Level 2 screen, is a percentile—commonly but not always the 90th—of the fee distribution for the procedure in the physician's geographic area.[2] Like Level 1 screens, Level 2 screens are determined from past fee data and are not affected by the physician's current charges. Thus, unless the physician charges less than the screen amounts, the reasonable fee for each procedure is fixed during the current period, and, unless it happens to coincide with the level 2 screen value, it is different for each physician.

Finally, the Plan determines the amount paid to the subscriber or physician based on the amount it allows. In partial service and indemnity business, the amount paid is equal to the allowance. In UCR business the amount paid is a percentage (up to 100 percent) of the allowance. In each of the two Plans in this study, participating physicians nominally agree to accept Plan allowances as full payment and to accept reimbursement from the Plan.[3] Thus, excluding deductibles, the net prices (average coinsurance rates) of UCR services in the two study Plans are (small) percentages of allowances on participating claims, and are equal to the physician's charge minus a (large) percentage of allowances on nonparticipating claims.[4] In partial service business the net prices of services are zero on participating claims, but equal to charges minus allowances on nonparticipating claims. Consequently, other things being equal, the net prices to patients of participating physicians' services are lower in the two Plans than those of nonparticipating physicians' services.

Given the public policy interest in physicians' decisions to participate (accept assignment), it is important to note the similarities and differences in the physician reimbursement procedures between Blue Shield private business and those of the Medicare and Medicaid programs. Medicare Part B features a UCR-type of physician reimbursement known as "customary-prevailing-and-reasonable" (CPR), in which the Level 1 and Level 2 screens are labeled the "customary fee" and the "prevailing fee" respectively, and in which, as in Blue Shield Plans, the amount allowed is called the "reasonable fee."[5] Physician reimbursement under the States' Medicaid programs is either of the CPR form or, as in Blue Shield partial service business, based on fixed (or de facto) fee schedules. In Medicare, the amount paid by the carrier is 80 percent of the reasonable fee. In Medicaid programs, the amount paid is 100 percent of the allowance and coinsurance payments are zero (Chavkin, 1979).

Medicare and Medicaid both employ a physician payment system called "accepting (benefit) assignment" which is virtually identical to Blue Shield participation arrangements. A physician who accepts assignment acknowledges the amount allowed as full payment for his or her services and is reimbursed for those services—except for Medicare deductables and coinsurance—by the carrier. The physician who does not accept assignment is free to charge and receive whatever average revenue he or she can, but must bill the patient who then files a claim for reimbursement with the carrier. Unlike the case in most Blue Shield participation arrangements, Medicare regulations permit a physician to accept assignment on a case-by-case basis. In Medicaid programs, acceptance of assignment is legally mandatory for any physician who treats Medicaid patients.

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[1] Both of the Blue Shield Plans included in this study used two fee screens. The actual amount allowed may be higher than the fee screen values under special circumstances such as when the charge can be justified by an unusual complexity of treatment required. However, such "special circumstances" claims were not included in the data base for this study.

[2] Some Plans establish separate geographic areas within their overall markets and calculate different Level 2 screens for each such area. One of the two Plans used in this study follows that practice. Likewise, some Plans compute separate Level 2 screens for specialists and non-specialists for services provided by both types of physicians. However, this was not the practice of the two Plans included in this study.

[3] However, as is discussed later, the two Plans differ with respect to their treatment of claims submitted directly by subscribers for services provided by participating MDs.

[4] The aggregate coinsurance rates in the two Plans could not be measured precisely because each Plan offered a variety of UCR contracts with differing coinsurance provisions. However, estimates indicated that the coinsurance rate averaged 5 percent or less on allowances.

[5] Technically, the Medicare Level 2 screen is the 75th percentile of the fee distribution for a procedure in the physician's geographic area. However, first under the 1972-1974 Economic Stabilization Program and, in 1975, under a separate Congressional mandate, the annual growth rates of the Medicare Level 2 screens were constrained to rise no higher than set amounts.

Theoretical Framework and Previous Results

With respect to practice pricing and output policy, the most important implication of participation is that the physician's maximum average revenue on participating claims is fixed during the current period.[6] That is, in the current period the physician acts like a price-taker in each Blue Shield submarket, defined by line of business, where he elects to participate. Depending on local competitive conditions, the physician may or may not be a price-taker in non-Blue Shield submarkets or in those Blue Shield submarkets where he or she does not participate.

One economic model that can be applied to this institutional setting is the Robinsonian model of price discrimination. The model has been used in prior research on physician participation and assignment (Sloan and Steinwald, 1978, and Hadley, 1978). Briefly, it postulates that physicians: (1) maximize (expected) profit; (2) face two or more demand functions representing the participating and nonparticipating segments of their markets; (3) face a participating demand function that is infinitely elastic in average revenue; (4) produce the same service in each market with one cost function; (5) are aware of allowance levels in the participating market segments; and (6) produce an output in each market segment and a price in each nonparticipating market segment that maximize (expected) profit.

The behavioral implications of the model are straightforward. In particular, and depending on the initial positions of the demand, marginal cost, and allowance level functions, the fraction of the physician's output devoted to the participating market segment should:

(1) increase (decrease) as the allowance level is raised (lowered);

(2) increase (decrease) as the short-run marginal cost function shifts downward (upward). For example, in a cross-section of physicians, one should observe the highest rates of participation among physicians with the shortest reimbursement lags, among those with the lowest input prices, among those of low quality (assuming low quality is associated with low marginal costs), and among group rather than solo physicians if there are economies of multi-physician practice;

(3) decrease (increase) as the nonparticipating demand function shifts outward (inward). Theoretically, factors that lead to high levels of nonparticipating demand and low physician participation rates are, for example, high physician quality, high patient income and educational levels, and a large volume of high-use patients—especially Medicare eligibles whose demands are financed outside of the Plans' private business. Factors leading (theoretically) to low levels of nonparticipating demands and high participation rates are a high risk of bad debt on nonparticipating bills (reflected, perhaps, by low *per capita* incomes in the physician's market area), and a large volume of alternative suppliers as measured by large numbers of physicians *per capita,* and ample use of hospital outpatient facilities.

Although the model outlined here assumes profit maximization, its implications hinge only on the relative income opportunities of participation and nonparticipation. Thus, the predictions can be expected to hold—albeit more weakly—for any type of physician optimizing behavior such as utility maximization or target net income maintenance where decision-making is sensitive to income opportunities.[7] When the profit-maximization assumption is relaxed, however, the physician's tastes and attitudes presumably have some impact on the participation decision.

The only prior study of physician participation in Blue Shield Plans is by Sloan and Steinwald (1978). Studies of Medicare assignment have been carried out by Huang and Koropecky (1973), Muller and Otelsberg (1978), and Paringer (1979). The determinants of Medicaid assignment have been explored by Sloan, Cromwell, and Mitchell (1978), and Hadley (1978). Explicitly or implicitly, all of these studies have employed the Robinsonian model, and all have used four basic groups of variables to account for variation in physician participation/assignment rates: (1) measures of reimbursement practices such as allowance levels and the stringency of claims review; (2) proxies for the level of the short-run marginal cost function; (3) measures of factors influencing the position of the practice's nonparticipating/nonassignment demand function; and (4) physician characteristics representing tastes, and possibly costs, or the position of the nonparticipating/nonassignment demand function.

Because of differences in analytic units, samples, definitions of variables, and estimation procedures, it is difficult to summarize the results of these studies. However, the evidence tends on balance to confirm the validity of the Robinsonian model. It shows that:

(1) Carrier reimbursement practices have significant effects on participation/assignment rates. The rates appear to increase significantly with allowance levels [Sloan and Steinwald (1978), Sloan *et al.* (1978), Paringer (1979)], and proxies for the stringency of claims review have been found to be negatively correlated with Medicare assignment tendencies [Huang and Koropecky (1973), Muller and Otelsberg (1978)].

(2) High input prices (office wage rates) lower assignment rates [Hadley (1978), Sloan *et al.* (1978), Paringer (1979)], but have no clearcut effect on participation tendencies [Sloan and Steinwald (1978)]. No other surrogates for the level of marginal costs have been used.

(3) Certain proxies for strong nonparticipating/nonassignment demands such as high income population, large percentages of urban, white, and elderly residents, and low volumes of hospital outpatient visits *per capita* are negatively correlated with assignment rates

[6]The arguments here also apply to Medicare and Medicaid assignment. We do not claim that long-run average revenue is fixed on participating claims, since in UCR business the physician has the power to raise the next year's Level 1 screens by raising the current year's fee levels.

[7]In the case of target net income maintenance, the physician's participation decision should be responsive to income differentials between participating and not participating if realized net income falls below the target level. But even if realized net income equals or exceeds the target, it is probably unreasonable to assume that a physician declines the opportunity to raise his or her net income when the opportunity is obvious and easy to exploit.

[Huang and Koropecky (1973), Sloan *et al.* (1978)]. But participation rates were found to be positively correlated with population income by Sloan and Steinwald (1978), and observed relationships between participation/assignment rates and the number of physicians *per capita* are mixed.

(4) For physician traits, the strongest results indicate that non-board-certified physicians, foreign medical graduates (FMGs), young physicians, and physicians with liberal attitudes toward publicly sponsored health care have the highest participation/assignment rates [Sloan and Steinwald (1978), Sloan *et al.* (1978), Paringer (1979)].[8] Mixed results have been found with respect to relationships between participation/assignment rates and physician specialties.

Because of their bearing on this study, the institutional and theoretical sections of the Sloan and Steinwald study merit special consideration. Sloan and Steinwald described partial service policies as "the most prevalent (of Blue Shield policies) and full-service (UCR) the least prevalent." This was not the case with the two Plans investigated in this study. Plan A had no partial service business during the sample period. In Plan B, the dollar volume of UCR business exceeded that of its partial service business.[9]

The Robinsonian model used by Sloan and Steinwald is also not completely valid for the all-or-nothing participation decision faced by physicians in our two study plans.[10] The Robinsonian model permits the physician to vary his or her proportions of participating and nonparticipating outputs continuously—in effect, to participate on a claim-by-claim basis. In cases where the physician must decide whether to participate or (as in Medicaid) to accept assignment across the board, the correct model is a discrete optimization model. If the physician maximizes profit, he or she must compare the (expected) profitability of the participating (assignment) and nonparticipating (nonassignment) options and choose the option with the largest anticipated profit.

The elements of such a model are illustrated in Figures 1a and 1b. It is assumed here that there are two submarkets and that the physician does not discriminate in price if he or she chooses not to participate. (The argument is substantively the same if the physician does discriminate in price.) In Submarket 1, where the demand and marginal revenue functions are shown as the lines AB and AC respectively, the physician cannot participate. In Submarket 2, the physician may participate or not. If the physician does not participate in Submarket 2, the demand and marginal revenue functions have the positions DE and DF, respectively (Figure 1a). If the physician participates in this submarket, the demand function is the line segment DL shown in Figure 1b. Under the nonparticipating option shown in Figure 1a, the physician will choose the output OQ, where the combined marginal revenue from the two submarkets (given by a point on the line segment ARIJ) equals the marginal cost QS. The profit maximizing fee level in each submarket is OK, and the physician's total profit is the area NMLK. That is, unit profit is the fee level OK minus unit cost ON. Under the participating option shown in Figure 1b, the physician chooses the output OQ, the fee level OG in Submarket 1, and outputs of OF and FQ in Submarkets 1 and 2, respectively. Total profit in this case is the sum of the areas HIEG and IJKD. The physician will then elect to participate only if the area HIEG + IJKD equals or exceeds the area NMLK.

We omit the details because of space limitations, but it can be shown that the economic implications of the discrete model are generally much more indeterminate than those of the Robinsonian model. For example, in the Robinsonian model an outward shift in the nonparticipating demand function (that is, in the demand function for services on which the physician cannot participate) unambiguously lowers the profitability of participating and reduces the probability of participating. In the discrete model, the same type of shift raises the profitability of *both* the participating and nonparticipating options, and, on strictly logical grounds, it is not possible to tell which option becomes more profitable to the physician. Hence, the effect of the shift in the participation probability cannot be unambiguously predicted. As a basis for comparing the implications of the Robinsonian and discrete models, the theoretically predicted impacts of shifts in allowance levels and demand and cost functions on the participation probability are summarized in Table 1.

TABLE 1
Predicted Effects of Changes in Market Conditions on Participation Probabilities

	Predicted Effect on Participation Probability (+ increase, -: decrease, ?, indeterminate)	
Change in Market Conditions	Robinsonian Model	Discrete Model
Outward Shift in Demand Function in Nonparticipating Submarket	—	?
Outward Shift in Demand Function in Participating Submarket	—	—
Upward Shift in Marginal Cost Function	—	?
Increase in Allowances in Participating Submarket	+	+ (except in special cases)

[8]Sloan and Steinwald (1978) argued that FMGs (from non-white, non-English speaking countries) are of lower perceived quality than U.S. medical graduates, and Paringer (1979) claimed that FMGs have lower implicit wage rates than U.S. medical graduates. But whether country of medical graduation is a quality proxy or a labor cost proxy, its effect on the participation/assignment decision should be in the same direction.

[9]There are indications that the amounts of all Plans' partial service business declined substantially after 1968, the year of the data source on Blue Shield Plan characteristics used by Sloan and Steinwald.

[10]See the next section on this point.

FIGURE 1A
Nonparticipating Physician Pricing and Output Decisions

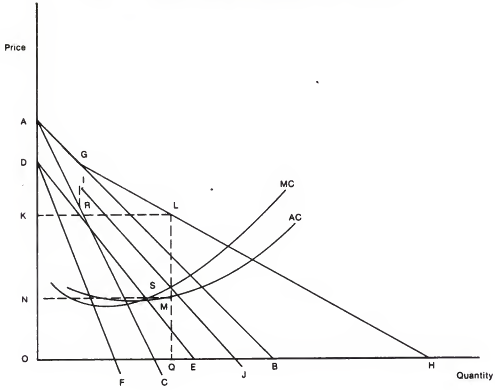
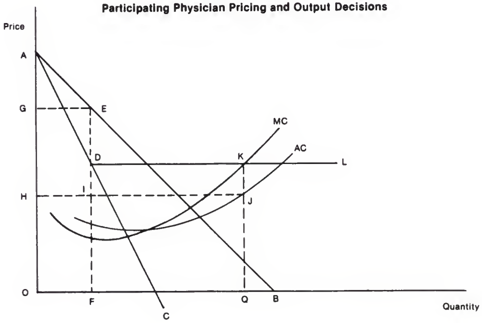


FIGURE 1B
Participating Physician Pricing and Output Decisions



The discrete model suggests further that the physician's participation decision will be less sensitive to shifts in any of these functions than the Robinsonian model implies. This is so because in the discrete model there must be a quantum change in the relative profitabilities of participating and not participating before the physician is led to switch from one option to the other. A consequence of this consideration is that when participation or assignment (as in Medicare) is on a claim-by-claim basis, participation/assignment decisions are more likely to be responsive to relatively small changes in Plan allowances and local market conditions than when participation/assignment is on an all-or-nothing basis.

The relative indeterminacy and lower sensitivity of all-or-nothing participation decisions to shifts in revenue and cost conditions do not lessen the importance of examining the decisions themselves. They merely emphasize that participation behavior must be determined empirically, and that it often cannot be predicted using *a priori* reasoning.

Data and Formulation of the Model

The data used in this study are the claims records of 942 physicians in Plan A and 928 physicians in Plan B covering the years 1973-1976. The records apply to approximately 60 high-use medical, surgical, and other procedures, and were provided by the Blue Shield Association. One of the two Plans is located on the East Coast. The other is located in the Midwest. Each physician in the sample practiced in the Plan's market area during the four years of the study period. The

The claims records contained the amounts charged by physicians and the amounts allowed and paid by the plan. They also contained the frequency with which each procedure was performed and certain additional claims data indicated in Table 2.[11] To derive a single measure of the physician's output, the procedure frequencies were converted into relative value units (RVUs) using the 1974 California Relative Value Scale. The number of RVUs was then aggregated for each physician and year, and mean charges and allowances per RVU were calculated for each physician and year. Finally, measures of RVUs were standardized across specialties in order to generate a common output index for all physicians.

The physician-specific claims data were merged with additional physician and county data taken from several sources. Physician characteristics such as age, sex, specialty, board certification status, country of medical graduation, etc., were derived from the American Medical Association's Masterfile of Physicians. County-level data describing local market conditions were drawn from the sources listed at the end of Table 2.

[11]"Special circumstance" claims where amounts allowed exceeded the scheduled or screen amounts were edited out of the data base due to obvious difficulties in analyzing the nature of conditions underlying the "special circumstances."

As already mentioned, the two study Plans formally offered participation agreements on an all-or-nothing basis. In Plan A the agreement applied only to UCR business. In Plan B a participating physician was required to participate in both UCR and partial service business, and he or she could not elect to participate in one of the two lines alone. Since partial service allowances were lower than UCR allowances in Plan B, it was predicted that they represent a stronger constraint on the Plan B physician's participation decision than UCR allowance levels.[12]

In modeling tne participation decision, it was assumed that, at the start of each year, the physician faces the discrete optimization problem previously described. Having chosen the alternative yielding the largest anticipated profit or net income, the physician then participates or does not participate in all applicable private business during the year. Accordingly, we estimated the probability that the physician participates in year t as a function of allowance levels and other reimbursement variables, proxies for level of his or her short-run marginal cost function, proxies for the position of the demand function in the nonparticipating segment of his or her market, and a group of physician and patient-mix variables.

Five groups of explanatory variables were selected for this study from among those justified in the foregoing section. The variables are defined in Table 2.

[12]Despite the all-or-nothing nature of the two participation agreements, the data indicated that some physicians in each Plan had both participating and nonparticipating claims in each of the sample years. Those physicians with both types of claims had predominantly one or the other, and there may have been several reasons such as switches in participation status or Plan coding errors that account for inconsistency between the data and the formal participation agreements. In addition, each Plan allowed participating physicians to bill their patients. In Plan B, when a patient who had been billed by a participating physician submitted a claim for reimbursement, he or she was informed of his or her payment liability—that is, that the physician was entitled to no more than the difference between the amount allowed and the amount paid by the Plan. A patient billed by a participating physician in Plan A was not informed of his or her payment liability except upon specific request. Hence, it was technically possible for physicians in Plan A to participate but to be reimbursed on some claims as if they were nonparticipating and, in effect, to participate on a claim-by-claim basis.

To generate participation data that were compatible with the Plans' participation agreements, physicians in both Plans were initially defined as participating if more than 5 percent of their RVUs in private business were provided on a participating basis. To allow for the possibility of *de facto* claim-by-claim participation in Plan A, a participation rate was defined as the ratio of RVUs provided on a participating basis to the total number of RVUs in private business recorded for the physician. This participation rate definition yielded empirical results which were almost identical to those derived from the first definition.

TABLE 2
List and Definitions of Variables

Variable	Definition[1]
	Dependent Variable
$PART_t$	Dummy variable = 1 if the physician participated in year t (P,C)
	Explanatory Variables
AGE	Physician's age in 1979 (P,A)
AMASEX	Dummy variable = 1 if the physician is female (P,A)
$APRVU1_t$	Amount allowed per RVU (in dollars) in UCR business in year t (P,C)
$APRVU5_t$	Amount allowed per RVU (in dollars) in partial service business in year t (P,C)
BORDCERT	Dummy variable = 1 if the physician was board certified in 1977 (P,A)
$CPRVU_t$	Amount charged per RVU (in dollars) in all private business lines in year t (P,C)
$DOCPRCAP_t$	Number of non-Federal physicians *per capita* in physician's county in year t (M,D)
$ENRBPRCAP_t$	Fraction of county population enrolled in Medicare Part B in year t (M,H)
FMG	Dummy variable = 1 if the physician was a foreign medical graduate (P,A)
GROUP	Dummy variable = 1 if the physician practiced in a group in 1977 (P,A)
IM	Dummy variable = 1 if the physician was an internist (P,A)
$INPAHOSP_t$	Fraction of the physician's RVUs in private business provided in hospitals in year t (P,C)
$INPERCAP_t$	*Per capita* income in the physician's county in year t (C,D)
$LAGPRCLM_t$	Average number of days between claim filing and claim payment in private business in year t (P,C)
OTHER—EM	Dummy variable = 1 if the physician practiced in a hospital or other institutional setting in 1977 (P,A)
OTHRSPEC	Dummy variable = 1 if the physician had a nonprimary care specialty (P,A)
$OUTPPRCP_t$	Number of hospital outpatient visits *per capita* in physician's county in year t (C,H,D)
PARTNER	Dummy variable = 1 if the physician practiced in a partnership in 1977 (P,A)
PD—	Dummy variable = if the physician was a pediatrician (P,A)
PRCT—URB	Percentage (X 10) of residents in county living in urban areas (C,H)
$RVU1_t$	Number of RVUs provided in UCR business in year t (P,C)
$RVU5_t$	Number of RVUs provided in partial service business in year t (P,C)
TIME74	Dummy variable = 1 if year of observation was 1974
TIME75	Dummy variable = 1 if year of observation was 1975
TIME76	Dummy variable = 1 if year of observation was 1976
$WAGEINDX_t$	Average payroll per employee in physicians' offices in year t (C,B)

[1]The first letter in parentheses following the variable definition indicates the unit to which the variable applies, where P denotes the physician and C denotes the physician's county. The second letter denotes the source of data. The sources are as follows:

A: American Medical Association, *Masterfile of Physicians*, 1977.

B: U.S. Bureau of the Census, *County Business Patterns*, annual.

C: Plan claims records.

D: American Medical Association, *Physician Distribution and Medical Licensure in the U.S.*, annual.

H; Manpower Analysis Branch, Health Resources Administration, U.S. Department of Health, Education, and Welfare, *Area Resources File, 1978*.

The first group consists of six reimbursement, pricing, and output variables. APRVU1 and APRVU5 denote the dollar amounts allowed per RVU in UCR and partial service business (that is, the fee screen or fee schedule amounts set by the Plans), respectively. Both allowances were predicted to be positively correlated with the participation probability. In Plan B the partial service allowance averaged about 55 percent of the UCR allowance during the four-year sample period. Hence it was expected to have a somewhat stronger impact on the participation probability than the UCR allowance level. In Plan A, where there were no partial service allowances, it was expected that the UCR allowance would have a stronger quantitative influence on the participation probability than the UCR allowance in Plan B.

LAGPRCLM signifies the average number of days between filing a claim and receipt of reimbursement from the Plan. Long payment lags increase the practice's accounts receivable, raise its interest costs, and shift its marginal cost function upward.[13] CPRVU stands for the average amount charged by the physician in private business. A single measure of average amount charged was used because variation in charges across the private business lines was negligible.[14] Other things being equal, it was assumed that to the extent practice costs (and quality) are correlated with charges, high-priced physicians would tend to have high unit and marginal costs and to face strong demands for services produced on a nonparticipating basis.[15]

The fraction of the physician's total number of RVUs provided to hospital inpatients (INPAHOSP) was taken as proxy for the level of marginal costs and the average size of claims representing, in turn, the risk of bad debt on nonparticipating services. Large values of INPAHOSP should imply low marginal costs and a high cost of bad debt on nonparticipating claims. It was further conjectured that large outputs of UCR and partial service RVUs (RVU1 and RVU5) increase the physician's sensitivity to anticipated profit differentials between participating and not participating (Paringer, 1979). This conjecture is explored further in the following section.

The second group of explanatory variables consisted of a measure of physicians' office wage rates (WAGEINDX) and type-of-practice dummies reflecting possible economies of large scale. Large values of WAGEINDX imply a relatively high level of production costs. Dummies indicating solo practice and practice in expense-sharing arrangements were deleted, so if there are important economies of scale, group practice (GROUP) and partnership practice (PARTNER) should denote relatively lower levels of unit costs. Practice in hospitals and other institutional settings (OTHER—EM) indicates a low level of non-physician expenses and should also denote a relatively lower level of unit production costs.

The third group of explanatory variables is comprised of several county-level proxies for the position of the average revenue functions in the nonparticipating submarkets and in the participating submarket when the physician does not participate. They include *per capita* income (INPERCAP), the fraction of the county population enrolled in Medicare Part B (ENRBPRCP), the percentage of county residents living in urban areas (PRCT-URB), the number of physicians *per capita* (DOCPRCAP), and the number of hospital outpatient visits *per capita* (OUTPPRCP). Increases in the values of each of the first three of these variables were assumed to signify outward shifts in the average revenue functions. Increases in the values of the last two were assumed to denote backward shifts—since they should be associated with fewer patients and/or diminished quantities demanded per physician.[16]

The fourth group of variables is made up of physician characteristics. Medical graduation in a foreign country (FMG) and board certification (BORDCERT) were taken as proxies for the perceived quality of the physician's services and/or the level of production costs. In the first sense, they stand for the positions of average revenue functions with respect to all nonparticipating services, and, in the second, they stand for the position of the physician's cost function. No hypotheses were proposed with respect to the effects of physician age (AGE) and sex (AMASEX) on the participation decision. Although physician age has generally been found to be negatively correlated with assignment rates, it may capture the influence of the physician's tastes, the perceived quality of his/her services, and the size of his/her nonparticipating and nonsubscribing clienteles. Thus, it was unclear on *a priori* grounds how age would be related to the participation probability, and similar comments apply with respect to the physician's sex.[17]

Specialty dummies denoting practice in internal medicine (IM), pediatrics (PD-), and the non-primary care fields (OTHRSPEC) were defined chiefly to reflect differences in participation propensities between the primary care and non-primary care fields. The general and family practice dummy was deleted. Although demands in the nonparticipating markets may differ between primary care and referral practitioners, there

[13]On nonparticipating claims the payment lag applies to the subscriber's claims. Lacking evidence to the contrary, we assumed that the payment lag incurred by the subscriber would have been incurred by the physician if the claim were submitted on a participating basis. If the assumption is not correct, it would tend to obscure the payment lag/participation probability relationship.

[14]Strictly speaking, the current average charge level is endogenous, but to have used the one-year lagged charge instead would have necessitated dropping the initial year's data. For this reason—and the fact that current and one-year lagged charges were highly correlated—the current charge level was retained.

[15]Paringer (1979) reported a significantly negative partial correlation between the physician's charge level and his or her willingness to accept Medicare assignment.

[16]All five of the variables were moderately to highly intercorrelated. Also, in Plan A the office wage proxy (a county-level variable) was almost perfectly correlated with county *per capita* income. No other county socioeconomic variables were entered into the regression equations because of the high degree of multi-collinearity.

[17]Other variables such as the holding of medical school appointments and proxies for the physician's race and medical school research orientation were considered as well. However, none of the sample physicians held faculty appointments, and the use of race and research orientation proxies led to large numbers of missing or unreliable observations. Consequently, these variables were omitted.

were no obvious hypotheses concerning a systematic relationship between specialty and participation status.

The final group of explanatory variables consists of three time dummies signifying the years of observation 1974 (TIME74), 1975 (TIME75), and 1976 (TIME76). The 1973 dummy was deleted. The variables were included as proxies for time-related events such as changes in reimbursement policies which might affect participation decisions but which could not be directly observed.

Findings

With the physician designated as the analytic unit, the participation probability was specified as a regression function of the explanatory variables listed in Table 2 and estimated from the combined cross-sectional and time-series sample of physician and county data.[18] Regressions were estimated separately using single-equation ordinary least squares (OLS), single-equation logit, and two-stage least squares (TSLS) applied to a simultaneous system.[19] All three sets of estimates were closely similar, and the TSLS estimates, which are not shown, were nearly identical to the OLS estimates—indicating that simultaneity is a negligible source of bias in the single-equation regressions. For comparative purposes the OLS and logit estimates of the participation probability are shown in Tables 3 and 4, respectively.

The results strongly confirm the role of allowances, charges, reimbursement lags, and, in general, the relative income opportunities of participating and not participating, in the physician's participation decision. Coefficients on the allowance variables all had the expected signs and, with one exception, all were significant (well below the 5 percent level). Moreover, as anticipated, the UCR allowance had a much stronger influence on the participation probability in Plan A (both quantitatively and in terms of statistical significance) than in Plan B. And in Plan B, the partial service allowance had a considerably stronger influence on the participation probability than the UCR allowance.

The elasticities of the probability of participating with respect to allowances, estimated from the OLS regressions at sample means, are: .838 for Plan A's UCR allowance; .095 for Plan B's UCR allowance; and .205 for Plan B's partial service allowance.[20] By way of contrast, Sloan and Steinwald (1978) estimated the elasticity of the participation probability with respect to (a proxy measure of partial service) allowances at approximately .10.[21]

The remaining results are rather more mixed. Six cost-related variables were used in the regressions—WAGEINDX, LAGPRCLM, INPAHOSP, GROUP, PARTNER, and OTHER-EM. Large values of the first two signify high unit and marginal costs under the hypotheses given in the preceding section. Thus, if upward shifts in the practice's average and marginal cost functions reduce participation probabilities, WAGEINDX and LAGPRCLM should be negatively related to the participation probability, and the remaining four variables should be positively related to it. The signs of the coefficients on LAGPRCLM, INPAHOSP, PARTNER, and OTHER-EM were consistent with this interpretation, although the coefficients themselves were not uniformly significant. The signs of the coefficients on WAGEINDX and GROUP either varied between Plan samples or else were not consistent with the prediction. Thus, although there were some indications that participation rates fall with increasing unit or marginal costs, the results were not systematic.

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[18]Two data editing steps were taken before estimating the regressions. First, observations defined by physician and year were deleted when charges equaled allowances. This was done because, as mentioned, the amount allowed by the Plan cannot exceed charges. Therefore, the fee screen or fee schedule amounts were not observable in those instances in which reported allowances were equal to charges (that is, the difference between the fee screen or fee schedule amounts and charges could not be determined when charges were less than or equal to the former amounts). Since the correct exogenous reimbursement variables are the fee screen or fee schedule amounts, it was necessary to restrict the samples to cases where they were observable. The deletions removed 26 percent of the observations from the Plan A sample and 11 percent of the observations from the Plan B sample.

Second, physicians with no UCR business were deleted from both samples because there were no reliable ways of estimating their missing UCR allowances. In Plan B, physicians having UCR claims but no partial service claims were retained, and their partial service allowances were estimated as the sample mean allowances for partial service business as a whole. Since partial service allowances are determined by fixed fee schedules (when they are less than amounts charged), it was felt that this procedure generated reasonably accurate proxies for the unobserved allowances.

Due to the two editing steps and the fact that some physicians had no recorded sample claims in one or more of the study years, the number of physicians appearing in each of the samples varied from year to year. In the Plan A sample, the number of physicians averaged about 725 per year. In the Plan B sample, the average number was about 750 per year.

[19]In the simultaneous equation system, the participation probability, current charge per RVU, current output(s) of RVUs, and the current allowance(s) per RVU were specified as endogenous.

[20]The exceptionally high sensitivity of the Plan A participation probability to allowances may be partly due to the relatively low overall rate of participation in that Plan. An average of only 74 percent of the Plan A physicians in the regression sample participated in one or more years of the study period, as opposed to an average of 88 percent of the physicians in Plan B. As the number of physicians motivated to enter participation agreements increases, one would tend to expect the remaining nonparticipants to be those who are least responsive to additional income incentives.

[21]We have suggested that all-or-nothing participation decisions ought to be less sensitive to changes in allowance levels than the claim-by-claim type decisions examined by Sloan and Steinwald. While the figures cited here indicate the contrary, the two studies are not strictly comparable. Aside from differences between our selection of explanatory variables and those chosen by Sloan and Steinwald, we were able to use exact measures of physicians' allowances and Sloan and Steinwald were not. It is hard to say whether Sloan and Steinwald underestimated the sensitivity of participation to allowances due to their allowance proxy, but additional empirical evidence on the sensitivity issue is clearly desirable in view of differences in our results.

TABLE 3
OLS Estimates of the Probability of Participating in Private Business

	Plan A		Plan B	
Variable	Parameter Estimate	t-ratio	Parameter Estimate	t-ratio
INTERCEPT	2.737**	3.90	1.201**	9.17
APRVU	.279**	6.98	—	—
APRVU1	—	—	.039*	2.10
APRVU5	—	—	.140**	7.01
CPRVU	-.261**	-9.25	-.057**	-4.49
RVU/1000	-.001	-.14	—	—
RVU1/1000	—	—	.004	1.01
RVU5/1000	—	—	.001	.17
LAGPRCLM	-.001**	-4.18	-.0005*	-2.49
AGE	.003**	3.65	-.002**	-2.67
AMASEX	.102*	2.56	.035	1.15
BORDCERT	-.061**	-3.01	-.064**	-4.98
FMG	.138**	6.60	.061**	4.27
GROUP	-.104**	-4.82	-.096**	-3.91
PARTNER	.092**	3.77	.007	.43
OTHER—EM	.121**	3.93	.045*	2.26
PD—	.118**	2.68	.106**	3.62
IM	-.128**	-3.16	-.094**	-3.51
OTHRSPEC	.005	.16	-.006	-.27
INPAHOSP	.023	.98	.051*	2.27
WAGEINDX	.002	.16	-.019**	-4.60
DOCPRCAP	159.776	1.12	-5.000	-.37
OUTPPRCP	.284	1.24	-.00008	-.005
INPERCAP	-.0005**	-2.83	-.00006*	-2.38
ENRBPRCP	-5.341**	-3.45	-.734	-1.49
PRCT—URB	-.00005	-.42	.0002**	3.78
TIME 74	.175	1.77	.084**	3.14
TIME 75	.159	1.33	.100**	3.18
TIME 76	.463*	2.01	.197**	3.77
DFE	2416		2984	
SSE	383.99		285.96	
MSE	.16		.10	
F	21.87		11.83	
Prob > F	.0001		.0001	
R^2	.18		.09	

One and two asterisks denote coefficients significantly different from zero at the 5 percent and 1 percent levels respectively (two-tailed tests). Because of heteroscedasticty, the t-ratios may be biased. However, any such bias appears to be minimal as the OLS-reported t-ratios here closely approximate the Logit model asymptotic t-ratios in Table 4.

TABLE 4
Logit Estimates of the Probability of Participating in Private Business

Variable	Plan A Parameter Estimate	Plan A Asymptotic t	Plan B Parameter Estimate	Plan B Asymptotic t
INTERCEPT	16.27**	3.21	5.726**	3.81
APRVU	1.749**	6.16	—	—
APRVU1	—	—	.360	1.95
APRVU5	—	—	1.497**	6.51
CPRVU	-1.597**	-7.71	-.466**	-4.22
RVU/1000	-.009	-.32	—	—
RVU1/1000	—	—	.038	.81
RVU5/1000	—	—	.008	.11
LAGPRCLM	-.006**	-4.01	-.005**	-2.77
AGE	.021**	3.64	-.014*	-2.23
AMASEX	.970**	2.72	1.401	1.89
BORDCERT	-.327*	-2.48	-.620**	-4.33
FMG	.989**	6.70	.845**	4.74
GROUP	-.577**	-4.56	-.768**	-3.66
PARTNER	.593**	3.50	.055	.32
OTHER—EM	.772**	3.53	.703*	2.57
PD—	.689*	2.14	2.531**	3.93
IM	-.829**	-3.08	-.969**	-3.31
OTHRSPEC	-.055	-.22	-.128	-.48
INPAHOSP	.141	.95	.415	1.77
WAGEINDX	.130	1.27	-.201**	-4.66
DOCPRCAP	-94.69	-.09	177.3	1.33
OUTPPRCP	4.618*	2.40	.207	1.24
INPERCAP	-.004**	-3.21	-.0007*	-2.54
ENRBPRCP	-44.97**	-3.30	-10.78	1.92
PRCT—URB	-.00008	-.11	.0008*	1.98
TIME 74	.476	.53	.861**	2.90
TIME 75	.062	.06	1.001**	2.91
TIME 76	2.333	1.21	2.013**	3.55
	At Convergence	At Zero	At Convergence	At Zero
Log Likelihood	-1177	-1729	-972	-2142
Sum of Squared Res.	2579	2494	2971	3089
DFE	2470	2495	3063	3090
% Correctly Predicted	77.5	50.0	88.3	50.0
Likelihood Ratio Index (About Zero)	.320		.546	
Likelihood Ratio Statistic (About Zero)	1106		2338	

One and two asterisks denote coefficients significantly different from zero at the 5 percent and 1 percent levels respectively (two-tailed tests).

The effects of the county-level proxies for the positions of physicians' average revenue functions for nonparticipating services were also somewhat mixed. *Per capita* income and the fraction of the county population enrolled in Medicare Part B were negatively correlated with the participation probability. These results suggest that the relative profitability of participating is reduced by outward shifts in the average revenue functions for services on which physicians do not participate. However, the same line of reasoning would suggest that the coefficients on PRCT-URB should have been negative, and those on DOCPRCAP and OUTPPRCP should have been positive. But there were no systematic patterns in the signs of the coefficients on these three variables. Hence, the evidence is not conclusive that shifts in the nonparticipating average revenue functions influence participation probabilities.

The surrogates for physician quality—FMG, BORDCERT, and CPRVU—entered the regressions highly significantly and with the same signs for each Plan sample. The findings here show unambiguously that "high-quality" physicians have materially lower participation rates than "low-quality" physicians. In terms of the theoretical model, they indicate that "high-quality" physicians face relatively large demands for services produced on a nonparticipating basis and have commensurately weak income incentives to enter into participation agreements where average revenues are lower.

The relationships between the participation probability and physicians' personal characteristics varied between Plans. In each Plan female physicians were more likely to participate than males, but the physician's age had no systematic relationship with the participation probability. In Plan A the participation probability rose significantly with the physician's age, but in Plan B the probability declined significantly with age. As a group, primary care practitioners seemed about as likely to participate as referral specialists (OTHRSPEC), but there were marked differences in participation probabilities within the primary care fields. General and family practitioners had about the same participation rates as referral specialists, but pediatricians in both Plans were significantly more likely to participate than general and family practitioners, and internists were significantly less likely to do so.

The time dummies indicate similar patterns of autonomous shifts in the participation probabilities in the two Plans over the four-year study period. In particular, the probabilities rose significantly in 1973-1974, remained stable during 1974-1975, and rose significantly again in 1975-1976. Although neither of the two Plans imposed constraints on physicians' allowances during the Economic Stabilization Program, the common pattern of shifts in the participation probability suggests a common cause. One possibility is the restrictions on Medicare allowances in effect during 1973-1974 and again after 1975. Restrictions on Medicare allowances may have reduced the average revenue on Medicare services sufficiently during 1973-1974 and 1975-1976 to make Medicare business relatively less profitable during those years. Such an effect would shift the average revenue function in the nonparticipating segment of the physician's market inward and could have increased the physician's incentives to participate in private business. Unfortunately, we were unable to explore this possibility with the data available to us, but it appears to deserve further research attention.

The volumes of the physician's outputs in UCR and partial service business had no significant impacts on participation probabilities, and none was initially predicted. However, following Paringer's (1979) study of Medicare assignment, where the hypothesis was first put forward, we conjectured that the responsiveness of physicians' participation decisions to participating/nonparticipating net income differentials would increase as the volumes of participation-eligible business increase.

While there are other ways of testing this conjecture, we attempted to replicate the approach used by Paringer. Both samples were stratified into terciles by the combined outputs of UCR and partial service business, and the single-equation version of the participation probability was re-estimated for each of the resulting subsamples. Because of the close similarity of the OLS and logit estimates for the full samples, the subsample regressions were estimated using only OLS. The results are shown in Tables 5 and 6. If Paringer's hypothesis is correct, the absolute values and t-statistics of coefficients on all explanatory variables measuring the relative income opportunities of participation and nonparticipation should increase monotonically with output levels in private business where the physician is eligible to participate.

TABLE 5
OLS Estimates of the Probability of Participating in Private Business for Sample Stratified by Physician Output: Plan A

	First Tercile		Second Tercile		Third Tercile	
Variable	Parameter Estimate	t-ratio	Parameter Estimate	t-ratio	Parameter Estimate	t-ratio
INTERCEPT	3.218*	2.56	2.563*	2.05	2.488*	2.00
APRVU	.144**	3.01	.411**	4.03	.726**	6.59
CPRVU	-.171**	-5.14	-.400**	-5.24	-.550**	-6.90
LAGPRCLM	-.001**	-3.27	-.001	-1.79	-.0002	-.39
AGE	.005**	3.16	.003*	2.15	.001	.55
AMASEX	.119*	2.09	.140	1.95	.063	.74
BORDCERT	-.100**	-2.83	-.099**	-2.88	.004	.11
FMG	.091*	2.50	.132**	3.68	.165**	4.55
GROUP	-.204**	-5.39	-.138**	-3.63	.032	.84
PARTNER	.139**	3.09	.037	.83	.095*	2.46
OTHER—EM	.121**	2.63	.086	1.52	.201**	3.05
PD—	.243**	3.67	.086	1.01	-.055	-.48
IM	.036	.53	-.027	-.40	-.351**	-4.65
OTHRSPEC	.112	1.94	.021	.37	-.088	-1.36
INPAHOSP	-.034	-.95	.086	1.89	.130**	2.65
WAGEINDX	.029	1.39	-.017	-.77	-.006	-.23
DOCPRCAP	198.520	.78	126.831	.50	205.131	.81
OUTPPRCP	.246	.58	.480	1.20	.063	.16
INPERCAP	-.001*	-2.06	-.0003	-1.15	-.001	-1.76
ENRBPRCP	-6.247*	-2.21	-7.613**	-2.69	-3.884	-1.46
PRCT—URB	-.0002	-1.07	-.0002	-1.17	.0003	1.85
TIME74	.086	.46	.216	1.24	.233	1.39
TIME75	-.011	-.05	.272	1.31	.232	1.10
TIME76	.359	.81	.479	1.17	.634	1.65
DFE	784		791		794	
SSE	119.16		125.93		119.84	
MSE	.15		.16		.15	
F	11.18		8.96		8.71	
PROB>F	.0001		.0001		.0001	
R^2	.25		.21		.20	

One and two asterisks denote coefficients significantly different from zero at the 5 percent and 1 percent levels respectively (two-tailed tests).

TABLE 6
OLS Estimates of the Probability of Participating in Private Business for Sample Stratified by Physician Output: Plan B

	First Tercile		Second Tercile		Third Tercile	
Variable	Parameter Estimate	t-ratio	Parameter Estimate	t-ratio	Parameter Estimate	t-ratio
INTERCEPT	.966**	4.44	1.119**	5.28	1.650**	5.86
APRVU1	.029	1.30	.125**	2.66	.040	.73
APRVU5	.079**	2.59	.194**	5.39	.156**	3.69
CPRVU	-.047**	-3.22	-.155**	-4.24	-.038	-.95
LAGPRCLM	-.0001	-.39	-.001*	-2.20	-.001**	-2.70
AGE	-.003**	-2.65	-.002	-1.85	.001	.71
AMASEX	-.014	-.32	.058	.99	.059	.91
BORDCERT	-.062**	-2.74	-.072**	-3.22	-.054*	-2.40
FMG	.064*	2.32	.101**	4.38	.017	.66
GROUP	-.031	-.65	-.131**	-3.51	-.108*	-2.37
PARTNER	-.017	-.60	.008	.28	.040	1.29
OTHER—EM	.043	1.41	.006	.16	.100*	2.50
PD—	.092*	2.36	.079	1.50	.186	1.47
IM	-.138**	-3.49	-.132**	-2.95	.065	.59
OTHRSPEC	.005	.15	-.031	-.77	.048	.45
INPAHOSP	.055	1.73	.045	1.04	.127*	2.44
WAGEINDX	-.010	-1.48	-.023**	-3.58	-.024**	-2.97
DOCPRCAP	.184	.01	-13.842	-.63	.246	.01
OUTPPRCP	-.005	-.19	-.022	-.82	.053	1.61
INPERCAP	.00002	.36	-.00004	-.90	-.0002**	-4.54
ENRBPRCP	-.224	-.27	-.316	-.39	-1.430	-1.55
PRCT—URB	.0001	1.33	.0003**	3.81	.0001	1.24
TIME74	.016	.32	.100*	2.31	.162**	3.19
TIME75	.019	.34	.134**	2.70	.174**	2.88
TIME76	.037	.43	.238**	2.88	.429**	3.99
DFE	977		980		979	
SSE	93.08		91.98		90.19	
MSE	.10		.09		.09	
F	4.49		9.08		4.22	
PROB>F	.0001		.0001		.0001	
R^2	.10		.18		.09	

One and two asterisks denote coefficients significantly different from zero at the 5 percent and 1 percent levels respectively (two-tailed tests).

The findings give qualified support to Paringer's hypothesis. None of the variable coefficients behaved strictly as the hypothesis predicts, but in Plan A the sensitivity of the participation probability to changes in allowance and charge levels increased dramatically with the physician's output of UCR services. Indeed, the elasticity of the participation probability with respect to allowances, shown in Table 7, rose five-fold from the first to the third output terciles. The same type of pattern emerged in Plan B for the first and second output terciles—and for the first and third as well—but not for the second and third.

TABLE 7
Elasticities of the Participation Probability with Respect to Allowances Evaluated at Output Tercile Means

Plan/ Line of Business	Output Tercile First	Second	Third
Plan A			
UCR	.443	1.214	2.173
Plan B			
UCR	.072	.308	.095
Partial Service	.126	.290	.203

Despite ambivalences in the evidence, it seems reasonable to conclude that there were interactions between physicians' participation decisions and the volumes of their participation-eligible business. This, of course, is to say no more than that a physician is likely to react to relative income opportunities more strongly when the amount of business affected by his or her decision is large than when it is small.

Conclusion

The physician participation agreements offered by the two study Plans were of the all-or-nothing type. Theoretically, the effects of physician, practice, and local market characteristics on participation decisions under this type of agreement have a high degree of uncertainty. Except for the impacts of allowance levels, it is consequently difficult to argue that any particular group of characteristics will affect participation decisions in the same way regardless of the makeup of the physician population. This is not to say that examining all-or-nothing participation choices is irrelevant for policy purposes, but rather that the policy implications ought to be based on empirical observation.

Although the participation agreements offered by the two study Plans have close parallels only in the present form of Medicaid assignment, we believe the results have several important applications to all forms of government reimbursement policy for physicians.

First, insofar as board certification, graduation from a U.S. medical school, and high charge levels are proxies for physician quality, the evidence clearly indicates that high-quality physicians are weakly attracted into participation agreements. Since the lower income portions of the population are precisely those served by—or with the strongest incentives to visit—participating and assignment physicians, it seems evident that the insitutions of assignment and participation tend to yield a relatively low quality of care to low income consumers. This conclusion should not be overemphasized, and, as Sloan and Steinwald (1978) have pointed out, it is probably an inevitable concommitant of any effort to constrain physicians' average revenues which leaves the practitioner free to reject the program. It can also be argued that providing *some* type of physicians' care to low income patients is preferable to offering little or none at all. Nevertheless, the issue of controlling health care costs versus maintaining health care quality is one which policymakers must continue to confront.

Second, the finding that allowance levels exert a moderate to strong influence on the decision to enter into a participation agreement highlights a fundamental problem in physician reimbursement. Inducing physicians to participate or to accept assignment and imposing constraints on their allowances is the cornerstone of current private and government reimbursement policy toward physicians. Yet the evidence shows that raising allowance levels is arguably the only significant policy tool for increasing participation/assignment rates. And at some point, the costs to the public of increasing physicians' allowances offset the savings due to controls on allowance levels. It is therefore reasonable to ask whether attempting to promote a 100 percent participation or assignment rate—or perhaps even a rate close to 100 percent—is necessarily a cost-effective method of paying for society's medical care.

Third, some of our results suggest that Blue Shield participation rates are adversely affected when physicians' income opportunities in the Medicare program are raised. Accordingly, it is reasonable to suppose that Medicare and Medicaid assignment is also adversely affected when physicians' income opportunities in Blue Shield Plans' and other carriers' private business are raised. If the supposition is correct, one can expect downward trends in Medicare and Medicaid assignment under any circumstances that lower physicians' income opportunities from these sources (such as new controls on Medicare or Medicaid allowances) relative to those from carriers' private business. The degree to which cost controls on government-and-privately-financed physicians' services interact in physicians' pricing and output decisions has not been systematically explored, and we were not able to investigate the issue here. It is another area deserving increased attention by policymakers and administrators.

Finally, some authorities have proposed that Medicare assignment be changed from its current claim-by-claim basis to an all-or-nothing system in order to strengthen the controls on Medicare costs. It has also been suggested that Medicaid and Medicare assignment be tied together as a means of increasing the number of physicians who provide Medicaid services.

The essential question in the first proposal is whether changing the form of Medicare assignment will, in fact, increase the rate of Medicare assignment. On this point the present study has relatively little empirical evidence to offer. Ideally, it would be necessary to compare the determinants of Medicare assignment with those of all-or-nothing participation among the same group of physicians—or among different physician samples with proper standardization. We were not able to conduct such analyses with the data available to us. However, as has been explained, participating physicians in Plan A whose patients submitted the claims were not effectively limited by the participation agreement to accepting amounts allowed as full payment. Thus, in effect, they could participate on a case-by-case basis. However, the regressions based on proportions of RVUs participating were virtually identical to those using a dummy variable for participation. This might indicate either a strong predisposition not to bend the rules or it could suggest that all-or-nothing participation is not much different from case-by-case participation in terms of the physician's decision to participate.

With respect to tying Medicare and Medicaid assignment together, the study's findings do shed light on the consequences one might expect for the joint assignment rate. In Plan B, physicians were allowed to participate only if they agreed to participate in high-allowance (UCR) and low-allowance (partial service) business. Although the average participation rate was considerably higher in Plan B than in Plan A, where only high-allowance (UCR) participation agreements were offered, it is obviously not possible to attribute this difference to a single characteristic of the two participation agreements. Indeed, in Plan B the participation probability behaved as one would theoretically predict. Participation probabilities varied significantly with allowance levels in both high-allowance and low-allowance business, but they were generally much more sensitive to reimbursement levels in the former than the latter.

Applying these results to a joint, all-or-nothing system of Medicare and Medicaid assignment, it is reasonable to believe that low Medicaid allowances would dominate high Medicare allowances in physicians' assignment decisions. Accordingly, the most likely effect of joint assignment should be an overall assignment rate between the current Medicare and Medicaid rates, and perhaps closer to the latter than the former. Joint assignment should therefore increase access to physicians' services by Medicaid eligibles, but it should also lower the portion of Medicare services subject to allowance controls on expenditures.

This study does not point the way to a magic solution for controlling the costs of physicians' care. Instead, it emphasizes the tradeoffs between cost-containment on the one hand, and maintaining the quality and accessibility of physicians' care or the market freedom of consumers and providers on the other. Since it is increasingly doubtful that a magic solution exists, the time is right for reimbursement policymakers to recognize the tradeoffs and to base their calculations on them.

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Special Report

Physician pricing and health insurance reimbursement

by Donald E. Yett, William Der,
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This study was based on physician claims records from three Blue Shield Plans. The principal results are:

- Physicians are income-motivated. This means that income incentives can be incorporated into reimbursement systems to achieve specific ends, and that care should be taken to assure that new mechanisms do not create income incentives for physicians to act contrary to policy objectives.
- Physician pricing is reasonably competitive.
- Physicians do not discriminate in price in their private lines of business, but they appear to discriminate between Medicare and the private lines. Allowance caps in the minor lines of business have no appreciable impact on charge levels or the rate of charge inflation.
- The Economic Stabilization Program significantly slowed the growth rate of Medicare charges, but had no discernible effect on the inflation rate of private charges. This indicates that allowance controls applied to a large part, but not all, of physicians' business induce physicians to "shift costs" against patients insured by programs where allowances are not controlled.
- The tests conducted indicate that pursuit of a target net income is not a pervasive characteristic of physicians' economic goal behavior. Therefore, reimbursement controls on utilization to counteract demand inducement are not justified at this time. However, in view of the large increase in physician supply expected over the next decade, the issue of demand inducement merits continued monitoring.
- Physicians are significantly more likely to participate in Plans' eligible business when allowances are high rather than low. Physicians of low-perceived quality are also significantly more likely to participate than physicians of high-perceived quality. Since increases in allowances raise insurance benefit costs, it follows that increasing access to care by promoting participation exacerbates cost inflation.

The study's principal policy implications are:

- Private carriers and government should decide on a uniform means of reimbursing physicians to restrain charge inflation and to discourage cost-shifting.
- Reimbursement systems less inflationary than the fee-screen method should be encouraged or adopted.
- Utilization controls for physicians' services are not warranted at present.
- Cost containment efforts are likely to reduce access to care (by reducing physician assignment rates) for persons that government health insurance programs were most intended to serve.

Introduction

Spending on physicians' services currently represents one-fifth of total national health care expenditures. From 1965 through 1981, expenditures on physicians' services grew at an average annual rate of 12.4 percent, and even larger increases were experienced by the Medicare and Medicaid programs. By contrast, gross national product grew at an average annual rate of 9.4 percent over the same period. From 1965 through 1981, the Consumers' Price Index (CPI) component for physicians' fees rose by 7.9 percent per year, a rate 17 percent higher than the CPI as a whole. In 1981, total national expenditures on physicians' services reached $54.8 billion, and the costs to government of physicians' services under Medicare and Medicaid were $9.6 billion and $2.8 billion respectively.

Against this background of expenditure and fee inflation, government reimbursement policy for physicians' services under Medicare and Medicaid has focused on three major issues: (1) containing the level and growth rate of spending; (2) maintaining access to care by the aged and needy who are served by the programs; and (3) preserving the quality of physicians' care.

This study addresses these broad issues. Its principal objectives were to examine the role of reimbursement in physicians' economic behavior, and to determine whether present reimbursement methods help or hinder the achievement of policy goals. However, the scope of the data made it possible to explore additional areas of importance for physician reimbursement policy. The

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specific research questions investigated in the course of the study were:

- What types of optimizing behavior do physicians engage in? Is there evidence of target net income achieving behavior as opposed to profit or utility maximization? How prevalent is the pursuit of target net incomes and accompanying supplier-induced demand?
- Are the physicians' services markets basically competitive or noncompetitive in terms of pricing behavior?
- Is fee-screen reimbursement (the "customary-prevailing-and-reasonable" and "usual-customary-and-reasonable" method used by Medicare and private carriers) inherently inflationary? Does the system provide income incentives to physicians to raise their fees? Is fee schedule reimbursement less inflationary?
- To what extent do physicians discriminate in price among patients with different types of insurance coverage, and what are the implications for reimbursement policy?
- What physician and local market characteristics are significantly correlated with fee levels and rates of fee inflation, and how can the associations be used in devising reimbursement strategies?
- What are the determinants of physician participation in Blue Shield Plans? What types of physicians are most likely to participate, and what do participation patterns imply for policies to influence Medicare and Medicaid assignment rates?

The study was carried out by the Human Resources Research Center at the University of Southern California. The primary data base consisted of the claims records of three Blue Shield Plans, which were obtained and assembled by the Blue Cross and Blue Shield Associations (BCBSA).

Characteristics of physician reimbursement

The structure of Blue Shield physician reimbursement formed the institutional background of this study. Altogether, the three study Plans provided four types of health insurance programs called "lines of business." These were "usual-customary-and-reasonable" (UCR), indemnity, partial service, and Medicare ("customary-prevailing-and-reasonable"). The first three are private lines. No Medicaid data were available for this study. Although there are variations in reimbursement characteristics within the private lines depending on specific contracts, the basic reimbursement principles are as follows.

Payment in both UCR and Medicare programs is based on the "fee-screen" method. The amount allowed by the Plan for a given service—known as the "reasonable fee"—depends on two dollars amounts or fee screens. The first of these, called the Level 1 screen, is the physician's median or modal charge for the service, and it is usually calculated over the prior year. The second, called the Level 2 screen, is a percentile in the area fee distribution for the service, and it is also usually calculated over the prior year. The reasonable fee for the service is then the minimum of the physician's Level 1 screen, the Level 2 screen, and the physician's actual charge.[1] In private business, the Level 1 and Level 2 screens are called the "usual fee" and "customary fee," respectively. In the Medicare program, they are called the "customary fee" and "prevailing fee," respectively.

In turn, the amount paid by the Plan for the service is a fixed percentage of the allowance or reasonable fee. In private business, it is ordinarily 80 percent, but it may be higher. In the Medicare Program, the figure is 80 percent after the patient's deductible is satisfied. (None of the three Plans had deductibles in private UCR business during the study period.) In Medicare, the Level 2 screen is nominally set at the 75th percentile of the area fee distribution,[2] while in private business the screen is commonly higher—up to the 90th percentile. Consequently, UCR reasonables and amounts paid tend to be higher than Medicare reasonables and amounts paid. In both private business and the Medicare program, the patient's copayment is the difference between the amount paid by the Plan and the physician's bill. However, the actual copayment rate depends on another institutional feature of reimbursement—benefit assignment or physician participation.

Reimbursement in the Plans' indemnity and partial service lines is based on "fee schedules." A scheduled fee is just a dollar amount listed by the Plan for the services, and the allowance for the service is the minimum of the scheduled fee and the actual charge. The amount paid by the Plan equals the allowance, and the patient's copayment is the difference between the physician's bill and the Plan's payment. On indemnity claims, copayment is the difference between the physician's charge and the amount paid by the Plan. On partial service claims, copayment varies.

The essential differences between fee-screen and fee-schedule payment are: (1) fee screen allowances vary with the physician while fee schedule allowances do not;[3] (2) fee-screen allowances are typically much higher than fee-schedule allowances (generally 50 percent to

[1]In special circumstances such as where there is an unusual complexity of treatment, the reasonable fee may be the physician's actual charge, even though it exceeds the fee screens.

[2]Constraints on the growth rate of Medicare Level 2 screens have been in effect almost continuously since the beginning of the Economic Stabilization Program in 1972. As a result, Medicare Level 2 screens tend to be lower than the 75th percentiles.

[3]There are exceptions to the rule. Physicians whose reasonable fees equal Level 2 screens will have the same fee-screen allowances. Those whose indemnity or partial service charges are below the scheduled fees will have different indemnity or parital service allowances.

100 percent higher in the study plans); and (3) fee-screen allowances are usually updated much more frequently than fee-schedule allowances. With the one exception discussed, reimbursement for indemnity and partial service claims is the same. However, to be eligible for a partial service policy, the subscriber's family income must not exceed a (generally low) ceiling. Indemnity contracts are not subject to this provision.

The amounts of physician reimbursement and patient copayment vary further within lines of business according to an arrangement known as "accepting benefit assignment" in Medicare and "physician participation" in the Plans' private business.[4] The physician who accepts assignment or participates agrees to accept the Plan's allowance as full payment for his service. In return for this agreement, he becomes eligible to be paid by the Plan rather than by the patient. In Medicare, the physician can accept or refuse assignment on a claim-by-claim basis. In the Plans' private business, participation is usually on an all-or-nothing basis. In the two study Plans which had them, the participation agreements were of the all-or-nothing kind.[5] The participation agreements applied only to UCR and, in one of the two Plans, to partial service business. They did not apply to indeminity claims, even those filed for participating physicians' services.

On assigned or participating claims, the physician's average revenue (that is, the amount he receives) is the Plan's allowance—the reasonable fee in fee-screen business—net of bad debt on the patient's copayment. The patient's copayment is therefore the Plan's allowance minus the amount the Plan pays. On nonassigned or nonparticipating claims, the physician's average revenue is his charge for the service, also net of bad debt on the patient's copayment. Copayment, in this case, is the physician's charge minus the amount paid by the Plan. As a result, the net price of services to patients (the out-of-pocket cost per unit of services) is typically lower for assigned/participating claims than for nonassigned/nonparticipating claims. The gross price of services (the physician's average revenue) is typically higher if he chooses not to accept assignment or participate then it is if he chooses to accept assignment or participate.

These characteristics of Plan reimbursement imply rather different structures of physician average revenue and net prices to patients across lines of business and physician assignment or participation status. The differences mandated special attention in this study, and they were taken into account in designing and carrying out the analysis.

[4]Medicaid programs have a similar arrangement, also called physician participation or, less often, accepting benefit assignment.

[5]It was observed in the study data that some physicians reported both participating and nonparticipating claims in the same year. This could have been due to reporting errors or to switches in participation status during the year. Since participating physicians were technically free to bill their patients, it may also be that some of them did so, and that the claims filed by patients were recorded as nonparticipating.

Data base and data sources

The study's primary data were the claims records of three Blue Shield Plans, which we refer to as Plans A, B, and C. The Plans are located in the Midwest, East, and South, respectively. The claims data apply to approximately 65-high-utilization medical, surgical, and other procedures. For Plans A and B the data covered the years 1973-76. For Plan C they covered the years 1975-78. All three Plans provided records for their UCR business. Plans A and B furnished data for their indemnity business, and Plan B provided data on its partial service business as well. Plan B, the only Medicare carrier of the three, made its Medicare Part B data available for the study.

For each service, the Plans' claims record contained data on the following variables: (1) amount charged by the physician, (2) amounts paid and allowed by the Plan, (3) number of services, (4) county location of the service, (5) physician specialty, (6) physician participation status,[6] (7) setting in which the service was performed, and (8) age and sex of the patient.

At the outset of the study, BCBSA constructed two analytical files for each Plan. In the first file, the county in which the service was performed was designated as the unit of analysis. In the second file, the individual physician was chosen as the analytical unit. To construct the second file, with the assistance of the American Medical Association, samples of physicians who practiced in each Plan's geographic area during every year of the study period were developed. The data elements listed above were then organized for each physician in the file, and these were merged with physician-specific data such as specialty, age, sex, practice setting, board certification status, and country of medical graduation taken from the American Medical Association's (AMA) *1977 Masterfile of Physicians.* Approximately 1,000 physicians were included in each Plan sample, representing 14 different specialties.

County-level data on population demographics and medical supply characteristics were merged with both analytical files. These data were derived from several sources, principally the AMA's annual series, *Physician Distribution and Medical Licensure in the U.S.*, and the *Area Resources File* created by the Manpower Analysis Branch, Health Resources Administration, U.S. Department of Health and Human Services.

Various minor editing tasks and data manipulations were necessary to carry out some of the analyses, but only three major operations were undertaken.

[6]The identifier of claim assignment status in Plan B's Medicare data was deleted. As a result, no analyses could be conducted involving Medicare assignment.

It was known at the start of the study that the Plans might assign a single provider code to all physicians in a group or partnership practice. Since the physicians selected for the physician analytical file could be identified in the claims records only by provider code, this meant that the claims of two or more physicians could be assigned to a single practitioner. To obviate the problem, a rule was established whereby group and partnership physicians were removed from the physician file if the volumes of their claims significantly exceeded the average volumes of solo physicians. The rule resulted in the editing of from 3 percent to 11 percent of total volume of services in the physician files depending on the Plan and year.

In order to utilize a single measure of output in the analyses, the numbers of procedures were converted into relative value units (RVUs). This was done with the use of the *1974 Revision of the California Relative Value Scale (CRVS).* Because the units defined by the CRVS vary by specialty, a method was designed and implemented to standardize them across specialties. In the final county and physician analytical files, all units of physicians' physical outputs of services were expressed as RVUs.

Some physicians in Plan A and B submitted both participating and nonparticipating claims in the same year. Because the Plans' participation agreements were on an all-or-nothing basis, a rule was established for the physician files in order to label each physician as participating or nonparticipating in a given year of observation. In Plan A, a practitioner was defined as participating in a particular year if more than 5 percent of his RVUs in UCR business were submitted on a participating basis. In Plan B, a practitioner was so defined if more than 5 percent of his RVUs in UCR and partial services business were submitted on a participating basis. The participation statuses of Plan B physicians having only Medicare claims were defined as unknown.

Physicians' economic motivation and optimizing behavior

Although physicians as a group may have many different types of entrepreneurial objectives, prior research has tended to focus on just three: profit maximization, utility maximization, and the pursuit of target net incomes. The first two objectives are well known in economics, but the third has been developed over the past ten years to explain certain aspects of physicians' observed economic behavior.

The target net income hypothesis has usually been linked with the concept of physician-(or supplier-) induced demand. Briefly, it holds that physicians set income targets for themselves, based either on estimates of their peers' earnings or on subjective estimates of their own fair, reasonable, or appropriate earnings capabilities. Insofar as the markets for physicians' services are imperfectly competitive and physicians have "agency" relationships with patients, the hypothesis also holds that physicians can increase their net incomes by raising their fees, prescribing unnecessary services for patients that is, inducing demands or both. Hence, it argues that physicians respond to forces that lower their actual net incomes below the targets by increasing their fees, generating demands, or both, unless public policy prevents them from doing so.

Two general kinds of conditions can cause physicians' actual net incomes to fall below the target levels: an increase in local physician supply, which reduces the number of patients per physician; or constraints on the growth rate of fees. Throughout most of the 1970s, government policy did, in fact, actively promote the growth of national physician supply, and constraints on the growth rates of fees were imposed during the Economic Stabilization Program of 1972-74. In addition, the growth rate of Medicare Level 2 screens has been limited since 1975 by the Medicare Economic Index. Under the target net income hypothesis, the expansionary manpower policy may have increased expenditures on physicians' services because it provoked increases in fees, demand generation, or both. Similarly, the constraints on fees and Level 2 screens may have increased the costs (paid benefits) of government and private health insurance programs because they gave physicians incentives to generate unnecessary demands. Thus, the target net income hypothesis implies that efforts to enlarge physician supplies inflate health care costs, and that fee controls must be accompanied by a system of utilization controls to prevent demand inducement.

To contrast these implications with those of the standard economic market model, suppose that physicians maximize either profit or utility, and assume that the markets for physicians' services are competitive. Under normal conditions, market demand and supply functions for physicians' services exist and are downwardly and upwardly sloped, respectively.

Consider first the effects of an increase in the supply of physicians. Other things equal, an increase in the number of physicians shifts the supply-of-services function outward and lowers the market price level. The quantity of services supplied (and consumed) also increases, and total expenditures on physicians' services rise, are constant, or fall depending on whether the market demand is price-elastic, unitary price-elastic, or price-inelastic. The quantity of services per patient also tends to increase. As a result, the behavior of quantity following an increase in physician supply may be much the same as the target net income hypothesis predicts. However, the hypothesis asserts that fee levels *may* rise, and the standard model predicts that they always fall. Under standard theory, then, an increase in physician supply may raise expenditures on physicians' services, but it improves patients' welfare because it means a lower price of care and improved access to physicians' services.

Next, consider the effects of controls on physicians' fees. They can be of two types-direct restraints on fees, or limits on alowances (for example, on Level 2 screens). Assuming that direct restraints achieve their purpose, they establish a ceiling on fees below the market-clearing level. In the standard model, the result is excess demand for physicians' services, a reduced quantity of services consumed, and a smaller total expenditure on physicians' services. Under the target net income hypothesis with demand inducement, physicians shift their demand functions outward to points where the consumption of services restores their net incomes to the target levels. In this case, total market consumption increases with respect to the equilibrium rate, excess demand is zero, and total expenditures on physicians' services may rise, remain constant, or fall.[7]

When controls are imposed on allowances, their effects on physicians who participate or accept assignment are identical to those of fee ceilings. That is, the controls set ceilings on physicians' average revenues. Thus, the comparative statics of the standard and target net income hypotheses are the same whether controls are imposed on allowances or direct restraints are placed on fees. For physicians who do not participate or accept assignment, tightening the controls on allowances raises the net prices paid by patients (since reimbursement is a fixed percentage of allowances) and shifts demand functions inwardly. In the standard model, the inward shift in demand leads to a decline in market fee levels and reductions in both the quantity of services and total expenditures on services. Under the target net income hypothesis, the shift can bring about a rise in fees (if market demand is sufficiently price-inelastic), a fall in fees (if market demand is sufficiently price-elastic), demand inducement without changes in fees, or some combination of changes in fee levels and demand inducement. Theoretically, the impacts on market quantities and total expenditures are equally difficult to predict. For instance, if physicians respond to the inward shift in market demand by inducing new demands, nothing prevents the new market equilibrium fees, quantities, and expenditures from being identical to their old values. In that event, there would be no change in any of the market variables after the imposition of allowance controls.

Because the implications of the target net income hypothesis are in large part indeterminate, it is difficult to design empirical tests to discern whether it or the standard theory best characterizes physicians' pricing and output behavior. However suggestions of three approximate tests for distinguishing between the standard and target net income theories follow.

1. Large physician-population ratios (that is, large market supplies of physicians) should be accompanied by low fee levels if the neoclassical theory is correct. Hence, positive correlations between physician density and market fee levels support the target net income hypothesis over the standard theory.
2. If demand inducement occurs, it should appear to shift the individual physician's average revenue function outwardly as the market supply of physicians increases. A positive partial correlation between the physician's average revenue and the area physician-population ratio therefore favors the target net income hypothesis. A zero or negative partial correlation argues against the hypothesis and favors the standard theory.
3. If the standard theory is correct, fee controls and limits on the growth of Medicare Level 2 screens should have retarded the growth rates of Medicare billed charges and quantities of services during the Economic Stabilization Program of 1972-1974. If Medicare fee levels were unaffected during this time or Medicare quantities increased, the findings would support the target net income hypothesis.

Each of these tests was carried out in the course of the study, but with somewhat ambiguous results. Test 1 was performed both descriptively and as an aspect of estimating cross-sectional charge regressions for the sampled physicians. In the descriptive findings, no significant simple correlations were found between charge levels and county physician density in any of the three Plans. Beyond that, about half of the signs on the correlations were negative. The results consequently did not support the target net income hypothesis. On the other hand, in the charge regressions, the partial correlations between charges and county physician population ratios were significantly negative in Plan A and significantly positive in Plans B and C. These estimates—which are more reliable than simple correlations—are indicative of demand inducement in Plans B and C, but not in Plan A.

Test 3 was applied to Plan B's Medicare Business. Descriptive findings showed that, between 1973 and 1974, Medicare fees rose at less than half the rate of fees in the Plan's private business, on which there were no allowance controls during the Economic Stabilization Program. Unfortunately, we could not observe the quantities of Medicare services per user, and we were forced to measure them on per-physician and per-enrollee bases instead. The quantity of services per physician grew by nearly 40 percent between 1973 and 1974, and the quantity per enrollee increased substantially in all fields but the medical specialties. Thus, the behavior of fees during the last year of the Economic Stabilization Program conformed to the predictions of both the standard and target net income theories, while the behavior of Medicare quantities was as predicted by the target net income hypothesis.

Although the evidence from Test 3 seems to support the theory of demand inducement, two factors prevent drawing any firm conclusions. First, there was a moderate growth of Medicare quantities throughout the study period, and it is hard to say whether the high growth rate of quantities during 1973-1974 actually

[7]Actually, the implications of the target net income hypothesis are slightly ambiguous under these circumstances. If physicians were realizing their income targets before the fee controls, obtaining the same net incomes at lower fees would require an increase in output. However, if marginal and average production costs are increasing, it may be difficult for physicians to raise their net incomes regardless of the amount of demand inducement, inasmuch as increases in output could reduce net incomes.

reflects demand inducement, or whether it was a part of the overall trend. Second, the growth of Medicare quantities was accompanied by a decline in the quantities of private services per physician, and the decline was especially pronounced in 1973-74. It is reasonable to infer that the sharp increase in Medicare quantity in 1973-74 was at least partly caused by a shift away from private business. Neither the standard nor target net income hypotheses predicts such a shift, and it is particularly puzzling in view of the relatively low levels and growth rates of Medicare fees in 1973 and 1974. For these reasons, the results of Test 3 are judged to be inconclusive and find that the appearance of demand inducement for Medicare services may have been due to unexplained and unobserved factors.

To carry out Test 2, we formulated and estimated an econometric model of the individual physician's practice. The model was designed to reveal whether physicians typically, maximize profit, maximize utility, or pursue target net incomes. Theoretically, it is known that all three types of optimizing behavior can yield the same pricing and output policies under special conditions. However, our objective was to determine whether physicians can be described generally as profit maximizers, as utility maximizers who do not induce demands, or as target net income pursuers who do not maximize profit.

A two-stage procedure was incorporated into the physician econometric model in order to perform Test 2. The first-stage test called for rejection of the profit maximization hypothesis if there were systematic differences between estimated marginal revenue and estimated marginal cost at observed outputs. When the model was estimated, the first-stage test indicated that profit maximization could be rejected for Plan A physicians and for (participating) physicians in Plan B who provided Medicare services. For physicians in Plan C and those providing non-Medicare services in Plan B, it was not possible to reject the profit maximization hypothesis.

The second-stage test was meant to distinguish between utility-maximizing and target net income behavior. If the physician did not maximize profit (as revealed by the first-stage test) and his average revenue was not significantly positively correlated with the county physician-population ratio, the implication was that he maximized utility. If he did not maximize profit and average revenue was significantly positively correlated with the county physician-population ratio, the implication was that he induced demands and was probably a target net income seeker. Execution of the second-stage test led to rejection of the utility maximization hypothesis and tentative acceptance of target net income achieving behavior for Plan C physicians and for Plan B physicians providing Medicare services.

The results of Test 2 are shown in Table 1, where they are compared with the outcomes of Test 1 and 2. The test results were generally consistent. There was no evidence of demand inducement in Plan A, and it was concluded that Plan A physicians maximized utility. In Plan B, Test 2 and 3 indicated the probable existence of demand generation for Medicare services, but not in the Plan's private business. To perform Test 1 on Plan B, private and Medicare business were aggregated, and since Medicare business represented about half of physicians' total observed outputs, demand inducement for Medicare services may have given the appearance of demand inducement in the aggregate. In Plan C, Tests 1 and 2 both suggested the existence of demand inducement, although the Test 2 results were partly consistent with profit maximization.

Table 1
Results of tests for physicians' optimizing behavior

Blue Shield Plan	Test 1	Test 2	Test 3
A (Midwest)	Not target net income achievers	Utility maximizers	Not applied
B (East) Private business	Target net income achievers	Profit maximizers	Not applied
Medicare		Target net income achievers	Possibly target net income achievers, but results ambiguous
C (South)	Target net income achievers	Probably target net income achievers, but results ambiguous	Not applied

On balance, then, the target net income hypothesis could not be rejected, but the analyses implied that pursuing a target net income is not a universal form of physician optimizing behavior. Indeed, it appeared that no single type of optimizing behavior best characterizes physicians. Why the type of optimizing behavior evidently varied across Plans is a difficult question to answer. The variation over Plans may have been due to regional differences in management practices, but it is not clear why physicians in the same Plan tended to exhibit different optimizing objectives depending on the line of business. The tests may, of course, have been biased, and it is also possible that the variations in objectives were more apparent than real. In terms of pricing and output policies utility maximizing behavior can be very similar to either profit maximizing or target income behavior. Hence, contingent on physicians' particular tastes, one could observe what appeared to be profit maximizing or target net income behavior even though in the narrow sense physicians' maximized utility. The results obtained here do not indicate an urgent need for policies to counteract the effects of demand inducement. However, if physicians' propensities to generate demands depend on their tastes and those tastes vary over time or with market conditions, the problem deserves continued attention and monitoring.

Physicians' pricing behavior: Competitive or monopolistic?

A firm is said to be competitive or perfectly competitive if its average revenue function is infinitely elastic in price (horizontal in quantity) at the going market price level. The firm is said to be imperfectly competitive, monopolistic, or to have market or monopoly power if its average revenue function is finitely price-elastic (downwardly sloping in quantity). The monopolistic firm can raise the price of its product by reducing its output. The competitive firm cannot, and if it raises its selling price over the market price level, it loses all of its customers to its competitors.

Because of restricted entry into the profession and consumers' ignorance of medical procedures, it has often been argued a priori that the physicians' services markets are noncompetitive. If this hypothesis is correct, it has several implications for the economic performance of the markets.

First, the size of the long-run profit or net income the physician can earn increases as his market power increases. The physician may choose not to exploit his market position, but if he does, his monopoly profit adds to health care costs. Second, in noncompetitive markets physicians are not compelled to be efficient, and, insofar as noncompetitive markets permit managerial slack, they also add to health care costs.

Third, most formulations of the target net income hypothesis assume that physicians possess some degree of market power, since otherwise they are unable to raise their fees as a means of achieving income targets. A finding that physicians do not possess significant market power tends to weaken the target net income hypothesis and to undermine the hypothesis' implications for market performance. However, it has never been established how little market power is necessary to induce demands. For example, consumers may be much more knowledgeable of, and sensitive to, fee differentials than they are of the quantities of services needed to treat illnesses. If this is the case, physicians' abilities to generate demands may be compatible with rather highly elastic average revenue functions.

Fourth, noncompetitive firms are better or more quickly able than competitive firms to pass along increases in input prices in the form of higher prices to consumers. Hence, the physicians' services are vulnerable to the cost-push type of price inflation to the extent that they are noncompetitive. Our analyses of the effects of fee-screen reimbursement suggested further that the inflationary incentives embodied in the system are strongest in the least competitive markets. The problem of reimbursement-related fee inflation is therefore likely to be most severe if the markets are highly monopolistic.

Although imperfections in market structure can usually be approached most successfully through public policy to revise structure, reimbursement policy can be used to mitigate some of the deleterious performance effects of market power. For instance, tighter controls on fees can be expected to have a constraining impact on monopoly profit, the costs of inefficiency, and the rate of fee inflation. As we have already remarked, demand generation can be counteracted by a system of utilization controls.

To study the question of physicians' market power, average revenue functions were specified as one aspect of the physician econometric model. The functions were estimated for six sub-samples of physicians who provided nonparticipating UCR, nonparticipating partial service, indemnity, and Medicare services in the three Plans[8]. The estimated price elasticities of the average revenue functions should have been large in absolute value if practices are competitive, and close to -1 if practices possess considerable market power.[9]

The estimated price elasticities of the average revenue functions ranged from -3.0 to -23.5. In three of the six subsamples, the slopes of the functions were not significantly negative—meaning that in those subsamples the functions were not statistically distinguishable from the average revenue functions of perfect competitors. The findings consequently suggest considerable variation in the degree of competitiveness of the physicians' services markets. They show that physicians' markets can be categorized generally as being at the more competitive rather than the less competitive end of the spectrum of market structures.

Curiously, the results seem to show that significant market power is neither necessary nor sufficient for demand inducement to occur. In Plan C, where the evidence of demand inducement was strongest, physicians' average revenue functions appeared to be highly price elastic. Yet in Plan A, where there was no evidence of demand inducement, the price elasticities of average revenue were relatively low. The contrast may well underscore both the unpredictability of physicians' optimizing behavior and its variability over different groups of providers.

The findings also have mixed implications for physician reimbursement policy. On one hand, they do not preclude the possibilities of monopoly profit, inefficiency, or excessive fee inflation in some markets. Hence, they do not conclusively rule out the need for selective remedial policies. But, they indicate monopoly performance is probably not characteristic of the markets as a whole, and they do not support the need for drastic or sweeping revisions of present reimbursement policy toward physicians.

Fee-screen reimbursement and charge inflation

It has long been argued by health economists and others that fee-screen reimbursement is inflationary. One part of the argument holds that the reimbursement mechanism enables physicians to raise their charges over time. That is, a rise in the physician's reasonable fees (allowances) between last year and this year lowers the net prices his patients pay if the physician does not raise his charges. Hence, the physician can raise his charges without affecting net prices—that is, without affecting the quantities of his services demanded—and the reimbursement mechanism permits him to do so.

The second and stronger part of the argument claims that physicians exploit the mechanism by raising their charges in order to raise next year's reasonable fees. In essence, it states that a rise in next year's reasonable fees allows the physician to raise his average revenue and net income over this year's levels. The rational, income-motivated physician therefore establishes an optimal or desired level of reasonable fees for next year, and sets his current charges to achieve it. If the hypothesis is correct, it implies not only that fee-screen reimbursement perpetuates fee inflation, but that it is actively encourages physicians to raise their charges over time.

The relationships between the rate of charge inflation and fee-screen reimbursement were explored in two ways. First, descriptive comparisons were made between inflation rates in different lines of business. If physicians did set their prices in order to exploit the fee screen mechanism, one would expect lower rates of charge inflation in lines of business like indemnity and partial service where reimbursement was based on infrequently updated fee schedules. Second, we specified and estimated three dynamic regression equations incorporating different hypotheses about physicians' propensities to raise their UCR and Medicare charges over time.

The results were generally mixed. The descriptive comparisons showed that charge inflation rates were almost identical in the physicians' private lines of business, regardless of the type of reimbursement and frequency of updating allowances. However, the rate of Medicare charge inflation was significantly lower than the rate for private business in Plan B, particularly during 1973 and 1974 when strict Economic Stabilization Program controls on Medicare allowances were in effect.

These rather anomalous findings appear to have a simple explanation. If the rates of charge inflation vary across lines of business for any reason, it must follow that physicians discriminate in price over their patients' insurance coverage. There was little evidence that physicians did, in fact, discriminate in price over their private lines of business, although we found that individual practitioners tended to charge slightly lower prices for their Medicare patients than private patients in Plan B. As a result, the patterns of charge inflation could reflect the absence of price discrimination over patients' private coverage, and some tendency for discrimination in favor of Medicare patients.

The low rate of charge inflation for Medicare services in 1973 and 1974 clearly suggests the influence of controls on the growth rates of Medicare Level 2 screens. The question remains, of course, why controls on Medicare allowances evidently did restrain charge inflation in Medicare business, while much stronger controls on the Plans' fee schedule allowances did not (nearly all of the fee schedules were not updated during the study periods). The answer may lie in the relative sizes of the sample physicians' Medicare and private fee schedule business. In all three Plans, fee schedule business represented a relatively small percentage of physicians' total outputs. Conversely, in Plan B Medicare business comprised 30-80 percent of physicians' total observed outputs, depending on specialty. Thus, it may have been unprofitable for the physicians to discriminate in price among their private patients, but it could have been profitable to discriminate in favor of Medicare patients because of the large sizes of Medicare clientele. If this were the case, one would expect a lower rate of charge inflation for Medicare services than for private services.

Two of the three regression equations gave implausible or ambivalent implications regarding physicians' dynamic pricing behavior. However, in both cases it seems likely that the models were conceptually inappropriate or econometrically misspecified. The third, and most theoretically defensible of the equations showed that physicians tend to establish desired reasonable fee levels for their UCR and Medicare services, and that they tend to raise their current charges in order to attain next year's reasonable fee targets. The parameters of the equation also indicated that physicians typically do not realize the full amounts of their target reasonables. The result could have been due to Level 2 screens, and this appeared to be largely true for Medicare services, but it could have been due to inefficiencies or miscalculations in physicians' pricing policies.

Overall, the analyses imply that:

- Fee-screen reimbursement embodies inflationary pricing incentives.
- Physicians generally respond to these incentives by pursuing inflationary pricing policies.
- Constraints on the growth rates of reasonable fees—that is, on Level 2 screens—are likely to retard the rate of charge inflation only if they apply to a significant share of physicians' business.
- Constraints on the magnitudes and growth rates of Medicare Level 2 screens encourage physicians to discriminate in price against private-paying patients. Thus, they may bring about cost-shifting away from Medicare patients and to the privately insured and uninsured sector.

Price discrimination

Price discrimination exists if a firm sells the same product under the same conditions to different buyers at different prices. It is generally associated with the possession of monopoly power by the firm, and it can occur only if markets are segmented (that is, the seller can group buyers into different classes and buyers cannot resell the commodity to one another). Price discrimination is a means for the firm to increase its profit. That is, rather than charging the same price to all customers, the firm staggers its selling prices to buyers according to their willingness and ability to pay. The effect on buyers as a group is to reduce their "consumers' surplus" thus, reducing consumers' welfare.

In the physicians' services markets, the historical use of the "sliding-fee scale" has often been labeled as price discrimination. Because the sliding scale resulted in the treatment of patients too poor to be cared for, its welfare implications are not entirely clear. However, it has been argued that the sliding scale was evidence both of physicians' monopoly power and of their tendencies to extract monopoly profits from patients.

In this study the issue of price discrimination was addressed through analyses of the prices charged to patients with different insurance coverage. Insurance coverage naturally segments the demands for physicians' services, and it also provides incentives for physicians to discriminate because it involves different rates of patient copayment and net prices, given the same gross price of services. Because data on production costs were not available, we could not determine whether differences in fees across coverage actually signified price discrimination. Since the physician can vary the quantity or quality of his services with the average revenue he expects to receive, fee differences may reflect cost differences, and in that event fee variation does not necessarily represent price discrimination. On the other hand, identical or closely similar fee levels over different types of insurance coverage suggest a homogeneous package of services provided to patients and the absence of price discrimination.

When the charges of individual physicians were examined, we found no evidence of fee variation across private lines of business in any of the three study Plans. This rather strongly indicates the absence of price discrimination in physicians' private business. On the other hand, in Plan B there were statisically significant differences between physicians' Medicare charges and those in private business. In three of the four broad specialty strata—general practice, the medical fields, and the surgical fields—physicians' Medicare charges were lower than their charges in private UCR business. In the fourth stratum—the nonmedical, nonsurgical fields—the reverse was true. Thus, the results show that physicians discriminated against Medicare patients in the nonmedical, nonsurgical specialties, but in favor of Medicare patients in the other specialties.

The anomalies in the evidence may raise more questions than answers for reimbursement policy. For example, the absence of price discrimination in private business occurred in spite of large differences in allowances and net prices between lines of business, and it is generally consistent with our findings showing that the markets are relatively competitive. But the charge variations between Medicare business and private business in Plan B occurred in the presence of large differences in allowances.

These results could indicate differences in the degree of physicians' market power between the Medicare and private lines, or they could indicate differences in physicians' willingness to exploit their market power. They could also suggest that physicians do not discriminate in price across minor lines of business. UCR outputs were somewhat larger than outputs in the other private lines, and it may not have been profitable for physicians to set separate charge levels for small groups of patients in those other lines. Medicare business did, however, comprise a substantial portion of physicians' observed outputs in Plan B, so in this case there may have been income incentives for many physicians to establish separate Medicare charge levels. If that interpretation is correct, Medicare reimbursement policy is partly responsible for what appears to be price discrimination mostly favoring Medicare patients. The policy segments consumers of physicians' services, and it also encourages price discrimination through its system of low Medicare allowances and high net prices to patients. Moreover, any effort to constrain Medicare allowances or to raise the net prices of services to Medicare patients is likely to increase the subsidization of Medicare services by non-Medicare patients.

Physicians' pricing patterns

This study examined the correlates of physicians' charges through the use of univariate descriptive methods and multiple regressions fitted to cross-sectional charge data for physicians in each Plan. The major issues considered were the effects on charge levels of physician product differentiation, market conditions, and reimbursement methods.

If physicians' services are heterogeneous and the degree of consumer ignorance of the services is moderate or large, charge levels should appear to vary significantly with measures of product differentiation. Regardless of the extent of product differentiation, charge levels should, of course, also vary significantly with measures of the strength of local demands, input prices, competition, and any other factors characterizing market conditions. To carry out the analyses, proxies for product differentiation were defined as the physician's specialty, age, sex, practice setting, professional and educational background, intensity of hospital practice, and patient-mix. Proxies for market conditions were specified as county per capita income, degree of urbanization, percentage of elderly in the population, physicians' office personnel salary rates, and the physician-population ratio.

The descriptive tabulations and multiple regressions both yielded much the same results. Charge levels tended to be highest for physicians who were specialists, board-certified, graduates of foreign medical schools (FMGs), young, not in solo practice, and whose outputs were provided largely in office settings. However, the regressions indicated in many instances that the tendencies were either not statistically significant or not systematic across Plans. In addition, the effects of the proxies on charge levels were generally numerically small, and in some cases the associations are hard to explain as the consequences of product differentiation alone. For example, if the relatively high charge levels of FMGs are attributed to a high level of service quality, this contradicts most opinion on the relative quality of U.S. and foreign medical graduates.

Admittedly, the proxies for product differentiation are limited. But subject to that qualification, they tend to show that the degree of product differentiation in the physicians' services markets is not very great. The result is consistent with our findings that physicians' average revenue functions are moderately to highly price-elastic. Strongly significant associations between sellers' prices and their (or their product) characteristics would be indicative of important market imperfections, and they would generally imply low elasticities of sellers' average revenue functions. Thus, the evidence tends to confirm the inference that physicians are competitors or monopolistic competitors rather than monopolists or oligopolists selling a highly differentiated product.

Most of the proxies for local market conditions also appeared to have little effect on physicians' charge levels. County per capita income was positively related to charge levels in all three Plans, and the relationship was statistically significant in two. This suggests that charges increase as the strength of demand within markets increases. However, charges were either not significantly or not systematically associated with the other four market variables. For instance, they were significantly positively related to the percentage of elderly in the county population in one Plan, significantly negatively related to the percentage in a second, and very weakly negatively related to the percentage in the third. There are no immediately obvious explanations for the patterns.

When the physician's average allowance level was added to the list of explanatory variables in the regressions, it was found to be highly positively correlated with the physician's charges. Moreover, the inclusion of allowances roughly doubled the explanatory power of the equations. This result is puzzling because allowances reflect the physician's prior-year charges, so they should have had the same predictive capabilities as the proxies for product differentiation and market conditions. That is, if allowances embodied only the lagged effects of product differentiation and market conditions, they should not have had strong, separate effects on charge levels.

The fact that they did have strong, separate effects suggests any of three possibilities. First, the proxies for product differentiation and market conditions may have been inadequate. If this is true, it weakens inferences that can be drawn from the regressions. And since the same or similar proxies have been widely used in other studies of physician pricing and the demands for physicians' services, it also raises more far-reaching questions about the reliability of known facts about physicians' practices.

Second, the theoretical relationships between price levels and product differentiation, seller concentration, the composition of demand, and other elements of market structure hold only when markets are in long-run equilibrium. Since the study periods were times of inflationary pressures on physicians' fees, the physicians' services markets were clearly not in long-run equilibrium. On the one hand, this implies that one should not necessarily expect to find significant or predictable associations between charges and industry structure. On the other hand, it indicates that time trends may be the most powerful predictors of current charge levels. If time trends are the strongest predictors of fees, this could easily explain why current charges were closely correlated with allowances, inasmuch as the latter are based on lagged fee levels.

Third, reimbursement methods may have had more powerful influences on physicians' pricing policies than the characteristics of the services of their markets. The findings on fee-screen reimbursement and pricing lend some support to this interpretation. If reimbursement mechanisms encourage physicians to follow similar pricing policies or free them from competitive pressures, charge levels would tend to vary more with allowances than with elements of market structure or physician characteristics. Ths may also be what the regression estimates reveal.

Variables measuring the percentages of the physician's outputs in non-fee screen business were included as regressors to investigate the impact of differences in allowances on charge levels. It was hypothesized that: charge levels increase as allowance levels increase because, other things equal, higher allowances mean lower net prices to patients; and the physician's average charge level falls as the percentage of his non-UCR business increases because allowances are lower in non-UCR business than in UCR business.[10] On these grounds, it was expected that charge levels would be negatively correlated with the percentages of the physician's outputs provided to patients covered by indemnity contracts, partial service contracts, and Medicare.

The regression results tended to confirm the expectation and its underlying hypotheses. Out of a total of five coefficients estimated in the three Plan regressions, three were significantly negative, one was nonsignificantly negative, and one was significantly positive. In all instances, the numerical effects on charges of changes in the percentages of non-UCR business were small. For example, the estimates showed that a ten-point increase in any of the percentages would have produced a reduction in charge levels by 1 percent or less. Consequently, variations in allowances and patient copayment rates among physicians' lines of business seem to have little impact on physicians' average charges.

Physician participation

In terms of patient welfare, the purpose of physician participation and benefit assignment arrangements is to increase access to care. Given the same charge or gross price for a service, the net price paid by the patient can never be higher on a participating/assigned claim than on a nonparticipating/nonassigned claim. But if, as is usually the case, the physician's charges exceed his allowances, the net prices on participating/assigned claims are lower than on nonparticipating/nonassigned claims.

In this study, physician participation rates in two of the study Plans were examined descriptively and analytically. The descriptive results showed that physicians with the highest participation rates tended to be general practitioners, foreign medical school graduates, not board certified, female, and not in group practice. They indicated further that participating physicians had somewhat lower charge levels than nonparticipating physicians. Other associations between participation tendencies and physician, practice, and patient traits were not consistent across the two Plans.

Because of the inherent limitations of univariate descriptive methods, participation tendencies were next estimated in the context of a regression model of the participation decision. Fundamentally, the model hypothesized that the decision depends on the relative income opportunities of participating and not participating.[11] Exogenous variables were included in the regression to represent the economic conditions facing physicians.

Like the descriptive findings, some of the regression results were not consistent across Plans. For example, there were no systematic relationships between the probability of participating and the physician's age, type of practice, or county characteristics. And unlike the descriptive findings, the regressions indicated that physicians in certain other fields were about as likely to participate as general practitioners. Pediatricians had about the same participation rates as general practitioners (as did physicians in some of the referral specialties), but internists had much lower rates.

The regressions yielded three strong and important results. First, they showed that increases in allowances (reasonable or scheduled fees) significantly raise participation rates, and that the sensitivity of the participation decision to increases in allowances rises markedly with the physician's output in lines of business where he is eligible to participate. . In general, the results suggested that allowance levels are the dominant factor in participation decisions.

Second, physicians with characteristics commonly associated with a relatively low quality of services had the highest participation rates. These characteristics include graduation from a foreign medical school, lack of board certification, and low charge levels.

Third, market factors outside the control of reimbursement policy had highly important impacts on the time trends of participation rates in both Plans. In one Plan, a large increase in county per capita income was accompanied by a substantial decline in the participation rate over the study period. In the second Plan, a large increase in office wage rates over the study period had a substantially depressing effect on the participation rate. But the effect was mostly offset by changes in unobservable factors (proxied by time dummies) which tended to raise the rate.

More than anything else, the findings underscore the normative problems inherent in policy to maintain participation or assignment rates. The first finding implies that policy must contend with tradeoffs between promoting access to care and containing the costs of health care to government. Raising allowance levels is the only powerful and direct tool for increasing assignment or participation rates, but when allowance levels rise, so do program benefit costs which are tied to them. Thus, there is a measurable increase in program costs associated with a policy to increase access to care by raising participation or assignment rates.

The second finding indicates that policy must also face tradeoffs between promoting the quality of physicians' services and containing health care costs. If physicians who do not participate (or, by analogy, do not accept assignment) consist disproportionately of those of the highest quality, any effort to increase their participation rate by raising allowances inflates benefit costs. Conversely, anti-inflationary limits on the growth rates or levels of allowances have a strong likelihood of discouraging participation by high-quality physicians. This is a particular problem for the Medicaid program, in which eligible patients can be treated only by physicians who participate in the program.

The third result shows that policy concerning participation or assignment rates can be vulnerable to external shocks. Market conditions may independently increase or lower the relative profitability of participation/assignment to physicians, and they may do so significantly and rapidly. If the relative profitability of participation/assignment rises, it brings a windfall gain to policy administrators. In that case, allowance levels and program costs can be reduced with no loss in terms of access to care or service quality. But, if the relative profitability of participation/assignment falls, administrators must decide whether to permit participation/assignment rates to decline, or whether to maintain the rates at their old levels and to incur the accompanying increase in program costs.

Conclusion

The results of this study convey an impression of the physicians' services markets as competitive or monopolistically competitive, and characterized by at most a moderate degree of product differentiation. Although physicians did not typically appear to maximize profit, nearly all indications show that they are income motivated. In the most general terms, this suggests that income incentives to achieve special reimbursement goals can be incorporated into policy and be expected to have predictable consequences. It also suggests that policy may inadvertently contain income incentives that can and will have adverse welfare effects.

There was considerable evidence of variability in physicians' pricing and output behavior across Plans, and in some cases across lines of business in the same Plan. For example, the incidence of apparent demand generation varied by Plan and line of business. Thus, even though the problem of demand generation is evidently not a pervasive one for reimbursement policy, it may be significant in certain geographic areas or for certain types of health insurance coverage. By the same token, an across-the-board program of utilization controls or similar restrictions to limit demand generation is likely to be unnecessary in many instances, and its adminstrative costs could easily exceed its savings.

The results do not suggest novel or ideal solutions for curbing fee and benefit cost inflation, maintaining access to physicians' care, and promoting the quality of services. However, they do raise serious doubts that ways can be found of satisfying all current policy objectives simultaneously.

Letters to the Editor

Medicare assignment rates

Frequently, an interesting tale can be told by examining beginning and end points of trend data. In other situations, attention must also be focused on intermediate points as well. In the case of Medicare assignment statistics, the former approach can be quite misleading, as illustrated by a single line in Janet Mitchell and Jerry Cromwell's article in the Summer 1983 issue, entitled "Impact on an All-or-Nothing Assignment Requirement Under Medicare." It was stated that "the steady decline in Medicare assignment rates over the past 10 years, from 60 percent of all claims to 50 percent, means that the elderly are bearing an increasingly larger share of the total medical care bill."

As indicated in Table 1, between 1971 and 1982, Medicare assignment rates declined from 63.9 to 55.2 percent, based on all claims data, or from 60.1 to 52.8 percent, based on net claims data. But, in contrast, one frequently is told that Medicare assignment rates are rising, and they are. Regardless of whether all claims or net claims data are used, assignment rate levels for the most recent fiscal year are higher than at any time in the last 6 years. Over the last 12 years, Medicare assignment rates have followed a u-shaped curve. They fell from 1971 until the mid-1970's and then began to rise. One might predict that the increasing number of physicians will provide competitive pressure for continued increases in acceptance of assignment in the future.

Bryan R. Luce, Ph.D.
Executive Editor

Table 1
Medicare assignment rates

Year	All claims[1]	Net claims[2]
FY 71	63.9	60.1
FY 72	60.6	56.4
FY 73	57.5	53.4
FY 74	56.4	52.2
FY 75	55.9	51.9
FY 76	55.1	51.0
FY 77	54.1	50.5
FY 78	53.8	50.6
FY 79	53.9	51.1
FY 80	54.1	51.4
FY 81	54.8	52.2
FY 82	55.2	52.8

[1] *All Claims*—((Number of assigned 1490's received + number of 1554's and 1556's received) ÷ (total number of claims received)) × 100.
[2] *Net Claims*—((Number of assigned 1490's received) ÷ (total number of 1490's received)) × 100.

SOURCE: Bureau of Program Operations, Health Care Financing Administration.

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Part One

ANALYSIS OF MEDICARE PREVAILING, CUSTOMARY, AND ACTUAL CHARGE DATA

by

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FINAL REPORT

on
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ABSTRACT

This study was based on physician claims records from three Blue Shield Plans. The principal results are:

--Physicians are income-motivated. This means that income incentives can be incorporated into reimbursement systems to achieve specific ends, and that care should be taken to assure that new mechanisms do not create income incentives for physicians to act contrary to policy objectives.

--Physician pricing is reasonably competitive.

--Physicians do not discriminate in price between their major and minor lines of insured business, and allowance caps in the minor lines have no appreciable impact on charge levels or the rate of charge inflation.

--The Economic Stabilization Program significantly slowed the growth rate of Medicare charges, but had no discernible effect on the inflation rate of private charges. This indicates that allowance controls applied to a large part, but not all, of physicians' business induce physicians to "shift costs" against patients insured by programs where allowances are not controlled.

--The strongest evidence showed that fee screen reimbursement promotes inflationary pricing by physicians.

--The tests we conducted indicate that pursuit of a target net income is not a pervasive characteristic of physicians' economic goal behavior. Therefore, reimbursement controls on utilization to counteract demand inducement are not justified at this time. However, in view of the large increase in physician supply expected over the next decade, the issue of demand inducement merits continued monitoring.

--Physicians are significantly more likely to participate in Plans' eligible business when allowances are high rather than low. Physicians of low perceived quality are also significantly more likely to participate than physicians of high perceived quality. Since increases in allowances raise insurance benefit costs, it follows that increasing access to care by promoting participation exacerbates cost inflation.

The study's principal policy implications are:

--Private carriers and government should decide on a uniform means of reimbursing physicians to restrain charge inflation and to discourage cost-shifting.

--Reimbursement systems less inflationary than the fee screen method should be encouraged or adopted.

--Utilization controls for physicians' services are not warranted at present.

--Cost containment efforts are likely to reduce access to care (by reducing physician assignment rates) for persons that government health insurance programs were most intended to serve.

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CHAPTER 1

EXECUTIVE SUMMARY

Spending on physicians' services currently represents one-fifth of total national health care expenditures. From 1965 through 1981, expenditures on physicians' services grew at an average annual rate of 12.4%, and even larger increases were experienced by the Medicare and Medicaid programs. By contrast, gross national product grew at an average annual rate of 9.4% over the same period. From 1965 through 1981, the Consumers' Price Index component for physicians' fees rose by 7.9% per year, a rate 17% higher than the CPI as a whole. In 1981, total national expenditures on physicians' services reached $54.8 billion, and the costs to government of physicians' services under Medicare and Medicaid were $9.6 billion and $2.8 billion respectively.

Against this background of expenditure and fee inflation, government reimbursement policy for physicians' services under Medicare and Medicaid has focused on three major issues: (1) containing the level and growth rate of spending; (2) maintaining access to care by the aged and needy who are served by the programs; and (3) preserving the quality of physicians' care.

This study addresses these broad issues. Its principal objectives were to examine the role of reimbursement in physicians' economic behavior, and to determine whether present reimbursement methods help or hinder the achievement of policy goals. However, the scope of the data made it possible to explore additional areas of importance for physician reimbursement policy. The specific research questions investigated in the course of the study were:

--What types of optimizing behavior do physicians engage in? Is there evidence of target net income achieving behavior as opposed to profit or utility maximization? How prevalent is the pursuit of target net incomes and accompanying supplier-induced demand?

--Are the physicians' services markets basically competitive or non-competitive in terms of pricing behavior?

--Is fee screen reimbursement (the "customary-prevailing-and-reasonable" and "usual-customary-and-reasonable" method used by Medicare and private carriers) inherently inflationary? Does the system provide income incentives to physicians to raise their fees? Is fee schedule reimbursement less inflationary?

--To what extent do physicians discriminate in price among patients with different types of insurance coverage, and what are the implications for reimbursement policy?

--What physician and local market characteristics are significantly correlated with fee levels and rates of fee inflation, and how can the associations be used in devising reimbursement strategies?

--What are the determinants of physician participation in Blue Shield Plans? What types of physicians are most likely to participate, and what do participation patterns imply for policies to influence Medicare and Medicaid assignment rates?

The study was carried out by the Human Resources Research Center at the University of Southern California. The primary data base consisted of the claims records of three Blue Shield Plans, which were obtained and assembled by the Blue Cross and Blue Shield Associations.

Characteristics of Physician Reimbursement

The structure of Blue Shield physician reimbursement formed the institutional background of the study. Altogether, the three study Plans provided four types of health insurance programs called "lines of business." These were "usual-customary-and-reasonable" (UCR), indemnity, partial service, and Medicare ("customary-prevailing-and-reasonable"). The first three are private lines. No Medicaid data were available for the study. Although there are variations in reimbursement characteristics within the private lines depending on specific contracts, the basic reimbursement principles are as follows.

Payment in both UCR and Medicare programs is based on the "fee screen" method. The <u>amount allowed</u> by the Plan for a given service--known as the "reasonable fee"--depends on two dollar amounts or fee screens. The first of these, called the <u>Level 1 screen</u>, is the physician's median or modal charge for the service, and it is usually calculated over the prior year. The second, called the <u>Level 2 screen</u>, is a percentile in the area fee distribution for the service, and it is also usually calculated over the prior year. The reasonable fee for the service is then the minimum of the physician's Level 1 screen, the Level 2 screen, and the physician's actual charge.* In private business the Level 1 and Level 2 screens are called the "usual fee" and "customary fee," respectively. In the Medicare program they are called the "customary fee" and "prevailing fee," respectively.

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*In special circumstances such as where there is an unusual complexity of treatment, the reasonable fee may be the physician's actual charge, even though it exceeds the fee screens.

In turn, the amount paid by the Plan for the service is a fixed percentage of the allowance or reasonable fee. In private business it is ordinarily 80%, but it mav be higher. In the Medicare Program the figure is 80% after the patient's deductible is satisfied. (None of the three Plans had deductibles in its private UCR business during the studv period.) In Medicare the Level 2 screen is nominally set at the 75% percentile of the area fee distribution,* while in private business the screen is commonly higher--up to the 90th percentile. Consequently, UCR reasonables and amounts paid tend to be higher than Medicare reasonables and amounts paid.
In both private business and the Medicare program, the patient's copayment is the difference between the amount paid by the Plan and the physician's bill. However, the actual copayment rate depends on another institutional feature of reimbursement called benefit assignment or physician participation which we discuss below.

Reimbursement in the Plans' indemnity and partial service lines is based on "fee schedules." A scheduled fee is just a dollar amount listed by the Plan for the service, and the allowance for the service is the minimum of the scheduled fee and the actual charge. The amount paid by the Plan equals the allowance, and the patient's copayment is the difference between the physician's bill and the Plan's payment. On indemnity claims, copayment is the difference between the physician's charge and the amount paid by the Plan. On partial service claims, copayment varies in a manner described below.

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*Constraints on the growth rate of Medicare Level 2 screens have been in effect almost continuously since the beginning of the Economic Stabilization Program in 1972. As a result, Medicare Level 2 screens tend to be lower than the 75th percentiles.

The essential differences between fee screen and fee schedule payment are: (i) fee screen allowances vary with the physician while fee schedule allowances do not;* (ii) fee screen allowances are typically much higher than fee schedule allowances (generally 50% to 100% higher in the study plans); and (iii) fee screen allowances are usually updated much more frequently than fee schedule allowances. With one exception already alluded to and discussed below, reimbursement for indemnity and partial service claims is the same. However, to be eligible for a partial service policy, the subscriber's family income must not exceed a (generally low) ceiling. Indemnity contracts are not subject to this provision.

The amounts of physician reimbursement and patient copayment vary further within lines of business according to an arrangement known as "accepting benefit assignment" in Medicare and "physician participation" in the Plans' private business.** The physician who accepts assignment or participates agrees to accept the Plan's allowance as full payment for his service. In return for this agreement, he becomes eligible to be paid by the Plan rather than by the patient. In Medicare the physician can accept or refuse assignment on a claim-by-claim basis. In the Plans'

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*There are exceptions to the rule. Physicians whose reasonable fees equal Level 2 screens will have the same fee screen allowances. Those whose indemnity or partial service charges are below the scheduled fees will have different indemnity or partial service allowances.

**Medicaid programs have a similar arrangement, also called physician participation or, less often, accepting benefit assignment.

private business, participation is usually on an all-or-nothing basis. In the two study Plans which had them, the participation agreements were of the all-or-nothing kind.* The participation agreements applied only to UCR and, in one of the two Plans, to partial service business. They did not apply to indemnity claims, even those filed for participating physicians' services.

On assigned or participating claims, the physician's average revenue (i.e., the amount he receives) is the Plan's allowance--the reasonable fee in fee screen business--net of bad debt on the patient's copayment. The patient's copayment is therefore the Plan's allowance minus the amount the Plan pays. On nonassigned or nonparticipating claims, the physician's average revenue is his charge for the service, also net of bad debt on the patient's copayment. Copayment in this case is the physician's charge minus the amount paid by the Plan. As a result, the <u>net price</u> of services

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*It was observed in the study data that some physicians reported both participating and nonparticipating claims in the same year. This could have been due to reporting errors or to switches in participation status during the year. Since participating physicians were technically free to bill their patients, it may also be that some of them did so, and that the claims filed by patients were recorded as nonparticipating.

to patients (the out-of-pocket cost per unit of services) is typically higher for assigned/participating claims than for nonassigned/nonparticipating claims.* Similarly, the gross price of services (the physician's average revenue) is typically higher if he chooses not to accept assignment or participate than it is if he chooses to accept assignment or participate.

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*For example, copayment on an assigned Medicare claim is 20% of the reasonable fee after the deductible is satisfied. Given the same reasonable fees, copayment on a nonassigned Medicare claim is 20% of the reasonable fee plus the difference between the physician's charge and the reasonable fee, provided the former is higher than the latter. The same statements hold for participating and nonparticipating UCR claims, except that the copayment rate is a lower percentage of the UCR reasonable. On a participating partial service claim, the patient's copayment is zero, but on a nonparticipating claim, copayment is the difference between the physician's charge and the scheduled fee, again assuming the former is higher than the latter. Since participation does not apply to indemnity business, all indemnity claims are treated as if the physician were nonparticipating. Copayment is the difference between the physician's charge and the scheduled fee, subject to the condition that the charge exceeds the scheduled fee.

These characteristics of Plan reimbursement imply rather different structures of physician average revenue and net prices to patients across lines of business and physician assignment or participation status. The differences mandated special attention in this study, and they were taken into account in designing and carrying out the analysis.

The Data Base and Data Sources

The study's primary data were the claims records of three Blue Shield Plans, which we refer to as Plans A, B, and C. The Plans are located in the Midwest, East, and South, respectively. The claims data apply to approximately 65 high-utilization medical, surgical, and other procedures. For Plans A and B the data covered the years 1973-76. For Plan C they covered the years 1975-78. All three Plans provided records for their UCR business. Plans A and B furnished data for their indemnity business, and Plan B provided data on its partial service business as well. Plan B, the only Medicare carrier of the three, made its Medicare Part B data available for the study.

For each service, the Plans' claims record contained data on the following variables: (1) amount charged by the physician, (2) amounts paid and allowed by the Plan, (3) number of services, (4) county location of the service, (5) physician specialty, (6) physician participation status,* (7) setting in which the service was performed, and (8) age and sex of the patient.

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*The identifier of claim assignment status in Plan B's Medicare data was deleted before we received the data. As a result, no analyses could be conducted involving Medicare assignment.

At the outset of the study BCBSA constructed two analytical files for each Plan. In the first, the county in which the service was performed was designated as the unit of analysis. In the second, the individual physician was chosen as the analytical unit. To construct the second file, They developed, with the assistance of the American Medical Association, samples of physicians who practiced in each Plan's geographic area during every year of the study period. The data elements listed above were then organized for each physician in the file, and these were merged with physician-specific data such as specialty, age, sex, practice setting, board certification status, and country of medical graduation taken from the AMA's 1977 Masterfile of Physicians. Approximately 1,000 physicians were included in each Plan sample. They represented 14 different specialties.

County-level data on population demographics and medical supply characteristics were merged with both analytical files. These data were derived from several sources, principally the AMA's annual series, Physician Distribution and Medical Licensure in the U.S., and the Area Resources File created by the Manpower Analysis Branch, Health Resources Administration, U.S. Department of Health and Human Services.

Various minor editing tasks and data manipulations were necessary to carry out some of the analyses, but only three major operations were undertaken.

(1) It was known at the start of the study that the Plans might assign a single provider code to all physicians in a group or partnership practice. Since the physicians selected for the physician analytical file could be identified in the claims records only by provider code, this

meant that the claims of two or more physicians could be assigned to a single practitioner. To obviate the problem, a rule was established whereby group and partnership physicians were removed from the physician file if the volumes of their claims significantly exceeded the average volumes of solo physicians. The rule resulted in the editing out of from 3% to 11% of total volume of services in the physician files depending on the Plan and year.

(2) In order to utilize a single measure of output in the analyses, the numbers of procedures were converted into relative value units (RVUs). This was done with the use of the 1974 Revision of the California Relative Value Scale (CRVS). Because the units defined by the CRVS vary by specialty, a method was designed and implemented to standardize them across specialties. In the final county and physician analytical files, all units of physicians' physical outputs of services were expressed as RVUs.

(3) As noted above, some physicians in Plans A and B submitted both participating and nonparticipating claims in the same year. Because the Plans' participation agreements were on an all-or-nothing basis, a rule was established for the physician files in order to label each physician as participating or nonparticipating in a given year of observation. In Plan A a practitioner was defined as participating in a particular year if more than 5% of his RVUs in UCR business were submitted on a participating basis. In Plan B a practitioner was so defined if more than 5% of his RVUs in UCR and partial service business were submitted on a participating basis. The participation statuses of Plan B physicians having only Medicare claims were defined as unknown.

Physicians' Economic Motivation and Optimizing Behavior

Although physicians as a group may have many different types of entrepreneurial objectives, prior research has tended to focus on just three: profit maximization, utility maximization, and the pursuit of "target" net incomes. The first two are well known in economics, but the third has been developed over the past ten years to explain certain aspects of physicians' observed economic behavior.

The target net income hypothesis has usually been linked with the concept of physician-(or supplier-)induced demand. Briefly, it holds that physicians set income targets for themselves, based either on estimates of their peers' earnings or on subjective estimates of their own fair, reasonable, or appropriate earnings capabilities. Insofar as the markets for physicians' services are imperfectly competitive and physicians have "agency" relationships with patients, the hypothesis also holds that physicians can increase their net incomes by raising their fees, prescribing unnecessary services for patients--i.e., inducing demands--or both. Hence, it argues that physicians respond to forces that lower their actual net incomes below the targets by increasing their fees, generating demands, or both, unless public policy prevents them from doing so.

Two general kinds of conditions can cause Physicians' actual net incomes to fall below the target levels: an increase in local physician supply, which reduces the number of patients per physician, or constraints on the growth rate of fees. Throughout most of the 1970s, government policy did, in fact, actively promote the growth of national physician supply, and constraints on the growth rates of fees were imposed during the Economic Stabilization Program of 1972-74. In addition, the growth rate of Medicare

Level 2 screens has been limited since 1975 by the Medicare Economic Index. Under the target net income hypothesis, the expansionary manpower policy may have increased expenditures on physicians' services because it provoked increases in fees, demand generation, or both. Similarly, the constraints on fees and Level 2 screens may have increased the costs (paid benefits) of government and private health insurance programs because they gave physicians incentives to generate unnecessary demands. Thus, the target net income hypothesis implies that efforts to enlarge physician supplies inflate health care costs, and that fee controls must be accompanied by a system of utilization controls to prevent demand inducement.

To contrast these implications with those of the standard economic market model, suppose that physicians maximize either profit or utility, and assume that the markets for physicians' services are competitive. Under normal conditions, market demand and supply functions for physicians' services exist and are downward and upward sloped, respectively.

Consider first the effects of an increase in the supply of physicians. Ceteris paribus, an increase in the number of physicians shifts the supply-of-services function outward and lowers the market price level. The quantity of services supplied (and consumed) also increases, and total expenditures on physicians' services rise, are constant, or fall depending on whether the market demand is price elastic, unitary price elastic, or price inelastic. The quantity of services per patient also tends to increase. As a result, the behavior of quantity following an increase in physician supply may be much the same as the target net income hypothesis predicts. However, the hypothesis asserts that fee levels may rise, and the standard model predicts that they always fall. Under standard theory, then, an increase in physician supply may raise expenditures on physicians' services, but it improves patients' welfare because it means a lower price of care and improved access to physicians' services.

Next, consider the effects of controls on physicians' fees. They can be of two types--direct restraints on fees or limits on allowances (e.g., on Level 2 screens). Assuming that direct restraints achieve their purpose, they establish a ceiling on fees below the market-clearing level. In the standard model, the result is excess demand for physicians' services, a reduced quantity of services consumed, and a smaller total expenditure on physicians' services. Under the target net income hypothesis with demand inducement, physicians shift their demand functions outward to points where the consumption of services restores their net incomes to the target levels. In this case, total market consumption increases with respect to the equilibrium rate, excess demand is zero, and total expenditures on physicians' services may rise, remain constant, or fall.*

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*Actually, the implications of the target net income hypothesis are slightly ambiguous under these circumstances. If physicians were realizing their income targets before the fee controls, obtaining the same net incomes at lower fees would require an increase in output. However, if marginal and average production costs are increasing, it may be difficult for physicians to raise their net incomes regardless of the amount of demand inducement, inasmuch as increases in output could reduce net incomes.

When controls are imposed on allowances, their effects on physicians who participate or accept assignment are identical to those of fee ceilings. That is, the controls set ceilings on physicians' average revenues. Thus, the comparative statics of the standard and target net income hypotheses are the same whether controls are imposed on allowances or direct restraints are placed on fees. For physicians who do not participate or accept assignment, controls on allowances raise the net prices paid by patients (since reimbursement is a fixed percentage of allowances) and shift demand functions inward. In the standard model, the inward shift in demand leads to a decline in market fee levels and reductions in both the quantity of services and total expenditures on services. Under the target net income hypothesis, it can bring about a rise in fees (if market demand is sufficiently price inelastic), a fall in fees (if market demand is sufficiently price elastic), demand inducement without changes in fees, or some combination of changes in fee levels and demand inducement. Theoretically, the impacts on market quantities and total expenditures are equally difficult to predict. For instance, if physicians respond to the inward shift in market demand by inducing new demands, nothing prevents the new market equilibrium fees, quantities, and expenditures from being identical to their old values. In that event, there would be no change in any of the market variables after the imposition of allowance controls.

Because the implications of the target net income hypothesis are in large part indeterminate, it is difficult to design empirical tests to discern whether it or the standard theory best characterizes physicians' pricing and output behavior. However, the foregoing discussion suggests three approximate tests for distinguishing between the standard and target net income theories.

(1) Large physician-population ratios (i.e., large market supplies of physicians) should be accompanied by low fee levels if the neoclassical theory is correct. Hence, positive correlations between physician density and market fee levels support the target net income hypothesis over the standard theory.

(2) If demand inducement occurs, it should appear to shift the <u>individual physician's</u> average revenue function outward as the market supply of physicians increases. A positive partial correlation between the physician's average revenue and the area physician-population ratio therefore favors the target net income hypothesis. A zero or negative partial correlation argues against the hypothesis and favors the standard theory.

(3) If the standard theory is correct, fee controls and limits on the growth of Medicare Level 2 screens should have retarded the growth rates of Medicare fees and quantities of services during the ESP of 1972-74. If Medicare fee levels were unaffected during this time or Medicare quantities increased, the findings would support the target net income hypothesis.

Each of these tests was carried out in the course of the study, but with somewhat ambiguous results. Test (1) was performed both descriptively and as an aspect of estimating cross-sectional charge regressions for the sampled physicians. In the descriptive findings, we found no significant simple correlations between charge levels and county physician density in any of the three Plans. Beyond that, about half of the signs on the correlations were negative. The results consequently did not support the target net income hypothesis. On the other hand, in the charge regressions the partial correlations between charges and county physician population ratios were significantly negative in Plan A and significantly positive in Plans B and C.

These estimates--which are more reliable than simple correlations--are indicative of demand inducement in Plans B and C, but not in Plan A.

Test (3) was applied to Plan B's Medicare Business. Descriptive findings showed that, between 1973 and 1974, Medicare fees rose at less than half the rate of fees in the Plan's private business, on which there were no allowance controls during the ESP. Unfortunately, we could not observe the quantities of Medicare services per user, and we were forced to measure them on per physician and per enrollee bases instead. The quantity of services per physician grew by nearly 40% between 1973 and 1974, and the quantity per enrollee increased substantially in all fields but the medical specialties. Thus, the behavior of fees during the last year of the ESP conformed to the predictions of both the standard and target net income theories, while the behavior of Medicare quantities was as predicted by the target net income hypothesis.

Although the evidence from test (3) seems to support the theory of demand inducement, two factors prevent drawing any firm conclusions. First, there was a moderate growth of Medicare quantities throughout the study period, and it is hard to say whether the high growth rate of quantities during 1973-74 actually reflects demand inducement, or whether it was a part of the overall trend. Second, the growth of Medicare quantities was accompanied by a decline in the quantities of private services per physician, and the decline was especially pronounced in 1973-74. It is reasonable to infer that the sharp increase in Medicare quantity in 1973-74 was at least partly caused by a shift away from private business. Neither the standard nor target net income hypotheses predicts such a shift, and it is particularly puzzling in view of the relatively low levels and growth rates of Medicare fees in 1973 and 1974. For these reasons, we judge the results of test (3) to be inconclusive and find that the appearance of demand inducement for Medicare services may have been due to unexplained and unobserved factors.

To carry out test (2), we formulated and estimated an econometric model of the individual physician's practice. The model was designed to reveal whether physicians typically maximize profit, maximize utility, or pursue target net incomes. Theoretically, it is known that all three types of optimizing behavior can yield the same pricing and output policies under special conditions. However, our objective was to determine whether physicians can be described generally as profit maximizers, as utility maximizers who do not induce demands, or as target net income pursuers who do not maximize profit.

A two-stage procedure was incorporated into the physician econometric model in order to perform test (2). The first-stage test called for rejection of the profit maximization hypothesis if there were systematic differences between estimated marginal revenue and estimated marginal cost at observed outputs. When the model was estimated, the first-stage test indicated that profit maximization could be rejected for Plan A physicians and for (participating) physicians in Plan B who provided Medicare services. For physicians in Plan C and those providing non-Medicare services in Plan B, it was not possible to reject the profit maximization hypothesis.

The second-stage test was meant to distinguish between utility-maximizing and target net income behavior. If the physician did not maximize profit (as revealed by the first-stage test) and his average revenue was not significantly positively correlated with the county physician-population ratio, the implication was that he maximized utility. If he did not maximize profit and his average revenue was significantly positively correlated with the county physician-population ratio, the implication was that he induced demands and was probably a target net income seeker. Execution of the second-stage test led to rejection of the utility maximization hypothesis and tentative acceptance of target net income achieving behavior for Plan C physicians and for Plan B physicians providing Medicare services.

The results of test (2) are shown in the table below, where they are compared with the outcomes of tests (1) and (2). The test results were generally consistent. There was no evidence of demand inducement in Plan A,

RESULTS OF TESTS FOR PHYSICIANS' OPTIMIZING BEHAVIOR

Plan	Test (1)	Test (2)	Test (3)
A	Not target net income achievers	Utility maximizers	Not applied
B Private business	Target net income achievers	Profit maximizers	Not applied
Medicare		Target net income achievers	Possibly target net income achievers, but results ambiguous
C	Target net income achievers	Probably target net income achievers, but results ambiguous	Not applied

and it was concluded that Plan A physicians maximized utility. In Plan B, tests (2) and (3) indicated the probable existence of demand generation for Medicare services, but not in the Plan's private business. To perform test (1) on Plan B, private and Medicare business were aggregated, and since Medicare business represented about half of physicians' total observed outputs, demand inducement for Medicare services may have given the appearance of demand inducement in the aggregate. In Plan C, tests (1) and (2) both suggested the existence of demand inducement, although the test (2) results were partly consistent with profit maximization.

On balance, then, we could not reject the target net income hypothesis, but the analyses implied that pursuing a target net income is not a universal form of physician optimizing behavior. Indeed, it appeared that no single type of optimizing behavior best characterizes physicians. Why the type of optimizing behavior evidently varied across Plans is a difficult question to answer. The variation over Plans may have been due to regional differences in management practices, but it is not clear why physicians in the same Plan tended to exhibit different optimizing objectives depending on the line of business. The tests may, of course, have been biased, and it is also possible that the variations in objectives were more apparent than real. In terms of pricing and output policies utility maximizing behavior can be very similar to either profit maximizing or target income behavior. Hence, contingent on physicians' particular tastes, one could observe what appeared to be profit maximizing or target net income behavior even though in the narrow sense physicians' maximized utility. The results obtained here do not indicate an urgent need for policies to counteract the effects of demand inducement. However, if physicians' propensities to generate demands depend on their tastes and those tastes vary over time or with market conditions, the problem deserves continued attention and monitoring.

Physicians' Pricing Behavior: Competitive or Monopolistic?

A firm is said to be competitive or perfectly competitive if its average revenue function is infinitely elastic in price (horizontal in quantity) at the going market price level. The firm is said to be imperfectly competitive, monopolistic, or to have market or monopoly power if its average revenue function is finitely price elastic (downward sloping in quantity). The monopolistic firm can raise the price of its product by reducing its output. The competitive firm cannot, and if it raises its selling price over the market price level, it loses all of its customers to its competitors.

Because of restricted entry into the profession and consumers' ignorance of medical procedures, it has often been argued *a priori* that the physicians' services markets are noncompetitive. If the argument is correct, it has several implications for the economic performance of the markets.

First, the size of the long-run profit or net income the physician can earn increases as his market power increases. The physician may choose not to exploit his market position, but if he does, his monopoly profit adds to health care costs. Second, in noncompetitive markets physicians are not compelled to be efficient, and, insofar as noncompetitive markets permit managerial slack, they also add to health care costs.

Third, most formulations of the target net income hypothesis assume that physicians possess some degree of market power, since otherwise they are unable to raise their fees as a means of achieving income targets. A finding that physicians do not possess significant market power *tends* to weaken the target net income hypothesis and to undermine the hypothesis' implications for market performance. However, it has never been established how little market power is necessary to induce demands. For example, consumers may be much more knowledgeable of, and sensitive to, fee differentials than they are of the quantities of services needed to treat illnesses. If this is the case, physicians' abilities to generate demands may be compatible with rather highly elastic average revenue functions.

Fourth, noncompetitive firms are better or more quickly able than competitive firms to pass along increases in input prices in the form of higher prices to consumers. Hence, the physicians' services are vulnerable to the cost-push type of price inflation to the extent that they are noncompetitive. Our analyses of the effects of fee screen reimbursement suggested further that the inflationary incentives embodied in the system are strongest in the least competitive markets. The problem of reimbursement-related fee inflation is therefore likely to be most severe if the markets are highly monopolistic.

Although imperfections in market structure can usually be approached most successfully through public policy to revise structure, reimbursement policy can be used to mitigate some of the deleterious performance effects of market power. For instance, tighter controls on fees can be expected to have a constraining impact on monopoly profit, the costs of inefficiency, and the rate of fee inflation. As we have already remarked, demand generation can be counteracted by a system of utilization controls.

To study the question of physicians' market power, average revenue functions were specified as one aspect of the physician econometric model described in the preceding section. The functions were estimated for six subsamples of physicians who provided nonparticipating UCR, nonparticipating partial service, indemnity, and Medicare services in the three Plans.* The

*Data on participating services could not be used because the current-year average revenue functions for participating services are fixed at the Plans' allowance levels. To the degree that physicians providing Medicare services accept assignment, it would also tend to appear that Medicare charges are independent of output. This problem may have biased the estimators of the slopes of Medicare average revenue functions toward zero.

estimated price elasticities of the average revenue functions should have been large in absolute value if practices are competitive and close to -1 if practices possess considerable market power.*

The estimated price elasticities of the average revenue functions ranged from -3.0 to -23.5. In three of the six subsamples, the slopes of the functions were not significantly negative--meaning that in those subsamples the functions were not statistically distinguishable from the average revenue functions of perfect competitors. The findings consequently suggest considerable variation in the degree of competitiveness of the physicians' services markets. They show that physicians' markets can be categorized generally as being at the more competitive rather than the less competitive end of the spectrum of market structures.

Curiously, the results seem to show that significant market power is neither necessary nor sufficient for demand inducement to occur. In PlanC, where the evidence of demand inducement was strongest, physicians' average revenue functions appeared to be highly price elastic. Yet in Plan A, where there was no evidence of demand inducement, the price elasticities of average revenue were relatively low. The contrast may well underscore both the unpredictability of physicians' optimizing behavior and its variability over different groups of providers.

The findings also have mixed implications for physician reimbursement policy. On the one hand, they do not preclude the possibilities of monopoly profit, inefficiency, or excessive fee inflation in some markets. Hence, they do not conclusively rule out the need for selective remedial policies. But they indicate monopoly performance is probably not characteristic of the markets as a whole, and they do not support the need for drastic or sweeping revisions of present reimbursement policy toward physicians.

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* Unless physicians are target net income achievers, one would never expect to observe price elasticities between -1 and 0 because in that event practices could increase their net incomes by reducing their outputs and raising their charges.

Fee Screen Reimbursement and Charge Inflation

It has long been argued by health economists and others that fee screen reimbursement is inflationary. One part of the argument holds that the reimbursement mechanism enables physicians to raise their charges over time. That is, a rise in the physician's reasonable fees (allowances) between last year and this year lowers the net prices his patients pay if the physician does not raise his charges. Hence, the physician can raise his charges without affecting net prices--i.e., without affecting the quantities of his services demanded--and the reimbursement mechanism permits him to do so.

The second and stronger part of the argument claims that physicians exploit the mechanism by raising their charges in order to raise next year's reasonable fees. In essence, it states that a rise in next year's reasonable fees allows the physician to raise his average revenue and net income over this year's levels. The rational, income-motivated physician therefore establishes an optimal or desired level of reasonable fees for next year, and sets his current charges so as to achieve it. If the hypothesis is correct, it implies not only that fee screen reimbursement perpetuates fee inflation, but that it actively encourages physicians to raise their charges over time.

The relationships between the rate of charge inflation and fee screen reimbursement were explored in two ways. First, descriptive comparisons were made between inflation rates in different lines of business. If physicians did set their prices in order to exploit the fee screen mechanism, one would expect lower rates of charge inflation in lines of business like indemnity and partial service where reimbursement was based on infrequently updated fee schedules. Second, we specified and estimated three dynamic regression equations incorporating different hypotheses about physicians' propensities to raise their UCR and Medicare charges over time.

The results were generally mixed. The descriptive comparisons showed that charge inflation rates were almost identical in the physicians' private lines of business, regardless of the type of reimbursement and frequency of updating allowances. However, the rate of Medicare charge inflation was significantly lower than the rate for private business in Plan B, particularly during 1973 and 1974 when strict ESP controls on Medicare allowances were in effect.

These rather anomalous findings appear to have a simple explanation. If the rates of charge inflation vary across lines of business for any reason, it must follow that physicians discriminate in price over their patients' insurance coverage. As reported below, there was little evidence that physicians did, in fact, discriminate in price over their private lines of business, although we found that individual practitioners tended to charge slightly lower prices for their Medicare patients than private patients in Plan B. As a result, the patterns of charge inflation could reflect the absence of price discrimination over patients' private coverage, and some tendency for discrimination in favor of Medicare patients.

The low rate of charge inflation for Medicare services in 1973 and 1974 clearly suggests the influence of controls on the growth rates of Medicare Level 2 screens. The question remains, of course, why controls on Medicare allowances evidently did restrain charge inflation in Medicare business, while much stronger controls on the Plans' fee schedule allowances (nearly all of the fee schedules were not updated during the study periods) did not. As we also argue below, the answer may lie in the relative sizes of the sample physicians' Medicare and private fee schedule business. In all three Plans, fee schedule business represented a relatively small percentage of physicians' total outputs. Conversely, in Plan B Medicare business comprised 30% to 80% of physicians' total observed outputs, depending on specialty. Thus, it may have been unprofitable for the physicians to discriminate in price among their private patients, but it could have paid them to discriminate in favor of Medicare patients because of the large sizes of their Medicare clienteles. If this were the case, one would expect to observe a lower rate of charge inflation for Medicare services than for private services.

Two of the three regression equations gave implausible or ambivalent implications regarding physicians' dynamic pricing behavior. However, in both cases it seems likely that the models were conceptually inappropriate or econometrically misspecified. The third, and most theoretically defensible, of the equations showed that physicians tend to establish desired reasonable fee levels for their UCR and Medicare services, and that they tend to raise their current charges in order to attain next year's reasonable fee targets. The parameters of the equation also indicated that physicians typically do not realize the full amounts of their target reasonables. The result could have been due to Level 2 screens, and this appeared to be largely true for Medicare services, but it could have been due to inefficiencies or miscalculations in physicians' pricing policies. In the two Plans that offered participation agreements, nonparticipating physicians seemed to be more sensitive than participating physicians to fee screen pricing incentives, and they achieved much the larger percentages of their desired annual increases in reasonable fees.

Overall, the analyses imply that:

(1) Fee screen reimbursement embodies inflationary pricing incentives.

(2) Physicians generally respond to these incentives by pursuing inflationary pricing policies.

(3) Constraints on the growth rates of reasonable fees--i.e., on Level 2 screens--are likely to retard the rate of charge inflation only if they apply to a significant share of physicians' business.

(4) Constraints on the magnitudes and growth rates of Medicare Level 2 screens encourage physicians to discriminate in price against private-paying patients. Thus, they may--and probably did among the sample physicians--bring about cost-shifting away from Medicare patients and to the privately insured and uninsured sector.

Price Discrimination

Price discrimination is said to exist if a firm sells the same product under the same conditions to different buyers at different prices. It is generally associated with the possession of monopoly power by the firm, and it can occur only if markets are segmented (i.e., the seller can group buyers into different groups and buyers cannot resell the commodity to one another). Price discrimination is usually viewed as a means by which the firm can increase its profit. That is, rather than charging the same price to all customers, the firm staggers its selling prices to buyers according to their willingness and ability to pay. The effect on buyers as a group is to reduce their "consumers' surplus"--the area under their demand function and over the firm's selling price(s) which represents the extra utility buyers receive by paying less for the commodity than the maximum amount they would have been willing to pay. Thus, the normal effect of price discrimination is to reduce consumers' welfare.

In the physicians' services markets, the historical use of the "sliding fee scale" (setting charges according to patients' incomes) has often been labeled as price discrimination. To the extent that the sliding scale resulted in the treatment of patients too poor to be cared for, its welfare implications are not entirely clear. However, it has been argued that the sliding scale was evidence both of physicians' monopoly power and of their tendencies to extract monopoly profits from patients.

In this study the issue of price discrimination was addressed through analyses of the prices charged to patients with different insurance coverage. Insurance coverage naturally segments the demands for physicians' services, and it also provides incentives for physicians to discriminate because it involves different rates of patient copayment and net prices, given the same gross price of services. Because data on production costs were not available, we could not determine whether differences in fees across coverage actually signified price discrimination. Since the physician can vary the quantity or quality of his services with the average revenue he expects to receive, fee differences may reflect cost differences, and in that event fee variation does not necessarily represent price discrimination. On the other hand, identical or closely similar fee levels over different types of insurance coverage suggest a homogeneous package of services provided to patients and the absence of price discrimination.

When the charges of individual physicians were examined, we found no evidence of fee variation across private lines of business in any of the three study Plans. This rather strongly indicates the absence of price discrimination in physicians' private business. On the other hand, in Plan B there were statistically significant differences between physicians' Medicare charges and those in private business. In three of the four broad specialty strata--general practice, the medical fields, and the surgical fields--physicians' Medicare charges were lower than their charges in private UCR business. In the fourth stratum--the non-medical, non-surgical fields--the reverse was true. Thus, the results show that physicians discriminated against Medicare patients in the non-medical, non-surgical specialties, but in favor of Medicare patients in the other specialties.

The anomalies in the evidence may raise more questions than answers for reimbursement policy. For example, the absence of price discrimination in private business occurred in spite of large differences in allowances and net prices between lines of business, and it is generally consistent with our findings showing that the markets are relatively competitive. But the charge variations between Medicare business and private business in Plan B occurred in the presence of large differences in allowances.

These results could indicate differences in the degree of physicians' market power between the Medicare and private lines, or they could indicate differences in physicians' willingness to exploit their market power. They could also suggest that physicians do not discriminate in price across minor lines of business. As we remarked above, UCR outputs were somewhat larger than outputs in the other private lines, and it may not have paid physicians to set separate charge levels for small groups of patients in those other lines. Medicare business did, however, comprise a substantial portion of physicians' observed outputs in Plan B, so in this case there may have been income incentives for many physicians to establish separate Medicare charge levels. If that interpretation is correct, Medicare reimbursement policy is partly responsible for what appears to be price discrimination mostly favoring Medicare patients. The policy segments consumers of physicians' services, and it also encourages price discrimination through its system of low Medicare allowances and high net prices to patients. Moreover, any effort to constrain Medicare allowances or to raise the net prices of services to Medicare patients is likely to increase the subsidization of Medicare services by non-Medicare patients.

Physicians' Pricing Patterns

The study examined the correlates of physicians' charges through the use of univariate descriptive methods and multiple regressions fitted to cross-sectional charge data for physicians in each Plan. The major issues considered were the effects on charge levels of physician product differentiation, market conditions, and reimbursement methods.

If physicians' services are heterogeneous and the degree of consumer ignorance of the services is moderate or large, charge levels should appear to vary significantly with measures of product differentiation. Regardless of the extent of product differentiation, charge levels should, of course, also vary significantly with measures of the strength of local demands, input prices, competition, and any other factors characterizing market conditions. To carry out the analyses, proxies for product differentiation were defined as the physician's specialty, age, sex, practice setting, professional and educational background, intensity of hospital practice, and patient-mix. Proxies for market conditions were specified as county per capita income, degree of urbanization, percentage of elderly in the population, physicians' office personnel salary rates, and the physician-population ratio.

The descriptive tabulations and multiple regressions both yielded much the same results. Charge levels tended to be highest for physicians who were specialists, board-certified, graduates of foreign medical schools (FMGs), young, not in solo practice, and whose outputs were provided largely in office settings. However, the regressions indicated in many instances that the tendencies were either not statistically significant or else not systematic across Plans. In addition, the effects of the proxies on charge levels were generally numerically small, and in some cases the associations are hard to explain as the consequences of product differentiation alone. For example, if the relatively high charge levels of FMGs are attributed to a high level of service quality, it contradicts most opinion on the relative quality of U.S. and foreign medical graduates.

Admittedly, the proxies for product differentiation are limited. But subject to that qualification, they tend to show that the degree of product differentiation in the physicians' services markets is not very great. The result is consistent with our findings that physicians' average revenue functions are moderately to highly price elastic. Strongly significant associations between sellers' prices and their (or their product) characteristics would be indicative of important market imperfections, and they would generally imply low elasticities of sellers' average revenue functions. Thus, the evidence here tends to confirm the inference that physicians are competitors or monopolistic competitors rather than monopolists or oligopolists selling a highly differentiated product.

Most of the proxies for local market conditions also appeared to have little effect on physicians' charge levels. County per capita income was positively related to charge levels in all three Plans, and the relationship was statistically significant in two. This suggests that charges increase as the strength of demand within markets increases. However, charges were either not significantly or not systematically associated with the other four market variables. For instance, they were significantly positively related to the percentage of elderly in the county population in one Plan, significantly negatively related to the percentage in a second, and very weakly negatively related to the percentage in the third. There are no immediately obvious explanations for the patterns.

When the physician's average allowance level was added to the list of explanatory variables in the regressions, it was found to be highly positively correlated with the physician's charges. Moreover, the inclusion of allowances roughly doubled the explanatory power of the equations. This result is puzzling since, insofar as allowances reflect the physician's prior-year charges, they should have had the same predictive capabilities as the proxies for product differentiation and market conditions. That is, if allowances embodied only the lagged effects of product differentiation and market conditions, they should not have had strong, separate effects on charge levels.

The fact that they did have strong, separate effects suggests any of three possibilities. First, the proxies for product differentiation and market conditions may have been inadequate. If this is true, it seriously weakens inferences that can be drawn from the regressions. And since the same or similar proxies have been widely used in other studies of physician pricing and the demands for physicians' services, it also raises more far-reaching questions about the reliability of some of what is thought to be known about physicians' practices.

Second, the theoretical relationships between price levels and product differentiation, seller concentration, the composition of demand, and other elements of market structure hold only when markets are in (or approximately in) long-run equilibrium. Since the study periods were times of inflationary pressures on physicians' fees, the physicians' services markets were clearly not in long-run equilibrium. On the one hand, this implies that one should not necessarily expect to find significant or predictable associations between charges and industry structure. On the other, it indicates that time trends may be the most powerful predictors of current charge levels. If time trends are the strongest predictors of fees, it could easily explain why current charges were closely correlated with allowances, inasmuch as the latter are based on lagged fee levels.

Third, it may have been the case that reimbursement methods had more powerful influences on physicians' pricing policies than the characteristics of the services or their markets. The findings on fee screen reimbursement and pricing discussed above lend at least some support to this interpretation. If reimbursement mechanisms encourage physicians to follow similar pricing policies or free them from competitive pressures, charge levels would tend to vary more with allowances than with elements of market structure or physician characteristics. This may also be what the regression estimates reveal.

Variables measuring the percentages of the physician's outputs in non-fee screen business were included as regressors to investigate the impact of differences in allowances on charge levels. It was hypothesized that: (1) charge levels increase as allowance levels increase because, other things equal, higher allowances mean lower net prices to patients; and (2) the physician's average charge level falls as the percentage of his non-UCR business increases because allowances are lower in non-UCR business than in UCR business.* On these grounds, it was expected that charge levels would

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*The hypotheses do not necessarily imply that physicians discriminate in price across patients by insurance status. Both hypotheses could be true even if physicians charged the same fees to all patients.

be negatively correlated with the percentages of the physician's outputs provided to patients covered by indemnity contracts, partial service contracts, and Medicare.

The regression results tended to confirm the expectation and its underlying hypotheses. Out of a total of five coefficients estimated in the three Plan regressions, three were significantly negative, one was nonsignificantly negative, and one was significantly positive. In all instances, the numerical effects on charges of changes in the percentages of non-UCR business were small. For example, the estimates showed that a ten-point increase in any of the percentages would have produced a reduction in charge levels by 1% or less. Consequently, variations in allowances and patient copayment rates among physicians' lines of business seem to have little impact on physicians' average charges.*

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*Most of the coefficients on the percentages of non-UCR business became positive when average allowances were entered into the regressions as predictors. While this suggests a perverse relationship between charges and allowance levels across lines of business, it is more likely the result of interactions between the percentages and average allowances. To see this, let P and A denote the physician's average charge and allowance, respectively. Then if, as we just argued, P is essentially constant as the percentage of non-UCR business increases, the difference P - A increases as the percentage rises (because A falls). But the regression shows only the partial effect of a change in the percentage, assuming that A is fixed. Hence, holding A fixed would make it appear that P increases with the percentage when, in fact, it does not.

Physician Participation

In terms of patient welfare, the purpose of physician participation and benefit assignment arrangements is to increase access to care. Given the same charge or gross price for a service, the net price paid by the patient can never be higher on a participating/assigned claim than on a nonparticipating/nonassigned claim. But if, as is usually the case, the physician's charges exceed his allowances, the net prices on participating/assigned claims are lower than on nonparticipating/nonassigned claims. Other things equal, it is therefore understandable why government reimbursement policy seeks to increase the participation and assignment rates of physicians.

In this study, physician participation rates in two of the study Plans were examined descriptively and analytically. The descriptive results showed that physicians with the highest participation rates tended to be general practitioners, foreign medical school graduates, not board certified, female, and not in group practice. They indicated further that participating physicians had somewhat lower charge levels than nonparticipating physicians. Other associations between participation tendencies and physician, practice, and patient traits were not consistent across the two Plans.

Because of the inherent limitations of univariate descriptive methods, participation tendencies were next estimated in the context of a regression model of the participation decision. Fundamentally, the model hypothesized that the decision depends on the relative income opportunities of participating and not participating.* Exogenous variables were included in the regression

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*This is not tantamount to an assumption of profit maximization, since utility maximizing and target net income achieving physicians may also be sensitive to relative income opportunities.

to represent the economic conditions facing physicians.

Like the descriptive findings, some of the regression results were not consistent across Plans. For example, there were no systematic relationships between the probability of participating and the physician's age, type of practice, or county characteristics. And unlike the descriptive findings, the regressions indicated that physicians in certain other fields were about as likely to participate as general practitioners. Pediatricians had about the same participation rates as general practitioners (as did physicians in some of the referral specialties), but internists had much lower rates. This makes it difficult to say that primary care physicians as a group had either higher or lower participation rates than physicians in the referral fields.

Nevertheless, the regressions yielded three strong and important results. First, they showed that increases in allowances (reasonable or scheduled fees) significantly raise participation rates, and that the sensitivity of the participation decision to increases in allowances rises markedly with the physician's output in lines of business where he is eligible to participate. In general, the results suggested that allowance levels are the dominant factor in participation decisions.

Second, physicians with characteristics commonly associated with a relatively low quality of services had the highest participation rates. These characteristics include graduation from a foreign medical school, lack of board certification, and low charge levels.

Third, market factors outside the control of reimbursement policy had highly important impacts on the time trends of participation rates in both Plans. In one Plan, a large increase in county per capita income was accompanied by a substantial decline in the participation rate over the study period. In the second Plan, a large increase in office wage rates over the study period had a substantial depressing effect on the participation rate. But the effect was mostly--and fortuitously--offset by changes in unobservable factors (proxied by time dummies) which tended to raise the rate.

More than anything else, the findings underscore the normative problems inherent in policy to maintain participation or assignment rates. The first implies that policy must contend with tradeoffs between promoting access to care and containing the costs of health care to government. Raising allowance levels is the only powerful and direct tool for increasing assignment or participation rates, but when allowance levels rise, so do program benefit costs which are tied to them. Thus, there is a measurable increase in program costs associated with a policy to increase access to care by raising participation or assignment rates.

The second finding indicates that policy must also face tradeoffs between promoting the quality of physicians' services and containing health care costs. If physicians who do not participate (or, by analogy, do not accept assignment) consist disproportionately of those of the highest quality, any effort to increase their participation rate by raising allowances inflates benefit costs. Conversely, anti-inflationary limits on the growth rates or levels of allowances have a strong likelihood of discouraging participation by high-quality physicians. This is a particular problem for the Medicaid program, in which eligible patients can be treated only by physicians who participate in the program.

The third result shows that policy concerning participation or assignment rates can be vulnerable to external shocks. That is, market conditions may independently increase or lower the relative profitability of participation/assignment to physicians, and they may do so significantly and rapidly. If the relative profitability of participation/assignment rises, it brings a windfall gain to policy administrators. In that case, allowance levels and program costs can be reduced with no loss in terms of access to care or service quality. But if the relative profitability of participation/assignment falls, administrators must decide whether to permit participation/assignment rates to decline, or whether to maintain the rates at their old levels and to incur the accompanying increase in program costs.

Conclusion

The results of this study convey an impression of the physicians' services markets as competitive or monopolistically competitive--tending to be more competitive than oligopolistic in terms of their pricing conduct, and characterized by at most a moderate degree of product differentiation. Although physicians did not typically appear to maximize profit, nearly all indications were that they are income motivated. In the most general terms, this suggests that income incentives to achieve special reimbursement goals can be incorporated into policy and be expected to have predictable consequences. It also suggests that policy may inadvertently contain income incentives that can and will have adverse welfare effects.

There was considerable evidence of variability in physicians' pricing and output behavior across Plans, and in some cases across lines of business in the same Plan. For example, the incidence of apparent demand generation varied by Plan and line of business. Thus, even though the problem of demand generation is evidently not a pervasive one for reimbursement policy, it may be significant in certain geographic areas or for certain types of health insurance coverage. By the same token, an across-the-board program of utilization controls or similar restrictions to limit demand generation is likely to be unnecessary in many instances, and its administrative costs could easily exceed its savings.

The results do not suggest novel or ideal solutions for curbing fee and benefit cost inflation, maintaining access to physicians' care, and promoting the quality of services. However, they do raise serious doubts that ways can be found of satisfying all current policy objectives simultaneously.

With respect to one overriding issue--the costs to government (and the public) of Medicare and Medicaid--the empirical evidence clearly indicated that the customary-prevailing-and-reasonable method of physician reimbursement is inflationary. It also strongly indicated that raising beneficiaries' copayment rates is (as theory argues it should be) an effective means of counteracting fee and benefit cost inflation. Copayment rates can be raised in several different ways: restricting the levels and growth rates of fee screens, reducing the frequency of screen updating, raising coinsurance rates, and raising deductibles. However, in each case the rise in the net prices beneficiaries must pay automatically reduces access to care. It may, as some of the findings implied, lead to price discrimination against privately insured patients and cost shifting away from public to private insurance programs. And any constraint on reasonable fees is highly likely to reduce physicians' willingness to accept benefit assignment, particularly if the physicians are of high quality.

Other solutions to the inflation problem do, of course, exist. Price controls can be imposed on physicians' fees, special taxes can be created to recapture physicians' inflationary gains in earnings, or, as some authors have proposed, the physicians' services markets can be made more competitive by revising health insurance purchases in a way that encourages market entry by low-priced health maintenance organizations. But, to varying degrees, these types of actions are either politically unrealistic, expensive and hard to administer, or of unproven workability in the long run. Chiefly, then, this study's results show that difficult choices must be made between containing the costs of medical insurance programs--whether public or private--and continuing to subsidize the demands for physicians' services on a massive scale.

CHAPTER II

GENERAL CHARACTERISTICS OF BLUE SHIELD PLAN AND MEDICARE REIMBURSEMENT

The Blue Shield Plans which provided the basic data for this study are part of the largest group of health insurance carriers in the nation. Although the types of insurance they offer and the methods of reimbursement they employ are not unique to the Blue Shield segment of the health insurance industry, they merit attention as part of the background of this study. Accordingly, this chapter gives a broad overview of Blue Shield insurance and reimbursement in order to define the study's institutional framework.* It concludes with a short discussion of the reimbursement characteristics of the three Plans included in our study.

Blue Shield Plans are independent nonprofit organizations, but they have many features in common. They were formed by, or with the sponsorship of, medical societies to provide coverage mainly for in-hospital physicians' services, and their benefit packages retain much of this emphasis today. Inpatient procedures represent a disproportionately large share of their covered services, and certain office procedures which are covered, for example, by Medicare are not necessarily covered in the Plans' private contracts. Services produced by hospitals and other medical facilities are ordinarily covered by other carriers. In most areas the "other" carrier is Blue Cross, and frequently Blue Shield and Blue Cross are jointly operated.

All Blue Shield Plans supply health insurance to private groups and individuals. In addition, many Plans are intermediaries for Medicare,

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* It must be emphasized that there are many exceptions to the generalizations about Plan characteristics and policies described below. The discussion is meant to provide a basic general description of insurance and reimbursement structures.

fiscal agents for their states' Medicaid programs, or both. Plans acting in these capacities accept, administer, and pay claims for services produced for Medicare or Medicaid enrollees. They are then reimbursed for their direct and administrative costs by the Federal and state governments.

The Plans offer an array of private health insurance packages which vary considerably in terms of their prices, scope and dollar value of benefits, reimbursement features, and the like. Nevertheless, each Plan sells one or more of three principal types of insurance:

(i) Usual-Customary-and-Reasonable (UCR)

(ii) Indemnity, and

(iii) Partial Service

The Plans refer to business activity associated with each of these types of insurance as a private <u>line of business</u>, and this terminology will be used hereafter.

The basic structure of Plan reimbursement is the same for each of these three types of insurance. Claims presented to the Plan identify the services produced by the physician and the <u>amount charged</u> for each service. As an integral part of its reimbursement process, the Plan sets a maximum amount it will pay for the service. Depending on the line of business and contract, this maximum amount is generated either by a <u>fee screen</u> (or fee screens) or by a fixed <u>fee schedule</u>. Fee screens are generally established separately for each physician and each service. Fee schedules are established separately for each service but not for each physician. The setting of fee screens and schedules will be considered in more detail below. For purposes of discussion, at this point, we assume the screens/schedules are predetermined. The Plan then sets the <u>amount allowed</u> for the service as the lower of the amount charged by the physician and the fee screen(s) or scheduled amount--i.e.,

$$\text{Amount allowed} = \min \left[\text{amount charged, fee screen(s)/schedule amount}\right].$$

Finally, the amount paid by the Plan for the service is the amount allowed minus the patient's copayment. The copayment consists of deductibles, if any, and/or any coinsurance the contract requires the patient to pay above the deductible amount.*

Physician participation is a common institutional feature of Blue Shield Plans which affects the amount of the patient's copayment, the person or agency receiving reimbursement, and the provider's revenue. For the Plans which have them, a participation agreement is an arrangement between the Plan and the provider of physicians' services under which the latter:

(i) agrees to accept the Plan's allowance for a procedure as payment in full,** and/or

(ii) is reimbursed by the Plan rather than paid by the patient.

The Plan may require (or the physician may elect) to participate across the board--that is, participate on all claims--or he or she may be allowed to participate on a claim-by-claim basis.*** Insofar as condition (i) applies

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* For simplicity, we ignore deductibles in what follows. Deductibles may, however, have a highly significant effect on demands and physicians' pricing policies if they are sufficiently large.

** Participation does not necessarily imply that the patient's copayment is zero.

*** Some Plans allow physicians to select the lines of business in which they will participate even if they do not permit claim-by-claim participation. However, the most common practice appears to be all or nothing participation in all lines of business except indemnity. Also, as is discussed below, in one of the study Plans the procedure for processing claims submitted by patients rather than the physicians directly created the possibility of claim-by-claim participation.

to a participation agreement, participation is a device for containing the costs of physicians' services. However, it is also a marketing device by which Plans attract insurance buyers, and it may have advantages for physicians as well. Although the participating physician is not free to set his revenue per service arbitrarily, reimbursement by the Plan eliminates some or all of the risk (cost) of bad debt and may lower the cost of interest foregone on delayed payment.

Participation agreements normally apply only to UCR and partial service insurance, and not to the indemnity line. Nonparticipation physicians who sell services to UCR and partial service patients can bill and receive payment from their patients, and the patients then file claims for reimbursement from the Plan. In indemnity business, a participating physician may be reimbursed by the Plan, but he or she is not constrained to accept the Plan's allowance as full payment.

The nature of the patient's copayment varies with both the physician's participation status and line of business. Under UCR contracts, the amount paid by the Plan is a percentage--usually 80% to 100%--of the amount allowed. On participating claims, copayment is therefore a percentage--usually zero to 20%--of the Plan's allowance. On nonparticipating claims, copayment is the same percentage of the allowance plus the difference, if it is positive, between the physician's charge and the allowance.

Under indemnity contracts, the Plan's allowance is the lower of the physician's charge and an amount determined by a fee schedule. The amount paid by the Plan is the full amount of the allowance, and copayment is the difference berween the charge and the amount allowed.

Under partial service contracts, the amount allowed is also the lower of the amount charged and an amount determined by a fee schedule. With two exceptions, partial service reimbursement is the same as indemnity reimbursement. The exceptions are that: (i) to be eligible for partial service benefits, a subscriber must state that his or her family income does not exceed a (generally low) level prescribed by the Plan; and (ii) participation agreements may apply to partial service claims. As in the indemnity line, the amount paid by the Plan is the full amount of the allowance, and copayment on participating claims is therefore zero. On nonparticipating claims, however, copayment is the difference between the amount charged by the physician and the Plan's allowance.

Besides the three possible private lines of business, some Plans administer the Federal Employees Health Benefits Program (FEP government-wide service plan). There are two types of Blue Shield FEP insurance: High Option and Low Option. The former is similar to UCR insurance, and FEP-High Option claims are treated in the same manner as UCR claims. FEP-Low Option insurance is indemnity insurance, and the Plans ordinarily treat FEP-Low Option claims in the same way as indemnity claims. For these reasons the UCR and FEP-High Option lines of business were merged in this study, and the indemnity and FEP-Low Option lines of business were merged as well.

Reimbursement in the two nonprivate lines of business, Medicare (Part B) and Medicaid, is carried out with fundamentally the same methods used in the

Plans' private business.* Although there are differences in terminology (which are indicated below), Medicare reimbursement is closely similar to UCR reimbursement. Reimbursement for Medicaid services is either of the general UCR type or of the indemnity (flat rate) type, depending on the state and its regulations.**

Medicare and Medicaid both utilize a physician arrangement similar to participation called <u>acceptance of benefit assignment</u>. Under both programs, a physician who accepts assignment (i.e., permits the patient to assign the program's benefits to him) accepts the Plan's allowance as payment in full. In the Medicare program, the physician who accepts assignments bills the Plan for reimbursement, receives 80% of the allowance and must bill the patient for the remaining 20%. Hence the patient's rate of copayment is 20% of the Plan's allowance.*** When the physician does not accept assignment, he bills the patient and the patient files a claim with the Plan. The Plan then pays the patient 80% of the Medicare allowance, and the patient must pay the remaining 20% plus the difference, if any, between the physician's charge and the allowance. As a result, the copayment rate is ordinarily

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* The principles of Medicare and Medicaid reimbursement are laid out by federal and state law and administrative practices, but the Plans generally have some discretion in applying the principles. See Schieber, <u>et al</u>., (1976) and Muller and Otelsberg (1979).

** See Burney, <u>et al</u>., (1978).

*** If the patient has supplemental insurance with the Plan or another carrier, his actual rate of copayment may, of course, be much less than this.

lower on assigned claims than on nonassigned claims and Medicare eligible persons have incentives to purchase services from physicians who accept benefit assignment.

Medicaid services are always provided on a mandatory assignment basis.* That is, each state having a Medicaid program requires physicians who treat Medicaid patients to accept Plan (or carrier) allowances as payment in full, and the physicians are reimbursed rather than the patients. Copayment by Medicaid patients is zero.**

The salient features of Plan reimbursement by line of business and participation/assignment status are summarized in Table 2-1. As the table suggests, the differences in reimbursement characteristics can give rise to rather different economic circumstances facing the physician. Modeling the physician's or practice's economic behavior therefore requires a recognition of these characteristics. Chief among them are:

(i) Participation/assignment status of the practice or claim. When the practice participates in a given private line of business or accepts assignment under Medicare or Medicaid, its revenue per procedure cannot exceed the Plan's allowance. Moreover, regardless of whether the allowance

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* At the national level, significant numbers of Medicaid eligible persons are also eligible for benefits under the Medicare program. Physicians who treat such persons must accept assignment jointly under the two programs, and they cannot accept assignment on a claim-by-claim basis. Acceptance of assignment for patients who are eligible only for Medicare is sometimes called "voluntary", while acceptance of assignment for joint Medicare-Medicaid eligible patients is termed "mandatory".

** From 1971 to 1973 California conducted an experiment in which some of its Medicaid eligibles paid coinsurance, and in the past a few other states evidently also imposed some form of copayment (such as enrollment fees) on Medicaid patients [Chavkin (1979)]. None of these states is included in the present study.

TABLE 2-1

SUMMARY OF BLUE SHIELD PLAN REIMBURSEMENT FEATURES

Line of Business (Type of Insurance)/ Participation Status of Claims	The Plan Reimburses	Plan Allowance: Minimum of Charge and	Maximum Amount Paid by the Plan	Amount of Copayment after Deductible	Provider Revenue for Service Equals	Provider Revenue for Service Fixed in Short Run*
UCR						
Participating	Provider	Fee Screen(s)	Percentage (up to 100%) of allowance	Allowance minus amount paid	Allowance	Yes
Nonparticipating	Patient	Fee Screen(s)	Percentage (up to 100%) of allowance	Charge minus percentage of allowance	Charge	No
Indemnity						
Participation not applicable	Patient or provider**	Fee schedule	Allowance	Charge minus allowance	Charge	No
Partial Service						
Participating***	Provider	Fee schedule	Allowance	Zero	Allowance	Yes
Nonparticipating	Patient or provider	Fee schedule	Allowance	Charge minus allowance	Charge	No
Medicare						
Assignment	Provider	Fee screen(s)	80% of allowance	20% of allowance	Allowance	Yes
Nonassignment	Patient	Fee screen(s)	80% of allowance	Charge minus 80% of allowance	Charge	No
Medicaid						
Assignment only (Nonassignment not applicable)	Provider	Fee screen(s) or schedule, depends on state	Allowance	Zero	Allowance	Yes

Notes on following page.

TABLE 2-1 (Continued)

* "Yes" entries assume that amount charged is at least as high as the fee screen(s)/schedule amounts.

** Providers who participate in other private lines of business may be reimbursed by the Plan.

*** In order for a claim to be participating, the physician must participate <u>and</u> the patient's family income must not exceed a prescribed limit.

is generated by fee schedules or by fee screens, the screen(s)/schedule amount is fixed prior to the time the service is produced. It is reasonable to hypothesize that the participating practice is at least roughly aware of the screen(s)/schedule amount by virtue of its prior reimbursement experience. In addition, the practice has pecuniary incentives to set its charges at least as high as these amounts.* As a result, the hypothesis can be advanced that the participating practice acts as a price (average revenue) taker at the fee screen(s)/schedule amounts set by the Plan. That is, it can be posited that the participating practice faces infinitely elastic average revenue functions at the fee screen(s)/schedule levels.**

On nonparticipating claims there are no Plan-imposed constraints on the practice's average revenue. Thus, unless the practice is a perfect competitor, it does not face infinitely elastic demand or average revenue functions for its services. The positions and elasticities of the demand functions will depend on the types of insurance patients have, but as a rule the practice is not compelled to be a price taker by the nature of Plan reimbursement. In short, a reasonable and testable hypothesis is that participation status determines whether the practice is or is not a price taker with respect to reimbursement.

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* Clearly, the practice can increase its total revenue and net income by increasing its fee level to the level of the screen(s)/schedule. The one instance in which this is not true is when the practice cannot sell all of the services it wishes to at the screen(s)/schedule level. In this case it may be rational for the practice to charge less than the screen(s)/schedule amount if the coinsurance rate is sufficiently high. However, if the coinsurance rate is zero or negligibly low, reducing fees below the allowance levels will have a zero or negligible effect on demands, and it will not be profitable for the practice to make the reduction.

** This type of hypothesis has been used by Hadley (1978), Sloan and Steinwald (1978), and Sloan, Cromwell, and Mitchell (1978).

(ii) The form of copayment. The form of copayment is important insofar as it affects demand functions for nonparticipating/nonassignment services. When copayment is a fixed percentage of the amount charged, the standard argument is that health insurance rotates the uninsured demand function upward and in a clockwise direction. That is, the insured demand function is a clockwise rotation of the uninsured function. The effect when copayment is the difference between the amount charged and a fixed, scheduled amount paid is to shift the uninsured function upward without changing its slope. In this case the insured function is an upward translation of the uninsured function.* Figures 2-1 and 2-2 illustrate the effects of percentage copayment and fee schedule copayment on market-level demands for nonparticipating/ nonassignment services.

If the nonparticipating/nonassignment practice faces downward sloping demand functions (i.e., it is a monopolistic competitor), the form of copayment affects practice-level demand functions in the same manner as it affects market-level functions. If the practice is a perfect competitor, however, insurance shifts its (infinitely elastic) demand functions upward regardless of the form of copayment.

Certain theoretical propositions are pertinent in terms of interpreting the empirical results presented in subsequent chapters. For example, when the uninsured demand function is downward sloping in price, percentage copayment and fee schedule copayment both reduce the price elasticity of

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* See Frech and Ginsburg (1975) and Sloan and Steinwald (1975). Although they are useful as simplifications, these propositions do not apply in all cases. As indicated in the text above, coinsurance on nonparticipating/ nonassigned claims is determined as a fixed percentage of the Plan's allowance plus the difference between the charge and the allowance. Thus, even excluding the effects of deductibles (which may cause the copayment rate to vary), the coinsurance rate is a fixed percentage of charges only if the allowance is a fixed percentage of charges.

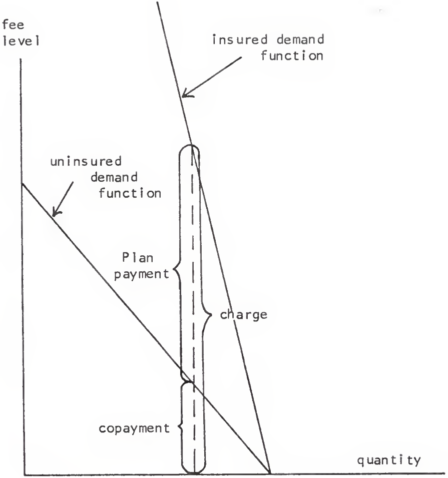

Figure 2-1. Relationship between insured and uninsured demand functions when copayment is a given percentage of the amount charged.

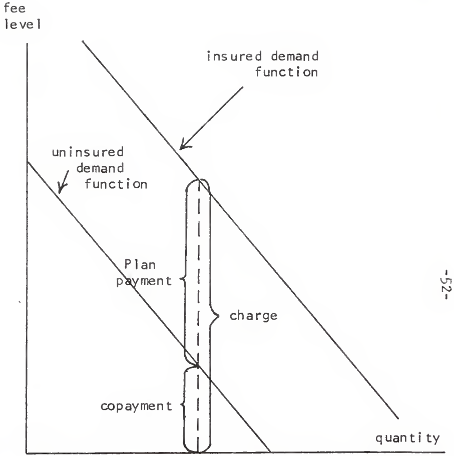

Figure 2-2. Relationship between insured and uninsured demand functions when copayment is a fixed amount determined by a fee schedule.

demand, but the former reduces the elasticity more than the latter. Based on this proposition, Frech and Ginsburg (1975) have shown that imperfectly competitive, profit-maximizing practices will (under certain conditions) tend to select higher fee levels when copayment is of the percentage type than when it is of the fee schedule type. Since UCR and Medicare copayment are of the percentage type, while indemnity and partial service copayment are of the fee schedule type, the Frech-Ginsburg theorem may have some bearing on practice pricing behavior across lines of business.

(iii) The amount of copayment. Although it is not so indicated in Table 2-1, the amounts of copayment tend to vary across lines of business. UCR benefit packages are typically somewhat more generous (and more expensive) than indemnity or partial service packages. That is, copayment on nonparticipating UCR claims is typically somewhat lower than either indemnity copayment or partial service copayment on nonparticipating claims. It is hard to be very precise about the effects of these differences on charges, but on the whole one would expect the lowest amounts of copayment to be associated with the highest levels of demands and charges.

A further problem raised by the variety of health insurance offered by Blue Shield Plans and other carriers concerns the economic meaning of the price of medical services. One can define at least three different and meaningful types of prices, no two of which may be numerically identical:

(i) the gross price of a service, or the amount charged by the physician;

(ii) the net price of a service, or the amount paid by the patient; and

(iii) the average revenue per unit of a service received by the physician.

As long as the patient's deductible is satisfied, the net price paid is always less than either gross price or average revenue. In addition, the physician's average revenue is lower than the amount he charges on participating/assigned claims if his charge exceeds the Plan's allowance.

These different concepts of "price" are well known and create no problems if they are used carefully. However, certain issues which are important to study can be expected to pose difficulties. One is price discrimination--an issue which has been stressed in several prior studies of physicians' practices [e.g., Kessel (1958, 1970), Rayack (1971), Ruffin and Leigh (1973), Masson and Wu (1974)].

A seller is said to discriminate in price if he sells the same commodity, produced at the same marginal cost, to different buyers or different buyer groups at different prices. In terms of general economic welfare, price discrimination affects the distribution of income between buyers and sellers, and it tends to imply economic inefficiency.* Laying aside for now evidence on the issue,** the point here is that it is hard to choose a measure of the physician's "price" which allows one to prove or disprove price discrimination

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* It may also enable the seller to supply the commodity to low-income buyers who would otherwise be excluded from the market.

** See Chapter 3.

across lines of business and participation status. For instance, a participating physician who sells UCR and indemnity services may charge the same amounts to all of his customers. Yet if his charge exceeds the UCR allowance, he earns different average revenues from UCR and indemnity patients, and the net prices paid by UCR and indemnity patients may differ as well. In this case one might be tempted to conclude that price discrimination does exist if "price" is defined as average revenue or the patient's net price, and would conclude otherwise if "price" is defined as the amount charged.*

One must also exercise caution in defining "price" for econometric models of practice pricing behavior. Numerous researchers have attempted to model practice pricing by specifying regressions which explain variation in amounts charged.** But if substantial amounts of practices' revenues are derived from services produced on a participating basis, the amounts charged may have little relation to current-period costs, current-period demands, or the practice's other characteristics. Indeed, unless charges are less than the Plan's allowances, they are irrelevant measures of the prices received by practices for services provided on a participating or assignment basis. A participating or assignment practice may deliberately set its

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* Beyond this, one must still apply the test regarding the identity of services and equality of marginal costs across the physician's UCR and indemnity outputs. Price discrimination models have been used to analyze physicians' propensities to participate in private business and to accept Medicaid assignment (see Chapter 3). In them, price is defined as the average revenue received by the physician, and it is assumed that the physician has an option to discriminate by virtue of the reimbursement structure. Although the models generally imply that reimbursement causes participating/assignment services to be subsidized by nonparticipating/nonassignment revenues, it is difficult to deduce welfare consequences from them because of differences in the structure of copayment.

** See Chapter 3.

charge at a high level in order to raise its fee profile and thereby influence its allowances in the next year. Hence, when charges are specified as current-period prices, an economic model must account for the strategies that practices may use to elevate their next year's allowances.

One way of circumventing this particular problem is to confine analyses of charges to nonparticipating/nonassignment and indemnity business, where charges are equal to the current-period revenues practices expect to receive.* In analyzing data on participating/assignment claims prices are probably best defined as Plan allowances. Even in this instance, though, it is essential to choose data from the appropriate lines of business. Allowances in partial service business are derived from fee schedules which are identical for all physicians in a Plan locality. Consequently, it makes little sense to attempt to "explain" partial service allowances in terms of a model using practice-specific costs, demands, and other practice characteristics.

Mostly, the foregoing observations stress the need to examine the institutional structure of Plan reimbursement in designing and interpreting methods for analyzing physicians' "prices." A major consequence of reimbursement structure involving systematic differences by line of business and participation status is segmentation of the demand side of the physicians' services markets. That is, Plan reimbursement practices divide consumers into mutually exclusive groups with different demand functions (or which present

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* It is worth emphasizing here that, because of differences in the meaning of participation across Plans, charges <u>may</u> equal allowances on participating claims as well. That is, under some participation arrangements, the physician need not accept the Plan's allowance as total payment for his services. In instances such as these, analyses of charges can be extended to participating claims as well. However, with one unimportant exception, this was not the case with respect to either of the two Plans in this study which had participation arrangements (see Chapter 8).

the practice with different average revenue functions). If one defines practice average revenue as the relevant current-period price of services, the structure of reimbursement policies implicitly provides incentives for physicians to set different average revenues in the submarkets defined by line of business and participation/assignment status. Realistic models of practice or market pricing behavior must be developed with an eye to testing this hypothesis.

The UCR form of reimbursement is generally based on two fee screens called Level 1 and Level 2.* In private UCR business (and sometimes in Medicaid business) the Level 1 screen is called the physician's or practice's usual fee, and the Level 2 screen is called the customary fee. In Medicare business (and sometimes in Medicaid business) the Level 1 and Level 2 screens are known as the customary fee and prevailing fee, respectively.

Depending on the Plan, the Level 1 screen may be determined in a variety of ways. Ordinarily, it is the physician's most common charge in a given (e.g., preceding) time period, and it is specific to the practice.** The Level 2 screen is a percentile in the charge distribution for the procedure within the physician's peer group, which is defined by his specialty, locality, or both. The Level 2 screen is calculated over some prior time period such as the preceding calendar year, and in private business it is frequently

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* Some Plans employ only a Level 2 screen.

** The "most common" charge may be the physician's mean, median, or modal charge for the service, and it is generally based on prior charge experience. However, it may also be a charge filed with the Plan by the physician, etc. Under the Medicare statutes, the Level 1 screen is the charge which "best represents" the physician's fee for the service [Health Care Financing Administration (1977)]. This may be the physician's mean, median, or modal charge for the service.

(but not always) as high as the 90th percentile. In Medicare business the Level 2 screen is the 75th percentile of the charge distribution.* Although the Level 2 screen is applied to the practice, it is identical for all practices in the same peer group.

Under the UCR form of reimbursement, the screen used by the Plan to determine the amount allowed is called the reasonable fee or charge. This term applies both to private UCR and to Medicare (and, as applicable, to Medicaid) business. The reasonable fee is the minimum of the amount charged by the physician, the Level 1 screen (if one is used), and the Level 2 screen, except under special circumstances such as when an unusual complexity of treatment is required.** In this case the reasonable fee may be adjudicated.

In terms of market pricing behavior there are two important aspects of UCR screening. The first, already mentioned, is that the Level 1 and Level 2 screens are customarily calculated from the past physician and market fee distributions. Hence the screens rise with a lag as physician and market fees rise. The second important characteristic is that the screens are regularly updated. Accordingly, as many authorities have pointed out, UCR reimbursement potentially has a built-in inflationary bias. Next year's Level 1 screen, Level 2 screen, and Plan allowance for each service are

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* In 1973 and 1974, the annual growth of Medicare Level 2 screens was constrained under the Economic Stabilization Program, but no similar controls were imposed on UCR Level 2s. Since 1975, the growth of Medicare Level 2 screens cannot exceed a percentage determined from a formula called the Medicare Economic Index. This index restricts the growth of prevailings to a rate justified in terms of increases in practice costs and a "reasonable" increase in physician net income.

** By law, Medicare allowances cannot be higher than the physician's charges for comparable services provided to non-Medicare patients.

higher than this year's values if, and only if, this year's charges for each service exceed last year's.

This fact also highlights a physician pricing motive we have alluded to--namely, that current charges affect future allowances and future revenues on UCR and Medicare claims. Indeed, in the extreme case where the physician sells services only on a participating or assignment basis and only in private or government lines where UCR-type reimbursement is used, the sole function of his current-year charges may be to raise his next year's Level 1 screen.

The principal features of fee screen reimbursement are summarized in Table 2-2. The more detailed types of administrative practices, which may or may not exist in a given Plan, are not itemized. These can include the specification of <u>Plan localities or areas</u>,* the establishment of different Level 2 screens for physicians in different specialties, methods for determining Level 1 screens for new physicians, methods for determining Level 1 screens for established physicians without fee profiles (i.e., those with few or no prior claims), etc.

It must be stressed that the foregoing overview of Plan reimbursement generalizes and simplifies Plans' policies. A more detailed discussion of the reimbursement characteristics of the three study Plans is given in the next section.

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* A Plan area is a group of counties or portions thereof for which a single Level 2 screen is computed. A Plan may delineate one or many such areas and utilize a corresponding number of different Level 2 screens.

TABLE 2-2

NOMENCLATURE AND DEFINITIONS USED IN FEE SCREEN REIMBURSEMENT

Line of Business	Level 1 Screen: Terminology and Definition	Level 2 Screen: Terminology and Definition	Base of Plan Allowance*
UCR and (as applicable) Medicaid	"Usual fee": physician's most common charge for the procedure usually though not always in a preceding time period.	"Customary fee": percentile (up to 90th) of fee distribution for procedure in physician's peer group defined by his location and/or specialty.	"Reasonable fee": minimum of the amount charged, the Level 1 screen, and the Level 2 screen, except under special circumstances such as unusual complexity of treatment.
Medicare and (as applicable) Medicaid	"Customary charge": physician's median or modal charge for the procedure in a preceding time period.	"Prevailing charge": 75th percentile of fee distribution for procedure in physician's peer group defined by his location and/or specialty.**	"Reasonable charge": minimum of the amount charged, the Level 1 screen, and the Level 2 screen, except under special circumstances such as unusual complexity of treatment.***

* Allowance is the reasonable fee or some percentage of it. See text for additional qualifications.

** In 1973 and 1974, the growth of Medicare Level 2 screens was controlled under the Economic Stabilization Program. Since 1975, Medicare Level 2 screens have been constrained to rise no faster than the Medicare Economic Index.

*** Medicare allowances cannot exceed those in comparable private business.

Reimbursement Characteristics of the Three Study Plans

The data analyzed in this study were provided by three Blue Shield Plans. Plan A is located in the Midwest, Plan B is located in a Middle Atlantic state, and Plan C is located in the South. The Plans varied somewhat in terms of their mixes of lines of business and reimbursement characteristics, which are summarized in Table 2-3.

All three Plans offered UCR and indemnity contracts during the study period (1973-76 for Plans A and B, 1975-78 for Plan C), but only one, Plan B, conducted partial service or Medicare business. None was a Medicaid carrier. Each of the Plans used Level 1 and Level 2 screens in its UCR business, and two of the three maintained different geographic areas within their overall markets over which separate Level 2 screens were calculated. Indemnity allowances--and, in Plan B, partial service allowances as well--were determined from fee schedules. In Plans A and C the indemnity schedules were not updated during the study period, and in Plan B the schedule was updated only once (in 1975). In Plan B the partial service fee schedule was not updated during the study period. Plan B experienced a large increase in indemnity enrollment from 1974 to 1976, and a decline in partial service enrollment. There were no large shifts in the composition of enrollments across lines of business in the other two Plans.

Two of the Plans, A and B, offered physician participation agreements. In both cases participating physicians were entitled to receive reimbursement from the Plan as part of the agreement and were required to accept the Plan's allowances as full payment. Also, in both cases, participation was nominally on an across-the-board basis. In each Plan, however, a participating physician was allowed to bill his or her patients rather than the Plan. When a patient thereafter filed a claim with Plan B, he or she was informed that the physician was entitled to payment only up to the Plan's allowance. But in Plan A, a patient was so informed only upon specific request. Hence in Plan A it was technically possible for a participating physician to bill patients on some claims and, if the patient was not aware of his or her payment liability, for the physician to be paid the amount charged instead of the amount allowed. In short, physicians who participated in Plan A could, in effect, participate on a claim-by-claim basis if they chose to do so.

Unfortunately, assigned and nonassigned claims in Plan B's Medicare data were combined before the data were received for analysis. This precluded an examination of the effects of Medicare assignment on physician pricing. During the Economic Stabilization Program (ESP) in 1972-74, and again under the federal cost containment program beginning in 1975, Medicare Level 2 screens were constrained to rise by no more than predetermined annual amounts. No similar federal or Plan-sponsored programs were instituted for the Plans' private business at any time during the study period. Compliance with the ESP in private business was left to individual physicians.

TABLE 2-3

SUMMARY OF THREE STUDY PLANS' REIMBURSEMENT CHARACTERISTICS

Plan	Lines of Business Included in Data	Number of Fee Screens in UCR Business	Participation Agreement: Has Agreement	Participation Agreement: Type of Agreement	Participation Agreement: Lines of Business	Number of Plan Areas*
A	UCR Indemnity	2	Yes	Across-the-Board	UCR	1
B	UCR,** Indemnity,*** Partial Service, Medicare	2	Yes	Across-the-Board	UCR, Partial Service	3 (UCR), 4 (Medicare)
C	UCR, Indemnity	2	No	NA	NA	5

* Applies only to UCR and Medicare business.

** FEP High Option data were merged with UCR data.

*** FEP Low Option data were merged with indemnity data.

CHAPTER III

POLICY ISSUES AND PRIOR FINDINGS

Since the Medicare and Medicaid programs were established in the mid-1960s, three major issues have played a central part in government reimbursement policy for physicians' services: containing the level of expenditures; providing access to physicians' care by the aged and needy who are served by Medicare and Medicaid; and maintaining the quality of physicians' services. This study addresses these three broad issues.

Government concern with cost containment reflects both the secular growth of spending on physicians' services and the current size of the expenditures themselves. From 1965 through 1981, total annual expenditures on physicians' services grew at an average annual rate of 12.4%, and even larger increases were experienced in Medicare and Medicaid [Freeland and Schendler (1981), Gibson and Wáldo (1982)]. By contrast, gross national product grew at an average annual rate of only 9.4% over the same period. In 1981, total national expenditures on physicians' services reached $54.8 billion, and the costs to government of physicians' services under the Medicare and Medicaid programs were $9.6 billion and $2.8 billion, respectively [Gibson and Waldo (1982)].

The growth of spending on physicians' services can be attributed to two factors, fee inflation and the growth in the volume of output. Fee inflation and its causes are a direct concern of reimbursement policy insofar as the methods of paying physicians either contribute to inflation or can be used to mitigate it. The growth in output has been attributed to such factors as the expansion of health insurance coverage, population growth, the rising proportion of the elderly, increases in per capita income, and technological progress in medicine itself.

It has also been argued that, by virtue of their agency relationships with patients, physicians are able to recommend--and thus can generate--demands for their services. According to this view, physicians attempt to maintain "target" net incomes, and when these income targets are threatened by restraints on fees or the entry of new practitioners into local markets, physicians will induce sufficient additional demands to maintain their net incomes at the target levels. Although this argument is still a matter of considerable controversy, its proponents say that an important implication is that government policy should employ utilization controls to restrain spending on physicians' services and at the same time discontinue financial support for the education of new physicians.

The issue of accessibility is basically one of the rationing of physicians' services. For a variety of reasons, the structures of health insurance programs may result in the rationing of physicians' care, and the rationing itself may be of either the price or non-price type. For example, physician participation in the Medicaid program (acceptance of benefit assignment) is a non-price rationing mechanism, since covered services can be provided only by participating physicians. Accordingly, it is of considerable policy importance to know what factors motivate physicians to participate and how an understanding of these factors can be used in policies to maintain or raise participation rates.

Although price rationing is not an issue in Medicaid, it can be associated with equity issues in connection with Medicare and private health insurance programs. For instance, to the extent that reimbursement practices produce geographic variations in the net prices paid by patients, such practices can contribute to increasing or decreasing geographic differences in access to care. Moreover, to the extent that net income opportunities influence physicians' career decisions, reimbursement levels can intensify geographic and specialty imbalances with respect to access to care. In each of these cases the persons responsible for reimbursement policy should be aware of the consequences of physician payment methods in order to correct adverse effects when they occur.

Price rationing also arises as an issue in connection with Medicare assignment. Under Medicare, the net prices to beneficiaries on assigned claims can be limited by regulations on allowances, while on nonassigned claims the only means of controlling net prices is to raise allowance levels. Consequently, inducing physicians to accept assignment lowers the net price to beneficiaries and increases their access to care. Thus, as is true for Medicaid participation, studying the motives physicians have to accept Medicare assignment may help in devising policies which will raise assignment rates and increase the availability of care to Medicare eligible persons.

The issue of maintaining the quality of physicians' services is related to many aspects of physician reimbursement policy. For example, the levels and scope of reimbursement may influence the quality of graduate medical education,* the effectiveness and range of therapeutic treatments

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* Indeed, the issue of how to separate the cost of providing patient services from graduate medical training expenses in teaching hospitals has been a chronic problem for both Medicare and private health insurance programs.

offered to patients, and the kinds of diagnostic procedures physicians order or perform. This issue may cut two ways--viz., a payment system will have adverse effects if it either inhibits service quality or induces a level of quality and commensurate costliness beyond what the underlying insurance program was designed to provide.

Another side of the quality issue concerns the characteristics of the physicians who supply services to an insurance program's beneficiaries. It is reasonable to conjecture that "high-quality" physicians have the highest expenses and the highest implicit wage costs. Hence, "high-quality" physicians are less likely to provide services to patients covered by low-paying insurance programs than are "low-quality" physicians. This concern is particularly applicable to Medicaid, but it may also apply to Medicare assignment as well. Consequently, it is important to understand how the level of reimbursement affects physicians' willingness to accept patients under government insurance programs in order that policies can be designed to maintain the quality of services at target levels.

Needless to say, it was not possible for this study to encompass all dimensions of the cost containment, access, and quality issues. Instead, it was decided to focus on those aspects of the issues which were most feasible to analyze using the data available. This approach led us to concentrate on the following policy questions.

--Is UCR (fee screen) reimbursement inflationary?

--What type of optimizing goal is most consistent with physicians' output and pricing decisions (e.g., profit maximization, target net income achievement)?

--Are physician services markets basically competitive or noncompetitive in terms of pricing behavior?

--To what extent do physicians price discriminate among patients with different types of insurance coverage?

--How widespread is demand "inducement" on the part of physicians pursuing target net incomes?

--What physician and local market area characteristics are significantly correlated with medical service fee levels and inflation rates?

--What are the determinants of physician participation in Blue Shield Plans; what types of physicians are most likely to participate; and what do participation patterns imply with respect to policies to influence Medicare and Medicaid benefit assignment rates?

UCR Reimbursement, Charge Levels, and the Growth Rate of Charges

It has long been argued that UCR (fee screen) reimbursement is inherently inflationary.* Proponents of this view content that under UCR Reimbursement: (i) next year's reasonable fees (allowances) increase roughly in proportion with the increase in this year's charges; (ii) physicians therefore have incentives to maintain high growth rates of charges in order to enjoy high growth rates of allowances; and (iii) administrative practices by which Level 2

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*For recent statements of the argument, see Dyckman (1978), Burney et al. (1979), and Showstack et al. (1979).

screens are established permit groups of physicians to raise the screens by their collective pricing behavior.*

Although the argument is especially relevant to participating/assigned claims, it also applies to nonparticipating/nonassigned claims. In the first instance, it is in the physician's interest to raise allowances because the revenue obtained from each unit of service supplied is equal to his/her current-year allowance for that particular service. But even in the second case, a steady inflation of allowances benefits the physician because it prevents net prices to patients from rising (inasmuch as the amount paid by the carrier is typically a constant fraction of allowances) and forestalls a decline in demands.

The policy implications of the foregoing argument are straightforward. If it is correct, it means that fee screen reimbursement is antithetical to cost containment. In turn, this implies that UCR reimbursement should be abandoned in favor of some less inflationary form of physician payment, or that the fee screens should be limited administratively as Medicare screens were regulated under the Economic Stabilization Program (ESP) and as they are now constrained by the Economic Index formula.

With the data available for the study it was possible to analyze the impact of UCR reimbursement methods on physicians' fee levels and the growth rate of fees using three approaches:

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* Among the practices singled out for criticism are the cases in which (i) small geographic areas are used in computing the Level 2 screens, (ii) separate screens are set for general practitioners and specialists, and (iii) separate screens are set for Medicare and private business claims.

(1) comparing charge levels and the growth rates of charges between fee screen (Medicare and private UCR) business and fee schedule (indemnity and partial service) business;*

(2) comparing charge levels and the growth rates of charges between physicians with large and small proportions of fee screen business;** and

(3) testing the hypothesis that physicians attempt to raise next year's (screen) allowances by increasing this year's charge level relative to last year's level.***

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* It has been claimed that reimbursement based on fee schedules is generally a less inflationary form of reimbursement than the fee screen method. Thus, the behavior of charges in fee schedule business is used as a standard to evaluate behavior of charges in fee screen business.

** In keeping with the hypothesis being tested, physicians with small proportions of fee screen business and large proportions of fee schedule business should exhibit lower charge levels and lower rates of fee inflation than physicians having large proportions of fee screen business and small proportions of fee schedule business. This would be expected regardless of whether physicians set different prices across lines of business. If fee levels differ across lines of business, the average charge level over all lines will tend to reflect reimbursement levels in the dominant lines. By the same token, if the physician's charge level is the same across lines of business, it should tend to be determined by reimbursement practices in the dominant lines.

*** Several methodologies were used for purposes of testing the hypothesis, including, for example, comparative analyses of the pricing behavior of participating and nonparticipating physicians. Since allowances of the former equal average revenues while those of the latter do not, the behavior predicted by the charge-allowance hypothesis should appear most strongly among participating physicians if the hypothesis itself is valid.

Other related empirical issues were examined as well. In particular, comparisons were made of charge and allowance levels across Plan areas, and between the charge and allowance levels of general practitioners and specialists. A few findings have shown that Level 2 and other carrier administrative practices do affect the levels and growth rates of physician charges [e.g., Huang and Koropecky (1973), Muller and Otelsberg (1979)]. However, the methodologies involved intercarrier comparisons of administrative practices, and, because of the small size of our sample of Plans, we could not apply the methodologies here.

Few empirical studies have addressed the purported relationship between fee screen reimbursement and fee inflation in the past, chiefly because of the lack of data on fees and allowances in both fee screen and fee schedule business. However, some descriptive results are available. For instance, in their study of Medicare charge levels for 1967-69, Huang and Koropecky (1973) found that in states where carriers used fee schedules the growth rates of charges were significantly lower than those in states where no fee schedules were used.

Additional evidence can be inferred from comparisons of Medicaid and Medicare charges. The former, which are generally based on fee schedules, appear to be lower than the latter [e.g., Sloan et al. (1977), Burney et al. (1978), Paringer (1979)]. But this may be primarily because physicians who treat Medicaid patients tend to be low-priced physicians [Hadley and Lee (1978)]. Also, it appears that the limits on Medicare allowances under the ESP slowed the growth rate of Medicare charge levels in 1973-74 [Dyckman (1978), Hadley and Lee (1978)]. This finding itself neither proves nor disproves the claim that fee screen reimbursement is automatically inflationary, but it does suggest that caps on fee screens can be used to restrain the growth of charges.

We are unaware of any prior study comparing charge levels and growth rates between physicians with large and small proportions of fee screen business. However, a study by Hadley and Lee (1978) of Medicare/Medicaid reimbursement in California found significantly negative correlations between current charge levels and the growth rate of Medicare allowances for two of three specialty strata. Their results imply that at least some physicians raise their charges when allowances increase more slowly than preferred or desired rates.

Thus, prior studies suggest that UCR or fee screen reimbursement may be more inflationary than reimbursement using fee schedules. However, the evidence to date on this point is certainly far from conclusive. Under these circumstances, our findings based upon detailed fee and allowances data from both fee screen and fee schedule business should be of particular interest.*

The Motives, Characteristics, and Correlates of Physicians' Pricing and Output Behavior

An important goal of this study was to provide additional evidence on how physicians respond to the types of economic incentives inherent in all reimbursement systems. The ability to accurately forecast physician

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* It should be noted that the purported relationship between fee screen reimbursement and fee inflation actually consists of two unrelated parts--namely, the manner in which current charges are translated into next year's allowances and the frequency with which allowance levels are updated. Consequently, any "inherently" inflationary properties of fee screen reimbursement can be counteracted either by restricting the growth of allowances (i.e., by altering the method of computing allowances) or by reducing the frequency of updating. As it was applied to the Medicare fee screens, the ESP used the first of these methods. Unfortunately, data were not available from a sufficiently large and varied set of Blue Shield Plans--e.g., those using one UCR screen rather than two, different percentiles of charge distributions for computing Level 2 screens, and different updating intervals--for us to be able to explore variations in fee screen reimbursement practices and their relative effectiveness in restraining fee inflation.

responses is essential to the design of reimbursement systems which are likely to achieve their objectives. The prior literature has concentrated on five major aspects of this crucial issue.

(1) The type of optimizing behavior most characteristic of physicians--whether it is of the profit-maximizing, utility-maximizing, or target net income type.* If on the whole physicians attempt to maximize (expected) profits then the compositions of their outputs, their choices of lines of business in which to operate, and their participation/assignment decisions will all be sensitive to the net income differences among their economic alternatives. In particular, reimbursement levels will tend to affect output composition by: (i) discouraging outputs of procedures that yield low returns and encouraging outputs of procedures that yield high returns; (ii) causing output to be reduced (access to be diminished) in a specific line of business when cost containment regulations are applied to that line of business but not to the others (e.g., Medicaid fee schedule freezes); and (iii) discouraging physicians from participating or accepting benefit assignment when allowance levels do not keep pace with charges. Profit maximizing physicians can also be expected to take full advantage of any reimbursement characteristics (such as the UCR type of computation of allowances) which may lead to higher rates of fee inflation whenever doing so increases the profitability of practice.

If, instead of seeking to maximize profit, physicians typically maximize utility or try to achieve a target net income, it would be

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* Target net income behavior is discussed separately in a later section.

reasonable to expect their behavior to be less sensitive to reimbursement incentives (except, perhaps, if the goal is target-net-income-maintenance and actual income falls below the target). That is, if the typical physician is a utility-maximizer rather than a profit-maximizer, the effects of reimbursement incentives may be diluted by associated changes in such utility-related factors as workloads, patient-mix, and pressures to increase or reduce office staffs. If, as a rule, physicians are target-net-income-pursuers (and incomes equal or exceed the targets), they may be quite insensitive to changes in reimbursement policy.

Thus, deviations from the goal of profit maximization imply: (i) a relatively weak relationship between reimbursement levels and the output composition of physician practices; (ii) little change in participation/assignment rates in response to related net-income opportunities; (iii) a tendency not to fully exploit opportunities to inflate fee levels; and (iv) that increasing physician supplies or reducing demands for services may have minimal or even perverse effects on fee levels and market outputs.*

Given the importance of the matter, it is unfortunate that the question of physicians' optimizing behavior remains unresolved. Theoretical models of physician behavior--some of them fitted to empirical data--typically assume profit maximization [e.g., Sloan (1976), Sloan et al. (1978),

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* If it could be demonstrated that physician practices take full advantage of all opportunities to maximize expected net income, it could be predicted unambiguously that increasing the supply of physicians (and/or constraining the demands for physicians' services) would result in lower fee levels and lower rates of fee inflation. Predictions that the opposite will occur implicitly assume utility-maximizing or target-net-income-motivated physicians have unexploited opportunities to "induce demand" which they will pursue only if supply increases (or demand curtailment) threaten the attainment of the latter objectives.

Hadley (1978), Sloan and Steinwald (1978)]. Likewise, it has been argued that certain empirical findings (e.g., observed partial correlations between fee levels and proxies for practice costs, measures of reimbursement incentives, and market characteristics) are consistent with profit-maximizing behavior on the part of physician practices [e.g., Steinwald and Sloan (1974), Sloan and Feldman (1978)].*

On the other hand, numerous analysts have claimed that certain aspects of physicians' behavior are not compatible with the goal of profit maximization. For instance, Reinhardt (1972) estimated that general practitioners utilize only half as many aides as would maximize profit. And the literature on physician-induced demand (described below) contends that the desire to achieve a target net income better characterizes physicians' economic motives than does profit maximization. Additionally, several models of utility-maximization by physician practices have been proposed [e.g., Evans (1976), Kehrer (1976), Sloan and Feldman (1978), Sloan et al. (1978)], but they have either not been fitted to data or they yielded ambiguous implications for physician practice pricing and output behavior. Moreover, some empirical evidence indicates that physicians actually may be profit maximizers. For instance, in a follow-up study of aide utilization, Kimbell and Deane (1974) reported results that, unlike Reinhardt's, were

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* These results are discussed in detail below.

compatible with the profit-maximizing hypothesis.* Finally, although the results of tests of the target-net-income hypothesis are mixed, they certainly cannot be viewed as uniformly supporting the profit-maximizing theory.

One of the issues addressed in the present study is the question of the nature of physician practice optimizing behavior. First, the hypothesis of whether physicians maximize profits was examined in the context of a model of individual physician practice pricing and output decisions. Second, the hypothesis of whether physicians generate demands for their services was explored both descriptively and in terms of the same physiciann practice pricing and output model. A finding that physicians do (even approximately) maximize profits would be incompatible with evidence of unutilized ability to induce demands.** Conversely, indications that physicians make selective use of any ability they have to generate demands would preclude their being profit maximizers. Depending upon the nature of the evidence with respect to demand inducement, a finding that physicians do not maximize profit would indicate either utility-maximizing or

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* Although they confirmed Reinhardt's result that, on average, physicians employ only about half as many aides as would maximize profit, they found that the apparent profit foregone was so small that it could easily be due to unmeasured costs relating to hiring and supervising additional aides.

** This is so because (other things being equal) demand generation increases profit. Thus, if physicians maximize profit demand generation should always be at the maximum level.

target-net-income practice optimization behavior. We believe that the present study provides reasonably strong tests of these alternative theories of physician optimization.

(2) The degree of price competition in physician service markets. The degree of market power possessed by individual physician practices is important both in terms of reimbursement policy and in terms of general policy toward the physicians' services industry. Specifically, the more market power each physician practice has the higher will be the average profit rate and, hence, the greater will be the cost of increasing benefits and coverage for physician services through either government or private health insurance programs. Also, because monopolistic market power implies low elasticities of demand, the more monopolistic physician practices are the better able each is to pass along increases in its production costs in the form of higher fees without a significant loss of patients. Thus, a high degree of individual producer market power would imply that the market for physician services would be especially vulnerable to cost-induced price inflation. Finally, if physician practices do have monopolistic market power they are less subject to competitive pressures to produce as efficiently as possible. This could mean higher operating costs, which, in turn, are transmitted to the public as higher fees.

Clearly, to the extent that individual physician practices possess significant market power, it would be possible for government policy to reduce the rate of fee inflation by limiting their monopoly profits and promoting practice efficiency. In this event, the range of policy options would range from a broad restructuring of the industry to imposing various types of regulation on fee levels, rates of return, output policy, and the like.

In a narrower sense, the magnitude of the typical physician practice's market power has an immediate application to reimbursement policy. Specifically, to the extent that physicians cannot generate demands without possessing market power, a finding that physicians are price-takers would weaken the demand-inducement hypothesis. In turn, this would weaken an important element of the argument for utilization controls to limit expenditures on physicians' services.*

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* Actually the issue is more complex than this. Price-taking behavior implies that a physician practice can sell as large an output as it wishes at the going market price. Under these conditions, it would have no incentive to generate demands. However, if the practice sells services in several submarkets defined by different insurance programs, the number of eligible patients in any submarket may be small. Hence the maximum quantity demanded in that particular submarket may be less than the physician wishes to sell at the going fee level. Although the practice is technically an imperfect competitor in the submarket, it may still act

Prior research on physician practice pricing behavior can be characterized as being either primarily deductive, descriptive, or analytical. In the first category are many literature reviews, essays, and theoretical papers noting that the structural elements of the physicians' services markets--such as a high level of product differentiation, consumer ignorance, and restricted entry--are generally inconsistent with perfect competition [c.f., Arrow (1963), Rayack (1971), and Sloan and Feldman (1978)]. However, these studies have stopped short of attempting to quantify the extent to which conditions in the physicians' services markets deviate from competitive norms.

Descriptive studies of physicians' services markets have been largely confined to examinations of fee levels over geographic areas.* Most have reported a moderate to relatively high degree of fee variation over counties or motropolitan areas. These findings have been interpreted as indicating the markets are imperfect competitive. However, for at least two reasons such evidence cannot be regarded as being persuasive. First, the definitions of physicians' markets employed are open to question. It is not clear, for example, that the relevant market areas are usually county-wide. Therefore, some of the observed fee variation may be across rather than within markets.

Second, none of the studies defined a null hypothesis. Presumably,

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like a price-taker--for example, if it sets uniform fees to patients across its submarkets regardless of insurance status. Therefore, if demand generation is possible, it may appear in a submarket as an outward shift in the maximum quantity demanded, even though the physician behaves like a price-taker.

* See Sloan and Feldman (1978) for a discussion of these studies.

the null hypothesis is that fee levels would be nearly identical among physicians if the markets were competitive. But identical, or nearly identical, fee levels are also consistent with (i) collusive pricing behavior and (ii) interdependent, but non-collusive, pricing behavior with a low level of product differentiation. Both of these pricing patterns occur in oligopolistic markets. As a result, either high or low degrees of fee variation can be taken as "showing" that the markets are noncompetitive. Thus, this methodology is inherently inconclusive.

Three analytical efforts have been made to determine whether physicians' pricing behavior is monopolistic or competitive. One by Newhouse (1970) found that fees for a group of specific procedures were negatively correlated with quantities demanded. Although this finding would appear to support the monopoly hypothesis, market-level data were employed. Thus, it does not demonstrate that the firm-specific (i.e., practice-level) demand functions are downward sloping in price.

The second effort, by Kehrer and Knowles (1974), did employ individual physician practices as the analytic unit. They estimated two regressions, one with a fee index as the dependent variable and the other with markup over cost (the ratio of average revenue to average cost) as the dependent variable. In both regressions they included proxies for market structure among the explanatory variables. In the markup regression, they found that variables representing oligopolistic and monopolistic market elements failed to enter significantly. In the fee index regression, they concluded that none of their pricing hypotheses--monopolistic, oligopolistic, or imperfectly competitive--could be accepted or rejected in favor of the

the competitive alternative. On these grounds they concluded that individual physician pricing behavior is as consistent with the proposition that the relevant market is competitive or monopolistically competitive as it is with hypotheses implying a greater degree of market power.

The third effort--by McLean (1980)--also used individual physician practices as the analytic unit in estimating a two-equation model of supply and demand for general practitioners' services. A fee index was employed as the measure of amount charged by the physician, and the net price paid by patients was estimated as the product of gross price and one minus the proportion of the physician's patients covered by UCR programs. In slightly differing versions of his model, McLean estimated the price elasticity of visits demanded as -2.16 with respect to gross price and -1.75 with respect to net price. Although the estimates are moderately low, it is unfortunately the case that the standard errors of the coefficients were underestimated by the regression package employed. Thus--since it is not possible to determine whether the estimated coefficients are statistically significant--it would be injudicious to infer from them that physicians possess a high degree of market power with respect to the prices they charge.

As the foregoing summary indicates, prior analytical studies have not resolved the issue of how competitive are the markets for physician services. Although none of this work supports the conclusion that the physicians' services markets are perfectly competitive, neither does it provide support for the view that physician practices possess significant monopolistic pricing power. Thus, two major empirical issues remain unresolved--

(1) how far do physician services markets depart from the competitive standard; and (2) does an "as if" assumption of competition provide a better or worse approximation of physician practice pricing than oligopolistic or monopolistic models. Since--as discussed in Chapter II--there are strong reasons to believe that physician practices behave like price-takers on participating/assigned claims, our approach to investigating these issues focused on estimating the price elasticities of demands for nonparticipating/nonassigned services. High elasticities of demand would be indicative of competitive or approximately competitive pricing, while low elasticities would imply substantial departures from competitive market structures.

(3) Price discrimination. In the absence of such health insurance reimbursement practices as fee schedules and participation/assignment, physician practices can charge different prices to different categories of patients only if they possess the requisite market power. Accordingly, anecdotal evidence that physicians price discriminate on the basis of patients' incomes provided the earliest support for the proposition that individual physician practices possess a significant degree of monopoly power. The best-known proponent of this position is Kessel (1958, 1970). One element of his argument that physician services are sold in highly monopolistic markets was the evidence provided by case studies (going back more than 30 years) which showed that physicians used a "sliding-scale" method of pricing based on patients' abilities to pay. In the extreme, it has even been argued that the provision of charity services to indigent patients was proof that physicians engaged in discriminatory pricing behavior; and at least two theoretical attempts have been made to rationalize

this type of behavior using utility maximizing models [Ruffin and Leigh (1973), Masson and Wu (1974)].

More recently, it has been contended that the growth of government and private insurance (which reduces the impact of patient income on demands) has either eliminated, or at least greatly diminished, "sliding-scale" pricing behavior. For example, Hadley and Lee (1978) reported that California physicians providing Medicare and Medicaid services billed the same amounts for both types of services. Likewise, Freiberg et al. (1979) examined 1976 data for a major Blue Shield Plan and found generally non-significant differences between average UCR and Medicare charges for groups of physicians providing both types of services. Similar results have also been reported by American Health Systems (1977).

In this study, particular attention was given to the question of whether it is common for physicians at this point in time to charge different fee levels across lines of business. As discussed in Chapter II, any observed differences in a physician's charges across lines of business must be interpreted cautiously. That is, such differences may or may not signify price discrimination. If there are differences in the marginal costs of producing services this fact--rather than price discrimination--could explain the existence of any observed differences in charge levels across lines of business. Thus, although price discrimination ordinarily implies fee variation among patients, the reverse is not necessarily true.

The question of how much fees vary across lines of business was explored because of its implications for cost containment policy. More specifically, physicians may charge the same amounts to all patients--regardless of whether they possess the power to discriminate--because it is too expensive to set up and administer different fee structures. If so, government efforts to restrain fee inflation in one line of business (e.g., imposing fee caps on allowances, replacing fee screens with fixed fee schedules, etc.) will have little impact unless that line of business represents a principal source of the practice's demands. If physicians employ a single structure of fees, the most likely consequence of cost containment applied to one business line is a contraction of output in that line because it will reduce average revenue in that line relative to the other lines. In short, policies to control physicians' fees must be applied to a significant share of physicians' business if they are to succeed without diminishing access to care for certain categories of patients.

(4) Physician and practice characteristics associated with charge levels. The composition of the physician population is changing in terms of such characteristics as specialty, board certification rates, educational background, sex, race, and mode of practice. In this context, it is important to identify the relationships between charge levels and physician and practice characteristics which can be used to predict the future costs of government-financed medical care programs. Still another important reason for studying relationships between charge levels and physician and practice traits is to identify classes of physicians with exceptionally high charge levels and rates of fee inflation. Selective policies designed to restrain the allowances of these classes of physicians could conceivably be a more effective method of checking costs than applying across-the-board controls.

Many studies have sought to identify correlations between charge levels and physician or practice characteristics. It is difficult to summarize their (often disparate) results, in part because certain characteristics are interrelated.* Thus, an apparent association between fee levels and one characteristic may actually reflect the influence of some other trait. Nevertheless, the findings from regression studies indicate that physician and practice characteristics are not significantly related to fee levels [e.g., Steinwald and Sloan (1974), Kehrer and Knowles (1974), Hadley and Lee (1978)**].

Although prior studies suggest that physicians' pricing behavior varies little with regard to their personal traits and conditions of practice, one cannot rule out the possibility that these results were influenced by units of analysis, scopes and sources of data, variable definitions, model specifications, and collinearity and other problems common in empirical analyses. Accordingly, they were retained as exogenous variables in our study methodology.

(5) County demographic characteristics associated with charge levels. The county demographic characteristics of primary interest depict access to care by underserved, disadvantaged, and Medicare populations. They include measures of the ruralness of the population, per capita income or the percentage of the poor, and the percentages of minorities and the elderly.

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* For instance, it is known that general practitioners tend to be older than specialists, to be more likely to practice in rural areas, and to be solo practitioners rather than members of groups.

** Kehrer and Knowles found that fee levels increased with the size of practice and with the practice's unit costs. Hadley and Lee reported results which are consistent with the latter finding.

They are directly related to the important policy issue of whether net price variations are indicative of differences in access to care based on patients' ability to pay.

Prior findings concerning relationships between fee levels and county characteristics are mixed. Studies in which the state or SMSA was used as the analytic unit have reported associations between fee levels and socioeconomic characteristics [Feldstein (1970), Newhouse (1970), Fuchs and Kramer (1972)]. But those which used the physician as the analytic unit found nonsignificant correlations between physicians' fees and the characteristics of their counties of practice [Steinwald and Sloan (1974), Sloan (1976)]. However, in view of the many differences between the two groups of studies besides the choice of an analytic unit, it is not possible to identify which ones account for specific differences in the results.

Despite the ambiguity of prior findings, county socioeconomic (and medical supply) characteristics were specified as exogenous variables for this study. In part this decision was made in order to explore the issue of access to physicians' care, and in part because these characteristics are proxies for the levels of demands facing physicians.

The Physician-Induced-Demand-Target-Income Hypothesis

An alternative to the conventional theories of physician economic behavior discussed above is the hypothesis which holds that physicians' pricing and output decisions are the result of their desires to achieve "target" net incomes and their abilities to "induce" patient demands. No widely accepted theoretical models of the physician-induced-demand-target-income (hereafter PIDTI) hypothesis exist, although several have been proposed [e.g., Evans (1974, 1976), Sloan and Feldman (1978)].

Briefly, however, the hypothesis contends that: (i) physicians attempt to maintain desired, preferred, or acceptable levels of net income; (ii) they have sufficient market power to raise fee levels, and--in their roles as "agents" for medically untrained patients--they can recommend levels of services beyond what well-informed patients would demand; and (iii) when their actual net incomes fall below the target levels--either because of shrinking clienteles when the ratio of physicians to population rises or because of reimbursement constraints--physicians attempt to reachieve the targets by raising fee levels, increasing output per patient, or both [e.g., Dyckman (1978)].

If the PIDTI hypothesis is valid, it clearly limits the range of policy alternatives for controlling the growth of expenditures on physicians' services. In particular, it implies that controls on charges alone, or on utilization rates alone, will fail because physicians can circumvent charge controls by generating demands, and can circumvent output controls by raising charges. Moreover, the hypothesis further implies that efforts to promote competitive market performance by, say, increasing the supply of practitioners may succeed only in elevating charges or raising utilization rates. In short, if the hypothesis is correct, the only successful cost-containment policy is one which regulates <u>both</u> feel levels and utilization. And, since such a policy entails a high administrative and political cost, it obviously ought not to be implemented in the absence of very convincing evidence that the hypothesis is, in fact, true.

Despite an enormous volume of empirical and theoretical research, it is fair to say that the PIDTI hypothesis has not been conclusively tested.

The research in this area has proceeded in three major directions: (i) empirical efforts to test the implications of the hypothesis; (ii) criticism--both empirical and theoretical--of these efforts; and (iii) attempts to construct rigorous tests to distinguish between the validity of the hypothesis and the applicability of standard neoclassical models for explaining physicians' economic behavior.

The research in the first of the three categories has sought to uncover relationships between physician-population ratios and fee levels or per capita utilization rates of physicians' services, since--in its simplest form--the PIDTI hypothesis predicts that high physician-population ratios <u>may</u> be accompanied by high fee levels, high per capita utilization rates, or both. The results are mixed. Many studies have, in fact, reported significantly positive correlations between physician-population ratios and area fee levels [e.g., Huang and Koropecky (1973), Newhouse and Phelps (1974, 1976), Redisch, Gabel, and Blaxall (1977), Kimbell and Barros (1978)], but negative correlations or inconclusive results have also been reported [e.g., Steinwald and Sloan (1974), Sloan (1976), Hadley and Lee (1978), Paringer (1979)]. Similarly, although most research indicates positive associations between physician-population ratios and per capita utilization rates [e.g., Fuchs and Kramer (1972), Newhouse and Phelps (1974, 1976), Holahan (1975), May (1975), Davis and Reynolds (1975), Wennberg and Gittleson (1975), Fuchs (1978)], in many instances the associations are not significant, and in several instances negative relationships between physician density and utilization rates have been reported [Kimbell and Barros (1978), Held and Manheim (1979)].

Many health economists have begun to question the rationale of the PIDTI hypothesis and the validity of methods that have been employed in the efforts to test it. Their criticisms have focussed on the hypothesis' lack of rigor, its failure to explain how the target incomes are set, the absence of standards against which utilization rates can be evaluated, test specifications, sources of bias in the test data, and the theoretical quality of tests [Kimbell and Barros (1978), Reinhardt (1978), Sloan and Feldman (1978), Yett (1978), Ramsey (1979)].*

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* For example, Feldstein's influential (1970) paper, in which reduced-form demand equations were found to be positively sloped--which he attributed to nonprice rationing by physicians--has been convincingly criticized on grounds that the demand equations were underidentified [Newhouse, et al., (1979)]. After re-estimating the model in simultaneous-equations form, Hixon and Mocniak (1979) found that the demand for physicians' services had the "correct" negative slope. Likewise, another influential paper by Fuchs and Kramer (1972) reported significant positive correlations between the demand for physicians' services and state physician-population ratios. However, the "demand" equation estimated by Fuchs and Kramer is not genuinely a demand function because their model lacks a supply-of-services function. As a result, their demand function is actually a utilization equation which combines the effects of demand and supply. And, since the supply of physicians' services is positively related to physician-population ratios, their finding of a positive correlation between utilization and physicians per capita fails to confirm or refute the PIDTI hypothesis [Ramsey (1979)]. However, even with the best of test specifications, it has often been pointed out that the data used to test the hypothesis have been susceptible to a variety of biases. For instance, with respect to interpreting correlations between fee levels or utilization rates and physician-population ratios, it has been argued that positive relationships could arise from the propensity of physicians to locate in areas of high demand per capita, higher levels of service "quality" in physician-rich areas, lower time-costs of obtaining services in physician-rich areas (leading to larger volumes of demand), and border-crossing by patients in physician-scarce areas to obtain services in physician-rich areas. There may also be interactions between patient characteristics and physicians' abilities to generate demands. Recently, Pauly (1980) found that utilization rates were significantly positively related to physician density among low-education patients, but significantly negatively related to physician density among high-education patients. This suggests that patient sophistication may influence the success of demand generation, although it is not clear why the most highly educated patients should demand fewer services as the physician-population ratio rises. Pauly himself concluded that the demand inducement effects in his sample were unimportant.

The most productive of the criticisms has led--and continues to lead--to the development of new tests of the PIDTI hypothesis. For example, Reinhardt (1978) noted that the behavioral implications of the PIDTI hypothesis may be--and generally will be--identical to those of the standard neoclassical supply-and-demand model. First, he argued that, ceteris paribus, an outward shift in the supply of physicians' services (i.e., an increase in the area physician-population ratio) leads to an increase in the market-clearing volume of services per user in both the PIDTI and standard models. Hence positive correlations between observed utilization rates and physician-population ratios do not establish the validity of the PIDTI hypothesis over the standard model.* Second, he observed that, ceteris paribus, an outward shift in the supply of services produces a decline in market-clearing fee levels if the standard theory is correct, and may increase, reduce, or not affect fee levels if the PIDTI hypothesis is correct. Under the PIDTI hypothesis, fee levels will rise if physicians seek to reachieve their target net incomes predominantly by elevating charges, and fee levels will remain constant or fall if physicians respond to diminishing clienteles predominantly by generating additional demands.

Reinhardt's proposed test of the PIDTI hypothesis centers on relationships between observed fee levels and physician-population ratios--and it cannot be conclusive. That is, positive correlations between fee levels and physician-population ratios are consistent with the PIDTI hypothesis but not with the standard theory. Negative correlations are consistent

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* It is worth emphasizing that this point alone is exceptionally damaging to much of the existing empirical work on the PIDTI hypothesis.

with both the PIDTI hypothesis and the standard theory, and the meaning of nonsignificant correlations is unclear.*

Two more direct tests of the PIDTI hypothesis are feasible. The first involves estimating patient demand as a function of physician-population ratios (and the appropriate standardizing variables) within a simultaneous system, and estimating the structural coefficients on the ratios themselves. Although nonsignificant or negative coefficients would not necessarily show that physicians cannot induce demands, positive coefficients would indicate that they can and probably do. A test that is somewhat similar to this approach was reported by Mitchell and Cromwell (1980).

Mitchell and Cromwell estimated a market-level supply and demand model for surgical operations in which the demand function was expressed, *inter alia*, as a function of the market's surgeon-population ratio. They divided their sample of markets into large metropolitan, small metropolitan, and nonmetropolitan areas. When they fitted their model to the subsample of large metropolitan groups, it yielded a backward-bending supply function

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* Ramsey (1979) has criticized Reinhardt's test on grounds that it assumes the existence of market supply functions although, as is well known, supply functions do not exist in imperfectly competitive markets. Ramsey suggested another test based on the effect of demand inducement on practice cost functions. He argued that, if demand inducement occurs, it requires the physician to spend additional time persuading patients to accept extra services and shifts the practice cost function upward. But his hypothesis is conjectural at best, and it would be difficult to demonstrate that any upward shift in practice cost functions related to physician-population ratios is due solely to time consumed in persuading patients to accept additional services. It should be noted that other tests of the PIDTI hypothesis against the standard model have been proposed by Green (1978) and Pauly and Satterthwaite (1979), but on the basis of their results it is difficult to tell how powerful or accurate they are.

which was less steeply sloped than the demand function. This implies an unstable market equilibrium such that prices move downward to zero, or upward without limit, after a displacement from an initial equilibrium. Mitchell and Cromwell speculated that demand inducement might explain why actual prices did not behave in the implausible fashion predicted by their fitted model.* However, they did not resolve this interpretation with the finding that the surgeon-population ratio did not enter significantly into their demand equation. Hence, their conclusion that demand inducement occurred was not derived from a strong empirical test, but is only one of many possible implications of their fitted model. And, since the fitted model has questionable properties--perhaps due to specification error--this conclusion cannot be regarded as persuasive.

The second of the more direct tests of the PIDTI hypothesis involves exploiting a natural experiment arising from the Economic Stabilization Program of 1972-74. The ESP imposed controls on Medicare allowances, and to the extent that the controls (i) restrained fee levels and (ii) lowered physicians' net incomes below target levels, the PIDTI hypothesis--but not the neoclassical model**--predicts there would be an increase in per capita utilization of physicians' services.

* Briefly, they argued that: (i) an increase in the surgeon-population ratio shifts the market supply function outward; (ii) target income motives lead surgeons to respond to excess market supplies by raising their prices rather than lowering them (as the neoclassical model predicts); (iii) demand inducement occurs, which shifts the market demand function outward and establishes a new equilibrium fee level; and (iv) market prices rise to the new equilibrium fee level.

** That is, when, in the neoclassical model, prices are held below market-clearing levels, the short-run effect is to reduce the market quantity supplied and to create excess demands.

The only presently available findings using this type of test support the validity of the PIDTI hypothesis. Specifically, Holahan and Scanlon (1978) reported that Medicare utilization rates in California increased more than twice as fast as Medicare charge levels in 1973-74. Moreover, they found that Medicare charges rose substantially after the termination of ESP controls, even though Medicare utilization rates remained stable or even fell. Unfortunately, they were unable to observe charge levels or utilization rates in private business, and their results may have been distorted by shifts in physician output between private and Medicare business. Indeed, in another analysis of the same data, Hadley et al. (1978) found that California physicians' net incomes leveled off during the ESP. They inferred from this that the rise in Medicare utilization rates during the ESP was offset by a decline in non-Medicare outputs, which, they argued, indicated that "physicians either did not or were unable to create enough demand to offset the fee restrictions imposed by ESP."

In an effort to expand upon the prior tests of the PIDTI hypothesis, we conducted three separate tests of the PIDTI hypothesis against the neoclassical model. They consisted of:

(1) Estimating physician demand functions in which the physician-population ratios are included as exogenous variables, along with standardizing variables for perceived "quality" differences.

(2) Estimating the relationship between charge levels and county physician-population ratios in the manner proposed by Reinhardt.

(3) Investigating further the impact of ESP controls on Medicare and private business.

Physician Participation

Inducing physicians to accept benefit assignment is a goal of public reimbursement policy because it increases access to physicians' care. Under both the Medicare and Medicaid programs, acceptance of assignment means that the physician accepts the carrier's allowance as full payment for the services performed. In Medicare, the net price paid on assigned claims is therefore the unit deductible plus the average difference between the carrier's allowance and the amount paid (80% of the allowance). The net price paid on nonassigned services is the unit deductible plus the average difference between the amount charged by the physician and the amount paid. Hence, other things being equal, Medicare beneficiaries tend to pay lower net prices on assigned services than on nonassigned services, and access to care as measured by net price is greater on the former than on the latter. In the states' Medicaid programs, services are provided to eligible enrollees only by physicians who participate (accept assignment). Accordingly, increasing the rate of Medicaid participation is an important method of increasing low income populations' access to physicians' services, although access in this case is based on the physical availability of care rather than on net price.

It follows that an important area for research is to identify factors which lead physicians to accept assignment. Those factors which can be influenced by policy actions represent potential ways in which HCFA may be able to increase assignment rates. In some instances, the characteristics of physicians with high or low propensities to accept assignment are also of policy interest. For example, knowledge of these characteristics (e.g., the physicians' fee levels, specialties, locational attributes, rates of board certification, and educational background) will allow policy makers and administrators to better understand the cost, quality, and access to services implications of policies to control expenditures by capping allowance levels.

Unfortunately, we did not have access to Medicaid or Medicare assignment data for this study. However we did have extensive data on the private market business from two Blue Shield Plans with physician participation arrangements.* All Blue Shield Plans market one or more of three types of basic health insurance contracts: (i) usual-customary-and-reasonable (UCR), (ii) partial service, and (iii) indemnity. Although participation agreements do not apply to indemnity policies, the other two lines of private business do have certain strong parallels with Medicare and Medicaid. In particular, as in Medicaid, a blue Shield subscriber is eligible for a partial service contract only if his/her family income is below a ceiling level. Also, the procedure used in setting allowances is basically the same for Medicare enrollees as it is for Blue Shield Plan UCR subscribers. Therefore, analyses of the determinants of physician participation in private Blue Shield business have important applications to Medicare and Medicaid reimbursement policy as well as to the Blue Shield Plans themselves.

With respect to pricing and output, the most important implication of participation is that the physician's maximum average revenue on participating

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* As it applies to Medicaid, "participation" is synonymous with acceptance of assignment. However, "participation" as used here refers to participation in the Plans' private business unless otherwise specified.

claims is fixed during the current period.* That is, in the current period the physician acts like a price taker with respect to each Blue Shield line of business in which he elects to participate. Depending on local market conditions, the physician may or may not be a price taker in non-Blue Shield submarkets or in those Blue Shield submarkets where he or she does not participate.

The economic model that has been applied to this institutional setting in prior studies is Robinson's (1969) well-known model of price discrimination [e.g., Sloan and Steinwald (1978), Hadley (1978), Paringer (1979)]. Briefly, the model postulates that physicians; (i) maximize (expected) profit; (ii) face two or more demand functions representing the participating and nonparticipating segments of their markets; (iii) face a participating demand function that is infinitely elastic in average revenue; (iv) produce the same service in each market with one cost function; (v) are aware of allowance levels in the participating market segments; and (vi) produce an output in each market segment and charge a price in each nonparticipating market segment that maximize (expected) profit.

The implications of the model are straightforward. In particular--and depending on the initial positions of the demand, marginal cost, and allowance level functions--the fraction of the physician's output devoted to the participating market segment should:

(1) Increase (decrease) as the allowance level is raised (lowered).

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* The arguments here also apply to Medicare and Medicaid assignment. We do not claim that long-run average revenue is fixed on participating claims, since in UCR (and Medicare) business the physician has the power to raise next year's Level 1 screens by raising this year's fee levels.

(2) Increase (decrease) as the short-run marginal cost function shifts downward (upward).

(3) Decrease (increase) as the nonparticipating demand function shifts outward (inward).

Although the Robinsonian model assumes profit maximization, its implications hinge only on the relative income opportunities of participation and nonparticipation. Thus, the predictions can be expected to hold--albeit more weakly--for any type of physician optimizing behavior (e.g., utility maximization or target net income maintenance) where decision-making is sensitive to income opportunities.* However, when the profit-maximization assumption is relaxed, the physician's tastes and attitudes presumably have some impact on the participation decision.

The only prior study of physician participation in Blue Shield Plans is by Sloan and Steinwald (1978). Studies of Medicare assignment have been carried out by Huang and Koropecky (1973), Muller and Otelsberg (1979) and Paringer (1979). The determinants of Medicaid assignment have been explored by Sloan, Cromwell, and Mitchell (1978) and Hadley (1978). Explicitly or implicitly, all of these studies employed the Robinsonian model. Because of differences in analytic units, samples, definitions of variables, and estimation procedures, it is difficult to summarize the results of these studies. However, on balance, the evidence tends to confirm

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* In the case of target net income maintenance the physician's participation decision should be responsive to income differentials between participating and not participating if realized net income falls below the target level. But even if realized net income equals or exceeds the target, it is probably unreasonable to assume that a physician declines the opportunity to raise his or her net income when the opportunity is obvious and easy to exploit.

the validity of the model's implications. Specifically, it shows that:

(1) Carrier reimbursement practices have significant effects on participation/assignment rates. The rates appear to increase significantly with allowance levels [Sloan and Steinwald (1978), Sloan et al. (1978), Paringer (1979)], and proxies for the stringency of claims review have been found to be negatively correlated with Medicare assignment tendencies [Huang and Koropecky (1973), Muller and Otelsberg (1979)].

(2) High input prices (office wage rates) lower assignment rates [Hadley (1978), Sloan et al. (1978), Paringer (1979)], but have no clear-cut effect on participation tendencies [Sloan and Steinwald (1978)]. No other surrogates for the level of marginal costs have been used.

(3) Certain proxies for strong nonparticipating/nonassignment submarket demands (e.g., high population income, large percentages of urban, white, and elderly residents, and low volumes of outpatient visits per capita) are evidently negatively correlated with assignment rates [Huang and Koropecky (1973), Sloan et al. (1978)]. But participation rates were found to be positively correlated with population income by Sloan and Steinwald (1978), and observed relationships between participation/assignment rates and the number of physicians per capita are mixed.

(4) With respect to proxies for physician tastes and attitudes, the strongest results indicate that non-board certified physicians, foreign medical graduates (FMGs),* young physicians, and physicians with liberal

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* Sloan and Steinwald (1978) argued that FMGs (from non-white, non-English speaking countries) are of lower perceived quality than U.S. medical graduates, and Paringer (1979) claimed that FMGs have lower implicit wage rates than U.S. medical graduates. But whether country of medical graduation is a quality proxy or a labor cost proxy, its effect on the participation/assignment decision should be in the same direction.

attitudes toward publicly sponsored health care have the highest participation/assignment rates [Sloan and Steinwald (1978), Sloan et al. (1978), Paringer (1979)]. Mixed results have been found with respect to relationships between participation/assignment rates and physician specialties.

As was indicated in Chapter II, in each of the two study Blue Shield Plans having participation agreements, the agreements were on an all-or-nothing basis. Thus, the decision faced by physicians dealing with these Plans was not how much to produce for the submarket(s) where they could participate, but whether to produce for the submarket(s) at all. In this case the Robinsonian price discrimination model is not appropriate for analyzing the decision. The correct theoretical model is one which compares the profitabilities of participating and not participating. Unfortunately, when the correct model is applied, it leads to much more indeterminate economic implications than does the Robinsonian model. For example, it is not generally possible to predict the effects of upward shifts in marginal costs or outward shifts of nonparticipating demand functions on the relative profitabilities of participating and not participating when participation is on all-or-nothing terms. These problems are discussed, and the appropriate economic model is set out in the analysis of physician participation, in Chapter VIII.

Most of the major policy issues with respect to participation (assignment) are well-known. Briefly, they concern:

(1) The tradeoff between increased access to care and the program costs of participation rates. If the rates are relatively insensitive to allowance levels, then allowances must be raised substantially in order to

raise participation rates. In the case of the Medicare and Medicaid programs this means that the costs to government of raising assignment rates in order to improve access to care may be very substantial. The costs necessary to secure a given absolute increase in assignment rates will be higher the less sensitivity assignment decisions are to allowance levels.*

(2) Prior findings indicate that participation and assignment arrangements are relatively more attractive to physicians having characteristics associated with below-average quality. If accurate, they suggest that using participation and assignment as devices for improving access to care may result in below-average quality of services.

(3) If Medicare and Medicaid assignment were combined under a single program, it could result in a two-tier payment system.** And this type of combined program has been under consideration as one of numerous possible modifications of the present Medicare and Medicaid programs. Hence, the issue of how sensitive the combined assignment rate is likely to be to each of the allowance levels--and whether, as one might expect, the lower of the allowance levels (the Medicaid level) would dominate the other as

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* Unlike the single prior study of participation in Blue Shield Plans, the present study was able to use actual data on allowances. This made it possible to estimate participation-allowance relationships without using proxies for fee schedules and fee screens. It also made possible direct comparisons of these relationships with those derived from studies of Medicare assignment and Medicaid participation. Until now no such comparisons could be made.

** It was noted in Chapter II that persons who are eligible for <u>both</u> Medicare and Medicaid receive services on a mandatorily assigned basis. However, physicians who provide these services are reimbursed at the Medicare level, and--although in a sense Medicare and Medicaid assignment are combined--this does not lead to a two-tier system of physician payment [Paringer (1980)].

a determinant of assignment--may be especially important in deliberations concerning possible programatic changes. No prior research has addressed this issue.

These three policy issues are explored both descriptively, and in terms of a model of physician participation, in Chapter VIII.

The next chapter presents in detail the analytical framework that we employed to further investigate each of the foregoing policy issues. This model was specifically designed to take account of the effects of the Blue Shield reimbursement practices and mechanisms described in Chapter II. Subsequent chapters contain the results obtained by applying the analytical framework to the data provided by the three study Plans, and the final chapter summarizes our conclusions based on the application of the findings to the policy issues set forth above.

CHAPTER IV

THEORETICAL FRAMEWORK

This chapter presents the theoretical framework for the study. It was designed to incorporate the basic features of Blue Shield Plan reimbursement practices descrived in Chapter II, and to address as many of the policy issues descrived in Chapter III as is possible given the data base available for the study. In addition to their intrinsic value, the descriptive tables and regressions in the next two chapters were used in the variable selection process which was required in order to reduce the candidate exogenous variables for the model's equations to a feasible number prior to estimating the model for the three study Plans. The estimated versions of the model are presented and discussed in Chapter VII. Chapter VIII contains an analysis of the factors affecting physicians' participation status, and thus can be viewed as an extension of the model which treats participation status as predetermined in the current period.

Three aspects of modeling physicians' practices as firms are given particular attention. They are: (i) optimization or goal behavior by the practice; (ii) the nature of the practice's average revenue function; and (iii) the character of production costs. The chapter concludes with a presentation of four econometric models of the practice which cover the basic institutional features of the marketplace and the descriptive findings drawn from the three study Plans.

Optimization and Goal Behavior by the Practice

In the literature on physicians' practices discussed in Chapter III, it has been claimed that physicians may engage in any of three basic forms of optimizing or goal-related behavior: (i) profit or net income maximization, (ii) utility maximization, and (iii) pursuit or achievement of a target net income.

There may, of course, be equivalences between any two of these three forms. For example, it is well known that profit and utility maximization may give exactly the same optimal price and output combinations [Olsen (1973, 1977)]. And profit maximization may be identical to target net income achieving behavior if the physician's net income target is maximum profit. Some efforts have been made to show that target net income achieving can be viewed as a type of utility maximization [e.g., Sloan and Feldman (1978)]. However, they have concentrated on the issue of when the physician wishes to generate demands rather than the conditions under which utility maximization yields "a" target net income. But, for our purposes, whenever two or more of the three forms of optimizing behavior are equivalent, it is immaterial to determine which of the equivalent forms best describes the practice's actual goal. For instance, if the physician always maximizes profit even though his psychological goal is utility maximization or achieving a target net income, it is reasonable to treat him as a profit-maximizer. Consequently, equivalences between the forms of optimizing behavior will be ignored in what follows, and it will be assumed that each of the three forms implies different pricing and output policies by the practice.

A perfectly general--and, indeed, tautological--way of characterizing the practice's first-order optimizing condition is

(1) $$R'(q) = C'(q) + M(q) ,$$ where

q = single-valued output index,
R' = marginal revenue,
C' = marginal cost,
M = markup representing the difference (if any) between marginal cost and marginal revenue.

The second-order optimizing condition is, of course, $R''(q) < C''(q) + M'(q)$, where the primes indicate the order of differentiation. It should be emphasized that (1) holds for <u>any</u> form of optimizing behavior whatsoever, and the practice maximizes profit if and only if $M = 0$ at the optimal output. If the markup (which may have any sign) $M \neq 0$ at the optimal output, then the practice <u>must be</u> either a utility maximizer or target net income achiever inasmuch as it cannot maximize profit.

Unfortunately, if $M \neq 0$ at the optimal output, it is not possible to deduce from this fact alone whether the practice maximizes utility or pursues a target net income. It can easily be shown that a utility maximizing practice may produce either more or less than the profit maximizing output (implying that $M < 0$ and $M > 0$, respectively), and the same is true if the practice pursues a target net income. Indeed, the output level of the target-net-income-achieving practice is indeterminate in general, because the same fixed level of net income can usually be achieved by many--perhaps infinitely many--price and output combinations. If one wishes to construct a test of the form of optimizing behavior derived from the sign of M at optimal output, the most that can be obtained is inferences as to whether the practice maximizes profit. Beyond this, the sign of M tells nothing about the form of goal behavior.

$M(q)$ itself can be regarded as monetized marginal psychic costs.* This suggests that a general way of specifying the markup is as

(2) $$M = M(q,Y) \text{ or } = M(Y)$$

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* In this sense target net income achieving can be looked upon as a case in which the practice incurs psychic costs which cause its profit to deviate from the maximum level.

where Y is a vector of physician or practice characteristics denoting tastes.*

If the practice maximizes utility, one might plausibly expect the value of M to vary with the physician's tastes and/or the nature of the practice.** M should also tend to vary with the elements of Y if the practice is a target net income achiever because the income targets can plausibly be expected to vary with physician and practice characteristics. On a priori grounds, however, there are no ways of predicting how M should vary differently with Y depending on whether the practice maximizes utility or achieves a target net income. All that can be said is that M is independent of Y if the practice maximizes profit.

The Practice's Average Revenue Functions

In the usual microeconomic theory there is no distinction between the demand and average revenue functions facing the firm. There is also no distinction between the demand and average revenue functions facing a physician's practice, where purchases are subsidized by private or government health insurance. However, unlike the case with the usual theoretical firm, the net price paid by the patient is less than the gross price received by the physician. Hence it is tempting to view "the" demand function facing the practice not as the average revenue function, but as the net price demand

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* Note that if M does not depend on q, the second-order optimizing condition is $R'' < C''$ --i.e., the same as the condition for profit maximization, regardless of the practice's actual goal behavior.

** For example, large group practices may have a stronger tendency to be profit maximizers than solo practices because of their ability to employ professional managers and the inherent difficulties of maximizing the joint utility of many physicians.

function of the practice's patients. But this is neither useful nor appropriate.

Just as it is in the usual microeconomic model of a firm, the practice's demand function is its average revenue function. This is true for several reasons. First, the practice's determination of its fee level and output depends on the average revenue it expects to receive, and not on the net price paid by its patients. Although the net price demand function may influence the average revenue the practice can expect to receive, it is the average revenue function which is relevant to the practice's pricing and output conduct.*

Second, the net price demand function facing the practice does not characterize patients' purchasing behavior except when the practice is a pure monopolist or when unrealistic assumptions are made about the marketplace. That is, insofar as it measures purchasing behavior, a demand function must be defined for a given consumer or a fixed group of consumers. In a pure monopoly the practice's demand function is the market demand function. And under certain assumptions (e.g., that the practice retains a fixed share of the total market regardless of its fee level), one can also deduce the market demand function from the practice's net price demand function. However, under all other circumstances the size of the practice's clientele is not

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* The point here is that the physician does not have to know explicitly the net price demand function in order to estimate the average revenue he can expect to receive.

Obviously, the net-price demand and average revenue functions can be deduced from one another provided one knows the coinsurance rate and the number of the practice's patients who satisfy deductibles (expressed as a function of output). Even so, as an empirical matter it may be exceedingly difficult to specify and estimate the average copayment rate which allows net price to be translated into gross price. For a discussion of the problem, see Sloan and Steinwald (1975).

invariant with respect to its price level. Depending on the pricing behavior of its competitors, the practice will normally lose clients when its price level rises and gain them when its price level falls. Accordingly, the shape and position of the practice's net price demand function cannot be used to deduce information as to individual patients' demands or as to market demands.

Third, both the average revenue and net price demand functions facing the practice measure the competitiveness of market pricing and, in principle, ease of entry into the market.* That is, the slopes and positions of both functions measure the practice's ability to capture a share of the total market and its ability to retain its patients when it changes its fee levels. If there are many sellers and the market approximates perfect competition, both functions will be highly price elastic independently of buyers' tastes and copayment rates. Only under pure monopoly or in highly concentrated oligopolies is there reason to believe that practice net price and average revenue functions may have different slopes--reflecting the effects of buyers' tastes and copayment rates. But even in tight oligopolies interdependent seller pricing policies may cause perceived net price and average revenue functions to be determined more by competitors' responses to price changes than by reimbursement methods or individual consumers' buying behavior. In short, however the practice's demand function is defined, it characterizes actual and potential competition in the marketplace. Highly elastic demand functions are associated with price-taking or near price-taking behavior by the practice. Inelastic demand functions are associated with moderate to high

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* If entry is easy, a general upward movement of fee levels will attract other practices into the market. Thus, even if the market is highly concentrated, the practice may perceive its average revenue and net price demand functions as highly price elastic above the going fee level.

levels of concentration or with moderate to high levels of product differentiation. There are no reasons to suppose that net price demand functions capture these properties more successfully than average revenue functions. Hence there are no persuasive grounds for defining the practice's demand functions in terms of net price rather than average revenue.

To summarize this discussion, net price demand functions facing the practice are not directly pertinent to the practice's decision-making, do not measure patients' demand behavior or the impact of insurance reimbursement on it, and are not superior to average revenue functions for characterizing the level of price competition in the marketplace. On this basis, the practice's demand function will hereafter be defined as its average revenue function. The definition is exactly the same as the definition of the demand function facing the firm in traditional microeconomic theory.

In order to accurately model the demands for the practice's services, it is necessary to take into account two features of the marketplace. The first of these is that patients generally have a variety of different types of health insurance coverage. These different types of insurance segment demands facing the practice. That is, demands are ordinarily said to be segmented if buyers can be separated into mutually exclusive groups, and if the commodity cannot be resold by members of one group to members of another. Clearly, the different types of health insurance coverage they have separate patients into such mutually exclusive groups. And, given group enrollment practices, it is reasonable to assume that patients do not normally switch their types of health insurance during a given year (and that they do not usually hold more than one type of health insurance). Obviously, the resale of health services from one group to another is impossible.

The result is that the practice may sell services in two or more submarkets defined by patients' insurance status. As indicated in Chapter II the submarkets are, for the Blue Shield Plans' private business:

(i) UCR

(ii) indemnity, and

(iii) partial service;

for government business:

(iv) Medicare;

and for all other services:

(v) non-Blue Shield.

The non-Blue Shield submarket includes Medicaid (and Medicare, in two of the three study Plans) business, services sold to patients insured with other carriers, and services sold to patients without health insurance.

Depending on the number of patients in each submarket and the number of practices (as well as on other conditions described below), the average revenue functions for these submarkets may have rather different price elasticities.* Since physicians are (or can become) aware of their patients' insurance status, this opens the possibility for discriminating in price across submarkets. Hence, an empirical question that must be resolved is whether they charge different fee levels to patients with different types of health insurance. If physicians do charge different fee levels, it does not necessarily imply that they maximize profit. Similarly, if they set the

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* For example, physician concentration vis-a-vis the number of patients may be high in one submarket and low in another. The practice's average revenue function for the first submarket should therefore tend to have a high price elasticity, and the function for the second submarket will tend to have a lower price elasticity.

same fee levels across submarkets, it does not necessarily mean that they fail to maximize profit. Price discrimination may occur with utility maximization or with target net income achieving, and the absence of discrimination may signify only that the billing cost or the loss of good will associated with discrimination is larger than any profit the physician foregoes by failing to discriminate.

The second feature of the marketplace which affects the physician's average revenue is Blue Shield Plan participation. The significant characteristics of participating claims are that:

(i) the maximum average revenue the physician can receive in the current year is predetermined and equal to the average amount allowed by the Plan, and

(ii) the current amount charged by the physician has, in general, no relation with current average revenue or the quantity of participating services demanded by patients.

The first of these characteristics holds regardless of whether the amount allowed is determined from a fee schedule or from fee screens. Since it is reasonable to assume that physicians are aware of their allowances with some degree of precision, it can be postulated that they behave like price-takers on current-year participating claims. Their average revenues cannot exceed the Plan's allowances and, except under special circumstances such as extending professional courtesy, they ordinarily have no incentives to charge and receive average revenues less than the Plan's allowances.*

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* Even if physicians are utility maximizers, one would expect the claim to be true as long as net income is an argument in the utility function. Target net income achievers may charge less than the allowed amounts if by doing so they can maintain their net income targets. However, if target net

For participating business the average revenue function facing the physician is therefore infinitely elastic at the going level of allowances. Theoretically, the average revenue function may be of infinite length, but for all practical purposes it is not. The number of patients having any type of health insurance and available to the practice is limited (unless the practice is a perfect competitor), and the maximum amount of services demanded of participating physicians is likely to be finite. That is, the practice's average revenue functions for participating services can be regarded as horizontal in output but of a finite length. One of the three study Plans had a participation arrangement which applied to both UCR and partial service business, and the allowance levels in partial service business were typically somewhat lower than UCR allowances. In this instance, the participating practice faces two perfectly elastic demand functions, each finitely long and of different heights depending on UCR and partial service allowances.

In the two study Plans which had them, participation agreements were offered nominally on an all-or-nothing basis. In terms of optimization strategies applied to such all-or-nothing agreements, the practice must

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income achievers do charge less than their allowances, it means that their income targets are lower than incomes they are aware they could attain by raising their fees to the allowance levels. Inasmuch as it is implausible to believe that income targets are usually lower than readily achievable incomes, it is reasonable to assume that physicians who pursue target net incomes also act like price-takers on nonparticipating claims.

It should be noted that, in UCR and Medicare business where allowances are determined from fee screens, the current amount charged is lower than the amount allowed only if the physician reduces his charge level from last year to the current year. This is because current allowances are never higher than last year's median, modal, or posted charges. It may be rational for the physician to reduce his charges from one year to the next in order to sell all of the services he wishes to, but in view of secular increases in demand, reductions in charges are almost certainly the exception rather than the rule.

calculate its anticipated profit, utility, or net income under the participation and nonparticipating options, and then choose to participate or not depending on which option meets, or most nearly meets, its goal. In either event, it faces a given set of average revenue functions defined for the submarkets in which it produces.*

There is some question about how to specify the average revenue functions facing nonparticipating physicians and the average revenue functions for indemnity services where participation does not apply. As indicated above, the slopes of these functions (or the price elasticities) are measures of competitive conditions in local markets. Horizontal or infinitely elastic functions characterize perfect competition, while steeply sloping or relatively inelastic functions accompany the existence of market power. In Chapter III it was observed that physicians' practices are generally believed to possess some degree of market power. Chiefly for this reason, the model was formulated so that the average revenue functions for nonparticipating and indemnity services were downward-sloping in price. The formulation itself was treated as a null hypothesis, and one object of the study was to test this hypothesis. Unfortunately, the relationship between the competitiveness of market pricing and the price elasticities of average revenue functions is never very precise.

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* The situation is slightly different when the physician can participate on a claim-by-claim basis. Claim-by-claim participation means that the practice faces two average revenue functions in each line of business where it can participate--one for participating claims and one for nonparticipating claims. The type of economic model that applies has been formulated by Sloan and Steinwald (1978) and Hadley (1978).

Medicare assignment is permitted on a claim-by-claim basis, but the Medicare data from the study Plan which was a Medicare carrier did not separate assigned and unassigned claims. Hence there was no reason to design an economic model for claim-by-claim participation or assignment because it could not be fitted with the Plan data as we received them.

About all one can say is that pricing approaches the competitive norm as the elasticities become large in absolute value.

The discussion in this section can be summarized as follows.

(i) The appropriate demand function for the practice's services is its average revenue function(s).

(ii) The demand side of the practice's market is segmented by patients' insurance status. The practice has a separate average revenue function for each such submarket.

(iii) Practices may or may not discriminate in price across submarkets where they do not participate or where participation does not apply.

(iv) We employ the (null) hypothesis that practices behave like price-setters in submarkets where they do not participate or where participation does not apply.

(v) If the practice participates, it behaves like a price-taker on current-year participating services. Its average revenue is fixed and pre-determined at the Plan's allowance level, and the maximum amount of participating services demanded is finite.

Since practices ordinarily produce for at least one submarket where they do not participate or where participation does not apply, (iv) precludes the possibility that a practice supply function exists. Economic models of the practice based on (i)-(v) must consequently utilize a framework other than supply and demand equilibrium. The models contained in this section take such an approach.

Production Costs

Without going into the complex details of the practice's production technology, it will be assumed that a practice cost function exists. The cost function can be regarded either as of the standard type or as a behavioral relationship between costs and output if the practice does not minimize costs.

For modeling purposes, we will consider that the practice produces a single unit of output--the relative value unit or RVU. However, even with a single unit of output, it is possible that the unit varies in terms of content, quality, or some other dimension across the submarkets for which the practice produces. For example, because of differences in submarket average revenues or his tastes, the physician may provide a fundamentally different service across submarkets. As a result, the practice can be viewed either as producing the same service for all patients, or as producing a different service for each submarket.

This, in turn, opens three options for specifying the practice's cost function. It can be assumed that the practice has (i) a separate cost function for each submarket; (ii) a multiproduct cost function, where each product is defined as a submarket output; or (iii) a single-product cost function, which implies that the practice sells the same service in all submarkets. Regrettably, the study data did not include observations on practice costs. The only strictly cost-related data were proxy measures of the wage rate of office personnel, and these were not adequate for deciding which of the three specifications was most realistic.

Instead, the choice between specifications was made partly on grounds of plausibility and partly on grounds of simplicity. The separate-function specification was rejected primarily because it implies that the amount produced for one submarket in no way affects the costs of producing for any other submarket, and such an assumption is clearly difficult to sustain. Because of its generality, a multiproduct specification is probably the most suitable, but existing forms of multiproduct cost functions--those that can rigorously be derived from multioutput production functions--would have been difficult at best to estimate for the study data. Accordingly, the single-output specification was selected. As just stated, it embodies the assumption that the properties of given procedures are the same for all patients.* It also implies that unit and marginal costs are fixed, given the total amount of output, and not affected by the composition of services allocated to the practice's submarkets.

The Practice Models

One approach to modeling physicians' pricing and output behavior would be to introduce uncertainty with regard to volumes of demands, patient-mix, patient arrival times, the composition of submarket demands, and so forth. However, the Blue Shield Plan data made available for the study were annual observations, which precluded models based upon day-to-day fluctuations in practice operations. Four practice models--each of which is feasible to estimate with the available data--are presented here. They are classified as to: (i) the physician's participation status, and (ii) the presence or absence of fee variation across lines of business.

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* It is observed in the next section that relatively little evidence of fee variation across submarkets was found in the Plans' data. While fee variation would not necessarily indicate differences in services across submarkets, its absence suggests that services probably are relatively homogeneous.

The physician's participation decision is, of course, an integral part of his overall economic behavior. But, as we have already remarked, the type of participation agreement offered by the study Plans was all-or-nothing. The physician was required to participate or not, and it was therefore impossible to observe average revenues or to postulate optimizing behavior for the alternative the physician did not select. This being the case, there was little point in designing pricing and output models which incorporated the participation decision, since they would have required observations on certain data specific to the unselected alternatives. The models therefore take the participation choice as given.* For example, it can be assumed that the physician selects his participation status at the beginning of each year, retains the status throughout the year, and bases his pricing and output decisions on his choice. Obviously, these decisions may vary with the choice he makes.

The question of fee variation across submarkets bears on the form of model appropriate to the data--more specifically, on whether to hypothesize the existence of price discrimination. For two of the study Plans there were no significant patterns of fee variation across lines of business, but for the third results were mixed. Two different pairs of practice models were proposed as a result, one assuming no price discrimination and the other allowing for discrimination across submarkets.

The models are variants of the well-known Robinsonian (1969) model of price discrimination and an econometric model of the multiproduct firm estimated by Rosse (1970). Each of those described here employs the

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* Chapter 8 presents the results of our investigation of the factors which affected the decision on the part of participating and nonparticipating physicians included in the study.

tautological proposition (1) that the practice equates its (expected) marginal revenue and marginal cost, subject to a systematic (and possibly zero) deviation representing departures from profit maximization. The models themselves therefore consist of one or more average revenue functions and optimality equations denoting the modified marginal revenue-marginal cost equality.

Recapitulating, the assumptions, hypotheses, and conventions common to the models are:

(i) The practice has a separate average revenue function for each submarket defined by patients' insurance status. The submarkets are one or more of the following: UCR, indemnity, partial service, Medicare, and a residual (and unobservable) other submarket.

(ii) In submarkets where the practice does not participate or where participation does not apply, average revenue functions are downward-sloping in quantity.

(iii) Because the Medicare data were not segregated into assigned and nonassigned claims, it is assumed that the practice's Medicare average revenue function is downward-sloping in quantity. The assumption is invalid for assigned claims, but unless the physician accepts assignment on all Medicare claims, he can be assumed to face a downward-sloping average revenue function on some portion of his Medicare business. The average revenue function for the physician's Medicare business can therefore be assumed to be downward-sloping in Medicare output.

(iv) In submarkets where the practice participates, its average revenue is fixed and predetermined at the Plan's average allowance level. The maximum quantity demanded in each such submarket is finite.

(v) The practice's cost function is of the single-product type, and marginal costs are not affected by the practice's allocation of its outputs among submarkets.

We use the following notation and assumptions regarding the forms of average revenue, marginal cost, and markup functions.

i, t = submarket and year indexes, $i = 1, \ldots, n$

n = index of the residual "other" (e.g., non-Blue Shield) submarket

q_{it} = quantity in submarket i and year t

$q_t = q_{1t} + \ldots + q_{nt}$ = total quantity in all submarkets in year t

p_{it} = average amount charged in submarket i and year t

p_t = average amount charged over all submarkets in year t

A_{it} = average amount allowed by the Plan in submarket i and year t

X_t, Y_t, Z_t = vectors of exogenous variables

$p_{it} = a_{i0} + a_{i1}q_{it} + a_{i2}X_t$ = practice average revenue function in submarket i where the practice does not participate or where participation does not apply

$C'_t = c_0 + c_1q_t + c_2Z_t$ = practice marginal cost function

$M_{it} = m_{i0} + m_{i1}Y_t$ = practice's markup function on marginal cost in submarket i.

In the specification of the markup function M_i given earlier, the function was defined as depending on q_i. This is probably a more theoretically suitable specification than the one given here, but for practical purposes it makes little difference whether output is included as an argument in the function. For example, suppose M_i is invariant over submarkets, and let m_2q denote the effect of output on the overall markup M. Then the practice's total production and psychic marginal cost, say $\overline{C}'$, can be defined as

$$(3) \qquad \bar{C}' = (c_0 + m_0) + (c_1 + m_2)q + c_2Z + m_1Y \quad ,$$

and m_2 is substantively an additive portion of the slope of total marginal cost. Unless m_2 can be estimated separately from c_1, there are no strong reasons for viewing it except in this way. By the same token, deleting m_2q from the markup function means that c_1 cannot be regarded as the pure effect of production on marginal cost whenever the markup function depends, in fact, on output. As we show below, the models do not allow c_1 and m_2 to be estimated separately, so that estimates of the slope of the practice's marginal cost function reflect both production and psychic costs. Inspection of (3) indicates that the same is true of the intercept term $c_0 + m_0$.

These comments imply that, as an empirical matter, it is impossible to determine the value of the markup function. They do not, however, rule out the possibility of designing a hypothesis for testing whether practices maximize profit. More particularly, M (or all of the M_i) $= 0$ if and only if the practice maximizes profit. Therefore, under the general specification of the markup function just given, practices maximize profit if and only if $m_0 + m_1Y + m_2q = 0$ for all optimal values of q. But the equality holds for all optimal q only if the vector $m_1 = 0$. That is, profit maximization implies $m_1 = 0$. The reverse is not necessarily true since m_0, m_2 or both may be nonzero.

As a consequence, a crucial aspect of formulating a test for profit maximization is selecting the vector of exogenous variables Y. The elements of Y are defined as measures of physicians' tastes. The reason for using this definition is that, if physicians maximize utility or pursue target net incomes, the value of the markup function should vary with their tastes.* Under this reasoning, it is unlikely that one would observe utility maximization or target-income-achieving behavior without also observing variation in the markup function due to physicians' tastes. Accordingly, we propose the following logically inconclusive but, nonetheless, strong test of profit maximization against other types of goal behavior:

> physicians maximize profit if and only if the vector of coefficients on physicians' tastes $m_1 = 0$.

If $m_1 \neq 0$, the logical implication is that physicians do not maximize profit. If $m_1 = 0$, it is not necessarily true that physicians maximize profit, but the likelihood is strong that they do.**

Model 1: Nonparticipating Physicians; No Price Discrimination Across Lines of Business

This model applies only to nonparticipating physicians. In addition to the assumptions and hypotheses already stated, it is assumed that the physician charges the same fee level p_t in all lines of business.

It is also assumed that the practice perceives its individual submarket

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* In the case of target income achieving, the income targets can be expected to vary with tastes and the physician characteristics associated with them.

** Unfortunately, it may not be possible to choose empirical measures of physicians' tastes which are unrelated to marginal costs. That is, in terms of equation (3), the elements of Y may be a subset of the elements of the vector of exogenous cost variables Z --e.g., $Y = Z^1$ and $Z = Z^1 + Z^2$. If this is true, the last two terms in (3) become $c_2^2 Z^2 + (c_2^1 + m_1)Y$, where the vectors c_2^1 and c_2^2 are defined analogously with the decomposition of Z. The estimated coefficients on the taste variables Y may therefore be sums of cost-related and taste-related effects. It is obviously unlikely that $c_2^1 + m_1 = 0$ when $m_1 \neq 0$, but it is equally obvious that $c_2^1 + m_1$ may be nonzero when $m_1 = 0$. Specification error therefore tends to bias the test toward rejection of the profit maximization hypothesis.

average revenue functions even though it does not discriminate in price. Under this condition, the practice's total marginal revenue function (i.e., the marginal revenue function for its total output) is the horizontal sum of its submarket marginal revenue functions. If the submarket average revenue functions are linear, the total marginal revenue function is piecewise linear and continuous. The total average revenue function is also piecewise linear but not necessarily continuous. Behaviorally, this implies that, at any given charge level, marginal revenues are equal in all submarkets where sales are positive. It implies further that the practice will sell in a given submarket only when marginal revenue in that submarket is at least as high as marginal revenues in all other submarkets.*

The practice's total average and marginal revenue functions are approximated by the linear forms

(4) $$p_t = B_0 + B_1 q_t + B_2 X_t \quad ,$$

(5) $$R'_t = p_t + B_1 q_t \quad ,$$

respectively, where X_t is a vector of exogenous variables affecting the practice's demands.

As already stated, the practice is assumed to maximize profit up to a

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* Alternatively, it could be assumed that the practice does not perceive its individual submarkets. In this case the total average revenue function is the horizontal sum of the submarket average revenue functions. If the submarket average revenue functions are linear, the total average revenue function is piecewise linear and continuous. However, the total marginal revenue function is not necessarily continuous, and its discontinuities are positive jumps from left to right. This type of discontinuity admits multiple local optima. Moreover, for some values of p_t it implies that the practice will sell outputs in one or more submarkets at marginal revenues lower than those it could earn in other submarkets. As a result, the assumption leads to behavior that is incompatible with profit maximization, and we rejected it for that reason.

systematic, but possibly zero, difference M_t between marginal revenue and marginal cost, i.e.,

(6) $$R'_t = C'_t + M_t \quad .$$

Thus, substituting (5) and the expressions for C'_t and M_t into (6) gives

$$p_t + B_1 q_t = (c_0 + m_0) + c_1 q_t + c_2 Z_t + m_1 Y_t \quad ,$$

or, after rearranging terms,

(7) $$p_t = (c_0 + m_0) + (c_1 - B_1) q_t + c_2 Z_t + m_1 Y_t \quad .$$

Equations (4) and (7) constitute a two-equation simultaneous system with the average amount charged over all submarkets p_t and total practice output q_t endogenous.

It has already been remarked that the non-Blue Shield output q_{nt} was not observable in the study data. Accordingly, transforming (4) and (7) into an estimable system in which the terms in q_{nt} are absorbed into error components yields

(8) $$p_t = B_0 + B_1(q_{1t} + \dots + q_{n-1t}) + B_2 X_t + B_1 q_{nt} \quad \text{(average revenue)}$$

(9) $$p_t = (c_0 + m_0) + (c_1 - B_1)(q_{1t} + \dots + q_{n-1t}) + c_2 Z_t + m_1 Y_t$$
$$+ (c_1 - B_1) q_{nt} \qquad \text{(optimality condition)} \quad .$$

Equations (8) and (9) comprise Model 1. The overall average amount charged p_t and the observable Blue Shield total output $q_{1t} + \dots + q_{n-1t}$ are the two endogenous variables.

The model can be modified by deleting (8) and replacing it with the individual submarket average revenue functions for Blue Shield services,

(10) $$p_t = a_{i0} + a_{i1} q_{it} + a_{i2} X_t \, , \qquad i = 1, \dots , n-1 \, .$$

However, if (9) and (10) are estimated instead of (8) and (9), it is not possible to obtain an estimate of c_1 in (9). This is because B_1 depends on the parameters of the non-Blue Shield average revenue function as well as on the parameters in (10). Since the non-Blue Shield average revenue functions cannot be estimated, B_1 --and thus c_1-- cannot be estimated either.

Model 2: Nonparticipating Physicians; Price Discrimination Across Submarkets

Model 2 is a straightforward adaptation of the Robinsonian model of the price discriminating firm. The optimality condition for this model (which assumes profit maximization) is that $R_i' = C'$ for all submarkets where the firm's output is positive. That is, marginal revenues in all submarkets where outputs are positive are equal and are equal to overall marginal cost. Here we define the more general optimality condition

$$(11) \qquad R'_{it} = C'_t + M_{it} , \qquad i = 1 , \ldots , n ,$$

and note that M_{it} can be constrained to be the same for all submarkets. Equation (11) implies that the practice may choose a different fee level for each submarket, but this is clearly not necessary. Without loss of generality it may be assumed that fee levels are the same over each of one or more subsets of the practice's submarkets. The number n-1 may be defined as the number of such subsets within which charge levels are the same, but between which charge levels are different.

This model is analogous to Model 1 and consists of n - 1 pairs of equations. The first equation in the pair is the practice's average revenue function for the i-th submarket,

$$(12) \qquad p_{it} = a_{i0} + a_{i1}q_{it} + a_{i2}X_t , \qquad i = 1 , \ldots , n-1 .$$

The second equation is the optimality condition for each submarket derived as in (6), (7), and (9):

$$(13) \qquad p_{it} = (c_0 + m_{i0}) + (c_1 - a_{i1})q_{it} + c_1 q^{\circ}_{it} + c_2 Z_t + m_{i1} Y_t + c_1 q_{nt} \ , \qquad i = 1 , \ldots , n-1 \ ,$$

where

$$q^{\circ}_{it} = q_t - q_{it} - q_{nt} \ , \qquad i = 1 , \ldots , n-1 \ ,$$

i.e., total practice output less output in the i-th submarket less output in the non-Blue Shield submarket. The endogenous variables are the n-1 amounts charged p_{it} and the n-1 submarket outputs q_{it}. The average revenue function and optimality conditions for the non-Blue Shield submarket have the same forms as (12) and (13), but they are not observable, and are therefore excluded from the system.

There is one constraint on the coefficients across each pair of equations (12) and (13), and there are 2(n-2) additional constraints on the coefficients across the equations (13). These are:

(i) (coefficient on q_{it} in (12)) + (coefficient on q_{it} in (13)) = (coefficient on q°_{it} in (13)), $i = 1 , \ldots , n-1$;

(ii) (coefficient on q°_{it} in (13)) = (coefficient on q°_{kt} in (13)), $i \neq k$, $i = 1 , \ldots , n-1$, $k = 1 , \ldots , n-2$;

(iii) (coefficient on Z_t in the i-th equation of (13)) = (coefficient on Z_t in the k-th equation of (13)), $i \neq k$, $i = 1 , \ldots , n-1$, $k = 1 , \ldots , n-2$.

If the markup function is assumed to be the same in all equations, further constraints on the vector of coefficients on Y_t must be imposed so that the estimated coefficients are the same in all n-1 equations in (13).

Model 3: Participating Physicians; No Price Discrimination in Lines of Business Where Participation Does Not Apply

As in Model 1, it is assumed that the amount charged by the practice is the same in all of its submarkets where average revenue functions are downward sloping in quantity--i.e., where participation does not apply. Additionally, it is assumed here that the practice produces for one or more submarkets in which it participates. In each of these submarkets average revenue is predetermined by the Plan and equal to the practice's allowance for the submarket. In general, the allowance levels in the practice's participating submarkets are not the same. Thus, the practice (sets and) receives one average revenue on its business where participation does not apply, and receives possibly different average revenues in each of the other lines of business where it participates or can participate.

Also, as in Model 1, the practice is assumed to perceive its submarket average revenue functions. Its total marginal revenue function for all sales is the horizontal sum of the submarket marginal revenue functions, and its total average revenue function is the integral over output of marginal revenue divided by total output. The total marginal revenue function is continuous in output, but the total average revenue function is not.

The structure of the practice's optimal solution is illustrated in Figure 1. It is assumed that the practice faces two participating submarkets and one nonparticipating submarket.* The average revenue function in the

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* Both here and in Model 4 it is postulated that the practice always has at least one nonparticipating submarket. It was clear from the data that we were generally able to observe only a small portion of physicians' business, and hence that the "other" non-Blue Shield line represented a significant share of sales for all or nearly all physicians. This justifies our assumption. If the physician has only participating business, his total average revenue function is a step function with one or more steps at the heights of the Plan's allowances.

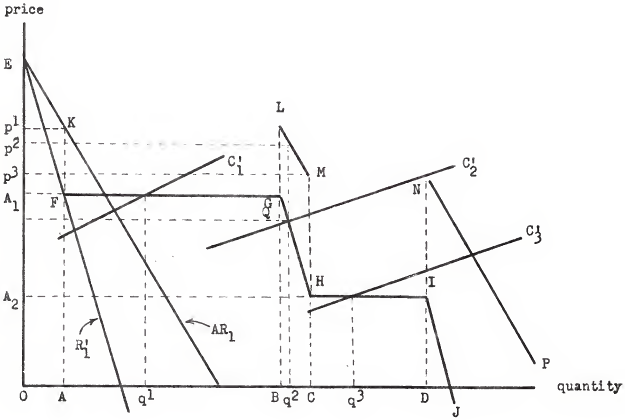
price
E
p^1
K
p^2
p^3
A_1
F
C_1'
L
M
G
Q
C_2'
N
C_3'
H
I
A_2
R_1'
AR_1
P
O
A
q^1
B
q^2
C
q^3
D
J
quantity

Figure 1

nonparticipating submarket is labeled AR_1 and the associated marginal revenue function is denoted by R_1'. The line segments FG (= AB) and HI (=CD) represent the maximum quantities demanded in the practice's two participating submarkets. A_1 and A_2 are the respective allowance levels in the two submarkets. The practice's total marginal revenue function is the continuous kinked line segment EFGHIJ. The total average revenue function is the broken line segment EKFGLMHINP. The downward sloping portions of the total marginal and average revenue functions to the right of the point A are outward displacements of the marginal and average revenue functions for the nonparticipating submarket.

For simplicity, it is assumed in the figure that the practice maximizes profit. Three possible positions of the practice's marginal cost function are illustrated. If the marginal cost function is C_1', profit maximizing output (i.e., the output where C_1' equals total marginal revenue) is Oq^1. Output allocated to the highest-allowance participating submarket is Aq^1, and output allocated to the nonparticipating submarket is OA at the fee level p^1 (= AK). Output allocated to the lowest-allowance participating submarket is zero.

When the practice's marginal cost function is in the position C_2', optimal total output is Oq^2. The output allocated to the highest-allowance participating submarket is the maximum amount demanded AB, output allocated to the nonparticipating submarket is $OA + Bq^2$ at the fee level p^2, and output allocated to the lowest-allowance participating submarket is still zero.

Finally, when the practice's marginal cost function is in the position C_3', optimal total output is Oq^3 (= CM). Output allocated to the highest-allowance participating submarket is again the maximum amount demanded AB, output allocated to the lowest-allowance submarket is Cq^3, and output allocated to the nonparticipating submarket is $OA + BC$ at the fee level p^3.

Several properties of the optimal solution should be noted. The properties apply whether the practice maximizes profit or not.* First, because of continuity of the total marginal revenue function, it is always true that total marginal cost plus the desired markup equals marginal revenue in the nonparticipating submarket. Second, marginal revenue in each participating submarket in which sales are positive is equal to or larger than total marginal cost plus the desired markup for this submarket.** Third, if the practice's sales in the lowest-allowance participating submarket are positive, its sales in the highest-allowance participating submarket equal the maximum amount demanded in that submarket. And fourth, if the marginal cost function

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* It may also be remarked that, if the marginal cost function C' is low enough, the optimal fee level in the nonparticipating submarket may be lower than one or both of the allowance levels in the participating submarkets. This raises a problem of consistency in trying to rationalize the practice's fee-setting behavior. If the practice does not discriminate in price (as we have assumed), it will charge its participating patients fee levels that are below allowances. This type of pricing behavior is clearly irrational if the practice maximizes profit, inasmuch as it can always earn a higher total revenue by charging its participating patients an amount equal to the allowance. On the other hand, if charges equal or exceed allowances in one or both of the participating submarkets but are set lower in the nonparticipating submarket, the practice discriminates in price. However, our purpose in designing the model was not to specify rational conduct, but rather to describe empirical behavior for practices that appear not to discriminate in price. In this sense it can be argued that practices which do not discriminate never face the possibility that optimal charges on their nonparticipating business are lower than allowance levels in their participating business. While this does not eliminate the potential contradictions between profit maximization and price discrimination between the participating and nonparticipating submarkets, it does provide a rationalization for observed empirical behavior. Because of the costs or loss of goodwill due to price discrimination, even a profit maximizing practice may choose not to discriminate as long as it does not forego a large profit on its participating business.

** Cf. the third solution in Figure 1 when the marginal cost function is C_3'.

is negatively sloped, an optimal solution cannot, in general, occur where C' cuts a flat segment of the total marginal revenue function from above.*

These comments imply that separate attention must be given to the participating and nonparticipating submarkets in formulating Model 3. First, let the participating submarkets be labeled $1,\ldots, r < n$, and let the nonparticipating submarkets (including the non-Blue Shield submarket) be labeled $r + 1,\ldots, n$. Since in this model it is assumed that the practice does not discriminate in price on nonparticipating services, we assume the existence of total average and marginal revenue functions <u>for nonparticipating submarkets</u>. These functions are defined analogously with the total and marginal revenue functions specified in Model 1:

(13) $$p_t = b_0 + b_1 q_t^{\circ} + b_2 X_t \qquad \text{(average revenue)}$$

(14) $$R_t'^{\circ} = p_t + b_1 q_t^{\circ} \qquad \text{(marginal revenue)}$$

where

p_t = average amount charged in all submarkets,

q_t° = total output in the nonparticipating submarkets,

$R_t'^{\circ}$ = marginal revenue on the combined output of nonparticipating services.

The practice's optimal pricing and output policy must satisfy the condition

$$R_t'^{\circ} = C_t' + M_t^{\circ}$$

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* At least for profit maximizing practices, the second-order optimizing condition is not satisfied by such a solution. This possibility is not illustrated in Figure 1. However, it can easily be shown that, if an optimal solution exists, it must be at an output where C' crosses a downward sloping portion of the total marginal revenue function from below. Moreover, if the optimal value of C' is less than the allowance level in one or both of the participating submarkets, it can also be shown that the practice's sales in that (or those) submarket(s) equal the maximum amount(s) demanded.

for nonparticipating business, where M_t° is the markup function applied to nonparticipating business. Substituting (14) and the forms of C_t' and M_t° into this expression, and rearranging terms, gives the following optimality condition for the practice's nonparticipating business:

$$(15) \qquad p_t = (c_0 + m_0^{\circ}) + (c_1 - b_1)(q_t^{\circ} - q_{nt}) + c_1(q_t - q_{nt}) + c_2 Z_t + m_1^{\circ} Y_t + (c_1 - b_1)q_{nt} \; .$$

The terms $q_t^{\circ} - q_{nt}$ and $q_t - q_{nt}$ are observable sales in the nonparticipating submarkets and observable total output, respectively. The unobservable non-Blue Shield output q_{nt} is absorbed into the error component of the equation.

In the participating submarkets average revenue is predetermined by the Plan, and there are no counterparts of the average revenue function (13). Instead, sales in those submarkets are determined solely by the optimality condition for those submarkets. Moreover, the practice's optimal output decision is determined by the allowance level in the lowest-allowance submarket for which it produces. In all submarkets where allowances are higher, marginal revenues (allowances) exceed optimal marginal cost plus the desired markup. Hence the relationships between marginal revenue and marginal cost in these other submarkets are irrelevant to the practice's decision making.

Accordingly, let

$\overline{A}_t$ = allowance level (= average revenue = marginal revenue) in the lowest-allowance submarket in which the practice's sales are positive,

and assume for now that the optimal total output is given by a point on a horizontal portion of the practice's total average revenue function. In Figure 1, this assumption is represented by the position of the marginal cost function at C_1' or C_3'. Then the practice's second optimality condition is

$$(16) \qquad \bar{A}_t = C'_t + \bar{M}_t ,$$

where $\bar{M}_t$ is the value of the desired markup for the lowest-allowance participating submarket in which sales are positive. Substituting the expressions for C'_t and $\bar{M}_t$ into (16) gives

$$\bar{A}_t = (c_0 + \bar{m}_0) + c_1 q_t + c_2 Z_t + \bar{m}_1 Y_t ,$$

or, after rearranging terms and separating out the unobservable output q_{nt} ,

$$(17) \qquad q_t - q_{nt} = -(c_0 + \bar{m}_0)/c_1 + (1/c_1)\bar{A}_t - (c_2/c_1)Z_t - (\bar{m}_1/c_1)Y_t - q_{nt} .$$

Equations (13), (15), and (17) comprise a closed system in three endogenous variables, namely

$$(18) \qquad p_t = b_0 + b_1(q_t^\circ - q_{nt}) + b_2 X_t + b_1 q_{nt} , \qquad \text{(nonparticipating average revenue),}$$

$$(19) \qquad p_t = (c_0 + m_0^\circ) + (c_1 - b_1)(q_t^\circ - q_{nt}) + c_1(q_t - q_t^\circ) + c_2 Z_t + m_1^\circ Y_t + (c_1 - b_1)q_{nt} \qquad \text{(nonparticipating optimality),}$$

$$(20) \qquad q_t - q_{nt} = -(c_0 + \bar{m}_0)/c_1 + (1/c_1)\bar{A}_t - (c_2/c_1)Z_t - (\bar{m}_1/c_1)Y_t - q_{nt} \qquad \text{(participating optimality).}$$

The endogenous variables are the average amount charged p_t , observable total output $q_t - q_{nt}$, and observable sales in the nonparticipating submarkets $q_t^\circ - q_{nt}$. The terms in non-Blue Shield output q_{nt} are included in the variance components of each of the three equations.

Unfortunately, it may not be the case that optimal output occurs at a point on a horizontal portion of the total average revenue function. For example, in Figure 1 the marginal cost function may have the position C_2'. In this event the markup function in (20) contains an unplanned positive component shown as the vertical distance QG in Figure 1. Equation (20) itself no longer characterizes the practice's optimal output policy for its participating submarket(s), and the practice's sales in all participating submarkets where sales are positive equal the maximum amounts demanded.

There are several possible ways of handling the problem of an unplanned positive component in the markup function, but none is entirely satisfactory. If it were known that sales in all participating submarkets were the maximum amounts demanded, the outputs allocated to these submarkets could, for example, be specified as exogenous. In this case equation (20) could be dropped from (18)-(20), and the new system would contain only two endogenous variables, p_t and observed sales in the nonparticipating submarkets $q_t^\circ - q_{nt}$. Alternatively, (18)-(20) could be augmented by a set of "maximum amount demanded" equations of the form

$$q_{it} = d_{i0} + d_{i1}X_t \ , \qquad i = 1 \ , \ \ldots \ , s \leq r \ ,$$

where s is the number of participating submarkets where sales are positive. In the augmented system of $s + 2$ equations, p_t, $q_t^\circ - q_{nt}$, and $q_{1t},\ldots,q_{st}$ are the $s + 2$ endogenous variables. However, there is no method of determining empirically when the practice's sales in its participating submarkets are the maximum amounts demanded. Consequently, applying either of these approaches may lead to specification error in the model.

A third approach is to specify the non-negative unplanned component of the markup function as a variable in (20)--i.e.,

$\overline{m}_{ut}$ = unplanned non-negative component of the markup function for the lowest-allowance participating submarket where the practice's sales are positive,

so that $\overline{M}_t = \overline{m}_0 + \overline{m}_{ut} + \overline{m}_1 Y_t$. Since it is reasonable to suppose that $\overline{m}_{ut}$ varies with the physician,* it can be included along with q_{nt} as an unobservable component error in (20). This gives the modified version of (20):

$$(21) \qquad q_t - q_{nt} = -(c_0 + \overline{m}_0)/c_1 + (1/c_1)\overline{A}_t - (c_2/c_1)Z_t - (\overline{m}_1/c_1)Y_t - q_{nt} - \overline{m}_{ut}/c_1 \, .$$

Nevertheless, the value of $\overline{m}_{ut}$ depends partly on the value of sales in the practice's participating submarkets, and, in particular, on the probability of the event, say

E_t = event that sales in the lowest-allowance participating submarket where output is positive equals the maximum amount demanded.

In this sense, $\overline{m}_{ut}$ and $Pr(E_t)$ are endogenous in a larger and more complex system than (18), (19), and (21). Although such a system can be specified, there are no techniques for estimating it inasmuch as neither $\overline{m}_{ut}$ nor $Pr(E_t)$ are observable. <u>Accordingly, Model 3 is specified as the equation system (18), (19), and (21)</u>.

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* That is, it varies with the position of the practice's total marginal revenue function as indicated in Figure 1. In turn, the position of the total marginal revenue function depends on the marginal revenue function in the non-Blue Shield submarket, which we have assumed to be a physician-specific unobservable effect.

Estimates of Model 3 are subject to some degree of simultaneous equations bias, but there are no evident methods for eliminating the bias. It should be emphasized that when a participating submarket is the last market served by the practice and the maximum amount demanded in this submarket is very large, the model is properly specified and equivalent to (18)-(20)--i.e., $\overline{m}_{ut}$ is always zero.* We have tried to show that the problems of misspecification and bias arise when a participating submarket is the last market served by the practice and maximum participating demands are small. In that event, the observed sales of participating services may be equal to maximum demands. Regrettably, the extent to which these eventualities occur cannot be evaluated. In a cross-section of physicians it may well be that there are few cases where participating sales are the maximum amounts demanded at going copayment rates. If few such cases do exist, the amount of bias entering the estimates should be small.

Inspection of (18), (19), and (21) shows that there are two constraints on the coefficients across equations. One is linear and two are nonlinear:

(i) (coefficient on $(q_t^\circ - q_{nt})$ in (18)) + (coefficient on $(q_t^\circ - q_{nt})$ in (19)) = (coefficient on $(q_t - q_t^\circ)$ in (21)).

(ii) (coefficient on $(q_t - q_t^\circ)$ in (19)) = 1/(coefficient on $\overline{A}_t$ in (21)).

(iii) (coefficient on Z_t in (19))$\cdot$(coefficient on $\overline{A}_t$ in (21)) = - (coefficient on Z_t in (21)).

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* In this case optimum output is always given by a point on a horizontal segment of the practice's average revenue function, and the optimum is an interior maximum of the practice's objective function.

Model 4: Participating Physicians; Price Discrimination in Lines of Business Where Participation Does Not Apply

Model 4 is identical to Model 3 except it assumes that physicians discriminate in price across submarkets where participation does not apply. As in Model 2, it is not necessary for the practice to discriminate across all such submarkets. This model applies when there are subsets of the nonparticipating submarkets in which charges are the same, but between which charges vary.

This model is essentially the standard price discrimination model. Because of this, and in view of the preceding discussion, no detailed rationalization of the equation system is necessary. The practice equates its total marginal revenue with its marginal cost subject to possibly different markups in each of its submarkets. As before, total marginal revenue is the horizontal sum of the marginal revenue functions of the practice's individual submarkets. Total average revenue is defined in the same manner as in Model 3, and charge levels in the nonparticipating submarkets are determined in the manner illustrated in Figure 1.

The model therefore consists of one pair of equations for each nonparticipating submarket and one optimality condition for the participating submarkets. The former are:

(22) $$p_{it} = a_{i0} + a_{i1}q_{it} + a_{i2}X_t , \qquad i = r+1,\ldots,n-1 \quad \text{(nonparticipating average revenue)}$$

(23) $$p_{it} = (c_0 + m_{i0}) + (c_1 - a_{i1})q_{it} + c_1(q_t - q_{it} - q_{nt}) + c_2Z_t + m_{i1}Y_t + c_1q_{nt} , \qquad i = r+1,\ldots,n-1 \quad \text{(nonparticipating optimality).}$$

Equation (23) is the expression $R'_{it} = C'_t + M_{it}$, which states that the discriminating practice equates marginal cost with marginal revenue in each nonparticipating submarket up to the value of a planned markup. The optimality condition for the participating submarkets is not affected by the optimality conditions for nonparticipating outputs. Thus it is the same as in Model 3:

$$(24)\qquad q_t - q_{nt} = -(c_0 + \bar{m}_0)/c_1 + (1/c_1)\bar{A}_t - (c_2/c_1)Z_t - (\bar{m}_1/c_1)Y_t$$

$$- q_{nt} - \bar{m}_{ut}/c_1 \qquad \text{(participating optimality).}$$

Equations (22)-(24) constitute Model 4. The system contains $n-r-1$ pairs of equations (22) and (23) which, with (24), gives $2(n-r) - 1$ equations in all. The endogenous variables are the $n-r-1$ charge levels p_{it} in the observable nonparticipating submarkets, the $n-r-1$ outputs q_{it} in these submarkets, and total observable output $q_t - q_{nt}$.

The constraints on coefficients across equations are as follows:

(i) (coefficient on q_{it} in (22)) + (coefficient on q_{it} in (23)) = (coefficient on $q_t - q_{it} - q_{nt}$ in (23)), $i = r+1, \ldots, n-1$.

(ii) (coefficient on $q_t - q_{it} - q_{nt}$ in (23)) = (coefficient on $q_t - q_{kt} - q_{nt}$ in (23)), $i = r+1, \ldots, n-1$, $k \neq i$, $k = r+1, \ldots, n-2$.

(iii) (coefficient on Z_t in the i-th equation of (24)) = (coefficient on Z_t in the k-th equation of (24)), $i = r+1, \ldots, n-1$, $k \neq i$, $k = r+1, \ldots, n-2$.

(iv) (coefficient on $q_t - q_{it} - q_{nt}$ in first equation of (23)) = 1/(coefficient on $\bar{A}_t$ in (24)).

(v) (coefficient on Z_t in first equation of (23))$\cdot$(coefficient on $\bar{A}_t$ in (24)) = - (coefficient on Z_t in (24)).

The optimality condition for participating submarkets (24) is vulnerable to the problems discussed in the formulation of Model 3.

Tests of Hypotheses Using the Models

The four models are designed to provide tests of two hypotheses. These concern the form of the practice's optimizing behavior and the slopes of the nonparticipating average revenue functions facing the practice.

(i) The form of the practice's optimizing behavior. The practice's optimizing behavior can be explored in a two-part test. The first part is a test of the profit maximization hypothesis against the alternatives of utility maximization and target net income achieving. It has been described above, and involves the coefficients on the vector of physician characteristics Y_t in the markup function. The hypotheses are formulated as follows:

> Null hypothesis: vector of coefficients on $Y_t = 0$ (practices maximize profit).
>
> Alternative hypothesis: vector of coefficients on $Y_t \neq 0$ (practices maximize utility or pursue target net income).

As already indicated, the test is not necessarily conclusive (i.e., not powerful in the statistical sense) but it is reasonably strong.

When the null hypothesis is rejected, the second part of the test distinguishes between utility maximization and pursuit of a target net income. Each of the models contains one or more average revenue functions for observable nonparticipating services.* One element of the vector X_t of

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* This will not be true if the models for participating physicians are fitted for physician who have only participating services. However, it is easy to choose the samples so that all participating physicians produce for at least one submarket (e.g., indemnity) where participation does not apply.

exogenous variables specified for each such average revenue function is defined as the physician-population ratio in the physician's county of practice. If physicians can and do generate demands, coefficients on the physician-population ratio should be positive.* As a result, the second part of the test involves the coefficient(s) on the physician-population ratio in the nonparticipating average revenue functions of the models. The hypotheses are formulated as follows:

> Null hypothesis: coefficient(s) on the physician-population ratio = 0 (practices maximize utility).
>
> Alternative hypothesis: coefficient(s) on the physician-population ratio $\neq 0$ (practices generate demands and pursue target net incomes).

Like the first part of the test, the second part is not necessarily conclusive. That is, practices may be target net income achievers, but if they can achieve their income targets without demand inducement, the test should lead to acceptance of the null hypothesis. In addition, for reasons given in Chapter III, factors other than demand inducement may lead to significant associations between average revenue and the physician-population ratio. In this case the null hypothesis may be incorrectly rejected.

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* That is, each average revenue function is of the form $p = a_0 + a_1 q + a_2 X$, where, for simplicity, it can be assumed that X is the physician-population ratio. The inverse average revenue function is therefore $q = -(a_0/a_1) + (1/a_1)p - (a_2/a_1)X$. According to the theory of induced demand discussed in Chapter 3, demand generation leads to outward shifts in the inverse average revenue function when p is held constant. If the coefficient a_1 is negative, the coefficient a_2 must consequently be positive. If a_1 is zero in this formulation (see the text immediately below), demand inducement cannot occur because it follows that practices behave like perfect competitors in their nonparticipating submarkets.

Accepting the uncertainties inherent in this (and virtually any other) test of the form of physicians' optimizing behavior, the test outcomes and their most plausible implications are summarized in the following table.

Test Outcomes Regarding Null Hypotheses	First Part	Second Part	Inference Regarding Optimization Behavior
1	Accept	Accept	Profit maximization, possibly utility maximization
2	Accept	Reject	Inconclusive, but possibly target income achieving
3	Reject	Accept	Utility maximization
4	Reject	Reject	Target income achieving

(ii) Practice pricing behavior. It was argued at the outset of this chapter that the slopes of the practice's nonparticipating average revenue functions primarily reflect competitive pricing conditions in the marketplace. Regardless of the character of individual or market demands, and irrespective of the type of health insurance in the nonparticipating submarkets, high (in absolute value) price elasticities of the nonparticipating average revenue functions imply a high level of price competition among practices. Low price elasticities imply the existence of market imperfections such as moderate to high seller concentration or moderate to high levels of product differentiation.

The coefficients on quantities in the practice's nonparticipating average revenue functions therefore provide a basis for a qualitative test of the practice's pricing behavior. The test is on the coefficient(s) of quantities. The null hypothesis is that practices behave like perfect competitors in their nonparticipating business. The alternative is that they behave like imperfect competitors in their nonparticipating business. In the first case, coefficients on quantities in the nonparticipating average revenue functions are zero. In the second case the coefficients are negative.

Summary

Four models of the physician's practice have been presented in this chapter. The next two chapters present basically descriptive analyses applicable to the specification of the exogenous variable sets; the descriptive analyses are, however, of interest in their own right. Estimates of the modells fitted to the study data are then presented in Chapter VII. The models themselves are meant to be fitted to samples stratified by physician participation status, and they employ different, verifiable assumptions regarding price discrimination across lines of business. The models are designed for examining two of the research and policy issues discussed in Chapter III: whether physicians are target net income achievers (and whether they generate demands to achieve the net income targets), and the degree to which practice pricing can be considered competitive.

It is worth emphasizing that the models are neither well suited nor designed for examining all of the issues discussed in Chapter III. They do not directly address the issue of price discrimination, which is decided empirically before the models are fitted to data. Likewise, the physician's participation is assumed to be predetermined.* The intertemporal behavior of charge levels and its relationship with Plan reimbursement is not explored because of the static nature of the models. This issue is studied in Chapter VI.

*A separate model of the participation decision is given and estimated in Chapter VII.

Finally, a number of the policy issues set forth in Chapter III are general questions bearing on charge levels and their associations with reimbursement methods and physician, practice, and patient population characteristics. In terms of the models presented here, the questions can be asked in either of two ways: how the various influences affect the structure of the models, and how they relate to the practice's equilibrium fee levels. In the first instance the questions may not be strictly meaningful, and the answers may be difficult to interpret.* In the second, empirical analyses of the issues must be dealt with by simulating the estimated models in order to predict how fee levels respond to changes in reimbursement policy. Although simulations are not difficult to carry out, the effects on fee levels of changes in the exogenous policy and other variables can be evaluated almost as successfully--and much more simply--by other methods. These other, primarily descriptive, methods are used in Chapters V and VI.

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* That is, the models consist of average revenue functions and optimality conditions reflecting marginal costs and the practice's economic goals. Since reimbursement methods generally do not affect marginal costs or economic goals, nearly any issue regarding reimbursement and the structure of the models must be rephrased so that it applies to the practice's average revenue function. Here, of course, the positions and slopes of average revenue functions may have little connection with the behavior of observed fees inasmuch as they do not uniquely determine fee levels. Moreover, we have argued that the shapes of average revenue functions tend to reflect the competitiveness of market forces rather than the pure effects of reimbursement practices by the Plan.

CHAPTER V

DESCRIPTIVE FINDINGS ON PHYSICIAN PRICING BEHAVIOR: CROSS-SECTIONAL AND LONGITUDINAL EVIDENCE

This chapter presents a variety of descriptive tables directed primarily to the policy and research issues outlined in Chapter III. Some of the material also bears on the implementation of the model of physician pricing presented in Chapter IV (the final estimated version of which is given in Chapter VII). This chapter is organized into issue-oriented sections which summarize the findings. For the most part, the tables pertinent to the findings are included in the text. However, tabulations that were found to be less revealing, or only peripherally relevant, were assembled into Appendix B.

The tables whose titles are prefaced "Plan" with the Plan letter following, refer to county level data or were derived from the county analytical files. Similarly, the tables whose titles are prefaced "Plan (letter) Physician Sample," refer to physician-specific data or were derived from the physician analytical files. In Plan B, the county-level data as received from the Plan separated indemnity claims into those for participating and nonparticipating physicians. Although participation agreements do not apply to indemnity claims, we retained the separation in constructing the tables because of its possible intrinsic interest. Throughout the chapter the unit of output is the relative value unit (RVU).*

Aside from its general descriptive content, this chapter specifically addresses the following questions and issues significant to physician reimbursement policy:

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* See Appendix A for a discussion of how the numbers of RVUs were computed from the claims data.

(i) the impact of the Economic Stabilization Program (ESP) of 1972-74 on Medicare and private business charge levels and service outputs;

(ii) the validity of the physician-induced-demand-target-income theory;

(iii) the effects on charge inflation of the frequency of updating Plan allowances;

(iv) the effects of allowance levels on charge levels;

(v) relationships between charge levels and physician, practice, and practice location characteristics;

(vi) physician participation in the Plans; and

(vii) the effects of changes in charge and allowance levels on the composition of physicians' outputs.

General Patterns of Charge Levels and Charge Inflation

The overall mean amounts charged, allowed, and paid per RVU are shown in Tables 5-1, 5-2, and 5-3 for the three Plans. In Plans A and B, charges per RVU rose from about $2 in 1973 to $2.50-2.75 between 1973 and 1976. In Plan C, charges per RVU rose from just under $2.50 in 1975 to nearly $3 in 1978. Despite regional differences in the Plan locations,* charge levels were similar across Plans for the years in common (i.e., until 1976).

Two findings are especially notable. First, UCR allowances were substantially higher than allowances in other lines of business in all three Plans.** Plans A and C did not update their indemnity fee schedules during

* Plan A is located in a midwestern state. Plans B and C were located in eastern and southern states, respectively.

** Plan C recorded its UCR allowances, but Plans A and B did not. Before we received the data, allowances were estimated by the latter two Plans on the basis of reported amounts paid and average copayment rates.

the 1973-76 period, and updated its indemnity schedule only once--in 1975.* In any case, fee schedule allowances ranged from about 45% to 80% of UCR allowances, and, except for Plan B's indemnity claims, the range was closer to 50%-60%. In addition, Plan B's Medicare allowances were roughly only 75%-80% of the Plan's UCR allowances.

The second especially noteworthy finding is the close similarity of charge levels across lines of business. In Plans A and C, average UCR and indemnity charges were within 3% or 4% of one another, and the same was true for UCR and partial service charges in Plan B. In 1975 and 1976, the only years in which Plan B's indemnity business was significant, average indemnity charges were about 10% lower than average UCR charges. Medicare charges in Plan B were about 15% lower than UCR charges, and they were below charge levels in Plan B's other private business as well.

Small differences in charges per RVU could easily be due to variation in the average mix of services provided to the different lines of business and/or to variation in the samples of physicians providing services to each line of business. Thus, these findings tend to suggest that there was relatively little if any price discrimination across private lines of business. They also tend to indicate that allowance levels had relatively little impact on charges. It is tempting to speculate that Plan B's Medicare charges were lower than its UCR charges because of the lower Medicare allowances. However,

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* It will be noticed that there was an upward drift in the allowance levels of Plan B's and Plan C's fee schedule business during the study periods. This was apparently due to a decline in the number of physicians whose charges were equal to or less than the scheduled amounts. (Recall that recorded allowances are the lower of charges and the scheduled or screen amounts.) In Plan A there was a general downward movement of indemnity allowances during the study period, culminated by a 10% decline between 1975 and 1976. The same pattern appeared in the physician data, but we were unable to account for it.

TABLE 5-1

PLAN A: DOLLAR AMOUNTS CHARGED, ALLOWED, AND PAID PER RVU, AND TOTAL NUMBER OF RVUs, CLASSIFIED BY YEAR, LINE OF BUSINESS, AND PARTICIPATION STATUS

Line of Business, Participation Status, and Amounts	1973	1974	1975	1976
UCR Participating				
Amount Charged/RVU	$2.03	$2.14	$2.38	$2.45
Amount Allowed/RVU	1.96	2.07	2.27	2.33
Amount Paid/RVU	1.96	2.06	2.26	2.32
Total RVUs	1424043	1785781	2563872	3958642
UCR Nonparticipating				
Amount Charged/RVU	2.08	2.22	2.49	2.65
Amount Allowed/RVU	2.01	2.11	2.27	2.37
Amount Paid/RVU	2.01	2.11	2.27	2.37
Total RVUs	353883	434049	716412	1648572
Indemnity				
Amount Charged/RVU	2.07	2.19	2.44	2.54
Amount Allowed/RVU	1.47	1.41	1.42	1.28
Amount Paid/RVU	1.47	1.41	1.42	1.28
Total RVUs	1755280	1610870	1272497	1720353
All Lines of Business				
Amount Charged/RVU	2.05	2.17	2.41	2.52
Amount Allowed/RVU	1.72	1.80	2.03	2.09
Amount Paid/RVU	1.72	1.80	2.03	2.09
Total RVUs	3533207	3830701	4552781	7327567

TABLE 5-2

PLAN B: DOLLAR AMOUNTS CHARGED, ALLOWED, AND PAID PER RVU, AND TOTAL NUMBER OF RVUS; CLASSIFIED BY YEAR, LINE OF BUSINESS, AND PARTICIPATION STATUS

Line of Business, Participation Status, and Amounts	Year			
	1973	1974	1975	1976
UCR Participating				
Amount Charged/RVU	$2.16	$2.37	$2.56	$2.81
Amount Allowed/RVU	1.97	2.11	2.28	2.40
Amount Paid/RVU	1.97	2.11	2.27	2.38
Total RVUs	4276837	4636799	5227321	5574544
UCR Nonparticipating				
Amount Charged/RVU	2.13	2.31	2.56	2.84
Amount Allowed/RVU	1.86	1.97	2.23	2.36
Amount Paid/RVU	1.86	1.97	2.21	2.34
Total RVUs	354240	436676	481055	601587
Indemnity Participating				
Amount Charged/RVU	1.95	2.24	2.53	2.69
Amount Allowed/RVU	.83	.90	1.78	1.89
Amount Paid/RVU	.83	.90	1.78	1.89
Total RVUs	52511	48627	314012	809031
Indemnity Nonparticipating				
Amount Charged/RVU	1.55	1.75	2.36	2.69
Amount Allowed/RVU	.74	.80	1.72	1.85
Amount Paid/RVU	.74	.80	1.72	1.85
Total RVUs	7921	7148	37551	108233
Partial Service Participating				
Amount Charged/RVU	2.09	2.28	2.48	2.74
Amount Allowed/RVU	1.24	1.27	1.33	1.32
Amount Paid/RVU	1.24	1.27	1.33	1.32
Total RVUs	3509287	3099128	2396095	1655455
Partial Service Nonparticipating				
Amount Charged/RVU	2.12	2.28	2.50	2.81
Amount Allowed/RVU	1.09	1.10	1.21	1.21
Amount Paid/RVU	1.09	1.10	1.21	1.21
Total RVUs	379466	365612	275092	216632

TABLE 5-2 (Continued)

Line of Business, Participation Status, and Amounts	1973	1974	1975	1976
Medicare				
Amount Charged/RVU	$1.84	$1.91	$2.12	$2.25
Amount Allowed/RVU	1.60	1.63	1.76	1.83
Amount Paid/RVU	1.06	1.11	1.21	1.30
Total RVUs	5611194	7769796	7908716	9083905

TABLE 5-3

PLAN C: DOLLAR AMOUNTS CHARGED, ALLOWED, AND PAID PER RVU, AND TOTAL NUMBER OF RVUs, CLASSIFIED BY YEAR AND LINE OF BUSINESS

Line of Business and Amounts	Year 1975	1976	1977	1978
UCR				
Amount Charged/RVU	2.43	2.59	2.76	2.97
Amount Allowed/RVU	2.12	2.33	2.45	2.78
Amount Paid/RVU	2.09	2.14	2.08	2.24
Total RVUs	1144068	1753669	1892276	1378167
Indemnity				
Amount Charged/RVU	2.34	2.51	2.70	2.91
Amount Allowed/RVU	1.07	1.13	1.20	1.24
Amount Paid/RVU	1.06	1.05	1.11	1.17
Total RVUs	618120	712340	502237	345716
All Lines of Business				
Amount Charged/RVU	2.40	2.57	2.75	2.96
Amount Allowed/RVU	1.75	1.99	2.19	2.47
Amount Paid/RVU	1.73	1.82	1.88	2.03
Total RVUs	1762188	2466009	2394513	1723883

TABLE 5-4

PLAN A: PERCENTAGE CHANGES IN AMOUNTS CHARGED, ALLOWED, AND PAID PER RVU, AND PERCENTAGE CHANGE IN TOTAL NUMBER OF RVUs, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

Line of Business, Participation Status, and Amounts	Time Period			
	1973-74	1974-75	1975-76	1973-76
UCR Participating				
Amount Charged/RVU	5.8	11.1	3.0	21.1
Amount Allowed/RVU	5.6	9.6	2.7	18.9
Amount Paid/RVU	5.6	9.6	2.7	18.8
Total RVUs	25.4	43.6	54.4	178.0
UCR Nonparticipating				
Amount Charged/RVU	6.8	11.9	6.4	27.2
Amount Allowed/RVU	5.2	7.4	4.5	18.1
Amount Paid/RVU	5.2	7.4	4.5	18.1
Total RVUs	22.7	65.1	130.1	365.9
Indemnity				
Amount Charged/RVU	6.0	11.2	4.1	22.7
Amount Allowed/RVU	-3.6	0.1	-9.6	-12.8
Amount Paid/RVU	-3.6	0.1	-9.6	-12.8
Total RVUs	-8.2	-21.0	35.2	-2.0
All Lines of Business				
Amount Charged/RVU	5.9	11.1	4.3	22.6
Amount Allowed/RVU	4.6	12.8	3.1	21.6
Amount Paid/RVU	4.6	12.8	3.1	21.5
Total RVUs	8.4	18.8	60.9	107.4

TABLE 5-5

PLAN B: PERCENTAGE CHANGES IN AMOUNTS CHARGED, ALLOWED, AND PAID PER RVU, AND PERCENTAGE CHANGE IN TOTAL NUMBER OF RVUS; CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

Line of Business, Participation Status, and Amounts	Time Period			
	1973-74	1974-75	1975-76	1973-76
UCR Participating				
Amount Charged/RVU	9.3	8.1	9.7	29.6
Amount Allowed/RVU	7.2	8.3	5.0	22.0
Amount Paid/RVU	7.2	7.7	4.8	21.1
Total RVUs	8.4	12.7	6.6	30.3
UCR Nonparticipating				
Amount Charged/RVU	8.3	11.0	10.8	33.2
Amount Allowed/RVU	6.3	12.9	5.9	27.1
Amount Paid/RVU	6.3	12.3	5.5	26.0
Total RVUs	23.3	10.2	25.1	69.8
Indemnity Participating				
Amount Charged/RVU	15.0	12.6	6.4	37.7
Amount Allowed/RVU	8.4	97.8	6.3	127.9
Amount Paid/RVU	8.4	97.8	6.3	127.9
Total RVUs	-7.4	545.8	157.6	1440.7
Indemnity Nonparticipating				
Amount Charged/RVU	12.7	34.9	13.8	73.0
Amount Allowed/RVU	8.0	114.2	7.7	149.1
Amount Paid/RVU	8.0	114.2	7.7	149.1
Total RVUs	-9.8	425.3	188.2	1266.4
Partial Service Participating				
Amount Charged/RVU	9.2	8.4	10.7	30.9
Amount Allowed/RVU	3.0	4.7	-.7	7.1
Amount Paid/RVU	3.0	4.7	-.7	7.1
Total RVUs	-11.7	-22.7	-30.9	-52.8
Partial Service Nonparticipating				
Amount Charged/RVU	7.4	9.5	12.3	32.1
Amount Allowed/RVU	1.1	9.2	.5	10.9
Amount Paid/RVU	1.1	9.2	.5	10.9
Total RVUs	-3.7	-24.8	-21.3	-42.9

TABLE 5-5 (Continued)

PLAN B: PERCENTAGE CHANGES IN AMOUNTS CHARGED, ALLOWED, AND PAID PER RVUS, AND PERCENTAGE CHANGE IN TOTAL NUMBER OF RVUS; CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

Line of Business, Participation Status, and Amounts	Time Period			
	1973-74	1974-75	1975-76	1973-76
Medicare				
Amount Charged/RVU	4.1	11.1	5.9	22.4
Amount Allowed/RVU	1.6	7.8	4.3	14.2
Amount Paid/RVU	4.2	9.3	7.1	21.9
Total RVUs	38.5	1.8	14.9	61.9

TABLE 5-6

PLAN C: PERCENTAGE CHANGES IN AMOUNTS CHARGED, ALLOWED, AND PAID PER RVU, AND PERCENTAGE CHANGE IN TOTAL NUMBER OF RVUs, CLASSIFIED BY LINE OF BUSINESS AND YEAR

Line of Business and Amounts	Year			
	1975-76	1976-77	1977-78	1975-78
UCR				
Amount Charged/RVU	6.6	6.5	7.6	22.2
Amount Allowed/RVU	10.0	5.1	13.4	31.2
Amount Paid/RVU	2.3	-2.5	7.7	7.4
Total RVUs	53.3	7.9	-27.2	20.5
Indemnity				
Amount Charged/RVU	7.5	7.6	7.5	24.4
Amount Allowed/RVU	5.6	5.8	3.7	15.9
Amount Paid/RVU	-0.2	4.9	5.6	10.5
Total RVUs	15.2	-29.5	-31.2	-44.1
All Lines of Business				
Amount Charged/RVU	7.1	7.0	7.6	23.3
Amount Allowed/RVU	13.3	10.2	13.0	41.0
Amount Paid/RVU	5.7	3.0	8.0	17.5
Total RVUs	39.9	-2.9	28.0	-2.2

Plan B's indemnity and partial service allowances were equal to or much lower than its Medicare allowances, and yet Medicare charges were mostly somewhat lower than charges in either of those two private lines. These issues are considered further below, but here the tables imply that physicians probably set a single overall charge level--at least on private Blue Shield claims. And, since allowance levels vary substantially by line of business, it is not surprising that charge levels show no strong relationships with allowance levels. By the same token, it may be the case that Medicare patients constitute such a large and easily identifiable submarket that some physicians do adjust their charges to this group in response to Medicare allowance levels.

The annual Plan-wide growth rates of charges, allowances, amounts paid, and numbers of RVUs are shown in Tables 5-4 - 5-6. Consistent with what has just been observed, the growth rates of charges were closely comparable across lines of business in all three Plans, although in Plan B the growth rate of Medicare charges was about one-third lower than the growth rates of charges in private lines of business.

If, in fact, physicians do price discriminate in order to hold down the co-payment responsibility of Medicare patients then the observed behavior of Plan B's Medicare charges may reflect the impact of the Economic Stabilization Program (ESP) of 1972-74. The ESP imposed limits on the growth rates of Medicare allowances, but the Plans did not invoke similar controls on UCR allowances. In private business compliance with the ESP was left to individual physicians. As Table 5-5 indicates, Medicare allowances rose at less than 25% the rate of UCR allowances in 1973-74, and Medicare charges in 1973-74 rose at about half the rate of charges in the Plan's private business. In 1974-75, Medicare allowances increased at about the same rate as UCR allowances--

which is surprising in view of the relatively low growth rate of Medicare charges in 1973-74--but Medicare charges increased at a higher rate than private business charges overall. The behavior of Medicare charges in 1974-75 is suggestive of a catch-up period following the end of the ESP. However, in 1975-76 Medicare charges also rose at a substantially lower rate than charges in Plan B's private business. This may possibly have been the result of the Medicare Economic Index, which was used to scale down Medicare allowances starting in 1976.

The tables indicate fairly dramatic changes in numbers of RVUs over the study periods. We were assured by the Plans that the output figures are accurate, and the changes may therefore be due to changes in Plan enrollment. In one case this was clearly the case. Plan B experienced a sharp increase in enrollment in its indemnity line after 1974, and a steady and significant decline in its partial service enrollment. Table 5-5 displays the large increase in indemnity RVUs and the falloff in partial service RVUs consistent with the change in enrollment composition. In both Plans A and C, the volume of indemnity services fell slightly to substantially during the sample periods, but we were unable to determine the exact cause. It should be emphasized, though, that none of the changes in service volumes was necessarily due to physician behavior. That is, the changes do not necessarily reflect deliberate decisions by physicians to increase or reduce outputs in response to changes in relative allowance levels across lines of business. The shift in the composition of Plan B's indemnity and partial service business appears to be closely related to shifts in the Plan's enrollment--i.e., to shifts in the demands for services. Thus, the declines in the quantities of indemnity services in Plans A and C may also be due to enrollment changes.

Nevertheless, it is doubtful that the behavior of Plan B's Medicare service volume was the result of Medicare enrollment changes. In 1973-74, when Medicare charge and allowance levels rose at considerably lower rates than those in the Plan's private business, the volume of Medicare RVUs increased more than four times as rapidly as the volume of private business RVUs. Then, in 1974-75, when Medicare charges and allowances rose at slightly higher rates than those in private business, the volume of Medicare services grew only about one-fifth as rapidly as the volume of private business RVUs. Finally, the pattern for 1973-74 was repeated--although in a less pronounced way--in 1975-76. Medicare charges and allowances increased at lower rates than those in the Plan's private business, but the volume of Medicare business increased faster than the volume of private business.

The behavior of Plan B's Medicare business--which is similar to a pattern reported in California by Holahan and Scanlon (1978) and Hadley et al. (1979)*--is consistent with the physician-induced demand hypothesis. That is, the below-average growth rates of Medicare charges and allowances in 1973-74 and in 1975-76 were accompanied by above-average growth rates of the quantity of services. This suggests the possibility that physicians may have compensated for less-than-desired increases in Medicare average revenues during the ESP and the cost-containment program of 1975 by generating demands. Additional evidence on this issue is discussed below.

Physician Average Revenues

Physician average revenues were defined as the amount charged per RVU on nonparticipating claims and as the amount allowed per RVU on participating

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* See Chapter III.

claims. These figures and their growth rates are shown in Tables 5-7 - 5-11. As defined, average revenues are overstated because they are not net of bad debt. Medicare average revenues were not estimated inasmuch as assigned and nonassigned claims could not be distinguished.

As the tables for Plans A and B indicate, there were moderate differences in average revenues across lines of business, but the largest differences occurred between participating and nonparticipating claims. The average revenues on participating claims were generally somewhat lower than those on nonparticipating claims.

In Plans A and B, participating average revenues grew considerably less rapidly than nonparticipating average revenues, and, at least in UCR business, the growth rates of participating average revenues were lower than the growth rates of the cost-of-living index in the major cities within the Plans' areas. Nonparticipating average revenues (i.e., charges per RVU) in both Plans rose either at the same rate as, or at a higher rate than, the metropolitan cost-of-living indexes. In Plan C, where all claims were non-participating, charges and average revenues increased slightly to moderately faster than the metropolitan cost-of-living index.

The tables clearly suggest that physician participation may have retarded inflationary increases in the costs of physicians' services to patients and the Plans. However, since participation agreements may have attracted physicians having low rates of fee inflation, it is not possible to say that participation actually caused the low observed rates of cost increase.

TABLE 5-7

PLAN A: IMPLICIT AVERAGE REVENUE PER RVU* IN DOLLARS, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

Line of Business/ Participation Status	Year 1973	1974	1975	1976
UCR Participating	$1.96	$2.07	$2.27	$2.33
UCR Nonparticipating	2.08	2.22	2.49	2.65
Indemnity	2.07	2.19	2.44	2.54

*When defined as amount charged on nonparticipating claims and as amount allowed on participating claims.

TABLE 5-8

PLAN A: PERCENTAGE CHANGES IN IMPLICIT AVERAGE REVENUE PER RVU*, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

Line of Business/ Participation Status	Time Period 1973-74	1974-75	1975-76	1973-76
UCR Participating	5.6	9.6	2.7	18.9
UCR Nonparticipating	6.8	11.9	6.4	27.2
Indemnity	6.0	11.2	4.1	22.7
Percent Change in Cost-of-Living Index in major city in Plan area**	10.2	8.9	5.0	26.0

*See note to Table 5-7.

**Source: U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1974, 1975, 1976, 1977 (Washington, D.C.: U.S. Government Printing Office, 1974, 1975, 1976, 1977).

TABLE 5-9

PLAN B: IMPLICIT AVERAGE REVENUE PER RVU* IN DOLLARS, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS AND YEAR

Line of Business/ Participation Status	Year 1973	1974	1975	1976
UCR Participating	$1.97	$2.11	$2.28	$2.40
UCR Nonparticipating	2.13	2.31	2.56	2.84
Indemnity Participating	1.95	2.24	2.53	2.69
Indemnity Nonparticipating	1.55	1.75	2.36	2.69
Partial Service Participating	1.24	1.27	1.33	1.32
Partial Service Nonparticipating	2.12	2.28	2.50	2.81

*When defined as amount charged on nonparticipating claims and as amount allowed on participating claims (except in indemnity line).

TABLE 5-10

PLAN B: PERCENTAGE CHANGES IN IMPLICIT AVERAGE REVENUE PER RVU*, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

Line of Business/ Participation Status	Time Period 1973-74	1974-75	1975-76	1973-76
UCR Participating	7.2	8.3	5.0	22.0
UCR Nonparticipating	8.3	11.0	10.8	33.2
Indemnity Participating	15.0	12.6	6.4	37.7
Indemnity Nonparticipating	12.7	34.9	13.8	73.0
Partial Service Participating	3.0	4.7	-.7	7.1
Partial Service Nonparticipating	7.4	9.5	12.3	32.1
Percent Change in Cost-of-Living Index in major city in Plan area**	13.0	8.4	5.3	28.9

*See note to Table 5-9.

**Source: U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1974, 1975, 1976, 1977 (Washington, D.C.: U.S. Government Printing Office, 1974, 1975, 1976, 1977).

TABLE 5-11

PLAN C: PERCENTAGE CHANGES IN IMPLICIT AVERAGE REVENUE PER RVU,*
CLASSIFIED BY LINE OF BUSINESS AND YEAR

	Time Period			
Line of Business	1975-76	1976-77	1977-78	1975-78
UCR	6.6	6.5	7.6	22.2
Indemnity	7.5	7.6	7.5	24.4
Percent Change in Cost-of-Living Index in major city in Plan area**	4.6	6.1	7.2	19.1

* When defined as amount charged per RVU.

** Source: U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1979 (Washington, D.C.: U.S. Government Printing Office, 1979).

TABLE 5-12

PLANS A, B, AND C: CHARGES PER RVU, CLASSIFIED BY SPECIALTY AND YEAR

	Year of Sample Period*			
Specialty	1st	2nd	3rd	4th
		Plan A		
General Practice	$2.01	$2.04	$2.27	$2.09
Medical Specialties	2.10	2.21	2.39	2.45
Surgical Specialties	2.03	2.15	2.38	2.55
Other Specialties	2.10	2.28	2.63	2.99
Unknown Specialties	1.93	2.20	2.26	2.45
		Plan B		
General Practice	1.75	1.83	1.93	2.10
Medical Specialties	2.17	2.34	2.48	2.66
Surgical Specialties	2.04	2.24	2.50	2.77
Other Specialties	1.72	1.67	1.99	2.06
Unknown Specialties	2.20	2.34	2.47	2.53
		Plan C		
General Practice	2.27	2.38	2.58	2.72
Medical Specialties	2.55	2.72	2.88	3.11
Surgical Specialties	2.46	2.63	2.83	3.01
Other Specialties	2.10	2.32	2.49	2.77
Unknown Specialties	1.59	1.49	2.68	3.04

* 1973-76 for Plans A and B, 1975-78 for Plan C.

Specialty Differences in Charges

Table 5-12 displays the Plan-wide charges per RVU classified by a four-way breakdown of physician specialties.* Except that General Practitioners' charge levels were the lowest, or nearly the lowest, in all three Plans, few systematic patterns appear in the table. For example, in Plan A, Other (i.e., non-medical, non-surgical) Specialists' charges were the highest, but in Plan C they were generally the lowest. The fastest growing charge levels were exhibited by Other Specialists in Plans A and C, and by the Surgical Specialties in Plan B.

Additional classifications of charge levels by specialty and Plan type of (specialty-related) service are included in Appendix B.

Composition of Physicians' Business

Tables 5-13 through 5-18 were constructed from the Plan physician files and show the compositions of physicians' claims among lines of business in the three Plans. Their primary purpose is to indicate that physicians typically sold services in all lines offered by the Plans.

Tables 5-13 - 5-15 give percentage distributions of physicians (by year and specialty) by combinations of lines of business in which they submitted at least one claim. In Plans A and C, the percentages of physicians who sold only UCR services increased materially over the study periods. This probably reflects the declines in the volumes of indemnity services in both Plans over the study periods. Somewhat curiously, Other Specialists were least likely to sell both UCR and indemnity services in both Plans, and most likely to

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* The "Unknown Specialties" categories refer to small volumes of claims for which Plan records listed no physician specialties.

sell only UCR services. As noted above, the growth rates of Other Specialists' charges were higher than those of other physicians in both Plans, but it is not clear how the growth rates of charges were related to the composition of sales across lines of business.

In Plan B, there were large increases in the percentages of physicians who sold services in all lines of business over the study period, and commensurately large declines in the percentages who submitted only UCR, partial service, and Medicare claims. This appears to be due to the increase in the overall volume of indemnity services and the dropoff in the volume of partial service business. Interestingly, Plan B General Practitioners were much more likely than other Plan B physicians to provide only Medicare services. Although the reasons for this finding are not immediately apparent, it may be the result of the location patterns of General Practitioners. More than other physicians, it may be that General Practitioners were located in areas--e.g., rural areas--where Plan penetration was relatively low. If this were the case, they would tend to sell relatively large volumes of Medicare services and relatively small volumes of services in the Plan's private lines.

Tables 5-16 - 5-18 give the average compositions of the physical volume of business on a per-physician basis. For Plans A and C, the tables depict more or less the same trends shown in Tables 5-13 and 5-15. UCR services represented 50% to more than 80% of the RVUs produced by physicians, and the percentages of RVUs delivered to indemnity patients fell during the study periods. In both Plans Other Specialists had slightly to substantially larger percentages of UCR business than did other physicians.

In Plan B, several characteristics of the data stand out. First, non-participating physicians tended to produce much larger percentages of Medicare

TABLE 5-13

PLAN A PHYSICIAN SAMPLE: PERCENTAGE DISTRIBUTION OF PHYSICIANS AMONG COMBINATIONS OF LINES OF BUSINESS IN WHICH THEY SUBMITTED AT LEAST ONE CLAIM, CLASSIFIED BY SPECIALTY AND YEAR

Combinations of Lines of Business	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1973		
U,I	81.33	70.73	86.36	67.61
U	10.67	22.93	9.09	29.58
I	8.00	6.34	4.55	2.82
Number of Physicians	75	205	330	142
		1974		
U,I	86.59	71.36	89.13	64.71
U	12.20	24.88	6.79	32.68
I	1.22	3.76	4.08	2.61
Number of Physicians	82	213	368	153
		1975		
U,I	75.61	69.20	86.02	56.28
U	19.51	30.40	10.84	43.17
I	4.88	0.40	3.13	0.55
Number of Physicians	82	250	415	183
		1976		
U,I	93.75	88.26	89.44	61.46
U	5.21	11.03	9.66	34.90
I	1.04	0.71	0.90	3.65
Number of Physicians	96	281	445	192

U = UCR, I = indemnity. Column percentages may not sum to 100 because of rounding errors.

TABLE 5-14

PLAN B PHYSICIAN SAMPLE: PERCENTAGE DISTRIBUTION OF PHYSICIANS AMONG COMBINATIONS OF LINES OF BUSINESS IN WHICH THEY SUBMITTED AT LEAST ONE CLAIM, CLASSIFIED BY SPECIALTY AND YEAR

Combinations of Lines of Business	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1973		
U,I,P,M	21.01	16.14	30.82	35.97
U,I,P	0.00	0.79	1.41	1.44
U,I,M	0.00	0.00	0.24	0.00
U,P,M	49.58	46.06	51.29	36.69
U,M	5.88	0.79	2.12	3.60
M	18.49	3.15	2.12	7.91
Other	5.04	33.07	12.00	14.39
Number of Physicians	119	254	425	139
		1974		
U,I,P,M	14.75	20.00	24.66	39.60
U,I,P	0.00	1.54	0.91	0.67
U,I,M	1.64	0.00	0.00	0.00
U,P,M	51.64	41.15	59.59	31.54
U,M	7.38	2.31	5.25	1.34
M	18.85	4.23	2.51	11.41
Other	5.74	30.77	7.08	15.44
Number of Physicians	122	260	438	149
		1975		
U,I,P,M	44.72	54.79	52.06	56.52
U,I,P	0.00	19.54	0.87	1.86
U,I,M	0.00	0.00	0.43	0.00
U,P,M	25.20	8.81	14.91	29.50
U,M	8.13	1.53	4.56	4.35
M	18.70	5.75	6.94	11.80
Other	3.25	9.58	5.64	10.56
Number of Physicians	123	261	461	161
		1976		
U,I,P,M	55.65	56.18	63.82	56.07
U,I,P	0.00	23.60	4.17	2.31
U,I,M	8.06	2.25	1.75	4.62
U,P,M	4.84	3.37	14.91	6.36
U,M	12.10	3.37	3.73	2.31
M	19.35	4.87	5.48	16.76
Other	0.00	6.37	6.14	11.56
Number of Physicians	124	267	456	173

U = UCR, I = indemnity, P = partial service, M = Medicare. Column percentages may not sum to 100 because of rounding errors.

TABLE 5-15

PLAN C PHYSICIAN SAMPLE: PERCENTAGE DISTRIBUTION OF PHYSICIANS AMONG COMBINATIONS OF LINES OF BUSINESS IN WHICH THEY SUBMITTED AT LEAST ONE CLAIM, CLASSIFIED BY SPECIALTY AND YEAR

Combinations of Lines of Business	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1975		
U,I	79.00	80.00	87.82	60.00
U	13.00	19.23	8.12	32.31
I	8.00	0.77	4.06	7.69
Number of Physicians	100	260	394	130
		1976		
U,I	90.32	84.53	89.31	65.24
U	5.38	15.09	7.38	33.54
I	4.30	0.38	3.31	1.22
Number of Physicians	93	265	393	164
		1977		
U,I	81.05	77.70	84.29	60.45
U	18.95	21.56	14.46	39.55
I	0.00	0.74	1.25	0.00
Number of Physicians	95	269	401	177
		1978		
U,I	65.26	70.94	74.49	53.53
U	33.68	28.30	23.31	45.29
I	1.05	0.75	2.30	1.18
Number of Physicians	95	265	392	170

U = UCR, I = indemnity. Column percentages may not sum to 100 because of rounding errors.

TABLE 5-16

PLAN A PHYSICIAN SAMPLE: MEAN PERCENTAGES OF RVUS PER PHYSICIAN PROVIDED IN LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Specialty, Participation Status, Line of Business	1973	1974	1975	1976
General Practice				
Participating				
UCR	55.5 (3.0;64)	61.5 (3.0;72)	76.0 (2.5;69)	74.0 (2.2;76)
Indemnity	44.5 (3.0;64)	38.5 (3.0;72)	24.0 (2.5;69)	26.0 (2.2;76)
Nonparticipating				
UCR	45.2 (5.8;5)	50.7 (7.1;9)	76.0 (9.6;9)	67.2 (2.8;19)
Indemnity	54.8 (5.8;5)	49.3 (7.1;9)	24.0 (9.6;9)	32.8 (2.8;19)
Medical Specialties				
Participating				
UCR	69.0 (2.1;143)	72.2 (1.9;150)	83.0 (1.2;173)	79.5 (1.2;176)
Indemnity	31.0 (2.1;143)	27.8 (1.9;150)	17.0 (1.2;173)	20.5 (1.2;176)
Nonparticipating				
UCR	61.4 (3.5;49)	68.3 (3.2;55)	80.7 (2.1;76)	74.4 (1.6;103)
Indemnity	38.6 (3.5;49)	31.7 (3.2;55)	19.3 (2.1;76)	25.6 (1.6;103)
Surgical Specialties				
Participating				
UCR	52.3 (1.5;254)	58.4 (1.2;280)	71.7 (1.1;311)	74.1 (1.0;285)
Indemnity	47.7 (1.5;254)	41.6 (1.2;280)	28.3 (1.1;311)	25.9 (1.0;285)
Nonparticipating				
UCR	50.9 (3.1;61)	56.0 (2.5;73)	67.5 (2.4;91)	72.8 (1.6;156)
Indemnity	49.1 (3.1;61)	44.0 (2.5;73)	32.5 (2.4;91)	27.2 (1.6;156)

TABLE 5-16 (Continued)

Specialty, Participation Status, Line of Business	1973	1974	1975	1976
Other Specialties				
Participating				
UCR	66.9 (2.5;114)	68.7 (2.7;114)	84.8 (1.5;143)	83.3 (1.3;139)
Indemnity	33.1 (2.5;114)	31.3 (2.7;114)	15.2 (1.5;143)	16.7 (1.3;139)
Nonparticipating				
UCR	71.9 (5.3;24)	73.8 (4.2;35)	84.1 (3.1;39)	81.7 (2.9;46)
Indemnity	28.1 (5.3;24)	26.2 (4.2;35)	15.9 (3.1;39)	18.3 (2.9;46)

First number in parentheses is the standard error of the mean; second is the number of physicians.

TABLE 5-17

PLAN B PHYSICIAN SAMPLE: MEAN PERCENTAGES OF RVUS PER PHYSICIAN PROVIDED IN LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Specialty, Participation Status, Line of Business	1973	1974	1975	1976
General Practice				
Participating				
UCR	20.1 (2.2;89)	18.7 (2.2;88)	16.4 (1.8;90)	20.1 (2.1;91)
Indemnity	.2 (0.04;89)	.2 (0.1;88)	1.0 (0.2;90)	3.2 (0.4;91)
Partial Service	15.3 (1.2;89)	11.6 (1.3;88)	9.5 (1.0;90)	4.8 (0.5;91)
Medicare	64.4 (2.7;89)	69.5 (2.7;88)	73.2 (2.4;90)	71.9 (2.4;91)
Nonparticipating				
UCR	2.5 (1.1;8)	17.5 (9.0;11)	8.5 (3.8;10)	10.9 (4.0;9)
Indemnity	4.2 (4.2;8)	.0 (0.0;11)	.8 (0.4;10)	1.1 (0.4;9)
Partial Service	3.5 (1.9;8)	6.4 (2.7;11)	4.6 (2.0;10)	2.4 (1.4;9)
Medicare	89.9 (4.3;8)	76.0 (9.7;11)	86.1 (6.1;10)	85.6 (5.5;9)
Medical Specialties				
Participating				
UCR	32.2 (1.5;221)	33.1 (1.6;220)	36.5 (1.7;217)	38.7 (1.8;224)
Indemnity	.1 (0.1;221)	.1 (0.1;220)	2.7 (0.3;217)	5.2 (0.5;224)
Partial Service	35.2 (1.5;221)	29.6 (1.3;220)	20.9 (1.1;217)	13.4 (0.9;224)
Medicare	32.4 (2.1;221)	37.2 (2.2;220)	39.9 (2.3;217)	41.8 (2.4;224)

TABLE 5-17 (Continued)

Specialty, Participation Status, Line of Business	1973	1974	1975	1976
Nonparticipating				
UCR	19.7 (4.3;25)	16.6 (3.0;29)	17.3 (2.8;29)	16.8 (2.7;30)
Indemnity	.0 (0.0;25)	.0 (0.0;29)	1.4 (0.2;29)	4.6 (1.0;30)
Partial Service	21.7 (2.9;25)	14.4 (1.7;29)	11.6 (1.5;29)	11.6 (1.5;30)
Medicare	58.5 (5.5;25)	68.9 (4.5;29)	69.7 (4.1;29)	72.0 (4.0;30)
Surgical Specialties				
Participating				
UCR	40.4 (1.3;372)	40.4 (1.3;376)	43.8 (1.3;372)	42.9 (1.4;369)
Indemnity	.6 (0.1;372)	.6 (0.1;376)	2.2 (0.2;372)	5.6 (0.4;369)
Partial Service	29.5 (0.9;372)	25.0 (0.8;376)	19.5 (0.7;372)	13.2 (0.6;369)
Medicare	29.5 (1.5;372)	34.0 (1.5;376)	34.5 (1.5;372)	38.2 (1.6;369)
Nonparticipating				
UCR	28.0 (3.1;44)	29.2 (3.2;51)	31.8 (3.4;57)	27.0 (3.0;62)
Indemnity	.7 (0.3;44)	.4 (0.1;51)	1.4 (0.3;57)	4.9 (1.6;62)
Partial Service	22.3 (2.4;44)	20.3 (2.2;51)	15.2 (1.7;57)	9.4 (1.0;62)
Medicare	48.9 (4.4;44)	50.1 (4.2;51)	51.6 (4.0;57)	58.7 (3.6;62)
Other Specialties				
Participating				
UCR	41.5 (1.9;113)	45.7 (2.3;113)	43.5 (2.2;118)	50.0 (2.2;121)
Indemnity	.7 (0.4;113)	.5 (0.1;113)	3.3 (0.6;118)	5.4 (0.5;121)

TABLE 5-17 (Continued)

Specialty, Participation Status, Line of Business	1973	1974	1975	1976
Participating (Continued)				
Partial Service	35.3 (1.9;113)	27.9 (1.8;113)	23.4 (1.6;118)	15.2 (1.5;121)
Medicare	22.4 (2.1;113)	25.9 (2.2;113)	29.8 (2.4;118)	29.3 (2.3;121)
Nonparticipating				
UCR	30.4 (6.8;15)	30.5 (4.6;19)	41.2 (5.8;24)	45.6 (6.8;23)
Indemnity	.6 (0.2;15)	.5 (0.2;19)	1.1 (0.3;24)	4.8 (1.1;23)
Partial Service	38.9 (6.2;15)	37.2 (5.7;19)	21.8 (5.4;24)	22.4 (5.8;23)
Medicare	30.1 (7.4;15)	31.8 (5.2;19)	36.0 (5.6;24)	27.2 (5.9;23)

First number in parentheses is the standard error of the mean; second is the number of physicians. Column percentages within cells defined by specialty and participation status of physician may not sum to 100 because of rounding errors.

TABLE 5-18

PLAN C PHYSICIAN SAMPLE: MEAN PERCENTAGES OF RVUS PER PHYSICIAN PROVIDED IN LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Specialty, Line of Business	1975	1976	1977	1978
General Practice				
UCR	60.9 (3.3;100)	67.7 (2.6;93)	76.9 (2.2;95)	81.1 (2.3;95)
Indemnity	39.1 (3.3;100)	32.3 (2.6;93)	23.1 (2.2;95)	18.9 (2.3;95)
Medical Specialties				
UCR	76.9 (1.4;260)	81.6 (1.0;265)	85.2 (1.0;269)	84.4 (1.2;265)
Indemnity	23.1 (1.4;260)	18.4 (1.0;265)	14.8 (1.0;269)	15.6 (1.2;265)
Surgical Specialties				
UCR	58.1 (1.4;394)	64.6 (1.2;393)	74.9 (1.2;401)	78.7 (1.2;392)
Indemnity	41.9 (1.4;394)	35.4 (1.2;393)	25.1 (1.2;401)	21.3 (1.2;392)
Other Specialties				
UCR	76.7 (2.7;130)	85.5 (1.5;164)	88.0 (1.3;177)	88.8 (1.4;170)
Indemnity	23.3 (2.7;130)	14.5 (1.5;164)	12.0 (1.3;177)	11.2 (1.4;170)

First number in parentheses is the standard error of the mean; second is the number of physicians.

services than participating physicians except in the Other Specialties. Indeed, for all nonparticipating physicians except Other Specialists, Medicare represented the most important line of business in terms of physical volume. Second, the total percentage of fee schedule business (indemnity and partial service combined) fell for all physicians. The percentage of indemnity RVUs rose--although it was still very small at the end of the study period--but the decline in partial service RVUs more than offset the rise. The decline in fee schedule business was accompanied by increases in both UCR and Medicare business. Third, the average percentage of Medicare business among General Practitioners was two to three times larger than the percentage for any other specialty group, and the percentage of Medicare business among Other Specialists was roughly half or less than half of the percentage for any other specialty group.

Except in descriptive terms, it is difficult to draw conclusions about these results. All three Plans exhibited marked declines in their fee schedule business during the study periods, but, as we have already said, this may have been due to shifts in the composition of enrollment or deliberate Plan policies to expand the number of their UCR contracts. In Plan B--the only Medicare carrier--Medicare business absorbed the major part of physician's service volume except in the Other Specialties. In all three Plans, Other Specialists tended to produce the largest relative volumes of UCR business.

Also in Plan B, nonparticipating physicians tended to have large volumes of Medicare business. In Chapter VIII we will argue that this trait is consistent with the decision not to participate. That is, physicians facing large demands for services--Medicare services in this case--on which participation agreements do not apply should have the weakest incentives to enter into participation agreements.

Medicare Outputs, the ESP, and Physician-Induced Demand

It has been shown that there were moderate increases in Medicare service volumes in Plan B during the last year of the ESP. Tables 5-19 - 5-21 display some additional characteristics of the phenomenon. Table 5-19 gives the mean number of sample Medicare RVUs per Medicare (Part B) enrollee in Plan B's counties during the study period. Table 5-20 gives the percentage changes in the mean numbers of RVUs per enrollee during the study period.

Chiefly, the tables are meant to show that the rise in Medicare service volumes was not due to a rise in Medicare enrollment. In three of the four groups of known specialties, there was an increase of 18% or more in Medicare RVUs per enrollee between 1973 and 1974. This was followed by a considerably slower growth rate of Medicare output per enrollee in 1974-75--and a decline in Medicare output per enrollee among General Practitioners.

Regrettably, there were no data on the number of users of Medicare services, and it is an open possibility that Medicare outputs rose sharply in 1973-74 because of an increase in the number of users. According to the theory of physician-induced demand, the ESP's constraints on physicians' Medicare average revenues in 1973-74 should have induced an increase in the volume of Medicare services per user. Without data on the number of users, we cannot test the implications of the hypothesis directly. The most that can be said is that the data are consistent with an increase in the volume of Medicare services per user during 1973-74--i.e., that they are consistent with the physician-induced demand hypothesis. However, in all specialty groups except General Practice, there were persistent and marked increases in the volumes of Medicare services per enrollee throughout the entire sample period.

TABLE 5-19

PLAN B: MEAN NUMBER OF MEDICARE RVUS PER MEDICARE (PART B) ENROLLEE OVER COUNTIES, CLASSIFIED BY SPECIALTY AND YEAR

	Year			
Specialty	1973	1974	1975	1976
General Practice	7.91 (5.56)	9.56 (7.02)	9.43 (6.85)	9.05 (6.52)
Medical Specialties	10.11 (8.65)	10.30 (9.43)	10.96 (9.93)	11.68 (11.43)
Surgical Specialties	15.59 (11.40)	18.38 (11.89)	20.01 (12.02)	21.96 (13.25)
Other Specialties	5.03 (4.30)	6.53 (5.41)	7.51 (5.96)	8.66 (7.17)
Unknown Specialties	1.85 (1.65)	2.49 (1.92)	3.02 (2.36)	3.27 (2.58)

Standard deviations (over counties) in parentheses.

TABLE 5-20

PLAN B: PERCENTAGE CHANGES IN MEAN NUMBER OF MEDICARE RVUS PER MEDICARE (PART B) ENROLLEE OVER COUNTIES, CLASSIFIED BY SPECIALTY AND YEAR

	Year			
Specialty	1973-74	1974-75	1975-76	1973-76
General Practice	20.9	-1.4	-4.0	14.4
Medical Specialties	1.9	6.4	6.6	15.5
Surgical Specialties	17.9	8.9	9.7	40.9
Other Specialties	29.8	15.0	15.3	72.2
Unknown Specialties	34.6	21.3	8.3	76.8

TABLE 5-21

PLAN B PHYSICIAN SAMPLE: BEHAVIOR OF MEDICARE AND PRIVATE BUSINESS RVUS*

Specialty and Measures of Mean Service Volumes Per Physician	Year			
	1973	1974	1975	1976
General Practice				
Total RVUs	3151	3709	3441	3444
Medicare RVUs	2207	2913	2674	2650
Private Business RVUs	944	796	767	794
Medicare RVUs as Percent of Total	70.0	78.5	77.7	76.9
Percent Change in Total RVUs Between Year and Last	-	17.7	-7.2	.0
Percent Change in Medicare RVUs Between Year and Last	-	32.0	-8.2	-.0
Percent Change in Private RVUs Between Year and Last	-	-15.7	-3.6	3.5
Medical Specialties				
Total RVUs	4881	5306	5016	4811
Medicare RVUs	3608	4489	4335	4333
Private Business RVUs	1273	817	681	478
Medicare RVUs as Percent of Total	73.9	84.6	86.4	90.1
Percent Change in Total RVUs Between Year and Last	-	8.7	-5.4	-4.1
Percent Change in Medicare RVUs Between Year and Last	-	24.4	-3.4	-.0
Percent Change in Private RVUs Between Year and Last	-	-35.8	-16.6	-29.8
Surgical Specialties				
Total RVUs	6313	6714	6576	6587
Medicare RVUs	2743	3207	3167	3507
Private Business RVUs	3570	3507	3409	2980
Medicare RVUs as Percent of Total	43.5	47.8	48.2	53.2
Percent Change in Total RVUs Between Year and Last	-	6.4	-2.1	.0
Percent Change in Medicare RVUs Between Year and Last	-	16.9	-1.2	10.7
Percent Change in Private RVUs Between Year and Last	-	-1.8	-2.8	-12.6
Other Specialties				
Total RVUs	4180	4260	4139	4138
Medicare RVUs	1193	1499	1387	1700
Private Business RVUs	2987	2761	2752	2438
Medical RVUs as Percent of Total	28.5	35.2	33.5	41.1
Percent Change in Total RVUs Between Year and Last	-	1.9	-2.8	-.0

TABLE 5-21 (CONTINUED)

Specialty and Measures of Mean Service Volumes Per Physician	Year 1973	1974	1975	1976
Other Specialties (Cont.)				
Percent Change in Medicare RVUs Between Year and Last	-	25.6	-7.5	22.6
Percent Change in Private RVUs Between Year and Last	-	-7.6	-.0	-11.4

* Excludes physicians with only Medicare or only private business claims.

Although the increases were most pronounced in 1973-74, this inevitably raises some question about the significance of the output trends.

Table 5-21 gives another perspective on the behavior of Medicare service volumes in Plan B. It shows the mean values of total, Medicare, and private business RVUs per physician, and the annual percentage changes in each category of output. The table indicates that: (i) depending on specialty, total RVUs per physician increased from 2% to 18% between 1973 and 1974 and then declined during 1974-76; (ii) the rise in total RVUs per physician between 1973 and 1974 was due to large increases in Medicare outputs per Physician between those two years; (iii) private business RVUs per physician fell during 1973-74, and, indeed, fell continuously throughout the study period; and (iv) Medicare outputs per physician fell slightly during 1974-75 and remained stable or increased again during 1975-76.

Again, in view of the fact that Medicare charges and allowances grew much less rapidly than those in private business during 1973-74, the patterns of change in Medicare outputs are compatible with the implications of physician-induced demand. What is surprising, however, is that there appeared to be no demand generation in private business between 1973 and 1974. Presumably, physicians who can and do induce demands are indifferent as to the classes of patients for whom they recommend additional services. Hence, if physicians' actual net incomes are less than target amounts because of diminished or less-than-desired revenues in one line of business, one would expect increases in output in all lines of business. That this did not happen in 1973-74 casts at least some doubt on the theory that physicians can or do generate demands at will.

Interestingly, a very similar pattern was observed among California physicians by Hadley et al. (1978). It was found that Medicare output per user and Medicare output per physician increased during the ESP, but data on physician incomes suggested that output per physician apparently did not increase in other lines of business. Hadley et al. concluded that California physicians did generate demands for Medicare services, but that their ability or willingness to generate demands for non-Medicare patients was limited. Here, the data also suggest that physicians may have generated demands for Medicare services and that demand generation did not extend to the private lines of business.

The general upward shift or upward movement of Medicare output among Plan B physicians after 1973 is another curious, and not readily explainable, pattern. If one can argue that 1976 was a reasonably "normal" year, it was still the case that the share of Medicare RVUs in physicians' total outputs was 10% to 40% higher than in 1973. Since no pre-1973 data were available, there is no way of telling how "normal" a year 1973 was in terms of the composition of outputs. It may have been that Medicare outputs were unusually low in 1973--which would imply a contraction of Medicare output in the first year of the ESP. If not, the data indicate irregular increases in Medicare outputs and irregular declines in private business outputs during the study period. In other words, there may have been longer-term causes than the ESP underlying the observed output trends. If these other forces existed, they obviously reduce the strength of inferences that the trends were due to physician responses to Medicare allowance restrictions under the ESP. (In Chapters VI and VII we report the results of our efforts to adjust for the effects of other factors using multi-variate analytical techniques.)

Charge Inflation and the Frequency of Updating Allowances

In the preceding discussion it was indicated that the rate of charge inflation across lines of business appeared to be about the same regardless of whether allowances were determined by frequently updated fee screens or by infrequently updated fee schedules. Table 5-22, which summarizes some of the data presented in Tables 5-4 - 5-6, suggests such a conclusion.

To review the issue in a slightly different way, Table 5-23 was constructed from the Plan physician file. The hypothesis to which the table is directed concerns the effect of large percentages of fee schedule business on the growth rates of individual physicians' charges. If the frequency of updating allowances is positively related to physicians' willingness to raise their charge levels, one would expect physicians' with the largest percentages of fee schedule (indemnity and partial service) business to exhibit the lowest annual growth rates of charges. Accordingly, Table 5-23 presents simple correlation coefficients between annual and four-year growth rates of charges and the percentages of physicians' RVUs produced for fee schedule lines of business. If the updating hypothesis is correct, the correlation coefficients should be predominantly negative.

In the first three columns of the table--which show the correlation coefficients for the annual growth rates of charges among specialty groups--21 of the 36 coefficients are negative and eight are significantly negative at or below the 5% level. Three of the 15 positive coefficients are significantly positive at or below the 5% level. Among the 12 coefficients for the four-year growth rate of charges, seven are negative and two are significantly negative. One of the positive coefficients is significantly positive.

The evidence shown in Table 5-23 is therefore weakly consistent at best

TABLE 5-22

COMPARISON OF GROWTH RATES OF AMOUNTS CHARGED PER RVU IN FEE SCREEN AND FEE SCHEDULE BUSINESS, CLASSIFIED BY PLAN

Plan, Method of Reimbursement, Line of Business	Growth Rates of Charges Per RVU Between Years of Study Periods*			
	1st-2nd	2nd-3rd	3rd-4th	1st-4th
Plan A				
Fee Screen				
UCR/Participating	5.8	11.1	3.0	21.1
UCR/Nonparticipating	6.8	11.9	6.4	27.2
Fee Schedule				
Indemnity	6.0	11.2	4.1	22.7
Plan B				
Fee Screen				
UCR/Participating	9.4	8.2	9.7	29.8
UCR/Nonparticipating	8.3	11.4	10.8	33.6
Medicare	4.1	11.2	5.9	22.6
Fee Schedule				
Indemnity	15.0	16.6	7.0	43.5
PS/Participating**	9.4	8.3	10.7	31.2
PS/Nonparticipating**	8.1	10.2	12.2	33.7
Plan C				
Fee Screen				
UCR	6.6	6.5	7.6	22.2
Fee Schedule				
Indemnity	7.5	7.6	7.5	24.4

* Study period was 1973-76 for Plans A and B, 1975-78 for Plan C.
** PS denotes partial service.

TABLE 5-23

PLAN A, B, AND C PHYSICIAN SAMPLES: SIMPLE CORRELATIONS BETWEEN PERCENTAGE OF TOTAL RVUS PRODUCED IN FEE SCHEDULE BUSINESS AND PERCENTAGE GROWTH RATES OF AVERAGE CHARGES PER RVU

Plan, Specialty	Correlation Coefficients[a] for Years of Study Period			
	1st-2nd	2nd-3rd	3rd-4th	1st-4th
Plan A				
General Practice	.04	.06	.01	.12
Medical Specialties	-.09	.01	-.03	-.02
Surgical Specialties	-.17**	-.08	-.08	-.18**
Other Specialties	-.05	.03	.35**	.36**
Plan B				
General Practice	.04	-.17*	.12	-.13
Medical Specialties	-.16**	-.09	.06	-.08
Surgical Specialties	-.01	-.18**	.12**	-.07
Other Specialties	.08	-.15*	-.27**	.10
Plan C				
General Practice	-.05	-.19*	-.10	-.03
Medical Specialties	.07	.03	-.16	.12
Surgical Specialties	.10*	-.02	.04	.02
Other Specialties	-.25**	-.03	-.06	-.19*

[a] Percentage changes in charges between two years were correlated with the percentage of the physician's total RVUs produced in fee screen business in the first of the two years.

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively.

with the updating hypothesis. Moreover, there are few consistent patterns for the specialty groups either within or across Plans. On the basis of these results, there seems little reason to believe that vigorous controls on allowances in physicians' fee schedule business have powerful restraining effects on the overall rate of charge inflation.

By the same token, the tentative inference can be drawn that controls on allowances in any given line of business will have little impact on physicians' desires to raise their charges. In support of this inference, the growth rates of Plan B's Medicare and private business charges is shown in Table 5-19. Medicare allowances were updated annually (or nearly so) during the study period, and the federally-imposed controls on Medicare allowances may have inhibited the growth of Medicare charges.* However, there are no indications that charges in Plan B's private business rose at slower rates because of the controls on the growth of Medicare allowances.

Charge Levels and Allowance Levels

If allowance levels across lines of business have restraining effects on charge levels, one would tend to expect the average amount charged by the physician to fall with the percentage of his service volume derived from fee schedule business (where allowance levels are generally the lowest). The negative relationship between charge levels and the percentage of service volume derived from fee schedule business should hold whether or not physicians discriminate in price across lines of business. If they do not discriminate,

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* It is hard not to suspect this conclusion in view of the fact that charges in the Plans' fee schedule lines of business grew at about the same rate as UCR charges even though fee schedule allowances were raised in only one of the three Plans' fee schedule lines of business.

the inhibiting effects of fee schedules on charges should be strongest for physicians with the largest quantities of fee schedule business. And if they do discriminate, the average amount charged over all business lines should still be lowest for physicians who are most dependent on fee schedule business.

Table 5-24 presents a test of the charge level-allowance level hypothesis. The table shows the simple correlation coefficients for the mean amounts charged over all business lines with the percentage of the physician's RVUs sold in fee schedule (indemnity and partial service) business. If the hypothesis is correct, the coefficients should be systematically negative.

The coefficients for Plan C physicians have a sign pattern consistent with the hypothesis, although only seven of the 16 coefficients are significantly negative. However, the sign patterns of the correlation coefficients for Plan A and B obviously contradict the hypothesis--particularly in Plan A, where 14 of the 16 coefficients are positive and six are significantly positive.

Accordingly, it may have been that low allowances on fee schedule business in Plan C had some restraining impact on physicians' charge levels, but there are no indications that this was so for Plans A and B. The evidence shown here suggests that the charge level-allowance level hypothesis is generally invalid.

Price Discrimination Across Lines of Business

If different allowance levels and/or different frequencies of updating allowances did have differential effects on charge levels, it would be virtually essential for physicians to set different charges across lines of business. Conversely, if physicians tend to set the same fee levels regardless of line of business, it follows that inter-line variation in allowances and/or the frequency of updating allowances should have no significant impact on

TABLE 5-24

PLAN A, B, AND C PHYSICIAN SAMPLES: SIMPLE CORRELATIONS BETWEEN PERCENTAGE OF TOTAL RVUS PRODUCED IN FEE SCHEDULE BUSINESS AND AVERAGE CHARGES PER RVU

Plan, Specialty	Correlation Coefficients for Years of Study Period 1st	2nd	3rd	4th
Plan A				
General Practice	.06	.08	.12	-.07
Medical Specialties	.34**	.26**	.12*	.13*
Surgical Specialties	.26**	.07	.06	-.10*
Other Specialties	.06	.05	.17**	.05
Plan B				
General Practice	.32**	.33**	.00	.08
Medical Specialties	.00	-.15**	-.23**	-.16**
Surgical Specialties	-.04	.04	-.05	.10*
Other Specialties	-.17*	.39**	.33**	.22**
Plan C				
General Practice	-.24**	-.28**	-.30**	-.16
Medical Specialties	-.10	.01	.11*	-.01
Surgical Specialties	-.07	.01	-.09*	-.00
Other Specialties	.03	-.32**	-.10	-.30**

One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (one-tailed tests).

line-specific charges and little effect on overall charges. Whether physicians set different charge levels across lines of business therefore has a direct bearing on the success of controls on allowances applied to one or two but not all lines of business.

Tables 5-25 - 5-29 are addressed to this question. Tables 5-25 - 5-27 show the mean amounts charged and allowed across lines of business for the subsamples of physicians who sold services in each line of business offered by the Plans. These particular subsamples were chosen in order to provide comparisons of charges across the maximum number of lines of business by the same physicians. The figures are cross classified by specialty and participation status, and are given for the first and last years of the study period for each Plan.

For Plans A and C, the charge levels for UCR and indemnity services were closely similar despite much different allowance levels. Thus, in these two Plans there is little indication of price discrimination across lines of business, and little indication that inter-line variation in charges is affected by inter-line variation in allowances. However, in Plan B the results are rather different. Notably, Medicare charge levels were slightly to moderately lower than charge levels in private business for three of the four specialty groups. In addition, indemnity charges in 1973 appeared to be lower than charges in other private lines of business. By 1976, the charge levels in all three of the Plan's lines of private business were about equal, but they were still higher than Medicare charge levels among three of the four specialty groups. The exception is Other Specialists', whose Medicare charges tended to exceed their private business charges, and in 1976 were significantly higher than their private business charges.

TABLE 5-25

PLAN A PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED AND ALLOWED PER RVU BY PHYSICIANS WHO SUBMITTED CLAIMS IN ALL LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND PARTICIPATION STATUS, 1973 and 1976*

Specialty/Participation Status of Physician/Amount	1973			1976		
	UCR	Indemnity	Number of Physicians	UCR	Indemnity	Number of Physicians
General Practice						
Participating						
Charged	1.96 (0.45)	1.96 (0.63)	56	1.91 (0.38)	1.87 (0.37)	71
Allowed	1.89 (0.34)	1.54 (0.39)	56	1.84 (0.34)	1.14 (0.32)	71
Nonparticipating						
Charged	2.04 (0.36)	2.07 (0.34)	5	2.31 (0.44)	2.35 (0.72)	19
Allowed	2.00 (0.35)	1.50 (0.23)	5	2.04 (0.72)	1.24 (0.29)	19
Medical Specialties						
Participating						
Charged	1.98 (0.29)	2.06 (0.55)	107	2.27 (0.39)	2.18 (0.49)	157
Allowed	1.92 (0.26)	1.64 (0.46)	107	2.15 (0.32)	1.23 (0.36)	157
Nonparticipating						
Charged	2.17 (0.48)	2.27 (0.56)	38	2.60 (0.51)	2.58 (0.71)	91
Allowed	2.06 (0.39)	1.74 (0.55)	38	2.29 (0.28)	1.26 (0.40)	91
Surgical Specialties						
Participating						
Charged	2.13 (0.47)	2.16 (0.50)	230	2.58 (0.56)	2.65 (0.70)	266
Allowed	2.02 (0.41)	1.47 (0.31)	230	2.39 (0.42)	1.28 (0.36)	266
Nonparticipating						
Charged	2.05 (0.59)	2.18 (0.58)	55	2.75 (0.53)	2.75 (0.61)	132
Allowed	1.96 (0.42)	1.51 (0.37)	55	2.42 (0.34)	1.34 (0.34)	132
Other Specialties						
Participating						
Charged	2.05 (0.35)	2.16 (0.57)	79	2.79 (0.59)	2.85 (0.72)	91
Allowed	2.01 (0.35)	1.29 (0.35)	79	2.62 (0.54)	1.35 (0.34)	91
Nonparticipating						
Charged	1.97 (0.60)	2.13 (0.77)	17	2.97 (0.70)	2.47 (0.46)	27
Allowed	1.86 (0.55)	1.52 (0.62)	17	2.89 (0.75)	1.40 (0.41)	27

* Physicians defined as participating if 5% or more of their claims were submitted on a participating basis. Standard deviations in parentheses.

TABLE 5-26

PLAN B PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED AND ALLOWED PER RVU FOR PHYSICIANS WHO SUBMITTED CLAIMS IN ALL LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND PARTICIPATION STATUS, 1973 AND 1976

Specialty/Participation Status of Physician/Amount	Line of Business: UCR	Indemnity	Partial Service	Medicare	Number of Physicians
		1973			
General Practice					
Participating					
Charged	1.99 (0.33)	2.10 (0.89)	1.98 (0.36)	1.73 (0.32)	25
Allowed	1.85 (0.22)	1.62 (0.47)	1.60 (0.23)	1.50 (0.29)	25
Nonparticipating					
Charged	---	---	---	---	0
Allowed	---	---	---	---	0
Medical Specialties					
Participating					
Charged	2.23 (0.26)	1.98 (0.57)	2.18 (0.27)	2.12 (0.49)	38
Allowed	2.08 (0.21)	1.77 (0.51)	1.49 (0.19)	1.86 (0.31)	38
Nonparticipating					
Charged	2.80 (0.56)	2.11 (0.91)	2.81 (0.83)	2.48 (0.56)	3
Allowed	2.20 (0.13)	1.46 (0.40)	1.47 (0.02)	1.91 (0.24)	3
Surgical Specialties					
Participating					
Charged	2.18 (0.51)	2.18 (0.88)	2.12 (0.51)	2.10 (0.54)	116
Allowed	1.97 (0.38)	0.90 (0.54)	1.14 (0.24)	1.75 (0.33)	116
Nonparticipating					
Charged	1.97 (0.27)	1.83 (0.86)	2.01 (0.32)	1.85 (0.33)	15
Allowed	1.74 (0.32)	0.77 (0.37)	0.97 (0.16)	1.61 (0.36)	15
Other Specialties					
Participating					
Charged	2.13 (0.48)	1.99 (0.78)	2.05 (0.49)	2.29 (0.56)	43
Allowed	1.89 (0.38)	1.04 (0.79)	1.09 (0.53)	1.97 (0.40)	43
Nonparticipating					
Charged	1.95 (0.10)	1.70 (0.51)	1.90 (0.15)	2.32 (0.20)	7
Allowed	1.64 (0.15)	0.53 (0.07)	0.67 (0.03)	1.87 (0.17)	7

Standard Deviations in parentheses. Dashes indicate empty cells.

TABLE 5-26 (CONTINUED)

Specialty/Participation Status of Physician/Amount	Line of Business: UCR	Indemnity	Partial Service	Medicare	Number of Physicians
1976					
General Practice					
Participating					
Charged	2.18 (0.52)	2.26 (0.83)	2.14 (0.52)	2.02 (0.49)	65
Allowed	1.97 (0.36)	1.93 (0.28)	1.67 (0.28)	1.66 (0.38)	65
Nonparticipating					
Charged	2.41 (0.08)	2.35 (0.67)	2.42 (0.27)	2.18 (0.50)	4
Allowed	2.31 (0.11)	2.23 (0.72)	1.72 (0.31)	1.75 (0.29)	4
Medical Specialties					
Participating					
Charged	2.65 (0.61)	2.62 (0.52)	2.74 (0.64)	2.58 (0.61)	126
Allowed	2.41 (0.40)	2.04 (0.31)	1.76 (0.32)	2.13 (0.39)	126
Nonparticipating					
Charged	3.03 (0.83)	2.91 (0.67)	3.12 (0.58)	2.93 (0.64)	24
Allowed	2.48 (0.40)	2.09 (0.22)	1.60 (0.34)	2.26 (0.26)	24
Surgical Specialties					
Participating					
Charged	2.92 (0.60)	2.96 (0.95)	2.91 (0.74)	2.64 (0.73)	251
Allowed	2.40 (0.45)	2.00 (0.47)	1.18 (0.30)	2.08 (0.38)	251
Nonparticipating					
Charged	2.82 (0.41)	2.85 (0.73)	2.84 (0.46)	2.50 (0.47)	40
Allowed	2.28 (0.28)	1.91 (0.37)	1.06 (0.25)	1.96 (0.31)	40
Other Specialties					
Participating					
Charged	3.02 (0.62)	3.03 (0.65)	3.08 (0.70)	3.23 (0.79)	83
Allowed	2.56 (0.46)	2.04 (0.33)	1.31 (0.57)	2.52 (0.47)	83
Nonparticipating					
Charged	2.85 (0.41)	2.78 (0.44)	2.74 (0.45)	3.11 (0.71)	14
Allowed	2.36 (0.24)	1.83 (0.22)	0.98 (0.18)	2.30 (0.40)	14

Standard Deviations in parentheses. Dashes indicate empty cells.

TABLE 5-27

PLAN C PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED AND ALLOWED PER RVU FOR PHYSICIAN WHO SUBMITTED CLAIMS IN ALL LINES OF BUSINESS, CLASSIFIED BY SPECIALTY, 1975 AND 1978

Line of Business/ Number of Physicians	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1975		
UCR				
Charged	2.20 (0.66)	2.54 (0.44)	2.47 (0.47)	2.46 (0.85)
Allowed	1.92 (0.44)	2.23 (0.34)	2.15 (0.41)	2.18 (0.80)
Indemnity				
Charged	2.20 (0.53)	2.58 (0.61)	2.47 (0.59)	2.51 (0.90)
Allowed	1.40 (0.45)	1.41 (0.44)	1.13 (0.39)	1.19 (0.54)
Number of Physicians	79	208	346	78
		1978		
UCR				
Charged	2.75 (0.74)	2.98 (0.42)	2.97 (0.52)	3.08 (0.96)
Allowed	2.59 (0.58)	2.87 (0.40)	2.75 (0.46)	2.87 (0.82)
Indemnity				
Charged	2.62 (0.74)	3.03 (0.60)	3.02 (0.85)	3.16 (1.18)
Allowed	1.60 (0.59)	1.53 (0.54)	1.38 (0.54)	1.45 (0.67)
Number of Physicians	62	188	292	91

Standard deviations in parentheses.

TABLE 5-28

PLAN A AND PLAN C PHYSICIAN SAMPLES: MEAN DIFFERENCES OF CHARGES PER RVU BETWEEN PAIRS OF LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Lines of Business Between Which Differences Apply	General Practice		Medical Specialties		Surgical Specialties		Other Specialties	
PLAN A								
1973								
UCR - Ind/P	.00	(56)	-.08	(107)	-.03	(230)	-.11	(79)
UCR - Ind/NP	-.04	(5)	-.10	(38)	-.14	(55)	-.16	(17)
UCR - Ind/All	.00	(61)	-.09*	(145)	-.05	(285)	-.12*	(96)
1974								
UCR - Ind/P	-.07	(62)	-.05	(109)	-.08*	(261)	-.08	(76)
UCR - Ind/NP	-.69	(9)	-.18**	(43)	-.01	(67)	.03	(23)
UCR - Ind/All	-.15*	(71)	-.09**	(152)	-.06*	(328)	-.05	(99)
1975								
UCR - Ind/P	.15	(54)	.01	(122)	-.07**	(278)	.01	(78)
UCR - Ind/NP	-.27	(8)	-.14	(51)	-.00	(79)	-.33	(25)
UCR - Ind/All	.09	(62)	-.04	(173)	-.06*	(357)	-.07	(103)
1976								
UCR - Ind/P	.04	(71)	.09**	(157)	-.08*	(266)	-.06	(91)
UCR - Ind/NP	-.04	(19)	.02	(91)	-.00	(132)	.08	(27)
UCR - Ind/All	.03	(90)	.07*	(248)	-.05*	(398)	-.03	(118)
PLAN C								
1975								
UCR - Ind	.01	(79)	-.04	(208)	-.00	(346)	-.05	(78)
1976								
UCR - Ind	-.06	(84)	-.07*	(224)	-.03	(351)	-.05	(107)
1977								
UCR - Ind	.02	(77)	-.07	(209)	-.03	(338)	-.02	(107)
1978								
UCR - Ind	.13	(62)	-.06	(188)	-.06	(292)	-.08	(91)

TABLE 5-28 (CONTINUED)

Ind = indemnity; P = participating; NP = nonparticipating; All = participating and nonparticipating. Row entries are read as follows: first column indicates lines of business and physician participation status for which differences in charges per RVU are defined; e.g., first row entry is the mean difference between UCR and indemnity charges for all participating physicians who had both UCR and indemnity claims. The numbers of physicians are in parentheses. One and two asterisks denote differences significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 5-29

PLAN B PHYSICIAN SAMPLE: MEAN DIFFERENCES OF CHARGES PER RVU BETWEEN PAIRS OF LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Lines of Business Between Which Differences Apply	General Practice		Medical Specialties		Surgical Specialties		Other Specialties	
1973								
UCR - Ind	-.11	(25)	.30**	(43)	.01	(138)	-.12	(52)
UCR - PS	.08	(84)	.05	(234)	.04*	(386)	.03	(114)
UCR - Med	.41**	(91)	.22**	(160)	.07*	(358)	.06	(106)
Ind - Med	.29	(26)	-.15	(41)	.07	(132)	-.34**	(50)
PS - Med	.22	(88)	.17**	(161)	.04	(357)	-.13*	(103)
Ind - PS	.12	(25)	-.25*	(43)	.04	(137)	.24	(52)
1974								
UCR - Ind	.01	(20)	.27**	(56)	-.04	(111)	.09	(60)
UCR - PS	.08	(82)	.06**	(237)	-.00	(387)	.16	(116)
UCR - Med	.43**	(92)	.23**	(165)	.12**	(391)	.05	(108)
Ind - Med	.41*	(20)	-.05	(52)	.14	(107)	-.14	(59)
PS - Med	.31**	(85)	.16**	(160)	.12**	(381)	.08	(108)
Ind - PS	.13	(18)	-.17	(56)	.07	(111)	.14	(60)
1975								
UCR - Ind	-.11	(55)	-.02	(195)	-.14*	(246)	-.01	(95)
UCR - PS	.05	(86)	-.01	(235)	.02	(393)	.04	(122)
UCR - Med	.12*	(96)	.06	(170)	.13**	(398)	-.11	(122)
Ind - Med	.29**	(55)	.09	(143)	.30**	(244)	-.10	(91)
PS - Med	.11*	(90)	.09**	(167)	.15**	(378)	-.06	(117)
Ind - PS	.15*	(55)	.00	(194)	.14**	(245)	.07	(94)
1976								
UCR - Ind	-.01	(79)	-.01	(223)	-.04	(320)	-.02	(109)
UCR - PS	.05	(75)	-.05*	(228)	.00	(383)	-.05	(115)
UCR - Med	.14*	(100)	.07	(174)	.30**	(384)	-.15**	(120)
Ind - Med	.19	(79)	.03	(157)	.33**	(304)	-.21**	(105)
PS - Med	.09	(75)	.17**	(160)	.30**	(374)	-.10	(108)
Ind - PS	.11	(69)	-.07*	(214)	.04	(315)	-.05	(100)

Ind = indemnity; PS = partial service; Med = Medicare. Row entries are read as follows: first column indicates lines of business between which differences in charges per RVU are defined; e.g., first row entry is the mean difference between UCR and indemnity charges per RVU for all physicians who had both UCR and indemnity claims. The numbers of physicians are in parentheses. One and two asterisks denote differences significant at the 5% and 1% levels respectively (two-tailed tests).

Tables 5-28 and 5-29 convey the same overall impressions as Tables 5-25 - 5-27. They present the mean differences in charge levels between pairs of lines of business for all physicians who sold services in each line of the pair. That is, 5-28 and 5-29 compare charge levels across two lines of business among physicians having claims in each of the two lines (rather than all lines as in 5-25 - 5-27).

In Plan C it is clear that UCR and indemnity charges--representing the only two lines of business offered by the Plan--were essentially the same, although the latter tended to exceed the former slightly. In Plan A, there was a more pronounced tendency for indemnity charges to exceed UCR charges, especially in the Surgical Specialties. Nevertheless, the mean numerical differences were almost all of the order of 3% or less of actual mean charges. On these grounds it is reasonable to conclude that there was no important evidence of price discrimination in private business for either of the two Plans. It is also worthwhile pointing out that the higher of the two charge levels occurred in the line of business having the lower level of allowances.

In Plan B, as we have seen, there were systematic differences in charge levels across lines of business varying by specialty and year. First, Medicare charge levels were generally lower than private business charge levels--in some cases by as much as 10%-15%--for all specialty groups except Other Specialists. Second, there were some tendencies in the Medical Specialties for indemnity charges to be lower than other private business charges in 1973 and 1974--a result which stands in contrast to the findings for Plans A and C. In 1975 and 1976, however, charge levels across the Plan's private lines of business were nearly the same, and even in the cases where charge levels were significantly different, the numerical differences were less than 5% of total mean charges.

Obviously, it is difficult to generalize about the extent and nature of price discrimination across lines of business from these findings. Some of the results may have been due to variations in the mix of procedures or to the mix of individual specialties within the overall specialty groups. All the same, it appears--as much of the preceding findings suggest--that there are differences in physician pricing behavior between specialties and between Plans. The strongest evidence reported here indicates price discrimination between private business and Medicare, but with little if any indication of discrimination within the private lines.

Charge Levels and County Socioeconomic and Medical Characteristics

Tables 5-30 - 5-32 present groups of simple correlation coefficients, classified by specialty and year, between charges per RVU and various county socioeconomic and medical characteristics. There are very few significant coefficients and few sign patterns of the coefficients that hold across specialties and Plans.*

Basically, the results indicate tendencies for charges to rise with: (i) the degree of county urbanization, although the tendencies are significant only for General Practitioners and Surgeons in Plans A and C; (ii) per capita income; (iii) small percentages of the elderly (Plans A and C); and (iv) small numbers of hospital beds per capita (Plans A and B). The remaining findings are not systematic across Plans or specialties.

The tables provide another crude test for the physician-induced-demand-target-income (PIDTI) hypothesis. In particular, the hypothesis predicts a

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* In Plan A there were only five counties, but in Plans B and C there were 22 and 28 counties, respectively.

TABLE 5-30

PLAN A: SIMPLE CORRELATION COEFFICIENTS BETWEEN CHARGES PER RVU IN COUNTIES AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS CLASSIFIED BY SPECIALTY AND YEAR

	Year			
Characteristic	1973	1974	1975	1976
General Practice				
Percentage of Population Living in Urban Areas	.89*	.87	.85	.34
Per Capita Income	.01	.28	.59	.48
Percentage of Population 65 and Older	.19	.25	.02	-.31
Percentage of Population 14 and Younger	-.38	-.52	-.41	.03
Percentage of Population Black	.28	.41	.45	-.14
General Practitioners Per Capita	.33	.19	-.13	-.59
Medical Specialists Per Capita	.33	.57	.60	.09
Surgical Specialists Per Capita	.64	.64	.65	.07
Other Specialists Per Capita	.12	.11	.39	-.10
Total Physicians Per Capita	.33	.45	.54	.01
Hospital Beds Per Capita	.35	.23	.13	-.46
Office Wage Rate	.28	.64	.62	.53
Medical Specialties				
Percentage of Population Living in Urban Areas	.08	.31	.23	.93*
Per Capita Income	.50	.36	.98**	.51
Percentage of Population 65 and Older	.35	.40	-.10	-.00
Percentage of Population 14 and Younger	-.55	-.58	-.32	-.41
Percentage of Population Black	.29	.25	.52	.54
General Practitioners Per Capita	-.19	.09	-.59	-.12
Medical Specialists Per Capita	.41	.40	.66	.68
Surgical Specialists Per Capita	.40	.53	.50	.64
Other Specialists Per Capita	-.00	-.12	.62	.57
Total Physicians Per Capita	.32	.30	.61	.62
Hospital Beds Per Capita	-.13	-.04	.03	.31
Office Wage Rate	-.001	.41	.82	.60
Surgical Specialties				
Percentage of Population Living in Urban Areas	-.60	-.55	-.24	-.19
Per Capita Income	.17	.17	.23	.48
Percentage of Population 65 and Older	.25	.30	.50	.25
Percentage of Population 14 and Younger	-.18	-.24	-.51	-.37
Percentage of Population Black	-.13	-.09	.13	.10
General Practitioners Per Capita	-.17	-.07	-.02	-.29
Medical Specialists Per Capita	-.08	-.07	.20	.23
Surgical Specialists Per Capita	-.19	.03	.34	.29
Other Specialists Per Capita	-.38	-.28	-.21	-.03
Total Physicians Per Capita	-.15	-.08	.17	.22
Hospital Beds Per Capita	-.41	-.28	-.09	-.18
Office Wage Rate	-.43	-.16	-.14	.32

TABLE 5-30 (Continued)

Characteristic	Year 1973	1974	1975	1976
Other Specialties				
Percentage of Population Living in Urban Areas	.68	.86	.82	.13
Per Capita Income	-.48	-.12	-.04	.27
Percentage of Population 65 and Older	.60	.37	.13	-.23
Percentage of Population 14 and Younger	-.55	-.48	-.27	.08
Percentage of Population Black	.45	.34	.14	-.33
General Practitioners Per Capita	.80	.52	.30	-.51
Medical Specialists Per Capita	.35	.42	.21	-.13
Surgical Specialists Per Capita	.63	.55	.41	-.07
Other Specialists Per Capita	.20	.01	-.03	-.36
Total Physicians Per Capita	.45	.36	.18	-.19
Hospital Beds Per Capita	.83	.41	.11	-.59
Office Wage Rate	-.04	.32	.09	.29
Unknown Specialties				
Percentage of Population Living in Urban Areas	.44	-.63	-.24	-.35
Per Capita Income	-.00	-.65	-.56	-.70
Percentage of Population 65 and Older	.17	.82	.40	.37
Percentage of Population 14 and Younger	-.25	-.44	-.11	-.02
Percentage of Population Black	.64	.16	.20	.07
General Practitioners Per Capita	.11	.99**	.83	.84
Medical Specialists Per Capita	.51	-.08	-.03	-.19
Surgical Specialists Per Capita	.45	.15	-.05	-.12
Other Specialists Per Capita	.76	-.13	.14	-.02
Total Physicians Per Capita	.61	.08	.06	-.11
Hospital Beds Per Capita	.85	.59	.68	.50
Office Wage Rate	.62	-.76	-.46	-.69
All Physicians				
Percentage of Population Living in Urban Areas	-.25	-.12	.02	.21
Per Capita Income	.12	.17	.25	.34
Percentage of Population 65 and Older	.54	.57	.56	.40
Percentage of Population 14 and Younger	-.51	-.58	-.63	-.56
Percentage of Population Black	.10	.16	.24	.23
General Practitioners Per Capita	.10	.21	.08	-.07
Medical Specialists Per Capita	.15	.22	.32	.35
Surgical Specialists Per Capita	.16	.39	.50	.49
Other Specialists Per Capita	-.30	-.24	-.14	-.00
Total Physicians Per Capita	.10	.18	.29	.34
Hospital Beds Per Capita	-.12	-.03	.01	-.02
Office Wage Rate	-.38	.04	-.08	.23

One asterisk denotes coefficient significantly different from zero at .05 level; two asterisks denote coefficient significantly different from zero at .01 level (two-tailed test). Five counties in sample.

TABLE 5-31

PLAN B: SIMPLE CORRELATION COEFFICIENTS BETWEEN CHARGES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	Year 1973	1974	1975	1976
General Practice				
Percentage of Population Living in Urban Areas	.55**	.48*	.38	.33
Per Capita Income	.69**	.61**	.49*	.48*
Percentage of Population 65 and Older	-.42	-.48*	-.51*	-.45*
Percentage of Population 14 and Younger	.09	.17	.24	.28
Percentage of Population Black	-.05	-.13	-.15	.02
General Practitioners Per Capita	-.22	-.23	-.23	-.27
Medical Specialists Per Capita	.33	.27	.12	.09
Surgical Specialists Per Capita	.26	.24	.10	.07
Other Specialists Per Capita	.49*	.48*	.31	.14
Total Physicians Per Capita	.37	.33	.19	.15
Hospital Beds Per Capita	-.10	-.15	-.25	-.22
Office Wage Rate	.63*	.37	.16	-.15
Medical Specialists				
Percentage of Population Living in Urban Areas	.00	-.05	.25	.18
Per Capita Income	-.32	-.27	.21	.17
Percentage of Population 65 and Older	.41	-.04	-.15	.05
Percentage of Population 14 and Younger	-.17	.35	.31	.05
Percentage of Population Black	.52*	.48*	.27	.39
General Practitioners Per Capita	.27	.09	-.26	-.05
Medical Specialists Per Capita	-.17	-.20	-.03	.05
Surgical Specialists Per Capita	-.23	-.23	-.03	.06
Other Specialists Per Capita	-.23	-.29	.03	.01
Total Physicians Per Capita	-.12	-.12	.07	.12
Hospital Beds Per Capita	.02	-.15	-.02	-.03
Office Wage Rate	-.05	.13	.36	.24
Surgical Specialists				
Percentage of Population Living in Urban Areas	.19	.33	.32	.21
Per Capita Income	.34	.37	.28	.36
Percentage of Population 65 and Older	-.19	-.34	-.49*	-.47
Percentage of Population 14 and Younger	.20	.23	.34	.37
Percentage of Population Black	.35	.28	.19	.20
General Practitioners Per Capita	.19	.08	-.08	-.07
Medical Specialists Per Capita	-.06	.01	-.05	-.17
Surgical Specialists Per Capita	-.15	-.02	-.07	-.20
Other Specialists Per Capita	.04	.10	.12	-.07
Total Physicians Per Capita	.04	.15	.08	-.06
Hospital Beds Per Capita	-.39	-.39	-.46*	-.48*
Office Wage Rate	.34	.12	.02	-.22
Other Specialists				
Percentage of Population Living in Urban Areas	.39	.33	.29	.25

TABLE 5-31 (Continued)

Characteristic	Year 1973	1974	1975	1976
Per Capita Income	.56*	.59**	.55*	.59**
Percentage of Population 65 and Older	-.63**	-.76**	-.77**	-.79**
Percentage of Population 14 and Younger	.33	.43	.55*	.64**
Percentage of Population Black	-.08	-.25	-.11	-.07
General Practitioners Per Capita	-.54*	-.58**	-.62**	-.66**
Medical Specialists Per Capita	-.04	-.02	.06	-.04
Surgical Specialists Per Capita	-.11	-.05	-.04	-.10
Other Specialists Per Capita	.31	.29	.28	.09
Total Physicians Per Capita	.12	.15	.16	.04
Hospital Beds Per Capita	-.38	-.44	-.44	-.45
Office Wage Rate	.79*	.27	.06	-.29

One asterisk denotes coefficient significantly different from zero at the 5% level (2-tail test); two asterisks denote coefficient significantly different from zero at 1% level (2-tail test).

TABLE 5-32

PLAN C: SIMPLE CORRELATION COEFFICIENTS BETWEEN CHARGES PER RVU IN COUNTIES AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1975	1976	1977	1978
General Practice				
Percentage of Population Living in Urban Areas	0.66**	0.52**	0.58**	0.51**
Per Capita Income	0.27	0.32	0.28	0.51**
Percentage of Population 65 and Older	-0.28	-0.21	-0.10	-0.39*
Percentage of Population 14 and Younger	0.03	0.06	0.001	0.19
Percentage of Population Black	0.32	0.31	0.40*	0.21
General Practitioners Per Capita	0.04	0.33	0.26	-0.13
Medical Specialists Per Capita	0.39*	0.25	0.37	0.42*
Surgical Specialists Per Capita	0.32	0.14	0.22	0.39*
Other Specialists Per Capita	0.44*	0.34	0.31	0.34
Total Physicians Per Capita	0.38*	0.27	0.33	0.36
Hospital Beds Per Capita	0.13	0.09	0.22	0.24
Office Wage Rate	-0.05	0.20	0.19	--
Medical Specialties				
Percentage of Population Living in Urban Areas	0.29	0.17	0.07	0.34
Per Capita Income	0.41	0.37	0.24	0.34
Percentage of Population 65 and Older	-0.43	-0.24	-0.22	-0.29
Percentage of Population 14 and Younger	0.13	0.08	0.22	0.22
Percentage of Population Black	0.11	0.02	0.09	0.26
General Practitioners Per Capita	-0.17	0.06	0.08	-0.22
Medical Specialists Per Capita	0.38	0.17	0.05	0.29
Surgical Specialists Per Capita	0.31	0.15	0.05	0.22
Other Specialists Per Capita	0.31	0.20	0.10	0.25
Total Physicians Per Capita	0.32	0.21	0.12	0.24
Hospital Beds Per Capita	-0.05	-0.15	-0.12	-0.17
Office Wage Rate	0.35	0.03	0.23	--
Surgical Specialties				
Percentage of Population Living in Urban Areas	0.48*	0.44*	0.22	0.12
Per Capita Income	0.51*	0.44*	0.10	0.05
Percentage of Population 65 and Older	-0.42*	-0.42	-0.19	-0.10
Percentage of Population 14 and Younger	0.25	0.39	0.12	-0.03
Percentage of Population Black	0.13	0.17	-0.03	-0.03
General Practitioners Per Capita	-0.04	-0.27	-0.20	0.12
Medical Specialists Per Capita	0.19	0.16	-0.08	-0.12
Surgical Specialists Per Capita	-0.03	0.06	-0.15	-0.22
Other Specialists Per Capita	0.18	0.20	0.06	0.01
Total Physicians Per Capita	0.15	0.15	-0.04	-0.05
Hospital Beds Per Capita	-0.15	-0.12	-0.25	-0.20
Office Wage Rate	0.26	0.22	-0.09	--

TABLE 5-32 (CONTINUED)

Characteristic	1975	1976	1977	1978
Other Specialties				
Percentage of Population Living in Urban Areas	-0.12	-0.06	-0.09	-0.01
Per Capita Income	0.06	-0.13	0.06	-0.02
Percentage of Population 65 and Older	-0.09	0.20	0.17	0.10
Percentage of Population 14 and Younger	0.10	-0.17	-0.33	-0.27
Percentage of Population Black	-0.28	-0.07	-0.15	-0.13
General Practitioners Per Capita	-0.02	0.59*	0.61	0.61
Medical Specialists Per Capita	-0.31	-0.24	-0.13	-0.18
Surgical Specialists Per Capita	-0.32	-0.12	-0.13	-0.20
Other Specialists Per Capita	-0.15	-0.10	-0.01	-0.08
Total Physicians Per Capita	-0.15	-0.07	-0.01	-0.07
Hospital Beds Per Capita	-0.41	-0.05	-0.03	-0.33
Office Wage Rate	0.01	-0.09	-0.06	--
Specialties Unknown				
Percentage of Population Living in Urban Areas	-0.63	0.09	0.28	0.48
Per Capita Income	-0.36	0.25	0.35	0.13
Percentage of Population 65 and Older	0.18	-0.20	-0.14	-0.16
Percentage of Population 14 and Younger	-0.08	0.14	-0.0001	-0.08
Percentage of Population Black	-0.22	-0.08	0.09	0.16
General Practitioners Per Capita	-0.03	0.03	0.06	0.13
Medical Specialists Per Capita	-0.25	0.05	0.27	0.18
Surgical Specialists Per Capita	-0.18	-0.003	0.22	0.17
Other Specialists Per Capita	-0.08	0.19	0.08	0.16
Total Physicians Per Capita	-0.14	0.16	0.20	0.16
Hospital Beds Per Capita	-0.20	-0.10	-0.07	0.16
Office Wage Rate	0.68	0.03	0.37	--
All Physicians				
Percentage of Population Living in Urban Areas	0.51**	0.45*	0.49**	0.53**
Per Capita Income	0.19	0.26	0.17	0.50**
Percentage of Population 65 and Older	-0.34	-0.28	-0.22	-0.53**
Percentage of Population 14 and Younger	0.12	0.23	0.18	0.36
Percentage of Population Black	0.24	0.32	0.31	0.16
General Practitioners Per Capita	-0.19	0.13	0.11	-0.25
Medical Specialists Per Capita	0.27	0.22	0.23	0.34
Surgical Specialists Per Capita	0.12	0.14	0.11	0.26
Other Specialists Per Capita	0.30	0.30	0.33	0.34
Total Physicians Per Capita	0.23	0.24	0.23	0.29
Hospital Beds Per Capita	-0.10	-0.10	-0.07	0.05
Office Wage Rate	0.25	0.35	0.02	--

One asterisk denotes coefficient significantly different from zero at .05 level; two asterisks denote coefficient significantly different from zero at .01 level (two-tailed test).

positive relationship between the equilibrium charge level in a market and the physician-population ratio in the market.* But there were no significant simple correlations between charge levels in any of the specialty groups and the numbers of physicians per capita in those specialty groups. The frequencies of positive and negative signs on the correlations, summarized in Table 5-29, are also inconsistent with the hypothesis except possibly in the Medical Specialties. Only 24 of the total of 48 signs on the correlations were positive.

Overall, Tables 5-30 - 5-32 suggest that charge levels may be higher in urban areas--as reflected by urban density, high per capita incomes, etc.--than in rural areas. But the pattern itself is not very strong. The general

TABLE 5-33

NUMBERS OF POSITIVE AND NEGATIVE SIGNS ON SIMPLE CORRELATIONS BETWEEN SPECIALTY CHARGES AND PHYSICIANS PER CAPITA IN THE SPECIALTIES

Specialty	Positive Signs	Significant Positive Signs	Negative Signs	Significant Negative Signs
General Practice	5	0	7	0
Medical Specialties	9	0	3	0
Surgical Specialties	4	0	8	0
Other Specialties	6	0	6	0

implications of the tables are that: (i) there is a good deal of variation in the simple correlates of charge levels over specialties and between Plans, and (ii) that none of the county socioeconomic and medical characteristics specified in the tables had a strong, simple relationship with charge levels.

* See Chapter III.

It may well be the case that simple correlations fail to show important associations that become apparent only when the effects of other variables are taken into account using multi-variate techniques. This possibility is explored at length in the subsequent chapters.

Charge Levels and Physician and Practice Characteristics

Tables 5-34, 5-35, and 5-36 give breakdowns of mean charges per RVU by a group of selected physician and practice characteristics for the first and last years of the study periods. The findings can be summarized as follows.

(i) General Practitioners exhibited the lowest charge levels in all three Plans, but no systematic patterns emerged for the other three specialty categories. Primary care practitioners tended to charge less than referral specialists, but in general this was only because General Practitioners had lower average charges than referral specialists. In Plan A, the mean charges of all primary care physicians were lower than those of referral physicians, but in Plans B and C, Internists and Pediatricians exhibited charge levels about as high as those of referral physicians.

(ii) Board-certified physicians had higher charges than non-certified physicians in all three Plans. Although the charge differences were statistically significant, they may have been due to the inclusion of General Practitioners among non-certified physicians.

(iii) The charge levels of foreign medical graduates were equal to or higher than those of U.S. medical graduates in all three Plans.

(iv) There were no systematic relationships between charge levels and the physician's sex.

(v) The youngest physicians had the highest charge levels and the oldest physicians had the lowest charge levels in all three Plans. This finding may also reflect specialty differences in charges, since General Practitioners tended to be older than other physicians.

(vi) There were no systematic relationships between charge levels and the physician's race.

(vii) In two of the three Plans, graduates of (U.S.) medical schools with the lowest research orientations had slightly lower charges than other physicians, but by and large there were no systematic relationships between charge levels and the research orientation of the physician's medical school.

(viii) Solo physicians tended to have the lowest charge levels, but they were not significantly lower than those of group physicians. In two Plans the highest charge levels were exhibited by physicians in expense-sharing arrangements. In two of the Plans physicians not in office-based practice (the "Other" category of type of practice) were also among those with the highest charge levels.

(ix) There were no systematic relationships between average payment lag (the time between claim filing and claim payment) and charge levels.

(x) There were no systematic relationships between charge levels and the physician's participation status. However, in Plan B physicians having only Medicare claims exhibited significantly lower charges than other physicians in the Plan.

(xi) Physicians with the highest ratios of amounts charged to amounts allowed had much higher charge levels than physicians with the lowest ratios of amounts charged to amounts allowed. The result is significant because it shows that, among different physicians, those with the highest charge levels are not necessarily those with the highest allowances.* Cross-

* More formally, the relationships described in the tables can be

sectionally at least, the result suggests further that restrictions on allowances need not lower or stabilize fee levels.* This finding is broadly compatible with some of the cross-sectional evidence, discussed above, which casts doubt on the hypothesis that charge levels are closely related to allowances. Even so, its primary importance is probably methodological. It indicates that cross-sectional estimates of the elasticity of charges with respect to allowances may very well underestimate the effects on average charge levels when allowances are raised over time.

Charge Inflation and Physician and Practice Characteristics

Table 5-37 shows the mean percentage rates of growth of charges for the physician samples of Plans A, B, and C over the study periods. The growth rates of charges are classified by the same set of physician and practice characteristics used in Tables 5-34 - 5-36. The results show that:

(i) General Practitioners' and Medical Specialists' charges tended to rise less rapidly than those of other physicians. For this reason primary care practitioners' charges rose less rapidly than those of referral specialists.

(ii) Within individual Plans there were certain large and

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represented in the form $p = a + b(p/A)$, where p is the amount charged and A is the amount allowed. From this it follows that $dA/dp = - ab/(p-a)^2$ and $dp/dA = - ab/(A-b)^2$. The tabled figures indicate that b is positive but they reveal nothing about the sign of a . Unless a is negative, $dA/dp \leqq 0$, which means that allowances do not increase with charge levels. Also observe that $dp/dA \leqq 0$ unless a is negative, which means that charges do not increase with allowances.

* See the preceding footnote. It is important to emphasize that the conclusion applies cross-sectionally rather than longitudinally. Even if charges are unresponsive to allowances in a cross-section of physicians, each individual physician may raise his/her charges in an effort to influence his or her particular allowances. This and related possibilities were explored using our longitudinal data base, and the results are presented in Chapter VI below.

TABLE 5-34

PLAN A PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973 Mean Amount Charged per RVU	1973 Std. Deviation of Amount Charged	1973 Number of Physicians	1976 Mean Amount Charged per RVU	1976 Std. Deviation of Amount Charged	1976 Number of Physicians
Specialty						
General Practice	1.91	0.39	75	1.97	0.42	96
Medical Specialties	1.98	0.43	205	2.37	0.49	281
Surgical Specialties	2.10	0.50	330	2.63	0.63	445
Other Specialties	2.02	0.39	142	2.79	0.73	192
Primary/Nonprimary Care Field						
General Practice	1.91	0.39	75	1.97	0.42	96
Internal Medicine	1.99	0.39	83	2.45	0.46	109
Pediatrics	1.82	0.41	65	2.02	0.32	93
Other Fields	2.08	0.47	529	2.68	0.65	716
Board Certification						
Certified	2.07	0.50	474	2.59	0.65	630
Not Certified	1.97	0.37	278	2.43	0.62	384
Country of Medical Education						
U.S.	2.03	0.46	560	2.53	0.65	732
Foreign	2.04	0.44	192	2.52	0.61	282
Sex						
Male	2.04	0.46	718	2.54	0.65	954
Female	1.94	0.33	34	2.42	0.59	60
Age in 1973						
35 and Younger	2.11	0.57	2	2.67	0.46	19
36-50	2.16	0.50	255	2.63	0.57	378
51-65	1.99	0.44	372	2.52	0.66	466
66 and Older	1.92	0.37	123	2.30	0.72	151
Race (U.S. Graduates Only)						
Black	2.13	0.39	12	2.54	0.51	17
Nonblack	2.03	0.47	548	2.53	0.66	715

TABLE 5-34 (Continued)

PLAN A PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973 Mean Amount Charged per RVU	1973 Std. Deviation of Amount Charged	1973 Number of Physicians	1976 Mean Amount Charged per RVU	1976 Std. Deviation of Amount Charged	1976 Number of Physicians
Research Orientation of Medical School*						
1	2.10	0.40	13	2.52	0.50	18
2	2.00	0.62	44	2.63	0.86	58
3	2.05	0.45	181	2.54	0.56	225
4	2.08	0.44	67	2.61	0.62	93
5	1.98	0.45	192	2.45	0.70	250
6	2.04	0.47	30	2.62	0.66	46
Type of Practice						
Solo	1.98	0.39	391	2.39	0.54	491
Partnership	2.15	0.64	95	2.61	0.61	141
Group	2.03	0.46	166	2.76	0.81	218
Arrangement	2.05	0.24	19	2.63	0.69	26
Other	2.18	0.52	65	2.58	0.62	107
Unknown	2.12	0.33	16	2.59	0.44	31
Participation Status (Private Business)**						
Participating	2.02	0.42	575	2.44	0.58	676
Nonparticipating	2.08	0.52	139	2.73	0.71	324
Indemnity Claims Only	2.07	0.74	38	2.32	0.57	14
Percent of Claims Submitted on Participating Basis (Physicians with no UCR Claims Excluded)						
Less than 50	2.09	0.50	152	2.69	0.69	383
50 to 75	2.26	0.31	9	2.67	0.32	10
75 to 90	2.19	0.60	13	2.41	0.40	11
90 or Higher	2.01	0.41	540	2.43	0.60	596
Average Lag Per Claim (All Business)						
Less than 50 Days	2.06	0.41	348	2.57	0.67	394
50 to 80 Days	2.04	0.44	225	2.51	0.59	370
80 Days or More	1.96	0.55	179	2.49	0.67	250

TABLE 5-34 (Continued)

PLAN A PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973 Mean Amount Charged per RVU	1973 Std. Deviation of Amount Charged	1973 Number of Physicians	1976 Mean Amount Charged per RVU	1976 Std. Deviation of Amount Charged	1976 Number of Physicians
Ratio of Amount Charged to Amount Allowed						
1.0	1.76	0.37	120	2.09	0.66	66
1.0+ to 1.1	1.94	0.41	176	2.20	0.42	194
1.1+ to 1.2	2.02	0.37	157	2.39	0.59	267
1.2+ to 1.3	2.08	0.33	102	2.61	0.49	208
1.3+ to 1.4	2.15	0.34	85	2.80	0.51	122
1.4+ to 1.5	2.30	0.48	62	2.97	0.82	62
1.5+	2.47	0.76	50	3.11	0.72	95

* 1 denotes lowest research orientation and 6 denotes highest research orientation.

** Physicians defined as participating if 5% or more of their claims were submitted on a participating basis.

TABLE 5-35

PLAN B PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973 Mean Amount Charged per RVU	1973 Std. Deviation of Amount Charged	1973 Number of Physicians	1976 Mean Amount Charged Per RVU	1976 Std. Deviation of Amount Charged	1976 Number of Physicians
Specialty						
General Practice	1.66	0.37	119	2.08	0.54	124
Medical Specialties	2.16	0.53	254	2.60	0.63	267
Surgical Specialties	2.09	0.55	425	2.77	0.61	456
Other Specialties	2.33	0.97	139	2.90	0.80	173
Primary/Nonprimary Care Field						
General Practice	1.66	0.37	119	2.08	0.54	124
Internal Medicine	2.14	0.40	91	2.60	0.49	95
Pediatrics	1.97	0.57	85	2.46	0.71	91
Other Fields	2.18	0.68	642	2.80	0.69	710
Board Certification						
Certified	2.16	0.63	535	2.76	0.67	584
Not Certified	2.00	0.64	402	2.53	0.68	436
Country of Medical Education						
U.S.	2.07	0.63	710	2.62	0.68	760
Foreign	2.16	0.66	227	2.80	0.69	260
Sex						
Male	2.08	0.62	897	2.66	0.69	972
Female	2.37	0.96	40	2.83	0.66	48
Age in 1973						
35 and Younger	2.26	0.15	3	2.83	0.54	12
36-50	2.20	0.67	352	2.81	0.67	420
51-65	2.05	0.60	403	2.63	0.68	413
66 and Older	1.96	0.63	179	2.38	0.66	175
Race (U.S. Graduates Only)						
Black	1.97	0.57	38	2.45	0.65	38
Nonblack	2.07	0.63	672	2.63	0.68	722

TABLE 5-35 (Continued)

Physician Trait/ Reimbursement Variable	1973 Mean Amount Charged per RVU	1973 Std. Deviation of Amount Charged	1973 Number of Physicians	1976 Mean Amount Charged per RVU	1976 Std. Deviation of Amount Charged	1976 Number of Physicians
Research Orientation of Medical School*						
1	1.95	0.54	43	2.44	0.62	43
2	2.01	0.50	25	2.63	0.60	26
3	2.02	0.53	406	2.60	0.69	432
4	2.17	0.50	49	2.82	0.69	58
5	2.27	0.60	29	2.74	0.62	33
6	2.15	0.69	121	2.69	0.70	130
Type of Practice						
Solo	2.05	0.62	617	2.56	0.62	636
Partnership	2.07	0.53	126	2.66	0.65	133
Group	2.09	0.37	48	2.86	0.65	53
Arrangement	2.31	0.60	26	3.02	0.52	30
Other	2.30	0.91	102	2.93	0.90	141
Unknown	2.15	0.45	18	2.98	0.75	27
Participation Status (Private Business)						
Participating	2.10	0.62	795	2.68	0.67	805
Nonparticipating	2.09	0.55	92	2.77	0.62	124
Medicare Claims Only	1.92	0.93	50	2.35	0.83	91
Average Lag Per Claim (All Business)						
Less than 50 Days	2.11	0.48	397	2.78	0.63	446
50 to 80 Days	2.05	0.68	390	2.64	0.69	299
80 Days or More	2.16	0.83	150	2.49	0.74	275
Ratio of Amount Charged to Amount Allowed						
1.0	1.90	0.85	39	2.03	0.86	30
1.0+ to 1.1	1.81	0.67	152	2.13	0.47	120
1.1+ to 1.2	1.86	0.37	221	2.33	0.49	234
1.2+ to 1.3	2.06	0.36	211	2.60	0.49	232
1.3+ to 1.4	2.22	0.38	125	2.85	0.50	158
1.4+ to 1.5	2.35	0.48	82	3.09	0.64	110
1.5+	2.74	1.02	107	3.38	0.71	136

* 1 denotes lowest research orientation and 6 denotes highest research orientation.

TABLE 5-36

PLAN C PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1975 AND 1978

Physician Trait/ Reimbursement Variable	1975 Mean Amount Charged per RVU	1975 Std. Deviation of Amount Charged	1975 Number of Physicians	1978 Mean Amount Charged Per RVU	1978 Std. Deviation of Amount Charged	1978 Number of Physicians
Specialty						
General Practice	2.20	0.56	100	2.65	0.73	95
Medical Specialties	2.54	0.46	260	3.00	0.59	265
Surgical Specialties	2.45	0.45	394	3.17	0.89	170
Other Specialties	2.54	0.87	130	3.04	0.59	392
Primary/Nonprimary Care Field						
General Practice	2.20	0.56	100	2.65	0.73	95
Internal Medicine	2.56	0.35	110	2.96	0.44	111
Pediatrics	2.46	0.56	97	2.95	0.74	101
Other Fields	2.49	0.57	577	3.09	0.68	615
Board Certification						
Certified	2.50	0.55	569	3.05	0.67	593
Not Certified	2.39	0.55	316	2.94	0.70	329
Country of Medical Education						
U.S.	2.45	0.56	807	2.99	0.67	842
Foreign	2.56	0.54	77	3.30	0.80	80
Sex						
Male	2.46	0.55	856	3.02	0.69	892
Female	2.56	0.68	28	2.91	0.54	30
Age in 1979						
35 and Younger	--	--	--	3.02	0.44	9
36-50	2.50	0.55	424	3.04	0.67	458
51-65	2.43	0.55	391	3.00	0.70	386
66 and Older	2.39	0.59	69	2.87	0.70	69
Race (U.S. Graduates Only)						
Black	2.59	0.39	28	3.63	0.69	29
Nonblack	2.45	0.56	779	2.96	0.65	813

TABLE 5-36 (Continued)

Physician Trait/ Reimbursement Variable	1975 Mean Amount Charged per RVU	1975 Std. Deviation of Amount Charged	1975 Number of Physicians	1978 Mean Amount Charged per RVU	1978 Std. Deviation of Amount Charged	1978 Number of Physicians
Research Orientation of Medical School*						
1	2.34	0.50	214	2.90	0.66	219
2	2.40	0.48	72	2.90	0.69	72
3	2.48	0.48	82	3.07	0.54	88
4	2.47	0.59	345	3.00	0.65	353
5	2.81	0.73	48	3.09	0.57	52
6	2.52	0.36	21	2.90	0.63	24
Type of Practice						
Solo	2.47	0.59	372	3.02	0.74	369
Partnership	2.43	0.45	212	2.99	0.54	220
Group	2.45	0.57	202	2.97	0.71	213
Arrangement	2.68	0.71	36	3.26	0.63	41
Other	2.42	0.58	46	3.03	0.72	60
Unknown	2.45	0.44	16	3.00	0.68	19
Average Lag Per Claim (All Business)						
Less than 50 Days	2.41	0.61	214	2.96	0.71	267
50 to 80 Days	2.42	0.44	335	3.10	0.68	355
80 Days or More	2.54	0.61	335	2.96	0.66	300
Ratio of Amount Charged to Amount Allowed						
1.0	2.28	0.95	34	2.83	0.72	137
1.0+ to 1.1	2.14	0.53	68	2.88	0.60	285
1.1+ to 1.2	2.42	0.43	191	3.05	0.51	205
1.2+ to 1.3	2.46	0.44	188	3.21	0.73	117
1.3+ to 1.4	2.48	0.51	109	3.11	0.76	54
1.4+ to 1.5	2.44	0.43	73	3.19	0.73	39
1.5+	2.62	0.66	221	3.27	0.90	85

* 1 denotes lowest research orientation and 6 denotes highest research orientation.

statistically significant differences between rates of charge inflation among physicians with different personal characteristics. But there were no systematic patterns across Plans indicating that rates of charge inflation were related to such characteristics as board certification status, country of medical education, the physician's sex, age, or race, and the research orientation of the medical school he or she attended.

(iii) In Plans A and B, the rate of charge inflation for group physicians was much higher than the rate for other physicians having known types of practice, but in Plan C the inflation rate for group physicians' charges was about average. Solo physicians' charges rose at average or below-average rates in all three Plans.

(iv) Nonparticipating physicians' charges rose moderately to substantially more than participating physicians' charges in Plans A and B. The rate of charge inflation was not systematically related to the average payment lag on physicians' claims.

(v) In Plans A and B, physicians with the lowest average ratios of charges to allowances exhibited rates of charge inflation that were moderately to considerably below average. In Plan C there was no clear relationship between the charge-allowance ratio and the rate of charge inflation.

For Plans A and B the results suggest two conclusions. First, physicians with the highest rates of charge inflation tended to have the highest average charges--and, as has been observed, they also had the highest charge-allowance ratios. This would imply a persistent disparity between the charge levels of high-charge and low-charge physicians, with the former having the highest growth rates of charges and the latter having the lowest.

Second, the results raise the possibility of a causal connection between

TABLE 5-37

PLAN A, B, AND C PHYSICIAN SAMPLES: PERCENTAGE CHANGES IN AMOUNTS CHARGED PER RVU, 1973-76/1975-78, CLASSIFIED BY SELECTED PHYSICIAN, REIMBURSEMENT, AND COUNTY CHARACTERISTICS

Physician Trait/ Reimbursement Variable	Percentage Changes in Charges Per RVU*		
	Plan A	Plan B	Plan C
Specialty			
General Practice	3.1	25.3	20.5
Medical Specialties	19.7	20.4	18.1
Surgical Specialties	25.2	32.5	29.4
Other Specialties	38.1	24.5	19.7
Primary/Nonprimary Care Field			
General Practice	3.1	25.3	20.5
Internal Medicine	23.1	21.5	15.6
Pediatrics	11.0	24.9	19.9
Other Fields	28.8	28.4	24.1
Board Certification			
Certified	25.1	27.8	22.0
Not Certified	23.4	26.5	23.0
Country of Medical Education			
U.S.	24.6	26.6	22.0
Foreign	23.5	29.6	28.9
Sex			
Male	24.5	27.9	22.8
Female	24.7	19.4	13.7
Age in 1973			
35 and Younger	26.5	25.2	--
36-50	21.8	27.7	21.6
51-65	26.6	28.3	23.5
66 and Older	19.8	21.4	20.1
Race (U.S. Graduates Only)			
Black	19.2	24.4	40.2
Nonblack	24.6	27.1	20.8
Research Orientation of Medical School**			
1	20.0	25.1	23.9
2	31.5	30.8	20.8
3	23.9	28.7	23.8
4	25.5	30.0	21.5
5	23.7	20.7	10.0
6	28.4	25.1	15.1

TABLE 5-37 (Continued)

Physician Trait/ Reimbursement Variable	Percentage Changes in Charges Per RVU* Plan A	Plan B	Plan C
Type of Practice			
Solo	20.7	24.9	22.3
Partnership	21.4	28.5	23.0
Group	36.0	36.8	21.2
Arrangement	28.3	30.7	21.6
Other	18.3	27.4	25.2
Unknown	22.2	38.6	22.4
Participating Status (Private Business)			
Participating	20.8	27.6	--
Nonparticipating	31.2	32.5	--
Medicare Claims Only	--	22.4	--
Average Lag Per Claim (All Business)			
Less than 50 Days	24.8	31.8	22.8
50 to 80 Days	23.0	28.8	28.1
80 Days or More	27.0	15.3	16.5
Ratio of Amount Charged to Amount Allowed			
1.0	18.8	6.8	24.1
1.0+ to 1.1	13.4	17.7	34.6
1.1+ to 1.2	18.3	25.3	26.0
1.2+ to 1.3	25.5	26.2	30.5
1.3+ to 1.4	30.2	28.4	25.4
1.4+ to 1.5	29.1	31.5	30.7
1.5+	25.9	23.4	24.8

* Percentage changes computed for 1973-76 in Plans A and B, for 1975-78 in Plan C.

** 1 denotes lowest research orientation and 6 denotes highest research orientation.

allowance levels and the rate of charge inflation. Specifically, they indicate: (i) that physicians may have desired or preferred allowance levels, and (ii) that physicians tend to raise their charges over time when allowances fall far enough below charge levels.* Hypotheses such as this are examined in detail in Chapter VI with the use of regression methods.

It should be emphasized here, though, that neither of the foregoing results appears to hold for physicians in Plan C. Thus, if there are links between the rates of physician charge inflation and either charge levels or allowance levels, the economic behavior underlying them evidently does not generalize to all physicians.

Physician Participation

Tables 5-38 through 5-43 list the percentages of physicians who participated in Plans A and B in 1973 and 1976, classified by various physician, practice, reimbursement, and county characteristics.** The results of our more thorough analysis of physician participation are presented in Chapter VIII. In that chapter we argue that under certain conditions participation rates will be lower the higher the levels of demands facing the practice, the higher the levels of practice costs, and the lower the levels of allowances. Variables associated with high levels of demands are, for example, proxies for physician quality (board certification, U.S. medical graduation, and possibly high charge levels) and measures of large county-level demands (high

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* Hadley and Lee (1978) advanced and tested a similar proposition.

** Table 5-40 gives only a limited number of county characteristics for Plan A physicians. This is because of the few counties in the Plan and the relatively little variation in county characteristics--i.e., numerous empty cells in the classifications of county characteristics.

TABLE 5-38

PLAN A PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1973 AND 1976*

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Percent of Physicians Participating	1976 Number of Physicians	1976 Percent of Physicians Participating
Specialty				
General Practice	69	92.75	95	80.00
Medical Specialties	192	74.48	279	63.08
Surgical Specialties	315	80.63	441	64.63
Other Specialties	138	82.61	185	75.14
Primary/Nonprimary Care Field				
General Practice	69	92.75	95	80.00
Internal Medicine	80	75.00	107	59.81
Pediatrics	61	83.61	93	74.19
Other Fields	504	79.37	705	66.24
Board Certification				
Certified	446	75.56	625	63.84
Not Certified	268	88.81	375	73.87
Country of Medical Education				
U.S.	534	76.40	725	62.34
Foreign	180	92.78	275	81.45
Sex				
Male	683	79.65	941	66.63
Female	31	100.00	59	83.05
Age in 1973				
35 and Younger	2	50.00	19	57.89
36-50	255	76.86	378	65.08
51-65	372	74.46	446	65.45
66 and Older	123	82.11	151	75.50
Race (U.S. Graduates Only)				
Black	12	91.67	17	94.12
Nonblack	522	76.05	708	61.58

TABLE 5-38 (Continued)

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Percent of Physicians Participating	1976 Number of Physicians	1976 Percent of Physicians Participating
Research Orientation of Medical School**				
1	13	92.31	18	88.89
2	44	72.73	57	52.63
3	171	76.61	224	57.14
4	65	64.62	92	56.52
5	183	82.51	248	69.35
6	28	75.00	44	56.82
Type of Practice				
Solo	375	82.67	487	68.99
Partnership	91	87.91	140	72.14
Group	158	64.56	214	55.14
Arrangement	19	100.00	25	68.00
Other	56	91.07	105	79.05
Unknown	15	86.67	29	72.41

* Physicians defined as participating if 5% or more of their claims were submitted on a participating basis. Physicians excluded if they had only indemnity claims.

** 1 denotes lowest research orientation and 6 denotes highest research orientation.

TABLE 5-39

PLAN A PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED FEE AND REIMBURSEMENT VARIABLES, 1973 AND 1976*

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Percent of Physicians Participating	1976 Number of Physicians	1976 Percent of Physicians Participating
Average Lag Per Claim (All Business)				
Less than 50 Days	331	83.99	390	76.41
50 to 80 Days	218	77.98	368	62.23
80 Days or More	165	76.97	242	61.57
Amount Charged Per RVU				
Less than $1.85	221	79.19	126	81.75
$1.85 to $2.35	361	84.76	271	75.28
$2.35 and Higher	132	71.21	603	61.19
Ratio of Amount Charged to Amount Allowed				
1.0	120	78.33	66	65.15
1.0+ to 1.1	176	80.68	194	81.96
1.1+ to 1.2	157	73.89	267	76.40
1.2+ to 1.3	102	77.45	208	64.42
1.3+ to 1.4	85	81.18	122	59.02
1.4+ to 1.5	62	83.87	62	48.39
1.5+	50	46.00	95	35.79

* Physicians defined as participating if 5% or more of their claims were submitted on a participating basis.

TABLE 5-40

PLAN A PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED COUNTY VARIABLES, 1973 and 1976*

County Socioeconomic Characteristic	1973 Percent of Physicians Participating	1973 Number of Physicians	1976 Percent of Physicians Participating	1976 Number of Physicians
Percentage of Population Urban				
High	78.2	702	62.4	997
Low	79.1	13	53.8	13
Percentage of Population Black				
Medium	79.3	599	62.9	852
Low	72.6	116	58.6	158
Number of Physicians per Capita				
High	79.3	599	62.1	909
Medium	72.6	116	63.8	101

* Physicians defined as participating if 5% or more of their claims were submitted on a participating basis

TABLE 5-41

PLAN B PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED PHYSICIAN TRAITS, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973		1976	
	Number of Physicians	Percent of Physicians Participating	Number of Physicians	Percent of Physicians Participating
Specialty				
General Practice	97	91.75	100	91.00
Medical Specialties	246	89.84	254	88.19
Surgical Specialties	416	89.42	431	85.61
Other Specialties	128	88.28	144	84.03
Primary/Nonprimary Care Field				
General Practice	97	91.75	100	91.00
Internal Medicine	88	85.23	92	83.70
Pediatrics	85	98.82	90	98.89
Other Fields	617	88.65	647	84.70
Board Certification				
Certified	520	87.31	543	82.87
Not Certified	367	92.92	386	91.97
Country of Medical Education				
U.S.	670	88.36	686	83.67
Foreign	217	93.55	243	95.06
Sex				
Male	853	89.33	884	86.31
Female	34	97.06	45	93.33
Age in 1973				
35 and Younger	3	66.67	12	75.00
36-50	352	89.49	420	82.86
51-65	403	85.86	413	80.39
66 and Older	179	73.74	175	66.29
Race (U.S. Graduates Only)				
Black	31	90.32	29	100.00
Nonblack	639	88.26	657	82.95

TABLE 5-41 (Continued)

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Percent of Physicians Participating	1976 Number of Physicians	1976 Percent of Physicians Participating
Research Orientation of Medical School*				
1	36	83.33	34	88.24
2	24	91.67	23	86.96
3	387	89.92	396	83.84
4	48	87.50	52	86.54
5	27	92.59	30	93.33
6	114	81.58	120	76.67
Type of Practice				
Solo	580	88.62	580	86.03
Partnership	126	91.27	127	84.25
Group	46	82.61	50	78.00
Arrangement	25	100.00	27	100.00
Other	93	94.62	118	93.22
Unknown	17	88.24	27	85.19

* 1 denotes lowest research orientation and 6 denotes highest research orientation.

TABLE 5-42

PLAN B PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED FEE AND REIMBURSEMENT VARIABLES, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Percent of Physicians Participating	1976 Number of Physicians	1976 Percent of Physicians Participating
Average Lag Per Claim (All Business)				
Less than 50 Days	383	91.12	426	88.73
50 to 80 Days	371	89.22	284	84.86
80 Days or More	133	86.47	219	84.93
Amount Charged Per RVU				
Less than $1.85	291	91.07	72	93.06
$1.85 to $2.35	381	88.19	212	89.62
$2.35 and Higher	215	90.23	645	84.96
Ratio of Amount Charged to Amount Allowed				
1.0	39	41.03	30	33.33
1.0+ to 1.1	152	88.82	120	74.17
1.1+ to 1.2	221	88.24	234	83.33
1.2+ to 1.3	211	89.10	232	83.19
1.3+ to 1.4	125	88.00	158	84.18
1.4+ to 1.5	82	85.37	110	74.55
1.5	107	75.70	136	75.74

TABLE 5-43

PLAN B PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED COUNTY VARIABLES, 1973 AND 1976

County Socioeconomic Characteristic	1973 Percent of Physicians Partici-pating	1973 Number of Physicians	1976 Percent of Physicians Partici-pating	1976 Number of Physicians
Per Capita Income				
Low	89.2	547	86.3	562
High	91.2	375	88.5	410
Percentage of Population Urban				
Low	100.0	28	87.1	31
Medium	84.4	147	75.2	157
High	90.7	745	89.7	783
Percentage of Population Black				
Low	90.4	333	87.5	352
Medium	88.6	140	82.9	164
High	90.1	444	88.5	452
Percentage of Population Aged 65 and Older				
Low	89.9	873	87.7	926
High	91.5	47	77.8	45
Number of Physicians Per Capita				
Low	100.0	2	--	0
Medium	100.0	29	90.9	33
High	89.7	889	87.1	938

Each county practice location treated as a separate observation.

per capita income, high degree of urbanization, etc.). High levels of costs might be associated with solo practice as opposed to other types (if there are economies of scale in large practices), and long payment lags. Low relative allowances might be denoted by high ratios of charges to allowances. Of course, some of these surrogate variables may also be related to physicians' tastes for participating, and the theory of participation does not predict the effects of tastes on participation decisions. For this reason--and the inherent limitations of descriptive summaries--the tables presented here cannot be expected to provide a clearcut confirmation or rejection of the theory.

Briefly, the tables show that:

(i) With one striking exception there are many similarities in the patterns of participation rates across Plans. The exceptional difference between the Plans is the marked decline in participation tendencies in Plan A over the study period--amounting to a 20%-30% drop in participation rates--compared with the stability of participation tendencies in Plan B. The cause of this difference is taken up in Chapter VIII.

(ii) In both Plans General Practitioners were more likely to participate than other physicians, although no other systematic relations between specialty and participation rates appeared. Primary care practitioners were generally more likely to participate than were referral specialists, but the rate of participation by Internists was below the average participation rate for referral specialists.

(iii) Board-certified physicians, U.S. medical graduates, and high-charge physicians were less likely than other physicians to participate in either Plan. This suggests that "high-quality" physicians tend to have the lowest participation rates. There were no very strong associations between participation rates and the research orientations of the medical schools attended by U.S. medical graduates, but there was some tendency for graduates of the most research-oriented ("highest-quality") medical schools to exhibit the lowest participation rates.

(iv) Female physicians were more likely to participate than males, and Black physicians appeared more likely to participate than whites, but the relationship between physician age and participation rates was mixed across Plans.

(v) Group physicians were less likely to participate than physicians in other types of practice, but there were no other obvious relationships between participation rates and type of practice. In both Plans physicians with the longest payment lags had the lowest propensities to participate.

(vi) No clear relationships holding across Plans emerged between participation rates and county characteristics.

(vii) There were no strong associations between participation rates and charge-to-allowance ratios in Plan B, but there were indications in Plan A that higher charge-to-allowance ratios were accompanied by low participation rates.

As remarked in Chapter II, the participation agreements in Plans A and B differed in one important respect--namely, that in Plan B, unlike Plan A, physicians who participated in UCR business were required to participate in partial service business as well. Since Plan B's partial service allowances were much lower than its UCR allowances, the participation decision for Plan B physicians was more complicated than the decision for Plan A physicians. This may account for some of the apparent disparities between the two Plans.

Characteristics of Medicare Physicians

Tables 5-44 and 5-45 are meant to give insights as to the attributes of Plan B physicians with large volumes of Medicare services. They show the mean percentages of Medicare RVUs for physicians, classified by the same set of attributes defined in the preceding section.

Physicians with the largest percentages of Medicare business tended to be General Practitioners* (or Internists), to be non-certified and U.S. medical graduates, to be male and relatively elderly, and to be solo practitioners. They practiced in counties that are predominantly rural, have low per capita incomes, few physicians per capita, and large percentages of the elderly and Black. They had generally low participation rates--partly because many had no private business claims--low charge levels, low charge-to-allowance ratios, and long payment lags. Most of the personal and locational attributes of these physicians are known to be associated with General Practice, and the data indicated that low charge levels and low charge-allowance ratios were also characteristic of General Practitioners.** The description of the "typical" Medicare physician in Plan B therefore appears to be heavily influenced by the fact that General Practitioners devoted larger shares of their business to Medicare than did other physicians.

Response of Output Composition to Charge and Allowance Levels

It has long been argued that changes in charge and allowance levels can

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* It has already been noted that General Practitioners tended to have larger shares of Medicare business than other physicians, and the various associations revealed by the two tables probably reflect that finding.

** See Appendix B for a classification of charge-to-allowance ratios by Specialty.

TABLE 5-44

PLAN B PHYSICIAN SAMPLE: MEAN PERCENTAGE OF MEDICARE RVUS PER PHYSICIAN, CLASSIFIED BY SELECTED PHYSICIAN, FEE, AND REIMBURSEMENT VARIABLES, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973			1976		
	Mean Percent of Medicare RVUs	Std. Deviation of Percentage	Number of Physicians	Mean Percent of Medicare RVUs	Std. Deviation of Percentage	Number of Physicians
Specialty						
General Practice	72.7	26.5	119	78.3	22.8	124
Medical Specialties	37.1	32.8	254	48.0	36.5	267
Surgical Specialties	32.8	29.9	425	44.4	32.8	456
Other Specialties	29.4	30.4	139	40.9	35.3	173
Primary/Nonprimary Care Field						
General Practice	72.7	26.5	119	78.3	22.8	119
Internal Medicine	53.7	24.3	91	70.3	15.6	95
Pediatrics	.9	5.3	85	4.2	16.6	91
Other Fields	35.0	30.6	642	46.6	33.6	710
Board Certification						
Certified	35.2	31.3	535	46.0	34.4	584
Not Certified	42.9	35.0	402	52.6	35.6	436
Country of Medical Education						
U.S.	41.1	33.8	710	51.8	35.5	760
Foreign	30.3	29.3	227	40.4	32.1	260
Sex						
Male	39.0	32.9	897	49.8	34.7	972
Female	28.0	37.2	40	29.4	37.0	48
Age in 1973						
35 and Younger	41.0	35.9	3	52.2	32.9	12
36-50	35.3	30.8	352	45.6	33.0	420
51-65	35.7	32.2	403	46.8	35.4	413
66 and Older	51.7	36.7	179	61.3	36.4	175
Race (U.S. Graduates Only)						
Black	42.4	41.5	38	49.1	41.5	38
Nonblack	41.1	33.4	672	51.9	35.2	722

TABLE 5-44 (Continued)

Physician Trait/ Reimbursement Variable	1973 Mean Percent of Medicare RVUs	1973 Std. Deviation of Percentage	1973 Number of Physicians	1976 Mean Percent of Medicare RVUs	1976 Std. Deviation of Percentage	1976 Number of Physicians
Research Orientation of Medical School*						
1	41.4	39.3	43	49.3	39.2	43
2	44.7	36.2	25	51.9	35.9	26
3	40.4	33.3	406	51.3	35.2	432
4	36.3	31.2	49	51.6	36.2	58
5	33.1	32.8	29	47.5	33.3	33
6	46.6	33.6	121	54.4	35.1	130
Type of Practice						
Solo	42.3	33.4	617	52.9	34.5	636
Partnership	32.4	31.5	126	40.1	34.9	133
Group	30.8	29.4	48	39.4	31.3	53
Arrangement	27.5	30.3	26	35.7	33.9	30
Other	29.5	32.2	102	46.9	37.3	141
Unknown	37.8	32.6	18	41.7	29.4	27
Participation Status (Private Business)						
Participating	33.1	29.9	795	41.7	32.4	805
Nonparticipating	52.0	30.9	92	58.0	30.9	124
Average Lag Per Claim (All Business)						
Less than 50 Days	32.7	31.9	397	39.3	33.9	446
50 to 80 Days	41.1	31.8	390	47.2	30.9	299
80 Days or More	47.3	36.8	150	66.2	34.7	275
Amount Charged Per RVU						
Less than $1.85	47.4	36.4	318	64.3	38.4	97
$1.85 to $2.35	35.6	30.6	395	56.0	34.8	239
$2.35 and Higher	31.0	29.6	224	44.2	33.6	684
Ratio of Amount Charged to Amount Allowed						
1.0	60.0	0.47	39	59.5	0.48	30
1.0+ to 1.1	49.6	0.36	152	58.6	0.37	120
1.1+ to 1.2	47.6	0.32	221	53.9	0.35	234
1.2+ to 1.3	34.6	0.30	211	50.2	0.34	232
1.3+ to 1.4	32.5	0.29	125	43.0	0.34	158
1.4+ to 1.5	27.5	0.28	82	42.0	0.33	110
1.5+	20.2	0.23	107	39.3	0.31	136

* 1 denotes lowest research orientation and 6 denotes highest research orientation.

TABLE 5-45

PLAN B PHYSICIAN SAMPLE: MEAN PERCENTAGE OF MEDICARE RVUS PER PHYSICIAN, CLASSIFIED BY SELECTED COUNTY VARIABLES, 1973 AND 1976

County Socioeconomic Characteristic	1973			1976		
	Mean Percent of Medicare RVUs	Std. Deviation of Percentage	Number of Physicians	Mean Percent of Medicare RVUs	Std. Deviation of Percentage	Number of Physicians
Per Capita Income						
Low	44.3	34.2	580	55.6	34.6	625
High	31.0	32.8	392	38.4	35.6	438
Percentage of Population Urban						
Low	61.5	36.6	35	67.0	35.1	36
Medium	51.2	34.2	157	58.2	34.9	173
High	35.5	33.2	778	45.8	35.8	853
Percentage of Population Black						
Low	31.5	32.3	344	39.6	35.3	375
Medium	39.2	34.6	146	47.1	35.9	175
High	44.1	34.6	477	55.4	35.2	509
Percentage of Population Aged 65 and Older						
Low	37.5	33.8	915	47.3	37.8	1,009
High	63.8	32.8	55	71.9	33.2	53
Number of Physicians Per Capita						
Low	96.6	4.0	3	--	--	0
Medium	66.2	30.5	35	76.2	27.6	40
High	37.8	33.9	932	47.5	35.9	1,022

Each county practice location treated as a separate observation.

affect the composition of physician's outputs. According to the standard theory of the firm, a rise in the average revenue for output A with respect to the average revenue for output B should induce the (profit-motivated) firm to substitute output A for output B in its production planning. As a result, the structure of practice reimbursement might be expected to stimulate the production of services that are relatively profitable and to discourage the production of services that are relatively unprofitable.

This hypothesis is explored in Tables 5-46 - 5-48. The tables were constructed as follows. First, three specialties--General Practice, Internal Medicine, and General Surgery--were chosen from the Plan physician files. The specialties were chosen partly because they are major specialties and partly because they were represented in the files by many physicians. Next, a group of procedures was selected for each of the specialties. The procedures were chosen so that they were common to the particular specialty, and, in fact, produced by all physicians in the specialty subsamples. The numbers of procedures are shown in parentheses in the tables.

The volume of services for each procedure was then converted to RVUs, and the average amounts charged and allowed per RVU were also computed for each procedure. Finally, the annual and four-year growth rates of procedure-specific outputs, charges, and allowances were calculated, and simple correlations were estimated between the growth rates of outputs and the growth rates of charges and allowances. The correlations are presented in the tables.

If the hypothesis that physicians substitute more profitable outputs for less profitable outputs is valid, one would tend to expect the correlations to be positive. That is, when the growth rates of procedure-specific average revenues (as measured by charges or allowances per RVU) increase, one would tend to expect the volumes of services associated with those average revenues to increase as well.

The tables indicate that the hypothesis is not well supported by the data. Of the 72 correlations for annual growth rates, only 35 were positive. Among the 24 correlations for four-year growth rates, only 12 were positive. On these grounds it cannot be concluded that changes in relative average revenues among procedures had a strong impact on the composition of procedures produced by the sample physicians. A rise in the amount charged or allowed for a given procedure was about as likely to be associated with a reduction in the output of that procedure as it was with an increase.

A further test was carried out in Plan B for changes in the composition of physicians' Medicare and private business outputs with respect to changes in relative charges and allowances per RVU. The findings are shown in Table 5-49. This table shows the estimated elasticities of the ratio of Medicare RVUs to private business RVUs with respect to the ratio of Medicare allowances (and amounts paid) to private business allowances (and amounts paid). If the substitution hypothesis is correct, the elasticities should be predominantly positive, indicating that a rise in Medicare average revenues vis-a-vis private business average revenues induces a substitution of Medicare outputs for private business outputs.

Again, the findings do not support the hypothesis. Among the 32 elasticities, only 14 are positive, and the results seem to indicate that physicians' relative outputs of Medicare and private business services in Plan B were not sensitive to relative reimbursement levels.

Of course, the tests are not conclusive. Chiefly, they fail to take

TABLE 5-46

PLAN A PHYSICIAN SAMPLE: SIMPLE CORRELATION COEFFICIENTS BETWEEN GROWTH RATES OF RVUS PER PHYSICIAN AND GROWTH RATES OF (1) AMOUNTS CHARGED PER RVU AND (2) AMOUNTS ALLOWED PER RVU FOR PROCEDURES PERFORMED IN SELECTED SPECIALTIES, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business/ Growth Rate of:	General Practice		Internal Medicine		General Surgery	
			1973-74			
UCR						
Charge/RVU	-0.39**	(29)	0.36	(20)	-0.15	(31)
Allowance/RVU	-0.31	(29)	0.07	(20)	-0.16	(31)
			1974-75			
UCR						
Charge/RVU	-0.08	(33)	0.14	(25)	0.24	(33)
Allowance/RVU	-0.02	(33)	0.05	(25)	-0.26	(33)
			1975-76			
UCR						
Charge/RVU	-0.02	(35)	-0.11	(27)	0.13	(37)
Allowance/RVU	-0.06	(35)	-0.11	(27)	-0.05	(37)
			1973-76			
UCR						
Charge/RVU	-0.19	(28)	-0.39*	(20)	-0.11	(32)
Allowance/RVU	-0.27	(28)	-0.62***	(20)	-0.14	(32)

Number of observations (procedures) in parentheses. One, two, and three asterisks denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests).

TABLE 5-47

PLAN B PHYSICIAN SAMPLE: SIMPLE CORRELATION COEFFICIENTS BETWEEN GROWTH RATES OF RVUS PER PHYSICIAN AND GROWTH RATES OF (1) AMOUNTS CHARGED PER RVU AND (2) AMOUNTS ALLOWED PER RVU FOR PROCEDURES PERFORMED IN SELECTED SPECIALTIES, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business/ Growth Rate of:	Specialty					
	General Practice		Internal Medicine		General Surgery	
			1973-74			
UCR						
Charge/RVU	-.47**	(27)	.57**	(18)	.08	(36)
Allowance/RVU	-.10	(27)	.49**	(18)	.27	(36)
Medicare						
Charge/RVU	-.05	(24)	.24	(23)	-.14	(41)
Allowance/RVU	-.29	(24)	.23	(23)	-.20	(41)
			1974-75			
UCR						
Charge/RVU	.02	(26)	-.14	(18)	.08	(37)
Allowance/RVU	.14	(26)	.26	(18)	.05	(37)
Medicare						
Charge/RVU	.30	(27)	-.15	(24)	.02	(43)
Allowance/RVU	.20	(27)	.03	(24)	.12	(43)
			1975-76			
UCR						
Charge/RVU	.46**	(27)	-.18	(20)	-.13	(36)
Allowance/RVU	.33*	(27)	-.26	(20)	-.29	(36)
Medicare						
Charge/RVU	-.06	(25)	-.18	(26)	.16	(40)
Allowance/RVU	-.11	(25)	-.37	(26)	-.09	(40)
			1973-76			
UCR						
Charge/RVU	.31	(25)	.02	(17)	.40**	(35)
Allowance/RVU	.51***	(25)	.27	(17)	.59***	(35)
Medicare						
Charge/RVU	.05	(22)	-.33	(25)	-.12	(40)
Allowance/RVU	.11	(22)	-.36	(25)	-.21	(40)

Number of observations (procedures) in parentheses. One, two, and three asterisks denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests).

TABLE 5-48

PLAN C PHYSICIAN SAMPLE: SIMPLE CORRELATION COEFFICIENTS BETWEEN GROWTH RATES OF RVUS PER PHYSICIAN AND GROWTH RATES OF (1) AMOUNTS CHARGED PER RVU AND (2) AMOUNTS ALLOWED PER RVU FOR PROCEDURES PERFORMED IN SELECTED SPECIALTIES, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business/ Growth Rate of:	General Practice	Internal Medicine	General Surgery
		1975-76	
UCR			
Charge/RVU	-0.06 (31)	0.00 (25)	-0.11 (35)
Allowance/RVU	-0.06 (31)	0.02 (25)	-0.04 (35)
		1976-77	
UCR			
Charge/RVU	-0.27 (35)	0.04 (27)	0.20 (40)
Allowance/RVU	-0.24 (35)	-0.05 (27)	0.20 (40)
		1977-78	
UCR			
Charge/RVU	0.10 (35)	0.49** (26)	0.04 (38)
Allowance/RVU	0.04 (35)	0.36* (26)	-0.11 (38)
		1975-78	
UCR			
Charge/RVU	-0.05 (29)	0.18 (24)	0.49*** (33)
Allowance/RVU	-0.10 (29)	0.08 (24)	0.51*** (33)

Number of observations (procedures) in parentheses. One, two, and three asterisks denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests).

TABLE 5-49

PLAN B PHYSICIAN SAMPLE: RESPONSES OF COMPOSITION OF PRIVATE AND MEDICARE PRODUCTION TO STRUCTURE OF REIMBURSEMENT. ELASTICITIES OF (MEDICARE RVUS/PRIVATE BUSINESS RVUS) WITH RESPECT TO (MEDICARE AMOUNT ALLOWED PER RVU/PRIVATE BUSINESS AMOUNT ALLOWED PER RVU) AND (MEDICARE AMOUNT PAID PER RVU/PRIVATE BUSINESS AMOUNT PAID PER RVU), CLASSIFIED BY SPECIALTY AND YEAR[a]

Elasticity of (Medicare RVUs/ Private Business RVUs) with Respect to:	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1973		
Medicare Allowance Per RVU/Private Business Allowance Per RVU	-1.33** (0.62)	-0.23 (0.50)	-0.05 (0.40)	-1.42*** (0.45)
Medicare Payment Per RVU/Private Business Payment Per RVU	-0.15 (0.34)	-0.15 (0.34)	0.79*** (0.23)	-0.39 (0.28)
		1974		
Medicare Allowance Per RVU/Private Business Allowance Per RVU	-0.91 (0.62)	1.20** (0.48)	0.21 (0.39)	-1.92*** (0.47)
Medicare Payment Per RVU/Private Business Payment Per RVU	-1.16** (0.46)	1.23*** (0.40)	1.21*** (0.27)	-0.85** (0.33)
		1975		
Medicare Allowance Per RVU/Private Business Allowance Per RVU	-0.09 (0.69)	-0.30 (0.65)	2.15*** (0.42)	-0.82 (0.52)
Medicare Payment Per RVU/Private Business Payment Per RVU	-0.56 (0.60)	0.21 (0.45)	2.31*** (0.25)	-0.51 (0.34)

TABLE 5-49 (Continued)

Elasticity of (Medicare RVUs/ Private Business RVUs) with Respect to:	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1976		
Medicare Allowance Per RVU/Private Business Allowance Per RVU	0.61 (0.62)	1.68*** (0.55)	1.24*** (0.39)	-0.93* (0.50)
Medicare Payment Per RVU/Private Business Payment Per RVU	0.19 (0.48)	0.72 (0.46)	1.53*** (0.24)	-1.37*** (0.42)

[a]Estimated from simple regressions. Only those physicians with positive numbers of Medicare RVUs and positive numbers of private business RVUs included in the sample. Standard errors are in parentheses.

One, two, and three asterisks denote significance at the 10%, 5%, and 1% levels, respectively.

account of the impact of patient demands on service outputs. Physicians may wish to shift their output compositions to more profitable levels, but when the demands for the relatively profitable services are not forthcoming, the shifts either cannot be made or cannot be made completely. Nevertheless, if physicians are profit-motivated one should expect to see stronger results than those indicated in the tables. The most immediate explanations for the results are that physicians tend not to be strongly profit-motivated and/or that the observed outputs of services were heavily influenced by patient demands.*

Summary

The material presented in this chapter gives an overview of the economic behavior of physicians in the three study Plans. Although a number of issues concerning reimbursement policy were examined, it should be kept in mind that descriptive tabulations are not necessarily conclusive for testing policy-relevant hypotheses. Associations between economic variables may fail to appear, or specious associations may appear, because of the influence of omitted variables that cannot be included in simple data classifications. Subject to this qualification, the major implications of the findings can be drawn together as follows.

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* It is difficult to predict the outcomes of the tests under the assumption that physicians seek target net incomes and can generate demands. If physicians can generate demands, it would be hard to argue that the observed outputs reflect patient-originated demands. Hence, if actual incomes are less than the target amounts one would expect to see strong positive associations between changes in average revenues and shifts to higher-income compositions of services. On the other hand, if actual physician incomes are close to or higher than the targets, output structures should not be sensitive to small changes in income opportunities, and there are no reasons to posit any systematic associations between output compositions and small changes in relative average revenues.

The expected patterns of charge inflation appeared in all three Plans, although the growth rates of charges and physician average revenues seemed to be about the same as, or slightly higher than, rises in metropolitan living costs. In Plan B, the only Medicare carrier among the three Plans, the growth rates of Medicare charges and allowances were lower than the rise in living costs. This was apparently due to the Economic Stabilization Program. There were no Plan-originated controls on charges or allowances in private business, and the ESP had no discernible impact on private business charges or allowances.

Evidence on the validity of the physician-induced-demand hypothesis was mixed. In Plan B there were large increases in Medicare output per physician between 1973 and 1974. Since Medicare charges and allowances grew at rates well below Plan averages between these two years, the result is consistent with demand generation in the Medicare line of business. However, there were declines in private business output per physician between the same two years--and, in fact, throughout the study period. Thus, the ESP or other unobservable factors appeared to induce a shift away from private business into Medicare business, and there was no evidence of a "spill-over" of demand generation in the private lines. This result is either inconsistent with the physician-induced-demand hypothesis, or it indicates that physicians' ability to generate demands is quite limited. Moreover, in all three Plans there was no significant evidence of positive correlations between charge levels and physician-population ratios, although such correlations are predicted by the physician-induced-demand hypothesis.

The findings on price discrimination across lines of business were mixed as well. In Plan C, charge levels in the two private lines were essentially identical. In Plan A, there were some indications that UCR charges were higher than indemnity charges, but on the order of 3%-5% or less. In Plan B, there were also minor suggestions of charge differences across the private lines of business, but the only important charge differentials occurred between Medicare and the private lines. At the end of the study period, Medicare charges were substantially lower than private business charges except among the non-medical, non-surgical specialties. In the non-medical, non-surgical fields, Medicare charges were markedly higher than those in private business. Therefore, on balance, the results indicated negligible degrees of price discrimination across the private lines, but probable price discrimination in favor of Medicare patients vis-a-vis private patients.

There was no evidence that the frequency of updating Plan allowances affected the growth rates of charges. In all three Plans, charge levels in fee schedule business grew about as rapidly as--and in some cases more rapidly than--those in UCR business, despite the fact that UCR allowances were updated annually and most of the Plans' fee schedules were not updated during the study periods.

In private business, there was no evidence that allowance levels affected charge levels. This result is compatible with the hypothesis--suggested by the essential absence of price discrimination--that physicians set a single overall charge level for their private business. Somewhat surprisingly, there were no indications that the physician's dependence on fee schedule business, where allowances were typically one-third or more lower than those in UCR business, was related to his charge levels. This may imply that fee schedule business represents a small share of the total gross income of most physicians, including income derived from business we were not able to observe.

The relatively weak effect of allowances on charges was reinforced by the finding that physicians with the highest average charge levels had the highest ratios of charges to allowances. If charges were closely related to allowances, one would expect high-charge physicians to have about the same ratios of charges to allowances as low-charge physicians--i.e., high allowances would imply high charges and low allowances would imply low charges.

On the other hand, the behavior of Medicare charges in Plan B appeared to be at variance with many of these inferences. Physicians evidently did tend to set different charge levels for Medicare and private-business patients, and the fact that Medicare allowances differed from UCR allowances (depending on specialty) suggests that it may have been the underlying cause. The different growth rates of Medicare and private business charge levels also suggests that restrictions on Medicare allowances dampened the inflation rate of Medicare charges.

Thus, the evidence implies that allowance restrictions in Medicare restrained Medicare charge levels and Medicare charge inflation, but that the allowance structure in the Plans' private business had no significant impact on either private charge levels or private charge inflation. Apparently Medicare patients represented a sufficiently large and price-sensitive submarket that physicians in Plan B were willing to offer such patients lower prices because of the out-of-pocket consequences to such patients of charging them the same fee as private patients.

With respect to physician participation, the most significant finding was that "high-quality" physicians--as measured by board certification, U.S. medical school graduation, and above-average charge levels--had lower participation rates than other physicians. This finding indicates that the relatively

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lower average revenues associated with participation probably attract fewer "high-quality" than "low-quality" physicians into participation agreements. Presumably, the result also holds for acceptance of benefit assignment under Medicare and participation in the states' Medicaid programs.

There appeared to be little empirical support for the proposition that physicians' output compositions are highly sensitive to changes in relative charge and allowance levels. Rises in procedure-specific charges and allowances seemed about as likely to be associated with reductions in the outputs of those precedures as they were with increases. This finding can be interpreted as showing that observed outputs of procedures are strongly influenced by patient demands (or physicians' perceptions of the appropriate treatments), that physicians are not strongly income motivated, or that reactions to changes in relative revenues occur very slowly.

Finally, as much of the discussion in this chapter has shown, there were important variations in physicians' behavior across Plans and across specialties within Plans. Regarding the inter-Plan differences, it may be that regional differences in physicians' business practices, perceptions of appropriate medical care, educational backgrounds, or tastes account for the anomalies, but it is more difficult to speculate on what produced the differences across specialties. In any event, the existence of these differences means that caution must be exercised in making generalizations about the nature of "physicians'" economic behavior.

CHAPTER VI

PHYSICIAN PRICING BEHAVIOR: SINGLE-EQUATION REGRESSION ANALYSES USING POOLED CROSS-SECTIONAL AND LONGITUDINAL DATA

This chapter addresses several issues bearing on charge-setting behavior by physicians in the three study Plans. The issues concern:

(i) The hypothesis that physicians attempt to raise their future allowance levels in fee screen (UCR and Medicare) business by inflating their current charge levels. We call this the "charge-allowance inflation hypothesis."

(ii) The effects of reimbursement characteristics such as allowances, participation status, Plan area designations, and the average lag between claim filing and claim payment on physicians' charge levels.

(iii) The hypothesis that physicians generate demands in order to achieve target net incomes.

(iv) The relationships between charge levels and physician, practice, and patient characteristics.

(v) The relationships between charge levels and county socioeconomic and medical characteristics.

The analyses of these issues were carried out using regression equations estimated by ordinary least squares. Although this approach is generally more robust than the descriptive techniques used in Chapter V, the equations themselves should properly be regarded as reduced-form equations.* Accordingly, it should be emphasized that the regression coefficients are not structural

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*Since the approach followed in this chapter is basically descriptive, no attempt was made to specify the general structural model(s) underlying all variants of the reduced-form equations that were estimated. Chapter VII describes one such model and presents simultaneous-equations estimates of the model. However, the regression results contained in this chapter are not necessarily reduced-form equations from that particular model.

coefficients. That is, they cannot be interpreted as revealing separately the effects of demand and supply influences on charge levels or the growth rate of charges. However, like any reduced-form equations, they can be used for predictive purposes. In addition, in some cases--e.g., evaluating the physician-induced-demand-target-income hypothesis--they can be used for testing behavioral propositions.

Two sets of equations were specified in order to explore the issues listed above. The first set was intended primarily for investigating physicians' intertemporal pricing behavior. The second set was meant chiefly for examining cross-sectional variation in charge levels. The specifications of the two sets of equations are discussed in the next two sections. The empirical findings are described thereafter.

Specification of the Equations: Intertemporal Pricing Behavior

In Chapter III we discussed the hypothesis that fee screen reimbursement such as is used in UCR and Medicare business is inherently inflationary. Essentially the argument holds that fee screen reimbursement gives physicians strong income incentives to raise their charge levels over time. That is, when physicians participate in UCR business or accept Medicare assignment, their current average revenues are just the allowance levels set by the Plan. Hence, to increase their average revenues from this year to next, participating and assignment physicians have economic motives for attempting to raise next year's allowances. Under fee screen reimbursement systems, next year's allowances are the Level 1 screens for most physicians--i.e., this year's median, modal, or listed fees. As a result, most physicians can raise their allowances between this year and next by raising their charge levels from last year to this. Moreover, if all physicians behave in the same way, Level 2 screens also increase between this year and next. Therefore, by maintaining high growth rates of charges, participating and assignment physicians will ordinarily succeed in raising their allowances and average revenues from year to year.

In this form the argument applies only to participating and assignment physicians. But nonparticipating and nonassignment physicians may also have incentives to raise their charges under fee screen reimbursement systems. This is so because the net price of services to patients does not rise as rapidly as charges whenever the Plan permits allowances to rise at roughly the same rate as charges. Thus, nonparticipating and nonassignment physicians may be able to raise their charge levels without being penalized by significant losses of demand. And, if this is the case, they have incentives to raise their charge levels, given costs, because to do so raises their revenues and net incomes.

To illustrate the argument, let p stand for the physician's charge level, A his allowance level, B the average amount paid by the Plan for his services, and t the year of observation. Suppose the amount paid by the Plan, B_t, is a fixed or approximately fixed proportion, r, of allowances--that is, $B_t = rA_t$. Then the net price to patients, say p_t^N, is

$$p_t^N = p_t - B_t = p_t - rA_t, \; 0 \leq r \leq 1,$$

and, if the annual change in allowances $A_t - A_{t-1}$ equals the annual change in charges $p_t - p_{t-1}$,

$$\begin{aligned} p_t^N - p_{t-1}^N &= p_t - rA_t - (p_{t-1} - rA_{t-1}) \\ &= p_t - p_{t-1} - r(A_t - A_{t-1}) \\ &= (1-r)(p_t - p_{t-1}) \end{aligned}$$

with $p_t^N - p_{t-1}^N$ approaching zero as r approaches unity. Assuming that the quantity of services demanded is a function of net price, say $q(p_t^N)$, the annual change in the physician's total revenue is

$$p_t q(p_t^N) - p_{t-1} q(p_{t-1}^N) = p_t q[p_{t-1}^N + (1-r)(p_t - p_{t-1})] - p_{t-1} q(p_{t-1}^N).$$

The expression $p_{t-1}^N + (1-r)(p_t - p_{t-1}) = p_t$ when $r = 0$, and it tends to p_{t-1}^N as r tends to one. Accordingly the fall in quantity demanded as the physician raises his/her charge level from p_{t-1} to p_t is $q(p_t) - q(p_{t-1})$ when $r = 0$, and it approaches zero as r tends to one. Thus, for realistic values of r--say, about .8 as in the Medicare program--the physician may be able to raise his/her charge level with minimal losses of patients and substantially increase his/her total revenue. Otherwise, of course, the effect on total revenue depends on the price elasticity of the demand function $q(p_t^N)$. For example, if this demand function is price elastic, an increase in charges would reduce total revenue in year t.

In essence, fee screen reimbursement lowers the elasticity of the physician's average revenue function. In the case where r is close to unity, the average revenue function has a near-zero elasticity regardless of the elasticity of the underlying "uninsured" or net price demand function $q(p_t^N)$. In these circumstances it pays the physician to raise his/her charges from year to year if by so doing he can raise his allowances at a high enough rate. Or to put the argument the other way around, it pays the nonparticipating or nonassignment physician (just as it pays the participating or assignment physician) to try to maintain a high rate of growth of allowances because it enables him to raise his net income.

It should be stressed though that the participating or assignment physician's average revenue depends only on the Plan's allowances. The average revenue of the nonparticipating or nonassignment physician depends on the underlying demand function for his services as well as on the Plan's allowances. For this reason, we conjecture that the participating or assignment physician has stronger and more direct incentives to attempt to raise his allowances than the nonparticipating or nonassignment physician. This conjecture was used in the empirical tests described below.

Whether applied to participating/assignment physicians or to nonparticipating/nonassignment physicians, the charge-allowance inflation hypothesis postulates that physicians have desired, preferred, or planned allowances in year t+1 which they set in year t. It also postulates that, assuming actual allowances are updated annually, an increase in the desired, preferred, or planned allowance level induces an increase in the physician's charge level in year t. We tested this hypothesis using three different specifications of physicians' intertemporal pricing behavior. We set them forth using the following notation.

t = year of observation

A^d_{t+1} = desired allowance per RVU in year t+1 (established in year t

A_t = actual or realized allowance in year t

p_t = amount charged per RVU in year t

X_t = vector of exogenous variables in year t

The first of the three specifications employs a simple lagged adjustment process. It states that:

(1) $$p_t = a_o + a_1 A^d_{t+1} + X_t B$$

(2) $$A_t - A_{t-1} = k(A^d_t - A_{t-1}),$$

where a_o, a_1, and k are scalar coefficients and B is a vector of coefficients. In equation (1) it is assumed that the physician sets a level of desired allowances for year t+1 before he/she determines a charge level in year t. Therefore, current charges depend on desired allowances in t+1 and on a set of exogenous variables represented by the vector X_t. If the charge-allowance hypothesis is true, an increase in next year's desired allowances A^d_{t+1} induces an increase in this year's charges p_t. Hence, the coefficient a_1 on A^d_{t+1} is positive if the charge-allowance inflation hypothesis is true. Equation (2) defines a partial adjustment process in which the difference between the current desired allowance and the lagged actual allowance may be only partly translated into the change between actual allowances in t and t-1.

The reaction coefficient k should be positive, and it is unity if the current actual and desired allowances are equal. However, the value of k depends on the Plan's Level 1 and Level 2 screens, and to this extent it is beyond the physician's control. The value exceeds unity if A_t is larger than A^d_t, and it is less than unity if A_t is less than A^d_t. Thus, the value of k indicates how stringently the Plan controls its allowance levels, and whether it enables physicians to achieve or exceed their desired allowances.

Equations (1) and (2) reduce to a single equation having only predetermined and exogenous variables on the right-hand side:

$$(3) \qquad A_t = -ka_o/a_1 + (k/a_1)p_{t-1} + (1-k)A_{t-1} - X_{t-1}(kB/a_1),\ a_1 \neq 0.$$

Obviously, k can be estimated directly from the coefficient on A_{t-1}, and a test for $k < 1$ against the alternative $k \geq 1$ can be performed on the coefficient itself. Unfortunately, it is not possible to test for the positivity of a_1 (the fee screen inflation hypothesis is true) against the alternative $a_1 \leq 0$ (the fee screen inflation hypothesis is not true) because a_1 must be assumed to be nonzero for equation (3) to exist. Nevertheless, if the estimated coefficient on p_{t-1} is positive and not "too large," it supports the conclusion that a_1 is positive.* Note that the vector of standardizing variables X_t explains variation in charges rather than variation in observed allowances.

The second specification of the physician's dynamic pricing behavior assumes the same relationship between p_t and A^d_{t+1} given by equation (1). But it assumes in addition that the physician's charge level between years t-1 and t changes in proportion with the difference between lagged desired and lagged actual allowances, i.e.,

$$(4) \qquad p_t - p_{t-1} = K(A^d_{t-1} - A_{t-1}), \quad K > 0.$$

In this case the reaction coefficient K should be positive, and one can conjecture that it should be "large" if physicians' pricing behavior is sensitive to differences between desired and realized allowances. More specifically, the difference $p_t - p_{t-1}$ should be positive and "large" when A_{t-1} is less than A^d_{t-1} if physicians raise their charge levels between years in order to bring their allowances up to the desired levels. The equation can be interpreted as stating that physicians anticipate deviations between desired and actual allowances to persist, and that they raise current charges over last year's charges in order to reduce the deviations.

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*That is, assuming k is not close to zero, a large, positive coefficient on p_{t-1} implies that the estimate of a_1 is close to zero. Similarly, a negative coefficient on p_{t-1} would be grounds for rejecting the charge-allowance hypothesis.

Note that this specification contains a two-part hypothesis about physicians' pricing behavior. The first part—equation (1)—claims that the *level* of charges depends on next year's desired allowances. The second part—equation (4)—claims that the between-year *difference* of charges depends on the lagged deviation of actual allowances from desired allowances. Since Specification 1 contains only the first part of this hypothesis, Specification 2 is "stronger" than Specification 1.

Equation (4) does, of course, imply that $p_t = p_{t-1}$ whenever $A^d_{t-1} = A_{t-1}$, and this is likely to be unrealistic. For example, if there is secular upward pressure on desired allowances and the Plan allows physicians to achieve their desired allowances ($A^d_t = A_t$ in all years), (4) states that charge levels are constant over time. But this is not possible if actual allowances do, in fact, grow over time—inasmuch as allowances rise only when charge levels rise. In effect, then, Specification 2 requires that A^d_{t-1} A_{t-1}, and it presupposes a disequilibrium between desired and actual allowances. In that sense Specification 2 is considerably more restrictive than Specification 1, and it was included only because it gives a means of examining physicians' pricing behavior under conditions where the physicians do not achieve their desired allowances.

Combining equations (1) and (4) gives a second single equation, also having only exogenous and predetermined variables on the right-hand side:

$$(5) \qquad p_t - p_{t-1} = -Ka_o/a_1 + (K/a_1)p_{t-2} - KA_{t-1} - X_t(KB/a_1), \quad a_1 \neq 0.$$

This was the second equation fitted to the Plan physician data. If physicians inflate their charge levels as predicted by the charge-allowance inflation hypothesis, a_1 and K must both be positive. Therefore, the test of the hypothesis consists of a test for positivity of the coefficient on p_{t-2} and negativity of the coefficient on A_{t-1}.

The third specification used to examine the charge-allowance inflation hypothesis is a variant of one used by Hadley and Lee (1978). It is:

$$p_t = b_o + b_1(A_t - A_{t-1})/A_{t-1} + X_t B_1. \quad (6)$$

*

Hadley and Lee argued that p_t should be negatively related to the growth rate of realized allowances $(A_t - A_{t-1})/A_{t-1}$ if the charge-allowance inflation hypothesis is true. Hence, if the estimate of b_1 is negative, it supports the validity of the hypothesis, and we used the same test. According to Hadley's and Lee's reasoning, a low growth rate of allowances means that actual allowances increase less rapidly than desired allowances, and, as a result, physicians are motivated to raise their charge levels. While the reasoning may be correct, it presupposes (like Specification 2) that the growth rates of actual and desired allowances are never equal. If they were equal, a low growth rate of actual allowances would not prompt physicians to raise their charge levels. Physicians might, in fact, set their charges precisely in order to maintain the growth rates of actual allowances whatever those growth rates are. As a result, a high growth rate of actual allowances could induce persistent increases in charges. The essential indeterminacy of Hadley-Lee test, which comes about from its assumption that desired and actual growth rates of allowances are unequal, considerably limits the test's usefulness. We included the test here primarily for

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*Hadley and Lee also specified the current allowance as a predetermined variable on the right-hand side of the equation. Because the focus here was on intertemporal pricing behavior, we omitted the variable from the equation.

completeness.

We have remarked that participating physicians should have stronger motives than nonparticipating physicians for raising their allowances. Thus, participating physicians should have stronger tendencies than non-participating physicians to exploit the fee screen reimbursement system if the fee screen inflation hypothesis is true. Although there are several ways of designing tests to compare these tendencies, the method used here consisted of stratifying the physician samples by participation status, estimating equations (3), (5), and (6) for the participating and nonparticipating subsamples, and comparing the parameter estimates across subsamples.

In Specifications 1 and 2 (equations (3) and (5)) it was postulated that the coefficient a_1 in

$$p_t = a_o + a_1 A^d_{t+1} + X_t B$$

is larger for participating physicians than for nonparticipating physicians. This means that, if the charge-allowance hypothesis is true, a given increase in next year's desired allowance level induces a larger increase in the participating physician's current charge level than in the nonparticipating physician's charge level. In Specification 2 we conjectured further that the coefficient K in

$$p_t - p_{t-1} = K(A^d_{t-1} - A_{t-1})$$

is larger for participating physicians than for nonparticipating physicians This is to say that a given (positive) difference between lagged desired and lagged actual allowances should induce a larger rise in charge levels between years t-1 and t for a participating physician than for a nonparticipating physician.

Finally, in Specification 3 (equation (6)) it was postulated that the coefficient b_1 in

$$p_t = b_o + b_1(A_t - A_{t-1})/A_{t-1} + X_t B_1$$

is negative if the charge-allowance inflation hypothesis is true, but that it is larger in absolute value (i.e., "more negative") for participating physicians than for nonparticipating physicians. This is to say that a given reduction in the growth rate of actual allowances leads to a larger increase in charges for participating physicians than for nonparticipating physicians.

Regrettably, because a_1 appears in the denominators of coefficients in equations (3) and (5), it was not possible to carry out tests on the estimates of a_1 across equations. Indeed, only with some difficulty is is possible to conduct approximate tests for the value of a_1 in (3) and (5). As a result, comparisons of a_1 for participating and nonparticipating physicians were made by inspection of the regressions for the two sets of subsamples.

However, Specification 3 permitted a test to be made on the estimates of b_1 obtained from samples of pooled participating and nonparticipating physicians. With

D_t = 1 if the physician did not participate in private Plan business in year t, and = 0 otherwise,

equation (6) was respecified as

$$(7) \qquad p_t = b_o' + b_1'D_t + b_2'(A_t - A_{t-1})/A_{t-1} + b_3'D_t(A_t - A_{t-1})/A_{t-1} + X_tB_2,$$

$b_2' < 0$ and $b_3' > 0$--i.e., that a small increase in the growth rate of actual allowances reduces the charge levels of participating physicians more than the charge levels of nonparticipating physicians. Equation (7) therefore enabled a test to be made on the similarities of participating and nonparticipating physicians' pricing behavior. Regrettably, analogues of equation (7) for Specifications 1 and 2 could not be constructed and estimated for the pooled samples.

Specification of the Equations: Cross-Sectional Pricing Behavior

To study the sources of cross-sectional variation in physicians' charge levels, two primarily descriptive regression specifications were used. They were

$$(8) \qquad p_t = h_o + X_tH$$

and

(9) $$p_t = h_o' + h_1' A_t + XH',$$

where h_o and h_1 are scalar parameters, H is a vector of parameters, and X is a vector of exogenous or predetermined variables. The two equations are simply stepwise versions of a single regression with the (predetermined) allowance level entered at the second step.

The allowance level was included in (9) to provide an estimate of the effects of allowance levels on charge levels in the same year. ~~However,~~ To the degree that A_t depends on the physician's past charge behavior and this behavior varies with the vector of exogenous variables, A_t can be expected to capture the pricing influences represented by X. In order to portray the "pure" effects of X on charges over and above their indirect influences implicit in A_t, the regression was first estimated in the form (8).

Equations (8) and (9) were designed to measure the relationships between charge levels and Plan reimbursement procedures, physician and practice characteristics, and county socioeconomic and medical characteristics. Each of these factors potentially affecting (or related to) charge levels was specified as an exogenous or predetermined variable and--except for A_t--defined as an element of the vector X. The variables themselves are listed and discussed in the following section.

An issue of special interest examined in the course of estimating (8) is the validity of the physician-induced-demand-target-income (PIDTI) hypothesis. As explained in Chapter III, Reinhardt (1978) proposed a test of the PIDTI hypothesis based on the partial relationship between equilibrium charge levels in local markets and physician-population ratios in those markets. He argued that an increase in the physician-population ratio--signifying an increase in the supply of physicians' services--should cause charge levels to fall if standard pricing theory applies. If the PIDTI hypothesis holds instead, an increase in the area physician-population ratio may raise, lower, or not affect market charge levels. But if charge levels are positively related to the physician-population ratio, the result clearly supports the validity of the PIDTI hypothesis.

Although Reinhardt's test is not definitive for the reasons given in Chapter III, equations (8) and (9) provided a means of carrying it out. The physician's average charge level p_t was taken as a proxy for the equilibrium charge level in the physician's market, and one of the elements of X was specified as the physician's county physician-population ratio. Under Reinhardt's formulation, a positive regression coefficient on the physician-population ratio is consistent with the PIDTI hypothesis. A zero or negative coefficient is inconclusive.

Data and Variable Definitions

The unit of observation for estimating all of the equations described in the preceding section was the individual physician. Pooled cross-sectional and annual time series data from each of the three study Plans were used. The study period for Plans A and B was 1973-76. The study period for Plan C was 1975-78. The physician's participation status was employed as a sample stratifier or specified as an exogenous variable and entered directly into the regressions. Similar methods were used to incorporate lines of business into the equations. Table 6-1 indicates the types of claims used in the equations, classfied by line of business, physician participation status, and Plan.*

*When we received them, Plan B's Medicare claims were not segregated by assignment status. For this reason it was not possible to conduct any of the analyses on Medicare business with stratifications by the assignment status of physicians.

TABLE 6-1

DATA CLASSIFICATIONS BY PLAN, LINE OF BUSINESS, AND PARTICIPATION STATUS

Line of Business/ Participation Status	Plan A	Plan B	Plan C
UCR Participating	X	X	
UCR Nonparticipating	X	X	X
Indemnity	X	X	X
Partial Service Participating		X	
Partial Service Nonparticipating		X	
Medicare		X	

Physicians in the Plan samples were categorized by both four-way and 17-way specialty classifications. All specialty designations were taken from the AMA's Masterfile of Physicians (see also Appendix A). The specialty classifications are as follows.

1. General and Family Practice

2. Medical Specialties

   a. Internal Medicine
   b. Pediatrics
   c. Other medical specialties including Allergy, Cardiovascular Diseases, Gastroenterology, Pediatric Allergy, and Pulmonary Diseases

3. Surgical Specialties

   a. General Surgery
   b. Neurological Surgery
   c. Obstetrics and Gynecology
   d. Ophthalmology
   e. Orthopedic Surgery
   f. Otolaryngology
   g. Urology
   h. Other surgical specialties including Plastic Surgery, Colon and Rectal Surgery, and Thoracic Surgery

4. Other Specialties

   a. Anesthesiology
   b. Neurology
   c. Psychiatry
   d. Pathology
   e. Radiology

Hereafter, unless otherwise stated, "specialties" will refer to the four broad fields.

Table 6-2 lists the dependent and explanatory variables that were used in one or more of the regressions. The first seven are pricing variables that were defined in the last section. The remainder are proxies for factors potentially affecting demands facing the physicians, practice costs, or both. The explanatory variables fall roughly into three groups consisting of measures of reimbursement structures, physician and practice characteristics, and the physician's market environment.

The reimbursement variables are an indicator of the physician's participation status (NONPART), the average lag between claim filing and claim payment (LAGPRCLM), dummy variables denoting Plan areas (AREA_2 and AREA_3) for Plans B and C,* and, as applicable to the Plan, the percentages of the physician's total RVUs produced for indemnity patients (PCTIND), for partial service patients (PCTPS), and for Medicare patients (PCTMED). The role of NONPART in testing the relationships between charge levels and allowance levels has been discussed in the preceding section. LAGPRCLM is a proxy for interest costs associated with the physician's accounts receivable, and the Plan area dummies are proxies for (possibly) different UCR and Medicare Level 2 screens faced by Plan physicians. The percentages of RVUs produced in lines of business other than UCR are proxies for the different

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*A "Plan area" is a region within the Plan over which a uniform Level 2 screen is calculated for UCR or Medicare business. Level 2 screens may vary between Plan areas but they are the same for all physicians within a given area. Plans B and C each had three areas but Plan A had none. In Plan B the areas designated for UCR and Medicare services were the same. The Plan had a fourth area used only for computing Medicare Level 2 screens, but we received no claims data on physicians located in it.

TABLE 6-2

LIST AND DEFINITIONS OF VARIABLES

Variable	Definition
	Price Variables
$CPRVU_t$	Amount charged per RVU in year t
$APRVU_t$	Amount allowed per RVU in year t
$CPRVLAG_t$	$= CPRVU_{t-1}$. Amount charged per RVU in year t-1
$APRVLAG_t$	$= APRVU_{t-1}$. Amount allowed per RVU in year t-1
$CPR2LAG_t$	$= CPRVU_{t-2}$. Amount charged per RVU in year t-2
$APRGROW_t$	Fractional growth rate of amount allowed per RVU between years t-1 and t
$CPRVDIF_t$	$= CPRVU_t - CPRVU_{t-1}$. Change in amount charged per RVU between years t-1 and t
	Nonprice Explanatory Variables
AGE	Physician's age in 1979
AMASEX	Dummy = 1 if the physician was female
AN	Dummy = 1 if the physician was an anesthesiologist
AREA_2*	Dummy = 1 if the practice is located in Plan's second charge area
AREA_3*	Dummy = 1 if the practice is located in Plan's third charge area
BORDCERT	Dummy = 1 if the physician was board certified in 1977
$DOCPRCAP_t$	Number of physicians per capita in physician's county in year t
FMG	Dummy = 1 if the physician was a foreign medical graduate
GP	Dummy = 1 if the physician was a general or family practitioner

* Both Plans B and C were divided into 3 charge areas each, while Plan A had no charge area divisions.

TABLE 6-2 (Continued)

Variable	Definition
	Nonprice Explanatory Variables (Continued)
$GPPRCAP_t$	Number of general practitioners per capita in practice's county in year t
GROUP	Dummy = 1 if the physician practiced in a group in 1977
GS	Dummy = 1 if the physician was a general surgeon
HOSPEMPL	Dummy = 1 if the physician practiced in a hospital in 1977
$INPAHOSP_t$	Fraction of the physician's RVUs provided in hospitals in year t
$INPERCAP_t$	Per capita income in the physician's county in year t
INTER3	APRGROW multiplied by NONPART
$LAGPRCLM_t$	Average number of days between claim filing and claim payment in year t (Physician specific)
$MSPRCAP_t$	Number of medical specialists per capita in practice's county in year t
N	Dummy = 1 if the physician was a neurologist
NONPART	Dummy = 1 if the physician does not participate
NS	Dummy = 1 if the physician was a neurological surgeon
OBG	Dummy = 1 if the physician was an obstetrician-gynecologist
$OLDRVU_t$	Fraction of physician's RVUs provided to patients aged 65 and older in year t
OMS	Dummy = 1 if the physician had an other medical specialty besides internal medicine and pediatrics
OPH	Dummy = 1 if the physician was an ophthalmologist
ORS	Dummy = 1 if the physician was an orthopedic surgeon

TABLE 6-2 (Continued)

Variable	Definition
	Nonprice Explanatory Variables (Continued)
OSS	Dummy = 1 if the physician had an other surgical specialty
OTH_EMPL	Dummy = 1 if the physician practiced in a setting other than solo, arrangement, group, partnership and hospital in 1977
OTO	Dummy = 1 if the physician was an otolaryngologist
$OTPRCAP_t$	Number of other (nonmedical, nonsurgical) specialists per capita in practice's county in year t
OVER65	Fraction of residents aged 65 and older in physician's county in year t
P	Dummy = 1 if the physician was a psychiatrist
PARTNER	Dummy = 1 if the physician practiced in a partnership in 1977
PD_	Dummy = 1 if the physician was a pediatrician
PCTFEMRV	Fraction of the physician's RVUs provided to female patients
PRCT_URB	Percent of 1970 county population living in urban areas x 10
$PCTIND_t$	Percentage of the practice's observed RVUs provided to indemnity patients in year t
$PCTMED_t$	Percentage of the practice's observed RVUs provided to Medicare patients in year t
$PCTPS_t$	Percentage of the practice's observed RVUs provided to partial service patients in year t
PTH	Dummy = 1 if the physician was a pathologist
R	Dummy = 1 if the physician was a radiologist
SPEC_2ND	Dummy = 1 if physician had a second specialty in 1977
$SPECPRCP_t$	County per capita number of specialists with the same specialty as the physician, for the county in which the practice is located in year t
$SSPRCAP_t$	Number of surgical specialists per capita in practice's county in year t

TABLE 6-2 (Continued)

Variable	Definition
	Nonprice Explanatory Variables (Continued)
TIME74	Dummy = 1 if the year of observation is 1974
TIME75	Dummy = 1 if the year of observation is 1975
TIME76	Dummy = 1 if the year of observation is 1976
TIME77	Dummy = 1 if the year of observation is 1977
TIME78	Dummy = 1 if the year of observation is 1978
U	Dummy = 1 if the physician was a urologist
$WAGEINDX_t$	Average payroll per employee in physicians' offices in county of practice in year t
$YNGRVU_t$	Fraction of physician's RVUs provided to patients aged 14 and younger in year t

NOTE: INPAHOSP, LAGPRCLM, OLDRVU, PCTFEMRV, YNGRVU, and the price variables are pooled across lines of business in regressions involving more than one business.

allowance levels across lines of business.*

The physician characteristics specified as standardizing variables were the practitioner's age in 1979 (AGE) and sex (AMASEX). BORDCERT indicates that the physician was certified by a specialty board in 1977, FMG denotes graduation from a foreign medical school, and SPEC_2ND indicates that the physician had a second specialty in 1977. Sixteen specialty dummies were defined in accordance with the 17-way specialty classification given above. The deleted specialty dummy was for Internal Medicine, the most numerously represented specialty in the samples. All of the physician-characteristic variables signify physicians' tastes or preferences to some degree, but BORDCERT and FMG also denote physician quality. We made the customary assumptions that BORDCERT typically denotes high physician quality and that FMG denotes relatively low physician quality as perceived by patients. SPEC_2ND may also indicate a high level of perceived quality. The specialty dummies were included to capture the effects of specialty-related costs, demands, or tastes not reflected in other variables.

The practice characteristics are comprised of a measure of physicians' office salary rates (WAGEINDX) and dummy indicators of the type of practice. The latter denote practice in a group (GROUP), in a hospital-based setting (HOSPEMPL), in a partnership (PARTNER), and in other settings (OTH_EMPL). The omitted dummy refers chiefly to solo practice but also applies to a few physicians in expense-sharing arrangements. Variables representing the physician's patient-mix are the fractions of total RVUs provided in hospitals (INPAHOSP), provided to patients aged 14 and younger (YNGRVU), provided to patients aged 65 and older (OLDRVU), and provided to

*They also serve as proxies for the frequency of updating allowances. UCR and Medicare allowances were updated annually (or nearly so) during the study periods. In Plan B indemnity allowances were updated once, but partial service allowances were not updated. In Plans A and C there were no updates of indemnity allowances.

female patients (PCTFEMRV). All of these variables are proxies for the level of production costs, although the type-of-practice dummies may also represent physicians' economic goals or business attitudes or practices insofar as entrepreneurial behavior varies with the type of practice. Unit costs should increase with WAGEINDX and, if there are economies of "large" scale (i.e., at scales above the solo level), unit costs should be negatively related to GROUP and PARTNER. Because physicians with hospital- or nonoffice-based practices do not necessarily pay for all of their expenses, HOSPEMPL, OTH_EMPL, and INPAHOSP should be negatively related with unit costs as well. The relationships between cost levels and YNGRVU, OLDRVU, and PCTFEMRV are not clear on *a priori* grounds.

Several county-level variables were specified as surrogates for rates of patient demands facing the physician. Per capita income (INPERCAP), the fraction of the population aged 65 and older (OVER65), and the percentage of the population living in urban areas (PRCT_URB) were each assumed to be positively related to volumes of demand.*

Five measures of the physician-population ratio were used depending on the specialty compositions of the physician subsamples. These were the total number of physicians per capita in the county (DOCPRCAP), the number of General and Family Practitioners per capita (GPPRCAP), and the numbers of medical specialists, surgical specialists, and other specialists per capita (MSPRCAP, SSPRCAP, and OTPRCAP, respectively). SPECPRCP was used in some of

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*Many other county-level proxies for demands--such as measures of racial composition, income and wealth distributions, educational levels, etc.--were available. However, they were found to be highly collinear with the variables listed here or with physician-population ratios, and they were not included for this reason.

the regressions to denote the number of county physicians per capita in the same broad field as the physician observation. That is, SPECPRCP was defined as GPPRCAP , MSPRCAP, SSPRCAP, or OTPRCAP depending on which of these fields the particular physician's specialty belonged to.

Finally, dummy variables indicating the year of observation (TIME74 through TIME78) were included in all of the regressions. They were intended to capture the influences of unobservable reimbursement, physician, practice, or market factors unique to the years of observation.

In the first two of the three basic specifications used to test intertemporal relationships between charges and allowances--equations (3) and (5)--the exogenous variables "explain" variation in physicians' current charge levels not otherwise accounted for by desired allowances. In the third basic specification--equation (6)--the current charge level was regressed on the growth rate of allowances, and in one of the cross-sectional specifications--equation (9)--the current charge level was regressed on the current level of allowances. In both of these sets of regressions the exogenous variables were entered as general standardizing variables, although the growth rate or level of the physician's allowances may absorb the effects of costs, demands, and entrepreneurial behavior on charge levels.

In the other cross-sectional equation--equation (8)--where current charges were regressed on the exogenous variables alone, the role of the exogenous variables can be interpreted more easily. Assuming some form of equilibrium in the physicians' services markets--i.e., that charge levels have adjusted more or less to underlying economic conditions--charge levels should tend to be positively related to proxies for unit costs and to measures (including physician quality proxies) of patient demands. In instances where the exogenous variables are surrogates for physicians' tastes, attitudes, or managerial behavior, a *priori* judgments regarding the signs of coefficients cannot, of course, be made.

Empirical Results: the Charge-Allowance Inflation Hypothesis

In terms of the variable definitions given in Table 6-2, the three regression specifications used to test the charge-allowance inflation hypothesis were:

1: $APRVU_t = -ka_o/a_1 + (k/a_1)CPRVLAG_t + (1-k)APRVLAG_t$ + terms in exogenous variables, $a_1 > 0$, $k > 0$ (participating and nonparticipating physicians not pooled)

2: $CPRVDIF_t = -Ka_o/a_1 + (K/a_1)CPR2LAG_t - K(APRVLAG_t)$ + terms in exogenous variables, $a_1 > 0$, $K > 0$ (participating and nonparticipating physicians not pooled)

3: $CPRVU_t = b_o + b_1 APRGROW_t$ + terms in exogenous variables, $b_1 < 0$ (participating and nonparticipating physicians not pooled)

$CPRVU_t = b'_o + b'_1 NONPART_t + b'_2 APRGROW_t + b'_3 INTER3_t$ + terms in exogenous variables, $b'_2 < 0$, $b'_3 > 0$ (participating and nonparticipating physicians pooled),

where the signs on the parameters are predicted by the charge-allowance hypothesis, and $INTER3 = NONPART \cdot APRGROW$.

Inasmuch as the variables on the right-hand sides of these equations are all exogenous or predetermined, the equations were estimated by ordinary least squares (OLS). Estimates were made for the UCR line of business in all three Plans, and estimates of Specification 3 for the pooled samples of participating and nonparticipating physicians were made Plans A and B. In Plan B, where Medicare data were available, each specification was also estimated for the Medicare line.*

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* The equations were not estimated for the Plans' fee schedule lines of business because Plans A and C did not change their indemnity allowances during the study periods, Plan B did not change its partial service allowances, and Plan B raised its indemnity allowances only once.

Estimates of the three regression specifications are shown in Tables 6-3 through 6-11. To estimate the regressions, the data were pooled across specialties, and 16 specialty dummies were used to indicate the effects of specialty on the dependent variables. A number of additional estimates were made on subsamples after stratification of the full samples by the four major specialty groupings. These are shown in Appendix C and, as pertinent, the results are summarized here.

Point estimates of the regression parameters whose signs are predicted by the charge-allowance hypothesis are given in Tables 6-12 and 6-13. The estimates were derived from Tables 6-3 - 6-11. In examining the results it should be recalled that Specification 1 is probably least restrictive in terms of its behavioral constraints. Specifications 2 and 3 both embody nonequilibrium assumptions about relationships between the physician's actual and desired allowances, and, as we have argued, the sign predictions of Specification 3 cannot necessarily be defended on theoretical grounds.

The signs on the Specification 1 parameter estimates shown in Table 6-12 strongly confirmed the charge-allowance hypothesis. All of the estimates of a_1 were positive and large, ranging in value from 2.08 to 4.87. That is, depending on the Plan, line of business, and the physician's participation status, the estimates of a_1 indicate that a one cent rise in the physician's desired allowance level for year t+1* induces an increase of 2.08 to 4.87 cents in his

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*Recall from the discussion above that the physician is assumed to set his desired allowance in year t+1 during year t--and, in fact, before he determines his charge level in year t.

TABLE 6-3

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 1, PLAN A

	UCR			
	Participating Physicians		Nonparticipating Physicians	
Variable	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio
INTERCEPT	1.3459*	2.01	-4.1560*	-2.31
NONPART	--	--	--	--
CPRVLAG	.1716*	2.42	.1646*	2.56
APRVLAG	.3803**	4.45	.1976*	2.16
LAGPRCLM	-.0008*	-2.05	.0011	1.67
AGE	-.0023	-1.83	-.0008	-.32
AMASEX	-.0266	-.48	--	--
BORDCERT	.0473	1.82	-.0079	-.16
FMG	-.0165	-.63	.0566	.92
SPEC_2ND	-.0892	-.78	-.0773	-.82
GROUP	-.0415	-1.26	.0918*	2.08
PARTNER	-.0716*	-1.98	.1043	1.67
HOSPEMPL	.0879	1.53	.0996	.91
OTH_EMPL	-.0032	-.06	-.1099	-.59
INPAHOSP	-.3298**	-5.93	-.3389**	-4.65
OLDRVU	.0740	.17	-.2435	-.63
PCTFEMRV	-.1308	-1.83	-.0023	-.03
YNGRVU	-.2156*	-2.27	.1038	.64
DOCPRCAP	-48.2542	-.54	-640.7489**	-3.29
INPERCAP	-.0002	-.91	.0010*	2.33
OVER65	3.0609	1.15	21.1017**	3.24
PRCT_URB	.0001	.59	.0003	.95
WAGEINDX	.0329	1.01	-.0165	-.29
TIME75	.0861	1.13	.1730	1.32
TIME76	.1773*	2.07	-.5316*	-2.24
PD	.1056	1.53	-.1540	-1.26
OMS	-.0083	-.14	.0414	.69
NS	.1607	1.63	.2706	1.72
ORS	.2295**	3.37	.0586	.73
OTO	.5399**	3.30	--	--
U	.1042	1.57	.0115	.14
OSS	.3234**	3.26	.1448	1.71
OBG	.2209**	3.38	.3238**	3.20
OPH	.1125	.73	.0988	1.26
AN	.5281**	8.24	.3707**	3.09
PTH	--	--	-.3101*	-2.09
P	-.0425	-.66	-.1373	-1.68
N	.0266	.32	.0360	.44
GP	.0329	.51	-.0391	-.43
GS	.1560**	2.64	.1718*	2.07
R	.1329	.90	.1133	.65
DFE	526		217	
R^2	.67		.62	
F-Ratio	27.61		9.40	
Prob > F	.0001		.0001	

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-4

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 1, PLAN B

	UCR			
	Participating Physicians		Nonparticipating Physicians	
Variable	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio
INTERCEPT	.94675**	4.11	1.728707**	3.38
NONPART	--	--	--	--
CPRVLAG	.22919**	5.10	.324407**	4.31
APRVLAG	.46022**	8.01	.074449	.72
LAGPRCLM	-.00051	-1.18	-.001428	-1.97
AGE	-.00131	-1.06	.000361	.16
AMASEX	-.03026	-.45	--	--
BORDCERT	.02955	1.21	.046962	.94
FMG	.01280	.50	.022300	-.34
SPEC_2ND	.05316	.49	-.283836	-1.81
GROUP	-.06362	-1.40	.112410	1.51
PARTNER	-.05876	-1.96	.050819	.74
HOSPEMPL	.11015	1.87	.106167	.89
OTH_EMPL	.01983	.14	.133236	1.22
INPAHOSP	.07650	1.70	.273438**	2.74
OLDRVU	-.78340**	-4.15	-.256077	-.80
PCTFEMRV	-.03826	-.60	.027338	.28
YNGRVU	-.14260	-1.35	-.573645*	-2.27
DOCPRCAP	10.79099	.53	16.924164	.37
INPERCAP	-.00001	-.34	-.000030	-.39
OVER65	-1.71808	-1.83	-5.547387*	-2.10
PRCT_URB	.00005	.57	-.000003	-.02
WAGEINDX	-.00553	-.62	.004867	.30
TIME75	.07519**	2.79	.138862**	3.16
TIME76	.11286*	2.27	.182168	1.78
AREA_2	-.01483	-.20	-.065121	-.40
AREA_3	.01155	.17	.087895	.53
PD	-.09342	-.58	--	--
OMS	.03228	.79	-.118922	-1.95
NS	.02802	.20	.122381	.71
ORS	.12658*	2.04	-.054838	-.31
OTO	.09600	1.11	--	--
U	.04403	.97	-.215162**	-2.77
OSS	.14398	1.06	--	--
OBG	-.04131	-.66	-.245134*	-2.33
OPH	-.06440	-.91	-.389513**	-3.57
AN	.05958	1.21	-.193102	-1.51
PTH	--	--	--	--
P	.07398	.71	--	--
N	.18674	1.32	--	--
GP	-.02821	-.73	-.104250	-1.09
GS	-.05775	-1.50	-.312347**	-3.13
R	-.01993	-.21	-.292397*	-2.04
Dep. Var.	APRVU		APRVU	
DFE	522		162	
R^2	.71		.64	
F-Ratio	31.59		8.53	
Prob > F	.0001		.0001	

TABLE 6-4 (Continued)

	Medicare	
Variable	Coefficient Estimate	t-Ratio
INTERCEPT	.65961**	3.942
NONPART	--	--
CPRVLAG	.12638**	4.962
APRVLAG	.55831**	13.869
LAGPRCLM	-.00020	-.956
AGE	-.00026	-.292
AMASEX	-.00581	-.100
BORDCERT	.03862*	2.107
FMG	.01681	.836
SPEC_2ND	.00101	.011
GROUP	.02129	.729
PARTNER	.00310	.138
HOSPEMPL	.10941*	2.541
OTH_EMPL	.03935	.552
INPAHOSP	-.09974**	-2.898
OLDRVU	--	--
PCTFEMRV	.04291	.766
YNGRVU	--	--
DOCPRCAP	-20.94509	-1.350
INPERCAP	-.00003	-1.187
OVER65	-.88123	-1.205
PRCT_URB	.00015*	2.203
WAGEINDX	.01083	1.762
TIME75	.03438	1.756
TIME76	.05313	1.496
AREA_2	-.01866	-.335
AREA_3	.07083	1.330
PD	.09579	.707
OMS	.01892	.658
NS	-.07440	-.846
ORS	-.05251	-1.306
OTO	-.06450	-1.533
U	-.03504	-.825
OSS	.20309	1.847
OBG	-.00782	-.185
OPH	.03426	.808
AN	.19461**	5.850
PTH	--	--
P	.07740	.866
N	.04569	.381
GP	-.09102**	-2.905
GS	-.00003	-.001
R	.04401	.643
Dep. Variable	APRVU	
DFE	728	
R^2	.72	
F-Ratio	50.35	
Prob > F	.0001	

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-5

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 1, PLAN C

	UCR	
Variable	Coefficient Estimate	t-Ratio
INTERCEPT	1.17259**	4.89
CPRVLAG	.37511**	5.37
APRVLAG	.21926**	2.59
LAGPRCLM	-.00090	-1.94
AGE	-.00420*	-2.46
AMASEX	.05234	.55
BORDCERT	.02887	.90
FMG	.06585	1.43
SPEC_2ND	.01001	.11
GROUP	.01923	.56
PARTNER	.01169	.36
HOSPEMPL	.12909	1.35
OTH_EMPL	.03101	.45
INPAHOSP	.00876	.18
PCTFEMRV	-.18685*	-2.58
YNGRVU	-.06307	-.71
DOCPRCAP	39.36454	1.39
INPERCAP	-.00004	-.91
OVER65	-.26426	-.16
PRCT_URB	.00031	1.57
TIME77	.04683	1.28
TIME78	.31587**	5.06
AREA_2	.05869	.81
AREA_3	.04579	.51
PD_	.04710	.53
OMS	-.07021	-1.07
NS	.01910	.19
ORS	-.01303	-.20
OTO	--	--
U	-.12857*	-2.06
OSS	-.17105	-1.14
OBG	.01689	.27
OPH	-.20017	-1.77
AN	.31606**	3.90
PTH	--	--
P	-.09864	-.53
N	.16763	1.85
GP	.07530	1.30
GS	.02774	.48
R	.01001	.13

Dep. Variable	APRVU
DFE	556
R^2	.66
F-Ratio	28.54
Prob > F	.0001

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-6

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 2, PLAN A

	UCR			
	Participating Physicians		Nonparticipating Physicians	
Variable	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio
INTERCEPT	1.0651	1.00	-.2152	-.06
CPR2LAG	.0630	.89	.3016**	2.63
APRVLAG	-.4463**	-5.66	-.7431**	-5.09
LAGPRCLM	.0001	.18	.0031	1.98
AGE	-.0019	-.96	-.0010	-.19
AMASEX	-.0186	-.21	--	--
BORDCERT	.1328**	3.11	-.1411	-1.38
FMG	.0087	.20	-.0151	-.12
SPEC_2ND	-.3338	-1.77	-.1482	-.74
GROUP	-.0533	-.99	-.0505	-.56
PARTNER	-.1548**	-2.62	.1174	.91
HOSPEMPL	.1527	1.63	.3943	1.64
OTH_EMPL	-.0727	-.84	-.2010	-.47
INPAHOSP	-.3715**	-4.00	-.4822**	-3.14
OLDRVU	1.0524	1.39	-.4351	-.51
PCTFEMRV	-.1717	-1.39	.0011	.01
YNGRVU	.0873	.54	.1051	.27
DOCPRCAP	-200.5570	-1.20	-91.4156	-.22
INPERCAP	-.0005	-1.40	.0008	.82
OVER65	9.4987	1.59	.2808	.02
PRCT_URB	.0001	.48	.0002	.41
WAGEINDX	.1054	1.66	-.1125	-.80
TIME76	.1722	.96	-.3251	-.60
PD	-.0533	-.48	-.1830	-.72
OMS	-.0101	-.11	-.0510	-.41
NS	.1443	.90	.5740	1.83
ORS	.0439	.39	-.0338	-.20
OTO	.5945*	2.24	--	--
U	.0669	.62	.1071	.59
OSS	.4290**	2.66	.0917	.54
OBG	.3056**	2.89	.4749*	2.33
OPH	.0504	.20	.2229	1.40
AN	.7198**	7.07	.7748**	3.03
PTH	--	--	-.5167	-1.70
P	-.0741	-.70	-.2147	-1.26
N	.0538	.40	.0543	.31
GP	.0144	.14	-.1778	-.94
GS	.1773	1.91	.0760	.46
R	.1183	.49	.2730	.68
Dep. Variable	CPRVDIF		CPRVDIF	
DFE	338		126	
R^2	.36		.38	
F-Ratio	5.03		2.12	
Prob > F	.0001		.0012	

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-7

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 2, PLAN B

	UCR				Medicare	
	Participating Physicians		Nonparticipating Physicians			
Variable	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio
INTERCEPT	1.091064**	3.03	1.86905	1.76	1.04452**	3.20
CPR2LAG	.177806**	3.18	.26940*	2.40	-.08295	-1.93
APRVLAG	-.437354**	-6.54	-.65355**	-3.95	-.14687*	-2.19
LAGPRCLM	-.000918	-1.32	-.00140	-.95	-.00065	-1.59
AGE	-.003066	-1.60	.00624	1.34	.00082	.47
AMASEX	-.172015	-1.64	--	--	-.06008	-.53
BORDCERT	.019868	.53	.12984	1.17	.05964	1.67
FMG	-.003724	-.09	.06819	.50	.04632	1.19
SPEC_2ND	.105574	.63	-.09436	-.28	.03079	.18
GROUP	-.026659	-.38	.01004	.06	.04877	.86
PARTNER	.018189	.39	.04581	.32	.04722	1.08
HOSPEMPL	.176206	1.93	-.07127	-.27	.13490	1.62
OTH_EMPL	.329888	1.51	.22799	.96	.59632**	4.31
INPAHOSP	-.082597	-1.20	.52500*	2.43	-.11914	-1.78
OLDRVU	-.283591	-1.04	-1.20758	-1.10	--	--
PCTFEMRV	.006726	.07	.07046	.32	.11319	1.04
YNGRVU	-.185868	-1.11	-.75559	-1.39	--	--
DOCPRCAP	24.285925	.81	-35.39164	-.39	-11.51671	-.40
INPERCAP	-.000004	-.08	-.00020	-1.32	-.00008	-1.66
OVER65	-2.787933	-1.95	-6.70137	-1.23	-2.80526*	-2.00
PRCT_URB	.000013	.09	.00002	.07	.00046**	3.47
WAGEINDX	-.008665	-.61	.00149	.04	-.01578	-1.25
TIME76	.134803*	2.22	.35190*	2.00	.05523	.98
AREA_2	-.068765	-.61	-.36209	-1.05	.15565	1.44
AREA_3	.049314	.46	.04287	.13	.24497*	2.40
PD_	.121926	.49	--	--	.19219	.73
OMS	.033109	.53	-.15268	-1.21	-.03257	-.58
NS	.385466	1.80	-.24777	-.65	-.03348	-.20
ORS	.195399*	2.01	-.25107	-.60	-.08717	-1.13
OTO	.475254**	3.66	--	--	-.02850	-.35
U	.303582**	4.33	-.08569	-.51	.06228	.75
OSS	.488721*	2.33	--	--	.20335	.95
OBG	.287030**	2.92	-.18808	-.80	-.05685	-.70
OPH	.350531**	3.18	-.32008	-1.43	.13998	1.71
AN	.373564**	4.85	-.03246	-.12	.38885**	5.93
PTH	--	--	--	--	--	--
P	-.140692	-.87	--	--	.03414	.20
N	.236701	1.09	--	--	-.09464	-.40
GP	.060631	1.01	-.16295	-.79	-.07680	-1.26
GS	.247686**	4.16	-.13213	-.62	.08670	1.65
R	-.119587	-.80	-.33957	-1.11	-.01128	-.08
Dep. Variable	CPRVDIF		CPRVDIF		CPRVDIF	
DFE	335		95		473	
R^2	.34		.39		.22	
F-ratio	4.50		1.83		3.61	
Prob > F	.0001		.0121		.0001	

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-8

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 2, PLAN C

Variable	UCR Coefficient Estimate	UCR t-Ratio
INTERCEPT	.86372*	2.43
CPR2LAG	.20013**	3.44
APRVLAG	-.46148**	-6.89
LAGPRCLM	-.00258**	-3.85
AGE	.00210	.84
AMASEX	-.02478	-.18
BORDCERT	.08581	1.86
FMG	.13139*	1.98
SPEC_2ND	-.15941	-1.20
GROUP	-.00918	-.19
PARTNER	-.01878	-.40
HOSPEMPL	.27056	1.96
OTH_EMPL	.14228	1.42
INPAHOSP	.03620	.49
PCTFEMRV	-.21104*	-2.05
YNGRVU	-.11121	-.88
DOCPRCAP	50.98755	1.25
INPERCAP	-.00002	-.34
OVER65	-1.74778	-.72
PRCT_URB	.00016	.58
TIME78	.08122	1.38
AREA_2	.07779	.74
AREA_3	.16123	1.22
PD	.16218	1.29
OMS	-.09637	-1.02
NS	-.03912	-.27
ORS	.04580	.48
OTO	--	--
U	-.15449	-1.72
OSS	-.00702	-.03
OBG	.08512	.92
OPH	.02204	.13
AN	.35547**	3.01
PTH	--	--
P	.75139**	2.79
N	.22146	1.67
GP	.02978	.35
GS	.00224	.03
R	-.01984	-.18

Dep. Variable	CPRVDIF
DFE	359
R^2	.25
F-Ratio	3.27
Prob > F	.0001

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-9

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 3, PLAN A

	UCR					
	Participating Physicians		Nonparticipating Physicians		All Physicians	
Variable	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio
INTERCEPT	-.0408	-.05	-6.5243*	-2.08	-.7788	-.97
NONPART	--	--	--	--	.1334**	3.71
APRGROW	1.2034**	11.11	.7128**	4.08	1.0946**	8.69
INTER3	--	--	--	--	-.2512	-1.27
LAGPRCLM	-.0016**	-2.99	.0021	1.81	.0002	.46
AGE	-.0005	-.33	-.0017	-.37	-.0008	-.52
AMASEX	-.0258	-.36	--	--	.0141	.17
BORDCERT	.0732*	2.18	.0490	.56	.0304	.89
FMG	-.0296	-.88	.0663	.62	-.0363	-1.02
SPEC_2ND	.1140	.77	-.0788	-.48	.0578	.54
GROUP	-.0394	-.92	.2890**	3.84	.1303**	3.45
PARTNER	-.0642	-1.38	.1746	1.61	.0115	.25
HOSPEMPL	.4626**	6.51	.2670	1.39	.3748**	5.09
OTH_EMPL	-.0230	-.34	.0044	.01	.0316	.40
INPAHOSP	-.3972**	-5.55	-.1877	-1.50	-.2782**	-4.27
OLDRVU	.5239	.91	.2361	.35	.4490	.99
PCTFEMRV	-.0238	-.26	-.4404**	-2.85	-.1623	-1.93
YNGRVU	-.2622*	-2.13	-.1409	-.50	-.1392	-1.13
DOCPRCAP	-178.5935	-1.53	-1037.7700**	-3.09	-284.1060**	-2.81
INPERCAP	.0004	1.56	.0017*	2.19	.0006*	2.11
OVER65	4.3136	1.25	30.3434**	2.70	7.1860*	2.06
PRCT_URB	.0002	1.13	.0004	.85	.0002	.98
WAGEINDX	.0050	.12	-.0211	-.21	.0004	.01
TIME75	.1998*	2.02	.3459	1.51	.2426*	2.35
TIME76	.0978	.88	-.6751	-1.63	.0217	.21
PD	.0696	.78	-.6971**	-3.33	-.1301	-1.52
OMS	.0168	.22	.1075	1.02	.0604	.95
NS	-.1275	-.99	1.0994**	4.08	.0241	.19
ORS	.6886**	8.44	.2985*	2.14	.5278**	7.14
OTO	.4563*	2.14	--	--	.3823	1.60
U	.1172	1.36	-.2270	-1.54	-.0320	-.41
OSS	.2424	1.87	.2876	1.95	.2171*	2.20
OBG	.1771*	2.07	.4389*	2.50	.2296**	2.83
OPH	.1185	.59	-.2207	-1.63	-.1338	-1.48
AN	.4756**	5.59	.5551**	2.64	.4376**	5.52
PTH	--	--	.0816	.31	.1785	.80
P	-.1452	-1.77	-.0198	-.14	-.0743	-1.01
N	.0535	.49	.2374	1.68	.1749*	2.00
GP	.0669	.80	-.0564	-.35	.0504	.64
GS	.2913**	3.84	.1322	.91	.2368**	3.49
R	.0762	.40	.6666*	2.18	.3660*	2.09
Dep. Variable	CPRVU		CPRVU		CPRVU	
DFE	527		218		782	
R^2	.59		.52		.47	
F-Ratio	20.57		6.63		17.32	
Prob > F	.0001		.0001		.0001	

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-10

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 3, PLAN B

	UCR					
	Participating Physicians		Nonparticipating Physicians		All Physicians	
Variable	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio	Coefficient Estimate	t-Ratio
INTERCEPT	2.89213**	7.67	2.6978**	2.75	2.31280**	6.79
NONPART	--	--	--	--	.13253**	2.97
APRGROW	.78890**	6.06	.4640*	2.25	.79963**	5.80
INTER3	--	--	--	--	-.29346	-1.28
LAGPRCLM	.00058	.76	-.0016	-1.13	.00041	.61
AGE	-.01264**	-5.89	.0117**	2.69	-.00409*	-2.12
AMASEX	-.13957	-1.16	--	--	-.15546	-1.24
BORDCERT	.14770**	3.44	.2345*	2.42	.18892**	4.80
FMG	.03464	.77	.1301	1.02	.08962*	2.04
SPEC_2ND	.07116	.37	-.5384	-1.78	.21213	1.08
GROUP	.00488	.06	.2200	1.52	.05516	.86
PARTNER	-.05051	-.95	.0262	.19	.00141	.03
HOSPEMPL	.37968**	3.65	.1213	.52	.34217**	3.66
OTH_EMPL	1.58156**	6.50	.5148*	2.44	.81962**	5.34
INPAHOSP	-.02660	-.33	.2763	1.44	.03822	.52
OLDRVU	.03282	.10	.3858	.61	-.07878	-.26
PCTFEMRV	.10797	.95	.0600	.31	.11513	1.17
YNGRVU	-.35258	-1.88	-.2359	-.46	-.24979	-1.42
DOCPRCAP	-19.84922	-.54	20.4865	.23	-22.40904	-.66
INPERCAP	-.00005	-.71	-.0001	-.71	-.00006	-.94
OVER65	-.99703	-.60	-9.8351	-1.94	-1.14256	-.71
PRCT_URB	.00014	.86	.0002	.53	.00020	1.35
WAGEINDX	.00665	.42	.0053	.17	.01352	1.01
TIME75	.14356**	3.03	.1688	1.96	.13487**	3.17
TIME76	.44018**	5.11	.5539**	2.76	.43336**	5.59
AREA_2	-.22106	-1.68	-.1062	-.33	-.16042	-1.33
AREA_3	-.15721	-1.28	.0824	.25	-.12038	-1.04
PD	-.36258	-1.26	--	--	-.28945	-.98
OMS	.24430**	3.42	.2038	1.76	.29166**	4.74
NS	-.49034*	-2.01	-.3430	-1.02	-.37480*	-1.99
ORS	.34800**	3.17	.7138*	2.17	.35957**	3.46
OTO	.49907**	3.25	--	--	.32278*	2.19
U	.19437*	2.41	-.3616*	-2.53	.04217	.60
OSS	.52997*	2.20	--	--	.07052	.30
OBG	.00535	.05	-.4669*	-2.29	-.07360	-.77
OPH	.06963	.55	-.4267*	-2.16	-.06669	-.67
AN	-.00264	-.03	-.4895*	-2.03	-.08426	-1.02
PTH	--	--	--	--	--	--
P	.72695**	3.98	--	--	.74912**	3.88
N	.84884**	3.42	--	--	.69320**	2.63
GP	-.02009	-.29	-.3045	-1.62	-.08768	-1.33
GS	.08232	1.22	-.3074	-1.67	.00890	.14
R	.52676**	3.11	-.7826**	-2.82	.20588	1.40
Dep. Variable	CPRVU		CPRVU		CPRVU	
DFE	523		163		720	
R^2	.50		.45		.40	
F-ratio	13.38		4.10		11.93	
Prob > F	.0001		.0001		.0001	

TABLE 6-10 (Continued)

Variable	Medicare Coefficient Estimate	Medicare t-Ratio
INTERCEPT	1.59543**	4.62
NONPART	--	--
APRGROW	.79559**	6.07
INTER3	--	--
LAGPRCLM	.00009	.20
AGE	-.00246	-1.29
AMASEX	-.19512	-1.56
BORDCERT	.26783**	6.95
FMG	.11297**	2.62
SPEC_2ND	.46082*	2.37
GROUP	.08115	1.30
PARTNER	.05776	1.20
HOSPEMPL	.22982*	2.48
OTH_EMPL	.79400**	5.21
INPAHOSP	-.35623**	-4.88
OLDRVU	--	--
PCTFEMRV	-.06321	-.52
YNGRVU	--	--
DOCPRCAP	19.85375	.59
INPERCAP	.00007	1.19
OVER65	-2.25059	-1.43
PRCT_URB	.00032*	2.22
WAGETNDX	.02447	1.86
TIME75	.19400**	4.62
TIME76	.26031**	3.41
AREA_2	.14885	1.24
AREA_3	.10022	.87
PD	-.05699	-.20
OMS	.24910**	4.07
NS	-.69486**	-3.75
ORS	.02391	.28
OTO	-.01817	-.20
U	-.21014*	-2.34
OSS	-.16511	-.70
OBG	.15962	1.76
OPH	.24396**	2.67
AN	.43362**	6.02
PTH	--	--
P	.40231*	2.10
N	.77399**	3.02
GP	-.21244**	-3.24
GS	.12419*	2.12
R	.16090	1.09
Dep. Variable	CPRVU	
DFE	729	
R^2	.46	
F-ratio	16.76	
Prob > F	.0001	

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-11

OLS ESTIMATES OF FEE INFLATION EQUATIONS: SPECIFICATION 3, PLAN C

	UCR	
Variable	Coefficient Estimate	t-Ratio
INTERCEPT	2.52129**	8.17
APRGROW	1.24125**	10.52
LAGPRCLM	.00046	.73
AGE	-.00810**	-3.54
AMASEX	-.08095	-.62
BORDCERT	.02237	.51
FMG	-.05134	-.81
SPEC_2ND	.28638*	2.31
GROUP	-.14235**	-3.05
PARTNER	-.11335*	-2.55
HOSPEMPL	.04193	.32
OTH_EMPL	.10502	1.11
INPAHOSP	-.06168	-.90
PCTFEMRV	-.32464**	-3.28
YNGRVU	-.32503**	-2.70
DOCPRCAP	95.05007*	2.45
INPERCAP	.00007	1.31
OVER65	-3.69903	-1.63
PRCT_URB	.00024	.91
TIME77	.22717**	4.66
TIME78	.30770**	3.64
AREA_2	-.03109	-.32
AREA_3	.05954	.48
PD	.13764	1.13
OMS	-.03220	-.36
NS	-.03489	-.26
ORS	-.19714*	-2.20
OTO	--	--
U	-.08387	-.98
OSS	-.47916*	-2.36
OBG	.27460**	3.18
OPH	-.36607*	-2.39
AN	.89498**	8.34
PTH	--	--
P	-.67584**	-2.69
N	.66594**	5.47
GP	.05333	.67
GS	.17780*	2.24
R	.20409*	2.00

Dep. Variable	CPRVU
DFE	557
R^2	.52
F-Ratio	16.62
Prob > F	.0001

Dashes indicate that no coefficients were estimated because data on variables were missing. One and two asterisks denote coefficients significant at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-12

SPECIFICATION 1 AND 2 PARAMETER ESTIMATES

Plan, Line of Business, and Participation Status of Sample Physicians	Parameter Estimates			
	Specification 1		Specification 2	
	a_1	k	a_1	K
A UCR				
Participating	3.61	.620	7.08	.446
Nonparticipating	4.87	.802	2.46	.743
B UCR				
Participating	2.36	.540	2.46	.437
Nonparticipating	2.85	.926	2.43	.654
Medicare	3.50	.442	-1.77	.147
C UCR	2.08	.781	2.30	.461

TABLE 6-13

SPECIFICATION 3 PARAMETER ESTIMATES

Plan, Line of Business, and Participation Status of Sample Physicians	Parameter Estimates		
	b_1	b'_2	b'_3
A UCR			
Participating	1.203		
Nonparticipating	.713		
Pooled		1.094	-.251
B UCR			
Participating	.789		
Nonparticipating	.464		
Pooled		.797	-.269
Medicare	.796		
C UCR	1.241		

charge level in year t.

The estimates of k indicate that the Plans' allowances substantially counteracted the inflationary behavior of physicians' charge setting. As will be recalled, when k is less than one, it means that physicians do not achieve their desired allowance levels. Five of the six estimates of k were significantly less than one, with the smallest being obtained for Plan B's Medicare business. These results suggest that the Plans' fee screens generally held physicians' actual allowances below the desired levels, and, at least in Plan B, that Medicare screens were more effective than UCR screens in restraining allowance levels.

However, the estimates of a_1 did not confirm our conjecture regarding the comparative responsiveness of participating and nonparticipating physicians' charge levels to their desired allowances. Contrary to expectations, the estimates of a_1 were larger for nonparticipating physicians than for participating physicians in Plans A and B. In addition, the estimates of k were higher for nonparticipating than participating physicians in both Plans. Thus, it appeared that nonparticipating physicians were more responsive to reimbursement incentives than participating physicians, and that they more nearly achieved their desired allowances as well. The reasons for these apparent differences are not clear.

The estimates of Specification 2 also generally supported the validity of the charge-allowance inflation hypothesis. All six of the estimates of K were significantly positive, indicating that charge levels rise <u>between successive years</u> when lagged desired allowances exceed lagged actual allowances.* Moreover, five of the six estimates of a_1 were positive,

*See equation (4) above.

implying that, in general, charge levels rise when desired allowances rise. On the other hand, in Plan B's Medicare business the estimate of a_1 indicated that a rise in desired allowances induced a fall in the physician's charge level. This conflicts with the charge-allowance inflation hypothesis.

Except for the Plan B Medicare subsample, the estimates of a_1 were reasonably stable between Specifications 1 and 2. Even so, the findings with respect to the relative inflationary pricing behavior of participating and nonparticipating physicians were mixed. Unlike the estimates of a_1 derived from Specification 1, the Specification 2 estimates indicated an equal or higher sensitivity of charge levels to desired allowances among participating physicians than among nonparticipating physicians. But the estimates of K showed that a given increase in the lagged difference between desired and actual allowances, $A^d_{t-1} - A_{t-1}$, stimulated a larger between-year increase in charges, $p_t - p_{t-1}$, among nonparticipating physicians than among participating physicians. Hence, the Specification 2 regressions implied that participating physicians' pricing behavior was at least as inflationary as nonparticipating physicians' in terms of charge levels, but less inflationary in terms of annual changes in charge levels.

Last of all, the estimates of Specification 3 were not consistent with the Hadley-Lee version of the charge-allowance inflation hypothesis. In all subsamples current charges were significantly positively related to the growth rate of allowances.* The estimates also showed that marginal increases in the

*The growth rate of charges was also regressed on the growth rate of allowances for each of the Plan subsamples. The results are not presented, but each of the growth rates of charges was positively and highly significantly correlated with the growth rate of allowances.

growth rate of allowances led to higher rates of charge inflation among participating physicians than among nonparticipating physicians, although results from the pooled samples indicated that the differences were not statistically significant.

The results, shown in Appendix C for the physician samples stratified by major specialty grouping, physician participation status, and line of business (UCR and Medicare) were closely similar to those described here. Unfortunately, the subsamples of nonparticipating physicians were so small that the regressions could not be run on them. For that reason the equations were estimated only for the participating physician subsamples, except in the case of Specification 3 where estimates were obtained from the subsamples of pooled participating and nonparticipating physicians.

For Specification 1, 15 of the 16 estimates of a_1 were positive, and all but three of the estimates of k were significantly less than one. For Specification 2, all of the estimates of K were positive, but six of the 16 estimates of a_1 were negative. For Specification 3, all of the estimates of b_1 were positive and, for the samples pooled across physicians' participation statuses, seven of the eight estimates of b_1' were also positive. Five of the eight estimates of b_2' were negative.

Like the estimates shown in Table 6-12, the estimates of Specification 1 derived from the stratified samples tended to support the charge-allowance inflation hypothesis and to indicate that the Plans prevented physicians from achieving their desired allowances. The estimates of Specification 2 gave mixed and inconclusive results with respect to the hypothesis, and the estimates of Specification 3 were almost uniformly at variance with Hadley's and Lee's conclusions regarding the hypothesis.

Empirical Results: Cross-Sectional Correlates of Charge Levels

Equations (8) and (9) were in the forms

(10) $CPRVU_t = h_o$ + terms in exogenous variables

(11) $CPRVU_t = h_o' + h_1' APRVU_t$ + terms in exogenous variables

respectively, where CPRVU is the average charge over all lines of business and APRVU is the average allowance over all lines of business. The equations were estimated by OLS for the full Plan physician samples with data pooled across lines of business and specialties. The estimated regressions are shown in Tables 6-14, 6-15, and 6-16.

The coefficients on the exogenous variables in (11) are interpreted as the marginal impacts on CPRVU of changes in the exogenous variables, given the value of APRVU. However, APRVU depends on the physician's past charge levels if the physician has fee screen (UCR and, in Plan B, Medicare) business, and, as shown in Chapter V, nearly all of the sample physicians did have substantial portions of fee screen business. To this extent, APRVU undoubtedly captures some of the effects of the exogenous variables on CPRVU, and the coefficients on those variables in (11) may therefore give misleading implications as to the variables' relationships with CPRVU. For this reason most of the following discussion concerns the estimates of (10). A number of additional versions of (10) and (11) were estimated for the Plan samples stratified by line of business and the four basic specialty groupings. These are presented in Appendix C and referred to here as appropriate.

Reimbursement variables. The only systematic and highly significant pattern regarding reimbursement characteristics concerned the charge levels of participating and nonparticipating physicians in Plans A and B. The results indicated that nonparticipating physicians' charges were significantly higher than those of participating physicians in both Plans. This accords with the descriptive

TABLE 6-14
CROSS-SECTIONAL CHARGE REGRESSIONS: PLAN A

Variable	Equation (10) Coefficient	Equation (10) t-ratio	Equation (11) Coefficient	Equation (11) t-ratio
INTERCEPT	.930	1.82	-1.202**	-3.33
NONPART	.197**	8.28	.117**	6.99
APRVU	--	--	1.157**	54.61
PCTIND	-.002**	-5.63	.007**	22.72
LAGPRCLM	-.0002	-.88	.001**	3.75
AGE	-.002	-1.83	-.001	-.98
AMASEX	-.059	-1.26	-.009	-.27
BORDCERT	.009	.35	-.037*	-2.16
FMG	-.011	-.44	-.011	-.63
SPEC_2ND	-.117	-1.50	-.0004	-.01
GROUP	.120**	4.48	.078**	4.11
PARTNER	.044	1.44	.056**	2.59
HOSPEMPL	.206**	4.82	.111**	3.69
OTH_EMPL	.189**	3.33	.084*	2.10
INPAHOSP	-.353**	-9.21	.260**	8.90
OLDRVU	-.106	-.80	.237**	2.53
PCTFEMRV	-.092*	-2.07	-.080**	-2.58
YNGRVU	-.026	-.38	-.088	-1.82
DOCPRCAP	-144.462	-1.88	-90.258	-1.67
INPERCAP	.0002	1.86	.0001	1.00
OVER65	6.950**	3.06	4.150**	2.60
PRCT_URB	.0001	.84	.0001	.76
WAGEINDX	.012	.79	.014	1.30
TIME74	-.046	-.50	-.045	-.68
TIME75	.159	1.30	.002	.02
TIME76	.048	.30	-.054	-.48
PD	-.111*	-2.03	.057	1.46
OMS	.047	1.03	.031	.97
NS	.093	1.25	.166**	3.16
ORS	.741**	13.92	.279**	7.26
OTO	.447**	2.47	.140	1.10
U	.066	1.13	.030	.73
OSS	.340**	4.50	.026	.48
OBG	.308**	6.16	.237**	6.73
OPH	.048	.90	-.035	-.92
AN	.409**	7.73	.139**	3.71
PTH	-.089	-.86	.230**	3.16
P	-.082	-1.50	.239**	6.20
N	.021	.30	.143**	2.84
GP	-.006	-.12	.025	.75
GS	.166**	3.78	.039	1.25
R	.046	.53	-.062	-1.02
DFE	2916		2915	
R^2	.32		.66	
F	33.5		139.0	
PROB > F	.0001		.0001	

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-15
CROSS-SECTIONAL CHARGE REGRESSIONS: PLAN B

	Equation (10)		Equation (11)	
Variable	Coefficient	t-ratio	Coefficient	t-ratio
INTERCEPT	2.174**	12.75	-.616**	-4.80
NONPART	.177**	5.83	.155**	7.26
APRVU	--	--	1.294**	60.57
PCTIND	.003	1.59	.009**	6.89
PCTMED	-.004**	-7.35	.001	1.57
PCTPS	-.003**	-4.27	.010**	21.99
LAGPRCLM	.001*	2.13	.001**	5.38
AGE	-.007**	-6.79	-.001	-1.63
AMASEX	.097*	2.04	.024	.73
BORDCERT	.116**	5.46	.030*	1.98
FMG	.081**	3.45	.018	1.11
SPEC_2ND	.066	.91	.008	.15
GROUP	-.007	-.16	-.019	-.64
PARTNER	.009	.33	.022	1.10
HOSPEMPL	.068	1.79	.046	1.74
OTH_EMPL	.113*	2.22	.219**	6.13
INPAHOSP	-.023	-.58	.091**	3.28
OLDRVU	-.843**	-3.98	.613**	4.08
PCTFEMRV	-.071	-1.22	.018	.44
YNGRVU	-.125	-1.49	-.179**	-3.05
DOCPRCAP	67.714**	3.88	43.465**	3.89
INPERCAP	.0001**	3.67	.0001*	2.27
OVER65	-.947	-1.14	-1.207*	-2.08
PRCT_URB	-.0001	-1.73	-.0001*	-2.31
WAGEINDX	.014*	2.15	-.007	-1.62
TIME74	.049	1.25	.082**	3.00
TIME75	.207**	4.50	.124**	3.82
TIME76	.271**	3.99	.155**	3.25
AREA_2	-.163*	-2.48	-.047	-1.02
AREA_3	-.154*	-2.36	-.008	-.17
PD	-.349**	-6.47	-.116**	-3.04
OMS	.168**	3.84	.073*	2.37
NS	-.406**	-4.92	-.079	-1.36
ORS	.152**	2.77	.215**	5.57
OTO	.242**	3.49	.290**	5.98
U	-.155**	-2.61	.135**	3.22
OSS	.217**	2.94	.337**	6.51
OBG	.001	.02	.134**	3.41
OPH	-.027	-.57	.170**	4.99
AN	.072	1.44	.269**	7.65
PTH	-.355**	-3.12	-.052	-.65
P	.888**	13.10	.738**	15.49
N	.318**	3.86	.060	1.04
GP	-.265**	-6.13	.112**	3.62
GS	-.108**	-2.60	.139**	4.73
R	.198**	2.67	-.055	-1.05
DFE	3562		3561	
R^2	.37		.69	
F	47.4		175.6	
PROB > F	.0001		.0001	

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE 6-16
CROSS-SECTIONAL CHARGE REGRESSIONS: PLAN C

Variable	Equation (10) Coefficient	Equation (10) t-ratio	Equation (11) Coefficient	Equation (11) t-ratio
INTERCEPT	2.407**	17.32	.151	1.47
APRVU	--	--	.994**	61.04
PCTIND	-.0001	-.30	.012**	37.47
LAGPRCLM	.0009**	3.89	.0005**	2.89
AGE	-.006**	-5.32	-.002**	-2.78
AMASEX	-.025	-.44	-.006	-.15
BORDCERT	.033	1.47	.040**	2.61
FMG	.094**	2.75	.015	.66
SPEC_2ND	.235**	3.80	.059	1.38
GROUP	-.096**	-4.03	-.046**	-2.82
PARTNER	-.060*	-2.52	-.035*	-2.16
HOSPEMPL	-.096	-1.64	-.079	-1.95
OTH_EMPL	-.091	-1.64	-.028	-.73
INPAHOSP	-.102**	-3.06	.082**	3.54
PCTFEMRV	-.066	-1.66	-.027	-.98
YNGRVU	.007	.13	.081*	2.12
DOCPRCAP	79.325**	4.10	31.869*	2.39
INPERCAP	.0001*	2.25	.00001	.47
OVER65	-3.180**	-2.97	-.840	-1.14
PRCT_URB	.0002	1.70	.0001	1.12
TIME76	.074*	2.12	-.009	-.38
TIME77	.224**	5.04	.052	1.71
TIME78	.418**	6.56	.010	.23
AREA_2	-.084	-1.83	-.090**	-2.84
AREA_3	.035	.54	-.082	-1.82
PD	.032	.64	-.006	-.17
OMS	.054	1.21	.013	.41
NS	.022	.30	.041	.80
ORS	-.116*	-2.48	-.160**	-4.97
OTO	.598	1.15	.435	1.22
U	-.009	-.19	.008	.25
OSS	.254**	3.57	.279**	5.72
OBG	.068	1.64	.124**	4.36
OPH	-.279**	-4.58	-.057	-1.37
AN	.621**	11.42	.165**	4.33
PTH	-.386**	-3.94	-.079	-1.17
P	.181**	3.49	.232**	6.51
N	.348**	4.07	.116*	1.97
GP	-.097*	-2.32	-.053	-1.82
GS	.145**	3.67	.075**	2.75
R	-.380**	-7.31	-.177**	-4.94
DFE	3343		3342	
R^2	.33		.68	
F	42.0		179.7	
PROB > F	.0001		.0001	

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

tabulations given in Chapter V and also with results reported below in Chapter VIII, where it is shown that the probability of participating in private business was significantly negatively correlated with the physician's average charge level. This finding does not, of course, necessarily imply that participation causes physicians to set relatively low charge levels. It may only imply that physicians with high charge levels have low rates of participation.

For the most part, the composition of the physician's output by line of business was not systematically related to charge levels. Here, the general hypothesis was that large percentages of indemnity or partial service outputs would lead to relatively low charge levels if charges tend to vary with line-of-business-specific allowances. With respect to Plan B's partial service business this appeared to be the case, although an increase of 10 points in PCTPS (the percentage of the physician's RVUs devoted to partial service business) led to a fall of only $.03 in the physician's average charge per RVU. Only in Plan A was CPRVU significantly negatively related to PCTIND (the percentage of the physician's RVUs devoted to indemnity business), and the quantitative effects of PCTIND on CPRVU were small even in this one case. In Plan B, CPRVU was significantly negatively correlated with PCTMED (the percentage of the physician's RVUs devoted to Medicare business), but again the predicted numerical impact of changes in PCTMED on CPRVU was small.

Like the descriptive findings in Chapter V, these results suggest that variations in allowances across lines of business do not greatly affect the physician's overall charge level. We concluded in Chapter V that there was relatively little price discrimination among lines of business--except possibly between private and Medicare business in Plan B--and the estimates of equation (10) are also compatible with that conclusion. On balance, physicians' charge-setting decisions appear not to be heavily influenced by low allowance levels in fee-schedule business.

Although they seem to contradict the foregoing interpretation, the positive and highly significant coefficients on PCTIND and PCTPS in equation (11) are probably misleading. Recall from Chapter V that allowances in indemnity and partial service were substantially lower than those in UCR business. Thus, physicians with large percentages of indemnity or partial service business should tend to have the lowest average allowances. Therefore, if charge levels do not change with the percentage of fee-schedule business, the difference CPRVU - APRVU increases as PCTIND and PCTPS increase. Whenever APRVU is "held constant"--as it is in interpreting the coefficients on PCTIND and PCTPS--it would then tend to appear that charge levels rise as the values of PCTIND and PCTPS increase. But the explanation is more likely that APRVU falls when PCTIND and PCTPS rise, and not that CPRVU rises.

The findings with respect to the other reimbursement variables were mixed. Charge levels were significantly positively related to LAGPRCLM in Plans B and C, suggesting that long payment lags do represent higher unit costs which are translated into higher charges. But the partial correlation in the Plan A sample was negative and not significant.

The Plan area dummies in Plans B and C were hypothesized to capture the effects on overall charges of allowance differences due to differences in UCR and (in Plan B) Medicare Level 2 screens. In Plan B, average charge levels were significantly lower in Plan areas 2 and 3 than in Plan area 1, and the pattern was generally the same in the regressions on the subsamples stratified by specialty and line of business shown in Appendix C. Moreover, in equation (11)--where APRVU was included as an explanatory variable--the Plan B area dummies were not significantly related to charges. This tends to indicate that the "cause" of charge variation across Plan areas was different levels of allowances which, in turn, may have been due to different Level 2 screens. On the other hand, charges were not significantly related to the Plan area dummies in Plan C. Indeed, in Plan C charges were more strongly related to the area dummies in equation (11)--i.e., given allowances--than in equation (10). At least in this Plan there were no material indications that differences in Level 2 screens had any effect on average charge levels.

Physician characteristics. In all three Plans charge levels were significantly negatively associated with the physician's age at the 5% level (using a one-sided test), but no systematic relationships appeared between charge levels and the physician's sex. These findings agree with those derived from the descriptive tabulations in Chapter V.

The proxies for physician quality behaved erratically across Plans. In Plan A, BORDCERT, FMG, and SPEC_2ND were all not significantly associated with charges. In Plans B and C, foreign medical graduates exhibited significantly higher charge levels than U.S. medical graduates. And only in Plan B did board-certified physicians appear to have significantly higher charge levels than other physicians. Likewise, only in Plan C were the charges of physicians' with subspecialties (denoted by SPEC_2ND) significantly higher than those of other physicians. Insofar as these proxies accurately measure physician quality, the results indicate that high quality is not systematically accompanied by high charge levels. The results here are also generally consistent with the descriptive material presented in Chapter V.

As expected, there were many significant differences in charge levels across specialties. In all three Plans, General Practitioners' charges were lower than those of Internists,* and in Plans A and B Pediatricians' charge levels were also significantly lower than those of Internists. The charge levels of Anesthesiologists, Neurologists, and Psychiatrists were relatively high in all three Plans, but there were no systematic relationships between

*Recall that the omitted specialty dummy refers to Internal Medicine.

Internists' charges and those of Pathologists, Radiologists, and the surgical specialists. On balance, the regression estimates--like the descriptive tabulations--suggest that General Practitioners and Pediatricians have the lowest charge levels, and that Internists and most of the referral specialists have the highest.

Practice characteristics. There were no common associations between charge levels and the type-of-practice dummies across Plans, although in Plans A and B physicians in "other employment" settings (denoted by OTH_EMPL) had significantly higher charges than solo practitioners. The results indicate either that the dummies are inadequate proxies for unit cost levels associated with type of practice, or that the differences in unit costs were not large enough to induce systematic differences in charge levels.

In the two Plans (A and B) where data on the proxy for office wage rates (WAGEINDX) were available, the coefficients on the proxy were positive. Since unit costs and equilibrium charges should increase as factor prices rise, the signs on the coefficients are theoretically plausible.

The four patient-mix variables entered the regressions with generally the same signs across Plans. INPAHOSP (the fraction of the physician's RVUs produced for hospital inpatients) appeared with negative coefficients in all three of the Plan regressions and two of the coefficients were significantly negative. This is consistent with the hypothesis that the physician's unit costs fall as the proportion of his business conducted in hospitals increases and that, as a result, his/her equilibrium charge level falls. In Plans A and B, charge levels were also negatively related to the other three measures of patient-mix--OLDRVU, PCTFEMRV, and YNGRVU. In view of the virtual absence of price variation across lines of business, it seems more likely that the relationships indicate the effects of cost differences than price discrimination among patients.

County characteristics. The volume of demand facing the practice was assumed to increase with the values of each of the three county socioeconomic variables, INPERCAP (per capita income), OVER65 (the fraction of the county population aged 65 and older), and PRCT_URB (the percentage of county residents living in urban areas). Hence, other things equal, charge levels were expected to be positively related to all three variables. However, only INPERCAP behaved according to expectations, and results for the other two variables varied across Plans.

Time. In Plans B and C, there were significant upward movements in charge levels due to the passage of "time"--i.e., due to unobservable factors associated with the passage of time and not accounted for by the other exogenous variables. In Plan A, charge levels were not significantly affected by the passage of time. In Plan C, there was an upward drift of charges due to time, but it appeared to be related to upward movements of allowances. That is, after allowances were included as a regressor in the charge regression equation (11), the time dummies were no longer significant. But in Plan B, the time dummies remained significant even after the allowance level was added to the right-hand side of the equation. Obviously, this makes it hard to generalize about time effects on charges in the study Plans. The most that can be said is that time-related influences of omitted variables on charge levels appeared to differ across the three plans.

Physician-induced demand. Unlike the descriptive material presented in Chapter V, the regressions revealed strong relationships between charge levels and county physician-population ratios. In Plans B and C, the coefficients on the physician-population ratio were positive and highly significant. On the other hand, the coefficient on the ratio in the Plan A physician sample was significantly negative at the 3% level using a one-tail test.

According to Reinhardt's test of physician-induced demand, the results for Plans B and C are consistent with demand generation by physicians, and they are not consistent with standard supply-and-demand theory. The results for Plan A are consistent with either the induced-demand hypothesis or standard theory.* If one accepts the validity of Reinhardt's test, these findings indicate that physicians in Plans B and C generated demands, but that there was no evidence of demand generation among Plan A physicians.

Although the findings tend to support the induced-demand hypothesis, the question remains as to why they differed so sharply between Plan A and Plans B and C. Previous research reviewed in Chapter III has also reported conflicting evidence concerning the signs on partial correlations between charge levels and physician-population ratios. But as far as we know, this is the first study to show strikingly different associations between charge levels and physician-population ratios for geographically different samples of physicians during the same, or nearly the same, time period with identical variable definitions and standardizing procedures. Thus, the differences cannot be attributed to differences in time or research methodology.

There are, of course, several ways of interpreting or explaining the

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*More particularly, under standard theory an outward shift in the market supply function--represented here by an increase in the physician-population ratio--leads to a fall in market price when the demand function is fixed. But when demand generation shifts the market demand function outward as the supply function shifts outward, the equilibrium market price may rise, remain constant, or fall, depending on the amount of demand generation that actually takes place. Further results are reported in Chapter VII, where a different approach is used to test the PIDTI hypothesis.

disparities. For example, the results could be taken as showing that physicians can generate demands but do not always do so. It might also be that some unobserved factor associated with physicians' regional locations (for example, their educational backgrounds) is a determinant of the degree to which they induce demands. Or it could be speculated that any of the empirical phenomena cited in Chapter III which tend to distort relationships between charges and physician-population ratios--border-crossing by patients into physician-dense areas, differentials in service quality or standards of medical practice between physician-poor and physician-dense areas, etc.--account for the different results.

Each of these considerations raises difficulties for interpreting the findings. On the one hand, they indicate that demand generation is not a pervasive aspect of physicians' economic behavior, and, indeed, that there is a missing and crucial element in the induced-demand hypothesis that tells when physicians do and do not induce demands. On the other, they suggest that considerably more empirical information than was available to us (or to similar studies) may be necessary to carry out a reliable test of the hypothesis. In either event, the results described here cannot be called conclusive because of their lack of consistency across Plans.

<u>Results from the stratified samples</u>. Equations (12) and (13) were also estimated for the physician subsamples stratified by Plan, line of business, and major specialty grouping (General Practice, Medical Specialties, Surgical Specialties, and Other Specialties). To derive the estimates, charges and allowances were defined separately for each of the cell classifications, and the line-of-business explanatory variables were deleted. The estimates are shown in Appendix C. Predictably, they varied somewhat across all three

of the sample stratifiers, but their principal implications can be summarized as follows.

--As was the case with the findings described above, NONPART was the only explanatory variable consistently related to charge levels. Among the Plan A specialty groupings, the coefficients on NONPART were positive and generally significant, but in Plan B the coefficients were positive and significant only for General Practitioners and Medical Specialists. No systematic patterns emerged between charge levels and the Plan area dummies, and coefficients on these variables were almost all not significant. When its coefficients were significant, LAGPRCIM entered the specialty regressions positively except for the Surgical Specialties subsamples.

--Coefficients on allowance levels (APRVU) in equation (13) ranged from about 1.0 to 1.3 in all three Plans' UCR business and had the same range of values in Plan B's Medicare business. Coefficients on indemnity, and, in Plan B, partial service allowances were slightly to moderately lower--from .4 to 1.2--and had lower t-ratios as well. This should not necessarily be interpreted as showing that physicians' charges are more sensitive to fee screen allowances than to fee schedule allowances. The latter were almost all constant during the study periods, and for that reason it is natural to expect weak associations between charges and fee schedule allowances. What is surprising is the apparently high sensitivity of UCR and Medicare charges to their respective allowances, which indicated that a unit increase in allowances was typically associated with a slightly larger-than-unit increase in charges.

--Charge levels were relatively weakly related to physician age and not systematically related to the physician's sex. Among Surgical Specialists in all three Plans there was some tendency for charges to fall with the physician's age. For physicians in other fields the tendency was less pronounced and varied by Plan or line of business.

--Increases in physician quality as measured by board certification, U.S. medical school graduation, and subspecialization also had relatively weak effects on charge levels. In Plan B higher charge levels were associated with board certification among Medical Specialists, and, in Plan C, among Surgeons. Surgeons in Plan B and General Practitioners in Plan C who were foreign medical graduates had significantly higher charge levels than their U.S.-educated counterparts. All other results were mixed or nonsignificant.

--Surgeons' charges varied with their type of practice in all three Plans, and General Practitioner's charges were unrelated to type of practice in all three Plans. Among Medical Specialists and Other Specialists there were few indications of charge variation by type of practice in Plans A and C. None of the relationships between charges and type of practice were systematic across Plans.

--Charge levels varied significantly with some of the patient-mix variables among all of the specialty groupings but for the most part the relationships were not systematic. Among all General Practitioners and Surgeons, charges tended to fall with the fraction of RVUs produced for hospital inpatients, but among Medical Specialists and Other Specialists, higher fractions of inpatient RVUs did not have a consistent impact on charge levels.

--The only county socioeconomic characteristic significantly associated with charges was income per capita. Surgeons' and Other Specialists' charges rose with income per capita, but results for General Practitioners and Medical Specialists were mixed and mostly not significant.

--Coefficients on the specialist-population ratio in the physician's field were generally not as significant as those on the overall physician-population ratio in the regressions described above. In Plan A, they were significantly negative for Surgeons and Other Specialists, but generally positive and not significant for General Practitioners and Medical Specialists. Thus, the negativity of the coefficients in the regressions pooled over specialties may have been due to the negativity of the coefficients for Surgeons and Other Specialists. In Plan B, on the other hand, the coefficients for Other Specialists were positive and significant in all lines of business, and they were positive and significant for Surgeons in the two principal lines of business--UCR and Medicare. For General Practitioners they were positive and significant only in Medicare business, and for Medical Specialists they were not significant in any of Plan B's lines of business. In Plan C, coefficients on the specialist-population ratio were positive but not significant for Surgeons and Other Specialists, significantly positive for General Practitioners, and positive and significant for Medical Specialists only in UCR business.

Although compatible with results derived from the regressions with pooled specialties, the relationships between charge levels and specialist-population ratios revealed by the stratified regressions add another dimension of complexity to the issue of physician-induced demand. There were virtually no consistent and significant associations between charges and specialist-population ratios across specialty groupings and lines of business. Like the findings discussed above, this tends to indicate that demand inducement--if it exists--is not a universal characteristic of physician behavior. Not only did there appear to be regional variation in the incidence of demand generation, but considerable interspecialty variation as well.

Summary

Three principal issues were explored in this chapter: whether physicians exploit fee screen (i.e., Medicare and UCR) reimbursement systems in order to inflate their charge levels; whether other reimbursement mechanisms have restraining effects on charge levels; and the impact of physician supply on charge levels. The empirical relationships between charges and a group of physician, practice, patient, and county socioeconomic characteristics were also examined.

Three regression specifications were used to study the hypothesis that fee screen reimbursement is inflationary. The results were found to be highly sensitive to the manner in which the hypothesis was formulated.

The first specification indicated that (i) physicians do attempt to raise their charges in order to achieve increases in their desired fee screen allowances, and that (ii) physicians were generally not able to raise their actual allowances up to the desired levels. The second specification indicated that (i) physicians do not systematically raise their charges in order to achieve their desired allowances, but (somewhat contradictorily) that (ii) they raise their charges when actual allowances fall below desired allowances. Estimates of the third specification showed that charge levels increase with the growth rate of actual allowances. Previous researchers have argued that charges should decline with the growth rate of actual allowances if the charge-allowance inflation hypothesis is valid. On this basis, the results obtained from the third specification must be viewed as contradicting the hypothesis.

In light of these conflicting findings, some effort must, of course, be made to assess the soundness of the test specifications. While no definitive evaluations are possible, we believe that the first specification is the most reliable of the three. The second is technically overidentified, and, as has been shown, it can lead to implausible implications for physicians' intertemporal pricing behavior. Interpretation of the estimates derived from the third hinges essentially on a conjecture regarding charge levels and the growth rate of actual allowances, and the conjecture itself is of doubtful validity.*

In addition, the result from Specification 1 that physicians are not ordinarily able to achieve their desired allowance levels has an intuitively appealing explanation. It probably reflects the impact of Level 2 screens which were used in each of the study Plans' fee screen business. That is, the statistical conclusion that the "average" physician failed to achieve his/her desired allowance level may be due to the behavior of physicians whose Level 1 screens exceeded their Level 2 screens.

In principle, a physician can achieve his/her desired allowance next year, provided it does not exceed the Plan's Level 2 screen, simply by setting his current charge high enough. Thus, if he does not realized his desired allowance, it is presumably because the desired allowance is above the Level 2 screen. Unfortunately, it was not possible to identify physicians whose Level 1 screens exceeded the Level 2 screens, but it is reasonable to believe that some were included in the physician samples. To the extent that they

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*More specifically, it was hypothesized that low growth rates of actual allowances signify growth rates of desired allowances <u>above</u> the actual rates. Hence, the difference between the desired and actual rates increases as the actual growth rate falls. If physicians attempt to raise actual allowances when they fall below desired allowances, it follows that their incentives to raise their charges should increase as the growth rate of actual allowances falls. What we argued was that low growth rates of actual allowances need not indicate that desired allowances are growing more slowly than actual allowances. And, if this is the case, one cannot reliably predict the observed association between charge levels and the growth rate of actual allowances when the charge-allowance inflation hypothesis is true.

were, it would appear that "on the average" physicians did not succeed in reaching their desired allowance levels. If this interpretation is correct, it also implies that physicians are least likely to achieve their desired allowances in fee screen lines of business where Level 2 screens are the lowest. In Plan B, Medicare Level 2s were lower than UCR Level 2s, and physicians should therefore have been less able to achieve their desired allowances in Medicare business than in UCR business. The estimates of Specification 1 for Plan B conformed with this prediction, and they strengthen our interpretation.

The policy implications of the Specification 1 estimates are straightforward. Cost containment in the Medicare and private UCR programs is contingent on restraining the growth of paid benefits, and, neglecting deductibles, paid benefits are fixed proportions of allowances under both progrsms. The Specification 1 estimates indicate that physicians generally attempt to set charge levels so as to achieve their desired allowances, and this means that paid benefits would increase if physicians were permitted to achieve their desired allowances. The estimates suggest further that the Level 2 screens prevented physicians from achieving these desired allowances. Hence, the results underscore the desirability of limiting the sizes and growth rates of Level 2 screens such as has been done in the Medicare and Medicaid programs.

Whether one regards fee screen reimbursement as automatically inflationary depends on one's viewpoint. In the absence of Level 2 screens, our evidence indicates that it is. However, Level 2 screens, which are not greatly different from scheduled fees, can be controlled in a variety of ways to yield any given ceiling level or ceiling growth rate of actual allowances. The frequency of updating Level 2s can be reduced, the base percentiles of area fee distributions can be lowered, the growth rates of Level 2s can be restricted, and so forth. In this sense, fee screen reimbursement systems are not inevitably more inflationary than fee schedule systems; the differences between the two methods are quantitative rather than qualitative. Indeed, in the extreme case where Level 2 screens are set so low that they are always lower than Level 1 screens (and are consequently equal to physicians' allowances), fee screen and fee schedule reimbursement systems become operationally identical.

Among the small group of other reimbursement characteristics we were able to study, charges were significantly related to only two--the physician's participation status and output composition by line of business. But in the first instance, where nonparticipating physicians were found to charge higher amounts than participating physicians, it is not clear that the relationships represent cause and effect. In Chapter VIII, for example, the evidence suggests that high-priced physicians have weaker incentives to participate than do low-priced physicians. Logic tends to support the evidence, and if it is correct, physician participation cannot be regarded as a device for constraining the growth rate of charges.

Moreover, although they indicated that charges frequently decline with the percentage of the physician's physical output provided to Medicare, indemnity, and partial service patients, the findings concerning output composition were not numerically important. The initial hypothesis was that charges should decline with the proportion of the physician's business provided in the relatively low-allowance lines if overall charge levels are influenced by allowances. But the results showed that large increases in low-allowance business would be accompanied by negligible reductions in charges. The most likely explanation of these results is one we advanced in Chapter V--namely, that there was little charge variation across lines of business. In examining the results here, it appears that physicians' overall charge levels are set in accordance with UCR reimbursement, market charge levels, or reimbursement and revenue opportunities in business outside our samples of data. Given the little fee variation (or fee discrimination) across lines of business, one would therefore not expect to observe charges falling substantially as the percentages of output provided in the low-allowance lines of business increase.

This does not mean that allowances have no impact on charge levels. What it does suggest is that changes in allowances in one line of business--such as Medicare--are unlikely to influence overall charge levels or charge levels in that line of business to an appreciable degree. Physicians normally sell to uninsured patients and patients insured by a variety of different programs. Hence, if they discriminate little in price across lines of business, it stands to reason that their pricing policies will be relatively insensitive to minor changes in reimbursement affecting small shares of their revenues.

This conclusion is a pessimistic one for government policy to limit fee inflation through reimbursement controls applied only to the Medicare and Medicaid programs. It may be that a drastic curtailment of Medicare or Medicare allowances (and benefits) would significantly slow the growth rate of charges because of the loss of patients and revenues to physicians. However, the action itself would severly limit access to physicians' care under the programs due either to increases in the net prices of services or physicians' refusal to serve program beneficiaries. The potential savings in government costs would need to be balanced against reduced access to care.

On the basis of the evidence presented here, the prudent course is to continue modest efforts to contain Medicare and Medicaid costs using controls on allowances and benefits. Although they should not have a major effect on overall charge inflation, they are likely to have a moderating influence on the rising costs of these two programs.

The third important issue considered in this chapter--the prevalance of physician-induced demand--promises to become more, rather than less, significant in the next decade. The supply of physicians has increased rapidly since the early 1970s, and some forecasts now predict a large surplus of physicians by 1990. If an increase in the number of competitors does motivate physicians to generate demands, this growth in the supply of physicians should have a profound inflationary impact on the costs of government and private health insurance programs. In addition, pervasive demand generation by physicians means that policies to retard this form of cost inflation through controls on fees will increase the quantity of services per patient and fail to constrain the rise in costs. Ultimately, then, demand generation implies that successful cost containment programs must regulate the supply of practitioners, fee levels, and utilization rates.

The evidence given in this chapter is based on a test holding that demand generation exists if market charge levels are positively related to the market physician-population ratio. A negative association between charge levels and the physician-population ratio is inconclusive.

The evidence produced by our test was distinctly mixed. In two of the Plans, the results for physicians pooled across specialties and lines of business showed statistically significant evidence of demand generation. In the third Plan, charge levels were significantly negatively related to the physician-population ratio. When the physician samples were stratified by Plan, major specialty grouping, and line of business, the results were even more varied. There were virtually no systematic associations between charge levels and specialist-population ratios that held across these three classifiers.

In terms of their empirical and policy implications, the most plausible interpretations of these findings are that (i) physicians can generate demands but do not necessarily do so, and (ii) the forces or motives for demand inducement vary considerably among groups of physicians without a discernible pattern. The demand generation hypothesis implies uncertainty as to the degree of demand inducement, which could be randomly distributed among the physician population. The degree of inducement may also be related to physicians' educational backgrounds, or it may occur only when some threshold physician density--perhaps varying by specialty--is reached. In any event, the evidence shows that demand generation either is not a general phenomenon or else cannot reliably be established with the kind of test used here.

It is worth observing that the findings also showed relatively few systematic correlates of charge levels among the various other practice and area area characteristics used as standardizing variables in our regressions. There was no strong evidence that charges were related to our proxies for physician quality. The charges of group physicians were neither consistently higher nor consistently lower than the charges of solo physicians. Variables representing patient-mix entered may of the regressions significantly, but the sign patterns of their coefficients varied across Plans and specialties. On balance, charge levels tended to rise with county per capita income, but it was found that county socioeconomic characteristics, including those omitted from the final regressions, were generally highly intercorrelated. Thus, the observed relationships between charge levels and affluence of the county could have been produced by other factors associated with population income.

As a consequence, it is difficult to summarize the nature and effects of forces operating on "the" physician's charge setting policies. Prior studies have also frequently reported mixed and ambiguous results in attempting to estimate the correlates of individual physicians' charges. We can therefore interpret the findings as showing--within limits--that product differentiation has little impact on physicians' pricing behavior. If, as many observers have argued, product differentiation is an element of structure in the physicians' services markets, it appears to have little influence on pricing. On that basis, one might question whether product differentiation is as significant a factor in these markets as is widely believed. In this case and others, the results described in this chapter highlight the dangers of overgeneralizing about behavior in the physicians' services markets. Although "the" physician is an appropriate concept for theoretical models, it appears hard to demonstrate that an average, typical, or modal form of physician pricing behavior exists.

CHAPTER VII

ECONOMETRIC MODELS OF PHYSICIAN PRICING AND OUTPUT DECISIONS

This chapter presents estimates of the econometric models of physician pricing and output behavior described in Chapter IV. Two principal policy issues are examined: (i) the nature of physicians' optimizing behavior--whether it is of the profit-maximizing, utility-maximizing, or target-net-income-achieving type--and the companion question of whether physicians generate demands; and (ii) whether physicians' pricing behavior can be characterized as competitive or monopolistic. The first issue is explored partly in terms of relationships between the physician's marginal revenue and marginal costs, and partly in terms of the effect of the physician-population ratio on the demand functions facing the practitioner. The second is examined in terms of price-quantity relationships in those same demand functions.

The Models

In view of the discussion given in Chapter IV, only a summary and overview of the basic models will be given here. The major hypotheses and assumptions used in formulating the models are:

(i) The practice has a separate average revenue function for each submarket defined by patients' insurance status. The submarkets consist of one or more of the following: UCR, indemnity, partial service, Medicare, and a residual (and unobservable) other submarket.

(ii) The practice produces the same service in all submarkets, its cost function is of the single-product type, and its marginal cost is not affected by its allocation of outputs among submarkets.

(iii) As a testable proposition, it is hypothesized that average revenue functions facing the practice are downward sloping in quantity in submarkets where it does not or cannot (e.g., as in indemnity business) participate. Because Medicare claims were not segregated by assignment status, it is also hypothesized that the Medicare average revenue function facing the practice is downward sloping in quantity. A test of the first proposition is used to establish whether practices are predominantly "competitive" or "monopolisitc." A test of the second hypothesis is not relaible because aggregating the physician's assigned and unassigned claims increases the apparent elasticity of his Medicare average revenue function.

(iv) In submarkets where the practice participates, its average revenue is fixed or predetermined at an allowance level set by the Plan. That is, the average revenue functions facing the participating practice are infinitely elastic at the average allowance level. However, the maximum quantity demanded in each such submarket is finite.

(v) In Plans A and C the amounts charged on nonparticipating UCR and indemnity claims are equal, i.e., physicians set a single level of charges in the Plans' private business. In Plan B physicians also set a single charge level over all lines of private nonparticipating business, but they may set different charge levels in private and Medicare business.

Assumption (i) is based on the usual convention that submarkets can be regarded as segmented if buyer crossover between submarkets is impossible or minimal. The assumption is a reasonable one because subscribers are presumably covered by only one type of Blue Shield contract, and Medicare eligibles are presumably not covered by both Medicare and basic Plan contracts.

Buyer crossover is therefore confined to the (probably very) few persons who switch coverage during the year.

Assumption (ii) is also a reasonable one, although there may be minor variations in service quality or amenities across lines of business. The assumption is strengthened by the finding from Chapter V that there was little charge variation across lines of business.

Item (iii), as indicated, is a verifiable hypothesis.

Assumption (iv) is based on the institutional structure of Plan reimbursement for participating physicians described in Chapter II.

Assumption (v) is derived from the Chapter V result that the physician's charge levels were essentially the same over the Plans' private lines of business. In Plan B some of the descriptive evidence indicated that Medicare charges were lower than those in private business, and on these grounds it is assumed that a separate Medicare average revenue function exists for Plan B physicians. Otherwise, the average revenue functions for private nonparticipating services are aggregated together into single "private business" average revenue functions.

In effect, the models consist of an average revenue function and optimality equation for nonparticipating services, and an optimality equation alone for participating services. Each of the optimality equations is derived from the <u>identity</u>

(1) $$R' = C' + M,$$

where R' is the physician's marginal revenue, C' is marginal cost, and M is a markup accounting for deviations between marginal revenue and marginal cost. Observe that (1) applies to <u>any form of optimizing behavior whatever</u>, provided that marginal cost C' exists. The equation involves no special assumptions or conditions regarding the physician's objectives or pricing and output behavior.

Although we had no data on the physician's production costs, they are not actually necessary to estimate equation (1). After replacing R', C', and M with their assumed (linear) functional forms, (1) becomes an equation in endogenous and exogenous variables which can be incorporated in a model of pricing behavior. Unfortuantely, however, the lack of direct estimates of C' presents problems in identifying the parameters of the markup function M, since M and C' may both contain constant terms and may be functionally related to the same variables. This is discussed further below.

Note that by assumption (iv) R' is just the participating physician's mean allowance level, which is predetermined. Hence, for participating physicians the optimality equation (1) constitutes the only equation in the system. But for nonparticipating physicians the average revenue function also generates an estimate of R', so that in this case the average revenue function and optimality equation must be estimated simultaneously. The endogenous variables in the models are the quantities of services expressed as numbers of RVUs and the amounts charged for private nonparticipating and (in Plan B) Medicare services.

Equation (1) provides for a test of the null hypothesis that physicians maximize profit against the alternative that they maximize utility or seek target net incomes. That is, the practice maximizes profit if and only if the markup term M = 0. To implement this test, M was defined as a function of certain physician and practice characteristics specified below. It was assumed that the value of the markup function varies with these characteristics if the physician maximizes utility or seeks a target net income. Hence, these characteristics enter the optimality equations nonsignificantly as a group if and only if the physician maximizes profit. If one or more of the characteristics appear significantly in the optimality equations, the appropriate inference is that physicians do not maximize profit.

The model then provides a subsidiary test for determining whether physicians maximize utility or seek target net incomes. The county physician-population ratio is included as an exogenous variable in the average revenue functions for nonparticipating services. If physicians can and do generate demands, the average revenue functions must shift outward as the physician-population ratio increases. Thus, significantly positive coefficients on physician-population ratios in the average revenue functions for nonparticipating services can be regarded as evidence of demand generation and, *ipso facto*, as evidence of target net income achieving behavior.* *Given a rejection of the profit maximization hypothesis*, the second step therefore consists of examining the coefficients on physician-population ratios in the nonparticipating average revenue functions. If the coefficients are significantly positive, the result implies that physicians attempt to achieve target net incomes. If the coefficients are not significantly positive, the result implies that physicians maximize utility.**

Unfortunately, as was explained in Chapter IV, both parts of the test for physicians' optimizing behavior can be distorted. For example, the

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* As argued in Chapter IV, there should not appear to be evidence of demand generation if physicians maximize either profit or utility. In both cases it pays the physician to induce the maximum amount of demand regardless of the size of the physician-population ratio. As a result, average revenue functions should not appear to shift outward as the physician-population ratio increases.

** It should be emphasized that this test is different from, and physician and practice characteristics specified as exogenous variables in the markup function may also be related to marginal costs. Thus, they may enter the optimality equations significantly because of their relationships with marginal costs, and not because the markup function varies with physicians' preferences. This tends to bias the first part of the test toward rejection of the profit maximization hypothesis. On the other hand, if the markup function is nonzero but also independent of the given physician and practice characteristics (i.e., dependent instead on omitted or unobserved variables), the test is biased toward acceptance of the profit maximization hypothesis. Similarly, the second part of the test can be distorted by any of the factors mentioned in Chapters III and VI which lead demand functions to shift outward with the physician-population ratio over and above the effects of demand inducement. All of these factors bias the second part of the test toward acceptance of the target net income hypothesis.

Since it is not possible to evaluate the amount of test bias with the available data, the best that can be done is to summarize the most plausible implications of the test outcomes. This is done in the following table which, with slight changes in nomenclature, is taken from Chapter IV. (See p. 310 for table.)

As already remarked, the test for the degree of competitiveness of local markets is performed on the private-business, nonparticipating average

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stronger than, the test for demand generation carried out in Chapter VI. In Chapter VI the physician-population ratio was included as an explanatory variable in a reduced-form price equation. That equation was <ins>not</ins> an average revenue function, and the test for demand generation is inconclusive when the coefficient on the ratio is zero or negative. Here the test is theoretically conclusive. A zero or negative coefficient on the physician-population ratio yields the stronger result that physicians do <ins>not</ins> generate demands.

Test Outcomes	First Part/Null Hypothesis: Profit Maximization	Second Part/Null Hypothesis: No Demand Generation	Inference Regarding Optimization Behavior
1	Accept	Accept	Profit maximization, possibly utility maximization
2	Accept	Reject	Inconclusive, but possibly target income achieving
3	Reject	Accept	Utility maximization
4	Reject	Reject	Targetincome achieving

revenue functions. The quantity of services is specified as a variable on the righthand sides of the functions, and zero values of the coefficients on the variable are indicative of perfectly competitive local markets. Other things equal, large, negative values of the coefficients yield low elasticities of demand which are indicative of noncompetitive local markets. The test is confined to the average revenue functions for nonparticipating services because on participating services the practice is a price taker and the amount charged has no bearing on the quantity of services demanded by patients.* As also remarked, the test applied to Medicare average revenue functions may be unreliable because we were forced to aggregate assigned and unassigned claims. On assigned claims the amount charged by the physician does not affect Medicare quantity demanded.

The submodels fitted to the Plans' physician data are shown in

* Recall from Chapter II that the net price of participating services to patients is the difference between the amount allowed by the Plan and the amount paid by the Plan.

abbreviated form in Table 7-1. CPRVU and RVU, with or without numbers attached as suffixes, are endogenous. They stand for the amounts charged per RVU and the number of RVUs, respectively. APRVU1 and APRVUMIN are the predetermined amounts allowed per RVU. Definitions of each of these variables and the exogenous variables used in the submodels are given below in Table 7-2.

Separate equation systems were estimated for participating and nonparticipating physicians because of the different characteristics of their average revenue functions. The physician's participation status was taken as predetermined, and no attempt was made to model the participation decision itself. Finally, no effort was made to pool the data across Plans because of the descriptive findings in Chapters V and VI indicating differences in physician pricing behavior across Plans--especially with respect to demand inducement.

Four different submodels of the practice were specified in Chapter IV. In accordance with the five assumptions listed at the beginning of this section, the submodels were fitted to the Plan data as follows.

Model Number	Assumptions	Model Fitted to Data on
1	Physicians do not participate; no price discrimination across lines of business	Nonparticipating physicians in Plans A and C (no participation agreement in Plan C)
2	Physicians do not participate; price discrimination across lines of business	Nonparticipating physicians in Plan B with Medicare business defined as nonparticipating and possible price discrimination between Medicare and private business
3	Physicians participate; no price discrimination across lines of business (indemnity, Medicare) where participation does not apply	Participating physicians in Plans A and B

TABLE 7-1

SPECIFICATION OF SUBMODELS FOR PARTICIPATING PHYSICIANS

Plan A

Indemnity Average Revenue Function:

$$CPRVU2 = a_0 + a_1 RVU2 + \text{terms in exogenous variables}$$

Indemnity Optimality Equation:

$$CPRVU2 = c_0 + c_1 RVU1 + (c_1 - a_1) RVU2 + \text{terms in exogenous variables}$$

UCR Optimality Equation:

$$RVU = h_0 + (1/c_1) APRVU1 + \text{terms in exogenous variables}$$

Plan B

Medicare Average Revenue Function:

$$CPRVU3 = b_0 + b_1 RVU3 + \text{terms in exogenous variables}$$

Medicare Optimality Equation:

$$CPRVU3 = d_0 + (c_1 - b_1) RVU3 + c_1 RVU15 + \text{terms in exogenous variables}$$

UCR/Partial Service Optimality Equation:

$$RVU = h_0 + (1/c_1) APRVUMIN + \text{terms in exogenous variables}$$

$a_1 \equiv$ indemnity average revenue function slope; $b_1 \equiv$ Medicare average revenue function slope; $c_1 \equiv$ marginal cost function slope.

TABLE 7-1 (Continued)

SPECIFICATION OF SUBMODELS FOR NONPARTICIPATING PHYSICIANS

Plans A and C

UCR/Indemnity Average Revenue Function:

$$CPRVU = a_0 + a_1 RVU + \text{terms in exogenous variables}$$

UCR/Indemnity Optimality Equation:

$$CPRVU = c_0 + (c_1 - a_1) RVU + \text{terms in exogenous variables}$$

Plan B

UCR/Partial Service Average Revenue Function:

$$CPRVU15 = a_0 + a_1 RVU15 + \text{terms in exogenous variables}$$

Medicare Average Revenue Function:

$$CPRVU3 = b_0 + b_1 RVU3 + \text{terms in exogenous variables}$$

UCR/Partial Service Optimality Equation:

$$CPRVU15 = c_0 + (c_1 - a_1) RVU15 + c_1 RVU3 + \text{terms in exogenous variables}$$

Medicare Optimality Equation:

$$CPRVU3 = d_0 + c_1 RVU15 + (c_1 - b_1) RVU3 + \text{terms in exogenous variables}$$

$a_1 \equiv$ private business average revenue function slope; $b_1 \equiv$ Medicare average revenue function slope; $c_1 \equiv$ marginal cost function slope.

Model 4, which was designed for participating physicians who discriminate across nonparticipating lines of business--i.e., the lines to which participation does not apply--was originally formulated for Plan B participating physicians. The hypothesis was that these physicians may discriminate in their charge levels between Medicare and indemnity business, and thus that they may perceive a separate average revenue function for each line. But after a trial attempt to estimate Model 4 for Plan B data, it was found that the volume of physicians' indemnity outputs was too small in the first three years of the sample period to provide reasonably reliable results. For this reason it was decided to omit the indemnity equations from the model. Because the model required at least two lines of business for nonparticipating claims, deletion of the indemnity equations forced us to abandon the model itself. Instead, Model 3 was fitted to the Plan B data on participating physicians with Medicare business defined as the single "nonparticipating" line. The same model was fitted to Plan A data on participating physicians, but with indemnity business defined as the single "nonparticipating" line.

As shown in Chapter IV, there are linear constraints across equations on the coefficients of Models 2 and 3, and in Model 3 there are nonlinear constraints besides. It was not possible to estimate Model 3 under the nonlinear constraints, but the linear constraints in Models 2 and 3 were incorporated into the estimation procedure.

Data and Variables

The data used to estimate the models were the claims records of 191 participating and 93 nonparticipating physicians in Plan A, 208 participating and 79 nonparticipating physicians in Plan B, and 199 physicians in Plan C. The periods of observation were 1973-76 for Plans A and B, and 1975-78 for Plan C.

A large amount of core capacity was required to estimate the models using the procedure described below, and a ceiling of roughly 200 physicians was consequently imposed on the sample sizes. Partly to satisfy this restriction and partly to assure stability in the sample compositions, only physicians (i) having UCR claims in all four years of the sample periods and (ii) whose participation statuses did not change during the sample periods were initially included. The numbers of participating physicians in Plan B and all physicians in Plan C were still too large, and they were reduced by choosing 39% and 33% random samples, respectively, of the candidates satisfying the initial criteria. The number of nonparticipating physicians in Plan B was then deemed to be too small, so the sample in this case was redefined to include all physicians with three or more consecutive years of UCR claims, but otherwise satisfying criterion (ii).

Table 7-2 lists and defines the variables used in estimating the models. In Chapter IV the exogenous variables were divided into three separate groups: those affecting nonparticipating average revenue functions, the physician's marginal cost function, and the physician's markup function (reflecting deviations between marginal revenue and marginal cost). They were labeled X_t, Z_t, and Y_t. We next briefly discuss each of these three groups of exogenous variables.

(i) Demand variables (X_t). In addition to the time and specialty dummies used as exogneous variables in the Chapter VI regressions, four county-level and nine physician variables were chosen as shift influences on the practice's average revenue function. The first four are county per capita income (INPERCAP), the fraction of the county population aged 65 and older (OVER65), the percentage of the county population living in urban areas

(PRCT_URB), and the number of all physicians per capita (DOCPRCAP). Increases in each of the first three variables should shift the physician's average revenue function outward inasmuch as they signify increases in patients' ability to pay, lower patient health status, and reductions in patients' travel time costs, respectively. The inclusion of DOCPRCAP provides for the second part of the test regarding physicians' optimizing behavior.*

The physician-specific variables were dummies indicating board certification (BORDCERT) and graduation from a foreign medical school (FMG); the physician's age (AGE), sex (AMASEX), and possession of a subspecialty (SPEC_2ND); and dummies denoting group practice (GROUP), partnership practice (PARTNER), practice in a hospital (HOSPEMPL), and practice in a non-hospital institutional setting (OTH_EMPL). The deleted mode-of-practice dummy denotes solo practice or practice in an expense-sharing arrangement. BORDCERT and SPEC_2ND are proxies for high physician quality. FMG is a proxy for low perceived (by patients) physician quality. Thus, average revenue was expected to be positively related to BORDCERT and SPEC_2ND, and negatively related to FMG. The other physician variables are proxies for real or perceived product differentiation, but no *a priori* expectations were placed on their relationships with average revenue.

Sixteen specialty dummies were added to the list of exogenous variables to standardize for interspecialty differences between the positions of average revenue functions. The omitted specialty dummy refers to Internal

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*Other county-level variables such as the median level of schooling, the percentage of minorities, the percentage of the poor, the number of hospital beds per capita, etc., were considered but abandoned when it was found that virtuall of the county variables were highly pairwise correlated.

Medicine. Time dummies were included to capture the effects of autonomous intertemporal shifts in average revenue functions, and a final variable--the percentage of the physician's RVUs provided to indemnity subscribers (PCTIND)--was specified to standardize for the composition of demands facing nonparticipating practices

(ii) Cost function variables (Z_t). The exogenous variables specified in the marginal cost function were four measures of the physician's patient-mix, the mode-of-practice dummies just defined, the average lag between filing for a claim and claim payment (LAGPRCLM),* a measure of physicians' office staff wage rates in the county of practice (WAGEINDX), the 16 specialty dummies, and three time dummies. The measures of patient-mix are the fractions of the physician's RVUs produced in hospitals (INPAHOSP), for female patients (PCTFEMRV), for patients aged 14 and younger (YNGRVU), and for patients aged 65 and older (OLDRVU).

Increases in LAGPRCLM and WAGEINDX should raise the physician's marginal cost function. If there are economies of scale in large practices and in hospital and institutional settings, the mode-of-practice dummies (indicating practice at scales larger than the solo level) should be negatively related to marginal costs. Large values of INPAHOSP should shift the marginal cost function downward. No predictions were attached to the effects on marginal costs of the other patient-mix variables, the specialty dummies, or the time dummies.

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*Strictly speaking, the payment lag--used as a proxy for interest foregone on delayed payments--only affects the marginal costs of participating physicians. On nonparticipating claims patients bear the costs of delayed payments. However, long payment lags on nonparticipating claims may delay the subscriber's payment to the physician, which increases his/her costs, and for this reason LAGPRCLM was included in the marginal cost function for both participating and nonparticipating physicians.

(iii) Markup variables (Y_t). The nine physician and practice characteristics listed as potential influences on average revenues were designated as the exogenous variables in the markup function. They are BORDCERT, FMG, SPEC_2ND, AGE, AMASEX, GROUP, PARTNER, HOSPEMPL, and OTH_EMPL. If physicians do not maximize profit, the direction and size of the markup--the deviation between marginal revenue and marginal cost--should be related to one or more of these proxies for physicians' tastes or attitudes toward income.

As remarked above, all of these variables may be related to marginal cost. Since they and the cost function variables appear together in the optimality equations, this makes it hard to tell when their coefficients signify the effects of markups and when they signify the influence of marginal costs. All the same, certain inferences can be made with a reasonable degree of confidence. For example, nonsignificant coefficients on the markup variables would suggest that the markup does not vary with physicians' tastes, inasmuch as the alternative explanation is that the relationships between the nine variables and markups are exactly cancelled by the relationships between the variables and marginal costs. Furthermore, coefficients with signs indicating perverse relationships with marginal costs--e.g., negative and positive signs, respectively, on the quality proxies BORDCERT and FMG--might be taken as showing that the designated markup variables do, in fact, influence markups rather than marginal costs.

Estimating the Models

In the presentation of the models in Chapter IV, it was shown that each of the equations contains a term in unobservable non-Blue Shield output

TABLE 7-2

LIST AND DEFINITIONS OF VARIABLES

Variable	Definition
	Endogenous and Dependent Variables
$CPRVU_t$*	Practice's average amount charged per RVU over all observed businesses in year t
$CPRVU2_t$	Practice's average amount charged per RVU in indemnity business in year t
$CPRVU3_t$	Practice's average amount charged per RVU in Medicare business in year t
$CPRVU15_t$	Practice's average amount charged per RVU over UCR and partial service businesses in year t
RVU_t*	Practice's total output of RVUs in all observed businesses in year t
$RVU1_t$	Practice's total output of RVUs in UCR business in year t
$RVU2_t$	Practice's total output of RVUs in indemnity business in year t
$RVU3_t$	Practice's total output of RVUs in Medicare business in year t
$RVU15_t$	Practice's total output of RVUs in UCR and partial service businesses in year t
	Exogenous and Predetermined Variables
AGE	Physician's age in 1979
AMASEX	Dummy = 1 if the physician was female
AN	Dummy = 1 if the physician was an anesthesiologist
$APRVU1_t$	Average amount allowed per RVU in UCR business in year t
$APRVUMIN_t$	Minimum of the practice's UCR allowance per RVU and partial service allowance per RVU

* Observed indemnity data were excluded from the submodels for Plan B since there were an insufficient number of physicians with observed indemnity business.

TABLE 7-2 (Continued)

Variable	Definition
AREA_2**	Dummy = 1 if the practice is located in Plan's second charge area
AREA_3**	Dummy = 1 if the practice is located in Plan's third charge area
BORDCERT	Dummy = 1 if the physician was board certified in 1977
$DOCPRCAP_t$	Number of physicians per capita in physician's county in year t
FMG	Dummy = 1 if the physician was a foreign medical graduate
GP	Dummy = 1 if the physician was a general or family practitioner
GROUP	Dummy = 1 if the physician practiced in a group in 1977
GS	Dummy = 1 if the physician was a general surgeon
HOSPEMPL	Dummy = 1 if the physician practiced in a hospital in 1977
$INPAHOSP_t$	Fraction of the physician's RVUs provided in hospitals in year t
$INPERCAP_t$	Per capita income in the physician's county in year t
$LAGPRCLM_t$	Average number of days between claim filing and claim payment in year t (Physician specific)
N	Dummy = 1 if the physician was a neurologist
NS	Dummy = 1 if the physician was a neurological surgeon
OBG	Dummy = 1 if the physician was an obstetrician-gynecologist
$OLDRVU_t$	Fraction of physician's RVUs provided to patients aged 65 and older in year t
OMS	Dummy = 1 if the physician had an other medical specialty besides internal medicine and pediatrics

** Both Plans B and C were divided into 3 charge areas each, while Plan A had no charge areas.

TABLE 7-2 (Continued)

Variable	Definition
OPH	Dummy = 1 if the physician was an ophthalmologist
ORS	Dummy = 1 if the physician was an orthopedic surgeon
OSS	Dummy = 1 if the physician had an other surgical specialty
OTH_EMPL	Dummy = 1 if the physician practiced in a setting other than solo, arrangement, group, partnership and hospital in 1977
OTO	Dummy = 1 if the physician was an otolaryngologist
OVER65	Fraction of residents aged 65 and older in physician's county in 1970
P	Dummy = 1 if the physician was a psychiatrist
PARTNER	Dummy = 1 if the physician practiced in a partnership in 1977
PD_	Dummy = 1 if the physician was a pediatrician
PCTFEMRV	Fraction of the physician's RVUs provided to female patients
PRCT_URB	Percent of 1970 county population living in urban areas x 10
$PCTIND_t$	Percentage of the physician's RVUs provided to indemnity patients in year t
$PCTPS_t$	Percentage of the physician's RVUs provided to partial service patients in year t
PTH	Dummy = 1 if the physician was a pathologist
R	Dummy = 1 if the physician was a radiologist
SPEC_2ND	Dummy = 1 if physician had a second specialty in 1977
TIME74	Dummy = 1 if the year of observation is 1974
TIME75	Dummy = 1 if the year of observation is 1975
TIME76	Dummy = 1 if the year of observation is 1976
TIME77	Dummy = 1 if the year of observation is 1977
TIME78	Dummy = 1 if the year of observation is 1978

TABLE 7-2 (Continued)

Variable	Definition
U	Dummy = 1 if the physician was a urologist
$WAGEINDX_t$	Average payroll per employee in physicians' offices in county of practice in year t
$YNGRVU_t$	Fraction of physician's RVUs provided to patients aged 14 and younger in year t

on the righthand side. It was also noted that, due to the sampling of procedures and editing of the Plans' claims records before we received them, portions of the Blue Shield outputs of services could not be observed. These unobservable terms in Blue Shield and non-Blue Shield outputs can be collected together and included in the disturbances of the equations. Although two-stage least squares (TSLS) is ordinarily used to estimate simultaneous equations systems, the failure to take account of systematic components (i.e., the unobserved outputs) in the disturbances leads to inefficient and possibly biased estimators of the coefficients.

Instead, the appropriate statistical model is a "random effects" or "variance components" model. An approximate way of estimating this general type of statistical model is to include a dummy variable for each practice on the right-hand sides of the equations. The method was available for this study because of the multiple annual observations on each practice.* It is assumed that the coefficients on the practice dummies are fixed parameters to be estimated along with the other parameters of the models. The estimates of the coefficients are then estimates of the unobservable terms in output or other factirs which, like the unobserved outputs, are unique to the practice. Actually, the inclusion of the practice-specific dummies and the time dummies permits the effects on the dependent variables of unobserved outputs and other factors to be decomposed into two parts. One part is practice-related and absorbed into the practice dummies. The other is time-related and absorbed into the time dummies.

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* The method cannot be used on a pure cross-sectional sample because the number of dummy variables would equal the sample size.

When TSLS is applied to the econometric model recast in this manner, the statistical model is termed a "fixed effects" model.* Even though the variance components model--in which the terms in unobserved outputs are treated like random errors rather than fixed effects--is probably more appropriate theoretically, it and the fixed effects model yield estimators that are consistent and asymptotically identical. Given its computational advantages, and the asymptotic equivalence of variance components and fixed effects estimators for simultaneous systems, the fixed effects model rather than the random effects model was used to estimate the equations described below.**

Findings

The econometric models summarized in Table 7-1 were estimated from pooled cross-sectional and time series data for each of the three Plans. The results for participating physicians are shown in Tables 7-3 and 7-4. Those for nonparticipating physicians are shown in Tables 7-5 and 7-6.***

Somewhat surprisingly--but consistent with prior research on physicians' cost functions--all of the point estimates of the slopes of marginal cost functions were negative.**** As indicated in Chapter IV, this raises the

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* See Mundlak (1978) and Maddala (1971) for discussions of the approach.

** Unfortunately, the fixed effects procedure led to another problem in that the practice dummies tended to be collinear with the dummy variables used as proxies for physician characteristics. The problem is of some consequence because the latter are the markup variables used in the significance tests for profit maximization, and the collinearity may have distorted the test outcomes.

*** The generally large values of F and R^2 are due to the practice dummies which are not listed in the tables.

**** See Ernst and Schwartz (1974) and Yett (1967). Yett reported that unit expense (and hence marginal expense) functions are U-shaped in output, but the upward sloping segments were beyond the range of his observed outputs.

TABLE 7-3

CONSTRAINED TSLS ESTIMATES OF SUBMODEL FOR PARTICIPATING PHYSICIANS: PLAN A

	Indemnity Average Revenue Function		Indemnity Optimality Equation	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	8.59806	1.50	10.42991	1.91
RVU1	--a	--a	-.00089*	-2.48
RVU2	-.00069**	-4.13	-.00020	-.52
LAGPRCLM	--a	--a	-.00488	-.91
AGE	-.06538*	-2.11	-.05205	-.72
AMASEX	5.04228**	3.15	9.81564*	2.14
BORDCERT	-1.86265**	-3.11	-4.31906*	-2.45
FMG	-2.78944**	-3.04	-4.79566	-1.93
SPEC_2ND	-.03365	-.01	1.64744	.62
GROUP	.12597	.31	.30846	.31
PARTNER	-.12562	-.13	.11938	.10
HOSPEMPL	1.38505*	1.98	1.10635	.62
OTH_EMPL	-6.05693*	-2.56	-10.31772*	-2.03
INPAHOSP	--a	--a	.19688	.19
OLDRVU	--a	--a	-.84798	-.35
PCTFEMRV	--a	--a	-.35714	-.52
YNGRVU	--a	--a	1.06438	.86
DOCPRCAP	186.72515	.23	--a	--a
INPERCAP	-.00001	-.01	--a	--a
OVER65	24.72757	.51	--a	--a
PRCT_URB	-.00321	-1.06	--a	--a
WAGEINDX	--	--	-.07880	-.88
TIME74	-.01969	-.03	.83734	1.26
TIME75	.00013	.00	1.96720*	2.07
TIME76	.19495	.10	3.30388*	2.27
PD	-.98848	-.97	-1.79620	-.44
OMS	-2.46247	-1.76	-4.66268	-1.42
NS	1.12970	1.13	.97268	.30
ORS	.27483	.32	.21621	.08
OTO	2.58503	1.19	1.24306	.32
U	.31301	.25	1.26792	.49
OSS	1.71683	.83	.77132	.21
OBG	.32999	.32	1.78957	.96
OPH	-.37980	-.25	.35953	.10
AN	-1.90470**	-3.20	-4.49376	-1.31
P	-.71832	-.61	1.63299	.78
N	-2.26462	-1.82	-4.26038	-1.17
GP	-2.55943	-1.41	-4.18808	-1.12
GS	.88675	.75	.80647	.26
R	4.33940**	3.38	10.42507*	2.09
Dependent variable	CPRVU2		CPRVU2	
DFE	485		480	
R^2	.45		.13	
F-ratio	2.12		.38	
Prob > F	.0001		1.0000	

TABLE 7-3 (Continued)

UCR Optimality Equation

Variable	Coefficient Estimate	t-ratio
INTERCEPT	14223.1**	3.28
APRVU1	-868.7*	-2.44
LAGPRCLM	-5.4	-.92
AGE	-78.1	-1.00
AMASEX	7051.2	1.62
BORDCERT	-2766.3	-1.70
FMG	-3212.5	-1.29
SPEC_2ND	4361.6	1.94
GROUP	597.1	.55
PARTNER	422.9	.32
HOSPEMPL	-2689.9	-1.62
OTH_EMPL	-8010.2	-1.67
INPAHOSP	1677.0*	2.38
OLDRVU	650.2	.25
PCTFEMRV	-115.4	-.15
YNGRVU	1805.2	1.62
WAGEINDX	-91.2	-1.01
TIME74	865.7	1.34
TIME75	1744.2*	2.08
TIME76	3287.2**	3.05
PD	-6013.9	-1.67
OMS	-7809.4**	-3.86
NS	-4184.7	-1.44
ORS	-4693.9*	-2.27
OTO	-3860.5	-.99
U	-2666.8	-1.03
OSS	-4448.8	-1.26
OBG	1734.2	.88
OPH	-3889.8	-1.12
AN	-8307.0**	-5.67
P	-1835.2	-.85
N	-8304.6**	-4.09
GP	-7761.6**	-3.11
GS	-3640.5	-1.19
R	11738.2**	3.61

Dependent Variable	RVU
DFE	481
R^2	.84
F-ratio	13.00
Prob > F	.0001

Dashes in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. Dashes followed by the letter "a" indicate that the variable was not included in the regression equation specification. One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE 7-4

CONSTRAINED TSLS ESTIMATES OF SUBMODEL FOR PARTICIPATING PHYSICIANS
PLAN B

Variable	Medicare Average Revenue Function Coefficient Estimate	t-ratio	Medicare Optimality Equation Coefficient Estimate	t-ratio
INTERCEPT	1.0054	.22	-2.6977	-1.00
RVU3	-.00003	-1.04	-.00015*	-2.21
RVU15	--a	--a	-.00018**	-2.68
LAGPRCLM	--a	--a	-.0020	-1.02
AGE	.0094	.48	.0927*	2.01
AMASEX	-1.1682	-1.94	.1698	.15
BORDCERT	.2738	.73	1.8033*	2.09
FMG	1.2230	.82	-1.7029*	-2.15
SPEC_2ND	-1.3328	-.78	1.4332	1.63
GROUP	.9568	.66	-2.2893**	-2.79
PARTNER	-.5388	-1.77	-1.0772*	-2.06
HOSPEMPL	.5405	.19	-.2058	-.20
OTH_EMPL	--	--	--	--
INPAHOSP	--a	--a	1.4949*	2.05
OLDRVU	--a	--a	-1.4943	-.57
PCTFEMRV	--a	--a	-.6392	-1.70
YNGRVU	--a	--a	.3613	.53
DOCPRCAP	281.8500	1.76	--a	--a
INPERCAP	.0004*	2.15	--a	--a
OVER65	99.9287	.59	--a	--a
PRCT_URB	-.0128	-.55	--a	--a
WAGEINDX	--a	--a	.0090	.33
TIME74	-.0139	-.15	.3150	1.90
TIME75	.1974*	2.06	.3962*	2.19
TIME76	.0223	.09	.5456*	2.30
AREA_2	-6.7756	-.53	-.2031	-.39
AREA_3	-10.5235	-.59	1.5936	1.33
PD	.0826	.06	-.1553	-.11
OMS	-.1631	-.34	-.6478	-.78
NS	.0036	.01	-2.6121*	-2.01
ORS	.8771*	2.23	.4887	.74
OTO	.9492*	2.04	-1.4786	-1.10
U	.6830*	2.03	1.2791	1.79
OSS	1.9868	1.23	1.2973	1.71
OBG	.4298	.82	.9421	1.26
OPH	.6472	1.36	-2.2175	-1.58
AN	1.3579**	3.26	-.5977	-.57
PTH	.9214	1.51	-.6310	-.55
P	-.2164	-.47	-2.2302	-1.79
N	.5464	1.06	.1683	.19
GP	2.6045	.79	.6942	.76
GS	.0777	.19	-1.2823	-1.44
R	.6789	1.21	.4390	.47
Dep. Variable	CPRVU3		CPRVU3	
DFE	443		438	
R^2	.75		.54	
F-ratio	7.52		2.86	
Prob > F	.0001		.0001	

TABLE 7-4 (Continued)

Variable	UCR/Partial Service Optimality Equation Coefficient Estimate	t-ratio
INTERCEPT	-27960.6*	-2.56
APRVUMIN	-2213.5*	-2.31
LAGPRCLM	-5.0	-.41
AGE	611.8**	4.33
AMASEX	7137.4	1.12
BORDCERT	10510.6**	2.98
FMG	-9113.6**	-2.79
SPEC_2ND	3859.5	.73
GROUP	-10032.6**	-3.40
PARTNER	-5317.9*	-2.14
HOSPEMPL	2237.1	.35
OTH_EMPL	--	--
INP_HOSP	8762.3**	3.96
OLDRVU	-9563.1	-.59
PCTFEMRV	1181.6	.49
YNGRVU	2913.4	.70
WAGEINDX	23.0	.13
TIME74	1344.6	1.48
TIME75	635.0	.55
TIME76	667.8	.44
AREA_2	4783.4	1.66
AREA_3	10162.0	1.64
PD	-10805.1	-1.40
OMS	-3933.3	-.78
NS	-18037.9**	-4.73
ORS	-3808.2	-.96
OTO	-19480.9**	-5.68
U	6938.3*	2.17
OSS	-5544.6	-1.16
OBG	-4721.7	-1.25
OPH	-19140.2**	-4.41
AN	-13952.3**	-3.38
PTH	-9094.5	-1.44
P	-18798.9**	-6.03
N	-2791.2	-.51
GP	2684.7	.47
GS	-12028.2**	-4.04
R	605.5	.10
Dep. Variable	RVU	
DFE	439	
R^2	.84	
F-ratio	13.00	
Prob > F	.0001	

Dashes in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. Dashes followed by the letter "a" indicate that the variable was not included in the regression equation specification. One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE 7-5

TSLS ESTIMATES OF SUBMODEL FOR NONPARTICIPATING PHYSICIANS

	UCR/Indemnity Average Revenue Function			
	Plan A		Plan C	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	9.15877	.41	.38138	.33
RVU	-.00009	-.65	-.00019	-1.84
PCTIND	.00239	1.14	.00058	.72
DOCPRCAP	560.53086	.38	473.99365*	2.52
INPERCAP	-.00035	-.26	-.00019	-1.82
OVER65	-19.18096	-.26	-54.69584**	-2.60
PRCT_URB	-.00156	-.26	.00782**	2.58
AGE	-.05700	-.34	-.01388	-.64
AMASEX	--	--	-.15683	-.48
BORDCERT	2.06766	1.43	.23164	.62
FMG	2.43368	1.93	.41287	1.46
SPEC_2ND	-1.36944	-1.66	.89237	.91
GROUP	-.33608	-.22	-.05387	-.29
PARTNER	-1.12256	-1.63	.07756	.29
HOSPEMPL	-.51319	-.13	.80015**	4.06
OTH_EMPL	-1.51410	-.37	.77264	1.41
TIME74	.25618	.43	--a	--a
TIME75	.60509	1.01	--a	--a
TIME76	1.10348	.65	.35164**	3.61
TIME77	--a	--a	.62065**	4.74
TIME78	--a	--a	.76834**	4.17
AREA_2	--a	--a	4.85024*	2.53
AREA_3	--a	--a	8.03073**	2.61
PD	-3.28564	-.89	-.96585	-1.86
OMS	-1.95645	-1.19	-1.46871	-1.83
NS	.30695	.12	-1.25925	-1.42
ORS	-1.29523	-.31	-1.13293**	-3.37
OTO	--	--	--	--
U	-2.48217	-1.46	-1.11508	-1.44
OSS	.78867	1.88	-2.93311*	-1.99
OBG	-1.86470	-.73	-.30798	-.64
OPH	-2.83655	-.87	-.77445**	-2.59
AN	-1.09000	-1.51	.24830	1.23
PTH	-1.19291**	-4.67	--	--
P	-2.40793	-.78	-1.48063*	-2.53
N	-1.87038	-1.03	-.94794	-1.02
GP	-.97898	-.22	-.75565	-1.90
GS	.15003	.34	-.43172	-1.61
R	.25226	.18	-.32367	-1.22
Dep. Variable	CPRVU		CPRVU	
DFE	185		495	
R^2	.72		.83	
F-ratio	5.05		12.27	
Prob > F	.0001		.0001	

TABLE 7-5 (Continued)

	UCR/Indemnity Optimality Equation			
	Plan A		Plan C	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-2.56957	-.56	10.84937	.91
RVU	.00001	.30	-.00101	-.74
LAGPRCLM	.00185	1.59	-.00243	-.54
AGE	.06940	.91	-.16637	-.68
AMASEX	--	--	-1.61486	-.64
BORDCERT	.98006	1.43	3.77622	.71
FMG	1.25272*	1.97	1.27807	.88
SPEC_2ND	-1.72949**	-3.89	-6.36887	-.65
GROUP	.79487	1.23	.05112	.13
PARTNER	-1.33129**	-3.28	.51959	.66
HOSPEMPL	2.70100	1.55	1.64657	1.18
OTH_EMPL	1.58136	.88	2.58372	.81
INPAHOSP	-.70461**	-5.14	.65616	.60
OLDRVU	-.51721	-1.16	--	--
PCTFEMRV	-.16396	-1.08	-.33915	-1.17
YNGRVU	-.35987	-1.78	.38730	1.28
WAGEINDX	.04703	.90	--	--
TIME74	-.24188	-.62	--a	--a
TIME75	-.07562	-.15	--a	--a
TIME76	.02015	.03	.49577	1.07
TIME77	--a	--a	.74808	1.53
TIME78	--a	--a	.42668*	2.17
AREA_2	--a	--a	.20034	.73
AREA_3	--a	--a	1.54875	.63
PD	-.06752	-.04	-4.06071	-.94
OMS	-.69688	-.90	1.16586	.36
NS	2.51946*	2.19	-5.14524	-.73
ORS	1.70221	.90	-3.55011	-.88
OTO	--	--	--	--
U	-.74977	-.90	-6.38129	-.76
OSS	.62966*	2.49	-.51475	-.16
OBG	-.47003	-.68	.69887	.42
OPH	.12005	.08	-.28724	-.45
AN	-1.12359	-1.93	.29898	.69
PTH	-1.54708**	-8.64	--	--
P	-.32184	-.23	-5.96521	-.84
N	-.47316	-.53	-4.61786	-.67
GP	1.53760	1.19	-1.99769	-.83
GS	.79576**	3.07	-1.37869	-.78
R	-.40494	-.47	1.59124	.50
Dep. Variable	CPRVU		CPRVU	
DFE	182		494	
R^2	.85		.54	
F-ratio	10.85		2.86	
Prob > F	.0001		.0001	

Dashes in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. Dashes followed by the letter "a" indicate that the variable was not included in the regression equation specification. One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE 7-6

CONSTRAINED TSLS ESTIMATES OF SUBMODEL FOR NONPARTICIPATING PHYSICIANS
PLAN B

	UCR/Partial Service Average Revenue Function		Medicare Average Revenue Function	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-3.9621	-.73	-.0682	-.02
RVU15	-.00018	-.78	--a	--a
RVU3	--a	--a	-.00008	-1.35
PCTPS	-.0010	-.39	--a	--a
DOCPRCAP	89.6844	.23	-372.8400	-1.61
INPERCAP	.0002	.58	.0002	.90
OVER65	78.3089	1.11	89.7211	1.62
PRCT_URB	-.0114	-1.53	-.0063	-.83
AGE	.1072	1.42	-.0123	-.18
AMASEX	--	--	--	--
BORDCERT	1.6061	1.21	.6146	.60
FMG	1.4198	1.17	.2190	.15
SPEC_2ND	3.1093	1.44	.3821	.19
GROUP	.2735	.23	1.1901	1.58
PARTNER	2.4716	.42	2.5855	.54
HOSPEMPL	4.3047	1.39	-.3397	-.19
OTH_EMPL	.1283	.25	-.0740	-.22
TIME74	.0674	.38	.2330	1.83
TIME75	.2256	1.13	.5437**	3.62
TIME76	.2494	.49	.6239	1.83
AREA_2	-10.9684	-1.25	-8.3100	-.91
AREA_3	-11.4833	-1.34	-9.7727	-1.16
PD	--	--	--	--
OMS	2.4923	1.93	.9687	.83
NS	5.0011	1.17	3.6013	.78
ORS	3.9659	1.22	1.5411	1.08
OTO	5.9267	1.36	1.0668	.36
U	4.0388	1.15	1.3443	.95
OSS	--	--	--	--
OBG	2.9028	1.32	.2061	.14
OPH	1.5183	1.12	.4599	.64
AN	-.9828*	-2.20	.6899*	2.10
PTH	--	--	--	--
P	--	--	--	--
N	--	--	--	--
GP	1.8755	1.23	.5710	.40
GS	5.4410	1.42	4.4333	1.10
R	1.5059	1.10	.1570	.14

Dep. Variable	CPRVU15	CPRVU3
DFE	195	196
R^2	.68	.85
F-ratio	5.01	13.59
Prob > F	.0001	.0001

TABLE 7-6 (Continued)

Variable	UCR/Partial Service Optimality Equation: Coefficient Estimate	t-ratio	Medicare Optimality Equation: Coefficient Estimate	t-ratio
INTERCEPT	3.3922	.39	-5.4094	-.74
RVU15	.00011	.57	-.00006	-.73
RVU3	-.00006	-.73	.00002	.25
LAGPRCLM	-.0031*	-2.10	-.0031*	-2.10
AGE	-.0053	-.05	.0894	.98
AMASEX	--	--	--	--
BORDCERT	-1.0059	-.97	.3623	.55
FMG	.0348	.05	.3714	.47
SPEC_2ND	-.5267	-.15	2.7819	.87
GROUP	.2748	.29	.2840	.44
PARTNER	1.4732	.37	-.3112	-.11
HOSPEMPL	.9423	.20	4.6470	1.20
OTH_EMPL	.8419	.51	1.7288	1.01
INPAHOSP	.3335	.65	.3335	.65
OLDRVU	-.5882	-.40	-.5882	-.40
PCTFEMRV	.1041	.30	.1041	.30
YNGRVU	-1.9035	-1.79	-1.9035	-1.79
WAGEINDX	-.0143	-.77	-.0143	-.77
TIME74	.3483*	2.39	.2421	1.77
TIME75	.5617**	3.10	.5052**	2.99
TIME76	.9276**	3.65	.6542**	3.35
AREA_2	-.4555	-.23	-.3739	-.24
AREA_3	-.0894	-.04	.3100	.17
PD	--	--	--	--
OMS	.2511	.12	2.3634	1.35
NS	.5548	.23	2.4198	.93
ORS	-.5401	-.15	3.6097	1.61
OTO	-1.0905	-.22	4.8839	1.63
U	-.9794	-.27	2.8780	1.34
OSS	--	--	--	--
OBG	-1.3159	-.43	1.9845	.91
OPH	-.1113	-.04	2.4500	.90
AN	-1.2296	-1.84	-.2520	-.39
PTH	--	--	--	--
P	--	--	--	--
N	--	--	--	--
GP	-.0125	-.005	2.1468	.90
GS	.0387	.02	2.5129	1.46
R	-.3932	-.19	1.3463	.71
Dep. Variable	CPRVU15		CPRVU3	
DFE	191		191	
R^2	.70		.72	
F-ratio	5.01		5.54	
Prob > F	.0001		.0001	

Dashes in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. Dashes followed by the letter "a" indicate that the variable was not included in the regression equation specification. One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

possibility of unstable equilibria in the submarkets for nonparticipating services. That is, if the slope of the marginal cost function is "more negative" than the slope of the marginal revenue function, the second-order conditions for profit maximization are not satisfied.

To explore this possibility, we carried out F-tests for the equality of the slopes of the marginal cost and marginal revenue functions in each of the six subsystems for nonparticipating services.* In one case--the Medicare subsystem for Plan B participating physicians--the slope of the marginal cost function was significantly less than the slope of the marginal revenue function at the 5% level. Hence, in this instance the evidence argues against profit maximization. However, four of the five remaining tests indicated that the slope of the marginal cost function was not significantly less than the slope of the average revenue function, and one--done on the indemnity subsystem for Plan A participating physicians--showed that it was significantly larger. With one exception, then, the estimates of the models satisfied the second-order condition for profit maximization, and profit maximization cannot automatically be rejected as a type of physician optimizing behavior.

Otherwise, the results of the test for optimizing behavior varied considerably across Plans. The test outcomes are summarized in Table 7-7.**

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* Note from Table 7-1 that the slope of each marginal revenue function is twice the slope of the associated average revenue function. This follows from the assumed linearity of the latter.

** The appropriate test for profit maximization is an F-test for the joint significance of the nine markup variables in the optimality equations. Due to collinearity between some of the markup variables and the physician dummies, the regression package deleted a few of the latter in the course of estimating the equations. When the equations were re-estimated under the

TABLE 7-7

SUMMARY OF TEST RESULTS FOR TYPE OF PHYSICIAN OPTIMIZING BEHAVIOR

		First Part		Second Part	
Plan	Participation Status and Line of Business	Coefficients on Physician Characteristics in Optimality Equations	Inference	Coefficient on Physician-Population Ratio in Average Revenue Function*	Inference
A	Participating--indemnity	Three significant at 5% level; four significant at 10% level	Reject profit maximization	+/not significant	Accept utility maximization
	Nonparticipating--UCR and indemnity	Three significant at 5% level	Reject profit maximization	+/not significant	Accept utility maximization
B	Participating--Medicare	Five significant at 5% level	Reject profit maximization	+/significant	Target net income achieving
	Nonparticipating--UCR and partial service	None significant at 10% level	Accept profit maximization	+/not significant	Accept profit maximization
	Nonparticipating--Medicare	None significant at 10% level	Accept profit maximization	-/not significant	Accept profit maximization
C	Nonparticipating--UCR and indemnity	None significant at 10% level	Accept profit maximization	+/significant	Target net income achieving or profit maximization

* "Significant" refers to one-tailed test at 5% level.

The findings for participating services are deleted from the table because, as was explained in Chapter IV, corner solutions can occur for profit-maximizing practices when average and marginal revenue functions are step-shaped over portions of their domains. We argued that participating physicians face such average and marginal revenue functions, and thus that their marginal revenues and marginal costs may not be equal even if they do maximize profit. Since the test for profit maximization is a test for the equality of marginal revenue and marginal cost, it is not necessarily reliable under these conditions.*

In Plan A the test for profit maximization led to rejection of the profit maximization hypothesis for both participating and nonparticipating physicians. In the test for demand generation, average revenue was not significantly positively related to the physician-population ratio for either group of physicians. Consequently, the target net income hypothesis was also rejected. On these grounds, it appeared that Plan A physicians could be characterized as utility maximizers.

In Plan B the test results indicated sharp differences between the optimizing behavior of participating and nonparticipating physicians. For the latter, the markup variables did not enter significantly into the optimality equations for either private business or Medicare services, and

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null hypothesis that the markup variables were jointly nonsignificant, the package reintroduced the deleted physician dummies. This made it impossible to carry out the F-tests, and so the tests shown in Table 7-7 are based on the significance of individual coefficients on the markup variables. The approximate F-tests we conducted (i.e., those using different numbers of the physician dummies) gave results identical to those shown in the table.

*The test applied to participating services in Plans A and B led to rejection of the profit maximization hypothesis in each case. The test applied to indemnity and Medicare services provided by participating physicians in the two Plans also led to rejection of the profit maximization hypothesis. Inasmuch as the tests on participating services are not conclusive, these results may or may not be mutually reinforcing.

neither private business nor Medicare average revenues were significantly positively related to county physician-population ratios. Accordingly, the behavior of Plan B nonparticipating physicians was consistent with profit maximization.

In the Medicare optimality equation for Plan B participating physicians, however, the markup variables entered highly significantly as a group, meaning that the profit maximization hypothesis could be rejected. As we have already remarked, the subsystem was the only one admitting an unstable equilibrium for profit maximizing practices, so that the evidence clearly pointed to utility maximizing or target net income achieving behavior by physicians. Moreover, in the test for demand generation, Medicare average revenue was significantly positively related to the county physician-population ratio. The results therefore imply that Plan B participating physicians were target net income achievers, at least in the Medicare line of business.*

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*In Chapter V we reported that Medicare charges in Plan B rose substantially from 1974 to 1975, the first full year after the end of the Economic Stabilization Program (ESP). It is noteworthy that the time dummies in the Medicare average revenue functions for both participating and nonparticipating physicians also indicated upward shifts in charges during 1975. Like the material in Chapter V, this suggests that Plan B physicians raised their Medicare charges in 1975 as a "catch-up" pricing effort after the ESP controls on Medicare Level 2s were relaxed. No similar pattern appeared in the average revenue functions for Plan B private business or for private business in Plan A.

It is of additional interest to observe that the coefficients on the time dummies for 1974 and 1976 in the Medicare average revenue functions were not significantly different from the coefficient on the dummy for 1973. This is contrary to what one would expect if the ESP induced demand generation for Medicare services. The ESP was in effect only through the first four months of 1974, and the Medicare Economic Index (which established new limits on Medicare Level 2s) was in effect only during part of 1976. Thus, ESP-induced demand generation should have caused the coefficients on the time dummies for 1974, 1975, and 1976 to be significantly positive. That is, one should have observed an apparently autonomous inward shift in the Medicare average revenue functions after the close of the ESP when the

There were further anomalies in the results for Plan C, although in this case they were in the test outcomes themselves. Consistent with the profit maximization hypothesis, the markup variables were not significant in the optimality equation for Plan C physicians, but the coefficient on the physician-population ratio was positive and significant in the average revenue function--indicative of demand inducement. The test therefore implies that Plan C physicians were either profit maximizers or target net income achievers, but the implication is obviously an unsatisfactory one. Profit maximization precludes the possibility of <u>observing</u> demand generation as the physician-population ratio increases, and, conversely, the existence of demand generation rules out the possibility of profit maximization.

Before considering these findings in more detail, we turn to the second basic issue explored in the course of estimating the models--the degree of market power possessed by physicians. The issue was investigated in terms of the slopes and price elasticities of the average revenue functions for nonparticipating (including indemnity and Medicare) services, estimates of which are given in Table 7-8. As the table shows, each of the point estimates of the slopes of the average revenue functions was negative, and estimates of the price elasticities evaluated at sample means ranged from -3.0 to -23.5.

While it is hard to determine how small in absolute value a price elasticity

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incentives to induce demands ended. No such shift seemed to occur.

Complicating the picture are the significant upward shifts in the Medicare optimality equations during the study period as indicated by the coefficients on the time dummies. These increases could have been due to upward shifts in either markup functions or marginal cost functions, although the latter seems the more likely possibility. Without simulating the model it is hard to tell how cost inflation may have affected Medicare charges and outputs, but it is evident that there were other economic forces acting on physicians during 1974-76 besides the lifting of ESP controlls on allowances. This makes it hard to claim that the behavior of observed charges and outputs in that period can be attributed only to the relaxation of controls on allowances.

TABLE 7-8

ESTIMATED SLOPES OF AVERAGE REVENUE FUNCTIONS FOR NONPARTICIPATING SERVICES AND ESTIMATED PRICE ELASTICITIES OF AVERAGE REVENUE FUNCTIONS AT SAMPLE MEANS

Plan	Participation Status of Physician and Line of Business	Estimated Slope of Average Revenue Function	Estimated Price Elasticity of Average Revenue Function at Sample Mean
A	Participating--indemnity	-.0007**	-3.0
	Nonparticipating--UCR and indemnity	-.00009	-8.9
B	Participating--Medicare	-.00003	-23.5
	Nonparticipating--UCR and partial service	-.0002	-4.8
	Nonparticipating--Medicare	-.00008*	-6.3
C	Nonparticipating--UCR and indemnity	-.0002*	-12.2

One and two asterisks denote coefficients significantly negative at the 10% and 5% levels respectively (one-tailed tests).

must be to demonstrate the existence of important market power, it appears that the sample physicians can be classified broadly as competitors or monopolistic competitors. Three of the six estimated slopes of the average revenue functions were not significantly different from zero, and two of the remaining three were significantly negative only at the 10% level (using one-tailed tests). This result and the generally high price elasticities of average revenue tend to indicate that the sample physicians fell more toward the price-taking than the price-setting end of the spectrum of market structures.

The findings also suggest that very little market power may be necessary to enable physicians to induce demands. The evidence of demand inducement was strongest in precisely the two subsamples--participating physicians in Plan B's Medicare line and all physicians in Plan C--where the estimated price elasticities of average revenue were the highest. Indeed, the elasticities of average revenue with respect to the physician-population ratio were moderately high in both subsamples--.35 in Plan B's Medicare line and .48 in Plan C when measured at sample means. This is to say that a 10% increase in the number of county physicians, given population, would have induced a 3.5% increase in the Medicare charges of Plan B's participating physicians and a 4.8% increase in the overall charges of Plan C's physicians.*

Obviously, there are problems in trying to reconcile the evidence of demand generation in Plans B and C with the appearance of competitive pricing behavior by physicians in those two Plans. Price taking implies

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* The elasticity of quantity demanded with respect to the physician-population ratio is a much more instructive measure of demand generation, but because only a fraction of the physicians' outputs was actually observed, estimates of the elasticities at sample mean outputs would tend to be greatly overstated.

that the seller loses all or a substantial portion of his buyers if he attempts to raise his price above the going level, but the demand generation argument holds exactly the opposite--that the physician can retain his patients when he raises his charge level. One possible explanation is that physicians within a local market jointly perceive and respond to increases in physician concentration. If this is the case, they may induce demands or raise their charge levels more or less simultaneously, and hence each practitioner knows he/she runs a low risk of losing patients to lower-priced or less "service intensive" competitors. Nevertheless, if physicians were sufficiently interdependent to react to diminishing clienteles in this way, one would expect them to exhibit interdependent pricing behavior and rather less price elastic average revenue functions than those observed. Still another possibility is that patients may be much more knowledgeable of, and sensitive to, fee differences than they are of the quantities of services needed to treat illnesses. If this is the case, physicians' abilities to generate demands may be compatible with highly elastic average revenue functions.*

The same pattern of inconsistent results regarding demand inducement emerged from the findings in Chapter VI. We suggested there that it may indicate physicians can generate demands but do not always do so. However, this leaves unanswered the question of why, given an increase in the

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* There may be other explanations for the results as well. Elsewhere we have noted that any test for demand generation that uses the physician-population ratio may be biased toward acceptance of the demand inducement hypothesis. Estimates of the slopes of the average revenue functions may also have been biased toward zero, leading to underestimates of physicians' market power.

physician-population ratio, some groups of practitioners appeared to generate demands while others, even those in the same Plan, did not.

Some of the findings concerning the average revenue functions for non-participating services were puzzling as well. For example, none of the physician quality proxies--BORDCERT, FMG, and SPEC_2ND--appeared significantly in the average revenue functions for Plan B. Nor, with one exception, did the proxies for patients' ability to pay (INPERCAP), health status (OVER65), and travel time costs (PRCT_URB). Although this is consistent with price taking behavior--i.e., measures of product differentiation and market demands should not (or should not necessarily) affect the average revenue functions facing competitive practices--all six of the quality and demand proxies entered significantly into the indemnity average revenue function for participating physicians in Plan A. To compound the ambiguities, five of the same six variables appeared significantly in the average revenue function for Plan C physicians, but the signs of their coefficients were the opposites of those on the coefficients in the indemnity regression for Plan A. Beyond that, there seemed to be no strong reasons for concluding that Plan C physicians were materially "less competitive" than Plan B physicians, for whom none of the coefficients was significant.

It is never satisfying to obtain unexplained and provocative results, but one clearly cannot expect uniform behavior from an industry like physicians' practices where firms are exceptionally small and management is heavily influenced by the personalities of owners and their business acumen. In addition, the combination of rapidly growing demands for physicians' services and inelastic supplies has undoubtedly created a level of profitability that allows idiosyncratic behavior or managerial slack to persist.

Under these conditions--in an industry of small sellers where growth rates of demand are high and perhaps uneven across geographic and specialty markets--some degree of variation in physicians' business policies can be anticipated. For instance, demand may be growing so rapidly in an area that physicians have little incentive to induce demands even if they have the capability of doing so and physician density is high. Or they may act like price takers even when they would behave otherwise in a less rapidly changing market environment. Regrettably, we had no way of evaluating the longer term effects of growing demands on physicians' behavior. It is likely that a much more detailed investigation of local markets than we and other researchers have been able to provide is necessary for a full understanding of physicians' pricing and output policies.

Conclusion

This chapter has presented estimates of an econometric model of physicians' practices that addresses two interrelated issues: the nature of physicians' optimizing behavior and the degree of competitiveness of local markets. With respect to the first of these issues, the essential questions are whether physicians are target net income achievers and whether they can and do induce demands. If physicians can and do generage demands when institutional or market pressures are brought to bear on their net incomes, the combination of present forms of reimbursement controls and the expanding supply of physicians will lead to increases in output and total expenditures for services. Conversely, if physicians are profit or utility maximizers, reimbursement controls and competition in the physicians' services markets should have mitigating effects on the rates of fee and expenditure inflation.

Knowing what kind of optimizing behavior physicians engage in therefore has important implications for reimbursement policy and physician manpower policy.

The degree of competitiveness of physicians' services markets has at least two consequences for reimbursement policy. First, a noncompetitive market structure has generally been believed to be a necessary condition for demand inducement to occur. To the extent that this is true, a finding that the markets are more or less "competitive" argues against the need for extensive utilization controls to counteract demand inducement. Second, the degree of market imperfection affects the ability of the practice to pass on to patients--and thus to government and other third-party payers--increases in its costs. The closer practices are to being monopolists, the more rapidly they can pass along cost increases in the form of higher fees. Overall, our finding that individual physician practices have highly elastic average revenue functions weakens the contention that policies to restrain fee levels will automatically be translated into larger expenditures on services. It also implies that physicians will find it very difficult to pass on cost increases in the form of higher charges unless the cost increases are widespread through the marketplace.

The results of our direct tests of the demand inducement hypothesis were mixed, although they were consistent with the less rigorous findings reported in Chapter VI. In Plan A there was no evidence of demand generation, in Plan B the positive evidence was restricted to the Medicare line of business of participating physicians, and in Plan C the positive evidence appeared to apply to both of the observed private lines of business.

Indeed, the findings with respect to physicians' optimizing behavior in general showed no clear patterns across Plans. In Plan A, unlike Plan C, the results indicated that physicians were utility maximizers, and in Plan B the test outcomes for the private lines--unlike the result for Medicare--were consistent with profit maximization.

The estimates of the average revenue functions for nonparticipating services yielded moderately high to very high price elasticities, even in Plans B and C where, paradoxically, the evidence of demand inducement was strongest. Accordingly, the sampled physicians can be described as moderately to highly "competitive," and, as we have noted, this finding contradicts the hypothesis that a noncompetitive market structure is necessary for demand generation.

We have suggested two possible explanations for the apparent contradiction. First, most or many physicians in a geographic market may face the same conditions encouraging them to induce demands. If they do, and if they are similarly motivated, they may generate demands simultaneously. The physician who does induce demands would therefore not necessarily lose (or expect to lose) patients to his rivals even if the market were highly price competitive. Second, some patients may be much more sensitive to price differentials among physicians than they are to differentials in service intensity. If this is the case, physicians serving these patients could induce demands with a low risk of losing patients even though they would lose patients if they raised their fees. Thus, the market could be competitive in the pricing sense and still permit demand inducement to occur.

The relatively high price elasticities of the nonparticipating average revenue functions also suggest that physicians' abilities to pass along inflationary cost increases are limited. Although producers in competitive markets can be expected to recover market-wide cost increases in terms of higher charges, they will not be likely to raise prices to cover discretionary cost increases that can be avoided by the other producers in the market. In this sense, our results imply that physician pricing is probably not as inflationary as it would be if average revenue functions were relatively less price elastic. Indeed, this may be a possible reason why hospital price inflation has substantially exceeded that of physicians' services since the mid-1960s.

We had expected to find more uniformity in the sampled physicians' economic behavior than we observed. It is possible, of course, that the differences were due to misspecification of the models or sampling errors, but we doubt that explanation given the lack of systematic deviations across Plans, lines of business, or specialties. Consequently, it seems plausible that significant numbers of physicians in the three Plans did pursue divergent types of goal and pricing behavior. This conclusion is even more plausible in view of the smallness of the typical practice, variations in physicians' educational backgrounds, the smallness of geographic markets, the asymetric nature of patient information, and other factors that permit idiosyncratic economic behavior to exist.

Subject to these qualifications, our results indicate that new reimbursement policies to control physician-induced demand are probably not needed at this time. However, they also show that <u>some</u> physicians appear to generate demands, and to this extent the matter deserves continued monitoring. For example, given the cross-sectional nature of our analyses, we cannot forecast the consequences of the large increases in physician supply that have been projected for the next decade. To be sure, increases in physician supply should increase competitive pressures in the marketplace, and this may reduce physicians' abilities to induce demands. Nevertheless, the theoretical benefits of increasing the number of sellers are contingent on easy exit from markets, and it is not true that physicians can easily retire from or migrate out of local markets where competition makes it unprofitable to operate. In other industries characterized by low factor mobility and rising price competition, it has often happened that sellers act collectively to protect themselves against falling incomes. Thus, it is at least conceivable that physicians would act likewise, and interdependent efforts to induce demand--without (and without the need for) express collusion--are a possibility.

The theory of physician-induced demand has been criticised on grounds that it is indeterminate. That is, it states that physicians may generate demands in response to controls on fees or increases in physician density, but it does not specify the circumstances under which they choose not to induce demands. The evidence presented in this report supports the notion that the theory is underdeveloped. Our results indicate that "yes-or-no" tests are not adequate for examining the hypothesis, and that closer examinations of local market environments are necessary for narrowing down the range of possibilities for demand inducement behavior.

For instance, if, as Sloan and Feldman have argued, the willingness of a physician to induce demands depends on ethical and related disutility considerations, how do medical educational backgrounds affect the incidence of demand generation? Are there other market characteristics such as the long-run growth rate of demand that cause variations in the incentives to induce demands, given physician density and the system of reimbursement controls? What effects do insurance structures have on patients' willingness to accept marginal or unnecessary treatments? In Plan B we found that there appeared to be demand inducement for Medicare services but not in the Plan's private lines of business. This could have been due to copayment differences, differences in physician density vis-a-vis Medicare eligibles and private subscribers, or some other unobserved factor. If demand inducement occurs as the supply of physicians in a local market grows, is it equally prevalent among new practitioners and--as would seem less likely--among older ones whose clienteles are presumably well established? Does the existence of fee-for-service groups in an area with their intra-practice referral systems facilitate demand inducement? Does excess local hospital capacity promote demand inducement? What exactly is the relationship between the individual practice's market power and its ability to generate demands without losing patients?

Regrettably, we were not able to answer these questions. However, our findings clearly demonstrate that such questions must be addressed. We believe that our results totally obviate the treatment of physician-induced demand as a "yes-no" proposition. Future researchers will have to examine the correlates of variation in demand inducement in order that its theoretical and policy implications can be understood. In this respect, several of our findings raise questions that should be examined further. Why, for instance, was it the case that indications of demand generation were found only in the submarkets where individual physician practices are closest to being price-takers (i.e., have the most highly elastic average revenue functions)?* Also, what is the explanation for why physicians who participated in UCR business in Plan A seemed not to be generating demands in their nonparticipating line of business (indemnity), while those who participated in UCR and partial service business in Plan B appeared to be generating demands in their only important nonparticipating line of business (Medicare)?

The descriptive tabulations in Chapter V disclosed no significant differences in the characteristics of the physicians who elected to participate in the two Plans. The only obvious difference was in the nature of the participation decision itself. In Plan A participation meant having to accept allowance levels for UCR business with its comparatively high fee screens. Whereas, participating in Plan B meant having to accept allowance levels for both UCR and partial service business. Moreover, partial service allowances are based upon comparatively low <u>fee schedules</u> which physicians cannot influence via prior year price-setting policies.

Perhaps participation appealed only to those physicians serving Plan B's

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* Recall that perfectly elastic practice average revenue functions in participating lines of business are due to the fact that current period allowance levels are predetermined. Viewed from a multiple-period perspective, they do not imply totally passive pricing behavior since (as was shown in Chapter VI) there is some evidence that current price setting is aimed at changing next year's allowance levels. However, the highly elastic practice average revenue functions imply that unless the great majority of physicians in the same market were not acting in the same manner the resulting higher allowances would be larger than next year's actual charges for the few that took such action. Thus, reimbursement would be based on charges rather than allowances for such practices. The fact that charges were greater than allowances for most of the practices in our sample (prior to editing out those for which they were not)--combined with the finding that prices did, in fact, seem to be set in part so as to influence allowances--strongly indicates that a common pattern of pricing by the bulk of physicians in a given market is compatible with highly elastic individual physician practice average revenue functions at the current going level of prices.

subscribers who were most inclined to order relatively greater amounts of services for all of their patients. By contrast, our data on the non-participating business of Plan A's participating physicians was limited to indemnity, with its low and infrequently-adjusted fee shcedule. One might speculate that because of the typically higher net prices faced by patients with indemnity insurance, Plan A physicians perceived them to be both more price <u>and</u> more volume sensitive than other patients, and were thus somewhat constrained as to the quantities of services they recommended. However, we have already speculated that somewhat the same type of concern may have led Plan B physicians to price discriminate in favor of Medicare patients, and there were no indications of similar treatment of indemnity patients by Plan A physicians. The answer may lie in the comparative sizes of the two submarkets, or in terms of the physicians' perceptions of the importance of closer monitoring and more intensive follow-up of elderly (Medicare) patients. Obviously, the range of possibilities is quite large, and we make no claim to having <u>the</u> answers to these questions. However, in any effort to explore them further, we did undertake an investigation of the factors affecting physicians' decisions as to whether they will or will not participate in private lines of business. The results are presented next in Chapter VIII.

CHAPTER VIII

BLUE SHIELD PLAN PHYSICIAN PARTICIPATION

As was described in Chapter II, Blue Shield Plan physician participation agreements serve both as a marketing device to attract subscribers and as a short-run cost containment strategy. In most Blue Shield Plans a participating physician agrees to accept the Plan's allowance for a procedure as payment in full. In return, the physician may be reimbursed by the Plan rather than being paid directly by the patient. The advantages to the physician are smaller accounts receivable, fewer bad debts, and, of course, extra attractiveness to Blue Shield Plan subscribers. Participation does not necessarily imply a zero copayment by patients even after deductibles, if any, are met. However, since the amounts of reimbursement for procedures are predetermined in the short run, participation makes it less risky for a Plan to offer policies with low or zero copayment. Moreover, even when copayment is not eliminated, subscribers benefit both in terms of the ceiling on out-of-pocket costs and by being relieved of the interest and liquidity costs of direct payment.

Medicare and Medicaid use similar cost-containment strategies. Physicians who treat Medicaid patients must accept as payment in full the amount allowed for each procedure by the state's program. Under the Medicare regulations physicians may participate ("accept assignment") on a claim-by-claim basis. Administrators of both programs are vitally concerned with how sensitive physician participation (assignment) is to the amounts allowed for procedures. In the case of Medicaid, too low allowances can mean insufficient suppliers of medical care for the poor. In the case of Medicare, too low allowances can mean low physician assignment levels and higher out-of-pocket costs for the elderly and disabled. Obviously, striking a desirable balance between allowance levels and participation rates is of major importance to Medicare and Medicaid management.

Unfortunately, we did not have access to Medicaid or Medicare assignment data for this study. However, we did have extensive data on the private market business from two Blue Shield Plans--Plans A and B--with physician participation arrangements. Although participation agreements do not apply to indemnity policies, the other two lines of private business to which they do apply--UCR and partial service benefit--have certain strong parallels with Medicare and Medicaid. In particular, as in Medicaid, a Blue Shield subscriber is eligible for the "payment-in-full" benefit of a partial service contract only if his/her family income is below a ceiling level. Also, the procedure used in setting allowances (<u>but not the levels</u>) is basically the same for Medicare enrollees as it is for Blue Shield Plan UCR subscribers. Therefore, analysis of physician participation in private Blue Shield business should have important implications with respect to Medicare and Medicaid as well as the Blue Shield private health insurance market.

Theoretical Framework

The assumptions, hypotheses, and conventions underlying the model presented here have been given in Chapter III. For conceptual purposes, it is assumed that the physician decides whether to participate or not at the beginning of each year. Having made the decision, the physician then participates or not until the beginning of the next year when a new decision is made. For convenience, only two submarkets facing the practice are denoted. The participating submarket is comprised of one or more submarkets in private business in which the physician can (but need not) participate. The nonparticipating submarket consists of all other submarkets--such as indemnity, non-Plan business, Medicare, Medicaid, etc.--which are not covered by a physician's Blue Shield participation agreement.

The following specifications are made:

(i) A practice's average revenue on participating claims is fixed (predetermined) and equal to the average allowance per RVU set by the Plan. The practice's average revenue function is of finite length.

(ii) A practice's average revenue on nonparticipating claims is downward sloping in quantity both in the nonparticipating submarket and in the participating submarket when the physician elects not to participate.

(iii) Physicians maximize profit. However, it will be shown below that this assumption is not strictly necessary to obtain the implications generated by the model.

The model developed in prior research on physician participation and assignment by Sloan and Steinwald (1978), Hadley (1978), and Paringer (1979) is basically the Robinsonian (1969) model of price discrimination.* It applies to claim-by-claim participation or assignment--i.e., it allows the physician to vary the volume of his participating business continuously.

As described in Chapter II, the participation agreements in Plans A and B were essentially of the all-or-nothing type, and physicians generally could

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* See Chapter III for a discussion of the results obtained by Sloan and Steinwald, Hadley, Paringer, and others.

not participate on a claim-by-claim basis. Accordingly, the model used here is a modified version of the Sloan-Steinwald-Hadley model. Since the physician must either participate or not, his decision entails a discrete choice. That is, an economically-motivated physician estimates his total profit if he participates and also his total profit if he does not participate. He then chooses the alternative yielding the largest profit.

The elements of such a model are illustrated in Figures 8-1 and 8-2. It is assumed here that the physician does not discriminate in price.* (However, the argument is substantively the same if the physician does discriminate in price.) The average and marginal revenue functions for the submarket in which the physician does not have the option to participate (hereafter, the "nonparticipating" submarket) are shown as the lines AB and AC respectively. In the other (hereafter, the "participating") submarket the physician has the option to participate or not. If the physician does not participate in the participating submarket, the average and marginal revenue functions have the positions DE and DF, respectively, in Figure 8-1. If the physician participates in this submarket, the average revenue function is the line segment DL shown in Figure 8-2. The combined average revenue for both submarkets is the broken line segment AEDLNR. Under the nonparticipating option shown in Figure 8-1, the physician will choose the output OQ, where the combined marginal revenue from the two submarkets (given by a point on the line segment ARIJ) equals the marginal cost QS. The profit maximizing fee level in each submarket is OK, and the physician's total profit is the area NMLK. That is, unit profit is the fee level OK minus unit cost ON. Under the participating option shown in Figure 8-2, the physician chooses the output OQ (where the combined marginal revenue from the two

* The specification that the physician does not price discriminate does not, of course, mean that he/she receives the same average revenue in the participating and nonparticipating submarkets. Indeed, "discrimination" in terms of submarket average revenue is clearly an important factor affecting the decision to participate in the model presented here.

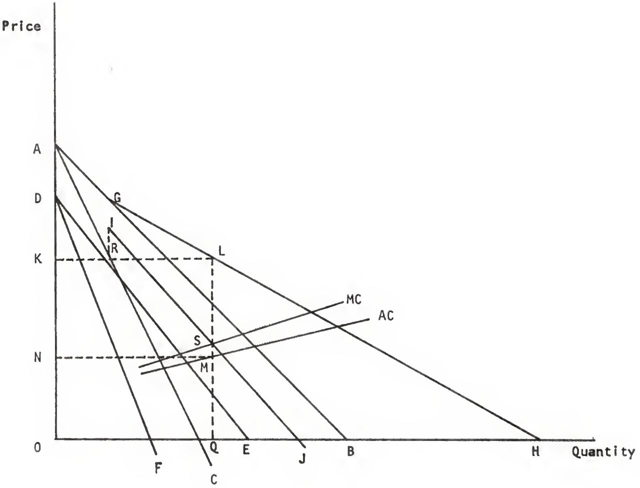

Figure 8-1

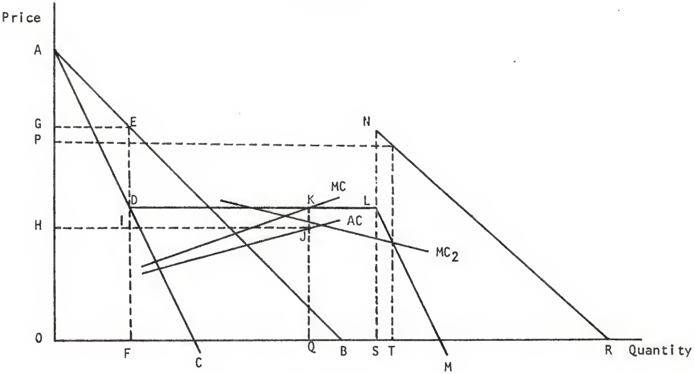

Figure 8-2

submarkets given by the broken line segment ADLM equals marginal cost), the fee level OG, and outputs of OF and FQ in the nonparticipating and participating submarkets, respectively. Total profit in this case is the sum of the areas HIEG and IJKD. The physician will then elect to participate only if the area HIEG + IJKD in Figure 8-2 equals or exceeds the area NMLK in Figure 8-1. Notice that in Figure 8-2, under the participating option, marginal cost may intersect total marginal revenue at an output larger than OS. In this case, output in the participating submarket is the maximum quantity demanded FS.

In the preceding chapter it was found that the practice marginal cost function may be downward sloping in output over the observed range. Accordingly, suppose the marginal cost function has the position MC_2 in Figure 8-2. Two properties of the optimal solution then follow.

First, the second-order condition for a maximum requires that marginal cost have a shallower slope than total marginal revenue. Thus, a maximum cannot occur at an output where marginal cost intersects a horizontal portion of the total marginal revenue function. A maximum can occur, as in Figure 8-2, only at an output larger than OS or smaller than OF, and the practice will either produce a zero output in the participating submarket or the maximum amount demanded.*

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* In Figure 8-2, if the physician does not price discriminate and his/her fee drops below the level indicated by point L (which is the minimum of the physician's level 1 and level 2 fee screens), then average revenue in the participating market would drop below the point L as well. Because of the way Figure 8-2 is drawn, the physician would not price below the point L since marginal revenue is already negative at that point. The Figure suffices for the empirical work reported here since the data used in the estimations described below contained only observations on which charges exceeded allowances. As has been explained, fee screens were not identifiable in any cases where the charge was recorded as equal to allowance, and such cases were deleted from the data set.

Second, there may be more than one local maximum of profit whenever the marginal cost function is downward sloping in output. In Figure 8-2 one maximum occurs at the output OT, but if MC_2 intersects total marginal revenue to the left of the output OF, that point gives a second local maximum. The practice must choose the larger of the two profits in order to determine how large its profit is from electing to participate. In Figure 8-2, the global maximum is assumed to occur at the output OT, which implies that nonparticipating output is OF + ST, optimal nonparticipating average revenue is OP, and output in the participating submarket is the maximum quantity demanded FS. If the global maximum occurs at an output less than OF (whatever the slope of marginal cost), it means that the practice will not produce for the participating submarket if to do so would require it to enter into a participation agreement. However, it <u>may</u> produce for the participating submarket on a nonparticipating basis. This will be the case if the nonparticipating option generates a higher anticipated profit than the participating option, and the nonparticipating optimal solution yields a positive output in the participating submarket.

Clearly, the decision as to whether to enter into a participation agreement depends upon the prospective gain or loss of profits and, unfortunately, the data for this study do not permit estimates of the amounts of such gains or losses. Thus, as an <u>empirical</u> matter, we cannot identify the conditions which determine whether a given physician will or will not participate. However, we are able to evaluate the effects of changes in market conditions on the <u>relative</u> profitabilities of participating and not participating. Specifically, we can test the hypothesis that if a given shift in practices' revenue and/or cost functions raises the profitability of one of the two options, then that shift will tend to raise the percentage of physicians in a given sample who select that particular option. Moreover, we can estimate changes in participation rates with respect to relative profitability gains. But in this regard, since the physician's participation status choice involves a comparison of profit levels, shifts in practice revenue and/or cost structure may not raise the profitability of one option enough to cause many physicians to choose it over the other. For that reason, estimates of the impacts of relative profitability changes on participation rates must be interpreted with caution in the absence of data on the absolute profit levels to which relative changes apply.

To evaluate the theoretical effects of shifts in revenue and cost structure on participation rates we use the following notation.

q_1 = actual output in the nonparticipating submarket

q_2 = actual output in the participating submarket

p = physician's average charge level

A = average allowance level in the participating market

$q_1^n(p)$ = average revenue function (inverted) in the nonparticipating submarket when the physician does not participate

$q_1^p(p)$ = average revenue function (inverted) in the nonparticipating submarket when the physician participates

$q_2^n(p)$ = average revenue function (inverted) in the participating submarket when the physician does not participate

$q_2^p(p)$ = output in the participating submarket when the physician participates

$C(q_1+q_2)$ = total cost function

When the physician does not participate, his/her total profit from all business (T^n) is

$$(1) \qquad T^n(p) = pq_1^n(p) + pq_2^n(p) - C[q_1^n(p) + q_2^n(p)] \quad ,$$

where, respectively, the terms on the right-hand side are total revenue in the nonparticipating submarket, total revenue in the participating submarket (if the physician provides output to that market but does not participate), and total costs. Assuming differentiability, at the profit-maximizing price and outputs it follows that

$$(2) \qquad \frac{dT^n}{dp} = q_1^n + pq_{1_p}^n + q_2^n + pq_{2_p}^n - (q_{1_p}^n + q_{2p}^n)C_q = 0 \quad ,$$

where the subscript p indicates the derivative with respect to p and C_q is marginal cost.

When the physician participates, his/her profit from all business, for the case in which the output in the participating submarket is an interior value, is

$$(3) \qquad T^p(p,q_2^p) = pq_1^p(p) + Aq_2^p - C[q_1^p(p) + q_2^p] \quad ,$$

where the second term on the right-hand side is total revenue in the participating submarket (if the physician participates) and the other terms have the same definitions as in (1). Again, assuming differentiability, at the profit-maximizing price and outputs it follows that

$$(4) \qquad \frac{\partial T^p}{\partial p} = q_1^p + pq_{1_p}^p - q_{1_p}^p C_q = 0 \quad \text{and} \quad \frac{\partial T^p}{\partial q_2^p} = A - C_q = 0$$

Since, in general, the average revenue and cost functions are also functions of exogenous variables, the optimal (i.e., profit-maximizing) values of p, q_1, and q_2 are functions of the exogenous variables. (Nevertheless, the optimality conditions in (2) and (4) still hold for the optimal values of p, q_1, and q_2.) The primary effects on T^n and T^p of changes in the exogenous variables are due to resulting shifts in (i) the nonparticipating submarket average revenue function $q_1(p)$, (ii) the participating submarket average revenue function $q_2(p)$, (iii) the practice's total cost function, and (iv) the allowance level A. Whenever a shift increases T^p more than T^n, it follows that the attractiveness of the option to participate increases <u>relatively</u> to that of the option of not participating. Hence, the shift makes it more likely that physicians in general will choose to participate. Whenever a shift increases T^n more than T^p, the reverse is true.

1. <u>Shifts in the nonparticipating average revenue function $q_1(p)$.</u> Let s be defined as a shift parameter (representing the effect of a change in an exogenous variable), then $q_1(p)$ can be written as $q_1(p,s)$. In the event of an outward shift in the average revenue function, then $\frac{\partial q_1}{\partial s} > 0$.* Taking the optimal values of p, q_1, and q_2, the maximum profit for a nonparticipating physician can be written as

$$(5) \qquad T^n = p(s)q_1^n[p(s),s] + p(s)q_2^n[p(s)] - C(q_1^n[p(s),s] + q_2[p(s)])$$

Differentiating with respect to s yields

$$(6) \qquad \frac{dT^n}{ds} = p_s(q_1 + pq_{1_p}^n + q_2 + pq_{2_p}^n) - (q_{1_p}^n + q_{2_p}^n)C_q + q_{1_s}^n(p - C_q) \quad ,$$

where the subscript s denotes a derivation or partial derivative with respect to s. Because of optimality condition (2), and because price is greater than marginal revenue (which, in turn, equals C_q at maximum profit), then for an outward shift in which $q_{1_s}^n > 0$, (6) becomes

$$(7) \qquad \frac{dT^n}{ds} = q_{1_s}^n(p - C_q) > 0 \ .$$

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* The partial derivative is positive as long as the physician sells output in the nonparticipating submarket. The data presented in Chapter V indicate that this was the case with respect to the physicians in our sample.

Thus, the maximum level of profits increases under the nonparticipating option as a consequence of an outward shift of the submarket average revenue function.

For participating physicians, maximum profits can be written as

$$(8) \qquad T^p = p(s)q_1^p[p(s),s] + Aq_2^p(s) - C(q_1^p[p(s),s] + q_2^p(s)).$$

Differentiating (8) with respect to s, gives

$$(9) \qquad \frac{dT^p}{ds} = p_s(q_1 + pq_{1_p}^p - q_{1_p}^p C_q) + (A - C_q)q_2^p + (p - C_q)q_{1_s}^p \ .$$

Given optimality condition (4), the derivative in (9) reduces to (10), which is positive for the same reasons as is (7).

$$(10) \qquad \frac{dT^p}{ds} = (p - C_q)q_{1_s}^p > 0$$

Since (7) and (10) are both positive, an outward shift of the nonparticipating submarket average revenue function would increase the physician's profits regardless of his/her participation status. However, in general, the effect on a nonparticipating physician would not be the same as the effect on a participating physician since equations (7) and (10) would be evaluated at different optimal values for the variables. Moreover, it cannot be determined _a priori_ which derivative will be largest. Thus we conclude that an outward shift of his/her nonparticipating average revenue function has a theoretically indeterminate effect on the relative profitabilities of participating and not participating--and an indeterminate effect on the physician's participation decision.

2. <u>Shifts in the participating average revenue function $q_2(p)$</u>. In this case, the average revenue function for the participating submarket is $q_2(p,s)$ and $q_{2_s} \geq 0$, where q_{2_s} is the partial derivative of q_2 with respect to s, and an outward shift in the function affects only the profitability of the physician's nonparticipating option.*

The maximum profit level associated with the nonparticipating option with the shift parameter incorporated is:

$$(11) \qquad T^n = p(s)q_1^n[p(s)] + p(s)q_2^n[p(s),s] - C(q_1^n[p(s)] + q_2^n[p(s),s])$$

Differentiating (11) with respect to s, yields

$$(12) \qquad \frac{dT^n}{ds} = p_s(q_1^n + pq_{1p}^n + q_2 + pq_{2p}^n - [q_{1p}^n + q_{2p}^n]C_q) + (p - C_q)q_{2s}^n ,$$

which, in view of optimality condition (2), reduces to

$$(13) \qquad \frac{dT^n}{ds} = (p - C_q)q_{2s}^n \geq 0$$

Thus an outward shift in the participating average revenue function unambiguously raises the relative profitability of not participating if $q_{2_s} > 0$ or leaves it unchanged if $q_{2_s} = 0$.

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* $q_{2_s} = 0$ if output on the average revenue curve is zero at the optimal price, both before and after the shift; otherwise q_{2_s} is positive for an outward shift of the participating submarket average revenue function.

3. Shifts in both the nonparticipating and participating average revenue functions. Many factors such as changes in per capita income or changes in health status among the practice's patients probably cause shifts in the average revenue functions in both the nonparticipating and participating submarkets at the same time. The impact on the attractiveness of participating can therefore be represented by entering the shift parameter s into each of the two average revenue functions. Omitting details, this gives

$$\frac{dT^n}{ds} = (p - C_q)q^n_{1_s} + (p - C_q)q^n_{2_s} > 0 \text{ , and}$$

$$\frac{dT^p}{ds} = (p - C_q)q^p_{1_s} > 0 \text{ .}$$

It is obvious that in the event an outward shift in the nonparticipating average revenue function raises the relative profitability of not participating, a contemporaneous outward shift in the participating average revenue function will reinforce the effect. Nevertheless, as discussed earlier, it cannot be determined *a priori* whether $(p - C_q)q^n_{1_s}$ is smaller or larger than $(p - C_q)q^p_{1_s}$. For this reason, outward shifts in both average revenue functions have a theoretically indeterminate impact on the relative profitabilities of participating and not participating.

4. Shifts in the total cost function. In order to accommodate a shift parameter, the total cost function is rewritten as $C(q_1[p(s)] + q_2[p(s)],s)$, and we consider the case in which the partial derivative $C_s > 0$, which reflects an upward shift in the cost function. Given optimality conditions (2) and (4), it can be shown that

(14) $$\frac{dT^n}{ds} = -C_s < 0 \quad \text{and} \quad \frac{dT^p}{ds} = -C_s < 0 \text{ .}$$

However, it cannot be specified a priori which derivative in (14) is greater in absolute value since the value of C_s depends on the optimal output level, which, in general, is different for the participating and nonparticipating options. Thus the effect of an upward shift in the practice's total cost function has a theoretically indeterminate impact on the relative profitabilities of participating and not participating.

5. Changes in the allowance level in the participating submarket. Up to this point it has been assumed that allowances in the participating submarket do not affect average revenues in that submarket when the physician does not participate. Although it was argued in Chapter IV that this is probably a reasonable assumption, we now allow for the possibility that changes in allowances do affect the participating submarket average revenue function for a nonparticipating physician. Other things equal, an increase in allowances will reduce the net prices of services to patients facing coinsurance in this submarket. Thus, to some extent, increases in allowances may shift a nonparticipating physician's participating submarket average revenue function outward. Since the allowance level A is a predetermined variable, an increase in A can be represented by a positive shift in parameter s. The participating submarket average revenue function can then be written as $q_2^n(p,s)$ with the partial derivative $q_{2_s}^n \geq 0$ to reflect an outward shift in the average revenue function with an increase in allowance levels.* As in (13), this means that

$$(15) \qquad \frac{dT^n}{ds} = (p - C_q)q_{2_s}^n \geq 0 \quad ,$$

* $q_{2_s}^n = 0$ if it is not profitable for the nonparticipating physician to produce output for the participating submarket either before or after the increase in allowances.

indicating that increases in allowances cause profits to increase under the nonparticipating option, provided that the physician produces output for the participating submarket.

It can also be shown that under the participating option

$$(16) \qquad \frac{dT^p}{dA} = q_2^p \geq 0 \quad ,$$

indicating that a participating physician's profits will increase when allowances are raised, provided that his/her optimal output level is positive in the participating submarket. However, since we cannot determine a priori whether (15) or (16) is largest, we conclude that, at the most general level, the effect of changes in allowances on the relative profitabilities of participating and not participating cannot be predicted theoretically.

Nevertheless, as an empirical issue, it is likely that changes in allowances will have little influence on the participating average revenue function.* Empirically, then, $(dT^p/dA) - (dT^n/dA)$ is expected to be approximately equal to q_2^p. This means that a rise in allowances in the participating submarket raises the profitability of participating unless the optimal output q_2^p is zero.

The foregoing discussion is summarized in Table 8-1, which shows the theoretically predicted impacts of shifts in revenue and cost functions on the probabilities that physicians choose to participate. In constructing the table, it was assumed that participation probabilities increase (decrease) whenever a shift in revenue or cost functions

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* As we contended in Chapter IV, the position and slope of the function are far more likely to be determined by competitive conditions in the submarket.

makes participation a relatively more (less) profitable alternative than nonparticipation. As we have argued, most of the shifts have theoretically indeterminate effects on participation decisions, but this does not make the empirical question of how revenue and cost structures affect the decisions less important. It merely states that the effects of changes in revenue and cost structures on participation rates must be determined empirically in most instances, and that most often they cannot be predicted using *a priori* reasoning.*

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* The Sloan-Steinwald-Hadley (SSH) model of participation, which was mentioned above, generates unambiguous predictions for changes in participation rates resulting from the types of structural changes listed in Table 8-1. In particular, it predicts that: (i) outward shifts in average revenue functions lower participation rates; (ii) upward shifts in the total cost function lower participation rates; and (iii) increases in allowances in the participating submarket raise participation rates.

There are two reasons for the differences between these predictions and those identified in Table 8-1. First, the SSH model applies to claim-by-claim participation--i.e., to the case where the physician can vary the percentage of his/her output in the participating submarket that he/she provides on a participating basis. They assume that the physician faces a horizontal average revenue function (at the amount fixed by the Plan's fee schedule or fee screens) for all services he/she sells in the participating submarket. This, in turn, implies that the physician has the option of participating or not on each unit of output depending upon whether he/she decides it should be sold in the participating or in the nonparticipating submarket. However, their model does not apply if participation is on an all-or-nothing basis. In that case, when a nonparticipating physician sells output in the participating submarket his/her average revenue is the amount he/she charges, not a fixed amount predetermined by the Plan. By contrast, the model proposed here--in order to apply to the all-or-nothing participation agreements offered by the study Plans--specifies that the percentage of the physician's output sold in the UCR and partial service submarkets on a participating basis must be zero or 100.

Second--and in contrast to the method used here--the SSH model examines the effects of structural changes on the amount of output of services provided on a participating basis, and it claims that any increase (reduction) in this amount raises (lowers) the probability that the physician will participate. However, a structural shift that induces a reduction in the output of nonparticipating services may also induce a reduction in the output of nonparticipating services produced for the participating submarket. Hence, it may not reduce the physician's willingness to participate--only the total volume of output produced for the participating submarket. For reasons such as this,

TABLE 8-1

PREDICTED EFFECTS ON PARTICIPATION PROBABILITIES OF CHANGES IN MARKET STRUCTURE

Change in Market Conditions	Predicted Effect on Participation Probabilities +: Increase; -: Decrease; 0: No Change; ?: Indeterminate
Outward shift in average revenue function in nonparticipating submarket	?
Outward shift in average revenue function in participating submarket	- or 0
Outward shifts in average revenue functions in nonparticipating and participating submarkets	?
Upward shift in total cost function	?
Increase in allowances in participating submarket	+ (except in special cases)

Description of the Variables

The data used in this study are the claims records of 942 physicians in Plan A and 928 physicians in Plan B covering the years 1973-76. As has been explained, the two study Plans offered participation agreements formally on an all-or-nothing basis. In Plan A the agreement applied only to UCR business. In Plan B a participating physician was required to participate in both UCR and partial service business, and he/she could not elect to participate in one of the two lines alone. Plan B physicians therefore faced

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our approach is to determine the impacts of structural changes on the percentage of output sold in the participating submarket on a participating basis.

Finally, it must be emphasized that the results obtained here posit profit maximization, although they should continue to hold to the extent that physicians are income-motivated at all. For instance, if physicians maximize utility and utility increases with net income, the implications of the model will be the same as those shown in the table as long as there are no direct or indirect differences in psychic income derived from participating and not participating. Target income achieving behavior should also lead to the same results unless physicians' net incomes are equal to or larger than the target amounts. Clearly, physicians will not be sensitive to small income differences between participating and not participating when their incomes under both alternatives are close to, or larger than, the target amounts.

two allowance levels on participating business rather than one. Since Plan B's partial service allowances averaged only about 55% of UCR allowances during the sample period, it was predicted that they would represent a stronger constraint on the Plan B physician's participation decision than UCR allowance levels.*

In modeling the participation decision, it was assumed that at the start of each year the physician faces the discrete optimization problem described in the preceding section. Having chosen the alternative yielding the largest anticipated profit or net income, the physician participates or does not participate in all applicable private business during the year. Accordingly, we estimated the probability that the physician participates in year t as a function of allowance levels and other reimbursement variables, proxies for

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* Despite the all-or-nothing nature of the two participation agreements, the data indicated that some physicians in each Plan had both participating and nonparticipating claims in each of the sample years. Those physicians with both types of claims had predominantly one or the other, and there may be several reasons for their having both types of claims (e.g., switches in participation status or Plan coding errors that account for inconsistency between the data and the formal participation agreements). In addition, each Plan allowed participating physicians to bill their patients. In Plan B, when a patient who had been billed by a participating physician submitted a claim for reimbursement he/she was informed of his/her payment liability--i.e., that the physician was entitled to no more than the difference between the amount allowed and the amount paid by the Plan. A patient billed by a participating physician in Plan A was not informed of his/her payment liability except upon specific request. Hence, it was technically possible for physicians in Plan A to participate but to be reimbursed on some claims as if they were nonparticipating and, in effect, to participate on a claim-by-claim basis.

To generate participation data that were compatible with the Plans' participation agreements, physicians in both Plans were initially defined as participating if more than 5% of their RVUs in private business were provided on a participating basis. To allow for the possibility of de facto claim-by-claim participation in Plan A, one measure of participation used in the analysis of that Plan's data was the ratio of RVUs provided on a participating basis to the total number of RVUs in private business recorded for the physician. The results obtained using the latter measure were almost identical to those obtained using the former measure.

level of his total cost function, proxies for the positions of the average revenue functions, and a group of physician and patient-mix variables.

Five groups of explanatory variables were selected for the regressions. The variables are defined in table 8-2.

The first group consists of six reimbursement, pricing, and output variables. APRVU1 and APRVU5 denote the dollar amounts allowed per RVU in UCR and partial service business (i.e., the fee screen or fee schedule amounts set by the Plans), respectively. Both allowances were predicted to be positively correlated with the participation probability. In Plan A, where there was no partial service business, it was expected that the UCR allowance would have a stronger quantitative influence on the participation probability than the UCR allowance in Plan B.

LAGPRCLM signifies the average number of days between filing a claim and receipt of reimbursement from the Plan. Long payment lags increase the practice's accounts receivable, raise its interest costs, and shift its cost function upward.* CPRVU stands for the average amount charged by the physician in private business. A single measure of average amount charged was used because variation in charges across the private business lines was negligible.** Other things equal, it was assumed that to the extent practice costs and quality are correlated with charges, high-priced physicians

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* On nonparticipating claims the payment lag applies to the subscriber's claims. We assumed that a long payment lag incurred by the subscriber generally means a long payment lag for the physician.

** See Chapter V for evidence on this point. Also, strictly speaking, the current average charge level is endogenous, but to have used the one-year lagged charge instead would have necessitated dropping the initial year's data. For this reason--and the fact that current and one-year lagged charges were highly correlated--the current charge level was retained.

TABLE 8-2

LIST AND DEFINITIONS OF VARIABLES

Variable	Definition
	Dependent Variable
$PART_t$	Dummy variable = 1 if the physician participated in year t
	Explanatory Variables
AGE	Physician's age in 1979
AMASEX	Dummy variable = 1 if the physician is female
$APRVU1_t$	Amount allowed per RVU (in dollars) in UCR business in year t
$APRVU5_t$	Amount allowed per RVU (in dollars) in partial service business in year t
BORDCERT	Dummy variable = 1 if the physician was board certified in 1977
$CPRVU_t$	Amount charged per RVU (in dollars) in all private business lines in year t
$DOCPRCAP_t$	Number of non-federal physicians per capita in physician's county in year t
$ENRBPRCP_t$	Fraction of county population enrolled in Medicare Part B in year t
FMG	Dummy variable = 1 if the physician was a foreign medical graduate
GROUP	Dummy variable = 1 if the physician practiced in a group in 1977
IM	Dummy variable = 1 if the physician was an internist

TABLE 8-2 (Continued)

Variable	Definition
	Explanatory Variables (Continued)
$INPAHOSP_t$	Fraction of the physician's RVUs in private business provided in hospitals in year t
$INPERCAP_t$	Per capita income in the physician's county in year t
$LAGPRCLM_t$	Average number of days between claim filing and claim payment in private business in year t
OTHER_EM	Dummy variable = 1 if the physician practiced in a hospital or other institutional setting in 1977
OTHRSPEC	Dummy variable = 1 if the physician had a non-primary care specialty
$OUTPPRCP_t$	Number of hospital outpatient visits per capita in physician's county in year t
PARTNER	Dummy variable = 1 if the physician practiced in a partnership in 1977
PD_	Dummy variable = 1 if the physician was a pediatrician
PRCT_URB	Percentage (X 10) of residents in county living in urban areas
$RVU1_t$	Number of RVUs provided in UCR business in year t
$RVU5_t$	Number of RVUs provided in partial service business in year t
TIME74	Dummy variable = 1 if year of observation was 1974
TIME75	Dummy variable = 1 if year of observation was 1975

TABLE 8-2 (Continued)

Variable	Definition
	Explanatory Variables (Continued)
TIME76	Dummy variable = 1 if year of observation was 1976
$WAGEINDX_t$	Average payroll per employee in physicians' offices in year t

would tend to have high unit costs and to face strong demands for services provided on a nonparticipating basis.*

The fraction of the physician's total number of RVUs provided to hospital inpatients (INPAHOSP) was taken as a proxy for both the level of office production costs and the average size of claims, the latter representing the risk of bad debt on nonparticipating services. Large values of INPAHOSP should imply low office production costs and a high cost of bad debt on nonparticipating claims. It was further conjectured that large outputs of UCR and partial service RVUs (RVU1 and RVU5) increase the physician's sensitivity to anticipated profit differentials between participating and not participating.**

The second group of explanatory variables consists of a measure of physicians' office wage rates (WAGEINDX) and type-of-practice dummies reflecting

* C.f. Paringer (1979) reported a significantly negative partial correlation between the physician's charge level and his or her willingness to accept Medicare assignment.

** C.f. Paringer (1979).

the possibility of economies of large scale. Large values of WAGEINDX imply a relatively high level of production costs. Dummies indicating solo practice and practice in (expense-sharing) arrangements were deleted, so that, if there are economies of scale, group practice (GROUP) and partnership practice (PARTNER) should denote relatively lower levels of unit costs. Practice in hospitals and other institutional settings (OTHER_EM) indicates a low level of non-physician expenses and should also denote a relatively lower level of unit production costs.

The third group of explanatory variables is comprised of several county-level proxies for the position of the average revenue functions in the non-participating submarkets and in the participating submarket when the physician does not participate. They include per capita income (INPERCAP), the fraction of the county population enrolled in Medicare Part B (ENRBPRCP), the percentage of county residents living in urban areas (PRCT_URB), the number of physicians per capita (DOCPRCAP), and the number of hospital outpatient visits per capita (OUTPPRCP). Increases in the values of each of the first three of these variables were assumed to signify outward shifts in the average revenue functions. Increases in the values of the last two were assumed to denote backward shifts--since they should be associated with fewer patients and/or diminished quantities demanded per physician.*

The fourth group of variables is made up of physician characteristics. Medical graduation in a foreign country (FMG) and board certification (BORDCERT)

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* All five of the variables were moderately to highly intercorrelated. Also, in Plan A the office wage proxy (a county-level variable) was almost perfectly correlated with county per capita income. No other county socio-economic variables were entered into the regression equations because of the high degree of multicollinearity.

were taken as proxies for the perceived quality of the physician's services and/or the level of production costs. In the first sense, they stand for the positions of average revenue functions with respect to all nonparticipating services, and, in the second, they stand for the position of the physician's cost function. No hypotheses were proposed with respect to the effects of physician age (AGE) and sex (AMASEX) on the participation decision. Although physician age has generally been found to be negatively correlated with assignment rates, it may capture the influence of the physician's tastes, the perceived quality of his/her services, and the size of his/her nonparticipating clientele. Thus, it was unclear on a priori grounds how age would be related to the participation probability, and similar comments apply with respect to the physician's sex.*

Specialty dummies denoting practice in internal medicine (IM), pediatrics (PD_), and the non-primary care fields (OTHRSPEC) were defined chiefly to reflect differences in participation propensities between the primary care and non-primary care fields. The general and family practice dummy was deleted. Although demands in the nonparticipating markets may differ between primary care and referral practitioners, there were no obvious hypotheses concerning a systematic relationship between specialty and participation status.

The final group of explanatory variables consists of three time dummies

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* Other variables such as the holding of medical school appointments and proxies for the physician's race and medical school research orientation were considered as well. However, none of the sample physicians held faculty appointments, and the use of race and research orientation proxies led to large numbers of missing or unreliable observations. Consequently, these variables were omitted.

signifying the years of observation 1974 (TIME74), 1975 (TIME75), and 1976 (TIME76). The 1973 dummy was deleted. The variables were included as proxies for time-related events such as changes in reimbursement policies which might affect participation decisions but which could not be directly observed.

Findings

With the physician designated as the analytic unit, the participation probability was specified as a regression function of the explanatory variables listed in Table 8-2 and estimated from the combined cross-sectional and time-series sample of physician and county data. Regressions were estimated separately using single-equation ordinary least squares (OLS) and single-equation logit. In addition, OLS and two-stage least squares (TSLS) estimates were made using data for a subsample of approximately 200 physicians from each Plan to test the possibility that the OLS estimates are subject to simultaneity bias. The participation probability, charge per RVU, output (in RVUs), and allowance per RVU were specified as endogenous dependent variables in making the TSLS estimates. The exogenous variables for the first stage of the TSLS estimation consisted of the exogenous variables (including the physician-specific dummy variables) used in the simultaneous-equations model described in Chapter VII and the additional exogenous variables listed in Table 8-2.

Tables 8-3 and 8-4 give the OLS and TSLS estimates of the participation probability equation for Plans A and B, respectively. The prefix "FIRST." in the list of explanatory endogenous variables for the TSLS indicates the substitution of fitted values obtained through first-stage least squares regression on all exogenous variables in the system. The residual sums of squares (SSE) from both methods were used to test whether the OLS estimates were significantly different from the TSLS estimates.* For both Plans, the test statistics (F test) indicate that the OLS estimates are not significantly different from the TSLS estimates. For Plan A, the F-ratio was .89 (with numerator and denominator degrees of freedom of 25 and 605, respectively), and for Plan B the F-ratio was .24 (with numerator and denominator degrees of freedom of 27 and 593, respectively).

In view of the evidence that simultaneity bias did not constitute a problem for this part of the analysis, it was decided to rely upon the OLS and logit techniques in estimating the participation probabilities for the full samples of physicians in Plan A and Plan B.** For purposes of comparison the OLS and logit estimates of the participation probability are given in Tables 8-4 and 8-5, respectively.*** The results strongly confirm the role of relative income opportunities in the physician's choice between participating and not participating. The coefficients on the allowance variables all had the expected signs and, with one exception, all were significant well below the 5% level. Moreover, as anticipated, the UCR allowance had a much stronger influence on the participation probability in Plan A (both quantitatively and in terms of statistical significance) than in Plan B. Also as expected, in Plan B the partial service allowance had a

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* See Maddala (1971) for a discussion of tests of linear restrictions.

** Two further considerations were also involved in this decision. First, as Maddala (1971, p. 231) pointed out, "...it has been found that the OLS method is more robust against specification errors than many of the simultaneous equation methods...." Second, the inclusion of physician-specific dummy variables in the first stage of the TSLS method creates severe computational difficulties with samples as large as those analyzed in this study.

*** Two data editing steps were taken before estimating the regressions. First, observations defined by physician and year were deleted when charges

TABLE 8-3

COMPARATIVE OLS AND TSLS ESTIMATES OF THE PROBABILITY OF PARTICIPATING IN PRIVATE BUSINESS: PLAN A

OLS

SSE	92.413691	F RATIO	6.53
DFE	605	PROB>F	0.0001
MSE	0.152750	R-SQUARE	0.2058

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	2.570828	1.277518	2.0124	0.0446
APRVU	1	0.419483	0.078602	5.3368	0.0001
CPRVU	1	-0.374857	0.056865	-6.5920	0.0001
RVU	1	-0.025947	0.008278577	-3.1342	0.0018
LAGPRCLM	1	-0.000419768	0.0005415789	-0.7751	0.4386
AGE	1	0.007127822	0.001904435	3.7427	0.0002
AMASEX	1	0.126294	0.108270	1.1665	0.2439
BORDCERT	1	-0.024311	0.039074	-0.6222	0.5341
FMG	1	0.200994	0.040998	4.9026	0.0001
GROUP	1	-0.022041	0.043471	-0.5070	0.6123
PARTNER	1	0.042557	0.048317	0.8808	0.3788
OTHER_EM	1	0.060150	0.060410	0.9957	0.3198
PD_	1	0.141965	0.090559	1.5677	0.1175
IM	1	-0.030983	0.079437	-0.3900	0.6967
OTHRSPEC	1	0.097585	0.068772	1.4190	0.1564
INPAHOSP	1	0.071837	0.048684	1.4756	0.1406
WAGEINDX	1	0.007971362	0.024007	0.3320	0.7400
DOCPRCAP	1	206.076117	258.631083	0.7968	0.4259
OUTPPRCP	1	0.111932	0.416109	0.2690	0.7889
INPERCAP	1	-0.000640585	0.000320823	-1.9967	0.0463
ENRBPRCP	1	-4.601860	2.930644	-1.5703	0.1169
PRCT_URB	1	0.0003049306	0.000230961	1.3203	0.1872
TIME74	1	0.214061	0.176699	1.2114	0.2262
TIME75	1	0.155296	0.213459	0.7275	0.4672
TIME76	1	0.617635	0.411001	1.5028	0.1334

TSLS

SSE	95.799184	F RATIO	7.23
DFE	605	APPROX PR>F	0.0001
MSE	0.158346	R-SQUARE	0.2230

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	APPROX PROB>|T|
INTERCEPT	1	2.605565	1.303553	1.9988	0.0461
FIRST.APRVU	1	0.722226	0.108849	6.6351	0.0001
FIRST.CPRVU	1	-0.633370	0.080693	-7.8492	0.0001
FIRST.RVU	1	-0.040325	0.009764202	-4.1298	0.0001
LAGPRCLM	1	.00001136657	0.0005699007	0.0199	0.9841
AGE	1	0.007482966	0.001945046	3.8472	0.0001
AMASEX	1	0.112000	0.110281	1.0156	0.3102
BORDCERT	1	-0.028457	0.039874	-0.7137	0.4757
FMG	1	0.209680	0.041906	5.0035	0.0001
GROUP	1	-0.012304	0.044561	-0.2761	0.7825
PARTNER	1	0.048019	0.049290	0.9742	0.3303
OTHER_EM	1	0.055634	0.062171	0.8949	0.3712
PD_	1	0.120734	0.093123	1.2965	0.1953
IM	1	-0.019333	0.081116	-0.2383	0.8117
OTHRSPEC	1	0.099958	0.070274	1.4224	0.1554
INPAHOSP	1	0.093319	0.050462	1.8493	0.0649
WAGEINDX	1	0.010259	0.024454	0.4195	0.6750
DOCPRCAP	1	229.741933	263.429263	0.8721	0.3835
OUTPPRCP	1	0.062505	0.424193	0.1473	0.8829
INPERCAP	1	-0.00067659	0.0003267498	-2.0707	0.0388
ENRBPRCP	1	-4.994986	2.985342	-1.6732	0.0948
PRCT_URB	1	0.0003354332	0.0002353901	1.4250	0.1547
TIME74	1	0.225469	0.179925	1.2531	0.2106
TIME75	1	0.172006	0.217429	0.7911	0.4292
TIME76	1	0.683472	0.418726	1.6323	0.1031

TABLE 8-4

COMPARATIVE OLS AND TSLS ESTIMATES OF THE PROBABILITY OF PARTICIPATING IN PRIVATE BUSINESS: PLAN B

OLS

SSE	68.180522	F RATIO	2.93
DFE	593	PROB>F	0.0001
MSE	0.114976	R-SQUARE	0.1138

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	0.554318	0.305537	1.8142	0.0701
APRVU1	1	0.080745	0.055276	1.4608	0.1446
APRVU5	1	0.222308	0.051619	4.3067	0.0001
CPRVU	1	-0.085964	0.038604	-2.2268	0.0263
RVU1	1	0.00917626	0.008120299	1.1300	0.2589
RVU5	1	-0.014140	0.015106	-0.9360	0.3496
LAGPRCLM	1	0.0005856028	0.0004884314	1.1989	0.2310
AGE	1	0.003815146	0.001555106	2.4533	0.0144
AMASEX	1	0.052065	0.109164	0.4769	0.6335
BORDCERT	1	-0.033080	0.031541	-1.0488	0.2947
FMG		0.105703	0.036236	2.9170	0.0037
GROUP	1	0.069904	0.061772	1.1317	0.2582
PARTNER	1	0.001946998	0.047663	0.0408	0.9674
OTHER_EM	1	-0.031187	0.051978	-0.6000	0.5487
PD_	1	0.004315616	0.069035	0.0625	0.9502
IM_	1	-0.00331427	0.063582	-0.0521	0.9584
OTHRSPEC	1	-0.066398	0.052627	-1.2617	0.2076
INPAHOSP	1	0.129317	0.058913	2.1951	0.0285
WAGEINDX	1	-0.023617	0.010052	-2.3494	0.0191
DOCPRCAP	1	38.037704	36.469387	1.0430	0.2974
OUTPPRCP	1	0.046240	0.040515	1.1413	0.2542
INPERCAP	1	.0000216143	.00006190051	-0.3492	0.7271
ENRBPRCP	1	-0.707998	1.109345	-0.6382	0.5236
PRCT_URB	1	.0000389074	0.0001293899	-0.3007	0.7637
TIME74	1	0.050783	0.064616	0.7859	0.4322
TIME75	1	0.075206	0.075116	1.0012	0.3171
TIME76	1	0.130766	0.125526	1.0417	0.2980

TSLS

SSE	68.922881	F RATIO	3.20
DFE	593	APPROX PR>F	0.0001
MSE	0.116227	R-SQUARE	0.1231

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	APPROX PROB>|T|
INTERCEPT	1	0.361261	0.319351	1.1312	0.2584
FIRST.APRVU1	1	0.084878	0.080891	1.0493	0.2945
FIRST.APRVU5	1	0.326332	0.067714	4.8200	0.0001
FIRST.CPRVU	1	-0.106741	0.056942	-1.8746	0.0613
FIRST.RVU1		0.020995	0.010160	2.0666	0.0392
FIRST.RVU5	1	-0.036970	0.019996	-1.8489	0.0650
LAGPRCLM	1	0.0006858724	0.000499928	1.3719	0.1706
AGE	1	0.004016577	0.001588441	2.5286	0.0117
AMASEX	1	0.047341	0.110006	0.4303	0.6671
BORDCERT	1	0.025583	0.031871	-0.8027	0.4225
FMG	1	0.106539	0.036500	2.9189	0.0036
GROUP	1	0.073811	0.062462	1.1817	0.2378
PARTNER	1	-0.011059	0.048438	-0.2283	0.8195
OTHER_EM	1	-0.041180	0.052423	-0.7855	0.4325
PD_	1	0.003901179	0.069829	0.0559	0.9555
IM_	1	-0.00500642	0.064506	-0.0776	0.9382
OTHRSPEC	1	-0.050397	0.053821	-0.9364	0.3495
INPAHOSP	1	0.196341	0.064337	3.0518	0.0024
WAGEINDX	1	-0.023368	0.010117	-2.3098	0.0212
DOCPRCAP	1	38.284891	36.681744	1.0437	0.2970
OUTPPRCP	1	0.044540	0.040775	1.0923	0.2751
INPERCAP	1	.0000140654	.00006253197	-0.2249	0.8221
ENRBPRCP	1	-0.545803	1.121564	-0.4866	0.6267
PRCT_URB	1	.0000527812	0.0001303814	-0.4048	0.6858
TIME74	1	0.041049	0.065140	0.6302	0.5288
TIME75	1	0.054691	0.076260	0.7172	0.4736
TIME76	1	0.101218	0.127173	0.7959	0.4264

considerably stronger influence on the participation probability than the UCR allowance.

The elasticities of the probability of participating with respect to allowances, estimated from the OLS regressions at sample means, were: 0.84 for Plan A's UCR allowance, 0.10 for Plan B's UCR allowance, and 0.21 for Plan B's partial service allowance.* By way of contrast, Sloan and Steinwald (1978) estimated the elasticity with respect to a proxy measure of partial service allowances at approximately 0.10.**

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allowed by the Plan cannot exceed charges. Therefore, the fee screen or fee schedule amounts were not observable in those instances in which reported allowances were to equal charges (i.e., the difference between the fee screen or fee schedule amounts and charges could not be determined when charges were less than or equal to the former amounts). Since the correct exogenous reimbursement variables are the fee screen or fee schedule amounts, it was necessary to restrict the samples to cases where they were observable. The deletions removed 26% of the observations from the Plan A sample and 11% of the observations from the Plan B sample.

Second, physicians with no UCR business were deleted from both samples because there were no reliable ways of estimating their missing UCR allowances. In Plan B, physicians having UCR claims but no partial service claims were retained, and their partial service allowances were estimated as the sample mean allowances for partial service business as a whole. Since partial service allowances are determined by fixed fee schedules (when they are less than amounts charged), it was felt that this procedure generated reasonably accurate proxies for the unobserved allowances.

Due to the two editing steps, and the fact that some physicians had no recorded sample claims in one or more of the study years, the number of physicians appearing in each of the samples varied from year to year. In the Plan A sample, the number of physicians averaged about 725 per year. In the Plan B sample it averaged about 750 per year.

* The exceptionally high sensitivity of the Plan A participation probability to allowances may be partly due to the relatively low overall rate of participation in that Plan. An average of only 74% of the Plan A physicians in the regression sample participated in one or more years of the study period, as opposed to an average of 88% of the physicians in Plan B. As the number of physicians motivated to enter participation agreements increases, one would tend to expect the remaining nonparticipants to be those who are least responsive to additional income incentives for participating.

** We have suggested that all-or-nothing participation decisions ought to be less sensitive to changes in allowance levels than the claim-by-claim type decisions examined by Sloan and Steinwald. While the figures cited

TABLE 8-4

OLS ESTIMATES OF THE PROBABILITY OF PARTICIPATING IN PRIVATE BUSINESS

	Plan A		Plan B	
Variable	Parameter Estimate	t-ratio	Parameter Estimate	t-ratio
INTERCEPT	2.737**	3.90	1.201**	9.17
APRVU	.279**	6.98	--	--
APRVU1	--	--	.039*	2.10
APRVU5	--	--	.140**	7.01
CPRVU	-.261**	-9.25	-.057**	-4.49
RVU/1000	-.001	-.14	--	--
RVU1/1000	--	--	.004	1.01
RVU5/1000	--	--	.001	.17
LAGPRCLM	-.001**	-4.18	-.0005*	-2.49
AGE	.003**	3.65	-.002**	-2.67
AMASEX	.102*	2.56	.035	1.15
BORDCERT	-.061**	-3.01	-.064**	-4.98
FMG	.138**	6.60	.061**	4.27
GROUP	-.104**	-4.82	-.096**	-3.91
PARTNER	.092**	3.77	.007	.43
OTHER_EM	.121**	3.93	.045*	2.26
PD_	.118**	2.68	.106**	3.62
IM	-.128**	-3.16	-.094**	-3.51
OTHRSPEC	.005	.16	-.006	-.27
INPAHOSP	.023	.98	.051*	2.27
WAGEINDX	.002	.16	-.019**	-4.60
DOCPRCAP	159.776	1.12	-5.000	-.37
OUTPPRCP	.284	1.24	-.00008	-.005
INPERCAP	-.0005**	-2.83	-.00006*	-2.38
ENRBPRCP	-5.341**	-3.45	-.734	-1.49
PRCT_URB	-.00005	-.42	.0002**	3.78
TIME_74	.175	1.77	.084**	3.14
TIME 75	.159	1.33	.100**	3.18
TIME 76	.463*	2.01	.197**	3.77
DFE	2416		2984	
SSE	383.99		285.96	
MSE	.16		.10	
F	21.87		11.83	
Prob > F	.0001		.0001	
R^2	.18		.09	

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests). Because of heteroscedasticity, the t-ratios may be biased. However, any such bias appears to be minimal as the OLS-reported t-ratios here closely approximate the Logit model asymptotic t-ratios in Table 8-5.

TABLE 8-5

LOGIT ESTIMATES OF THE PROBABILITY OF PARTICIPATING IN PRIVATE BUSINESS

	PLAN A		PLAN B	
Variable	Parameter Estimate	Asymptotic t	Parameter Estimate	Asymptotic t
INTERCEPT	16.27 **	3.21	5.726 **	3.81
APRVU	1.749 **	6.16	--	--
APRVU1	--	--	.360	1.95
APRVU5	--	--	1.497 **	6.51
CPRVU	-1.597 **	-7.71	-.466 **	-4.22
RVU/1000	-.009	-.32	--	--
RVU1/1000	--	--	.038	.81
RVU5/1000	--	--	.008	.11
LAGPRCLM	-.006 **	-4.01	-.005 **	-2.77
AGE	.021 **	3.64	-.014 *	-2.23
AMASEX	.970 **	2.72	1.401	1.89
BORDCERT	-.327 *	-2.48	-.620 **	-4.33
FMG	.989 **	6.70	.845 **	4.74
GROUP	-.577 **	-4.56	-.768 **	-3.66
PARTNER	.593 **	3.50	.055	.32
OTHER_EM	.772 **	3.53	.703 *	2.57
PD_	.689 *	2.14	2.531 **	3.93
IM_	-.829 **	-3.08	-.969 **	-3.31
OTHRSPEC	-.055	-.22	-.128	-.48
INPAHOSP	.141	.95	.415	1.77
WAGEINDX	.130	1.27	-.201**	-4.66
DOCPRCAP	-94.69	-.09	177.3	1.33
OUTPPRCP	4.618 *	2.40	.207	1.24
INPERCAP	-.004 **	-3.21	-.0007	-1.92
ENRBPRCP	-44.97 **	-3.30	-10.78 *	1.98
PRCT_URB	-.00008	-.11	.0008 **	2.90
TIME_74	.476	.53	.861 **	2.91
TIME 75	.062	.06	1.001 **	3.55
TIME 76	2.333	1.21	2.013 **	3.81

	At Convergence	At Zero	At Convergence	At Zero
Log Likelihood	-1177	-1729	-972	-2142
Sum of Squared Res.	2579	2494	2971	3089
DFE	2470	2495	3063	3090
% Correctly Predicted	77.5	50.0	88.3	50.0
Likelihood Ratio Index (About Zero)	.320		.546	
Likelihood Ratio Statistic (About Zero)	1106		2338	

The remaining results are rather more mixed. Six cost-related variables were used in the regressions--WAGEINDX, LAGPRCLM, INPAHOSP, GROUP, PARTNER, and OTHER_EM. Large values of the first two signify high total unit costs. Large values of the other four denote low unit and total costs under the hypotheses given in the preceding section. Thus, if upward shifts in the practice's average and marginal cost functions reduce participation probabilities, WAGEINDX and LAGPRCLM should be negatively related to the participation probability, and the remaining four variables should be positively related to it. The signs of the coefficients on LAGPRCLM, INPAHOSP, PARTNER, and OTHER_EM were consistent with this interpretation, although the coefficients themselves were not uniformly significant. The signs of the coefficients on WAGEINDX and GROUP either varied between Plan samples or else were not consistent with the prediction. Thus, although there were some indications that participation rates fall with increasing unit or marginal costs, the results were not systematic.

The effects of the county-level proxies for the positions of physicians' average revenue functions for nonparticipating services were also somewhat mixed. Per capita income and the fraction of the county population enrolled in Medicare Part B were negatively correlated with the participation probability. These results suggest that the relative profitability of participating is

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here indicate the contrary, the two studies are not strictly comparable. Aside from differences between our selection of explanatory variables and those chosen by Sloan and Steinwald, we were able to use exact measures of physicians' allowances and they were not. It is hard to say whether Sloan and Steinwald underestimated the sensitivity of participation to allowances due to their allowance proxy, but additional empirical evidence on the sensitivity issue is clearly desirable in view of the differences in our results.

reduced by outward shifts in the average revenue functions for services on which physicians do not participate. However, the same line of reasoning would suggest that the coefficients on PRCT_URB should have been negative, and those on DOCPRCAP and OUTPPRCP should have been positive. But there were no systematic patterns in the signs of the coefficients on these three variables. Hence, the evidence is not conclusive that shifts in the non-participating average revenue functions influence participation probabilities.

The surrogates for physician quality--FMG, BORDCERT, and CPRVU--entered the regressions highly significantly and with the same signs for each Plan sample. The findings here show unambiguously that "high-quality" physicians have materially lower participation rates than "low-quality" physicians--confirming the implications of the descriptive tables in Chapter V. In terms of the theoretical model, they indicate that "high-quality" physicians face relatively large demands for services produced on a nonparticipating basis and have commensurately weak income incentives to enter into participation agreements where average revenues are lower.

The other results regarding physician characteristics are similar to those depicted in Tables 5-38 and 5-41 in Chapter V. In each Plan female physicians were more likely to participate than males, but the physician's age had no systematic relationship with the participation probability. In Plan A the participation probability rose significantly with the physician's age, but in Plan B the probability declined significantly with age. As a group, primary care practitioners seemed about as likely to participate as referral specialists (OTHRSPEC), but there were marked differences in participation probabilities within the primary care fields. General and Family Practitioners had about the same participation rates as referral specialists, but Pediatricians in both Plans were significantly more likely to participate than General and Family Practitioners, and Internists were significantly less likely to do so.

No relationships were expected between the participation probability and the physician's outputs of UCR and partial service RVUs (RVU, RVU1, RVU5), and none appeared. However, following Paringer (1979), who first set forth the hypothesis (regarding Medicare assignment), we conjectured that the responsiveness of physicians' participation decisions to income differentials between participating and not participating would increase as the volumes of participation-eligible business increased.

To test this conjecture, we replicated the approach used by Paringer. Both Plan samples were stratified into terciles by the physician's combined outputs of UCR and (in Plan B) partial service RVUs, and the participation probabilities were re-estimated for each of the resulting subsamples. If Paringer's hypothesis is correct, the absolute values and t-ratios of the coefficients on all explanatory variables that measure the relative income opportunities of participating and not participating should increase monotonically with output levels in the UCR and partial service submarkets. Because of the close similarity between the OLS and logit estimates for the full samples, the subsample regressions were estimated using only OLS. The results are shown in Tables 8-7 and 8-8.

In Plan A, the subsample regression estimates strongly confirmed Paringer's hypothesis. The sensitivity of the Plan A participation probability to changes in UCR allowances increased dramatically with the physician's output of UCR services. Indeed, the elasticity of the participation probability with respect to allowances, shown in Table 8-9, rose five-fold from the first to the third output terciles. In Plan B, the elasticities of the participation probabilities with respect to UCR and partial service allowances rose from the first to the second and third output terciles, but they fell from the second output tercile to the third. Thus, on balance the findings give qualified support to the hypothesis that the responsiveness of the physician's participation to income opportunities increases as the volume of his/her business affected by the decision increases. But there was some evidence of a "threshold effect" in Plan B such that the responsiveness no longer increased beyond a certain range of UCR and partial service output levels.

The time dummies (TIME74, TIME75, and TIME76) shown in Tables 8-3 and 8-4 indicate autonomous shifts in the participation probabilities in the two Plans over the four-year study period. As a result of these shifts, the probabilities rose moderately from 1973 to 1974 when the Economic Stabilization Program was in effect, remained relatively stable between 1974 and 1975, and increased sharply between 1975 and 1976. Although neither of the two Plans imposed constraints on physicians' allowances during the Economic Stabilization Program, the common pattern of shifts in the participation probability suggests a common cause. One possibility is the restrictions on Medicare allowances in effect during 1973-1974 and again after 1975. Restrictions on Medicare allowances may have reduced the average revenue on Medicare services sufficiently during 1973-1974 and 1975-1976 to make Medicare business relatively less profitable during those years. Such an effect would shift the average revenue function in the nonparticipating segment of the physician's market inward and could have increased the physician's incentives to participate in private business.

TABLE 8-7

OLS ESTIMATES OF THE PROBABILITY OF PARTICIPATING IN PRIVATE BUSINESS
FOR SAMPLE STRATIFIED BY PHYSICIAN OUTPUT: PLAN A

First Tercile

SSE	119.164458	F RATIO	11.18
DFE	784	PROB>F	0.0001
MSE	0.151995	R-SQUARE	0.2470

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	3.218804	1.259106	2.5564	0.0108
APRVU	1	0.144368	0.048001	3.0076	0.0027
CPRVU	1	-0.171326	0.033310	-5.1434	0.0001
LAGPRCLM	1	-0.00111064	0.0003393054	-3.2733	0.0011
AGE	1	0.004730435	0.001498377	3.1570	0.0017
AMASEX	1	0.119409	0.057188	2.0880	0.0371
BORDCERT	1	-0.100376	0.035491	-2.8287	0.0048
FMG	1	0.091227	0.036474	2.5011	0.0126
GROUP	1	-0.204461	0.037970	-5.3849	0.0001
PARTNER	1	0.138967	0.044938	3.0924	0.0021
OTHER_EM	1	0.121344	0.046069	2.6340	0.0086
PD_	1	0.242756	0.066178	3.6682	0.0003
IM	1	0.035608	0.067445	0.5293	0.5968
OTHRSPEC	1	0.111640	0.057646	1.9366	0.0531
INPAHOSP	1	-0.033576	0.035458	-0.9458	0.3445
WAGEINDX	1	0.028646	0.020549	1.3940	0.1637
DOCPRCAP	1	198.520221	254.240791	0.7808	0.4351
OUTPPRCP	1	0.245844	0.426827	0.5760	0.5648
INPERCAP	1	-0.000636167	0.0003085001	-2.0621	0.0395
ENRBPRCP	1	-6.246535	2.831754	-2.2059	0.0277
PRCT_URB	1	-0.000209711	0.0001957247	-1.0715	0.2843
TIME74	1	0.085776	0.185522	0.4623	0.6440
TIME75	1	-0.010561	0.221167	-0.0478	0.9619
TIME76	1	0.359464	0.444254	0.8091	0.4187

Second Tercile

SSE	125.932629	F RATIO	8.96
DFE	791	PROB>F	0.0001
MSE	0.159207	R-SQUARE	0.2067

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	2.562981	1.252093	2.0470	0.0410
APRVU	1	0.410838	0.102003	4.0277	0.0001
CPRVU	1	-0.400141	0.076391	-5.2381	0.0001
LAGPRCLM	1	-0.000887589	0.000495406	-1.7916	0.0736
AGE	1	0.003459233	0.001609554	2.1492	0.0319
AMASEX	1	0.140465	0.072102	1.9481	0.0518
BORDCERT	1	-0.099210	0.034462	-2.8788	0.0041
FMG	1	0.131747	0.035812	3.6789	0.0003
GROUP	1	-0.137998	0.038068	-3.6250	0.0003
PARTNER	1	0.037161	0.044686	0.8316	0.4059
OTHER_EM	1	0.085972	0.056738	1.5152	0.1301
PD_	1	0.086038	0.085257	1.0092	0.3132
IM	1	-0.027237	0.067993	-0.4006	0.6888
OTHRSPEC	1	0.020903	0.056012	0.3732	0.7091
INPAHOSP	1	0.085794	0.045408	1.8894	0.0592
WAGEINDX	1	-0.016860	0.021845	-0.7718	0.4405
DOCPRCAP	1	126.830588	251.219933	0.5049	0.6138
OUTPPRCP	1	0.479723	0.398662	1.2033	0.2292
INPERCAP	1	-0.00035565	0.0003105153	-1.1454	0.2524
ENRBPRCP	1	-7.613276	2.826959	-2.6931	0.0072
PRCT_URB	1	-0.000222073	0.0001900319	-1.1686	0.2429
TIME74	1	0.216364	0.174941	1.2368	0.2165
TIME75	1	0.272223	0.208093	1.3082	0.1912
TIME76	1	0.479014	0.408271	1.1733	0.2410

TABLE 8-7 (Continued)

Third Tercile

SSE	119.843178	F RATIO	8.71
DFE	794	PROB>F	0.0001
MSE	0.150936	R-SQUARE	0.2014

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	2.488112	1.242473	2.0025	0.0456
APRVU	1	0.726222	0.110210	6.5894	0.0001
CPRVU	1	-0.549717	0.079693	-6.8979	0.0001
LAGPRCLM	1	-0.000216106	0.0005516072	-0.3918	0.6953
AGE	1	0.0009679668	0.001767197	0.5477	0.5840
AMASEX	1	0.063252	0.085676	0.7383	0.4606
BORDCERT	1	0.003870725	0.034529	0.1121	0.9108
FMG	1	0.165420	0.036320	4.5546	0.0001
GROUP	1	0.031544	0.037585	0.8393	0.4016
PARTNER	1	0.094843	0.038528	2.4617	0.0140
OTHER_EM	1	0.201346	0.066070	3.0475	0.0024
PD_	1	-0.054594	0.113167	-0.4824	0.6296
IM_	1	-0.350566	0.075468	-4.6452	0.0001
OTHRSPEC	1	-0.088043	0.064744	-1.3599	0.1743
INPAHOSP	1	0.129625	0.048978	2.6466	0.0083
WAGEINDX	1	-0.00601739	0.026410	-0.2278	0.8198
DOCPRCAP	1	205.131231	252.656615	0.8119	0.4171
OUTPPRCP	1	0.063158	0.395588	0.1597	0.8732
INPERCAP	1	-0.000562398	0.0003200938	-1.7570	0.0793
ENRBPRCP	1	-3.884341	2.661697	-1.4593	0.1449
PRCT_URB	1	0.0003420152	0.0001850559	1.8482	0.0649
TIME74	1	0.233066	0.167925	1.3879	0.1656
TIME75	1	0.231953	0.211543	1.0965	0.2732
TIME76	1	0.634393	0.383367	1.6548	0.0984

TABLE 8-8

OLS ESTIMATES OF THE PROBABILITY OF PARTICIPATING IN PRIVATE BUSINESS FOR SAMPLE STRATIFIED BY PHYSICIAN OUTPUT: PLAN B

First Tercile

SSE	93.078630	F RATIO	4.49
DFE	977	PROB>F	0.0001
MSE	0.095270	R-SQUARE	0.0993

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	0.966260	0.217708	4.4383	0.0001
APRVU1	1	0.029024	0.022359	1.2981	0.1946
APRVU5	1	0.078802	0.030384	2.5935	0.0096
CPRVU	1	-0.047256	0.014689	-3.2170	0.0013
LAGPRCLM	1	-.0000994547	0.0002521197	-0.3945	0.6933
AGE	1	-0.00263357	0.0009953992	-2.6457	0.0083
AMASEX	1	-0.014389	0.044625	-0.3224	0.7472
BORDCERT	1	-0.061983	0.022651	-2.7365	0.0063
FMG	1	0.064130	0.027671	2.3176	0.0207
GROUP	1	-0.031467	0.048171	-0.6532	0.5138
PARTNER	1	-0.017216	0.028710	-0.5997	0.5489
OTHER_EM	1	0.043216	0.030540	1.4151	0.1574
PD_	1	0.091994	0.039038	2.3565	0.0186
IM_	1	-0.138457	0.039611	-3.4954	0.0005
OTHRSPEC	1	0.004797678	0.032279	0.1486	0.8819
INPAHOSP	1	0.054512	0.031450	1.7333	0.0834
WAGEINDX	1	-0.010464	0.007085484	-1.4768	0.1401
DOCPRCAP	1	0.183506	23.277048	0.0079	0.9937
OUTPPPCP	1	-0.005165573	0.027444	-0.1882	0.8507
INPERCAP	1	.00001555736	.00004353855	0.3573	0.7209
ENRBPRCP	1	-0.223966	0.833077	-0.2688	0.7881
PRCT_URB	1	.00009892144	.00007442172	1.3292	0.1841
TIME74	1	0.015687	0.048453	0.3238	0.7462
TIME75	1	0.018812	0.054700	0.3439	0.7310
TIME76	1	0.037361	0.086970	0.4296	0.6676

Second Tercile

MODEL:	MODEL01	SSE	91.979156	F RATIO	9.08
		DFE	980	PROB>F	0.0001
DEP VAR:	PART	MSE	0.093856	R-SQUARE	0.1820

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	1.119492	0.211889	5.2834	0.0001
APPVU1	1	0.125073	0.047032	2.6593	0.0080
APRVU5	1	0.194322	0.036020	5.3949	0.0001
CPRVU	1	-0.155430	0.036699	-4.2352	0.0001
LAGPRCLM	1	-0.000827396	0.0003761288	-2.1998	0.0281
AGE	1	-0.00194756	0.001052712	-1.8500	0.0646
AMASEX	1	0.057564	0.058028	0.9920	0.3214
BORDCERT	1	-0.072284	0.022439	-3.2214	0.0013
FMG	1	0.101496	0.023192	4.3763	0.0001
GROUP	1	-0.130504	0.037201	-3.5080	0.0005
PARTNER	1	0.007858093	0.028188	0.2788	0.7805
OTHER_EM	1	0.005922342	0.037454	0.1582	0.8744
PD_	1	0.078961	0.052627	1.5004	0.1338
IM_	1	-0.132247	0.044848	-2.9488	0.0033
OTHRSPEC	1	-0.030674	0.039997	-0.7669	0.4433
INPAHOSP	1	0.044950	0.043182	1.0409	0.2982
WAGEINDX	1	-0.023074	0.00643706	-3.5846	0.0004
DOCPRCAP	1	-13.842026	22.053354	-0.6277	0.5304
OUTPPRCP	1	-0.021602	0.026305	-0.8212	0.4117
INPERCAP	1	-.0000385083	.0000426695	-0.9025	0.3670
ENRBPRCP	1	-0.316079	0.815212	-0.3877	0.6983
PRCT_URB	1	0.0002655968	.00006971923	3.8095	0.0001
TIME74	1	0.099865	0.043213	2.3110	0.0210
TIME75	1	0.133852	0.049590	2.6992	0.0071
TIME76	1	0.238082	0.082686	2.8793	0.0041

TABLE 8-8 (Continued)

Third Tercile

SSE	90.185380	F RATIO	4.22
DFE	979	PROB>F	0.0001
MSE	0.092120	R-SQUARE	0.0937

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB>|T|
INTERCEPT	1	1.650024	0.281553	5.8604	0.0001
APRVU1	1	0.039522	0.054196	0.7292	0.4660
APRVU5	1	0.156127	0.042323	3.6889	0.0002
CPPVU	1	-0.038279	0.040118	-0.9542	0.3402
LAGPRCLM	1	-0.00121472	0.0004489746	-2.7055	0.0069
AGE	1	0.0008918045	0.001248611	0.7142	0.4753
AMASEX	1	0.059447	0.065379	0.9093	0.3634
BORDCERT	1	-0.054375	0.022626	-2.4032	0.0164
FMG	1	0.016685	0.025155	0.6633	0.5073
GROUP	1	-0.107928	0.045381	-2.3783	0.0176
PARTNER	1	0.039720	0.030706	1.2936	0.1961
OTHER_EM	1	0.100173	0.040076	2.4996	0.0126
PD_	1	0.186316	0.126476	1.4731	0.1410
IM_	1	0.065020	0.110393	0.5890	0.5560
OTHRSPEC	1	0.047851	0.105570	0.4533	0.6505
INPAHOSP	1	0.127206	0.052099	2.4416	0.0148
WAGEINDX	1	-0.023537	0.007937521	-2.9653	0.0031
DOCPRCAP	1	0.245510	27.598343	0.0089	0.9929
OUTPPRCP	1	0.052601	0.032620	1.6125	0.1072
INPERCAP	1	-0.00023675	.00005209316	-4.5447	0.0001
ENRBPRCP	1	-1.430340	0.922240	-1.5509	0.1212
PRCT_URB	1	0.0001080211	.00008709398	1.2403	0.2152
TIME74	1	0.161838	0.050668	3.1941	0.0014
TIME75	1	0.174079	0.060550	2.8750	0.0041
TIME76	1	0.428796	0.107352	3.9943	0.0001

TABLE 8-9

ELASTICITIES OF THE PARTICIPATION PROBABILITY WITH RESPECT TO ALLOWANCES EVALUATED AT OUTPUT TERCILE MEANS

Plan/ Line of Business	Output Tercile First	Second	Third
Plan A			
UCR	.443	1.214	2.173
Plan B			
UCR	.072	.308	.095
Partial Service	.126	.290	.203

The shifts in the participation probabilities due to "time" were only part of the general movements of the probabilities over the sample period due to changes in the exogenous variables. In Plan A, the net effects of changes in the exogenous variables caused the participation rate to fall from .83 in 1973 to .67 in 1976--a decline of 20%. On the other hand, in Plan B the effects of these changes were largely self-cancelling, and the participation rate remained stable at .87 to .90 throughout the sample period.

As a means of examining the behavior of the two participation rates, the OLS regression estimates given in Table 8-4 were used to deduce the sources of changes in the rates over the 1973-76 study period. With PR_t denoting the participation rate in year t, $\overline{X}_{it}$ the mean value of the i-th explanatory variable in year t, and $\hat{B}_i$ the estimated regression coefficient on the i-th explanatory variable, the following equation was constructed:

$$PR_{1976} - PR_{1973} = \sum_{i=1} \hat{B}_i(\overline{X}_{i,1976} - \overline{X}_{i,1973}) .$$

The term $\hat{B}_i(\overline{X}_{i,1976} - \overline{X}_{i,1973})$ represents the estimated change in the overall participation rate due to a change in the mean value of the i-th explanatory variable. The values of these terms are shown in Table 8-10.

As Table 8-10 indicates, autonomous shifts due to "time" raised the mean participation rate by nearly .5 in Plan A and by approximately .2 in Plan B. However, in Plan A the autonomous upward shift was more than offset by the decline in the participation rate due to an increase in per capita income. Increases in the mean amounts charged by physicians and a rise in the number of Medicare enrollees per capita also significantly lowered the Plan A participation rate. The mean amount allowed by Plan A on UCR allowances rose from \$2.00 per RVU in 1973 to \$2.34 in 1976. To have held the mean participation rate constant at .83 between 1973 and 1976 (given the values of all other variables), the mean amount allowed on UCR services would have had to be raised from \$2.00 to \$2.47--an increase of about one-third more than the actual growth rate of mean allowances. Assuming that amounts paid by the Plan were approximately fixed proportions of the amounts allowed, this means that the amounts the Plan paid--and therefore the costs of the Plan's benefits per RVU of services--would have had to rise approximately one-third faster than they did in order to maintain a stable participation rate. And had there been no autonomous upward shift in the participation probability, the costs of maintaining a stable participation rate would, of course, have been materially higher.

In Plan B, the major sources of potential declines in the participation rate were a rise in the wage rate of physicians' office personnel and an

TABLE 8-10

CHANGES IN ESTIMATED PARTICIPATION PROBABILITIES, 1973-76, DUE TO CHANGES IN VALUES OF EXPLANATORY VARIABLES

Variable	Numerical Change in Participation Probabilities, 1973-76, Predicted by Change in Mean Value of Explanatory Variable	
	Plan A	Plan B
APRVU	.095	--
APRVU1	--	.015
APRVU5	--	.016
CPRVU	-.119	-.034
RVU/1000	-.001	--
RVU1/1000	--	.0002
RVU5/1000	--	-.001
LAGPRCLM	-.002	.002
AGE	-.003	.002
AMASEX	.002	.0002
BORDCERT	.001	.001
FMG	.002	.001
GROUP	.001	-.0001
PARTNER	-.0004	-.00002
OTHER_EM	.003	.001
PD_	.003	.0004
IM_	-.003	.0002
OTHRSPEC	-.0004	.0001
INPAHOSP	.002	-.004
WAGEINDX	.026	-.149
DOCPRCAP	.053	-.002
OUTPPRCP	.068	-.00001
INPERCAP	-.682	-.069
ENRBPRCP	-.074	-.005
PRCT_URB	-.0006	-.002
TIME74	--	--
TIME75	--	--
TIME76	.463	.197

increase in the number of county Medicare enrollees per capita. The declines in the participation rate from these two sources almost exactly offset the upward shift due to "time," and changes in the other explanatory variables were generally so small as to have minor impacts on the rate. As a result, the rate itself changed relatively little over the four-year study period. Nevertheless, it is worth observing that the low sensitivity of the Plan B participation probability to allowance levels has important implications for the Plan's efforts to raise or maintain its participation rate. For example, without the estimated .2 increase in the participation rate due to "time," the Plan would have had to quadruple its UCR and partial service allowances to maintain its 1973 participation rate.

Primarily, this discussion leads to two conclusions. First, participation rates can change--perhaps substantially--due to factors over which Plans have no direct controls. Second, the only immediate method available to Plans for counteracting the effects of these factors is to change allowance levels in participation-eligible lines of business. The method can be a costly one to the Plans and, ultimately, to subscribers who bear the burden of increases in benefits paid out. Physician participation is a device for containing subscribers' out-of-pocket costs, but if efforts to raise participation rates require a large addition in benefits paid out, there is clearly a tradeoff between the incremental costs of increased benefits and the incremental pecuniary advantages of participation to subscribers.

Summary

The physician participation agreements offered by the two study Plans which had them were of the all-or-nothing type. Theoretically, the effects of physician, practice, and local market characteristics on participation decisions under this type of agreement have a high degree of uncertainty. Except for the impacts of allowance levels, it is consequently difficult to argue that any particular group of characteristics will affect participation decisions in the same way regardless of the makeup of the physician population. This is not to say that examining all-or-nothing participation choices is irrelevant for policy purposes, but rather that the policy implications ought to be based on empirical observation.

Although the participation agreements considered here have parallels only in the present form of Medicaid participation, we believe the results do have important extensions to overall government reimbursement policy for physicians.

First, insofar as board certification, graduation from a U.S. medical school, and high charge levels signify high physician quality, the evidence clearly indicates that "high-quality" physicians have the lowest propensities to participate. Since the lower income portions of the population are precisely those served by--or with the strongest incentives to visit--participating or assignment physicians, it can be inferred that participation and assignment tend to yield a relatively low quality of care to low income consumers. The same conclusion has been reached by other researchers; and, as Sloan and Steinwald (1978) have remarked, it is probably an inevitable concommitant of any program constraining physicians' average revenues but leaving them free to refuse the arrangement. However, it can be argued that providing <u>some</u> form of physicians' care to low income patients is preferable to offering little or none at all. The results presented here merely emphasize that increasing access to physicians' care through participation and assignment arrangements probably cannot be achieved without some diminution in the quality of the care provided.

Second, it has been shown that the participation probability increases significantly in response to increases in allowance levels on participation-eligible business. This finding confirms other researchers' results, and it indicates that changing allowance levels is a major policy tool for raising or maintaining participation and assignment rates. But, by the same token, imposing restraints on the levels or growth rates of allowances is the principal device for controlling the costs of physicians' services under Medicare and the states' Medicaid programs. Consequently, the results presented here imply a potentially serious policy dilemma. Fee controls have a depressing effect on Medicaid participation and on the rate of Medicare assignment. Whether such controls are successful or not, they tend to reduce the volume of care provided at low or zero out-of-pocket costs to low-income patients under Medicaid participation and Medicare assignment. Obviously, then, pursuing this form of cost containment requires a recognition that the burden may not fall equally on high- and low-income patients.

Third, we found that market conditions had highly significant impacts on participation rates in both of the study Plans. This finding is a crucial one because it indicates that assignment or participation rates may change rapidly in response to changes in market conditions, some of which are not subject to policy control.* If allowance levels are raised to counteract

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* Perhaps fortuitously, the effects on the study Plans' participation rates of changing circumstances in the physicians' services markets were offset, or partly offset, by autonomous shifts in participation rates. But there are no reasons to believe that this must always be the case.

the effects of changes in the demands for or costs of physicians' services, our results suggest that the required increases may be very large. Insofar as paid benefits rise with allowances, the costs to government or private carriers of achieving or preserving target participation or assignment rates may also be very large. Again, these results further imply that there can be important conflicts between the goals of cost containment and promoting access to care through physician participation and benefit assignment.

Finally, some authorities have proposed that Medicare assignment be changed from the current claim-by-claim system to an all-or-nothing basis in order to strengthen controls on the out-of-pocket costs to Medicare enrollees. It has also been suggested that Medicaid and Medicare assignment be combined under one program as a means of increasing the number of physicians who provide Medicaid services.

The essential question in connection with the first proposal is whether changing the form of Medicare assignment will, in fact, increase the rate of Medicare assignment. Unfortunately, the present study has relatively little empirical evidence to offer on this point. However, as was explained in Chapter II, participating physicians in Plan A whose patients submitted claims directly to the Plan were not effectively limited by the participation agreement to accepting amounts allowed as full payment. That is, by choosing to bill their patients rather than the Plan, participating physicians in Plan A could, in effect, participate on a claim-by-claim basis. We therefore estimated the equations shown in Tables 8-3 and 8-4 for Plan A physicians with the proportion of the physician's UCR claims submitted on a participating basis defined as the dependent variable instead of the zero-one dummy denoting all-or-nothing participation. If Plan A physicians actually perceived their participation agreement as a claim-by-claim arrangement, the coefficients in re-estimated regressions would indicate the sensitivity of claim-by-claim participation to changes in the explanatory variables. However, the re-estimated coefficients were virtually identical to those obtained using the zero-one dependent variable. This means that the fraction of such claims would have been the same (given the values of the explanatory variables) regardless of whether participation was all-or-nothing or permitted on a claim-by-claim basis.

Of course, many Plan A physicians may not have been aware of the technicality allowing them *de facto* claim-by-claim participation, or they may not have exploited it. Hence, the second set of regressions may have given downward biased estimates of the responsiveness of claim-by-claim participation to changes in the explanatory variables. Nevertheless, subject to this qualification, it appears that giving Plan A physicians what was, in effect, an option between claim-by-claim and all-or-nothing participation had no visible impact on the overall participation rate. At least on these grounds, switching Medicare assignment to an all-or-nothing system or permitting physicians to choose between all-or-nothing and claim-by-claim assignment seems unlikely to affect the average assignment rate.

With respect to combining Medicare and Medicaid assignment, the study's findings do shed light on what might be expected for the joint assignment rate. In Plan B, physicians were allowed to participate only if they consented to participate jointly in UCR (high-allowance) and partial service (low-allowance) business. Thus, there are close similarities between Plan B's participation agreement and an assignment arrangement linking Medicare (high-allowance) assignment and Medicaid (low-allowance) participation. In

Plan A, on the other hand, the participation agreement applied only to UCR business.

The evidence presented here indicates that: (i) the elasticity of the participation probability with respect to UCR allowances was considerably higher in Plan A than in Plan B; and (ii) the elasticity in Plan B was somewhat higher for partial service allowances than for UCR allowances. Taken together, the results suggest that a joint Medicare-Medicaid assignment system might easily reduce the sensitivity of Medicare assignment to allowance levels and cause the physician's assignment choice to be dominated by Medicaid allowance levels. Accordingly, a likely product of joint assignment is an average assignment rate between current Medicare and Medicaid rates--assuming the two-tier system of allowances is continued--and perhaps closer to the latter than the former. It should tend to increase Medicaid eligibles' access to physicians' care, but reduce access by Medicare enrollees insofar as it reduces the rate of Medicare assignment.*

In this instance, as in the others we have discussed, the study findings highlight the tradeoffs inherent in pursuing almost any given policy of physician reimbursement. Promoting access to care in one program by expanding physician participation in it may raise government health care costs, diminish service quality, or lower the access to care in another program.

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* As was noted in Chapter II, a system of joint Medicare-Medicaid assignment is already in existence. However, under this system allowances are set at Medicare levels and Medicaid pays for what would normally be the patient's out-of-pocket costs. Consequently, this system is quite different from the proposal considered in the text. It makes acceptance of assignment mandatory for physicians who <u>accept</u> patients eligible for benefits under both Medicare and Medicaid. Basically, it is an all-or-nothing assignment system in which the physician cannot treat Medicare-Medicaid eligibles if he refuses to accept assignment. Neither of the two study Plans' participation agreements had features similar to this.

Tradeoffs between the relative social priorities of access, cost containment, and service quality are therefore inescapable in the process of formulating reimbursement policy.

CHAPTER IX

CONCLUSION

In this report we have examined a number of aspects of physicians' economic behavior and their implications for the basic objectives of reimbursement policy: containing costs, assuring access to care, and maintaining the quality of care. Another goal of the study was to advance existing knowledge of the market for physicians' services. In most instances, the issues were explored from two or more methodological perspectives involving descriptive tabulations, heuristic models, and formal models. Although it seems fair to say--and, indeed, it can be viewed as a significant conclusion--that no narrow characterization of physicians' economic behavior emerges from the results, the findings are sufficiently robust to justify certain generalizations about that behavior itself.

Physicians' Economic Motivation

In some prior studies it has been observed that physicians appear to respond to market stimuli in ways that increase their net incomes, and it has been proposed that this behavior is compatible with profit maximization. Many of the results reported here are consistent with that observation, if not necessarily with the inference.

For example, it was found that the physician's decision to participate is strongly influenced by the levels of the Plan's fee screens and fee schedules. As one would predict if physicians are income motivated, increases in the fee screens and fee schedules (which raise average revenues on participating claims) significantly raised the likelihood of participation. The strongest evidence concerning physicians' pricing patterns and the updating of fee screens showed that physicians probably do raise this year's charge levels in order to raise next year's allowances. Insofar as next year's allowances determine or affect next year's average revenues, this finding is also consistent with income-motivated behavior. Finally, the tabulations in Chapter V and the cross-sectional fee regressions in Chapter VI revealed tendencies for charge levels to rise with county per capita income. Since high per capita incomes presumably imply strong demands for physicians' services, this finding is further suggestive of income-motivated pricing behavior.

But it does not necessarily follow that physicians maximize profit just because they are, or seem to be, income motivated. Moreover, some of our findings suggest that physicians do not always act to earn the highest possible net incomes. In Chapter V we sought to determine whether output composition in a selected group of specialties is sensitive to charge or allowance differentials among procedures. If physicians rigorously attempt to maximize profit, one would expect them to adjust their outputs so as to produce the procedures which, other things equal, yield the highest unit profits. While the methodology we used is inconclusive because we could not directly measure unit profits, we failed to find any significant indications that the composition of procedures changes in response to changes in amounts charged or allowed. Nor were physicians' proportions of Medicare and private business outputs sensitive to changes in relative charges and allowances between the two lines of business.

To explore the profit maximization issue more closely, we carried out a test for profit maximization in the context of an econometric model of the practice estimated in Chapter VII. Because the data did not contain direct information on costs, the test is more inferential than we would have preferred. Subject to that qualification, the results indicated that profit maximization could be rejected for physicians in one of the three study Plans (Plan A) and for Medicare business supplied by physicians who participated in private business in a second (Plan B). In the third Plan (Plan C) the results were quite ambiguous.

On balance, the evidence indicates that physicians are income motivated, but that many of them are probably not profit maximizers. This is not, of course, surprising. Physicians' practices are small firms by most standards. Physicians are not ordinarily trained to be skillful business managers, and the ethics of the medical profession place business acumen below the practitioner's service obligations to his/her patients. Beyond that, the rapid growth of demand over the past two decades has undoubtedly made it possible for inefficient medical practices, and those with weak profit motives, to survive. Under such circumstances, one should expect a good deal of variation in physicians' efforts to maximize profits, and uneven success among the practices that do attempt to maximize profits. Nevertheless, the general indications of income motivation are worth emphasizing. They suggest that income incentives can be built into reimbursement policy to achieve desired effects, and that physicians will respond predictably to them, even if not as sensitively as they would if they fully maximized profits.

Patterns of Pricing Behavior

It has long been argued on the basis of intuition or casual observation that physicians possess considerable market power. We were not able to conduct the kind of industry study that would fully resolve the issue. However, in Chapter VII we gave estimates of the price elasticities of physicians' average revenue functions for services on which they did not or could not participate. The estimates varied across lines of business, but they were all moderately to very high. Indeed, in some instances the estimates were not statistically distinguishable from the price elasticities facing perfectly competitive firms. On the basis of these results, physicians' pricing behavior can probably best be described as competitive or monopolistically competitive, and more toward the price-taking than the price-setting end of the range. By itself this does not mean that physicians lack market power, but it indicates that they act approximately like price takers when they determine their charge levels.*

Another (and related) issue we examined is the extent of price discrimination within local markets. Historically, it was claimed that physicians used sliding scales to bill high income patients at higher rates than low income patients. Since a seller cannot discriminate in price without having market power, the existence of sliding scales was cited as proof that physicians do, in fact, possess market power. Our exploration of the price discrimination issue was confined to the question of price variation across submarkets defined by patients' insurance status. Since variation in copayment rates naturally segregates patients into submarkets,

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*This is not to say that individual physician practices appear to be typically passive with respect to charge levels. As we have noted, many physicians probably do set current-year fees with the intention of affecting next year's allowances. What the highly elastic practice average revenue functions imply is that if the majority were not acting in the same manner, this behavior could not continue because of the loss of business it would entail for practices that set their charges much higher than market levels.

we felt that price discrimination would, if it exists, be most likely to appear across these submarkets.

When the pricing of individual physicians was examined in Chapter V, no large or systematic differences were found between their charge levels for UCR services and for services in the other private lines. However, in Plan B physicians in three of the four major specialty groupings charged significantly less for Medicare services than for UCR services. In the fourth grouping (composed of the non-medical, non-surgical fields) the reverse was true. Hence, the results indicate that Plan B physicians charged the same or nearly the same amounts to their private patients, but lower (or higher, depending on specialty) amounts to their Medicare patients.* In view of the differences in Medicare pricing across specialties, it is difficult to conclude that Medicare business was subsidized by Plan B's private business, but this appears to be a distinct possibility. Research on an expanded sample of carriers having Medicare and private business is clearly desirable in order to explore this question further.

The lack of evidence of price discrimination in the three Plans' private business is compatible with the evidence of generally highly elastic average revenue functions. It does not show that physicians lack the market power to discriminate in price, but it reinforces the view that their market power is not as substantial as has been widely believed.

Another closely related issue is the degree to which product differentiation is associated with variation in physicians' charge levels. In local

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*There is a possibility that at least part of the observed price differences between Medicare and non-Medicare services may have been due to the fact that physicians with the largest percentages of Medicare patients had below average charge levels overall.

markets where entry has probably been little affected by the national supply of new physicians, the principal source of the practice's market power has usually been thought to be real or perceived product differentiation, due in part to consumer ignorance. If this is true and physicians exploit the profit opportunities arising from product differentiation, one should observe systematic relationships between charge levels and measures of product differentiation among individual physicians. On the other hand, if local markets are reasonably competitive with little important product differentiation, these relationships should be weak or else not appear at all.

In Chapters V and VI we attempted to correlate individual physicians' charges with proxies for product differentiation such as the physician's specialty, age, sex, type of practice, extent of hospital practice, and educational credentials. The descriptive tabulations in Chapter V and the cross-sectional charge regression estimates in Chapter VI showed the same basic patterns. Charge levels tended to be highest for physicians who were specialists (not general practitioners), board-certified, FMGs, young, not in solo practice, and whose outputs were provided largely in office settings. Nevertheless, the regressions indicated that many of the tendencies were either not statistically significant or else not systematic across Plans. In addition, the numerical effects of the proxies on charges were small, and a few of the relationships are difficult to explain as the consequences of product differentiation alone. For example, if the relatively high charge levels of FMGs can be attributed to high service quality, it suggests that FMGs are generally perceived as of higher quality than U.S. medical graduates--an inference contrary to the majority of informed opinion.

While our results do not rule out product differentiation as a fact explaining charge differentials, they indicate that the level of physicians' product differentiation is not very high. This conforms with our findings that submarket average revenue functions are mostly highly price elastic and that the incidence of price variation across private lines of business was minor. Taken as a whole, the evidence depicts the local markets for physicians' services as consisting of small firms which act like price competitors or monopolistic competitors, and which produce outputs that consumers perceive to be only slightly differentiated.

Physician-Induced Demand and the Target Net Income Hypothesis

As it is usually put forward, the theory of physician-induced demand holds that physicians have sufficient market power to allow them to raise their fees, generate demands for their services, or both when their actual net incomes fall below target levels. Although our findings suggest that physicians generally lack considerable market power, the theory itself does not state how much market power is necessary for demand inducement to occur. The results concerning pricing behavior therefore do not automatically preclude some degree of demand inducement among physicians.

We investigated the issue of demand generation in four ways. First, county-level average charges were correlated with county physician-population ratios as part of the descriptive analyses in Chapter V. Second, physician-level average charges were correlated with county physician-population ratios in the cross-sectional charge regressions presented in Chapter VI. Third, the average revenue functions facing the individual physician were regressed on county physician-population ratios in the course of estimating the practice econometric model in Chapter VII. And fourth, the behavior of Medicare outputs in Plan B during the Economic Stabilization Program was examined descriptively in Chapter V.

In the first three of these methods, the evidence of demand generation was expected to appear as positive correlations between physician-population ratios and county charge levels, physician charge levels, and physician average revenue, respectively. In the fourth method, it was expected to appear as an increase in Medicare output per user during the ESP, when restrictions on Medicare allowances were in effect, coupled with a reduction in output per user afterward.*

As a practical matter, the third of these appraches probably gives the most reliable test of the demand inducement hypothesis. The first method, based on simple correlations, may fail to standardize for other influences on charges. Even then, neither it nor the second test actually implies the existence of demand generation unless fees are positively correlated with area physician-population ratios. We were not able to apply the fourth method rigorously because we were unable to obtain data on the number of Medicare users. To implement the approach at all, we had to resort to indirect procedures such as measuring Medicare output per physician and per county enrollee in the Program. However, the third method is a reasonably reliable means of detecting demand generation, and it could be carried out with the data available to us.

Not surprisingly, the first method produced no systematic relationships

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*That is, if the restrictions on Medicare allowances reduced (Medicare fees and) physicians' net incomes far enough, demand inducement should appear as a temporary increase in the volume of services per user.

between county charge levels and physician-population ratios. However, the other three approaches consistently showed: no evidence of demand generation in Plan A; evidence of demand generation for Medicare services in Plan B but not for the private lines of business; and indications of demand inducement in Plan C.

While these findings provide some support of the induced-demand-target net-income theory, they also raise important questions about the theory and existing techniques for testing it. In particular:

(i) The varied indications of demand generation across Plans suggest that pursuit of a target net income is not a universal form of physician behavior. Moreover, if evidence of demand inducement can be observed only among some physicians or only on some occasions, the theory lacks a mechanism for predicting when physicians generate demands in response to declines in their net incomes.

(ii) In two cases--in Plan A and in Plan B for Medicare services provided by participating physicians (who represented three-quarters of all Plan B physicians)--our physician econometric model indicated that profit maximization could be rejected as the prevalent type of physician optimizing behavior. Nevertheless, in only one of these two cases--Plan B's Medicare line--was there accompanying evidence of demand generation. The results indicated that Plan A physicians could best be characterized as utility maximizers who did not generate demands.

(iii) Insofar as it always pays a profit-maximizing practice to induce demands up to maximum amounts, one would expect to observe relatively little variation in the degree of demand generation among profit-maximizing practices.* Despite that, the results for Plan C physician showed signi-

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*That is, if there exists a constant "maximum amount" of demand generficant evidence of demand generation <u>and</u> that the profit maximization hypothesis could not be rejected. This implies that demand generation can coexist with profit maximization. One possible explanation for this apparent contradiction is that the degree of demand generation varies among physicians because of differences in their abilities to induce demands. Another possibility, suggested by Sloan and Feldman (1978), is that the degree of demand generation varies because of differences in the psychic costs (disutility) to physicians of "creating" demands. But if profit maximization is compatible with empirical evidence of demand inducement, then major revisions in the standard neoclassical theory of practice behavior are neither necessary nor appropriate.

(iv) The possession of market power has generally been regarded as a requisite for physicians to have the ability to induce demands. But in Plans B and C, where indications of demand generation were observed, there was little evidence that physicians did, in fact, possess significant market power. This suggests that demand inducement may have the potential for occurring in reasonably competitive markets, and that the existence of demand inducement may not require highly noncompetitive markets.

(v) In Plan B, the results implied that Medicare demand inducement occurred in response to ESP controls on Medicare allowances and, quite separately, to increases in county physician concentration. By contrast, there seemed to be no demand inducement in Plan B's private lines of business during the ESP and none in response to increases in market physician concentration. Thus, the results showed especially sharp differences in

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ation, all practices should, other things equal, be inducing demands up to that amount. Only if the maximum varies systematically with differences in practice characteristics would any significant variation be observed at all.

the extent of observed demand inducement between Medicare services and those produced for the Plan's private lines of business. The difference with respect to ESP-related demand inducement is even more noteworthy because a similar pattern was reported in a recent study of California physicians [Hadley et al. (1978)]. The study concluded that physicians had limited abilities to generate demands, and the same conclusion appears to apply here. However, this leaves unanswered the question of why the same group of physicians seemed to behave very differently toward two different groups of patients. While it is possible to speculate on answers (for example, Medicare patients may in some way be more susceptible to demand inducement than other patients), there are no immediately persuasive ones. Inevitably, the evidence raises doubts about the completeness of the target income theory insofar as it is unable to give consistent predictions of physician behavior.

(vi) Criticism of empirical research on the target net income theory has frequently focussed on the distorting effects of unobservable factors such as border-crossing by patients from physician-scarce to physician-dense areas, differences in service quality or methods of medical practice by physicians in the two types of areas, rationing of services by practitioners in physician-scarce areas, and so forth. These factors, it is argued, can lead falsely to the conclusion that demand generation exists. Although our results were largely consistent across methodologies, the possibility cannot be excluded that they were caused by one or more of these unobservable factors. For instance, Plan A served a much more urban group of counties than either of the other two study Plans. Thus, if these factors giving the appearance of demand inducement were significant in any of the three Plans, they should have been least significant in Plan A. In fact, there were no indications of demand inducement in Plan A, and this could mean that all of our tests performed on the other Plans were biased toward acceptance of the target net income hypothesis.

The issue of whether physicians generate demands in the pursuit of target net incomes is crucial for reimbursement policy as well as for an understanding of the workings of physicians' services markets. If demand generation is the norm, then imposing constraints on physicians' fees and enlarging the supply of practitioners will increase per capita consumption of services, raise fee levels unless they are restrained, or both. Accordingly, the existence of significant demand generation will tend to frustrate the standard approaches for containing the costs of government and private health insurance programs.*

In summary: there were manifestations of demand inducement among the sampled physicians, but these were neither pervasive nor fully consistent with certain of our other findings. On these grounds, it is difficult to conclude that physicians systematically generated demands, or that the problem of demand inducement is serious enough to warrant major revisions of current reimbursement policy. Obviously, this should not be taken to mean that diagnostic and treatment procedures are always medically necessary, or that peer review, second opinion programs, and other methods of controlling utilization are unnecessary.

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*This is not necessarily to say that these approaches would otherwise accomplish reimbursement policy goals. For instance, increasing the supply of physicians would, if there were no demand inducement, bring about downward pressure on fees and increase the quantities of services demanded. Whether total expenditures on services would fall depends on the price elasticities of market demand functions. In particular, expenditures would fall only if the demand functions were price inelastic in the range of market fee levels. Similarly, constraints on fees in the standard market context would tend to cause excess demands and limit patients' access to physicians.

Physician Pricing and Reimbursement Practices

The setting of allowance levels is one of the principal methods of cost containment in health insurance programs for physicians' services. In some lines of business such as Medicare and UCR the maximum amounts are determined by fee screens, while in others such as indemnity and partial service they are determined by fixed fee schedules common to all physicians. Although the physician is free to establish his/her charge level, the amount the Plan pays is a fixed percentage (up to 100%) of the Plan's allowances after deductibles are satisfied. Thus, the benefits paid by the Plan--i.e., the direct costs of insurance programs--rise or fall as allowance levels rise or fall, and limiting allowances is therefore a means of containing the costs of the programs.

It is in the interest of physicians for allowances to be maintained at high levels. When a practitioner participates in the Plan or accepts benefit assignment, he accepts the Plan's allowance as full payment on his claims. Consequently, his average revenue on a participating or assigned claim is precisely the Plan's allowance and, other things equal, his net income rises when allowances are raised. Even if the practitioner does not participate or accept assignment, the net prices paid by his patients fall as allowances rise. As a consequence, an increase in allowances shifts his/her average revenue function outward, given charges, and provides him/her with the opportunity of increasing his net income by raising his charges.

It has often been claimed that physicians' economic interests combine with the reimbursement characteristics of the Medicare and UCR programs to make the programs inherently inflationary. This is because fee screens are usually updated annually and based on prior-year physician and area charge distributions. Since increases in charges between last year and this are translated into increases in allowances between this year and next, the argument is that fee screen reimbursement promotes both fee inflation and inflation in insurance program costs.

We examined this issue in two ways. First, in Chapter VI we specified and estimated three longitudinal regression models to determine whether physicians raise their current charge levels in order to raise their next year's UCR and Medicare allowances. Second, in Chapters V and VI we used descriptive tabulations and regression equations to ascertain whether there were different charge levels or rates or charge inflation in fee screen and fee schedule business due to different reimbursement practices.

Two of the three longitudinal regression models gave mixed or negative results concerning the fee-screen inflation hypothesis. However, there are reasons to believe that each of them was either misspecified or conceptually inappropriate. The third and conceptually strongest of the models showed that physicians do tend to establish allowance targets for their UCR and Medicare allowances, and that they tend to raise this year's charges in order to achieve next year's allowance targets. The findings also indicated that physicians' actual allowances were lower than their target allowances. This result may have been due to the Plans' Level 2 screens, which restrict maximum allowances to given percentiles of last year's charge distribution in the physician's area. Presumably, some physicians would have been unable to achieve their target allowances because of the Level 2 screens. To the extent that these physicians were included in the samples, the regression estimates may have made it appear that the "average physician" failed to achieve his/her target allowance level.

But even though the most persuasive evidence suggested that fee screen reimbursement is inflationary, it did not indicate that fee schedule reimbursement is materially less so. In one sense this is surprising. Fee schedule allowances ranged from 50% to 70% of UCR allowances in the study Plans, and only one of the four fee schedules was updated during the study periods.* Thus, if fee levels or rates of fee inflation are significantly affected by allowances, one would expect either or both to be lowest in the lines of business where fee schedules rather than fee screens are used to set allowances. Yet the results from Chapter V showed that charge levels and the rates of charge inflation were virtually the same in all of the Plans' private lines of business. And those in Chapters V and VI indicated that the compsition of the physician's output between fee screen and fee schedule business had a minor or negligible influence on his/her overall charge level.

Much of this can probably be explained by the relatively small amounts of output produced for fee schedule business, and the general absence of price discrimination in private lines of business among the sample physicians. Even though fee schedule business represented from 10% to 40% of the physicians' observed outputs (varying by Plan, year, and specialty), it almost certainly comprised a smaller percentage of their total outputs--including the portion that was outside our data base. Accordingly, assuming that physicians determined their charge levels on the basis of their total volumes of business and that they did not discriminate across private lines of

*Each of the Plans had an indemnity program, and Plan B also had a partial service program. Plan B updated its indemnity fee schedule once during the sample period, but the other three schedules were not changed.

business, it would follow that fee schedule allowances played only a small role in their pricing decisions. Therefore, the apparent ineffectiveness of fee schedule allowances in restraining fee levels and fee inflation does not necessarily mean that lowering allowances would have no impact on charges. What it does imply is that setting low allowances on a small part of the physician's business is unlikely to affect charge levels either in that part of his/her business or in his/her business overall.

The somewhat anomalous behavior of charges and allowances in Plan B's Medicare and fee schedule business from 1973 to 1975 may have a related explanation. Medicare charges grew at only half the rate of the Plan's private business charges between 1973 and 1974, but at a rate higher than private business charges between 1974 and 1975. This can be interpreted as showing that the ESP's restrictions on Medicare allowances during 1973 and early 1974 controlled Medicare charge inflation, and that, when the ESP ended in 1974, physicians raised their Medicare fees to restore them to desired levels. But from 1973 to 1975, Plan B did not update its fee schedules at all, and, as we have mentioned, charge levels in its fee schedule business grew at the same rate as those in its UCR business. Since the zero growth rates of the Plan's fee schedules had no discernible effect on charge inflation in its fee schedule business, it is reasonable to ask whether the limitations on Medicare allowances were the real cause of the slowdown and subsequent surge in Medicare charge inflation.

In this respect, it is significant that Medicare business constituted a much larger percentage of Plan B physicians' observed outputs--from 30% to 80% depending on specialty--than did private fee schedule business. Hence, it is plausible to believe that physicians' Medicare pricing decisions were much more influenced by Medicare allowances than their fee schedule business pricing decisions were influenced by fee schedule allowances.* If this conjecture is correct, it implies that the ESP's restrictions on Medicare allowances did reduce the rate of Medicare charge inflation--but primarily because the restrictions applied to an important share of physicians' business. By the same token, it indicates that controlling allowances in order to contain overall charge inflation will probably be unsuccessful unless the controls are applied to a large share of physicians' business.

Physician Participation

Two of the three study Plans (A and B) offered participation agreements to physicians. The agreements were on an all-or-nothing basis, meaning that they required the physician to participate either on all claims or none in the eligible private lines of business. In this sense, they are similar to the participation conditions of Medicaid programs, in which the physician cannot treat Medicaid patients unless he agrees to participate in the state's program. Thus, they stand in contrast to Medicare assignment arrangements where the physician is allowed to accept assignment on a claim-by-claim basis.

Using descriptive tabulations, we examined the correlates of participation

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*There is another possibility as well. The physician's charges in the Plan's fee schedule business were included in the data base used to establish the Plan's UCR Level 1 and Level 2 screens, while Medicare charges were not. Consequently, physicians had incentives to keep their charges in fee schedule business from falling too low, but no similar incentives to maintain high Medicare charges. We were unable to evaluate this possibility, and it may or may not be credible. Offhand, one might guess that it is of minor importance, since it is not clear that physicians were typically aware of which, if any, lines of business other than UCR the Plan included in calculating UCR fee screens.

rates in Chapter V. The results showed that physicians with the highest rates of participation tended to be general practitioners, foreign medical school graduates, non-board certified, female, and not in group practice. No other personal, practice, or county socioeconomic characteristics appeared to be consistently associated with participation tendencies across Plans. However, we did find that participating physicians had somewhat lower charge levels than nonparticipants, and that their average revenues grew at only two-thirds the rate of those of nonparticipants. Superficially, this suggests that the Plans' participation arrangements helped constrain the growth of expenditures on physicians' services during the study period. But the results may only mean that physicians with low earnings and low growth rates of earnings had unusually high participation rates.

Because the descriptive findings are susceptible to many kinds of bias, we formulated and estimated a regression model of the physician's participation decision in Chapter VIII. The underlying conceptual model assumed that the decision depends on the relative net income opportunities of participating and not participating.* Its behavioral implications were generally weaker than those of a similar model used in past research on claim-by-claim participation. With important exceptions, the behavioral patterns shown by the results were not consistent across Plans, and this may indicate that the correlates of all-or-nothing participation are, in fact, difficult to predict. For example, we found no systematic relationships between the probability of participating and the physician's age, type of practice, or

*Although for simplicity our conceptual model postulated profit maximization, the regression model assumed only that physicians are income-motivated. The estimates of the model described below are consistent with physician income motivation, but they should not be construed as evidence of profit maximization.

county characteristics. Moreover, physicians in several specialties, including pediatrics and some of the referral fields, were about as likely to participate as general practitioners.

Even so, estimates of the model yielded three significant results. First, they showed that the decision to participate is moderately to highly sensitive to the Plans' applicable fee screens and fee schedules. Furthermore, this sensitivity generally increases with the volume of the physician's output in lines of business where he/she is eligible to participate. Second, physicians with characteristics commonly associated with low quality--graduation from a foreign medical school, lack of board certification, and low charge levels--were significantly more likely to participate than physicians without those characteristics. And third, it was found that market factors outside the control of reimbursement policy had significant impacts on participation rates.

Each of these findings has applications to reimbursement policy. The primary function of physician participation and, in the Medicare program, of benefit assignment is to promote access to physician' care by reducing the net prices paid by patients. Our results clearly showed that participation rates rise in response to increases in allowances. Thus, to raise participation rates and to increase access to physicians' care, the most obvious and readily available policy action is to raise allowances. But since the paid benefits of private and government health insurance programs increase as allowances rise, improving access through the participation mechanism entails an increase in program costs. Similarly, controlling allowances to contain program costs means a decline in participation rates and a lowering of access to care.

The tradeoff here between controlling costs and maintaining access to physicians' care becomes even more complicated when physicians of low measured quality are disproportionately likely to participate or accept assignment. Theoretically, "high-quality" physicians should have advantages in attracting a patient clientele vis-a-vis "low-quality" physicians at any given net price. Therefore, "high-quality" physicians should have weaker incentives than "low-quality" physicians to participate in order to lower the net prices to patients. Our regression results support this theoretical proposition. As a consequence, they imply that attempting to contain program costs by limiting allowances will not only reduce access to care, but also lower the measured quality of care available to patients on a participating or assigned basis.

Finally, in each of the study Plans we found that one or more exogenous factors had highly important quantitative effects on participation rates. In one Plan the effects were largely self-cancelling, but in the other a single factor--an increase in county per capita income--appeared to cause a large decline in the aggregate participation rate. These results present special difficulties for policy planning because of their magnitude and unpredictability. When market forces act fortuitously to raise participation or assignment rates, this represents, in effect, a windfall gain to policy administrators. But when market forces reduce participation rates, it means that a choice must be made between permitting the rates to fall and raising allowances to maintain them--that is, between permitting a fall in access to care and raising program costs.

Reimbursement Policy

In order to justify a change in reimbursement policy, it is necessary to show that current policy leads to (or fails to correct) a problem, that a remedy exists, and that applying the remedy increases social welfare. This study was conceived as an empirical investigation of the problems linked with the prevalent methods of physician reimbursement. It was directed at fee-for-service physicians and, in particular, the part of their economic activities covered by Blue Shield Plan reimbursement. For these reasons, it was not designed to take account of other forms of physician payment nor to evaluate their advantages and disadvantages with respect to current policy. Instead, its purpose was to determine whether the common reimbursement mechanisms and physicians' behavior toward them are so antithetical to established policy goals that remedial action ought to be seriously considered.

Taken in toto, the results of this study do call attention to certain problems with respect to the prevailing forms of physician reimbursement. But they also indicate that difficult, and possibly socially costly, decisions may be required in order to solve them. For example, if the overall rate of charge inflation--which exceeded the rate of increase in the cost-of-living indexes for two of the three study Plans--is to be slowed, it may be necessary to institute controls not only on government-financed health programs, but on private programs as well.* In this event, it would

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* The alternative of promoting increases in "competition" among health insurers and service providers raises a host of as yet unanswered questions which were outside the scope of this study.

not necessarily be the case that the full burden of cost containment will be shifted to physicians. Instead, some of the burden may simply be transferred to patients in terms of diminished access to care. Similar dilemmas exist in most of the other areas of reimbursement policy to which our findings apply. Moreover, aside from the tradeoffs among policy goals, the addition of new controls on the physicians' services markets will inevitably be accompanied by increases in administrative costs and the indirect costs of mistakes in judgment. While there are undoubtedly inefficiencies in these markets, it is reasonable to ask whether--and, if so, in which instances--the gains from reducing them will outweigh the costs inherent in making untested changes in existing government and private physician reimbursement mechanisms.

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APPENDIX A

APPENDIX A

REPORT ON DATA BASE

Data Sources

The data used in this study were taken from seven sources, as follows:

(1) The primary data source is the claims files of three unnamed Blue Shield Plans, which we refer to as Plans A, B, and C. The claims data apply to 65 medical, surgical, and other procedures which are listed, along with their 1974 California Relative Value Studies codes, in Table 1.* For two Plans, A and B, the data cover the years 1973 through 1976. For Plan C, the data cover the years 1975 through 1978 by agreement between HCFA and the Blue Shield Association (BSA). The data apply to a maximum of four lines of business. The lines of business specific to each Plan are:

Plan	Lines of Business
A	UCR, indemnity
B	UCR, indemnity, partial service, Medicare**
C	UCR, indemnity

Two analytical files were constructed by BSA for each Plan. In the first, the county in which the service was performed was selected as the unit of analysis. In the second, the physician was designated as the unit of

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* The procedures were selected by the Blue Shield Association (BSA) as the 65 most frequently performed procedures on a national basis. Although figures are not available for the amounts of private or Medicare business the procedures represent, BSA indicates that they account for approximately 55% of national business in the Federal Employees Health Benefits Program. Hence they probably represent about half of the individual Plans' private and Medicare business as well. Not every procedure was covered by each of the sample Plans in each year of the sample period(s). However, at least 55 procedures were covered in each year by each Plan, so that the data apply to most or all of the procedures for all Plans and years.

** Plan B had High- and Low-Option business under the Federal Employees Health Benefits Program (FEP) during the sample period. Because of identical or closely similar reimbursement methods between these and the respective private lines of business, the Plan's FEP/High-Option data were merged with UCR data, and FEP/Low-Option data were merged with indemnity data. Plan A also had FEP business, but FEP claims data were not made available to us by the Plan.

TABLE 1

LIST OF SAMPLE PROCEDURES

1974 CRVS Code	BSA Type of Service/Procedure
90803	Psychiatry/Psychotherapy Verbal, Drug Augmented
90836 & -38	Psychiatry/Convulsive Therapy, Electroconvulsive or Drug-Induced
77040	Therapeutic Radiology/Supervoltages
77030	Therapeutic Radiology/Teleradiotherapy, Low Voltage
11100	Surgery/Skin Biopsy
19120	Surgery/Excision of Cyst, Breast
19200	Surgery/Radical Mastectomy, Inclusive
23505	Surgery/Clavicular Fracture, Closed Reduction
25606	Surgery/Distal Radial Fracture, Closed Reduction
20610	Surgery/Arthocentesis, Major Joint
31620	Surgery/Bronchoscopy, Diagnostic
32480	Surgery/Lobectomy, Total, Subtotal, or Segmental
42840	Surgery/Tonsillectomy, Adenoidectomy--Juvenile
42841	Surgery/Tonsillectomy, Adenoidectomy--Adult
44140	Surgery/Colectomy, Partial
44950	Surgery/Appendectomy
40240	Surgery/Sigmoidoscopy, Diagnostic
46255	Surgery/Hemorrhoidectomy, Internal and External
47600	Surgery/Cholecystectomy
49508	Surgery/Herniorraphy, Inguinal, Unilateral
52100	Surgery/Cystourethroscopy, Inclusive
52601	Surgery/Prostate, TUR, Complete
53600	Surgery/Dilation of Urethra, Initial
55250	Surgery/Vasectomy
58120	Surgery/D&C Nonobstetrical
58150	Surgery/Hysterectomy, Total
61310	Surgery/Craniectomy or Craniotomy, Inclusive
62270	Surgery/Spinal Puncture, Lumbar, Diagnostic
66920 & -40	Surgery/Extraction of Lens, Unilateral
59400	Maternity/Total OB Care
59501	Maternity/C-Section, Low Cervical, Inclusive
59862	Maternity/Therapeutic Abortion by D & C
42840	Anesthesia/Tonsillectomy, Adenoidectomy--Juvenile
44140	Anesthesia/Colectomy, Partial
44950	Anesthesia/Appendectomy
47600	Anesthesia/Cholecystectomy
49508	Anesthesia/Herniorraphy, Inguinal, Unilateral
52601	Anesthesia/Prostate, TUR, Complete
58120	Anesthesia/D & C, Nonobstetrical
58150	Anesthesia/Hysterectomy, Total
70260	Diagnostic Radiology/Skull, Complete

TABLE 1 (Continued)

1974 CRVS Code	BSA Type of Service/Procedure
71020	Diagnostic Radiology/Chest X-Ray, Two Views
72110	Diagnostic Radiology/Spine X-Ray, Lumbar, Complete
74242	Diagnostic Radiology/Stomach-UGI Complete
74270	Diagnostic Radiology/Colon, Barium Enema
90010	Medicine/Office Visit, New Patient, Inclusive
90020	Medicine/Office Visit, New Patient, Diagnostic
90040	Medicine/Office Visit, Established Patient, Brief Service
90050	Medicine/Office Visit, Established Patient, Treatment
90100	Medicine/Home Visit, New Patient
90200	Medicine/Hospital Visit, New or Established Patient
90220	Medicine/Hospital Visit, New or Established Patient, Inclusive
90250	Medicine/Hospital Visit, New or Established Patient, Ltd. Exam
90285	Medicine/Routine Newborn Care, Hospital
90620	Medicine/Consultation
93000	Medicine/EKG with Interpretation and Report
95819	Medicine/EEG with Interpretation and Report
82947	Pathology/Blood Sugar
85031	Pathology/Complete Blood Count
85014	Pathology/Hematocrit
85610	Pathology/Prothrombin Time Test
81000	Pathology/Urinalysis
88150	Pathology/Pap Test

analysis. To construct the second file, BSA developed, with the assistance of the American Medical Association, samples of physicians who practiced in each Plan's geographic area during every year of the sample period. The process by which the physician samples were chosen is discussed below.

For each combination of procedure, line of business, year, county, Plan Area of service location, and physician specialty, BSA entered into each of the two files the total amount charged, the total amount allowed by the Plan,* the total amount paid by the Plan, the number of times the service was performed, and certain other claim-related information described below. To construct the county-level analytical file, the totals for each of the relevant variables over each county were placed in the file. For the physician-level analytical file, the totals of each of the relevant variables were computed for each physician in the AMA sample and placed in the file. Averages were obtained by dividing the totals in each file by the corresponding frequency of performance.

(2) The AMA's 1977 Masterfile of Physicians was used as the source of physician-specific data such as specialty, medical school of graduation, board certification, age, sex, type of practice, and an indicator of medical school faculty appointments. Medical school of graduation was also used to generate a <u>proxy</u> for the physician's race if he was a U.S. graduate. The physician was assumed to be Black if he was a graduate of Howard or Meharry medical schools, and to be non-Black otherwise.

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* The actual amounts allowed were available only for Plan C and for Medicare business in Plan B. UCR allowances were estimated by the Plans A and B (for 1975 and 1976) by applying known coinsurance rates to the amounts paid on contracts with coinsurance provisions. In all other cases the amount allowed was assumed to be equal to the amount paid.

(3) A report by the Association of American Medical Colleges* was used as the source of an index of the physician's medical school's research orientation.

(4) Certain county-level data such as the number of physicians per capita, the number of physicians per capita in each of four specialty groupings (general practitioners, medical specialists, surgical specialists, and other specialists), the number of hospital beds per capita, estimated population, and estimated per capita income, were derived from the AMA's annual series, Physician Distribution and Medical Licensure in the U.S. In each instance the data are annual values of the variables.

(5) In cases where annual data on population or per capita income were not available from AMA publications, they were taken from the source utilized by the AMA-- Sales and Marketing Management's annual Survey of Buying Power series.

(6) The U.S. Department of Commerce's annual publication County Business Patterns was used as the source of a measure of average county wage rates in physicians' offices.

(7) All remaining county-level variables were derived from the Area Resources File developed by the Manpower Analysis Branch, Health Resources Administration, U.S. Department of Health, Education, and Welfare.

A more detailed description of data sources, which is keyed to the variables defined for the study, is presented at the end of this appendix.

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* See: Association of American Medical Colleges, Postdoctorals Vs. Non-Postdoctorals: Career Performance Differentials Within Academic Medicine, DHEW Publication No. (HRA) 75-73 (Washington, D.C.: U.S. Department of Health, Education, and Welfare, April, 1975).

Modifications of the BSA Analytical Files

Two major modifications of the BSA analytical files were undertaken to improve the clarity of the data. The first was performed on physicians' type of practice, the second on the physician's participation status.

(1) It was known at the outset of the claims extraction process that a single provider code might be applied by the Plan to all physicians in a group or partnership practice. Since physicians selected for the physician sample could be identified by the Plan only by provider code, this meant that the claims of two or more physicians--perhaps even those in different specialties--might erroneously be assigned to a single practitioner. To obviate this problem, or at least to eliminate the possibility that claims from different group specialists were recorded for one physician, the following editing process was carried out.

For the physician sample, all nongroup physicians in each specialty were first identified. The procedures of these nongroup physicians which appeared in the claims files were then arranged by specialty. The rule was next adopted that: (i) if physicians in a given specialty provided less than 3% of the total volume of services of a given procedure, and (ii) the given procedure represented less than 3% of the total volume of services provided by the given specialty, all services of group and partnership physicians defined by the given procedure-specialty combination were deleted from the file.

The rationale underlying the rule was that any specialty-procedure combination it uncovered was unlikely to be performed by any physician. Thus, if a group or partnership physician was observed to provide the combination, it was deemed due to a probable misassignment to that physician of the claims by other members of the group. It should be stressed that the editing process deleted only certain types of services from the physician file that were recorded for some group and partnership physicians. It did not reduce the size of the physician sample itself.

It should also be stressed that, because the process could not be applied to the county-level file (in which individual physicians were not identified), it was performed only on the physician-level file.

The application of the editing rule resulted in the loss of roughly 15-20% of group and partnership physicians' business, and of approximately 1-12% of the business of all sample physicians, depending on the measure of business, Plan, and year. Reductions in the physician sample data are summarized in Table 2 for four measures of business (total physician charges, total Plan payments, total number of relative value units [RVUs], and total number of services), for each Plan, and for each sample year.

The percentage reductions in total charges, total payments, and total numbers of RVUs were nearly equal. This implies that the average charge and payment per RVU for the deleted procedures were virtually the same as those for the procedures retained in the sample. However, the percentage reductions in service counts were somewhat lower than the percentage reductions in total numbers of RVUs. This indicates that the average number of RVUs per procedure was higher for the deleted procedures than for the procedures retained in the sample.

TABLE 2

PERCENTAGE REDUCTIONS IN VOLUMES OF SAMPLE BUSINESS DUE TO EDITING OF PHYSICIAN FILE FOR EXCESSIVE SERVICES ATTRIBUTED TO GROUP AND PARTNERSHIP PHYSICIANS

	Measures of Physician Business							
	Group and Partnership Physicians				All Sample Physicians			
Plan/Year	Amount Charged	Amount Paid	Total RVUs	Total Services	Amount Charged	Amount Paid	Total RVUs	Total Services
Plan A								
1973	16.6	16.1	17.6	6.7	6.6	6.4	6.9	2.9
1974	15.1	14.8	16.2	5.8	6.2	6.1	6.5	2.7
1975	14.2	13.5	14.9	6.0	6.4	6.1	6.5	2.8
1976	12.6	12.6	13.6	5.8	5.4	5.4	5.5	2.2
Plan B								
1973	14.3	14.4	13.6	4.5	3.0	3.0	2.8	0.8
1974	15.4	15.7	14.7	4.8	3.2	3.2	3.0	0.9
1975	18.0	19.1	17.9	9.0	3.6	3.8	3.5	1.6
1976	18.4	18.8	18.8	11.2	3.7	3.8	3.8	2.1
Plan C								
1975	20.4	18.9	20.3	7.8	11.6	10.8	11.6	4.5
1976	18.9	17.8	18.8	7.7	10.8	10.2	10.8	4.5
1977	17.9	16.9	17.5	7.3	10.7	10.2	10.6	4.4
1978	18.8	18.0	18.5	7.7	11.0	10.9	11.1	4.8

(2) The second major modification of the data was undertaken to make the physician file records of participating and nonparticipating claims compatible with Plan policies as reported to us. As in the case of the first modification, it was possible to carry out the adjustments only on the physician file.

As reported to us by BSA, participation in Plans A and B is nominally on an all-or-nothing basis. Further investigation by BSA revealed that this characterization is operationally accurate for Plan B, but not necessarily so for Plan A. Both Plans permit participating physicians to bill patients rather than the Plan, but Plan B informs the patient that he or she is liable for payment only up to the Plan's allowance. In Plan A, the patient is so informed only if he or she contacts the Plan and requests the information. Hence, a participating physician in Plan A may in some cases receive payment as if the claim had been treated as being nonparticipating. There are, however, no circumstances in which nonparticipating physicians in either Plan are paid as if they were participating.

In reviewing the physician data of Plans A and B, it was found that many physicians had both participating and nonparticipating claims throughout the sample period. In Plan B, the percentage with both types of claims was approximately 30 (for UCR business) in each year, while in

Plan A (also for UCR business) it ranged from 11 to 19. Aside from the practice of Plan A toward participation, there appeared to be several possible explanations for the anomaly: (i) changes in participation status by physicians during the sample years; (ii) accidental miscoding by the Plan; and (iii) the coding of participation status as "unknown" by Plan clerical personnel (i.e., when claims for services provided by participating physicians were submitted to the Plan by the patient rather than by the physician). Claims whose participation status was "unknown" were combined with nonparticipating claims by BSA during the data extraction process.

Because it seemed likely that accidental coding errors and coding of claims as participation status "unknown" were responsible for many of the cases where participating and nonparticipating claims were recorded for the same physician, the following rules were adopted for editing the physician file (no similar procedure was possible with respect to the county file).

(i) In Plan B, physicians were defined as participating if more than 5% of their relative value units (RVUs) in private business were performed on a participating basis. Otherwise, they were treated as nonparticipating. Physicians having only Medicare business were defined as having unknown participation statuses.* The 5% figure was used so that clerical

* In Plan B, participation agreements apply only to UCR and partial service business. However, unlike the data in other Plans, Plan B's indemnity claims were segregated by BSA into those performed by participating and nonparticipating physicians. This made it possible to use claims from indemnity business as well as other private lines of business in applying the procedure defined here. The purpose of doing so was to define participation status for physicians having only claims for indemnity business in our sample of claims, and thereby to increase the sample of physicians with "known" participation statuses. In Plan B's partial service line of business, a claim is designated as participating by the Plan only if (i) the physician participates and (ii) the patient's family income does not exceed a prescribed ceiling. The Plan leaves enforcement of the second provision to the physician, and it cannot determine whether a partial service claim literally fulfills its conditions for participation. However, the rule we adopted was meant only to identify a physician's participation status--in order to characterize the general conditions of reimbursement--and therefore it was not necessary to modify the rule for the Plan's special practices toward partial service payment.

errors would not lead to our classifying a physician as participating simply because a few of his claims were mistakenly coded as participating.

(ii) In Plan A, physicians were defined as participating if more than 5% of their RVUs in UCR business were performed on a participating basis. Otherwise, they were treated as nonparticipating. Physicians having only indemnity business (in which claims were not segregated into those submitted by participating and nonparticipating physicians) were defined as having unknown participation statuses.

(iii) Because Plan A allowed the possibility that participating physicians could, in some cases, receive payment as if they were nonparticipating, a second rule was established for this Plan.* A measure of the physician's participation was defined as the fraction of his RVUs in UCR business provided on a participating basis. This measure, which treats participation as if it were applied on a claim-by-claim basis, was used in some of the analytical work on Plan A.

The above editing rules could not be applied to the county file. They could be applied only to claims data in the physician file.

General Characteristics of the County and Physician Analytical Files

This section gives a brief summary of the county and physician file characteristics.

(1) The availability of data across lines of business has been indicated above. A specific breakdown of the analytical file data by line of business,

* That is, when a patient submitted a claim for service from a participating physician to Plan A the physician's compliance with the participation agreement was strictly voluntary on his part. Since we have no way of knowing the extent of such voluntary compliance, we proposed to analyze participation as though it were total and zero, respectively, in order to see if the assumption significantly affects the results obtained.

participation status of the physician or claims, and Plan is given in Table 3. Among the three Plans, only Plan B had Medicare business, and in the form in which we received the data, its Medicare claims were not segregated by assignment status. None of the three Plans had Medicaid business.

(2) Both of the BSA files contained a 19-way classification of physician specialties. The 19 specialties were condensed into the following four-way classification, which was used chiefly in the county file:

--General Practice (G)

--Medical Specialties (MS)

--Surgical Specialties (SS)

--Other (non-medical, non-surgical) Specialties (OS)

The recoding of the 19 BSA specialties into the four-way grouping is shown in Table 4. The AMA Masterfile of Physicians contained an additional specialty classification which, after the claims data-Masterfile merger, was used for the physician analytical file. The AMA classification is discussed below.

(3) The original BSA codes contained an 11-way classification of service locations. For working purposes, this classification was reduced to the following four-way classification in both of the analytical files:

--Hospital Inpatient (A)

--Clinic and Hospital Outpatient (B)

--Physician's Office (C)

--Other (D)

The condensation rules we used are shown in Table 5.

(4) The list of the 65 sample procedures entered into the analytical files is shown above in Table 1. In fact, the BSA coding procedure separates

TABLE 3

DATA AVAILABILITY BY LINE OF BUSINESS, PARTICIPATION STATUS, AND PLAN

Plan/ Participation Status	Line of Business: UCR	Indemnity*	Partial Service	Medicare
Plan A				
Participating	X			
Nonparticipating	X	X		
Plan B				
Participating	X	X	X	
Nonparticipating	X	X	X	
Medicare				X**
Plan C				
Participating***				
Nonparticipating	X	X		

* Participation does not apply to indemnity business. Plan B's indemnity data were segregated by the Plan into claims by participating and nonparticipating physicians in the UCR and partial service lines.

** Participation does not apply to Medicare business. Plan B did not segregate Medicare assigned and nonassigned claims in the files made available to us.

*** Plan C does not have a physician participation arrangement.

TABLE 4

CONDENSATION OF BSA SPECIALTY CLASSIFICATION

BSA Specialty	Four-Way Grouping
Anesthesiology	OS
Cardiovascular Surgery	SS
Ear, Nose, and Throat	SS
Family Practice	G
General Practice	G
General Surgery	SS
Internal Medicine	MS
Neurology	OS
Neurosurgery	SS
Obstetrics-Gynecology	SS
Ophthalmology	SS
Orthopedic Surgery	SS
Pathology	OS
Pediatrics	MS
Psychiatry	OS
Radiology	OS
Urology	SS
Other Medical Specialties	MS
Other Surgical Specialties	SS

TABLE 5

CONDENSATION OF BSA SERVICE LOCATION CLASSIFICATION

BSA Service Location	Four-Way Service Location Classification
Inpatient Hospital	A
Outpatient Hospital	B
Clinic	B
Physician's Office	C
Home	D
Independent Laboratory	D
Nursing Home, ECF, SNF	D
Intermediate Care Facility	D
Outpatient Psychiatric Facility	D
Short Procedures Unit	D
Other	D

"professional" and "technical" claims components for certain laboratory procedures, each of which can be treated as a distinct service. The "professional" component is the portion of the overall service for which the physician is reimbursed by the Plan. The "technical" component is the portion for which the owner of the laboratory equipment is reimbursed by the Plan. The addition of the two-component breakdown of laboratory services to the initial list of procedures raises the number of procedures from 65 to a potential maximum of 82. However, none of the three Plans provided two-component breakdowns of laboratory services, and the actual number of procedures used in the analyses was therefore 65.

(5) As already indicated, service locations are recorded by county in the analytical files. Moreover, each Blue Shield Plan maintains one or more "Plan Areas" within which it establishes certain uniform reimbursement practices such as the same Level 2 fee screen values.

Plan A maintains only one Plan Area composed of five counties.

In Plan B, there are three Plan Areas used for both private and Medicare business, and one additional Plan Area used for private business only. No data were made available to us from the fourth Area, consisting of portions of two counties, so that all of the Plan B claims records (except those with unknown service locations) are derived from three Areas. Each such area is comprised of a group of counties.

Plan C maintains three Areas which, unlike those of Plans A and B, consist of portions of counties rather than entire counties.

Plan A's data cover 5 counties. Plan B's data cover 22 counties with 6 counties in Plan Area 1, 4 counties in Plan Area 2, and 12 counties in Plan Area 3. In Plan C, 6 counties had the majority of their business in Plan Area 1, 8 counties had the majority of their business in Plan Area 2, and 14 counties had the majority of their business in Plan Area 3.

Selection and Properties of the Physician Sample

The selection of the physician sample was carried out by BSA with the assistance of the AMA. For each Plan, the AMA provided the names of a candidate group of physicians sufficient to generate a maximum of 150 to 200 practitioners in each of 17 specialties or specialty groups. Each candidate physician was required to have practiced in the Plan's geographic area throughout the sample period. When fewer than 150 such physicians could be located in a given specialty or specialty grouping, all physicians in that specialty or specialty grouping who satisfied the length-of-practice criterion were chosen.

The list of candidate physicians was then forwarded to BSA, and BSA attempted to match the candidate names with the names of physicians appearing in the Plan's provider files. To preserve confidentiality, the names and addresses (other than county location) of the matched physicians were not retained in the analytical files.

As was expected, not all of the candidate physicians could be included in the physician sample. For one group of candidates, it was found that there were no records of them in the Plan's provider files.* For a second group, it was found that, although their names were listed in the Plan's provider files, they submitted no claims during the sample period(s). Together, these two groups of physicians were classified as "mismatched" by the physician-selection procedure. The third group of matched physicians was found to have submitted claims during at least one of the years of the sample period(s), and this group was selected as the sample for the physician analytical file.

A breakdown of groups of matched and mismatched physicians is given for each Plan in Table 6.

* This could have occurred for several reasons: (i) although they were in active private practice, the physicians may never have submitted claims to the Plan (e.g., because they were newly established); (ii) they may have

TABLE 6

SUMMARY OF MATCHED AND MISMATCHED PHYSICIANS SELECTED AS CANDIDATES FOR PHYSICIAN SAMPLE

Plan	Total Number of Candidate Physicians	Number of Physicians Matched (Sample Sizes)	Number of Mismatches	
			No Plan Records	No Claims Data
Plan A	1,720	1,095	325	300
Plan B	1,732	1,090	499	143
Plan C	1,418	1,006	134	278

After the selection of the physician sample, personal and practice characteristics recorded in the AMA's Masterfile were merged with the physician claims data. Additional mergers were next performed using county-level data keyed to the physicians' county locations. When a physician was recorded as having two or more county locations, the relevant county-level data were coded separately for each such practice location.

Table 7 summarizes the record layout used in the physician analytical file,* insofar as it contains claims elements and data from the AMA's Masterfile. Elements 1-9 in the table refer to claims records, and elements 10-24 refer to the Masterfile data.

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been members of group or partnership practices who did not submit claims under their own names or enter into participation agreements; (iii) they may have been salaried employees of hospitals, medical schools, etc., who did not submit claims under their own names or enter into participation agreements; (iv) they may have erroneously reported their activity statuses to the AMA (i.e., they were not actively engaged in providing direct patient care); and (v) they may have erroneously reported their state locations to the AMA. Among these possible explanations, the first three probably account for the major portion of "missing" Plan records.

* See above for description of editing procedures applied to this file by USC after its receipt from BSA.

TABLE 7

PHYSICIAN RECORD DESCRIPTION

Field

1. BSA Plan Number
2. BSA Type of Service
3. BSA Procedure Code
4. BSA Component Code
5. BSA Service Location
6. USC Specialty Code
7. BSA Group/Non-Group Code
8. BSA Hospital-Based Code
9. Totals Table

Total by Year occurs 4 times.
Totals by Line of Business occurs 5 times.
Totals by Physician Participation occurs 2 times.

a) Total Charge
b) Total Allowance
c) Total Paid
d) Total Service
e) Total Female Service
f) Total Male Service
g) Total Young Service
h) Total Old Service
i) Total Claim
j) Total Lag Time
k) Total Unknown Age Service
l) Total Treatment Group A*
m) Total Treatment Group B*
n) Total Treatment Group C*
o) Total Treatment Group D*
p) Total Service Recipients
q) Filler

10. Physicians anonymous identification
11. AMA County
12. AMA Sex
13. AMA Birth year
14. AMA Medical school graduation year
15. AMA National board test year
16. AMA Licensure year
17. AMA Medical school identification
18. AMA Primary specialty
19. Secondary specialty board
20. AMA Primary specialty board
21. AMA Secondary specialty board
22. AMA Tertiary specialty board
23. AMA Type of practice
24. AMA Type of employment indication

* Refers to treatment location. See the text above.

Variables in the Data Base

Table 8 defines the variables which come directly or indirectly from the claims data of the three Blue Shield Plans. Some of these variables are expressed in terms of RVUs, and the RVU itself was used as the unit of measurement of the quantity of physician services. The conversion of Blue Shield Plan counts of services into RVUs was conducted on a procedure-by-procedure basis using the values in the 1974 Revision of the California Relative Value Studies (CRVS).*

The CRVS classifies procedures in five major types of services: Medicine, Anesthesia, Surgery, Radiology/Nuclear Medicine, and Pathology. The CRVS assigns each specific procedure a measure of relative value based on the relative median charges of California physicians for the various procedures within each of the five major types of services. Consequently, the relative values reported are not comparable across the individual types of services. In order to derive a measure of relative value across the types of services, it was necessary for us to estimate conversion factors.

The conversion factors were estimated from Plan B's** claims data for 1973 using the following methodology:

(1) For each type of service, the total number of RVUs was computed by multiplying the number of times each procedure was performed by the CRVS relative value measure, and summing across the procedures specific to the major type of service in question.

(2) For each major type of service, the average charge per RVU was

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* California Medical Association. 1974 Revision of the 1969 California Relative Value Studies. San Francisco, 1975.

** Plan B was the first Plan for which claims data was provided to us.

TABLE 8

VARIABLES DERIVED FROM BLUE SHIELD CLAIMS DATA

Variable Name	Definition
CPRVU	Amount charged per RVU
APRVU	Amount allowed per RVU
PPRVU	Amount paid by Plan per RVU
RVU	Quantity of RVUs
PART	Dummy variable = 1 if the physician participates
NONPART	Dummy variable = 1 if the physician does not participate
PCTIND	Fraction of the practice's observed RVUs provided to indemnity patients
PCTPS	Fraction of the practice's observed RVUs provided to partial service patients
PCTMED	Fraction of the practice's observed RVUs provided to Medicare patients
LAGPRCLM	Average number of days between the filing of and payment for the practice's claims
INPAHOSP	Fraction of the practice's observed RVUs provided in hospitals
OLDRVU	Fraction of the practice's observed RVUs provided to patients aged 65 and older
YNGRVU	Fraction of the practice's observed RVUs provided to patients aged 14 and younger
PCTFEMRV	Fraction of the practice's RVUs provided to female patients
CPRVLAG	Amount charged per RVU in the previous year
APRVLAG	Amount allowed per RVU in the previous year
CPRVDIF	Amount charged per RVU in the year of the observation minus the amount charged per RVU in the previous year
CPR2LAG	Amount charged per RVU two years prior to the year of the observation
APRGROW	Fractional change in the amount allowed per RVU from the previous year to the year of the observation
AREA_2	Dummy variable = 1 if the service location is in Plan Area 2 of the Plan
AREA_3	Dummy variable = 1 if the service location is in Plan Area 3 of the Plan
TIME74	Dummy variable = 1 if year of observation is 1974
TIME75	Dummy variable = 1 if year of observation is 1975
TIME76	Dummy variable = 1 if year of observation is 1976
TIME77	Dummy variable = 1 if year of observation is 1977
TIME78	Dummy variable = 1 if year of observation is 1978

computed by dividing the total in step (1) into total charges for that type of service.

(3) The conversion factors for the various major types of services were obtained by normalizing the average charges computed in step (2) so that the Medicine type of service conversion factor had a value of 1.0 while maintaining the same relative values as the average charges.

Table 9 lists the conversion factors for the eight types of services (as defined by BSA) used in our study. Some of the eight BSA types of services have the same conversion factor values since they are aggregated together by the CRVS into the same major type of service.

TABLE 9

ESTIMATED CONVERSION FACTORS USED FOR CONVERTING SERVICE COUNTS OF PROCEDURES INTO RVUs

BSA Type of Service	CRVS Type of Service	Conversion Factor
Medicine	Medicine	1.000
Anesthesia	Anesthesia	8.210
Surgery	Surgery	23.190
Maternity	Surgery	23.190
Diagnostic Radiology	Radiology/Nuclear Medicine	1.670
Therapeutic Radiology	Radiology/Nuclear Medicine	1.670
Pathology	Pathology	0.267
Psychiatry	Medicine	1.000

The conversion factor values computed from the 1973 Plan B data are closely comparable to the conversion factors estimated independently by the California Industrial Accidents Commission (CIAC) using California data. These conversion factors obtained by the CIAC were as follows:

Type of Service	CIAC Conversion Factor	USC Conversion Factor
Medicine	1.000	1.000
Anesthesia	6.050	8.210
Surgery	24.210	23.190
Radiology	1.980	1.670
Pathology	0.222	0.267

The conversion of the count of the number of services for a specific procedure to the number of RVUs was done by multiplying the service count by the CRVS unit measure and by the conversion factor for the appropriate type of service. That is, for the i-th procedure,

$$\text{RVUs}_i = (\text{service count of procedure } i) \times (\text{CRVS unit scale value of procedure } i) \times (\text{conversion factor for major type of service in which procedure } i \text{ is classified}).$$

To construct the numbers of RVUs per county and per physician, the procedure-specific numbers of RVUs were summed across procedures performed in the given county and by the given sample physician, respectively. In this way, the county and physician numbers of RVUs were standardized for variations in output due to differences in mix of procedures and to differences across major types of services.

Table 10 defines the variables which were derived from the 1977 AMA

Masterfile of Physicians or from related sources.*

Table 11 defines the county-level variables which were taken from or derived from the 1978 Area Resources File developed by the Manpower Analysis Branch of the Health Resources Administration. The WAGEINDX variable included in the table is from the Department of Commerce's County Business Patterns. There were no missing values of the variables except for WAGEINDX, the proxy for wage rates of physicians' office personnel. In this case, values were missing for a large number of counties. Since the statistical computer package we employed deletes observations from the estimation of regression equations when any variables have missing values, missing values of the WAGEINDX were estimated. This was done on the basis of OLS regressions of the average physicians' office wage on county transportation and utility employee average wages from the Area Resources File. Average retail wage rates and average manufacturing wage rates were also tested as regressors, but they were found to be insignificantly related to physicians' office wage rates. Hospital employees' wage rates were missing with about the same frequency as physicians' office wage rates and thus could not be used in the regressions to estimate the former's missing values. Data for WAGEINDX was unavailable for the final year of the study period for Plan C.

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* Some of the variables listed in the table require comment. The type of practice dummies, GROUP, SOLO, PARTNER, ARRANGE, OTH_EMPL, OTHER_EM, and HOSPEMPL were assigned missing values if the physician was coded in the Masterfile with "No Classification" under type of practice, or if no code was listed. AAMCINDX and BLACK_MD were assigned missing values if the physician was a graduate of a foreign medical school. AAMCINDX was also assigned a missing value if physician's medical school was not given an index value for medical research orientation (which is the case of newer schools).

TABLE 10

PHYSICIAN AND PRACTICE CHARACTERISTIC VARIABLES*

Variable Name	Definition
AAMCINDX**	Index of medical school research orientation of school attended by physician. Higher values denote greater research orientation (assigned a missing value if physician is a graduate of a foreign medical school or if the physician's medical school was not given an index value)
AGE***	Age of the physician in 1979
AMASEX	Dummy variable = 1 if the physician is female
BLACK_MD	Dummy variable = 1 if the physician is a graduate of Howard University College of Medicine or Meharry Medical College (assigned a missing value if the physician is a graduate of a foreign medical school)
BORDCERT	Dummy variable = 1 if the physician was board certified in 1977
FMG	Dummy variable = 1 if the physician is a graduate of a foreign medical school
SPEC_2ND	Dummy variable = 1 if the physician had a second specialty in 1977
	Type-of-Practice Dummy Variables
ARRANGE	Dummy variable = 1 if the physician had an arrangement type of practice in 1977
GROUP	Dummy variable = 1 if the physician practiced in a group in 1977
HOSPEMPL	Dummy variable = 1 if the physician practiced in a hospital in 1977
PARTNER	Dummy variable = 1 if the physician practiced in a partnership in 1977
SOLO	Dummy variable = 1 if the physician had a solo practice in 1977
OTH_EMPL	Dummy variable = 1 if the physician practiced in a setting other than solo, arrangement, group, partnership and hospital in 1977
OTHER_EM	Dummy variable = 1 if the physician practiced in a hospital or other institutional setting in 1977
	Physician Specialty Dummy Variables
AN	Dummy = 1 if the physician's specialty is anesthesiology
GP	Dummy = 1 the physician is a general practitioner
GS	Dummy = 1 if the physician's specialty is general surgery
IM	Dummy = 1 if the physician's specialty is internal medicine
N	Dummy = 1 if the physician's specialty is neurology
NS	Dummy = 1 if the physician's specialty is neurological surgery
OBG	Dummy = 1 if the physician's specialty is obstetrics-gynecology

TABLE 10 (Continued)

Variable Name	Definition
OMS	Dummy = 1 if the physician's specialty is allergy, cardio-vascular diseases, gastroenterology, pediatric allergy, or pulmonary diseases
OPH	Dummy = 1 if the physician's specialty is ophthalmology
ORS	Dummy = 1 if the physician's specialty is orthopedic surgery
OSS	Dummy = 1 if the physician's specialty is plastic surgery, colon/rectal surgery, or thoracic surgery
OTHRSPEC	Dummy = 1 if the physician had a non-primary care specialty
OTO	Dummy = 1 if the physician's specialty is otolaryngology
P	Dummy = 1 if the physician's specialty is psychiatry
PD	Dummy = 1 if the physician's specialty is pediatrics
PTH	Dummy = 1 if the physician's specialty is pathology
R	Dummy = 1 if the physician's specialty is radiology
U	Dummy = 1 if the physician's specialty is urology

* For all variables listed except AAMCINDX the source is the 1977 American Medical Association Masterfile.

** Source: Association of American Medical Colleges. Postdoctorals Vs. Non-Postdoctorals: Career Performance Differentials Within Academic Medicine. DHEW Publication No. (HRA) 75-73. Washington, D.C.: U.S. DHEW, April, 1975.

*** For some tables (as indicated) the physician's age is given for 1973. This was done to increase the number of age group categories.

TABLE 11

COUNTY LEVEL VARIABLES DERIVED FROM THE AREA RESOURCES FILE AND THE COUNTY BUSINESS PATTERNS*

Variable Name	Definition
	Variables with Multiple-Year Data**
ENRBPRCP	Fraction of county population enrolled in Medicare Part B***
OUTPPRCP	Number of hospital outpatient visits per capita in physician's county
WAGEINDX	Total payroll per employee in physician's offices in the county (in $1,000s)****
	Variables with only Single-Year Data
OVER65	Fraction of 1970 county population aged 65 and over
PRCT_BLK	Percent of 1970 county population which was Black x 10
PRCT_URB	Percent of 1970 county population living in urban areas x 10
UNDER15	Fraction of 1970 county population aged 14 and younger

* For all variables except WAGEINDX, the source is the 1978 Area Resources File developed by the Manpower Analysis Branch of the Health Resources Administration.

** 1978 values of WAGEINDX and 1977-78 values of ENRBPRCP were unavailable, limiting the use of these variables in the analysis of Plan C for which the claims data cover the period 1975-78.

*** The ENRBPRCP variable also required values of the CNTY_POP variable listed in Table 12.

**** The source for the payroll and employee data is: U.S. Bureau of the Census, (annual) County Business Patterns. The number of employees was for the Mid-March pay period for 1973 and for the week including March 12 for all other years. See the text for additional discussion of the variable.

The definitions of the county medical characteristics variables and other variables taken from the AMA's annual Physician Distribution and Medical Licensure in the U.S. (titled Distribution of Physicians prior to 1974) and the Sales and Marketing Management's annual Survey of Buying Power Data Service are listed in Table 12. The data for all variables in this table come from the AMA publications, including INPERCAP and CNTY_POP (which was used to obtain per capita variables in this table) except for the years 1977 and 1978. The 1977 and 1978 values for INPERCAP and CNTY_POP come from the Sales and Marketing Management's publications, which is the original source of data for those two variables in the AMA publications. None of the variables had missing values.

TABLE 12

OTHER COUNTY LEVEL VARIABLES WITH MULTI-YEAR DATA*

Variable Name	Definition
BDSPERCP	Hospital beds per capita in the county
DOCPRCAP**	Number of physicians per capita in the county
GPPRCAP**	Number of general practitioners per capita in the county
MSPRCAP**	Number of medical specialists per capita in county
SSPRCAP**	Number of surgical specialists per capita in the county
OTPRCAP**	Number of other (nonmedical, nonsurgical) specialists per capita in the county
CNTY_POP	County population
INPERCAP	County per capita income

* The sources are the American Medical Association's annual Physician Distribution and Medical Licensure in the U.S. (titled Distribution of Physicians prior to 1974) and the Sales and Marketing Management's annual Survey of Buying Power Data Service.

** Includes only non-federal physicians.

APPENDIX B

APPENDIX B

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TABLE B-1

PLAN A: AMOUNTS CHARGED PER RVU (IN DOLLARS) AND TOTAL NUMBER OF RVUs, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Line of Business, Participation Status, and Specialty	Year 1973	1974	1975	1976
UCR Participating				
General Practice				
Amount Charged/RVU	$2.04	$2.03	$2.26	$2.07
Total RVUs	147776	161782	187848	646137
Medical Specialties				
Amount Charged/RVU	2.03	2.16	2.34	2.36
Total RVUs	200794	251970	418886	962422
Surgical Specialties				
Amount Charged/RVU	2.00	2.13	2.35	2.50
Total RVUs	752110	1053678	1470641	1728449
Other Specialties				
Amount Charged/RVU	2.08	2.25	2.59	2.88
Total RVUs	311956	301219	458514	569700
Specialties Unknown				
Amount Charged/RVU	1.90	2.15	2.27	2.64
Total RVUs	11407	17132	27983	51934
All Specialties				
Amount Charged/RVU	2.03	2.14	2.38	2.45
Total RVUs	1424043	1785781	2563872	3958642
UCR Nonparticipating				
General Practice				
Amount Charged/RVU	1.96	2.03	2.31	2.20
Total RVUs	14747	20644	26991	117872
Medical Specialties				
Amount Charged/RVU	2.12	2.22	2.42	2.56
Total RVUs	107786	137012	246521	690791
Surgical Specialties				
Amount Charged/RVU	2.04	2.19	2.46	2.68
Total RVUs	152256	213987	339343	641032
Other Specialties				
Amount Charged/RVU	2.12	2.39	2.80	3.20
Total RVUs	78667	61755	101208	183555
Specialties Unknown				
Amount Charged/RVU	1.69	2.10	1.78	1.59
Total RVUs	427	651	2350	15322
All Specialties				
Amount Charged/RVU	2.08	2.22	2.49	2.65
Total RVUs	353883	434049	716412	1648572

TABLE B-1 (Continued)

Line of Business, Participation Status, and Specialty	Year 1973	1974	1975	1976
Indemnity				
General Practice				
Amount Charged/RVU	$1.99	$2.06	$2.27	$2.06
Total RVUs	120085	103551	67336	201321
Medical Specialties				
Amount Charged/RVU	2.14	2.25	2.46	2.45
Total RVUs	289787	266812	228316	509992
Surgical Specialties				
Amount Charged/RVU	2.05	2.17	2.40	2.58
Total RVUs	1040778	1001706	813618	798451
Other Specialties				
Amount Charged/RVU	2.11	2.29	2.67	3.09
Total RVUs	300852	229023	156742	199053
Specialties Unknown				
Amount Charged/RVU	2.06	2.30	2.41	2.72
Total RVUs	3778	9779	6485	11535
All Specialties				
Amount Charged/RVU	2.07	2.19	2.44	2.54
Total RVUs	1755280	1610870	1272497	1720353
All Lines of Business				
General Practice				
Amount Charged/RVU	2.01	2.04	2.27	2.09
Total RVUs	282608	285976	282175	965330
Medical Specialties				
Amount Charged/RVU	2.10	2.21	2.39	2.45
Total RVUs	598367	655794	893723	2163205
Surgical Specialties				
Amount Charged/RVU	2.03	2.15	2.38	2.55
Total RVUs	1945145	2269372	2623601	3167932
Other Specialties				
Amount Charged/RVU	2.10	2.28	2.63	2.99
Total RVUs	691475	591997	716464	952308
Specialties Unknown				
Amount Charged/RVU	1.93	2.20	2.26	2.45
Total RVUs	15612	27562	36819	78791
All Specialties				
Amount Charged/RVU	2.05	2.17	2.41	2.52
Total RVUs	3533207	3830701	4552781	7327567

TABLE B-2

PLAN B: AMOUNTS CHARGED PER RVU (IN DOLLARS) AND TOTAL NUMBER OF RVUs, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Line of Business, Participation Status, and Specialty	1973	1974	1975	1976
UCR Participating				
General Practice				
Amount Charged/RVU	$2.04	$2.18	$2.23	$2.36
Total RVUs	193,187	205,428	202,245	206,819
Medical Specialties				
Amount Charged/RVU	2.30	2.55	2.62	2.83
Total RVUs	762,817	788,820	830,138	907,529
Surgical Specialties				
Amount Charged/RVU	2.15	2.37	2.64	2.98
Total RVUs	1,969,684	2,199,834	2,467,735	2,561,306
Other Specialties				
Amount Charged/RVU	2.07	2.24	2.45	2.63
Total RVUs	536,615	661,469	1,003,202	1,160,786
Unknown Specialties				
Amount Charged/RVU	2.20	2.36	2.47	2.60
Total RVUs	814,533	781,249	724,001	738,103
UCR Nonparticipating				
General Practice				
Amount Charged/RVU	2.12	2.18	2.19	2.45
Total RVUs	16,045	18,186	17,250	20,873
Medical Specialties				
Amount Charged/RVU	2.35	2.49	2.60	2.85
Total RVUs	76,348	90,230	99,992	129,870
Surgical Specialties				
Amount Charged/RVU	2.15	2.35	2.60	2.90
Total RVUs	166,063	204,533	249,751	322,915
Other Specialties				
Amount Charged/RVU	1.89	2.09	2.52	2.78
Total RVUs	81,325	103,510	103,834	121,542
Unknown Specialties				
Amount Charged/RVU	2.15	2.40	2.44	2.20
Total RVUs	14,459	20,216	10,218	6,387

TABLE B-2 (Cont.)

Line of Business, Participation Status, and Specialty	1973	1974	1975	1976
Indemnity Participating				
General Practice				
Amount Charged/RVU	$2.10	$1.95	$2.09	$2.21
Total RVUs	1,518	1,069	18,623	43,425
Medical Specialties				
Amount Charged/RVU	2.19	2.35	2.58	2.80
Total RVUs	4,237	3,823	56,638	156,838
Surgical Specialties				
Amount Charged/RVU	1.97	2.24	2.58	2.81
Total RVUs	31,981	29,797	136,989	321,570
Other Specialties				
Amount Charged/RVU	1.84	2.24	2.50	2.54
Total RVUs	6,185	6,910	58,600	163,629
Unknown Specialties				
Amount Charged/RVU	1.80	2.26	2.52	2.60
Total RVUs	8,592	7,028	43,161	123,570
Indemnity Nonparticipating				
General Practice				
Amount Charged/RVU	1.54	2.05	2.02	2.30
Total RVUs	240	229	1,435	4,339
Medical Specialties				
Amount Charged/RVU	2.33	2.07	2.50	2.81
Total RVUs	375	626	9,590	33,209
Surgical Specialties				
Amount Charged/RVU	1.41	1.52	2.29	2.66
Total RVUs	5,628	3,964	19,418	48,648
Other Specialties				
Amount Charged/RVU	1.79	2.09	2.44	2.66
Total RVUs	1,275	1,808	6,525	20,544
Unknown Specialties				
Amount Charged/RVU	2.11	1.86	2.30	2.34
Total RVUs	402	521	585	1,493

TABLE B-2 (Cont.)

Line of Business, Participation Status, and Specialty	1973	1974	1975	1976
Partial Service Participating				
General Practice				
Amount Charged/RVU	$1.91	$2.06	$2.11	$2.20
Total RVUs	197,379	166,670	119,123	77,639
Medical Specialties				
Amount Charged/RVU	2.21	2.40	2.56	2.85
Total RVUs	802,657	704,232	468,267	324,177
Surgical Specialties				
Amount Charged/RVU	2.04	2.26	2.50	2.81
Total RVUs	1,415,076	1,277,464	1,064,918	775,358
Other Specialties				
Amount Charged/RVU	1.98	2.18	2.41	2.61
Total RVUs	388,771	390,484	396,229	304,378
Unknown Specialties				
Amount Charged/RVU	2.19	2.33	2.49	2.71
Total RVUs	705,403	560,278	347,558	173,902
Partial Service Nonparticipating				
General Practice				
Amount Charged/RVU	2.09	2.13	2.17	2.45
Total RVUs	17,158	14,730	11,520	6,689
Medical Specialties				
Amount Charged/RVU	2.33	2.45	2.62	2.90
Total RVUs	107,283	101,880	75,098	59,858
Surgical Specialties				
Amount Charged/RVU	2.08	2.26	2.45	2.79
Total RVUs	152,795	151,286	128,460	103,555
Other Specialties				
Amount Charged/RVU	1.84	2.08	2.53	2.79
Total RVUs	82,256	79,152	53,942	45,377
Unknown Specialties				
Amount Charged/RVU	2.56	2.48	2.35	2.29
Total RVUs	19,974	18,564	6,072	1,153

TABLE B-2 (Cont.)

Line of Business, Participation Status, and Specialty	1973	1974	1975	1976
Medicare				
General Practice				
Amount Charged/RVU	$1.64	$1.72	$1.85	$2.03
Total RVUs	883,742	1,182,352	1,146,586	1,096,776
Medical Specialties				
Amount Charged/RVU	2.07	2.23	2.40	2.55
Total RVUs	1,648,742	2,134,320	2,201,169	2,525,874
Surgical Specialties				
Amount Charged/RVU	1.93	2.12	2.36	2.57
Total RVUs	1,951,542	2,548,884	2,587,447	3,007,045
Other Specialties				
Amount Charged/RVU	1.40	1.28	1.56	1.58
Total RVUs	990,211	1,699,078	1,772,719	2,165,820
Unknown Specialties				
Amount Charged/RVU	2.17	2.31	2.45	2.19
Total RVUs	136,958	205,163	200,794	288,390

TABLE B-3

PLAN C: AMOUNTS CHARGED PER RVU (IN DOLLARS) AND TOTAL NUMBER OF RVUs, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business and Specialty	Year 1975	1976	1977	1978
UCR				
General Practice				
Amount Charged/RVU	2.34	2.43	2.63	2.75
Total RVUs	94319	139846	142729	94193
Medical Specialties				
Amount Charged/RVU	2.55	2.71	2.87	3.09
Total RVUs	300151	485247	479506	332404
Surgical Specialties				
Amount Charged/RVU	2.49	2.64	2.83	3.01
Total RVUs	511025	753648	848623	623747
Other Specialties				
Amount Charged/RVU	2.21	2.42	2.56	2.84
Total RVUs	233280	370467	418475	324784
Specialties Unknown				
Amount Charged/RVU	1.51	1.37	2.64	3.02
Total RVUs	5293	4461	2943	3039
All Specialties				
Amount Charged/RVU	2.43	2.59	2.76	2.97
Total RVUs	1144068	1753669	1892276	1378167
Indemnity				
General Practice				
Amount Charged/RVU	2.16	2.28	2.45	2.61
Total RVUs	63285	66689	47167	27079
Medical Specialties				
Amount Charged/RVU	2.56	2.77	2.92	3.17
Total RVUs	92190	123105	90105	75301
Surgical Specialties				
Amount Charged/RVU	2.43	2.61	2.83	3.01
Total RVUs	381847	427215	287429	180744
Other Specialties				
Amount Charged/RVU	1.77	1.90	2.13	2.41
Total RVUs	77646	93695	77292	62286
Specialties Unknown				
Amount Charged/RVU	1.71	1.82	3.14	3.17
Total RVUs	3153	1637	245	306
All Specialties				
Amount Charged/RVU	2.34	2.51	2.70	2.91
Total RVUs	618120	712340	502237	345716

TABLE B-3 (CONTINUED)

Line of Business and Specialty	Year 1975	1976	1977	1978
All Lines of Business				
General Practice				
Amount Charged/RVU	2.27	2.38	2.58	2.72
Total RVUs	157604	206535	189896	121272
Medical Specialties				
Amount Charged/RVU	2.55	2.72	2.88	3.11
Total RVUs	392341	608352	569611	407705
Surgical Specialties				
Amount Charged/RVU	2.46	2.63	2.83	3.01
Total RVUs	892871	1180863	1136052	804491
Other Specialties				
Amount Charged/RVU	2.10	2.32	2.49	2.77
Total RVUs	310926	464162	495766	387070
Specialties Unknown				
Amount Charged/RVU	1.59	1.49	2.68	3.04
Total RVUs	8445	6098	3188	3345
All Specialties				
Amount Charged/RVU	2.40	2.57	2.75	2.96
Total RVUs	1762188	2466009	2394513	1723883

TABLE B-4

PLAN A: CHARGES PER RVU (IN DOLLARS) CLASSIFIED BY LINE OF BUSINESS, BLUE SHIELD TYPE OF SERVICE, AND YEAR

Type of Service	Line of Business/Participation Status: UCR Participating	UCR Nonparticipating	Indemnity
1973			
Psychiatry	$1.95	$2.02	$2.11
Therapeutic Radiology	1.54	2.45	2.05
Surgery	2.02	2.09	2.05
Maternity	2.87	2.97	2.85
Anesthesia	1.98	1.96	1.98
Diagnostic Radiology	2.30	2.59	2.38
Medicine	1.84	1.94	1.95
Pathology	2.05	2.08	2.13
All Services	2.03	2.08	2.07
1974			
Psychiatry	2.10	2.37	1.74
Therapeutic Radiology	1.63	2.32	2.47
Surgery	2.16	2.25	2.18
Maternity	2.10	2.23	2.23
Anesthesia	2.17	2.22	2.14
Diagnostic Radiology	2.41	2.68	2.47
Medicine	1.99	2.10	2.09
Pathology	2.32	2.20	2.87
All Services	2.14	2.22	2.19
1975			
Psychiatry	2.36	2.54	2.13
Therapeutic Radiology	1.84	2.75	2.60
Surgery	2.40	2.47	2.43
Maternity	2.30	2.51	2.41
Anesthesia	2.57	2.85	2.58
Diagnostic Radiology	2.71	2.78	2.71
Medicine	2.23	2.36	2.33
Pathology	2.35	2.39	2.32
All Services	2.38	2.49	2.44
1976			
Psychiatry	2.54	2.71	--
Therapeutic Radiology	2.22	3.13	2.83
Surgery	2.63	2.73	2.66
Maternity	2.55	2.85	2.71
Anesthesia	3.13	3.38	3.17
Diagnostic Radiology	2.89	3.17	3.00
Medicine	2.17	2.48	2.28
Pathology	2.42	2.28	2.28
All Services	2.45	2.65	2.54

TABLE B-5

PLAN B: CHARGES PER RVU (IN DOLLARS) CLASSIFIED BY LINE OF BUSINESS, BLUE SHIELD TYPE OF SERVICE, AND YEAR

Line of Business	Psychiatry	Therapeutic Radiology	Surgery	Maternity	Anesthesia	Diagnostic Radiology	Medicine	Pathology
				1973				
UCR Participating	-	$2.20	$2.07	$2.25	$2.05	$2.23	$2.29	$2.05
UCR Nonparticipating	-	2.24	2.11	2.24	1.83	2.51	2.41	2.07
Indemnity Participating	-	7.26	1.84	2.29	1.78	1.88	2.21	2.29
Indemnity Nonparticipating	-	5.45	1.42	1.84	1.68	2.18	1.90	2.52
Partial Service Participating	-	1.97	1.99	2.29	1.95	2.29	2.18	2.03
Partial Service Nonparticipating	-	2.39	2.02	2.38	1.79	2.72	2.39	2.09
Medicare	$1.47	-	1.92	-	2.24	1.54	1.81	1.93
				1974				
UCR Participating	$ 3.83	$ 2.06	$2.30	$2.48	$2.33	$2.37	$2.49	$2.10
UCR Nonparticipating	1.67	2.17	2.29	2.39	2.05	2.80	2.53	2.26
Indemnity Participating	23.21	11.83	2.19	2.43	2.30	2.05	1.93	2.25
Indemnity Nonparticipating	-	3.14	1.56	-	2.09	1.85	2.02	1.70
Partial Service Participating	0.94	2.11	2.22	2.50	2.25	2.38	2.35	2.06
Partial Service Nonparticipating	-	2.27	2.19	1.91	2.04	2.94	2.50	2.22
Medicare	1.80	-	2.13	2.20	2.52	1.60	1.83	1.99

NOTE: Dashes indicate empty cells.

TABLE B-5 (Continued)

Line of Business	Psychiatry	Therapeutic Radiology	Surgery	Maternity	Anesthesia	Diagnostic Radiology	Medicine	Pathology
				1975				
UCR Participating	$2.24	$2.00	$2.60	$2.79	$2.88	$2.46	$2.48	$2.22
UCR Nonparticipating	1.75	3.16	2.56	2.65	2.52	3.09	2.59	2.23
Indemnity Participating	4.32	1.95	2.60	2.55	2.90	2.55	2.42	2.24
Indemnity Nonparticipating	-	2.80	2.25	2.36	2.55	2.20	2.48	2.14
Partial Service Participating	1.91	2.14	2.49	2.64	2.84	2.46	2.45	2.16
Partial Service Nonparticipating	1.85	2.48	2.42	2.13	2.54	3.29	2.59	2.21
Medicare	1.89	-	2.42	2.02	3.01	1.73	2.03	2.16
				1976				
UCR Participating	$2.35	$2.38	$2.94	$3.14	$3.26	$2.59	$2.67	$2.28
UCR Nonparticipating	2.41	3.44	2.90	2.95	2.81	3.39	2.70	2.41
Indemnity Participating	-	2.50	2.83	2.96	3.17	2.55	2.60	2.27
Indemnity Nonparticipating	-	2.04	2.65	2.51	2.76	3.15	2.74	2.36
Partial Service Participating	2.17	2.42	2.82	2.79	3.21	2.53	2.65	-
Partial Service Nonparticipating	2.64	2.61	2.83	2.29	2.83	3.80	2.73	-
Medicare	2.14	-	2.71	-	3.49	1.73	2.11	2.30

NOTE: Dashes indicate empty cells.

TABLE B-6

PLAN C: CHARGES PER RVU (IN DOLLARS) CLASSIFIED BY LINE OF BUSINESS, BLUE SHIELD TYPE OF SERVICE, AND YEAR

	Line of Business	
Type of Service	UCR	Indemnity
	1975	
Psychiatry	2.19	2.18
Therapeutic Radiology	2.36	2.75
Surgery	2.49	2.43
Maternity	2.48	2.40
Anesthesia	2.67	2.86
Diagnostic Radiology	2.16	1.61
Medicine	2.46	2.43
Pathology	2.49	2.34
All Services	2.43	2.34
	1976	
Psychiatry	2.55	2.52
Therapeutic Radiology	2.58	2.13
Surgery	2.65	2.59
Maternity	2.58	2.62
Anesthesia	3.03	3.14
Diagnostic Radiology	2.20	1.79
Medicine	2.64	2.61
Pathology	2.62	2.63
All Services	2.59	2.51
	1977	
Psychiatry	2.62	2.65
Therapeutic Radiology	2.56	2.38
Surgery	2.85	2.82
Maternity	2.80	2.79
Anesthesia	3.40	3.44
Diagnostic Radiology	2.34	1.95
Medicine	2.80	2.80
Pathology	2.71	2.60
All Services	2.76	2.70
	1978	
Psychiatry	2.99	2.91
Therapeutic Radiology	2.48	3.81
Surgery	3.02	3.00
Maternity	3.00	2.93
Anesthesia	3.79	3.96
Diagnostic Radiology	2.49	2.15
Medicine	2.99	3.05
Pathology	2.87	2.85
All Services	2.97	2.91

TABLE B-7

PLAN B: CHARGES PER RVU, CLASSIFIED BY PLAN AREA, SPECIALTY, AND YEAR

Plan Area/ Specialty	Year 1973	1974	1975	1976
Area I				
General Practice	$1.92	$2.00	$2.13	$2.30
Medical Specialties	2.20	2.37	2.53	2.73
Surgical Specialties	2.11	2.31	2.58	2.86
Other Specialties	1.78	1.73	2.07	2.17
Specialties Unknown	2.16	2.33	2.46	2.54
Area II				
General Practice	1.50	1.60	1.72	1.83
Medical Specialties	2.08	2.20	2.34	2.39
Surgical Specialties	1.59	1.78	2.02	2.21
Other Specialties	1.39	1.32	1.42	1.37
Specialties Unknown	2.36	2.32	2.37	2.25
Area III				
General Practice	1.53	1.58	1.68	1.90
Medical Specialties	1.94	2.18	2.21	2.36
Surgical Specialties	1.57	2.34	2.67	2.93
Other Specialties	1.89	1.95	2.51	3.04
Specialties Unknown	2.21	2.36	2.60	3.09
Entire Plan				
General Practice	1.75	1.83	1.93	2.10
Medical Specialties	2.17	2.34	2.48	2.66
Surgical Specialties	2.04	2.24	2.50	2.77
Other Specialties	1.72	1.67	1.99	2.06
Specialties Unknown	2.20	2.34	2.47	2.53

Calculations include claims with missing county and plan area locations.

TABLE B-8

PLAN C: CHARGES PER RVU, CLASSIFIED BY PLAN AREA, SPECIALTY, AND YEAR

Plan Area/ Specialty	1975	1976	1977	1978
Area I				
General Practice	2.47	2.58	2.79	2.99
Medical Specialties	2.57	2.74	2.89	3.13
Surgical Specialties	2.50	2.65	2.85	3.04
Other Specialties	2.11	2.32	2.50	2.77
Specialties Unknown	1.55	1.44	2.67	3.16
Area II				
General Practice	2.11	2.19	2.38	2.52
Medical Specialties	2.18	2.38	2.60	2.77
Surgical Specialties	2.19	2.45	2.60	2.75
Other Specialties	1.72	2.17	2.40	2.62
Specialties Unknown	2.23	2.18	2.76	2.35
Area III				
General Practice	2.04	2.21	2.41	2.49
Medical Specialties	2.36	2.51	2.69	2.64
Surgical Specialties	2.27	2.53	2.90	3.01
Other Specialties	2.88	3.05	1.60	3.89
Specialties Unknown	3.35	2.12	2.48	2.36
Entire Plan				
General Practice	2.27	2.38	2.58	2.72
Medical Specialties	2.55	2.72	2.88	3.11
Surgical Specialties	2.46	2.63	2.83	3.01
Other Specialties	2.10	2.32	2.49	2.77
Specialties Unknown	1.59	1.49	2.68	3.04

TABLE B-9

PLAN A: SIMPLE CORRELATION COEFFICIENTS BETWEEN PERCENTAGE CHANGES IN CHARGES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1973-74	1974-75	1975-76	1973-76
General Practice				
Percentage of Population Living in Urban Areas	-.42	-.30	-.80	-.73
Per Capita Income	.62	.68	-.19	.43
Percentage of Population 65 and Older	.07	-.66	-.44	-.48
Percentage of Population 14 and Younger	-.22	.42	.64	.46
Percentage of Population Black	.23	-.01	-.84	-.43
General Practitioners Per Capita	-.56	-.89*	-.53	-.73
Medical Specialists Per Capita	.31	.03	-.77	-.33
Surgical Specialists Per Capita	.02	-.26	-.77	-.60
Other Specialists Per Capita	.19	.47	-.74	-.25
Total Physicians Per Capita	.22	.01	-.81	-.43
Hospital Beds Per Capita	-.28	-.32	-.89*	-.80
Office Wage Rate	.29	.38	-.29	-.13
Medical Specialists				
Percentage of Population living in Urban Areas	.56	-.26	.97**	.79
Per Capita Income	-.01	-.09	.26	.09
Percentage of Population 65 and Older	.38	-.48	.04	-.28
Percentage of Population 14 and Younger	-.22	.55	-.33	.46
Percentage of Population Black	.23	-.11	.40	-.43
General Practitioners Per Capita	-.56	-.28	.16	-.73
Medical Specialists Per Capita	.31	-.24	.48	-.33
Surgical Specialists Per Capita	.02	-.43	.57	-.60
Other Specialists Per Capita	.19	.33	.35	-.25
Total Physicians Per Capita	.22	-.15	.45	-.43
Hospital Beds Per Capita	-.28	.06	.28	-.80
Office Wage Rate	.29	-.19	.42	-.13
Surgical Specialists				
Percentage of Population Living in Urban Areas	.71	.93*	.05	.76
Per Capita Income	-.20	.12	.82	-.19
Percentage of Population 65 and Older	-.05	.46	-.58	.45
Percentage of Population 14 and Younger	-.04	-.66	.21	-.30
Percentage of Population Black	.29	.59	-.04	.48
General Practitioners Per Capita	.31	.46	-.90*	-.15
Medical Specialists Per Capita	.23	.67	.17	.58
Surgical Specialists Per Capita	.38	.77	.00	.71
Other Specialists Per Capita	.44	.26	.21	.54
Total Physicians Per Capita	.30	.61	.08	.54
Hospital Beds Per Capita	.58	.56	-.52	.28
Office Wage Rate	.49	.51	.77	.83

TABLE B-9 (Continued)

Characteristic	1973-74	1974-75	1975-76	1973-76
Other Specialists				
Percentage of Population Living in Urban Areas	.82	-.66	-.83	-.36
Per Capita Income	.11	.25	.24	.51
Percentage of Population 65 and Older	.09	-.73	-.34	-.54
Percentage of Population 14 and Younger	-.30	.72	.39	.42
Percentage of Population Black	.17	-.63	-.41	-.50
General Practitioners Per Capita	.21	-.82	-.66	-.69
Medical Specialists Per Capita	.26	-.55	-.35	-.33
Surgical Specialists Per Capita	.56	-.71	-.49	-.43
Other Specialists Per Capita	.03	-.27	-.25	-.39
Total Physicians Per Capita	.23	-.60	-.38	-.46
Hospital Beds Per Capita	.17	-.85	-.60	-.90*
Office Wage Rate	.11	-.05	.03	-.16

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE B-10

PLAN B: SIMPLE CORRELATION COEFFICIENTS BETWEEN PERCENTAGE CHANGES IN CHARGES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1973-74	1974-75	1975-76	1973-76
General Practice				
Percentage of Population Living in Urban Areas	-.26	-.15	-.05	-.23
Per Capita Income	.02	-.17	.04	-.06
Percentage of Population 65 and Older	-.37	-.23	.09	-.21
Percentage of Population 14 and Younger	.36	.27	.11	.37
Percentage of Population Black	-.41	-.16	.44*	.08
General Practitioners Per Capita	-.32	-.03	.16	.04
Medical Specialists Per Capita	-.12	-.37	.01	-.30
Surgical Specialists Per Capita	-.10	-.19	-.01	-.21
Other Specialists Per Capita	.12	-.32	-.21	-.33
Total Physicians Per Capita	-.12	-.26	.06	-.19
Hospital Beds Per Capita	-.23	-.30	.04	-.26
Office Wage Rate	.32	-.18	-.23	-.19
Medical Specialists				
Percentage of Population Living in Urban Areas	-.11	.24	-.03	.04
Per Capita Income	.23	.44	.27	.47
Percentage of Population 65 and Older	-.38	-.07	.30	-.53*
Percentage of Population 14 and Younger	.50*	-.14	-.25	.47
Percentage of Population Black	.01	-.32	.29	-.12
General Practitioners Per Capita	-.22	-.16	.08	-.51*
Medical Specialists Per Capita	.01	.11	.06	.04
Surgical Specialists Per Capita	-.02	.15	.07	.11
Other Specialists Per Capita	.02	.32	.05	.22
Total Physicians Per Capita	.05	.15	.07	.10
Hospital Beds Per Capita	-.22	.06	-.02	-.15
Office Wage Rate	.42	.28	.31	.72*
Surgical Specialists				
Percentage of Population Living in Urban Areas	.17	-.01	.04	.01
Per Capita Income	.05	-.34	-.00	-.21
Percentage of Population 65 and Older	-.16	-.48*	-.37	-.45
Percentage of Population 14 and Younger	-.03	.35	.50*	.28
Percentage of Population Black	-.22	-.30	.05	-.15
General Practitioners Per Capita	-.30	-.25	-.37	-.10
Medical Specialists Per Capita	.11	-.37	-.13	-.35
Surgical Specialists Per Capita	.23	-.26	-.10	-.23
Other Specialists Per Capita	.14	-.21	-.18	-.25
Total Physicians Per Capita	.16	-.30	-.20	-.27
Hospital Beds Per Capita	.12	-.32	-.24	-.33
Office Wage Rate	.67*	.11	-.20	.06

Part Three
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TABLE B-10 (Continued)

Characteristic	1973-74	1974-75	1975-76	1973-76
Other Specialists				
Percentage of Population Living in Urban Areas	.07	-.01	.04	.24
Per Capita Income	.43	.09	-.00	.52*
Percentage of Population 65 and Older	-.63**	.01	-.37	-.25
Percentage of Population 14 and Younger	.33	.20	.50*	.17
Percentage of Population Black	-.19	.40	.05	.20
General Practitioners Per Capita	-.20	.05	-.37	-.11
Medical Specialists Per Capita	-.11	.26	-.13	.13
Surgical Specialists Per Capita	-.20	.20	-.10	.03
Other Specialists Per Capita	.07	.05	-.18	.23
Total Physicians Per Capita	.02	.20	-.20	.22
Hospital Beds Per Capita	-.50*	.11	-.24	-.29
Office Wage Rate	.29	-.10	-.20	.40

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE B-11

PLAN C: SIMPLE CORRELATION COEFFICIENTS BETWEEN PERCENTAGE CHANGES IN CHARGES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1975-76	1976-77	1977 78	1975-78
General Practice				
Percentage of Population Living in Urban Areas	-.18	.26	-.10	-.02
Per Capita Income	-.12	-.00	.11	.07
Percentage of Population 65 and Older	.09	.25	-.23	-.06
Percentage of Population 14 and Younger	.07	-.16	.28	.27
Percentage of Population Black	-.01	.28	.00	.16
General Practitioners Per Capita	.33	.20	-.54**	-.15
Medical Specialists Per Capita	-.24	.20	.03	.09
Surgical Specialists Per Capita	-.20	.18	.10	.10
Other Specialists Per Capita	-.10	.16	.11	.06
Total Physicians Per Capita	-.11	.16	.01	.07
Hospital Beds Per Capita	-.03	.36	-.29	-.02
Office Wage Rate	.60	.13	-.52	.11
Medical Specialists				
Percentage of Population Living in Urban Areas	-.03	-.04	.17	-.03
Per Capita Income	-.12	-.14	.13	-.16
Percentage of Population 65 and Older	.11	.13	.20	.36
Percentage of Population 14 and Younger	-.03	.03	-.15	-.02
Percentage of Population Black	-.10	.11	.23	.17
General Practitioners Per Capita	.38	-.06	.02	.32
Medical Specialists Per Capita	-.13	-.14	.23	-.21
Surgical Specialists Per Capita	-.19	-.12	.26	-.18
Other Specialists Per Capita	-.09	-.13	.14	-.15
Total Physicians Per Capita	-.11	-.13	.19	-.15
Hospital Beds Per Capita	-.18	.01	.14	-.03
Office Wage Rate	-.20	.34	-.02	-.29
Surgical Specialists				
Percentage of Population Living in Urban Areas	-.06	-.14	-.27	-.41*
Per Capita Income	-.05	-.16	-.17	-.36
Percentage of Population 65 and Older	.01	.18	.23	.35
Percentage of Population 14 and Younger	.15	-.14	-.22	-.34
Percentage of Population Black	.08	-.26	-.05	-.22
General Practitioners Per Capita	-.28	-.08	.45*	.37
Medical Specialists Per Capita	-.05	-.20	-.10	-.44*
Surgical Specialists Per Capita	.06	-.22	-.11	-.31
Other Specialists Per Capita	.02	-.10	-.16	-.31
Total Physicians Per Capita	-.00	-.16	-.07	-.28
Hospital Beds Per Capita	.02	-.33	.11	-.07
Office Wage Rate	.15	-.47	-.21	-.29

TABLE B-11 (Continued)

Characteristic	1975-76	1976-77	1977-78	1975-78
Other Specialists				
Percentage of Population Living in Urban Areas	.10	-.13	-.17	-.12
Per Capita Income	.09	.19	-.22	-.05
Percentage of Population 65 and Older	.12	-.08	-.10	.19
Percentage of Population 14 and Younger	-.32	-.04	.38	-.19
Percentage of Population Black	.06	-.06	-.07	.07
General Practitioners Per Capita	.51	-.24	-.48	.52
Medical Specialists Per Capita	.19	.14	-.21	.02
Surgical Specialists Per Capita	.33	.13	-.23	.03
Other Specialists Per Capita	.25	.20	-.18	-.02
Total Physicians Per Capita	.21	.12	-.22	-.02
Hospital Beds Per Capita	.32	-.07	-.39	.08
Office Wage Rate	-.09	-.19	-.20	-.32

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE B-12

PLAN A: SIMPLE CORRELATION COEFFICIENTS BETWEEN AMOUNT ALLOWED PER RVU IN COUNTIES AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1973	1974	1975	1976
General Practice				
Percentage of Population Living in Urban Areas	.70	.90*	.96*	.84
Per Capita Income	-.36	-.07	.11	-.13
Percentage of Population 65 and Older	-.04	.05	.04	-.13
Percentage of Population 14 and Younger	.03	-.20	-.27	-.03
Percentage of Population Black	.02	.24	.37	.08
General Practitioners Per Capita	.45	.29	.28	.11
Medical Specialists Per Capita	-.02	.33	.41	.14
Surgical Specialists Per Capita	.27	.38	.49	.17
Other Specialists Per Capita	.06	.09	.33	.09
Total Physicians Per Capita	.04	.26	.40	.09
Hospital Beds Per Capita	.38	.30	.35	.10
Office Wage Rate	.05	.40	.33	.06
Medical Specialties				
Percentage of Population Living in Urban Areas	.47	.76	.97*	.83
Per Capita Income	.35	.20	.14	-.14
Percentage of Population 65 and Older	.58	.49	.25	-.03
Percentage of Population 14 and Younger	-.81	-.69	-.48	-.11
Percentage of Population Black	.55	.46	.61	.34
General Practitioners Per Capita	.13	.37	.43	.31
Medical Specialists Per Capita	.64	.59	.61	.31
Surgical Specialists Per Capita	.74	.73	.67	.29
Other Specialists Per Capita	.18	.05	.53	.39
Total Physicians Per Capita	.59	.50	.62	.28
Hospital Beds Per Capita	.28	.31	.63	.44
Office Wage Rate	.10	.50	.31	.04
Surgical Specialties				
Percentage of Population Living in Urban Areas	-.79	-.88*	.51	.48
Per Capita Income	-.72	-.60	-.54	-.50
Percentage of Population 65 and Older	.31	-.35	.59	.58
Percentage of Population 14 and Younger	.15	.74	-.45	-.49
Percentage of Population Black	-.53	-.83	.12	.08
General Practitioners Per Capita	.47	-.11	.81	.60
Medical Specialists Per Capita	-.63	-.93*	.06	.04
Surgical Specialists Per Capita	-.60	-.91*	.36	.34
Other Specialists Per Capita	-.75	-.63	-.27	-.27
Total Physicians Per Capita	-.58	-.86	.08	.06
Hospital Beds Per Capita	-.19	-.58	.36	.21
Office Wage Rate	-.92	-.82	-.50	-.49

TABLE B-12 (Continued)

Characteristic	Year 1973	1974	1975	1976
Other Specialties				
Percentage of Population Living in Urban Areas	.69	.55	.70	.51
Per Capita Income	-.46	-.49	-.36	-.70
Percentage of Population 65 and Older	.14	.51	.32	.32
Percentage of Population 14 and Younger	-.11	-.40	-.30	-.16
Percentage of Population Black	.12	.37	.35	.10
General Practitioners Per Capita	.60	.79	.72	.73
Medical Specialists Per Capita	.05	.26	.25	-.04
Surgical Specialists Per Capita	.35	.40	.36	.12
Other Specialists Per Capita	.09	.12	.23	-.06
Total Physicians Per Capita	.14	.33	.29	-.01
Hospital Beds Per Capita	.54	.71	.63	.42
Office Wage Rate	-.01	-.15	-.14	-.58
Unknown Specialties				
Percentage of Population Living in Urban Areas	.52	.23	.05	-.03
Per Capita Income	.04	-.23	-.41	-.50
Percentage of Population 65 and Older	-.08	-.02	-.02	.04
Percentage of Population 14 and Younger	-.03	.10	.20	.18
Percentage of Population Black	.50	.29	.12	.09
General Practitioners Per Capita	-.03	.26	.50	.58
Medical Specialists Per Capita	.40	.11	-.07	.12
Surgical Specialists Per Capita	.32	.01	-.21	-.18
Other Specialists Per Capita	.74	.48	.27	.15
Total Physicians Per Capita	.48	.23	.01	-.07
Hospital Beds Per Capita	.69	.62	.53	.45
Office Wage Rate	.66	-.16	-.17	-.42
All Physicians				
Percentage of Population Living in Urban Areas	.59	.54	.69	.72
Per Capita Income	-.60	-.54	-.35	-.39
Percentage of Population 65 and Older	.61	.65	.66	.57
Percentage of Population 14 and Younger	-.49	-.52	-.63	-.57
Percentage of Population Black	.33	.30	.41	.31
General Practitioners Per Capita	.87	.89*	.84	.65
Medical Specialists Per Capita	.22	.23	.34	.27
Surgical Specialists Per Capita	.52	.45	.59	.51
Other Specialists Per Capita	.07	-.11	.04	.02
Total Physicians Per Capita	.33	.27	.37	.28
Hospital Beds Per Capita	.78	.61	.61	.44
Office Wage Rate	-.31	-.18	-.30	-.35

One asterisk denotes coefficient significantly different from zero at .05 level; two asterisks denote coefficient significantly different from zero at .01 level (two-tailed test). Five counties in sample.

TABLE B-13

PLAN B: SIMPLE CORRELATION COEFFICIENTS BETWEEN AMOUNT ALLOWED PER RVU IN COUNTIES AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	Year 1973	1974	1975	1976
General Practice				
Percentage of Population Living in Urban Areas	.58**	.49*	.42	.43*
Per Capita Income	.64**	.60**	.56**	.61**
Percentage of Population 65 and Older	-.41	-.53*	-.66**	-.53*
Percentage of Population 14 and Younger	.03	.19	.34	.21
Percentage of Population Black	-.07	-.13	-.24	-.16
General Practitioners Per Capita	-.23	-.25	-.39	
Medical Specialists Per Capita	.33	.28	.11	.23
Surgical Specialists Per Capita	.28	.29	.12	.22
Other Specialists Per Capita	.42	.45*	.33	.32
Total Physicians Per Capita	.32	.31	.19	.25
Hospital Beds Per Capita	-.09	-.15	-.30	-.21
Office Wage Rate	.61*	.45	.20	.08
Medical Specialties				
Percentage of Population Living in Urban Areas	.18	.09	.31	.19
Per Capita Income	.11	.00	.40	.27
Percentage of Population 65 and Older	-.05	-.12	-.21	.15
Percentage of Population 14 and Younger	.14	.24	.18	-.13
Percentage of Population Black	.03	.10	-.08	.32
General Practitioners Per Capita	-.15	-.03	-.55*	-.14
Medical Specialists Per Capita	.17	.09	.26	.12
Surgical Specialists Per Capita	.05	-.05	.17	.02
Other Specialists Per Capita	.05	-.06	.21	-.02
Total Physicians Per Capita	.11	-.07	.22	.12
Hospital Beds Per Capita	.04	-.09	.15	-.07
Office Wage Rate	-.05	.05	.40	.21
Surgical Specialties				
Percentage of Population Living in Urban Areas	-.02	.13	.29	.27
Per Capita Income	.12	.21	.30	.41
Percentage of Population 65 and Older	-.11	-.17	-.42	-.42
Percentage of Population 14 and Younger	.26	.22	.27	.26
Percentage of Population Black	.36	.44	.15	.12
General Practitioners Per Capita	.18	.28	.01	-.10
Medical Specialists Per Capita	-.23	-.17	-.08	-.11
Surgical Specialists Per Capita	-.35	-.24	-.14	-.16
Other Specialists Per Capita	-.13	-.14	.08	-.02
Total Physicians Per Capita	-.16	-.05	.04	-.02
Hospital Beds Per Capita	-.45*	-.44	-.48*	-.45
Office Wage Rate	.18	-.03	.01	-.18

TABLE B-13 (Continued)

Characteristic	1973	1974	1975	1976
		Year		
Other Specialties				
Percentage of Population Living in Urban Areas	.25	.31	.33	.34
Per Capita Income	.39	.57*	.61**	.68**
Percentage of Population 65 and Older	-.72**	-.81**	-.78**	-.78**
Percentage of Population 14 and Younger	.50*	.50*	.54*	.56*
Percentage of Population Black	-.04	-.22	-.11	-.11
General Practitioners Per Capita	-.52*	-.57*	-.61**	-.69**
Medical Specialists Per Capita	-.18	-.09	.08	.02
Surgical Specialists Per Capita	-.21	-.09	-.03	-.06
Other Specialists Per Capita	.08	.20	.33	.18
Total Physicians Per Capita	-.05	.08	.20	.12
Hospital Beds Per Capita	-.39	-.44	-.45	-.45
Office Wage Rate	.63*	.21	.08	-.19
Unknown Specialties				
Percentage of Population Living in Urban Areas	-.48*	-.48*	-.37	-.40
Per Capita Income	-.40	-.29	-.22	-.28
Percentage of Population 65 and Older	.12	.04	-.07	-.21
Percentage of Population 14 and Younger	.25	.37	.46*	.60**
Percentage of Population Black	.09	.18	.24	.20
General Practitioners Per Capita	.20	.07	.01	.14
Medical Specialists Per Capita	-.39	-.26	-.32	-.49*
Surgical Specialists Per Capita	-.40	-.27	-.33	-.41
Other Specialists Per Capita	-.48*	-.38	-.39	-.41
Total Physicians Per Capita	-.36	-.26	-.28	-.35
Hospital Beds Per Capita	-.08	.03	-.06	-.24
Office Wage Rate	-.45	-.28	-.17	-.39
All Physicians				
Percentage of Population Living in Urban Areas	.53*	.50*	.58**	.54*
Per Capita Income	.64**	.60**	.65**	.71**
Percentage of Population 65 and Older	-.50*	-.57**	-.67**	-.60**
Percentage of Population 14 and Younger	.28	.35	.37	.31
Percentage of Population Black	.01	-.00	-.15	-.08
General Practitioners Per Capita	-.24	-.25	-.46*	-.46*
Medical Specialists Per Capita	.28	.27	.34	.26
Surgical Specialists Per Capita	.19	.21	.27	.22
Other Specialists Per Capita	.32	.33	.47*	.33
Total Physicians Per Capita	.30	.31	.37	.30
Hospital Beds Per Capita	-.11	-.17	-.16	-.23
Office Wage Rate	.30	.09	.21	-.14

One asterisk denotes coefficient significantly different from zero at .05 level; two asterisks denote coefficient significantly different from zero at .01 level (two-tailed test).

TABLE B-14

PLAN C: SIMPLE CORRELATION COEFFICIENTS BETWEEN AMOUNT ALLOWED PER RVU IN COUNTIES AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	Year 1975	1976	1977	1978
General Practice				
Percentage of Population Living in Urban Areas	.50*	.44*	.54**	.47*
Per Capita Income	.17	.24	.34	.52**
Percentage of Population 65 and Older	-.14	-.14	-.18	-.39*
Percentage of Population 14 and Younger	.16	.18	.24	.25
Percentage of Population Black	.60**	.53**	.62**	.30
General Practitioners Per Capita	.13	.26	-.00	-.22
Medical Specialists Per Capita	.23	.16	.43*	.44*
Surgical Specialists Per Capita	.12	.05	.27	.41*
Other Specialists Per Capita	.35	.28	.35	.38
Total Physicians Per Capita	.24	.18	.34	.37
Hospital Beds Per Capita	-.09	-.08	.15	.21
Office Wage Rate	-.07	.11	.04	--
Medical Specialties				
Percentage of Population Living in Urban Areas	.12	.19	.25	.11
Per Capita Income	.41	.46*	.38	.36
Percentage of Population 65 and Older	-.47*	-.24	-.27	-.30
Percentage of Population 14 and Younger	.24	.13	.23	.39
Percentage of Population Black	.09	.17	.25	.22
General Practitioners Per Capita	-.42	-.28	-.35	-.46*
Medical Specialists Per Capita	.29	.22	.23	.22
Surgical Specialists Per Capita	.22	.26	.21	.21
Other Specialists Per Capita	.28	.30	.20	.22
Total Physicians Per Capita	.25	.27	.23	.18
Hospital Beds Per Capita	-.13	.00	-.21	-.33
Office Wage Rate	.34	.32	.20	--
Surgical Specialties				
Percentage of Population Living in Urban Areas	.51*	.41	.15	.04
Per Capita Income	.60**	.33	.31	.15
Percentage of Population 65 and Older	-.52*	-.34	-.34	-.26
Percentage of Population 14 and Younger	.35	.22	.51*	.28
Percentage of Population Black	.25	.03	.12	-.17
General Practitioners Per Capita	-.29	-.08	-.57**	.08
Medical Specialists Per Capita	.38	.02	.05	-.01
Surgical Specialists Per Capita	.27	-.07	.07	.02
Other Specialists Per Capita	.34	.11	.19	.06
Total Physicians Per Capita	.33	.06	.05	.07
Hospital Beds Per Capita	.04	-.15	-.37	-.12
Office Wage Rate	.02	-.13	-.03	--

TABLE B-14 (Continued)

Characteristic	Year 1975	1976	1977	1978
Other Specialties				
Percentage of Population Living in Urban Areas	-.11	.01	.03	.08
Per Capita Income	.01	-.10	.25	.13
Percentage of Population 65 and Older	-.03	.20	-.02	-.02
Percentage of Population 14 and Younger	.04	-.19	-.20	-.12
Percentage of Population Black	-.24	.04	-.06	-.02
General Practitioners Per Capita	.12	.55*	.28	.40
Medical Specialists Per Capita	-.33	-.15	.10	-.03
Surgical Specialists Per Capita	-.36	-.04	.08	-.06
Other Specialists Per Capita	-.19	-.05	.13	.02
Total Physicians Per Capita	-.18	-.01	.14	.03
Hospital Beds Per Capita	-.41	.06	.05	-.22
Office Wage Rate	-.22	-.07	-.01	--
Unknown Specialties				
Percentage of Population Living in Urban Areas	-.61	-.09	.08	.36
Per Capita Income	-.42	.13	.32	.21
Percentage of Population 65 and Older	.42	-.41	-.01	-.23
Percentage of Population 14 and Younger	-.22	.41	-.06	.14
Percentage of Population Black	.03	-.38	.16	.20
General Practitioners Per Capita	.13	-.21	.11	-.19
Medical Specialists Per Capita	-.30	-.27	.41	.18
Surgical Specialists Per Capita	-.36	-.14	.53	.09
Other Specialists Per Capita	-.37	.00	.33	.11
Total Physicians Per Capita	-.24	-.14	.42	.11
Hospital Beds Per Capita	-.06	-.39	.28	.10
Office Wage Rate	.62	-.17	.58	--
All Physicians				
Percentage of Population Living in Urban Areas	.31	.36	.46*	.32
Per Capita Income	.03	.14	.32	.47*
Percentage of Population 65 and Older	-.11	-.10	-.31	-.48*
Percentage of Population 14 and Younger	.17	.19	.36	.45*
Percentage of Population Black	.56**	.53**	.48**	.19
General Practitioners Per Capita	-.00	.20	-.22	-.36
Medical Specialists Per Capita	.12	.10	.34	.32
Surgical Specialists Per Capita	-.00	.03	.25	.31
Other Specialists Per Capita	.23	.25	.39	.32
Total Physicians Per Capita	.12	.15	.30	.28
Hospital Beds Per Capita	-.24	-.18	-.12	.10
Office Wage Rate	.02	.06	.03	--

One asterisk denotes coefficient significantly different from zero at .05 level; two asterisks denote coefficient significantly different from zero at .01 level (two-tailed test). Values of the Office Wage Rate proxy were missing for 1978.

TABLE B-15

PLAN A: SIMPLE CORRELATION COEFFICIENTS BETWEEN PERCENTAGE CHANGES IN ALLOWANCES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1973-74	1974-75	1975-76	1973-76
General Practice				
Percentage of Population Living in Urban Areas	.97**	-.79	-.73	.40
Per Capita Income	.15	.27	-.52	.81
Percentage of Population 65 and Older	.16	-.14	-.52	-.23
Percentage of Population 14 and Younger	-.42	.19	.83	-.17
Percentage of Population Black	.43	-.12	-.98**	.19
General Practitioners Per Capita	.23	-.44	-.32	-.58
Medical Specialists Per Capita	.48	-.19	-.98**	.38
Surgical Specialists Per Capita	.74	-.29	-.95*	.37
Other Specialists Per Capita	.33	.10	-.84	.20
Total Physicians Per Capita	.48	-.13	-.99**	.26
Hospital Beds Per Capita	.43	-.26	-.84	-.33
Office Wage Rate	.77	-.20	-.47	.37
Medical Specialists				
Percentage of Population Living in Urban Areas	.85	-.43	.57	.46
Per Capita Income	-.08	-.17	-.23	-.26
Percentage of Population 65 and Older	.32	-.49	-.29	-.31
Percentage of Population 14 and Younger	-.47	.62	.25	.30
Percentage of Population Black	.29	-.24	.03	.01
General Practitioners Per Capita	.45	-.29	.23	.17
Medical Specialists Per Capita	.33	-.38	-.02	-.06
Surgical Specialists Per Capita	.66	-.55	-.06	.04
Other Specialists Per Capita	.06	.21	.22	.29
Total Physicians Per Capita	.34	-.28	-.00	.02
Hospital Beds Per Capita	.41	-.05	.23	.34
Office Wage Rate	-.01	-.32	.14	.32
Surgical Specialists				
Percentage of Population Living in Urban Areas	-.63	.79	-.29	.76
Per Capita Income	-.15	-.13	.57	-.19
Percentage of Population 65 and Older	-.78	.62	-.24	.45
Percentage of Population 14 and Younger	.96*	-.69	.06	-.53
Percentage of Population Black	-.79	.48	-.17	.27
General Practitioners Per Capita	-.40	.67	-.71	.57
Medical Specialists Per Capita	-.79	.52	-.00	.29
Surgical Specialists Per Capita	-.92*	.70	-.04	.63
Other Specialists Per Capita	-.40	.04	-.14	-.04
Total Physicians Per Capita	-.80	.48	-.07	.31
Hospital Beds Per Capita	-.68	.55	-.59	.43
Office Wage Rate	-.27	.25	.34	-.54

TABLE B-15 (Continued)

Characteristic	1973-74	1974-75	1975-76	1973-76
Other Specialists				
Percentage of Population Living in Urban Areas	.83	-.22	-.84	-.80
Per Capita Income	.11	.60	.15	.32
Percentage of Population 65 and Older	.09	-.78	-.34	-.12
Percentage of Population 14 and Younger	-.30	.55	.43	.17
Percentage of Population Black	.17	-.37	-.52	-.17
General Practitioners Per Capita	.21	-.96*	-.64	-.51
Medical Specialists Per Capita	.26	-.20	-.45	-.13
Surgical Specialists Per Capita	.56	-.41	-.54	-.45
Other Specialists Per Capita	.03	-.01	-.40	-.12
Total Physicians Per Capita	.23	-.31	-.48	-.20
Hospital Beds Per Capita	.17	-.76	-.70	-.49
Office Wage Rate	.11	.41	-.05	-.12

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE B-16

PLAN B: SIMPLE CORRELATION COEFFICIENTS BETWEEN PERCENTAGE CHANGES IN ALLOWANCES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1973-74	1974-75	1975-76	1973-76
General Practice				
Percentage of Population Living in Urban Areas	-.26	-.12	.07	-.06
Per Capita Income	.02	-.01	.06	.27
Percentage of Population 65 and Older	-.37	-.43*	.39	-.46*
Percentage of Population 14 and Younger	.57**	.43*	-.40	.40
Percentage of Population Black	-.28	-.33	.24	-.25
General Practitioners Per Capita	-.36	-.31	.19	-.27
Medical Specialists Per Capita	.06	-.47*	.47*	-.06
Surgical Specialists Per Capita	.13	-.33	.39	.02
Other Specialists Per Capita	.36	-.24	.22	.15
Total Physicians Per Capita	.10	-.25	.34	.06
Hospital Beds Per Capita	-.22	-.39	.32	-.27
Office Wage Rate	.74**	-.24	.12	.50
Medical Specialists				
Percentage of Population Living in Urban Areas	-.10	.19	-.17	-.15
Per Capita Income	-.08	.33	-.17	-.26
Percentage of Population 65 and Older	-.08	.01	.39	.20
Percentage of Population 14 and Younger	.19	-.10	-.27	-.07
Percentage of Population Black	.22	-.11	.36	.41
General Practitioners Per Capita	.09	-.16	.41	.29
Medical Specialists Per Capita	-.07	.15	-.22	-.29
Surgical Specialists Per Capita	-.15	.22	-.19	-.27
Other Specialists Per Capita	-.19	.26	-.22	-.23
Total Physicians Per Capita	-.02	.17	-.16	-.19
Hospital Beds Per Capita	-.19	.14	-.18	-.23
Office Wage Rate	.45	.55	.28	.83**
Surgical Specialists				
Percentage of Population Living in Urban Areas	.10	.22	.01	.27
Per Capita Income	.06	-.12	-.23	-.00
Percentage of Population 65 and Older	.17	-.22	-.13	-.17
Percentage of Population 14 and Younger	-.30	-.15	-.02	-.27
Percentage of Population Black	.16	-.58*	-.21	-.44
General Practitioners Per Capita	.07	-.19	.01	-.24
Medical Specialists Per Capita	.08	-.07	-.14	.07
Surgical Specialists Per Capita	.15	-.03	-.11	.17
Other Specialists Per Capita	.09	.16	-.14	.23
Total Physicians Per Capita	.12	-.04	-.19	.06
Hospital Beds Per Capita	.10	-.21	-.00	-.03
Office Wage Rate	.23	.29	-.26	.20

TABLE B-16 (Continued)

Characteristic	1973-74	1974-75	1975-76	1973-76
Other Specialists				
Percentage of Population Living in Urban Areas	.20	.14	.18	.24
Per Capita Income	.58*	.28	-.02	.52*
Percentage of Population 65 and Older	-.49*	-.00	-.07	-.25
Percentage of Population 14 and Younger	.11	.09	.12	.17
Percentage of Population Black	-.16	.30	-.09	.20
General Practitioners Per Capita	-.04	-.03	-.45	-.11
Medical Specialists Per Capita	-.08	.38	.03	.13
Surgical Specialists Per Capita	-.18	.28	.03	.03
Other Specialists Per Capita	.21	.29	-.10	.23
Total Physicians Per Capita	.12	.35	-.13	.22
Hospital Beds Per Capita	-.50*	.05	-.00	-.29
Office Wage Rate	.28	.06	.10	.40

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE B-17

PLAN C: SIMPLE CORRELATION COEFFICIENTS BETWEEN PERCENTAGE CHANGES IN ALLOWANCES PER RVU AND COUNTY SOCIOECONOMIC AND MEDICAL CHARACTERISTICS, CLASSIFIED BY SPECIALTY AND YEAR

Characteristic	1975-76	1976-77	1977-78	1975-78
General Practice				
Percentage of Population Living in Urban Areas	-.19	.10	-.01	-.01
Per Capita Income	-.13	.11	.15	-.03
Percentage of Population 65 and Older	-.03	.08	-.17	-.03
Percentage of Population 14 and Younger	.08	.05	.07	.09
Percentage of Population Black	-.22	.17	-.19	-.05
General Practitioners Per Capita	.08	-.18	-.15	-.06
Medical Specialists Per Capita	-.14	.31	.07	.12
Surgical Specialists Per Capita	-.12	.30	.15	.17
Other Specialists Per Capita	-.13	.16	.13	.07
Total Physicians Per Capita	-.11	.17	.08	.10
Hospital Beds Per Capita	.05	.30	-.15	.03
Office Wage Rate	.42	.07	-.40	-.01
Medical Specialists				
Percentage of Population Living in Urban Areas	.36	-.13	-.07	.06
Per Capita Income	.14	-.32	.20	-.01
Percentage of Population 65 and Older	.13	.19	-.15	.15
Percentage of Population 14 and Younger	-.05	.02	.27	.17
Percentage of Population Black	.35	-.01	.02	.21
General Practitioners Per Capita	.19	.24	-.41	.04
Medical Specialists Per Capita	.19	-.15	.24	.06
Surgical Specialists Per Capita	.14	-.25	.24	.06
Other Specialists Per Capita	.18	-.30	.13	.01
Total Physicians Per Capita	.17	-.22	-.07	.01
Hospital Beds Per Capita	.24	-.22	-.07	-.08
Office Wage Rate	.22	-.20	.33	-.02
Surgical Specialists				
Percentage of Population Living in Urban Areas	-.17	-.20	-.27	-.51*
Per Capita Income	-.32	.02	-.28	-.41
Percentage of Population 65 and Older	.29	-.03	.24	.27
Percentage of Population 14 and Younger	-.20	.27	-.31	-.08
Percentage of Population Black	-.28	-.11	-.17	-.51*
General Practitioners Per Capita	.48*	-.60**	.71**	.46*
Medical Specialists Per Capita	-.38	.01	-.11	-.44*
Surgical Specialists Per Capita	-.34	.07	-.19	-.34
Other Specialists Per Capita	-.25	.09	-.24	-.32
Total Physicians Per Capita	-.26	-.01	-.11	-.33
Hospital Beds Per Capita	-.22	-.16	.10	-.33
Office Wage Rate	-.15	.33	-.23	.04

TABLE B-17 (Continued)

Characteristic	1975-76	1976-77	1977-78	1975-78
Other Specialists				
Percentage of Population Living in Urban Areas	.20	-.05	-.15	.09
Per Capita Income	.21	.29	-.18	.24
Percentage of Population 65 and Older	.04	-.25	-.12	-.09
Percentage of Population 14 and Younger	-.26	.15	.39	.03
Percentage of Population Black	.17	-.08	-.07	.18
General Practitioners Per Capita	.26	-.46	-.42	.05
Medical Specialists Per Capita	.36	.18	-.19	.27
Surgical Specialists Per Capita	.50	.13	-.21	.26
Other Specialists Per Capita	.37	.20	-.16	.19
Total Physicians Per Capita	.35	.12	-.20	.18
Hospital Beds Per Capita	.48	-.14	-.40	.19
Office Wage Rate	.08	-.12	-.22	-.13

One and two asterisks denote coefficients significantly different from zero at the 5% and 1% levels respectively (two-tailed tests).

TABLE B-18

COUNTY DEMOGRAPHIC VARIABLE CODES

Variable and Classification	Definition
Income per Capita	
High	Per capita income greater than $3734 in 1974
Low	Per capita income equal to or less than $3734 in 1974
Degree of Urbanization	
High	Percentage of population living in urban areas greater than 48 in 1970
Medium	Percentage of population living in urban areas greater than 19 but no larger than 48 in 1970
Low	Percentage of population living in urban areas no larger than 19 in 1970
Percentage of Blacks in Population	
High	Percentage of Blacks in population greater than 23 in 1970
Medium	Percentage of Blacks in population greater than 6 but no larger than 23 in 1970
Low	Percentage of Blacks in population no larger than 6 in 1970
Percentage of Population Aged 66 and Older	
High	Percentage of persons in population aged 66 and older greater than 12 in 1970
Low	Percentage of persons in population aged 66 and older no larger than 12 in 1970
Percentage of Population Aged 14 and Younger	
High	Percentage of persons in population aged 14 and younger greater than 29 in 1970
Low	Percentage of persons in population aged 14 and younger no larger than 29 in 1970
Total Physicians per Capita	
High	More than 6.8 physicians per 10,000 persons in given year
Medium	More than 4 physicians but no more than 6.8 physicians per 10,000 persons in given year
Low	No more than 4 physicians per 10,000 persons in given year

TABLE B-18 (Continued)

Variable and Classification	Definition
General Practitioners per Capita	
High	More than 3.4 general practitioners per 10,000 persons in given year
Medium	More than 2.2 but no more than 3.4 general practitioners per 10,000 persons in given year
Low	No more than 2.2 general practitioners per 10,000 persons in given year
Medical Specialists per Capita	
High	More than 6.8 medical specialists per 100,000 persons in given year
Medium	More than zero but no more than 6.8 medical specialists per 100,000 persons in given year
Low	No medical specialists in county
Surgical Specialists per Capita	
High	More than 1.3 surgical specialists per 100,000 persons in given year
Medium	More than zero but no more than 1.3 surgical specialists per 100,000 persons in given year
Low	No surgical specialists in county

TABLE B-19

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY COUNTY PER CAPITA INCOME LEVEL, SPECIALTY, AND YEAR

County Income Level	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1973		
High Income	$1.90	$2.14	$2.08	$1.70	$2.22
Low Income	1.64	2.19	2.02	1.72	2.17
			1974		
High Income	1.99	2.31	2.29	1.73	2.31
Low Income	1.71	2.36	2.22	1.64	2.34
			1975		
High Income	2.11	2.47	2.56	2.12	2.45
Low Income	1.80	2.49	2.47	1.92	2.46
			1976		
High Income	2.28	2.66	2.86	2.31	2.54
Low Income	1.97	2.66	2.72	1.93	2.51

TABLE B-20

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY COUNTY PER CAPITA INCOME LEVEL, SPECIALTY, AND YEAR

County Income Level	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973-74		
High Income	4.62	7.72	10.19	1.49	4.14
Low Income	4.15	7.77	9.74	-4.94	7.95
			1974-75		
High Income	6.30	7.22	11.53	22.54	5.86
Low Income	5.21	5.60	11.58	17.28	4.99
			1975-76		
High Income	8.17	7.45	11.65	9.32	3.80
Low Income	9.21	6.84	10.07	.67	2.08
			1973-76		
High Income	20.30	24.10	37.22	35.95	14.44
Low Income	19.66	21.59	34.78	12.24	15.69

TABLE B-21

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY COUNTY PER CAPITA INCOME LEVEL, SPECIALTY, AND YEAR

County Income Level	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975		
High Income	2.37	2.57	2.49	2.22	1.49
Low Income	2.13	2.42	2.34	1.75	2.79
			1976		
High Income	2.50	2.75	2.65	2.42	1.44
Low Income	2.21	2.53	2.54	1.98	2.11
			1977		
High Income	2.71	2.90	2.85	2.57	2.70
Low Income	2.40	2.71	2.75	2.13	2.60
			1978		
High Income	2.83	3.15	3.03	2.85	3.10
Low Income	2.57	2.83	2.91	2.33	2.81

TABLE B-22

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY COUNTY PER CAPITA INCOME LEVEL, SPECIALTY, AND YEAR

County Income Level	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975-76		
High Income	5.59	6.89	6.22	8.91	-3.34
Low Income	4.04	4.55	8.66	13.42	-24.67
			1976-77		
High Income	8.28	5.49	7.53	6.28	87.47
Low Income	8.67	6.91	8.15	7.52	23.38
			1977-78		
High Income	4.69	8.46	6.49	10.69	14.70
Low Income	7.02	4.48	6.10	9.37	8.14
			1975-78		
High Income	19.70	22.30	21.64	28.12	107.86
Low Income	21.00	16.78	24.69	33.37	0.51

TABLE B-23

PLAN A: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS LIVING IN URBAN AREAS, SPECIALTY, AND YEAR

Degree of Urbanization	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Physicians
			1973			
High	$2.02	$2.10	$2.03	$2.10	$1.93	$2.05
Low	1.82	2.05	2.13	1.80	-	2.02
All Levels	2.01	2.10	2.03	2.10	1.93	2.05
			1974			
High	2.04	2.21	2.15	2.28	2.20	2.17
Low	1.88	2.05	2.23	1.69	-	2.11
All Levels	2.04	2.21	2.15	2.28	2.20	2.17
			1975			
High	2.27	2.39	2.38	2.63	2.26	2.42
Low	2.14	2.39	2.35	2.16	-	2.33
All Levels	2.27	2.39	2.38	2.63	2.26	2.41
			1976			
High	2.09	2.45	2.55	2.99	2.45	2.52
Low	2.07	2.25	2.56	2.95	-	2.38
All Levels	2.09	2.45	2.55	2.99	2.45	2.52

NOTE: Dashes indicate empty cells.

TABLE B-24

PLAN A: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS LIVING IN URBAN AREAS, SPECIALTY, AND YEAR

Degree of Urbanization	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
		1973-74				
High	1.34	5.28	6.01	8.74	13.65	5.87
Low	3.25	0.18	4.44	-6.37	-	4.55
All Levels	1.29	5.26	6.00	8.72	13.65	5.86
		1974-75				
High	11.07	8.37	10.65	15.39	2.90	11.11
Low	14.14	16.36	5.70	27.62	-	10.36
All Levels	11.17	8.41	10.58	15.53	2.90	11.10
		1975-76				
High	-8.14	2.36	7.38	13.42	8.27	4.29
Low	-3.41	-5.64	8.76	36.91	-	2.24
All Levels	-8.06	2.29	7.40	13.45	8.27	4.26
		1973-76				
High	3.39	16.79	25.95	42.31	26.63	22.69
Low	13.84	10.00	20.06	63.59	-	17.97
All Levels	3.53	16.72	25.89	42.49	26.63	22.61

NOTE: Dashes indicate empty cells.

TABLE B-25

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS LIVING IN URBAN AREAS, SPECIALTY, AND YEAR

Percentage of Urban Residents	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973		
High	$1.88	$2.21	$2.09	$1.77	$2.18
Medium	1.58	1.94	1.78	1.38	2.13
Low	1.45	1.99	1.91	1.49	2.36
			1974		
High	1.96	2.38	2.29	1.71	2.34
Medium	1.67	2.11	2.00	1.41	2.28
Low	1.52	2.38	2.07	1.55	2.43
			1975		
High	2.08	2.53	2.56	2.04	2.46
Medium	1.79	2.21	2.25	1.63	2.3
Low	1.62	2.46	2.28	1.68	2.53
			1976		
High	2.25	2.72	2.84	2.11	2.52
Medium	1.97	2.35	2.47	1.71	2.51
Low	1.81	2.65	2.55	1.74	2.47

TABLE B-26

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS LIVING IN URBAN AREAS, SPECIALTY, AND YEAR

Degree of Urbanization	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973-74			
High	4.35	7.40	9.60	-3.58	6.93
Medium	5.72	8.61	12.69	2.23	6.84
Low	4.28	19.93	8.63	3.99	3.18
		1974-75			
High	5.98	6.73	11.64	19.61	5.54
Medium	6.64	5.08	12.48	15.03	3.21
Low	7.18	3.44	10.23	8.95	4.01
		1975-76			
High	7.99	7.41	11.03	3.28	2.41
Medium	10.18	6.03	9.65	4.26	6.77
Low	11.20	7.69	11.45	20.95	-2.12
		1973-76			
High	19.43	23.13	35.86	19.10	15.57
Medium	24.22	21.01	38.98	23.32	17.74
Low	24.30	33.59	33.45	17.26	5.04

TABLE B-27

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS LIVING IN URBAN AREAS, SPECIALTY, AND YEAR

Percentage of Urban Residents	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975		
High	2.42	2.57	2.49	2.12	1.55
Medium	2.10	2.22	2.25	1.57	2.24
Low	1.99	2.58	2.08	2.95	3.45
			1976		
High	2.53	2.74	2.64	2.33	1.44
Medium	2.21	2.38	2.50	1.91	2.13
Low	2.19	2.54	2.36	3.08	1.88
			1977		
High	2.76	2.89	2.84	2.51	2.69
Medium	2.37	2.66	2.72	2.05	2.65
Low	2.34	2.77	2.63	3.48	--
			1978		
High	2.93	3.12	3.02	2.78	3.13
Medium	2.50	2.81	2.91	2.58	2.74
Low	2.50	2.86	2.71	2.44	1.64

TABLE B-28

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS LIVING IN URBAN AREAS, SPECIALTY, AND YEAR

Degree of Urbanization	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975-76		
High	4.43	6.66	6.22	10.02	-7.15
Medium	5.12	7.18	11.11	21.54	-4.92
Low	10.06	-1.48	13.56	4.56	-45.65
			1976-77		
High	9.12	5.41	7.48	7.55	86.29
Medium	7.48	11.47	8.53	7.31	24.58
Low	6.84	9.16	11.15	13.16	---
			1977-78		
High	6.28	8.23	6.44	10.71	16.41
Medium	5.21	5.70	7.05	26.16	3.38
Low	7.07	3.30	3.15	-29.94	---
			1975-78		
High	21.11	21.68	21.52	31.00	101.35
Medium	18.87	26.28	29.09	64.54	22.46
Low	25.89	11.10	30.20	-17.11	-52.56

TABLE B-29

PLAN A: AMOUNTS CHARGED PER RVU (IN DOLLARS) IN COUNTIES, CLASSIFIED BY PERCENTAGE OF POPULATION AGED 14 AND YOUNGER, SPECIALTY, AND YEAR

Percentage of Population Aged 14 and Younger	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
			1973			
High	$2.01	$2.06	$2.03	$2.11	$1.92	$2.05
Low	2.03	2.13	2.03	2.09	2.01	2.06
All Levels	2.01	2.10	2.03	2.10	1.93	2.05
			1974			
High	2.01	2.17	2.14	2.27	2.21	2.16
Low	2.08	2.24	2.16	2.29	2.10	2.19
All Levels	2.04	2.21	2.15	2.28	2.20	2.17
			1975			
High	2.22	2.34	2.33	2.65	2.29	2.37
Low	2.33	2.42	2.42	2.62	2.18	2.44
All Levels	2.27	2.39	2.38	2.63	2.26	2.41
			1976			
High	2.06	2.34	2.46	3.01	2.52	2.43
Low	2.11	2.49	2.61	2.97	2.16	2.56
All Levels	2.09	2.45	2.55	2.99	2.45	2.52

TABLE B-30

PLAN A: PERCENTAGE CHANGES IN AMOUNTS CHARGED PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF POPULATION AGED 14 AND YOUNGER, SPECIALTY, AND YEAR

Percentage of Population Aged 14 and Younger	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Physicians
			1973-74			
High	0.05	5.16	5.52	7.88	15.40	5.34
Low	2.72	4.94	6.51	9.68	4.28	6.33
All Levels	1.29	5.26	6.00	8.72	13.65	5.86
			1974-75			
High	10.58	7.71	8.79	16.71	3.33	10.09
Low	11.95	8.43	11.88	14.47	3.95	11.67
All Levels	11.17	8.41	10.58	15.53	2.90	11.10
			1975-76			
High	-7.02	0.10	5.38	13.69	10.39	2.53
Low	-9.46	2.70	8.14	13.44	-0.93	4.91
All Levels	-8.06	2.29	7.40	13.45	8.27	4.26
			1973-76			
High	2.88	13.38	20.97	43.14	31.63	18.90
Low	4.11	16.85	28.86	42.43	7.38	24.56
All Levels	3.53	16.72	25.89	42.49	26.63	22.61

TABLE B-31

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS AGED 14 OR YOUNGER, SPECIALTY, AND YEAR

Percentage of Residents Aged 14 or Younger	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973			
High	$1.63	$2.07	$1.99	$1.56	$2.23
Low	1.79	2.18	2.05	1.73	2.18
		1974			
High	1.71	2.22	2.20	1.67	2.35
Low	1.87	2.35	2.25	1.67	2.33
		1975			
High	1.81	2.50	2.50	1.90	2.51
Low	1.97	2.75	2.50	2.00	2.45
		1976			
High	1.96	2.54	2.83	1.98	2.69
Low	2.16	2.68	2.76	2.07	2.50

TABLE B-32

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS AGED 14 OR YOUNGER, SPECIALTY, AND YEAR

Percentage of Residents Aged 14 or Younger	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		<u>1973-74</u>			
High	4.85	7.57	10.63	7.03	5.24
Low	4.45	7.83	9.74	-3.57	7.02
		<u>1974-75</u>			
High	6.30	7.95	13.70	14.28	7.05
Low	5.68	6.09	11.28	19.69	4.97
		<u>1975-76</u>			
High	8.07	5.87	13.28	4.15	6.96
Low	9.33	7.34	10.13	3.56	1.93
		<u>1973-76</u>			
High	20.45	22.95	42.50	27.39	20.50
Low	20.68	22.79	34.49	19.52	14.51

TABLE B-33

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS AGED 14 OR YOUNGER, SPECIALTY, AND YEAR

Percentage of Residents Aged 14 or Younger	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
		1975			
High	2.22	2.49	2.43	1.86	1.46
Low	2.35	2.57	2.49	2.30	2.58
		1976			
High	2.32	2.62	2.62	2.01	1.27
Low	2.48	2.75	2.63	2.56	2.64
		1977			
High	2.47	2.78	2.80	2.22	2.76
Low	2.73	2.91	2.8	2.65	2.63
		1978			
High	2.63	2.93	2.97	2.55	2.91
Low	2.86	3.16	3.03	2.88	3.13

TABLE B-34

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS AGED 14 OR YOUNGER, SPECIALTY, AND YEAR

Percentage of Residents Aged 14 or Younger	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
		1975-76			
High	4.62	5.45	7.86	7.78	-13.08
Low	5.42	7.01	5.97	11.25	2.38
		1976-77			
High	6.56	5.90	6.92	10.33	117.49
Low	10.38	5.54	7.99	3.57	-0.38
		1977-78			
High	6.27	5.46	6.21	15.01	5.76
Low	4.55	8.68	6.57	8.49	19.29
		1975-78			
High	18.46	17.77	22.48	36.77	99.93
Low	21.65	22.73	21.95	25.02	21.66

TABLE B-35

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS AGED 66 OR OLDER, SPECIALTY, AND YEAR

Percentage of Residents Aged 66 or Older	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973		
High	\$1.53	\$2.10	\$1.80	\$ .70	\$2.42
Low	1.77	2.17	2.05	1.73	2.18
			1974		
High	1.55	2.22	1.98	.62	2.45
Low	1.86	2.34	2.26	1.69	2.33
			1975		
High	1.98	2.13	2.11	.91	2.43
Low	2.05	2.50	2.52	2.01	2.46
			1976		
High	2.13	2.25	2.29	.91	2.47
Low	2.31	2.68	2.79	2.07	2.52

TABLE B-36

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF RESIDENTS AGED 66 OR OLDER, SPECIALTY, AND YEAR

Percentage of Residents Aged 66 or Older	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973-74		
High	.97	5.59	10.17	-10.94	1.24
Low	4.90	7.87	9.88	-2.72	6.93
			1974-75		
High	3.52	-4.03	6.34	47.11	-.92
Low	6.04	6.72	11.83	18.87	5.47
			1975-76		
High	15.71	5.60	8.37	.02	1.84
Low	7.60	7.25	10.82	3.36	2.67
			1973-76		
High	20.95	7.01	26.97	31.05	2.16
Low	19.69	23.47	36.17	19.52	15.79

TABLE B-37

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF BLACKS IN COUNTY POPULATION, SPECIALTY, AND YEAR

Percentage of Blacks in County Population	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
		1975			
High	2.40	2.57	2.50	2.26	2.56
Medium	2.29	2.48	3.39	2.08	1.32
Low	2.15	2.53	2.42	1.78	2.70
		1976			
High	2.50	2.75	2.65	2.53	2.89
Medium	2.41	2.61	2.58	2.06	1.29
Low	2.26	2.65	2.60	2.01	2.54
		1977			
High	2.80	2.90	2.87	2.64	2.57
Medium	2.58	2.78	2.70	2.33	2.81
Low	2.41	2.81	2.82	2.18	2.87
		1978			
High	3.20	3.15	3.04	2.90	3.09
Medium	2.66	2.98	2.92	2.69	2.64
Low	2.58	2.95	2.98	2.42	3.11

TABLE B-38

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF BLACKS IN COUNTY POPULATION, SPECIALTY, AND YEAR

Percentage of Blacks in County Population	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
		1975-76			
High	4.23	7.17	6.01	11.99	13.07
Medium	5.42	5.50	8.09	-0.88	-2.16
Low	5.39	4.66	7.51	13.19	-6.02
		1976-77			
High	11.87	5.40	8.34	4.19	-10.89
Medium	6.97	6.34	4.55	12.84	118.09
Low	6.51	6.22	8.16	8.49	12.88
		1977-78			
High	7.97	8.64	6.05	9.70	19.97
Medium	3.09	7.20	8.31	15.76	-5.89
Low	7.01	5.05	6.01	10.83	8.26
		1975-78			
High	25.88	22.72	21.80	28.01	20.87
Medium	16.25	20.27	22.40	29.48	100.80
Low	20.12	16.79	23.27	36.11	14.85

TABLE B-39

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF BLACKS IN COUNTY POPULATION, SPECIALTY, AND YEAR

Percentage of Blacks in County Population	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973		
High	$1.70	$2.24	$2.09	$1.78	$2.15
Medium	1.76	2.00	1.98	1.56	2.19
Low	1.78	2.15	1.99	1.68	2.27
			1974		
High	1.75	2.40	2.27	1.68	2.35
Medium	1.87	2.17	2.22	1.64	2.31
Low	1.87	2.32	2.19	1.66	2.31
			1975		
High	1.81	2.51	2.52	1.99	2.47
Medium	1.97	2.36	2.53	1.85	2.48
Low	2.00	2.51	2.46	2.06	2.41
			1976		
High	2.07	2.69	2.77	2.03	2.54
Medium	2.10	2.57	2.83	1.93	2.64
Low	2.11	2.66	2.72	2.19	2.42

TABLE B-40

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY PERCENTAGE OF BLACKS IN COUNTY POPULATION, SPECIALTY, AND YEAR

Percentage of Blacks in County Population	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973-74		
High	2.44	7.44	8.85	-5.52	9.12
Medium	6.34	8.55	12.06	4.74	5.40
Low	5.22	7.76	10.49	-1.01	1.85
			1974-75		
High	3.87	4.55	10.81	18.34	5.12
Medium	5.02	8.85	13.59	13.20	7.26
Low	7.00	7.98	12.11	23.71	4.57
			1975-76		
High	14.29	7.22	10.09	2.06	2.81
Medium	7.19	8.75	12.18	4.22	6.73
Low	5.17	6.05	10.67	6.27	.17
			1973-76		
High	21.61	20.44	32.79	14.11	17.93
Medium	19.71	28.48	42.79	23.56	20.65
Low	18.40	23.40	37.08	30.14	6.69

TABLE B-41

PLAN A: AMOUNTS CHARGED PER RVU (IN DOLLARS) IN COUNTIES, CLASSIFIED BY PERCENTAGE OF BLACKS IN POPULATION, SPECIALTY, AND YEAR

Percentage of Blacks in County Population	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Physicians
			1973			
Medium	$2.02	$2.11	$1.98	$2.10	$2.07	$2.03
Low	2.01	2.08	2.09	2.10	1.72	2.09
All Levels	2.01	2.10	2.03	2.10	1.93	2.05
			1974			
Medium	2.05	2.21	2.11	2.29	2.11	2.15
Low	2.02	2.20	2.21	2.27	2.24	2.21
All Levels	2.04	2.21	2.15	2.28	2.20	2.17
			1975			
Medium	2.29	2.42	2.36	2.62	2.30	2.40
Low	2.23	2.34	2.42	2.65	2.24	2.44
All Levels	2.27	2.39	2.38	2.63	2.26	2.41
			1976			
Medium	2.08	2.48	2.55	2.95	2.38	2.51
Low	2.12	2.32	2.57	3.09	2.48	2.53
All Levels	2.09	2.45	2.55	2.99	2.45	2.52

TABLE B-42

PLAN A: PERCENTAGE CHANGES IN AMOUNTS CHARGED PER RVU IN COUNTIES, CLASSIFIED BY THE PERCENTAGE OF BLACKS IN THE COUNTY POPULATION, SPECIALTY, AND YEAR

Percentage of Blacks in County Population	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Physicians
			1973-74			
Medium	1.46	4.68	6.91	9.27	1.91	6.12
Low	0.73	6.00	5.40	8.05	30.06	5.84
All Levels	1.29	5.26	6.00	8.72	13.65	5.86
			1974-75			
Medium	11.52	9.33	11.65	14.54	8.77	11.78
Low	10.16	5.99	9.67	16.96	-0.07	10.39
All Levels	11.17	8.41	10.58	15.53	2.90	11.10
			1975-76			
Medium	-9.13	2.63	8.12	12.42	3.72	4.53
Low	-5.02	-0.57	6.07	16.35	10.80	3.85
All Levels	-8.06	2.29	7.40	13.45	8.27	4.26
			1973-76			
Medium	2.83	17.46	29.06	40.71	14.97	24.00
Low	5.40	11.71	22.61	47.03	44.00	21.33
All Levels	3.53	16.72	25.89	42.49	26.63	22.61

TABLE B-43

PLAN A: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF PHYSICIANS PER CAPITA, SPECIALTY, AND YEAR

Number of Physicians Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Physicians
			1973			
High	$2.02	$2.11	$1.98	$2.10	$2.07	$2.03
Medium	2.01	2.08	2.09	2.10	1.72	2.09
All Levels	2.01	2.10	2.03	2.10	1.93	2.05
			1974			
High	2.05	2.21	2.11	2.29	2.11	2.15
Medium	2.02	2.20	2.21	2.27	2.24	2.21
All Levels	2.04	2.21	2.15	2.28	2.20	2.17
			1975			
High	2.29	2.41	2.36	2.63	2.27	2.40
Medium	2.19	2.33	2.44	2.64	2.25	2.44
All Levels	2.27	2.39	2.38	2.63	2.26	2.41
			1976			
High	2.09	2.48	2.55	2.96	2.33	2.51
Medium	2.08	2.30	2.57	3.06	2.50	2.52
All Levels	2.09	2.45	2.55	2.99	2.45	2.52

TABLE B-44

PLAN A: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF PHYSICIANS PER CAPITA, SPECIALTY, AND YEAR

Number of Physicians Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Physicians
			1973-74			
High	1.46	4.68	6.91	9.27	1.91	6.12
Medium	0.73	6.00	5.40	8.05	30.06	5.84
All Levels	1.29	5.26	6.00	8.72	13.65	5.86
			1974-75			
High	11.78	9.30	11.57	14.95	7.60	11.74
Medium	8.50	5.78	10.49	16.30	0.67	10.74
All Levels	11.17	8.41	10.58	15.53	2.90	11.10
			1975-76			
High	-8.88	2.67	8.27	12.52	2.59	4.66
Medium	-5.22	-1.30	5.19	16.09	11.19	3.32
All Levels	-8.06	2.29	7.40	13.45	8.27	4.26
			1973-76			
High	3.34	17.47	29.14	41.34	12.49	24.10
Medium	3.58	10.67	22.51	45.89	45.59	21.10
All Levels	3.53	16.72	25.89	42.49	26.63	22.61

TABLE B-45

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF PHYSICIANS PER CAPITA, SPECIALTY, AND YEAR

Number of Physicians Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973		
High	$1.80	$2.17	$2.05	$1.72	$2.18
Medium	1.48	2.03	1.82	1.23	2.49
Low	1.35	3.19	2.14	-	2.38
			1974		
High	1.89	2.34	2.25	1.67	2.33
Medium	1.58	2.44	2.05	1.38	2.73
Low	1.38	2.78	2.34	.62	2.34
			1975		
High	1.99	2.48	2.50	1.99	2.45
Medium	1.61	2.55	2.47	1.84	2.67
Low	1.65	-	-	-	-
			1976		
High	2.18	2.66	2.77	2.06	2.52
Medium	1.79	2.04	2.72	2.62	2.71
Low	1.74	-	-	-	

Dashes indicate empty cells.

TABLE B-46

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF PHYSICIANS PER CAPITA, SPECIALTY, AND YEAR

Number of Physicians Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973-74		
High	4.53	7.69	9.82	-2.73	6.88
Medium	6.66	20.28	12.51	12.17	9.84
Low	2.29	-12.81	.43	-	-1.46
			1974-75		
High	5.46	6.26	11.38	18.77	5.29
Medium	1.56	4.61	20.79	33.18	-2.35
Low	19.12	-	-	-	-
			1975-76		
High	11.66	7.53	10.69	3.74	2.64
Medium	5.48	-20.01	10.26	-12.04	1.54
Low	12.90	-	-	-	-
			1973-76		
High	20.80	23.05	35.40	19.84	15.50
Medium	20.96	.64	49.84	31.40	8.91
Low	28.52	-	-	-	-

Dashes indicate empty cells.

TABLE B-47

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF PHYSICIANS PER CAPITA, SPECIALTY, AND YEAR

Number of Physicians Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975		
High	2.36	2.56	2.47	2.09	1.58
Medium	2.26	2.49	2.39	2.45	2.15
Low	1.91	2.31	2.44	2.31	3.45
			1976		
High	2.48	2.73	2.63	2.31	1.44
Medium	2.37	2.73	2.59	2.67	2.09
Low	2.16	2.25	2.67	2.76	3.01
			1977		
High	2.69	2.88	2.82	2.51	2.67
Medium	2.42	2.87	2.97	1.94	2.75
Low	2.26	2.78	2.82	2.66	2.50
			1978		
High	2.83	3.11	3.00	2.77	3.08
Medium	2.55	2.99	3.17	2.78	2.94
Low	2.43	3.01	3.06	2.97	2.80

TABLE B-48

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF PHYSICIANS PER CAPITA, SPECIALTY, AND YEAR

Number of Physicians Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975-76		
High	4.80	6.73	6.30	10.47	-8.60
Medium	4.77	9.56	8.62	9.17	-2.62
Low	12.93	-2.35	9.61	19.82	-12.70
			1976-77		
High	8.53	5.36	7.17	8.47	85.19
Medium	2.02	5.20	14.41	-27.20	31.49
Low	4.49	23.33	5.50	-3.83	-17.10
			1977-78		
High	5.18	8.11	6.38	10.47	15.42
Medium	5.44	4.16	6.81	42.78	6.83
Low	7.38	8.34	8.67	11.70	12.03
			1975-78		
High	19.63	21.57	21.19	32.38	95.38
Medium	12.70	20.06	32.73	13.48	36.80
Low	26.71	30.47	25.66	28.71	-18.92

TABLE B-49

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF GENERAL PRACTITIONERS PER CAPITA, SPECIALTY, AND YEAR

Number of General Practitioners Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973			
High	$1.52	$2.20	$1.75	$ .76	$2.50
Medium	1.76	2.20	2.08	1.77	2.15
Low	1.78	2.13	2.00	1.67	2.25
		1974			
High	1.72	2.19	2.06	.73	2.36
Medium	1.73	2.37	2.27	1.66	2.35
Low	1.88	2.30	2.21	1.68	2.31
		1975			
High	1.73	2.50	2.19	.82	2.44
Medium	1.78	2.48	2.48	1.95	2.45
Low	2.09	2.49	2.55	2.04	2.47
		1976			
High	1.88	2.34	2.33	.85	2.56
Medium	1.99	2.67	2.74	1.99	2.53
Low	2.21	2.73	2.83	2.19	2.50

TABLE B-50

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF GENERAL PRACTITIONERS PER CAPITA, SPECIALTY, AND YEAR

Number of General Practitioners Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973-74			
High	13.14	-.61	17.66	-4.72	-5.67
Medium	-1.59	7.71	8.99	-5.85	9.19
Low	5.73	7.77	10.64	.75	2.64
		1974-75			
High	.56	14.23	6.18	12.62	3.42
Medium	2.96	4.58	9.24	17.44	4.47
Low	10.71	8.22	15.06	21.61	6.67
		1975-76			
High	8.47	-6.52	6.46	3.50	4.71
Medium	11.84	7.76	10.81	1.77	3.32
Low	5.83	6.38	11.18	7.12	1.39
		1973-76			
High	23.42	6.12	33.00	11.07	2.16
Medium	13.32	21.39	31.94	12.53	17.86
Low	23.88	24.06	41.54	31.25	11.01

TABLE B-51

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF GENERAL PRACTITIONERS PER CAPITA, SPECIALTY, AND YEAR

Number of General Practitioners Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
		1975			
High	1.93	2.20	2.34	--	2.59
Medium	2.19	2.29	2.10	1.57	2.27
Low	2.30	2.56	2.48	2.11	1.57
		1976			
High	3.21	--	--	--	--
Medium	2.27	2.45	2.29	3.64	2.13
Low	2.40	2.73	2.63	2.31	1.45
		1977			
High	2.17	--	2.35	--	--
Medium	2.58	2.73	2.37	2.86	2.73
Low	2.59	2.88	2.83	2.49	2.68
		1978			
High	2.05	2.06	3.30	--	--
Medium	2.66	2.91	2.73	4.08	3.77
Low	2.73	3.11	3.01	2.77	3.03

TABLE B-52

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF GENERAL PRACTITIONERS PER CAPITA, SPECIALTY, AND YEAR

Number of General Practitioners Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
		1975-76			
High	66.25	--	--	--	--
Medium	3.38	6.84	8.85	132.55	-6.38
Low	4.25	6.60	6.21	9.62	-7.54
		1976-77			
High	-32.47	--	--	--	--
Medium	13.57	11.56	3.36	-21.45	28.11
Low	7.87	5.57	7.64	7.57	84.56
		1977-78			
High	-5.22	--	40.53	--	--
Medium	3.08	6.42	15.61	42.58	38.45
Low	5.66	8.00	6.30	11.20	13.32
		1975-78			
High	6.42	-6.50	40.90	--	--
Medium	21.50	26.85	30.07	160.47	66.05
Low	18.81	21.54	21.54	31.14	93.36

TABLE B-53

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF MEDICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Medical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973			
High	$1.80	$2.17	$2.05	$1.72	$2.18
Medium	1.57	1.97	1.98	1.11	2.44
Low	1.40	2.29	1.74	1.37	2.58
		1974			
High	1.89	2.34	2.25	1.67	2.33
Medium	1.72	2.42	2.16	1.47	2.69
Low	1.33	2.60	1.71	1.00	2.41
		1975			
High	2.00	2.48	2.51	1.99	2.45
Medium	1.80	2.34	2.52	1.84	2.73
Low	1.51	2.80	1.92	1.12	2.57
		1976			
High	2.18	2.67	2.77	2.06	2.52
Medium	1.91	1.96	2.91	1.98	2.82
Low	1.65	3.20	2.08	1.05	2.63

TABLE B-54

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF MEDICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Medical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973-74			
High	4.53	7.69	9.82	-2.73	6.88
Medium	9.64	22.55	8.93	31.76	9.92
Low	-4.71	13.75	-1.73	-29.91	-6.45
		1974-75			
High	6.00	6.35	11.48	18.96	5.28
Medium	4.68	-3.16	17.04	25.11	1.67
Low	13.52	7.60	12.37	11.60	6.64
		1975-76			
High	8.91	7.44	10.59	3.57	2.65
Medium	6.23	-16.48	15.42	7.65	3.29
Low	8.90	14.28	8.63	-6.17	2.14
		1973-76			
High	20.67	23.04	35.40	19.84	15.50
Medium	21.92	-.88	47.14	77.46	15.44
Low	17.80	39.88	19.96	-23.46	1.89

TABLE B-55

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF MEDICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Medical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975		
High	2.38	2.56	2.48	2.09	1.58
Medium	2.16	2.25	2.32	2.46	3.75
Low	1.94	2.55	2.11	2.16	3.45
			1976		
High	2.47	2.73	2.63	2.31	1.48
Medium	2.16	2.25	2.69	3.05	3.01
Low	2.13	2.65	2.28	2.46	1.88
			1977		
High	2.68	2.88	2.82	2.49	2.66
Medium	2.30	2.82	2.93	3.39	2.88
Low	2.27	2.75	2.69	1.84	--
			1978		
High	2.83	3.11	3.01	2.77	3.10
Medium	2.43	2.78	3.05	3.69	2.97
Low	2.40	2.92	2.79	1.99	1.59

TABLE B-56

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF MEDICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Medical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975-76		
High	3.75	6.56	6.12	10.39	-6.34
Medium	0.33	0.07	16.15	24.08	-19.59
Low	10.01	4.14	8.28	13.81	-45.65
			1976-77		
High	8.54	5.50	7.47	7.55	80.17
Medium	6.31	25.07	8.73	11.27	-4.44
Low	6.29	3.54	17.95	-25.08	--
			1977-78		
High	5.80	8.03	6.55	11.22	16.75
Medium	5.40	-1.49	4.11	8.72	3.22
Low	6.04	6.34	3.80	8.24	--
			1975-78		
High	19.15	21.45	21.51	32.05	97.01
Medium	12.41	23.29	31.47	50.11	-20.69
Low	23.99	14.67	32.57	-7.71	-53.89

TABLE B-57

PLAN B: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF SURGICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Surgical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
		1973			
High	$1.76	$2.17	$2.04	$1.72	$2.18
Low	1.51	2.89	2.18	-	2.38
		1974			
High	1.83	2.34	2.24	1.67	2.33
Low	1.60	2.18	2.31	.62	2.34
		1975			
High	1.93	2.48	2.50	1.99	2.46
Low	1.97	2.15	2.90	-	-
		1976			
High	2.14	2.48	2.77	2.06	2.52
Low	2.31	2.73	3.67	-	-

Dashes indicate empty cells.

TABLE B-58

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF SURGICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Surgical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties
			1973-74		
High	4.47	7.79	9.87	-2.68	6.90
Low	6.17	-24.58	5.99	-	-1.46
			1974-75		
High	4.96	6.24	11.62	18.97	5.27
Low	22.95	-1.39	25.43	-	-
			1975-76		
High	8.64	7.09	10.66	3.60	2.65
Low	8.68	15.55	26.62	-	-
			1973-76		
High	19.13	22.63	35.70	19.94	15.51
Low	41.87	-14.07	68.34	-	-

Dashes indicate empty cells.

TABLE B-59

PLAN C: CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF SURGICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Surgical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975		
High	2.30	2.56	2.46	2.10	1.58
Low	1.96	2.30	2.52	2.99	3.45
			1976		
High	2.39	2.73	2.63	2.32	1.46
Low	2.28	2.22	2.64	1.01	2.28
			1977		
High	2.59	2.88	2.83	2.49	2.68
Low	2.42	2.59	2.66	--	2.73
			1978		
High	2.72	3.11	3.01	2.77	3.04
Low	2.47	2.58	3.35	--	--

Dashes indicate empty cells.

TABLE B-60

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF SURGICAL SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Surgical Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Specialties Unknown
			1975-76		
High	4.05	6.74	6.63	10.47	-7.14
Low	15.94	-3.41	4.69	-66.31	-34.05
			1976-77		
High	8.31	5.45	7.63	7.51	82.86
Low	6.22	16.73	0.89	--	19.79
			1977-78		
High	5.24	7.98	6.42	11.23	13.39
Low	1.95	-0.55	25.86	--	--
			1975-78		
High	18.60	21.54	22.13	32.10	92.54
Low	25.56	12.14	32.93	--	--

TABLE B-61

PLAN A: MEAN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF OTHER SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Other Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
			1973			
High	$2.02	$2.11	$1.98	$2.10	$2.07	$2.03
Low	2.01	2.08	2.09	2.10	1.72	2.09
			1974			
High	2.05	2.21	2.11	2.29	2.11	2.15
Low	2.02	2.20	2.21	2.27	2.24	2.21
			1975			
High	2.29	2.42	2.36	2.62	2.30	2.40
Low	2.23	2.34	2.42	2.65	2.24	2.44
			1976			
High	2.08	2.48	2.55	2.95	2.38	2.51
Low	2.12	2.32	2.57	3.09	2.48	2.53

TABLE B-62

PLAN A: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF OTHER SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Other Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
			1973-74			
High	1.5	4.7	6.9	9.3	1.9	6.1
Low	.7	6.0	5.4	8.1	30.1	5.8
			1974-75			
High	11.5	9.3	11.7	14.5	8.8	11.8
Low	10.2	6.0	9.7	17.0	-.1	10.4
			1975-76			
High	-9.1	2.6	8.1	8.1	12.4	4.5
Low	-5.0	-.6	6.1	6.1	16.3	3.8
			1973-76			
High	2.8	17.5	29.1	40.7	15.0	24.0
Low	5.4	11.7	22.6	47.0	44.0	21.3

TABLE B-63

PLAN B: MEAN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF OTHER SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Other Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
		1973				
High	$1.81	$2.20	$2.05	$1.74	$2.18	$2.03
Medium	1.81	2.11	2.05	1.70	2.19	1.98
Low	1.39	2.20	1.81	.91	2.54	1.58
		1974				
High	1.85	2.36	2.22	1.66	2.35	2.13
Medium	1.91	2.30	2.30	1.71	2.28	2.14
Low	1.54	2.56	2.09	1.17	2.55	1.84
		1975				
High	2.08	2.51	2.54	2.03	2.46	2.39
Medium	1.78	2.27	2.27	1.59	2.42	2.08
Low	1.66	2.55	2.47	1.84	2.67	2.03
		1976				
High	2.25	2.70	2.80	2.10	2.51	2.56
Medium	1.96	2.35	2.62	1.63	2.70	2.29
Low	1.81	2.65	2.55	1.74	2.48	2.22

TABLE B-64

PLAN B: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF OTHER SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Other Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
		1973-74				
High	2.6	7.0	8.5	-2.7	7.9	4.8
Medium	5.5	8.8	12.4	-4.6	4.3	7.8
Low	10.8	16.7	15.6	.4	.3	16.0
		1974-75				
High	12.3	6.6	14.2	19.0	4.6	11.9
Medium	-6.9	-1.4	-1.2	22.2	6.0	-2.8
Low	7.9	-.4	18.2	-6.8	4.5	10.4
		1975-76				
High	8.1	7.6	10.4	3.6	2.1	7.3
Medium	10.3	3.7	15.2	3.6	11.4	10.2
Low	8.9	3.9	2.9	2.4	-7.2	9.7
		1973-76				
High	24.6	22.7	36.8	19.9	15.1	25.8
Medium	8.4	11.3	27.9	20.9	23.2	15.5
Low	30.2	20.8	40.5	-4.2	-2.7	40.5

TABLE B-65

PLAN C: MEAN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF OTHER SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Other Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
		1975				
High	$2.38	$2.56	$2.48	$2.10	$1.57	$2.42
Medium	2.18	2.41	2.37	1.88	2.02	2.28
Low	1.97	2.26	2.36	2.99	3.35	2.13
		1976				
High	2.47	2.74	2.63	2.32	1.44	2.58
Medium	2.26	2.57	2.62	2.10	2.07	2.49
Low	2.23	2.44	2.38	4.11	2.26	2.30
		1977				
High	2.67	2.88	2.83	2.51	2.66	2.76
Medium	2.50	2.87	2.84	1.88	2.69	2.67
Low	2.38	2.61	2.77	1.97	2.74	2.56
		1978				
High	2.81	3.12	3.00	2.77	3.00	2.97
Medium	2.63	2.95	3.09	2.70	3.19	2.94
Low	2.50	2.66	2.60	1.99	--	2.51

Dash indicates empty cell.

TABLE B-66

PLAN C: PERCENTAGE CHANGES IN CHARGES PER RVU IN COUNTIES, CLASSIFIED BY THE NUMBER OF OTHER SPECIALISTS PER CAPITA, SPECIALTY, AND YEAR

Number of Other Specialists Per Capita	General Practice	Medical Specialties	Surgical Specialties	Other Specialties	Unknown Specialties	All Specialties
		1975-76				
High	4.0	6.7	6.2	10.3	-8.4	6.9
Medium	3.5	6.7	10.8	11.9	2.3	8.9
Low	13.3	7.9	.7	37.7	-32.7	7.9
		1976-77				
High	8.1	5.3	7.6	8.4	85.0	7.1
Medium	10.7	11.8	8.3	-10.6	30.4	7.1
Low	6.4	6.9	16.4	-52.0	21.4	11.0
		1977-78				
High	5.1	8.2	6.2	10.3	12.5	7.4
Medium	5.4	2.8	8.9	43.5	18.2	10.4
Low	5.2	2.2	-6.1	.9	--	-1.6
		1973-76				
High	18.1	21.6	21.3	31.9	90.6	22.9
Medium	20.8	22.7	30.6	43.5	57.7	28.8
Low	26.8	17.9	10.1	-33.9	--	17.8

Dashes indicate empty cells.

TABLE B-67

PLAN A PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Line of Business/ Participation Status of Physician*	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1973		
UCR				
Participating	1.95 (0.44)	1.91 (0.32)	2.10 (0.48)	2.02 (0.36)
Nonparticipating	2.04 (0.36)	2.06 (0.49)	2.03 (0.61)	2.01 (0.53)
Indemnity				
Participating	1.96 (0.63)	2.06 (0.55)	2.16 (0.50)	2.16 (0.57)
Nonparticipating	2.07 (0.34)	2.27 (0.56)	2.18 (0.58)	2.13 (0.77)
Indemnity Claims Only	1.84 (0.47)	2.17 (0.80)	2.14 (0.80)	1.78 (0.67)
		1974		
UCR				
Participating	1.94 (0.48)	2.06 (0.36)	2.25 (0.59)	2.18 (0.37)
Nonparticipating	1.99 (0.76)	2.29 (0.47)	2.24 (0.41)	2.40 (0.79)
Indemnity				
Participating	2.02 (0.52)	2.15 (0.38)	2.33 (0.72)	2.28 (0.61)
Nonparticipating	2.68 (0.90)	2.49 (0.48)	2.28 (0.50)	2.25 (0.56)
Indemnity Claims Only	1.92 (0.00)	2.67 (1.07)	2.80 (1.29)	2.67 (0.78)
		1975		
UCR				
Participating	2.31 (0.64)	2.23 (0.37)	2.52 (0.70)	2.42 (0.53)
Nonparticipating	2.61 (0.59)	2.67 (0.72)	2.57 (0.72)	2.62 (0.71)
Indemnity				
Participating	2.23 (0.40)	2.31 (0.61)	2.60 (0.66)	2.54 (0.44)
Nonparticipating	2.73 (0.56)	2.74 (1.03)	2.56 (0.62)	3.15 (1.71)
Indemnity Claims Only	2.28 (0.42)	2.25 (0.00)	3.21 (1.40)	1.71 (0.00)
		1976		
UCR				
Participating	1.90 (0.38)	2.25 (0.41)	2.56 (0.58)	2.71 (0.61)
Nonparticipating	2.31 (0.44)	2.60 (0.55)	2.78 (0.73)	3.06 (0.95)
Indemnity				
Participating	1.87 (0.37)	2.18 (0.49)	2.65 (0.71)	2.85 (0.72)
Nonparticipating	2.35 (0.72)	2.58 (0.71)	2.75 (0.61)	2.89 (0.75)
Indemnity Claims Only	1.60 (0.00)	2.21 (0.41)	2.31 (0.44)	2.46 (0.68)

Standard deviations in parentheses.

* Physicians defined as participating if 5% or more of their RVUs were submitted on a participating basis.

TABLE B-68

PLAN B PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Line of Business/ Participation Status of Physician	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1973		
UCR				
Participating	1.96 (0.62)	2.21 (0.56)	2.18 (0.61)	2.45 (1.08)
Nonparticipating	3.19 (2.63)	2.56 (0.65)	2.01 (0.42)	1.92 (0.15)
Indemnity				
Participating	2.10 (0.89)	1.95 (0.58)	2.19 (0.87)	2.34 (2.50)
Nonparticipating	1.02 (0)	2.11 (0.91)	1.86 (0.84)	1.70 (0.51)
Partial Service				
Participating	1.84 (0.49)	2.17 (0.59)	2.11 (0.52)	2.24 (0.85)
Nonparticipating	2.24 (0.55)	2.62 (0.78)	2.03 (0.35)	1.87 (0.18)
Medicare				
Participating	1.62 (0.38)	2.12 (0.47)	2.06 (0.55)	2.27 (0.51)
Nonparticipating	1.90 (0.50)	2.47 (0.67)	1.95 (0.47)	2.08 (0.46)
Medicare Claims Only	1.52 (0.32)	2.16 (0.52)	1.66 (0.89)	2.78 (1.39)
		1974		
UCR				
Participating	2.16 (0.72)	2.33 (0.64)	2.33 (0.56)	2.81 (1.40)
Nonparticipating	2.67 (1.21)	2.59 (0.61)	2.29 (0.43)	2.17 (0.25)
Indemnity				
Participating	2.26 (0.90)	2.19 (0.63)	2.31 (0.70)	2.37 (1.36)
Nonparticipating	1.88 (0)	2.69 (0.64)	2.70 (1.34)	2.37 (0.63)
Partial Service				
Participating	1.96 (0.45)	2.24 (0.60)	2.33 (0.56)	2.70 (1.20)
Nonparticipating	2.98 (0.99)	2.73 (0.55)	2.33 (0.55)	2.46 (1.12)
Medicare				
Participating	1.70 (0.40)	2.23 (0.46)	2.21 (0.54)	2.45 (0.57)
Nonparticipating	2.05 (0.50)	2.56 (0.58)	2.16 (0.43)	2.40 (0.36)
Medicare Claims Only	1.62 (0.46)	2.10 (0.46)	2.05 (1.20)	2.04 (0.57)

Standard deviations in parentheses.

TABLE B-68 (Continued)

Line of Business/ Participation Status of Physician	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1975		
UCR				
Participating	2.00 (0.43)	2.34 (0.56)	2.61 (0.63)	2.82 (0.97)
Nonparticipating	2.06 (0.62)	2.77 (0.54)	2.60 (1.00)	2.53 (0.38)
Indemnity				
Participating	2.20 (0.60)	2.41 (0.66)	2.77 (0.99)	2.79 (0.81)
Nonparticipating	2.00 (0.47)	2.71 (0.82)	2.34 (0.60)	2.68 (0.67)
Partial Service				
Participating	1.94 (0.45)	2.35 (0.58)	2.60 (0.68)	2.82 (0.75)
Nonparticipating	2.45 (0.32)	2.87 (0.68)	2.52 (0.63)	3.04 (1.49)
Medicare				
Participating	1.84 (0.45)	2.39 (0.52)	2.44 (0.63)	2.85 (0.77)
Nonparticipating	2.23 (0.41)	2.67 (0.60)	2.50 (0.82)	2.75 (0.62)
Medicare Claims Only	1.83 (0.64)	2.50 (0.71)	2.70 (1.46)	2.58 (1.05)
		1976		
UCR				
Participating	2.22 (0.65)	2.56 (0.65)	2.93 (0.79)	2.96 (0.83)
Nonparticipating	2.34 (0.42)	2.90 (0.84)	2.88 (0.67)	2.76 (0.72)
Indemnity				
Participating	2.24 (0.82)	2.59 (0.61)	2.97 (0.96)	2.96 (0.69)
Nonparticipating	2.17 (0.69)	2.87 (0.66)	2.84 (0.87)	2.64 (0.57)
Partial Service				
Participating	2.13 (0.51)	2.60 (0.67)	2.92 (0.86)	3.12 (0.80)
Nonparticipating	2.42 (0.27)	3.16 (0.60)	2.90 (0.75)	2.78 (0.41)
Medicare				
Participating	2.06 (0.52)	2.59 (0.59)	2.63 (0.73)	3.12 (0.82)
Nonparticipating	2.34 (0.42)	2.82 (0.68)	2.57 (0.53)	3.07 (0.70)
Medicare Claims Only	1.90 (0.67)	2.76 (0.79)	2.43 (0.82)	2.48 (0.85)

Standard deviations in parentheses.

TABLE B-69

PLAN C PHYSICIAN SAMPLE: MEAN AMOUNTS CHARGED PER RVU, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business of Physician	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1975		
UCR	2.23 (0.67)	2.54 (0.46)	2.45 (0.48)	2.51 (0.83)
Indemnity	2.19 (0.54)	2.58 (0.61)	2.47 (0.62)	2.56 (0.96)
		1976		
UCR	2.31 (0.54)	2.65 (0.47)	2.61 (0.45)	2.68 (0.80)
Indemnity	2.35 (0.60)	2.72 (0.54)	2.65 (0.56)	2.68 (0.94)
		1977		
UCR	2.42 (0.60)	2.79 (0.48)	2.81 (0.54)	2.84 (0.81)
Indemnity	2.44 (0.68)	2.89 (0.64)	2.84 (0.64)	2.86 (0.97)
		1978		
UCR	2.69 (0.77)	2.99 (0.58)	3.01 (0.57)	3.18 (0.89)
Indemnity	2.62 (0.73)	3.03 (0.60)	3.05 (0.88)	3.15 (1.17)

Standard Deviations in parentheses.

TABLE B-70

PLAN A: PERCENTAGE CHANGES IN AMOUNTS CHARGED PER RVU AND PERCENTAGE CHANGES IN TOTAL NUMBER OF RVUS, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Line of Business, Participation Status, and Specialty	1973-74	1974-75	1975-76	1973-76
UCR Participating				
General Practice				
Amount Charged/RVU	-.3	11.5	-8.5	1.7
Total RVUs	9.5	16.1	244.0	337.2
Medical Specialties				
Amount Charged/RVU	6.4	8.6	.9	16.6
Total RVUs	25.5	66.2	129.8	379.3
Surgical Specialties				
Amount Charged/RVU	6.2	10.4	6.5	24.8
Total RVUs	40.1	39.6	17.5	129.8
Other Specialties				
Amount Charged/RVU	8.3	14.8	11.5	38.6
Total RVUs	-3.4	52.2	24.2	82.6
UCR Nonparticipating				
General Practice				
Amount Charged/RVU	3.3	14.0	-4.6	12.4
Total RVUs	40.0	30.7	336.7	699.3
Medical Specialties				
Amount Charged/RVU	4.6	9.1	5.8	20.8
Total RVUs	27.1	79.9	180.2	540.9
Surgical Specialties				
Amount Charged/RVU	7.3	12.1	9.0	31.2
Total RVUs	40.5	58.6	88.9	321.0
Other Specialties				
Amount Charged/RVU	13.0	16.9	14.6	51.4
Total RVUs	-21.5	63.9	81.4	133.3
Indemnity				
General Practice				
Amount Charged/RVU	3.3	10.1	-9.1	3.4
Total RVUs	-13.8	-34.9	199.0	67.6
Medical Specialties				
Amount Charged/RVU	5.2	9.2	-.1	14.8
Total RVUs	-7.9	-14.4	123.4	76.0

TABLE B-70 (Continued)

Line of Business, Participation Status, and Specialty	1973-74	1974-75	1975-76	1973-76
Surgical Specialties				
Amount Charged/RVU	5.9	10.8	7.2	25.9
Total RVUs	-3.8	-18.8	-1.9	-23.3
Other Specialties				
Amount Charged/RVU	8.3	16.9	15.7	46.5
Total RVUs	-23.9	-31.6	-27.0	-33.8
All Lines of Business				
General Practice				
Amount Charged/RVU	1.3	11.2	-8.1	3.5
Total RVUs	1.2	-1.3	242.1	241.6
Medical Specialties				
Amount Charged/RVU	5.3	8.4	2.3	16.7
Total RVUs	9.6	36.3	142.0	261.5
Surgical Specialties				
Amount Charged/RVU	6.0	10.6	7.4	25.9
Total RVUs	16.7	15.6	20.7	62.9
Other Specialties				
Amount Charged/RVU	8.7	15.5	13.4	42.9
Total RVUs	-14.4	21.0	32.9	37.7
All Specialties				
UCR Participating				
Amount Charged/RVU	5.8	11.1	3.0	21.1
Total RVUs	25.4	43.6	54.4	178.0
UCR Nonparticipating				
Amount Charged/RVU	6.8	11.9	6.4	27.2
Total RVUs	22.6	65.1	130.1	365.8
Indemnity				
Amount Charged/RVU	6.0	11.2	4.1	22.7
Total RVUs	-8.2	-21.0	35.2	-2.0

TABLE B-71

PLAN B: PERCENTAGE CHANGES IN AMOUNTS CHARGED PER RVU AND PERCENTAGE CHANGES IN TOTAL NUMBER OF RVUS, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY AND YEAR

Line of Business, Participation Status, and Specialty	1973-74	1974-75	1975-76	1973-76
UCR Participating				
General Practice				
Amount Charged/RVU	8.4	2.1	5.1	16.3
Total RVUs	8.4	-1.3	2.4	9.6
Medical Specialties				
Amount Charged/RVU	10.6	3.1	8.3	23.4
Total RVUs	3.2	5.7	9.4	19.5
Surgical Specialties				
Amount Charged/RVU	10.1	11.6	12.7	38.6
Total RVUs	11.7	12.1	3.6	29.8
Other Specialties				
Amount Charged/RVU	8.2	9.3	7.2	26.8
Total RVUs	24.2	52.1	15.9	119.0
UCR Nonparticipating				
General Practice				
Amount Charged/RVU	3.6	.8	11.6	16.7
Total RVUs	13.2	-4.0	21.5	31.9
Medical Specialties				
Amount Charged/RVU	5.9	4.5	9.8	21.5
Total RVUs	18.5	10.9	29.8	70.6
Surgical Specialties				
Amount Charged/RVU	9.0	10.9	11.4	34.5
Total RVUs	23.1	22.2	29.3	94.4
Other Specialties				
Amount Charged/RVU	10.5	20.7	10.4	47.3
Total RVUs	27.5	.3	17.0	49.6
Indemnity Participating				
General Practice				
Amount Charged/RVU	-7.3	10.2	3.3	5.5
Total RVUs	-29.6	1212.4	156.9	2274.7

TABLE B-71 (Continued)

Line of Business, Participation Status, and Specialty	1973-74	1974-75	1975-76	1973-76
Medical Specialties				
Amount Charged/RVU	7.3	9.8	8.6	28.0
Total RVUs	-9.8	1379.9	176.8	3596.4
Surgical Specialties				
Amount Charged/RVU	13.3	15.7	9.1	43.1
Total RVUs	-6.8	349.7	133.6	878.6
Other Specialties				
Amount Charged/RVU	21.7	11.3	1.5	37.5
Total RVUs	12.2	746.7	179.6	2555.5
Indemnity Nonparticipating				
General Practice				
Amount Charged/RVU	33.3	-.9	13.1	49.3
Total RVUs	-4.6	496.5	205.8	1639.5
Medical Specialties				
Amount Charged/RVU	-11.0	20.5	12.6	20.9
Total RVUs	66.7	1432.8	246.3	8747.7
Surgical Specialties				
Amount Charged/RVU	7.7	51.2	15.9	88.7
Total RVUs	-29.6	389.1	150.8	764.1
Other Specialties				
Amount Charged/RVU	16.2	9.2	48.2	41.8
Total RVUs	41.8	256.3	218.9	1511.0
Partial Service Participating				
General Practice				
Amount Charged/RVU	7.6	2.0	4.4	14.6
Total RVUs	-15.2	-27.8	-32.8	-58.8
Medical Specialties				
Amount Charged/RVU	8.8	6.7	11.4	29.3
Total RVUs	-12.2	-33.5	-30.5	-59.5
Surgical Specialties				
Amount Charged/RVU	10.9	10.5	12.2	37.5
Total RVUs	-9.8	-16.5	-27.1	-45.1
Other Specialties				
Amount Charged/RVU	10.1	10.5	8.4	31.9
Total RVUs	1.4	1.8	-23.0	-20.6

TABLE B-71 (Continued)

Line of Business, Participation Status, and Specialty	1973-74	1974-75	1975-76	1973-76
Partial Service Nonparticipating				
General Practice				
Amount Charged/RVU	1.8	3.0	12.2	17.7
Total RVUs	-14.7	-22.2	-43.3	-52.3
Medical Specialties				
Amount Charged/RVU	5.5	6.6	10.8	24.6
Total RVUs	-4.9	-26.2	-20.5	-44.2
Surgical Specialties				
Amount Charged/RVU	10.9	10.5	12.2	37.5
Total RVUs	-9.8	-16.5	-27.1	-45.1
Other Specialties				
Amount Charged/RVU	10.1	10.5	8.4	31.9
Total RVUs	1.4	1.8	-23.0	-20.6
Medicare				
General Practice				
Amount Charged/RVU	5.0	7.3	9.7	23.6
Total RVUs	33.8	-3.0	-4.3	24.1
Medical Specialties				
Amount Charged/RVU	7.6	7.7	5.9	22.7
Total RVUs	29.5	3.1	14.8	53.2
Surgical Specialties				
Amount Charged/RVU	10.0	11.6	8.6	33.3
Total RVUs	30.6	1.5	15.8	53.6
Other Specialties				
Amount Charged/RVU	-8.2	21.9	.9	12.9
Total RVUs	71.6	4.3	22.2	118.7
All Lines of Business				
General Practice				
Amount Charged/RVU	4.5	5.6	8.6	19.9
Total RVUs	22.3	-4.5	-3.8	12.3
Medical Specialties				
Amount Charged/RVU	7.8	6.2	7.1	22.6
Total RVUs	12.4	-2.1	10.6	21.9

TABLE B-71 (Continued)

Line of Business, Participating Status, and Specialty	1973-74	1974-75	1975-76	1973-76
Surgical Specialties				
Amount Charged/RVU	9.9	11.6	10.7	35.7
Total RVUs	12.7	3.7	7.1	25.2
Other Specialties				
Amount Charged/RVU	-2.7	19.0	3.6	19.9
Total RVUs	41.6	15.5	17.4	92.0
All Specialties				
UCR Participating				
Amount Charged/RVU	9.4	8.2	9.7	29.8
Total RVUs	11.7	18.4	8.1	43.1
UCR Nonparticipating				
Amount Charged/RVU	8.3	11.4	10.8	33.6
Total RVUs	22.3	13.5	25.9	74.7
Indemnity Participating				
Amount Charged/RVU	15.1	14.2	6.2	39.6
Total RVUs	-7.6	589.1	160.6	1560.0
Indemnity Nonparticipating				
Amount Charged/RVU	13.1	35.5	13.9	74.5
Total RVUs	-11.7	455.2	189.9	1321.4
Partial Service Participating				
Amount Charged/RVU	9.4	8.3	10.7	31.2
Total RVUs	-8.9	-18.9	-29.7	-48.0
Partial Service Nonparticipating				
Amount Charged/RVU	8.1	10.2	12.2	33.7
Total RVUs	-3.5	-22.4	-20.5	-40.4
Medicare				
Amount Charged/RVU	4.1	11.2	5.9	22.6
Total RVUs	39.2	2.2	14.8	53.2

TABLE B-72

PLAN C: PERCENTAGE CHANGES IN AMOUNTS CHARGED PER RVU AND PERCENTAGE CHANGES IN TOTAL NUMBER OF RVUS, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business, Specialty	1975-76	1976-77	1977-78	1975-78
UCR				
General Practice				
Amount Charged/RVU	3.6	8.2	4.6	17.2
Total RVUs	48.3	2.1	-34.0	-.1
Medical Specialties				
Amount Charged/RVU	6.2	5.8	7.8	21.1
Total RVUs	61.7	-1.2	-30.7	10.7
Surgical Specialties				
Amount Charged/RVU	6.0	7.1	6.5	20.9
Total RVUs	47.5	12.6	-26.5	22.1
Other Specialties				
Amount Charged/RVU	9.7	5.6	11.0	28.6
Total RVUs	58.8	13.0	-22.4	39.2
Indemnity				
General Practice				
Amount Charged/RVU	5.5	7.3	6.4	20.5
Total RVUs	5.4	-29.3	-42.6	-57.2
Medical Specialties				
Amount Charged/RVU	8.3	5.3	8.5	23.8
Total RVUs	33.5	-26.8	-16.4	-18.3
Surgical Specialties				
Amount Charged/RVU	7.3	8.5	6.3	23.9
Total RVUs	11.9	-32.7	-37.1	-52.6
Other Specialties				
Amount Charged/RVU	7.4	12.1	13.2	36.3
Total RVUs	20.7	-17.5	-19.4	-19.8
All Lines of Business				
General Practice				
Amount Charged/RVU	4.8	8.5	5.1	19.6
Total RVUs	31.0	-8.1	-36.1	-23.1
Medical Specialties				
Amount Charged/RVU	6.6	5.6	7.9	21.6
Total RVUs	55.1	-6.4	-28.4	3.9

TABLE B-72 (Continued)

Line of Business, Specialty	1975-76	1976-77	1977-78	1975-78
Surgical Specialties				
Amount Charged/RVU	6.6	7.6	6.4	22.1
Total RVUs	32.3	-3.8	-29.2	-9.9
Other Specialties				
Amount Charged/RVU	10.4	7.5	11.2	32.1
Total RVUs	49.3	6.8	-21.9	-24.5
All Specialties				
UCR				
Amount Charged/RVU	6.6	6.5	7.6	22.2
Total RVUs	53.3	7.9	-27.2	20.5
Indemnity				
Amount Charged/RVU	7.5	7.6	7.5	24.4
Total RVUs	15.2	-29.5	-31.2	-44.1

TABLE B-73

PLAN A PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO SUBMITTED CLAIMS, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Specialty/Participation Status	Line of Business: UCR	Line of Business: Indemnity	Number of Physicians
1973			
General Practice			
Participating	100.0	87.5	64
Nonparticipating	100.0	100.0	5
Medical Specialties			
Participating	100.0	74.8	143
Nonparticipating	100.0	77.6	49
Surgical Specialties			
Participating	100.0	90.6	254
Nonparticipating	100.0	90.2	61
Other Specialties			
Participating	100.0	69.3	114
Nonparticipating	100.0	70.8	24
1974			
General Practice			
Participating	100.0	86.1	72
Nonparticipating	100.0	100.0	9
Medical Specialties			
Participating	100.0	72.7	150
Nonparticipating	100.0	78.2	55
Surgical Specialties			
Participating	100.0	93.2	280
Nonparticipating	100.0	91.8	73
Other Specialties			
Participating	100.0	66.7	114
Nonparticipating	100.0	65.7	35

TABLE B-73 (Continued)

Specialty/Participation Status	Line of Business UCR	Indemnity	Number of Physicians
	1975		
General Practice			
Participating	100.0	78.3	69
Nonparticipating	100.0	88.9	9
Medical Specialties			
Participating	100.0	70.5	173
Nonparticipating	100.0	67.1	76
Surgical Specialties			
Participating	100.0	89.4	311
Nonparticipating	100.0	86.8	91
Other Specialties			
Participating	100.0	54.6	143
Nonparticipating	100.0	64.1	39
	1976		
General Practice			
Participating	100.0	93.4	76
Nonparticipating	100.0	100.0	19
Medical Specialties			
Participating	100.0	89.2	176
Nonparticipating	100.0	88.4	103
Surgical Specialties			
Participating	100.0	93.3	285
Nonparticipating	100.0	84.6	156
Other Specialties			
Participating	100.0	65.5	139
Nonparticipating	100.0	58.7	46

TABLE B-74

PLAN B PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO SUBMITTED CLAIMS, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, SPECIALTY, AND YEAR

Specialty/Participation Status	Line of Business: UCR	Indemnity	Partial Service	Medicare	Number of Physicians
1973					
General Practice					
Participating	95.5	28.1	94.4	98.9	89
Nonparticipating	87.5	12.5	50.0	100.0	8
Medicare Only	--	--	--	100.0	22
Medical Specialties					
Participating	97.7	18.1	97.7	62.9	221
Nonparticipating	100.0	12.0	92.0	96.0	25
Medicare Only	--	--	--	100.0	8
Surgical Specialties					
Participating	97.6	32.8	96.0	87.1	372
Nonparticipating	95.4	36.4	93.2	100.0	44
Medicare Only	--	--	--	100.0	9
Other Specialties					
Participating	96.5	39.8	93.8	84.1	113
Nonparticipating	93.3	46.7	86.7	86.7	15
Medicare Only	--	--	--	100.0	11
1974					
General Practice					
Participating	96.6	21.6	88.6	97.7	88
Nonparticipating	90.9	9.1	72.7	90.9	11
Medicare Only	--	--	--	100.0	23
Medical Specialties					
Participating	100.0	23.2	95.5	62.7	220
Nonparticipating	96.6	17.2	96.6	96.6	29
Medicare Only	--	--	--	100.0	11

NOTE: Dashes indicate empty cells.

TABLE B-74 (Continued)

Specialty/Participation Status	UCR	Indemnity	Partial Service	Medicare	Number of Physicians
			Line of Business		
		1974 (Cont.)			
Surgical Specialties					
Participating	97.1	25.0	94.4	94.4	376
Nonparticipating	96.1	35.3	90.2	98.0	51
Medicare Only	--	--	--	100.0	11
Other Specialties					
Participating	97.4	43.4	91.2	82.3	113
Nonparticipating	89.5	57.9	94.7	89.5	19
Medicare Only	--	--	--	100.0	17
		1975			
General Practice					
Participating	95.6	57.8	94.4	100.0	90
Nonparticipating	100.0	30.0	50.0	100.0	10
Medicare Only	--	--	--	100.0	23
Medical Specialties					
Participating	99.5	78.3	96.3	65.9	217
Nonparticipating	100.0	86.2	93.1	96.6	29
Medicare Only	--	--	--	100.0	15
Surgical Specialties					
Participating	98.9	59.4	94.1	93.8	372
Nonparticipating	96.5	49.1	84.2	96.5	57
Medicare Only	--	--	--	100.0	32
Other Specialties					
Participating	97.5	71.2	92.4	89.0	118
Nonparticipating	91.7	45.8	75.0	79.2	24
Medicare Only	--	--	--	100.0	19

NOTE: Dashes indicate empty cells.

TABLE B-74 (Continued)

Specialty/Participation Status	UCR	Indemnity	Line of Business: Partial Service	Medicare	Number of Physicians
		1976			
General Practice					
Participating	100.0	80.2	78.0	100.0	91
Nonparticipating	100.0	66.7	44.4	100.0	9
Medicare Only	--	--	--	100.0	24
Medical Specialties					
Participating	99.6	88.0	91.1	65.2	224
Nonparticipating	96.7	90.0	86.7	96.7	30
Medicare Only	--	--	--	100.0	13
Surgical Specialties					
Participating	96.8	76.	93.2	91.6	369
Nonparticipating	93.6	69.4	87.1	98.4	62
Medicare Only	--	--	--	100.0	25
Other Specialties					
Participating	97.5	76.9	85.1	87.6	121
Nonparticipating	91.3	69.6	78.3	65.2	23
Medicare Only	--	--	--	100.0	29

NOTE: Dashes indicate empty cells.

TABLE B-75

PLAN C PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO SUBMITTED CLAIMS, CLASSIFIED BY LINE OF BUSINESS, SPECIALTY, AND YEAR

Line of Business/ Number of Physicians	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
		1975		
UCR	92.0	99.2	95.9	92.3
Indemnity	87.0	80.8	91.9	67.7
Number of Physicians	100	260	394	130
		1976		
UCR	95.7	99.6	96.7	98.8
Indemnity	94.6	84.9	92.6	66.5
Number of Physicians	93	265	393	164
		1977		
UCR	100.0	99.3	98.8	100.0
Indemnity	81.1	78.4	85.5	60.5
Number of Physicians	95	269	401	177
		1978		
UCR	98.9	99.2	97.7	98.8
Indemnity	66.3	71.7	76.8	54.7
Number of Physicians	95	265	392	170

TABLE B-76

PLAN A PHYSICIAN SAMPLE: ANNUAL PERCENTAGE CHANGES IN THE PERCENTAGES OF PHYSICIANS' OUTPUTS OF RVUS IN LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Specialty, Participation Status, Line of Business	1973-74	1974-75	1975-76	1973-76
General Practice				
Participating				
UCR	10.7	23.6	-2.7	33.2
Indemnity	-13.4	-37.7	8.4	-41.5
Nonparticipating				
UCR	12.1	39.8	-5.1	48.7
Indemnity	-10.0	-40.8	12.3	-40.1
Medical Specialties				
Participating				
UCR	4.6	15.0	-4.3	15.2
Indemnity	-10.3	-39.0	20.8	-33.9
Nonparticipating				
UCR	11.3	18.1	-7.8	21.1
Indemnity	-17.9	-39.0	32.7	-33.6
Surgical Specialties				
Participating				
UCR	11.7	22.8	3.3	41.7
Indemnity	-12.9	-32.0	-8.3	-45.7
Nonparticipating				
UCR	10.1	20.5	7.8	43.1
Indemnity	-10.5	-26.1	-16.3	-44.6
Other Specialties				
Participating				
UCR	2.7	23.4	-1.7	24.6
Indemnity	-5.5	-51.4	9.7	-49.7
Nonparticipating				
UCR	2.6	13.9	-2.8	13.6
Indemnity	-6.8	-39.1	14.8	-34.9

TABLE B-77

PLAN B PHYSICIAN SAMPLE: ANNUAL PERCENTAGE CHANGES IN THE PERCENTAGES OF PHYSICIANS' OUTPUTS OF RVUS IN LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Specialty, Participation Status, Line of Business	1973-74	1974-75	1975-76	1973-76
General Practice				
Participating				
UCR	-6.7	-12.4	22.7	.2
Indemnity	40.0	322.6	232.7	1868.4
Partial Service	-24.4	-18.0	-49.1	-68.5
Medicare	7.8	5.3	-1.7	11.5
Nonparticipating				
UCR	604.5	-51.5	28.9	320.2
Indemnity	-99.8	9307.8	44.5	-73.4
Partial Service	85.8	-28.7	-48.2	-31.4
Medicare	-15.4	13.3	-.7	-4.8
Medical Specialties				
Participating				
UCR	2.8	10.2	5.9	19.9
Indemnity	-12.0	2168.9	125.8	4408.9
Partial Service	-16.1	-29.4	-35.9	-62.0
Medicare	14.8	7.3	4.7	28.9
Nonparticipating				
UCR	-15.8	4.3	-3.0	-14.8
Indemnity	204.6	2669.4	234.7	28129.8
Partial Service	-33.5	-20.0	-43.5	-70.0
Medicare	17.7	1.2	3.3	23.1
Surgical Specialties				
Participating				
UCR	.0	8.5	-2.2	6.2
Indemnity	-4.7	282.0	150.9	813.5
Partial Service	-15.2	-22.2	-31.9	-55.1
Medicare	15.3	1.4	11.0	29.7
Nonparticipating				
UCR	4.4	8.9	-15.1	-3.5
Indemnity	-52.0	294.3	246.2	554.9
Partial Service	-9.1	-25.2	-38.4	-58.1
Medicare	2.4	2.9	13.8	20.0

TABLE B-77 (Continued)

Specialty, Participation Status, Line of Business	1973-74	1974-75	1975-76	1973-76
Other Specialties				
Participating				
UCR	9.8	-4.8	15.1	20.3
Indemnity	-35.4	587.4	63.6	626.0
Partial Service	-20.8	-16.3	-34.8	-56.8
Medicare	15.6	15.1	-1.7	30.8
Nonparticipating				
UCR	.3	35.2	10.7	50.1
Indemnity	-8.5	102.5	349.9	733.2
Partial Service	-4.4	-41.4	2.8	-42.4
Medicare	5.5	13.1	-24.4	-9.8

TABLE B-78

PLAN C PHYSICIAN SAMPLE: ANNUAL PERCENTAGE CHANGES IN THE PERCENTAGES OF PHYSICIANS' OUTPUTS OF RVUS IN LINES OF BUSINESS, CLASSIFIED BY SPECIALTY AND YEAR

Specialty, Line of Business	1975-76	1976-77	1977-78	1975-78
General Practice				
UCR	11.2	13.6	5.4	33.2
Indemnity	-17.4	-28.6	-18.1	-51.7
Medical Specialties				
UCR	6.0	4.5	-1.0	9.8
Indemnity	-20.1	-20.0	5.6	-32.5
Surgical Specialties				
UCR	11.2	16.1	5.0	35.5
Indemnity	-15.5	-29.3	-15.0	-49.2
Other Specialties				
UCR	11.5	2.9	0.9	15.8
Indemnity	-37.8	-17.3	-6.6	-51.9

TABLE B-79

PLAN A PHYSICIAN SAMPLE: MEAN CHARGES PER RVU, MEAN AMOUNT ALLOWED PER RVU, MEAN AMOUNT PAID PER RVU, AND MEAN NUMBER OF RVUS PER PHYSICIAN, CLASSIFIED BY YEAR AND PHYSICIAN AGE IN 1973

Physician Age in 1973 (Number)	Mean Amount Charged	Std. Deviation	Mean Amount Allowed	Std. Deviation	Mean Amount Paid	Std. Deviation	Mean RVUs Per Physician	Std. Deviation
				1973				
Under 30 (2)	$2.11	$0.57	$1.91	$0.66	$1.91	$0.66	237	280
30 - 39 (131)	2.20	0.54	1.79	0.36	1.79	0.36	1161	1637
40 - 49 (260)	2.04	0.46	1.74	0.40	1.74	0.40	1597	1916
50 - 59 (236)	1.99	0.42	1.68	0.32	1.68	0.32	1798	2604
60 - 69 (123)	1.92	0.37	1.61	0.33	1.61	0.33	1464	2713
				1974				
Under 30 (3)	1.96	0.21	1.38	0.77	1.38	0.77	175	187
30 - 39 (152)	2.33	0.60	1.89	0.41	1.89	0.41	1263	1781
40 - 49 (277)	2.24	0.48	1.86	0.44	1.86	0.44	1850	2567
50 - 59 (252)	2.15	0.55	1.79	0.39	1.78	0.39	1948	2824
60 - 69 (132)	2.15	0.62	1.76	0.40	1.76	0.40	1266	2075
				1975				
Under 30 (10)	2.82	0.49	2.20	0.53	2.20	0.53	349	458
30 - 39 (190)	2.51	0.62	2.05	0.38	2.05	0.38	1512	2284
40 - 49 (313)	2.48	0.61	2.08	0.43	2.08	0.43	2029	3177
50 - 59 (273)	2.43	0.62	2.07	0.43	2.06	0.43	2136	3242
60 - 69 (144)	2.39	0.82	2.05	0.55	2.04	0.55	1284	2198
				1976				
Under 30 (19)	2.67	0.46	2.17	0.42	2.17	0.42	832	744
30 - 39 (212)	2.62	0.56	2.08	0.44	2.08	0.44	2495	2790
40 - 49 (342)	2.60	0.65	2.11	0.49	2.11	0.49	3102	4129
50 - 59 (290)	2.49	0.62	2.03	0.43	2.02	0.43	2984	3703
60 - 69 (151)	2.30	0.72	1.89	0.54	1.88	0.54	1676	2089

TABLE B-80

PLAN B PHYSICIAN SAMPLE: MEAN CHARGES PER RVU, MEAN AMOUNT ALLOWED PER RVU, MEAN AMOUNT PAID PER RVU, AND MEAN NUMBER OF RVUS PER PHYSICIAN, CLASSIFIED BY YEAR AND PHYSICIAN AGE IN 1973

Physician Age in 1973 (Number)	Mean Amount Charged	Std. Deviation	Mean Amount Allowed	Std. Deviation	Mean Amount Paid	Std. Deviation	Mean RVUs Per Physician	Std. Deviation
				1973				
Under 30 (3)	$2.26	$0.15	$1.81	$0.04	$1.44	$0.32	1236	1260
30 - 39 (192)	2.27	0.68	1.76	0.55	1.56	0.59	4815	5705
40 - 49 (326)	2.11	0.62	1.65	0.36	1.46	0.38	5656	5536
50 - 59 (237)	2.01	0.61	1.61	0.38	1.36	0.45	5022	5081
60 - 69 (179)	1.96	0.63	1.57	0.41	1.23	0.47	4071	4398
				1974				
Under 30 (5)	2.80	0.39	2.19	0.21	1.94	0.37	2403	3699
30 - 39 (218)	2.40	0.62	1.81	0.31	1.59	0.33	5514	9675
40 - 49 (329)	2.26	0.64	1.75	0.32	1.52	0.35	5940	5929
50 - 59 (234)	2.17	0.59	1.71	0.38	1.45	0.45	5380	5562
60 - 69 (183)	2.06	0.68	1.65	0.38	1.28	0.43	3971	4620
				1975				
Under 30 (10)	2.82	0.94	2.10	0.65	1.72	0.93	2347	2895
30 - 39 (233)	2.60	0.64	2.00	0.36	1.74	0.40	5051	7439
40 - 49 (338)	2.52	0.75	1.95	0.52	1.67	0.56	5736	5862
50 - 59 (241)	2.38	0.63	1.88	0.41	1.55	0.51	5076	5502
60 - 69 (184)	2.30	0.91	1.84	0.67	1.40	0.65	3606	4465
				1976				
Under 30 (12)	2.83	0.54	2.35	0.35	2.05	0.46	3116	4152
30 - 39 (248)	2.84	0.65	2.17	0.47	1.89	0.50	4962	6852
40 - 49 (345)	2.71	0.66	2.07	0.38	1.78	0.43	5730	6060
50 - 59 (240)	2.61	0.72	2.04	0.44	1.68	0.54	5232	6110
60 - 69 (175)	2.38	0.66	1.90	0.43	1.47	0.49	3154	3930

TABLE B-81

PLAN C PHYSICIAN SAMPLE: MEAN CHARGES PER RVU, MEAN AMOUNT ALLOWED PER RVU, MEAN AMOUNT PAID PER RVU, AND MEAN NUMBER OF RVUs PER PHYSICIAN, CLASSIFIED BY YEAR AND PHYSICIAN AGE IN 1973

Physician Age in 1973 (Number)		Mean Amount Charged	Std. Deviation	Mean Amount Allowed	Std. Deviation	Mean Amount Paid	Std. Deviation	Mean RVUs Per Physician	Std. Deviation
					1975				
Under 30	(0)	--	--	--	--	--	--	--	--
30-39	(260)	2.52	0.56	1.87	0.50	1.84	0.50	757	732
40-49	(354)	2.47	0.57	1.83	0.50	1.81	0.51	1011	1700
50-59	(201)	2.38	0.51	1.79	0.49	1.77	0.48	937	1359
60-69	(69)	2.39	0.59	1.83	0.58	1.81	0.58	490	582
					1976				
Under 30	(2)	3.17	0.37	1.71	0.93	1.56	1.14	153	207
30-39	(277)	2.66	0.56	2.09	0.55	1.92	0.56	1099	1153
40-49	(363)	2.64	0.53	2.07	0.47	1.87	0.49	1290	2102
50-59	(207)	2.52	0.55	1.98	0.49	1.77	0.50	1095	1557
60-69	(66)	2.47	0.53	1.98	0.44	1.71	0.49	688	844
					1977				
Under 30	(5)	3.14	0.30	2.42	0.37	2.32	0.35	608	447
30-39	(288)	2.82	0.59	2.31	0.57	1.97	0.59	1057	1264
40-49	(371)	2.80	0.60	2.26	0.52	1.90	0.57	1173	1637
50-59	(207)	2.71	0.56	2.21	0.49	1.88	0.49	1058	1229
60-69	(71)	2.59	0.63	2.10	0.49	1.82	0.51	589	880
					1978				
Under 30	(9)	3.02	0.44	2.62	0.33	2.03	0.89	539	605
30-39	(289)	3.05	0.72	2.62	0.68	2.11	0.71	698	841
40-49	(352)	3.07	0.65	2.62	0.61	2.17	0.60	842	1202
50-59	(203)	2.91	0.68	2.49	0.64	2.00	0.60	715	868
60-69	(69)	2.87	0.70	2.41	0.69	1.91	0.69	403	561

TABLE B-82

PLAN A PHYSICIAN SAMPLE: PERCENTAGE DISTRIBUTION OF PHYSICIANS BY RATIO OF AMOUNT CHARGED TO AMOUNT ALLOWED, CLASSIFIED BY SPECIALTY, 1973 AND 1976

	Ratio of Charge to Allowance							
Specialty	1.0	1.0+ to 1.1	1.1+ to 1.2	1.2+ to 1.3	1.3+ to 1.4	1.4+ to 1.5	1.5+	Number of Physicians
				1973				
General Practice	22.7	29.3	17.3	12.0	5.3	6.7	6.7	75
Medical Specialties	27.8	34.6	17.6	5.8	3.9	4.9	5.4	205
Surgical Specialties	7.6	14.2	25.8	19.1	13.9	11.2	8.2	330
Other Specialties	14.8	25.4	16.2	12.7	19.0	7.0	4.9	142
				1976				
General Practice	4.2	25.0	33.3	17.7	8.3	6.2	5.2	96
Medical Specialties	7.8	24.2	27.8	17.4	7.8	5.7	9.2	281
Surgical Specialties	5.2	12.1	27.2	24.5	14.2	7.0	9.9	445
Other Specialties	8.8	25.0	18.8	17.2	15.1	4.7	10.4	192

Row percentages may not sum to 100 because of rounding errors.

TABLE B-83

PLAN B PHYSICIAN SAMPLE: PERCENTAGE DISTRIBUTION OF PHYSICIANS BY RATIO OF AMOUNT CHARGED TO AMOUNT ALLOWED, CLASSIFIED BY SPECIALTY, 1973 AND 1976

Specialty	Ratio of Charge to Allowance							Number of Physicians
	1.0	1.0+ to 1.1	1.1+ to 1.2	1.2+ to 1.3	1.3+ to 1.4	1.4+ to 1.5	1.5+	
1973								
General Practice	5.9	33.6	36.1	15.1	6.7	1.7	0.8	119
Medical Specialties	3.9	16.1	33.9	22.8	9.4	6.3	7.5	254
Surgical Specialties	3.1	12.5	18.1	28.0	18.1	9.9	10.3	425
Other Specialties	6.5	13.0	10.8	11.5	11.5	15.8	30.9	139
1976								
General Practice	3.2	16.1	35.5	27.4	8.9	5.6	3.2	120
Medical Specialties	3.4	17.2	30.7	24.7	12.7	6.0	5.2	267
Surgical Specialties	0.9	7.2	16.2	23.5	20.2	14.7	17.3	456
Other Specialties	7.5	12.1	19.6	14.4	12.1	11.6	22.5	173

Row percentages may not sum to 100 because of rounding errors.

TABLE B-84

PLAN C PHYSICIAN SAMPLE: PERCENTAGE DISTRIBUTION OF PHYSICIANS BY RATIO OF AMOUNT CHARGED TO AMOUNT ALLOWED, CLASSIFIED BY SPECIALTY, 1975 AND 1978

	Ratio of Charge to Allowance							
Specialty	1.0	1.0+ to 1.1	1.1+ to 1.2	1.2+ to 1.3	1.3+ to 1.4	1.4+ to 1.5	1.5+	Number of Physicians
				1975				
General Practice	5.0	7.0	29.0	18.0	16.0	8.0	17.0	100
Medical Specialties	2.7	10.8	29.6	26.5	11.9	5.8	12.7	260
Surgical Specialties	2.3	3.6	11.9	18.0	14.7	11.7	37.8	394
Other Specialties	10.0	14.6	29.2	23.1	3.1	3.1	16.9	130
				1978				
General Practice	16.8	36.8	21.1	11.6	7.4	2.1	4.2	95
Medical Specialties	15.1	41.9	20.8	7.2	3.8	2.3	9.1	265
Surgical Specialties	7.7	20.2	25.0	19.4	8.2	6.6	13.0	392
Other Specialties	30.0	35.3	18.8	6.5	2.9	2.9	3.5	170

Row percentages may not sum to 100 because of rounding errors.

TABLE B-85

PLAN A PHYSICIAN SAMPLE: MEAN GROWTH RATES OF AMOUNT CHARGED PER RVU, 1973-76, CLASSIFIED BY THE MEAN GROWTH RATES OF AMOUNT ALLOWED PER RVU, 1973-76, LINE OF BUSINESS, SPECIALTY, AND YEAR

Growth Rate of Allowance per RVU (Percent)	General Practice		Medical Specialties		Surgical Specialties		Other Specialties	
	UCR Non-participating	UCR Participating	UCR Non-participating	UCR Participating	UCR Non-participating	UCR Participating	UCR Non-participating	UCR Participating
Less than 0	-8.9	-12.8	-2.4	-11.0	-3.5	-10.4	-7.6	-12.9
0 to 10	10.6	9.2	13.5	9.0	9.9	11.6	19.4	7.9
10 to 20	23.0	20.2	20.8	17.4	23.7	16.3	27.5	17.3
20 to 30	40.0	28.8	25.4	26.9	33.2	29.0	31.2	24.8
30 to 40	--	36.4	45.8	35.1	41.1	35.2	62.8	40.9
40 to 50	--	47.5	58.6	43.3	54.5	43.2	50.1	56.4
50 to 60	--	--	--	53.2	--	54.5	88.4	60.9
60 and Higher	--	--	143.0	116.1	156.6	92.7	70.1	81.7

TABLE B-86

PLAN B PHYSICIAN SAMPLE: MEAN GROWTH RATES OF AMOUNT CHARGED PER RVU, 1973-76, CLASSIFIED BY THE MEAN GROWTH RATES OF AMOUNT ALLOWED PER RVU, 1973-76, LINE OF BUSINESS, SPECIALTY, AND YEAR

Growth Rate Of Allowance Per RVU (Percent)	General Practice			Medical Specialties		
	UCR Non-participating	UCR Participating	Medicare	UCR Non-participating	UCR Participating	Medicare
Less than 0	4.4 (1)	-5.3 (25)	-1.7 (18)	-13.4 (6)	-7.2 (29)	-3.3 (22)
0 to 10	6.2 (1)	10.5 (21)	14.0 (19)	10.2 (9)	5.0 (46)	13.9 (44)
10 to 20	2.0 (2)	25.5 (15)	22.5 (25)	12.6 (3)	15.3 (42)	22.5 (42)
20 to 30	29.6 (1)	28.5 (8)	31.6 (22)	43.4 (6)	22.2 (31)	29.9 (28)
30 to 40	33.3 (1)	44.7 (3)	41.0 (16)	39.0 (2)	37.8 (21)	50.1 (12)
40 to 50	-- (0)	40.9 (3)	50.2 (8)	21.8 (1)	35.6 (16)	31.7 (5)
50 to 60	-- (0)	49.3 (1)	58.6 (2)	50.4 (1)	58.2 (8)	61.3 (2)
60 and Higher	-- (0)	80.6 (5)	72.8 (6)	-- (0)	85.1 (11)	105.7 (10)

Numbers of physicians in parentheses.

TABLE B-86 (Continued)

Growth Rate Of Allowance Per RVU (Percent)	Surgical Specialties			Other Specialties		
	UCR Non-participating	UCR Participating	Medicare	UCR Non-participating	UCR Participating	Medicare
Less than 0	-14.1 (4)	4.1 (26)	-11.3 (53)	-24.6 (2)	-22.4 (12)	-15.7 (8)
0 to 10	33.9 (7)	25.8 (57)	22.3 (48)	5.7 (1)	12.2 (11)	21.5 (14)
10 to 20	35.7 (10)	30.1 (65)	28.9 (80)	17.6 (1)	24.5 (12)	29.7 (20)
20 to 30	42.7 (11)	33.9 (71)	28.2 (64)	-- (0)	31.0 (13)	38.6 (16)
30 to 40	42.8 (8)	39.9 (58)	47.0 (44)	47.4 (4)	45.2 (11)	49.4 (20)
40 to 50	49.1 (4)	56.1 (21)	53.5 (24)	53.2 (2)	67.2 (8)	46.3 (8)
50 to 60	71.9 (3)	73.1 (8)	51.2 (16)	56.5 (2)	61.4 (9)	50.6 (11)
60 and Higher	94.1 (6)	88.1 (15)	112.7 (26)	73.1 (2)	80.4 (14)	83.1 (12)

Numbers of physicians in parentheses.

TABLE B-87

PLAN C PHYSICIAN SAMPLE: UCR MEAN GROWTH RATES OF AMOUNT CHARGED PER RVU, 1975-78, CLASSIFIED BY THE UCR MEAN GROWTH RATES OF AMOUNT ALLOWED PER RVU, 1975-78, LINE OF BUSINESS, SPECIALTY, AND YEAR

Growth Rate of Allowance Per RVU (Percent)	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
Less than 0	-25.6 (7)	-15.3 (17)	-7.5 (18)	-16.3 (5)
0 to 10	-4.3 (2)	0.5 (21)	6.0 (36)	12.2 (5)
10 to 20	13.0 (9)	6.6 (43)	12.9 (59)	16.2 (7)
20 to 30	17.4 (18)	15.3 (42)	19.6 (76)	16.7 (10)
30 to 40	25.1 (18)	22.1 (59)	26.6 (58)	27.4 (19)
40 to 50	37.0 (13)	30.6 (25)	32.1 (43)	37.7 (9)
50 to 60	42.8 (5)	41.4 (16)	37.9 (20)	41.4 (20)
60 and Higher	56.6 (14)	62.0 (26)	64.9 (42)	71.4 (28)

Numbers of physicians in parentheses.

TABLE B-88

PLAN A PHYSICIAN SAMPLE: ESTIMATED ELASTICITIES OF CURRENT AMOUNTS CHARGED WITH RESPECT TO LAGGED AMOUNTS ALLOWED,* CLASSIFIED BY SPECIALTY AND LINE OF BUSINESS, 1973-76

Line of Business	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
UCR	0.40 (0.08)	0.62 (0.03)	0.63 (0.03)	0.65 (0.04)
Indemnity	0.12 (0.06)	0.15 (0.03)	0.17 (0.02)	0.18 (0.05)

* Derived from simple regression of ln (amount charged in year t) on ln (amount allowed in year t-1). Standard errors in parentheses.

TABLE B-89

PLAN B PHYSICIAN SAMPLE: ESTIMATED ELASTICITIES OF CURRENT AMOUNTS CHARGED WITH RESPECT TO LAGGED AMOUNTS ALLOWED,* CLASSIFIED BY SPECIALTY AND LINE OF BUSINESS, 1973-76

Line of Business	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
UCR	0.54 (0.05)	0.70 (0.03)	0.64 (0.03)	0.56 (0.05)
Indemnity	0.39 (0.08)	0.19 (0.05)	0.18 (0.03)	0.18 (0.03)
Partial Service	0.38 (0.06)	0.42 (0.05)	0.15 (0.03)	0.28 (0.04)
Medicare	0.81 (0.04)	0.75 (0.04)	0.64 (0.03)	0.94 (0.04)

* Derived from simple regression of ln (amount charged in year t) on ln (amount allowed in year t-1). Standard errors in parentheses.

TABLE B-90

PLAN C PHYSICIAN SAMPLE: ESTIMATED ELASTICITIES OF CURRENT AMOUNTS CHARGED WITH RESPECT TO LAGGED AMOUNTS ALLOWED,* CLASSIFIED BY SPECIALTY AND LINE OF BUSINESS, 1975-78

Line of Business	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
UCR	0.71 (0.05)	0.69 (0.03)	0.62 (0.02)	0.77 (0.03)
Indemnity	0.18 (0.05)	0.001 (0.03)	0.04 (0.02)	-0.06 (0.05)

* Derived from simple regression of ln (amount charged in year t) on ln (amount allowed in year t-1). Standard errors in parentheses.

TABLE B-91

PLAN A PHYSICIAN SAMPLE: MEAN PERCENTAGE OF RVUs PER PHYSICIAN SUBMITTED ON A PARTICIPATING BASIS BY PHYSICIANS WITH SELECTED TRAITS, 1973 and 1976*

Physician Trait/ Reimbursement Variable	1973		1976	
	Number of Physicians	Mean Percent of Partici-pating RVUs	Number of Physicians	Mean Percent of Partici-pating RVUs
Specialty				
General Practice	69	90.26	95	78.60
Medical Specialties	192	71.12	279	55.45
Surgical Specialties	315	78.27	441	58.58
Other Specialties	138	81.79	185	71.92
Primary/Nonprimary Care Field				
General Practice	69	90.26	95	78.60
Internal Medicine	80	69.44	107	55.37
Pediatrics	61	82.33	93	63.51
Other Fields	504	77.42	705	60.68
Board Certification				
Certified	446	73.72	625	56.90
Not Certified	268	85.61	375	70.70
Country of Medical Education				
U.S.	534	74.21	725	55.84
Foreign	180	89.98	275	78.51
Sex				
Male	683	77.23	941	61.12
Female	31	90.20	59	77.40
Age in 1973				
35 and Younger	2	50.00	18	60.73
36 - 50	245	77.59	376	59.26
51 - 65	356	75.36	460	61.09
66 and Older	111	89.04	146	72.60
Race (U.S. Graduates Only)				
Black	12	91.67	17	94.12
Nonblack	522	73.81	708	54.92

TABLE B-91 (Continued)

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Mean Percent of Participating RVUs	1976 Number of Physicians	1976 Mean Percent of Participating RVUs
Research Orientation of Medical School**				
1	13	91.87	18	89.00
2	44	70.70	57	47.76
3	171	74.22	224	48.08
4	65	62.90	92	52.87
5	183	79.59	248	61.95
6	28	74.30	44	56.38
Type of Practice				
Solo	375	79.45	487	64.96
Partnership	91	86.12	140	66.93
Group	158	63.21	214	44.20
Arrangement	19	97.76	25	59.66
Other	56	90.16	105	76.82
Unknown	15	86.67	29	70.76

* Physicians excluded if they had only indemnity claims.

** 1 denotes lowest research orientation and 6 denotes highest research orientation.

TABLE B-92

PLAN A PHYSICIAN SAMPLE: PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, CLASSIFIED BY SELECTED FEE AND REIMBURSEMENT VARIABLES, 1973 AND 1976

Physician Trait/ Reimbursement Variable	1973 Number of Physicians	1973 Percent of Physicians Participating	1976 Number of Physicians	1976 Percent of Physicians Participating
Average Lag Per Claim (All Business)				
Less than 50 Days	331	83.99	390	76.41
50 to 80 Days	218	77.98	368	62.23
80 Days or More	165	76.97	242	61.57
Amount Charged Per RVU				
Less than $1.85	221	79.19	126	81.75
$1.85 to $2.35	361	84.76	271	75.28
$2.35 and Higher	132	71.21	603	61.19
Ratio of Amount Charged to Amount Allowed				
Less than 1.25	493	80.53	638	74.92
1.25 to 1.75	211	81.52	330	56.67
1.75 and Higher	10	60.00	32	34.38

TABLE B-93

PLAN A AND B PHYSICIAN SAMPLES: PERCENTAGE CHANGES IN THE PERCENTAGE OF PHYSICIANS WHO PARTICIPATED IN PRIVATE BUSINESS, 1973-76, CLASSIFIED BY SELECTED PHYSICIAN, COUNTY, AND REIMBURSEMENT VARIABLES

Physician, County, and Reimbursement Variables	Percentage Change in the Percentage of Physicians Who Participated in Private Business	
	Plan A[a]	Plan B
Specialty		
General Practice	-13.7	-.8
Medical Specialties	-15.3	-1.8
Surgical Specialties	-19.8	-4.3
Other Specialties	-9.0	-4.8
Primary/Nonprimary Care Field		
General Practice	-13.7	-.8
Internal Medicine	-20.3	-1.8
Pediatrics	-11.3	.1
Other Fields	-16.5	-4.5
Board Certification		
Certified	-15.5	-5.1
Not Certified	-16.8	-1.0
Country of Medical Education		
U.S.	-18.4	-5.3
Foreign	-12.2	1.6
Sex		
Male	-16.3	-3.4
Female	-17.0	-3.8
Age in 1973		
35 and Younger	15.8	12.5
36-50	-15.3	-7.4
51-65	-12.1	-6.4
66 and Older	-8.0	-10.1
Race (U.S. Graduates Only)		
Black	2.7	10.7
Nonblack	-19.0	-6.0

TABLE B-93 (Continued)

Physician, County, and Reimbursement Variables	Percentage Change in the Percentage of Physicians Who Participated in Private Business	
	Plan A[a]	Plan B
Research Orientation of Medical School*		
1	-3.7	5.9
2	-27.6	-5.1
3	-25.4	-6.8
4	-12.5	-1.1
5	-16.0	.8
6	-24.2	-6.0
Type of Practice		
Solo	-16.5	-2.9
Partnership	-17.9	-7.7
Group	-14.6	-5.6
Arrangement	-32.0	.0
Other	-13.2	-1.5
Unknown	-16.5	-3.5
Average Lag Per Claim (All Business)		
Less than 50 Days	-9.0	-2.6
50 to 80 Days	-20.2	-4.9
80 Days or More	-20.0	-1.8
Amount Charged Per RVU		
Less than $1.85	3.2	2.2
$1.85 to $2.35	-11.2	1.6
$2.35 and Higher	-14.1	-5.8
Ratio of Amount Charged to Amount Allowed		
1.0	-16.8	-18.8
1.0+ to 1.1	1.6	-16.5
1.1+ to 1.2	3.4	-5.6
1.2+ to 1.3	-16.8	-6.6
1.3+ to 1.4	-27.3	-4.3
1.4+ to 1.5	-42.3	-12.7
1.5+	-22.2	.1
Per Capita Income		
Low	---	-3.3
High	---	-3.0

TABLE B-93 (Continued)

Physician, County, and Reimbursement Variables	Percentage Change in the Percentage of Physicians Who Participated in Private Business	
	Plan A[a]	Plan B
Percentage of Population Urban		
Low	-20.2	-12.0
Medium	---	-10.9
High	-32.0	-1.1
Percentage of Population Black		
Low	-20.7	-3.2
Medium	---	-6.4
High	-19.3	-1.8
Percentage of Population Aged 65 and Older		
Low	---	-2.4
High	---	-15.0
Number of Physicians Per Capita		
Low	---	---
Medium	-21.7	-9.1
High	-12.1	-2.9

* 6 denotes the highest research orientation and 1 denotes the lowest.

Dashes indicate empty cells.

[a] Physicians defined as participating if more than 5% of their RVUs were provided on a participating basis.

TABLE B-94

PLAN B PHYSICIAN SAMPLE: PERCENTAGE CHANGES IN THE MEAN PERCENTAGE OF MEDICARE RVUS PER PHYSICIAN, 1973-76, CLASSIFIED BY SELECTED PHYSICIAN AND REIMBURSEMENT VARIABLES

Physician Trait/ Reimbursement Variable	Percentage Change in Percentage of Medicare RVUs Per Physician, 1973-76
Specialty	
General Practice	7.7
Medical Specialties	29.4
Surgical Specialties	35.4
Other Specialties	39.1
Primary/Nonprimary Care Field	
General Practice	7.7
Internal Medicine	30.9
Pediatrics	366.7
Other Fields	33.1
Board Certification	
Certified	30.7
Not Certified	22.6
Country of Medical Education	
U.S.	26.0
Foreign	33.3
Sex	
Male	27.7
Female	5.0
Age in 1973	
35 and Younger	27.3
36-50	29.2
51-65	31.1
66 and Older	18.6
Race (U.S. Graduates Only)	
Black	15.8
Nonblack	26.3
Research Orientation of Medical School*	
1	19.1
2	16.1
3	27.0
4	42.1
5	43.5
6	16.7

TABLE B-94 (Continued)

Physician Trait/ Reimbursement Variable	Percentage Change in Percentage of Medicare RVUs Per Physician, 1973-76
Type of Practice	
Solo	25.1
Partnership	23.8
Group	27.9
Arrangement	29.8
Other	59.0
Unknown	10.3
Participation Status (Private Business), 1973	
Participating	26.0
Nonparticipating	11.5
Average Lag Per Claim (All Business), 1973	
Less than 50 Days	20.2
50 to 80 Days	14.8
80 Days or More	40.0
Amount Charged Per RVU, 1973	
Less than $1.85	35.7
$1.85 to $2.35	57.3
$2.35 and Higher	42.6
Ratio of Amount Charged to Amount Allowed, 1973	
1.0	-.8
1.0+ to 1.1	18.1
1.1+ to 1.2	13.2
1.2+ to 1.3	45.1
1.3+ to 1.4	32.3
1.4+ to 1.5	52.7
1.5+	94.6

* 1 denotes lowest research orientation and 6 denotes highest.

TABLE B-95

PLAN B PHYSICIAN SAMPLE: MEAN CHARGES PER RVU IN MEDICARE BUSINESS, CLASSIFIED BY THE RATIO OF AMOUNT CHARGED TO AMOUNT ALLOWED, SPECIALTY, AND YEAR

Specialty	Ratio of Charge to Allowance: 1.0	1.0+ to 1.1	1.1+ to 1.2	1.2+ to 1.3	1.3+ to 1.4	1.4+ to 1.5	1.5+
				1973			
General Practice	1.49	1.49	1.61	1.80	2.03	1.46	1.53
Medical Specialties	2.16	1.96	2.06	2.31	2.80	2.48	3.20
Surgical Specialties	1.82	1.84	2.00	2.05	2.40	2.70	2.92
Other Specialties	2.15	1.92	2.20	2.30	2.59	3.08	3.26
				1974			
General Practice	1.42	1.59	1.65	1.88	1.96	2.31	1.95
Medical Specialties	1.93	2.06	2.13	2.62	2.68	3.03	3.44
Surgical Specialties	1.91	1.92	2.15	2.26	2.54	2.85	3.21
Other Specialties	1.92	2.04	2.35	2.56	3.08	2.99	3.56
				1975			
General Practice	1.17	1.70	1.73	2.09	1.87	1.89	2.46
Medical Specialties	1.91	2.14	2.28	2.60	2.81	3.12	3.67
Surgical Specialties	2.09	2.01	2.24	2.45	2.73	2.93	3.63
Other Specialties	1.97	2.42	2.60	3.16	3.19	3.43	4.08
				1976			
General Practice	1.51	1.82	1.93	2.08	2.42	2.25	2.42
Medical Specialties	2.01	2.29	2.40	2.81	2.98	2.92	3.37
Surgical Specialties	1.92	2.05	2.43	2.62	2.84	3.18	3.57
Other Specialties	1.82	2.21	2.85	3.07	3.50	3.44	4.01

TABLE B-96

PLAN A PHYSICIAN SAMPLE: TOTAL DOLLAR VALUE OF CHARGES PER PHYSICIAN, TOTAL AMOUNT ALLOWED PER PHYSICIAN, TOTAL AMOUNT PAID PER PHYSICIAN, AND TOTAL RVUS PER PHYSICIAN, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR (FIGURES IN HUNDREDS)

	UCR		Indemnity		UCR		Indemnity	
Specialty	Participating	Nonparticipating	Participating	Nonparticipating	Participating	Nonparticipating	Participating	Nonparticipating
	1973				1974			
General Practice								
Charge/Physician	7.89	4.66	8.30	6.49	9.09	4.90	6.11	5.35
Allowed/Physician	7.66	4.60	6.27	4.44	8.86	4.70	4.42	3.38
Paid/Physician	7.66	4.60	6.27	4.44	8.86	4.70	4.42	3.38
RVUs/Physician	4.04	2.34	4.30	3.07	4.73	2.13	3.10	2.23
Medical Specialties								
Charge/Physician	8.50	13.27	18.31	12.75	11.63	19.12	7.38	14.46
Allowed/Physician	8.33	12.77	9.76	11.11	11.26	18.69	6.12	11.85
Paid/Physician	8.31	12.76	9.76	11.11	11.25	18.68	6.12	11.85
RVUs/Physician	4.22	6.06	6.98	5.60	5.41	8.24	3.32	6.01
Surgical Specialties								
Charge/Physician	23.80	16.37	24.97	20.71	69.41	24.64	25.36	21.04
Allowed/Physician	22.86	16.02	16.56	14.63	65.14	23.38	14.68	12.61
Paid/Physician	22.84	16.01	16.56	14.63	64.97	23.36	14.68	12.61
RVUs/Physician	12.00	8.70	12.05	10.21	27.52	11.32	11.74	9.42
Other Specialties								
Charge/Physician	17.06	15.60	15.13	13.65	17.62	15.19	10.91	12.26
Allowed/Physician	16.52	14.56	9.64	10.72	16.90	13.48	6.96	8.31
Paid/Physician	16.50	14.55	9.64	10.72	16.87	13.47	6.96	8.31
RVUs/Physician	8.38	6.85	7.27	6.39	8.03	5.76	4.92	4.86

TABLE B-96 (Continued)

Specialty	UCR Partici-pating	UCR Nonparti-cipating	Indemnity Partici-pating	Indemnity Nonparti-cipating	UCR Partici-pating	UCR Nonparti-cipating	Indemnity Partici-pating	Indemnity Nonparti-cipating
	1975				1976			
General Practice								
Charge/Physician	13.50	5.73	5.21	1.94	35.16	31.78	10.21	14.91
Allowed/Physician	12.84	5.28	3.41	1.22	34.01	28.72	5.91	7.57
Paid/Physician	12.82	5.28	3.41	1.22	33.97	28.71	5.91	7.57
RVUs/Physician	6.30	2.34	2.32	.71	18.14	13.95	5.39	6.50
Medical Specialties								
Charge/Physician	17.66	27.51	5.68	11.39	44.48	50.47	12.66	18.31
Allowed/Physician	16.92	25.81	4.37	8.58	42.39	45.41	6.88	9.76
Paid/Physician	16.91	25.80	4.37	8.58	42.34	45.35	6.88	9.76
RVUs/Physician	7.64	10.92	2.41	4.36	19.07	19.29	5.47	6.98
Surgical Specialties								
Charge/Physician	48.80	34.66	20.46	18.82	69.41	50.37	22.37	21.43
Allowed/Physician	46.32	31.04	10.28	9.74	65.14	44.81	10.63	9.73
Paid/Physician	46.23	30.99	10.28	9.74	64.96	44.75	10.63	9.73
RVUs/Physician	20.80	14.18	8.51	7.71	27.52	18.84	8.71	7.99
Other Specialties								
Charge/Physician	39.30	20.13	10.71	7.17	39.30	52.63	10.71	20.65
Allowed/Physician	37.16	17.16	5.14	4.21	37.16	43.31	5.14	10.54
Paid/Physician	37.10	17.14	5.14	4.21	37.10	43.26	5.14	10.54
RVUs/Physician	14.32	7.04	3.67	2.36	14.32	15.79	3.67	6.43

TABLE B-97

PLAN B PHYSICIAN SAMPLE: TOTAL DOLLAR VALUE OF CHARGES PER PHYSICIAN, TOTAL AMOUNT ALLOWED PER PHYSICIAN, TOTAL AMOUNT PAID PER PHYSICIAN, AND TOTAL RVUS PER PHYSICIAN, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR (FIGURES IN HUNDREDS)

Specialty	UCR		Indemnity		Partial Service		Medicare		
	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Medicare Claims Only
					1973				
General Practice									
Charge/Physician	9.45	.95	.15	.02	10.06	1.26	34.56	18.37	13.32
Allowed/Physician	8.72	.85	.07	.02	7.96	.97	30.44	15.99	11.44
Paid/Physician	8.72	.85	.07	.02	7.96	.97	17.27	6.91	4.22
RVUs/Physician	4.95	.39	.06	.02	5.44	.49	22.90	10.10	8.85
Medical Specialties									
Charge/Physician	26.72	24.00	.08	.07	28.99	31.92	46.46	75.21	2.92
Allowed/Physician	24.66	20.82	.07	.04	18.90	17.29	42.19	58.27	2.69
Paid/Physician	24.66	20.82	.07	.04	18.90	17.29	27.31	37.79	1.33
RVUs/Physician	11.85	9.43	.04	.03	13.41	11.99	23.05	31.49	1.43
Surgical Specialties									
Charge/Physician	46.60	40.10	.77	.68	34.25	33.98	42.98	74.53	4.58
Allowed/Physician	42.54	36.03	.29	.28	18.25	16.25	37.92	66.04	3.94
Paid/Physician	42.54	36.03	.29	.28	18.25	16.25	27.51	49.05	2.81
RVUs/Physician	21.84	18.87	.43	.47	16.84	16.78	22.38	40.20	2.34
Other Specialties									
Charge/Physician	38.75	24.77	.41	.58	30.44	29.41	22.51	19.65	.98
Allowed/Physician	33.48	21.17	.17	.17	14.24	10.52	19.40	16.10	.85
Paid/Physician	33.48	21.17	.17	.17	14.24	10.52	12.90	11.69	.57
RVUs/Physician	17.48	12.56	.22	.31	14.49	15.47	10.14	9.49	.44

TABLE B-97 (Continued)

Specialty	UCR Partici- pating	UCR Nonparti- cipating	Indemnity Partici- pating	Indemnity Nonparti- cipating	Partial Service Partici- pating	Partial Service Nonparti- cipating	Medicare Partici- pating	Medicare Nonparti- cipating	Medicare Claims Only
					1974				
General Practice									
Charge/Physician	11.12	4.26	.09	.01	8.28	3.96	46.04	27.98	18.40
Allowed/Physician	10.21	3.87	.06	.01	6.21	2.53	39.28	24.48	15.66
Paid/Physician	10.21	3.87	.06	.01	6.21	2.53	23.28	14.69	6.00
RVUs/Physician	5.22	1.80	.05	.01	4.23	1.76	30.09	13.54	11.10
Medical Specialties									
Charge/Physician	28.50	27.38	.13	.08	26.92	26.53	61.54	101.48	2.74
Allowed/Physician	25.78	23.98	.08	.04	16.52	14.92	54.48	81.18	2.48
Paid/Physician	25.78	23.98	.08	.04	16.52	14.92	36.17	54.27	1.55
RVUs/Physician	11.78	10.34	.06	.03	11.68	9.81	28.48	40.92	1.21
Surgical Specialties									
Charge/Physician	53.25	45.27	.70	.73	31.97	29.25	59.22	98.82	7.90
Allowed/Physician	46.84	39.03	.24	.24	15.74	13.02	50.16	81.84	7.01
Paid/Physician	46.84	39.03	.24	.24	15.74	13.02	37.09	60.74	4.92
RVUs/Physician	22.66	19.51	.34	.36	14.14	12.99	28.05	47.86	3.65
Other Specialties									
Charge/Physician	43.96	32.02	.49	.55	28.98	26.94	29.78	27.89	7.42
Allowed/Physician	37.54	28.41	.18	.13	12.58	10.08	25.06	23.08	6.85
Paid/Physician	37.54	28.41	.18	.13	12.58	10.08	17.34	16.16	4.59
RVUs/Physician	18.31	14.38	.21	.24	12.09	12.49	12.51	12.40	3.18

TABLE B-97 (Continued)

Specialty	UCR Partici- pating	UCR Nonparti- cipating	Indemnity Partici- pating	Indemnity Nonparti- cipating	Partial Service Partici- pating	Partial Service Nonparti- cipating	Medicare Partici- pating	Medicare Nonparti- cipating	Medicare Claims Only
					1975				
General Practice									
Charge/Physician	10.03	3.81	.73	.27	5.76	3.09	46.56	38.61	14.33
Allowed/Physician	9.29	3.63	.65	.24	4.44	2.12	38.23	30.03	12.12
Paid/Physician	9.25	3.61	.65	.24	4.44	2.12	22.31	16.85	4.82
RVUs/Physician	4.74	1.81	.36	.14	3.06	1.40	27.93	16.00	8.09
Medical Specialties									
Charge/Physician	29.57	33.10	1.94	2.73	16.96	23.12	64.92	123.88	3.08
Allowed/Physician	27.11	28.70	1.50	2.11	10.66	13.57	55.36	99.47	2.33
Paid/Physician	26.94	28.52	1.50	2.11	10.66	13.57	36.52	68.09	1.43
RVUs/Physician	11.99	12.40	.81	1.06	6.98	8.48	27.79	47.63	1.10
Surgical Specialties									
Charge/Physician	62.23	58.37	3.37	3.40	27.31	30.79	64.42	110.15	7.56
Allowed/Physician	54.13	50.46	2.26	2.41	12.11	12.28	51.77	86.67	6.37
Paid/Physician	53.86	50.23	2.26	2.41	12.11	12.28	38.30	64.47	4.31
RVUs/Physician	23.63	22.71	1.30	1.46	10.83	12.72	27.12	47.53	3.24
Other Specialties									
Charge/Physician	56.13	25.69	3.46	1.28	25.06	14.97	33.57	27.23	9.66
Allowed/Physician	50.02	22.99	2.30	.82	11.67	6.16	27.71	22.90	8.23
Paid/Physician	49.82	22.84	2.30	.82	11.67	6.16	19.17	16.41	5.97
RVUs/Physician	21.24	9.97	1.30	.44	9.42	5.70	12.22	11.59	4.39

TABLE B-97 (Continued)

Specialty	UCR Partici-pating	UCR Nonparti-cipating	Indemnity Partici-pating	Indemnity Nonparti-cipating	Partial Service Partici-pating	Partial Service Nonparti-cipating	Medicare Partici-pating	Medicare Nonparti-cipating	Medicare Claims Only
				1976					
General Practice									
Charge/Physician	12.15	5.15	2.33	.62	4.24	1.35	51.75	49.96	13.32
Allowed/Physician	10.77	4.81	2.09	.54	3.07	.84	41.97	37.93	11.68
Paid/Physician	10.68	4.79	2.09	.54	3.07	.84	25.58	22.22	5.28
RVUs/Physician	5.27	2.08	1.12	.27	2.05	.57	27.15	19.94	7.52
Medical Specialties									
Charge/Physician	30.92	33.94	5.21	8.23	11.41	13.67	68.36	123.19	2.09
Allowed/Physician	28.38	28.87	3.95	5.90	6.74	7.57	56.91	100.99	1.67
Paid/Physician	28.18	28.60	3.95	5.90	6.74	7.57	38.49	69.87	1.13
RVUs/Physician	11.81	11.90	2.02	2.89	4.26	4.73	27.65	46.31	.77
Surgical Specialties									
Charge/Physician	67.41	62.07	8.75	3.40	21.10	21.08	76.44	130.79	17.46
Allowed/Physician	55.13	49.88	5.97	2.41	8.30	7.48	60.88	101.40	15.59
Paid/Physician	54.75	49.45	5.97	2.41	8.30	7.48	45.58	76.89	9.09
RVUs/Physician	22.98	21.51	3.14	1.46	7.53	7.51	29.37	50.88	8.18
Other Specialties									
Charge/Physician	59.37	33.84	7.29	5.77	17.38	14.37	39.29	36.20	9.51
Allowed/Physician	50.13	28.11	4.92	3.75	6.63	4.93	31.56	29.09	7.85
Paid/Physician	49.79	27.94	4.92	3.75	6.63	4.93	22.39	20.91	5.49
RVUs/Physician	20.27	11.88	2.52	2.01	5.84	5.11	14.20	14.78	3.85

TABLE B-98

PLAN C PHYSICIAN SAMPLE: TOTAL DOLLAR VALUE OF CHARGES PER PHYSICIAN, TOTAL AMOUNT ALLOWED PER PHYSICIAN, TOTAL AMOUNT PAID PER PHYSICIAN, AND TOTAL RVUS PER PHYSICIAN, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR (FIGURES IN HUNDREDS)

	1975		1976		1977		1978	
Specialty	UCR	Indemnity	UCR	Indemnity	UCR	Indemnity	UCR	Indemnity
General Practice								
Charge/Physician	6.47	4.16	10.27	4.49	10.55	3.41	7.61	2.13
Allowed/Physician	5.62	2.31	9.26	2.31	9.36	1.77	7.31	1.11
Paid/Physician	5.59	2.30	8.35	2.24	7.74	1.65	5.64	1.07
RVUs/Physician	2.77	1.98	4.22	2.04	4.10	1.46	2.83	.85
Medical Specialties								
Charge/Physician	13.42	4.00	20.88	5.12	21.07	3.96	14.44	2.90
Allowed/Physician	11.78	2.01	18.78	2.31	18.97	1.70	13.85	1.19
Paid/Physician	11.51	1.93	17.25	2.20	15.93	1.57	11.02	1.09
RVUs/Physician	5.18	1.59	7.60	1.85	7.28	1.35	4.65	.92
Surgical Specialties								
Charge/Physician	13.39	9.95	20.48	11.55	24.03	8.23	17.80	5.34
Allowed/Physician	11.71	4.20	18.46	4.83	21.02	3.44	16.31	2.08
Paid/Physician	11.61	4.15	17.04	4.40	18.53	3.14	13.84	1.97
RVUs/Physician	5.31	4.12	7.71	4.41	8.42	2.92	5.88	1.78
Other Specialties								
Charge/Physician	23.40	6.16	31.31	5.99	32.32	5.16	26.63	4.84
Allowed/Physician	20.52	3.93	27.81	4.01	29.19	3.48	25.10	2.95
Paid/Physician	20.29	3.85	25.22	3.91	23.61	3.34	18.61	2.86
RVUs/Physician	10.51	3.44	12.79	3.06	12.48	2.43	9.33	2.03

TABLE B-99

PLAN A PHYSICIAN SAMPLE: PERCENTAGE CHANGES IN TOTAL DOLLAR VALUE OF CHARGES PER PHYSICIAN, TOTAL AMOUNT ALLOWED PER PHYSICIAN, TOTAL AMOUNT PAID PER PHYSICIAN, AND TOTAL RVUS PER PHYSICIAN, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

	1973-74				1974-75			
	UCR		Indemnity*		UCR		Indemnity*	
Specialty	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating
General Practice								
Charge/Physician	15.3	5.1	-26.3	-17.6	48.5	17.0	-14.8	-63.8
Allowed/Physician	15.7	2.1	-29.5	-24.0	44.9	12.4	-22.7	-63.9
Paid/Physician	15.7	2.1	-29.5	-24.0	44.7	12.4	-22.7	-63.9
RVUs/Physician	17.0	-9.0	-28.0	-27.5	32.3	6.1	-25.0	-68.0
Medical Specialties								
Charge/Physician	36.8	44.0	-6.0	13.4	51.8	43.9	-23.0	-21.2
Allowed/Physician	35.2	46.4	-9.2	6.7	50.3	38.1	-28.5	-27.6
Paid/Physician	35.4	46.5	-9.2	6.7	50.3	38.1	-28.5	-27.6
RVUs/Physician	28.0	36.0	-11.1	7.4	41.2	32.5	-27.4	-27.5
Surgical Specialties								
Charge/Physician	33.9	50.5	1.6	1.6	53.1	40.7	-19.3	-10.5
Allowed/Physician	34.4	45.9	-11.3	-13.8	50.8	32.8	-30.0	-22.7
Paid/Physician	34.3	45.9	-11.3	-13.8	50.8	32.7	-30.0	-22.7
RVUs/Physician	26.2	30.1	-2.6	-7.7	37.4	25.3	-27.5	-18.2
Other Specialties								
Charge/Physician	3.3	-2.6	-27.9	-10.2	50.5	32.6	-35.1	-41.5
Allowed/Physician	2.3	-7.4	-27.8	-22.5	49.4	27.3	-40.3	-49.3
Paid/Physician	2.3	-7.4	-27.8	-22.5	49.5	27.3	-40.3	-49.3
RVUs/Physician	-4.2	-15.8	-32.3	-24.0	32.0	22.2	-43.8	-51.5

TABLE B-99 (Continued)

Specialty	1975-76 UCR Partici-pating	1975-76 UCR Nonparti-cipating	1975-76 Indemnity* Partici-pating	1975-76 Indemnity* Nonparti-cipating	1973-76 UCR Partici-pating	1973-76 UCR Nonparti-cipating	1973-76 Indemnity* Partici-pating	1973-76 Indemnity* Nonparti-cipating
General Practice								
Charge/Physician	160.4	454.7	96.0	669.4	345.8	582.3	23.0	96.0
Allowed/Physician	164.9	444.2	73.2	521.1	344.1	524.6	-5.7	70.5
Paid/Physician	165.1	444.0	73.2	521.1	344.0	524.2	-5.7	70.5
RVUs/Physician	187.9	516.6	132.3	811.6	348.7	494.8	25.4	111.8
Medical Specialties								
Charge/Physician	151.9	83.5	122.7	60.8	423.4	280.2	61.2	43.6
Allowed/Physician	150.5	75.9	57.5	13.8	409.1	255.6	2.1	-12.2
Paid/Physician	150.4	75.8	57.5	13.8	409.4	255.5	2.1	-12.2
RVUs/Physician	149.6	76.7	127.0	60.3	351.4	218.3	46.4	24.7
Surgical Specialties								
Charge/Physician	42.3	45.3	-19.3	-10.5	191.7	207.7	9.3	13.8
Allowed/Physician	40.6	44.4	3.4	-.2	184.9	179.7	-35.8	-33.5
Paid/Physician	40.5	44.4	3.4	-.2	184.5	179.5	-35.8	-33.5
RVUs/Physician	32.3	32.9	2.3	3.6	129.8	116.5	-27.8	-21.7
Other Specialties								
Charge/Physician	48.2	161.3	51.3	188.0	130.4	237.4	-29.2	51.3
Allowed/Physician	47.2	152.5	23.7	150.1	124.9	197.6	-46.7	-1.7
Paid/Physician	47.1	152.3	23.7	150.1	124.8	197.3	-46.7	-1.7
RVUs/Physician	35.0	124.3	32.5	172.5	70.8	130.7	-49.6	.5

* Breakdown by participation status applies to physicians' participation status on UCR claims.

TABLE B-100

PLAN B PHYSICIAN SAMPLE: PERCENTAGE CHANGES IN TOTAL DOLLAR VALUE OF CHARGES PER PHYSICIAN, TOTAL AMOUNT ALLOWED PER PHYSICIAN, TOTAL AMOUNT PAID PER PHYSICIAN, AND TOTAL RVUS PER PHYSICIAN, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

	UCR		Indemnity		Partial Service		Medicare		
Specialty	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Partici-pating	Nonparti-cipating	Medicare Claims Only
1973-74									
General Practice									
Charge/Physician	17.7	348.8	-42.5	-42.6	-17.7	213.6	33.2	52.3	38.2
Allowed/Physician	17.1	355.9	-15.5	-42.6	-22.0	160.8	29.0	53.1	37.0
Paid/Physician	17.1	355.9	-15.5	-42.6	-22.0	160.8	34.8	112.5	42.4
RVUs/Physician	5.3	360.5	-9.5	-68.6	-22.3	259.3	25.5	31.4	33.9
Medical Specialties									
Charge/Physician	6.6	14.1	69.4	13.5	-7.1	-16.9	32.4	34.9	-6.0
Allowed/Physician	4.5	15.2	15.2	11.1	-12.6	-13.7	29.2	39.3	-8.0
Paid/Physician	4.5	15.2	15.2	11.1	-12.6	-13.7	32.4	43.6	17.0
RVUs/Physician	-.5	9.6	41.7	18.0	-12.8	-18.2	23.6	30.0	-15.0
Surgical Specialties									
Charge/Physician	14.3	12.9	-7.9	7.6	-6.7	-13.9	37.8	32.6	72.2
Allowed/Physician	10.1	8.3	-17.9	-16.4	-13.7	-19.9	32.3	23.9	77.4
Paid/Physician	10.1	8.3	-17.9	-16.4	-13.7	-19.9	34.8	23.8	74.8
RVUs/Physician	3.8	3.4	-19.7	-24.2	-16.1	-23.4	25.4	19.1	56.1
Other Specialties									
Charge/Physician	13.5	29.3	20.3	-4.0	-4.8	-8.4	32.3	41.9	653.5
Allowed/Physician	12.1	34.2	3.4	-21.2	-11.7	-4.2	29.2	43.3	701.0
Paid/Physician	12.1	34.2	3.4	-21.2	-11.7	-4.2	34.4	38.2	698.9
RVUs/Physician	4.7	14.5	-4.2	-22.0	-16.5	-19.3	23.3	30.7	624.8

TABLE B-100 (Continued)

Specialty	UCR Partici-pating	UCR Nonparti-cipating	Indemnity Partici-pating	Indemnity Nonparti-cipating	Partial Service Partici-pating	Partial Service Nonparti-cipating	Medicare Partici-pating	Medicare Nonparti-cipating	Medicare Claims Only
				1974-75					
General Practice									
Charge/Physician	-9.8	-10.8	1880.0	751.5	-30.4	-22.1	1.1	38.0	-22.1
Allowed/Physician	-9.0	-6.3	998.6	1630.7	-28.4	-16.2	-2.7	22.1	-22.7
Paid/Physician	-9.4	-6.7	998.6	1630.7	-28.4	-16.2	-4.2	14.7	-19.8
RVUs/Physician	-9.1	.4	589.3	1775.5	-27.7	-20.4	-7.2	18.2	-7.1
Medical Specialties									
Charge/Physician	3.8	20.9	1386.8	3301.7	-37.0	-12.8	5.5	22.1	12.2
Allowed/Physician	5.2	19.7	1856.3	4787.9	-35.5	-9.0	1.6	22.5	-6.0
Paid/Physician	4.5	18.9	1856.3	4787.9	-35.5	-9.0	1.0	25.5	-7.9
RVUs/Physician	1.8	19.9	1348.9	3300.8	-40.3	-13.5	-2.4	16.4	-9.1
Surgical Specialties									
Charge/Physician	16.9	28.9	377.8	363.0	-14.6	5.3	8.8	11.5	-4.4
Allowed/Physician	15.6	29.3	843.1	910.0	-23.1	-5.6	3.2	5.9	-9.2
Paid/Physician	15.0	28.7	843.1	910.0	-23.1	-5.6	3.3	6.1	-12.4
RVUs/Physician	4.3	16.4	278.1	308.5	-23.4	-2.1	-3.3	-.7	-11.1
Other Specialties									
Charge/Physician	27.7	-19.8	599.3	130.7	-13.5	-44.4	12.7	-2.4	30.2
Allowed/Physician	33.3	-19.1	1208.4	526.2	-7.2	-38.9	10.6	-.8	30.2
Paid/Physician	32.7	-19.6	1208.4	526.2	-7.2	-38.9	10.6	1.6	30.2
RVUs/Physician	16.0	-30.7	507.2	83.7	-22.1	-54.4	-2.4	-6.6	37.8

TABLE B-100 (Continued)

Specialty	UCR Partici-pating	UCR Nonparti-cipating	Indemnity Partici-pating	Indemnity Nonparti-cipating	Partial Service Partici-pating	Partial Service Nonparti-cipating	Medicare Partici-pating	Medicare Nonparti-cipating	Medicare Claims Only
					1975-76				
General Practice									
Charge/Physician	21.1	35.3	221.1	130.5	-26.5	-56.2	11.1	29.4	-7.0
Allowed/Physician	16.0	32.8	223.0	129.5	-31.0	-60.2	9.8	26.3	-3.6
Paid/Physician	15.5	32.6	223.0	129.5	-31.0	-60.2	14.6	31.8	9.6
RVUs/Physician	11.1	15.4	213.1	101.2	-33.0	-59.4	-2.8	24.6	-7.1
Medical Specialties									
Charge/Physician	4.5	2.5	169.3	201.0	-32.7	-40.9	5.3	-.6	-32.0
Allowed/Physician	4.7	.6	163.3	179.9	-36.8	-44.2	2.8	1.5	-28.2
Paid/Physician	4.6	.3	163.3	179.9	-36.8	-44.2	5.4	2.6	-21.1
RVUs/Physician	-1.5	-4.0	150.1	173.1	-39.0	-44.2	-.5	-2.8	-30.6
Surgical Specialties									
Charge/Physician	8.3	6.3	159.8	131.5	-22.7	-31.6	18.7	18.7	131.2
Allowed/Physician	1.9	-1.2	164.1	120.3	-31.5	-39.1	17.6	17.0	144.9
Paid/Physician	1.7	-1.6	164.1	120.3	-31.5	-39.1	19.0	19.3	110.8
RVUs/Physician	-2.8	-5.3	142.4	102.4	-30.5	-40.9	8.3	7.0	152.3
Other Specialties									
Charge/Physician	5.8	31.7	111.1	351.4	-30.7	-4.0	17.0	32.9	-1.6
Allowed/Physician	.2	22.3	113.9	355.7	-43.2	-20.0	13.9	27.0	-4.6
Paid/Physician	-.1	22.3	113.9	355.7	-43.2	-20.0	16.8	27.4	-8.0
RVUs/Physician	-4.6	19.2	94.3	358.2	-38.0	-10.2	16.2	27.6	-12.4

TABLE B-100 (Continued)

Specialty	UCR Partici-pating	UCR Nonparti-cipating	Indemnity Partici-pating	Indemnity Nonparti-cipating	Partial Service Partici-pating	Partial Service Nonparti-cipating	Medicare Partici-pating	Medicare Nonparti-cipating	Medicare Claims Only
					1973-76				
General Practice									
Charge/Physician	28.6	441.8	1471.4	2519.9	-57.9	7.1	49.7	171.9	-.0
Allowed/Physician	23.5	467.2	2899.8	2180.7	-61.5	-13.1	37.9	137.1	2.2
Paid/Physician	22.5	464.1	2899.8	2180.7	-61.5	-13.1	48.1	221.4	25.2
RVUs/Physician	6.4	433.3	1852.7	1083.4	-62.4	16.2	18.5	97.3	-15.0
Medical Specialties									
Charge/Physician	15.7	41.4	6684.0	11517.7	-60.6	-57.2	47.1	63.8	-28.3
Allowed/Physician	15.1	38.7	5834.6	15096.0	-64.3	-56.2	34.9	73.3	-38.0
Paid/Physician	14.3	37.4	5834.6	15096.0	-64.3	-56.2	41.0	84.9	-14.9
RVUs/Physician	-.3	26.1	5034.0	10861.9	-68.3	-60.5	20.0	47.1	-46.3
Surgical Specialties									
Charge/Physician	44.7	54.8	1043.3	1054.0	-38.4	-38.0	77.9	75.5	280.8
Allowed/Physician	29.6	38.4	1944.0	1760.0	-54.5	-54.0	60.5	53.5	294.8
Paid/Physician	28.7	37.3	1944.0	1760.0	-54.5	-54.0	65.7	56.7	223.0
RVUs/Physician	5.2	14.0	635.7	526.8	-55.3	-55.2	31.3	26.6	249.8
Other Specialties									
Charge/Physician	53.2	36.6	1675.8	899.5	-42.9	-51.1	74.6	84.2	865.7
Allowed/Physician	49.7	32.8	2793.4	2148.1	-53.4	-53.1	62.7	80.7	818.4
Paid/Physician	48.7	32.0	2793.4	2148.1	-53.4	-53.1	73.6	78.8	857.0
RVUs/Physician	16.0	-5.4	1030.0	556.5	-59.7	-66.9	40.0	55.8	775.1

TABLE B-101

PLAN C PHYSICIAN SAMPLE: PERCENTAGE CHANGES IN TOTAL DOLLAR VALUE OF CHARGES PER PHYSICIAN, TOTAL AMOUNT ALLOWED PER PHYSICIAN, TOTAL AMOUNT PAID PER PHYSICIAN, AND TOTAL RVUS PER PHYSICIAN, CLASSIFIED BY LINE OF BUSINESS, PARTICIPATION STATUS, AND YEAR

	1975-76		1976-77		1977-78		1975-78	
Specialty	UCR	Indemnity	UCR	Indemnity	UCR	Indemnity	UCR	Indemnity
General Practice								
Charge/Physician	58.7	7.9	2.7	-24.0	-27.9	-37.7	17.5	-48.9
Allowed/Physician	64.6	0.2	1.1	-23.5	-21.9	-37.1	30.0	-51.8
Paid/Physician	49.3	-2.5	-7.3	-26.2	-27.1	-35.3	1.0	-53.5
RVUs/Physician	52.1	2.6	-2.9	-28.1	-30.9	-41.7	2.1	-57.0
Medical Specialties								
Charge/Physician	55.7	28.0	0.9	-22.6	-31.5	-26.8	7.6	-27.5
Allowed/Physician	59.5	14.8	1.0	-26.6	-27.0	-29.9	17.6	-41.0
Paid/Physician	49.9	13.9	-7.7	-28.5	-30.8	-30.7	-4.3	-43.6
RVUs/Physician	46.7	16.6	-4.3	-26.8	-36.1	-32.2	-10.3	-42.1
Surgical Specialties								
Charge/Physician	52.9	16.1	17.4	-28.7	-25.9	-35.1	32.9	-46.3
Allowed/Physician	57.6	15.1	13.9	-28.8	-22.4	-39.6	39.3	-50.5
Paid/Physician	46.8	6.2	8.8	-28.7	-25.3	-37.1	19.2	-52.4
RVUs/Physician	45.1	7.1	9.1	-34.0	-30.2	-38.8	10.6	-56.7
Other Specialties								
Charge/Physician	33.8	-2.8	3.2	-13.8	-17.6	-6.2	13.8	-21.4
Allowed/Physician	35.5	2.1	5.0	-13.2	-14.0	-15.1	22.3	-24.9
Paid/Physician	24.3	1.4	-6.4	-14.4	-21.1	-14.3	-8.3	-25.7
RVUs/Physician	21.7	-11.2	-2.4	-20.4	-25.3	-16.6	-11.3	-41.1

APPENDIX C

APPENDIX C

Contents

Contents (Continued)

TABLE C-1

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN A, UCR, GENERAL PRACTICE, PARTICIPATING

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	1.08019	INTERCEPT	7.16582	INTERCEPT	-2.27375
CPRVLAG	-0.01921	CPR2LAG	-0.61194*	APRGRCW	1.07045**
APRVLAG	0.00289	APRVLAG	-1.04645**	LAGPRCLM	0.00463
LAGPRCLM	0.00245	LAGPRCLM	-0.00668	AGE	-0.00643
AGE	-0.00416	AGE	-0.01037	BORDCERT	0.86653**
BORDCERT	0.47156*	BORDCERT	0.64279	FMG	0.18265
FMG	0.04393	FMG	-0.17721	GROUP	-0.99106*
GROUP	-0.50134	GROUP	-0.49951	HOSPEMPL	-0.08347
HOSPEMPL	-0.32495	HOSPEMPL	-0.61339	INPAHOSP	-0.18957
INPAHOSP	-0.56280**	INPAHOSP	-0.61859	OLDRVU	-0.46533
OLDRVU	2.10070	OLDRVU	-0.81924	PCTFEMRV	-0.43854
PCTFEMRV	-0.25239	PCTFEMRV	-0.25756	YNGRVU	0.05599
YNGRVU	0.85332**	YNGRVU	0.85015	GPPRCAP	20813.50000
GPPRCAP	6399.14600	GPPRCAP	5464.46700	INPERCAP	0.00090
INPERCAP	0.00015	INPERCAP	-0.00270	OVER65	-17.65917
OVER65	-2.52439	OVER65	22.18621	PRCT_URB	-0.00038
PRCT_URB	-0.00005	PRCT_URB	-0.00096	WAGEINDX	-0.04215
WAGEINDX	0.00497	WAGEINDX	0.43842	TIME75	0.44556
TIME75	0.24009	TIME76	0.85930	TIME76	-0.31302
TIME76	0.00831				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	48	25	49
R^2	.63	.71	.53
F-ratio	4.33	3.40	3.11
Prob > F	.0001	.0026	.0008

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-2

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN A, UCR, MEDICAL SPECIALTIES, PARTICIPATING

Specification 1

Variable	Coefficient Estimate
INTERCEPT	4.22164
CPRVLAG	0.08651
APRVLAG	0.40447**
LAGPRCLM	-0.00055
AGE	-0.00089
AMASEX	0.03245
BORDCERT	0.03358
FMG	0.04467
GROUP	-0.02871
PARTNER	-0.05449
HOSPEMPL	-0.03020
OTH_EMPL	0.00008
INPAHOSP	-0.21929*
OLDRVU	-1.40234
PCTFEMRV	-0.09408
YNGRVU	0.03309
MSPRCAP	1703.85800
INPERCAP	-0.00086*
OVER65	-3.89702
PRCT_URB	-0.00089
WAGEINDX	0.10604*
TIME75	-0.18621
TIME76	0.24244
PD	-0.04536
OMS	-0.00364

Specification 2

Variable	Coefficient Estimate
INTERCEPT	11.57576
CPR2LAG	-0.07232
APRVLAG	-0.51161**
LAGPRCLM	0.00059
AGE	-0.00387
AMASEX	-0.06496
BORDCERT	0.02367
FMG	0.03838
GROUP	-0.06860
PARTNER	-0.10428
HOSPEMPL	0.01485
OTH_EMPL	-0.04058
INPAHOSP	-0.37552*
OLDRVU	-1.98685
PCTFEMRV	-0.30352
YNGRVU	0.26713
MSPRCAP	8426.31100
INPERCAP	-0.00190
OVER65	-31.13545
PRCT_URB	-0.00448
WAGEINDX	0.19121
TIME76	0.93551*
PD	-0.20363
OMS	0.01212

Specification 3

Variable	Coefficient Estimate
INTERCEPT	3.29095
APRGROW	0.88731**
LAGPRCLM	-0.00012
AGE	0.00128
AMASEX	0.05957
BORDCERT	0.05096
FMG	0.08181
GROUP	0.05001
PARTNER	0.02058
HOSPEMPL	0.10133
OTH_EMPL	-0.04429
INPAHOSP	-0.30881**
OLDRVU	-1.60717
PCTFEMRV	-0.16171
YNGRVU	-0.04397
MSPRCAP	836.35638
INPERCAP	-0.00032
OVER65	-2.89546
PRCT_URB	-0.00108
WAGEINDX	0.08476
TIME75	-0.04599
TIME76	0.08895
PD	-0.04276
OMS	0.06277

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	166	98	167
R^2	.53	.39	.38
F-ratio	7.72	2.73	4.54
Prob > F	.0001	.0003	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-3

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN A, UCR, OTHER SPECIALTIES, PARTICIPATING

Specification 1

Variable	Coefficient Estimate
INTERCEPT	15.16559
CPRVLAG	0.58782 **
APRVLAG	-0.31840
LAGPRCLM	-0.00147 *
AGE	-0.00141
AMASEX	-0.05385
BORDCERT	0.05960
FMG	-0.06149
GROUP	-0.10718
PARTNER	-0.08596
HOSPEMPL	0.22604
OTH_EMPL	0.08010
INPAHOSP	-0.17588
OLDRVU	-0.12916
PCTFEMRV	-0.34751 **
YNGRVU	-0.36253 *
OTPRCAP	-6665.17000
INPERCAP	0.00025
OVER65	-149.72308
WAGEINDX	0.11768
TIME75	0.10213
AN	0.27791
P	-0.32197 **
N	-0.25576

Specification 2

Variable	Coefficient Estimate
INTERCEPT	93.62399
CPR2LAG	0.01576
APRVLAG	-0.82043**
LAGPRCLM	0.00029
AGE	0.00061
AMASEX	0.01589
BORDCERT	0.09717
FMG	-0.05239
GROUP	-0.10658
PARTNER	-0.11189
HOSPEMPL	0.36436*
OTH_EMPL	0.02462
INPAHCSP	-0.33293*
OLDRVU	0.26757
PCTFEMRV	-0.52289**
YNGRVU	-0.69509**
OTPRCAP	-18203.30000
INPERCAP	0.00096
OVER65	-923.67464
AN	0.55466**
P	-0.46500**
N	-0.30207

Specification 3

Variable	Coefficient Estimate
INTERCEPT	5.18405
APRGROW	0.95618**
LAGPRCLM	-0.00126
AGE	-0.00072
AMASEX	-0.02290
BORDCERT	0.07544
FMG	-0.06262
GROUP	-0.14771*
PARTNER	-0.12258
HOSPEMPL	0.53085**
OTH_EMPL	0.01492
INPAHOSP	-0.05514
OLDRVU	0.16808
PCTFEMRV	-0.28844*
YNGRVU	-0.57872**
OTPRCAP	-4515.23000
INPERCAP	0.00079
OVER65	-61.23899
WAGEINDX	0.04465
TIME75	0.24981
AN	0.12861
P	-0.36228**
N	-0.36843*

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	164	101	165
R^2	.72	.59	.75
F-ratio	18.71	6.83	22.07
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C - 4

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN A, UCR, SURGICAL SPECIALTIES, PARTICIPATING

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	-0.87183	INTERCEPT	-2.16562	INTERCEPT	-2.10264
CPRVLAG	0.32740**	CPR2LAG	0.34381**	APRGROW	0.86708**
APRVLAG	0.25095**	APRVLAG	-0.55671**	LAGPRCLM	-0.00360**
LAGPRCLM	-0.00101*	LAGPRCLM	0.00019	AGE	0.00448
AGE	-0.00086	AGE	-0.00213	AMASEX	0.08229
AMASEX	-0.02922	AMASEX	0.14539	BORDCERT	0.11096
BORDCERT	0.03349	BORDCERT	0.04577	FMG	0.02751
FMG	0.02227	FMG	0.08533	SPEC_2ND	-0.08151
SPEC_2ND	-0.13633	SPEC_2ND	-0.22095	GROUP	0.10949
GROUP	0.07294	GROUP	0.05967	PARTNER	0.04298
PARTNER	-0.01163	PARTNER	-0.03471	HOSPEMPL	0.43934**
HOSPEMPL	-0.01442	HOSPEMPL	-0.20368	OTH_EMPL	0.08175
OTH_EMPL	-0.00118	OTH_EMPL	-0.14650	INPAHOSP	-0.51507**
INPAHOSP	-0.38661**	INPAHOSP	-0.38540**	OLDRVU	0.00616
OLDRVU	0.01355	OLDRVU	0.05428	PCTFEMRV	-0.10282
PCTFEMRV	-0.08732	PCTFEMRV	-0.23632	YNGRVU	-0.26127
YNGRVU	0.07759	YNGRVU	0.55152**	SSPRCAP	-6703.61000
SSPRCAP	-4806.57000	SSPRCAP	-6161.64000	INPERCAP	0.00090
INPERCAP	0.00025	INPERCAP	0.00063	OVER65	21.39342
OVER65	17.37317	OVER65	19.51067	PRCT_URB	0.00092
PRCT_URB	0.00066	PRCT_URB	0.00112	WAGEINDX	-0.01007
WAGEINDX	0.02568	WAGEINDX	-0.02068	TIME75	0.27607*
TIME75	0.07794	TIME76	-0.43542	TIME76	-0.17721
TIME76	-0.17926	NS	-0.09909	NS	-0.30831*
NS	0.00804	ORS	-0.23351*	ORS	0.43940**
ORS	0.03584	OTO	0.20693	OTO	0.18655
OTO	0.22017	U	-0.05626	U	-0.19280
U	-0.03105	OSS	0.31593	OSS	0.07131
OSS	0.19414*	OBG	0.23938**	OBG	-0.00311
OBG	0.11775**	OPH	-0.20150	OPH	-0.03154
OPH	0.00156				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	390	237	391
R^2	.71	.29	.43
F-ratio	31.92	3.38	10.07
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C - 5

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN A, UCR, SPECIFICATION 3

General Practice

Variable	Coefficient Estimate
INTERCEPT	3.594722
NONPART	0.080773
APRGROW	0.991429 *
INTER3	-0.268522
LAGPRCLM	0.004835
AGE	-0.001307
AMASEX	.
BORDCERT	0.218643
FMG	0.183420
SPEC_2ND	.
GROUP	-0.252056
PARTNER	.
HOSPEMPL	-0.010416
OTH_EMPL	.
INPAHOSP	-0.063409
CLDRVU	-0.014377
PCTFEMRV	-0.282747
YNGRVU	0.226885
SPECPRCP	1922.617000
INPERCAP	-0.000638
OVER65	0.659483
PRCT_URB	-0.000126
WAGEINDX	0.071969
TIME75	0.078661
TIME76	0.230932

Dep. Variable	CPRVU
DFE	59
R^2	.45
F-ratio	2.38
Prob > F	.0054

Medical Specialties

Variable	Coefficient Estimate
INTERCEPT	4.663222
NONPART	0.192899 **
APRGROW	0.978230 **
INTER3	-0.615276 *
LAGPRCLM	0.000836
AGE	0.004738
AMASEX	0.270990
BORDCERT	0.117159 *
FMG	0.016426
SPEC_2ND	.
GROUP	0.228797 **
PARTNER	0.115296
HOSPEMPL	0.232764 *
OTH_EMPL	-0.088569
INPAHOSP	-0.032745
CLDRVU	-2.066007
PCTFEMRV	-0.326337 *
YNGRVU	0.121192
SPECPRCP	3240.399000
INPERCAP	-0.000378
OVER65	-10.293001
PRCT_URB	-0.001899
WAGEINDX	0.045368
TIME75	0.054343
TIME76	0.241109
PD	-0.393641 **
OMS	0.017952

Dep. Variable	CPRVU
DFE	237
R^2	.43
F-ratio	7.09
Prob > F	.0001

TABLE C- 5 (CONTINUED)

Other Specialties		Surgical Specialties	
Variable	Coefficient Estimates	Variable	Coefficient Estimate
INTERCEPT	-3.984354	INTERCEPT	-1.335097
NCNPART	0.364185**	NCNPART	-0.009518
APRGROW	0.991465**	APRGROW	0.831530**
INTER3	0.366378	INTER3	-0.012552
LAGPRCLM	-0.000621	LAGPRCLM	-0.002390**
AGE	-0.001552	AGE	0.001801
AMASEX	0.002754	AMASEX	0.077461
BCRDCERT	0.058882	BCRDCERT	-0.054214
FMG	-0.065156	FMG	0.003084
SPEC_2ND	-0.009727	SPEC_2ND	0.094164
GROUP	-0.118135	GROUP	0.145985*
PARTNER	-0.113897	PARTNER	0.032321
HOSPEMPL	0.551929**	HOSPEMPL	0.299580**
OTH_EMPL	-0.026752	OTH_EMPL	0.084650
INPAHOSP	0.032932	INPAHOSP	-0.578225**
CLDRVU	0.237468	CLDRVU	0.268013
PCTFEMRV	-0.359738**	PCTFEMRV	-0.203601
YNGRVU	-0.713117**	YNGRVU	-0.262231
SPECPRCP	-5989.870000	SPECPRCP	-5713.210000
INPERCAP	0.001068	INPERCAP	0.000840
OVER65	16.524428	OVER65	18.783760
PRCT_URB	0.000769	PRCT_URB	0.000713
WAGEINDX	0.042700	WAGEINDX	-0.015113
TIME75	0.243164	TIME75	0.305817*
TIME76	-0.210208	TIME76	-0.099969
AN	-0.013504	NS	-0.077731
PTH	-0.148121	CRS	0.352272**
P	-0.500540**	OTO	0.209230
N	-0.489464**	U	-0.210821*
		OSS	0.019325
		OBG	0.105270
		OPH	-0.092214
Dep. Variable	CPRVU		CPRVU
DFE	208		511
R^2	.70		.40
F-ratio	17.67		10.77
Prob > F	.0001		.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests). A dot in place of a coefficient estimate indicates no data were available in the sample for the variable.

TABLE C - 6

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, UCR, GENERAL PRACTICE, PARTICIPATING

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.871127*	INTERCEPT	0.598584	INTERCEPT	0.337367
CPRVLAG	0.356489**	CPR2LAG	-0.039448	APRGROW	0.786659**
APRVLAG	0.076984	APRVLAG	-0.481099**	LAGPRCLM	-0.000426
LAGPRCLM	0.000688	LAGPRCLM	-0.000924	AGE	-0.002149
AGE	-0.003367	AGE	-0.003242	BORDCERT	0.323632**
BORDCERT	0.119592*	BORDCERT	0.097566	FMG	-0.131119
FMG	0.005569	FMG	0.078452	GROUP	-0.302303
GROUP	-0.026325	GROUP	-0.119496	PARTNER	-0.162676
PARTNER	-0.059822	PARTNER	0.057131	INPAHOSP	-0.257475**
INPAHOSP	-0.045925	INPAHOSP	-0.131970	OLDRVU	1.047796*
OLDRVU	-0.158093	OLDRVU	0.331271	PCTFEMRV	0.356339*
PCTFEMRV	-0.311620*	PCTFEMRV	-0.125164	YNGRVU	0.988976**
YNGRVU	0.776602**	YNGRVU	0.174535	SPECPRCP	809.425494
SPECPRCP	-290.870769	SPECPRCP	-36.086225	INPERCAP	0.000312**
INPERCAP	0.000040	INPERCAP	0.000052	OVER65	1.721160
OVER65	0.342153	OVER65	-0.312443	PRCT_URB	-0.000531*
PRCT_URB	-0.000100	PRCT_URB	0.000015	WAGEINDX	0.048551**
WAGEINDX	0.038079**	WAGEINDX	0.039180	TIME75	-0.024869
TIME75	-0.099643	TIME75	0.022791	TIME76	-0.251625*
TIME76	-0.169638	AREA_2	-0.079256	AREA_2	-0.051325
AREA_2	-0.031360	AREA_3	0.122732	AREA_3	-0.141395
AREA_3	-0.038296				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	110	66	111
R^2	.56	.47	.49
F-ratio	6.57	2.88	5.25
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-7

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, UCR, MEDICAL SPECIALTIES, PARTICIPATING

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.719985	INTERCEPT	0.744742	INTERCEPT	1.044356
CPRVLAG	0.365542**	CPR2LAG	-0.009078	APRGROW	0.768777**
APRVLAG	0.216083**	APRVLAG	-0.274714**	LAGPRCLM	0.001962*
LAGPRCLM	-0.000964	LAGPRCLM	-0.001531	AGE	-0.007520**
AGE	0.000235	AGE	0.000566	AMASEX	0.126083
AMASEX	0.013095	AMASEX	-0.110609	BORDCERT	0.163683**
BORDCERT	0.050296	BORDCERT	-0.014615	FMG	-0.087050
FMG	-0.002927	FMG	-0.047463	GROUP	-0.283831
GROUP	-0.126318	GROUP	0.002800	PARTNER	0.064661
PARTNER	-0.034346	PARTNER	0.022944	HOSPEMPL	0.410959**
HOSPEMPL	0.137232*	HOSPEMPL	0.287334**	OTH_EMPL	0.818083**
OTH_EMPL	-0.047010	OTH_EMPL	0.160064	INPAHOSP	0.209622*
INPAHOSP	0.200125**	INPAHOSP	0.275736**	OLDRVU	-0.650057
OLDRVU	-1.015549**	OLDRVU	-0.428765	PCTFEMRV	0.312526
PCTFEMRV	-0.098750	PCTFEMRV	0.185270	YNGRVU	-1.278077
YNGRVU	-0.213906	YNGRVU	-0.872491	SPECPRCP	-1152.610000**
SPECPRCP	-356.137430	SPECPRCP	97.266447	INPERCAP	-0.000017
INPERCAP	-0.000033	INPERCAP	-0.000028	OVER65	5.635236
OVER65	0.415416	OVER65	-3.144605	PRCT_URB	-0.000011
PRCT_URB	0.000121	PRCT_URB	0.000233	WAGEINDX	0.109007**
WAGEINDX	0.022400	WAGEINDX	-0.009592	TIME75	-0.059431
TIME75	-0.035318	TIME76	0.242011*	TIME76	-0.177320
TIME76	0.081299	AREA_2	-0.085922	AREA_2	-0.623862**
AREA_2	-0.196784	AREA_3	0.114025	AREA_3	-0.279577
AREA_3	0.031773	PD_	0.026368	PD_	-0.306583*
PD_	-0.122824	OMS	0.047909	OMS	0.059733
OMS	-0.001333				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	285	180	286
R^2	.66	.27	.43
F-ratio	20.88	2.62	8.78
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-8

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, UCR, OTHER SPECIALTIES, PARTICIPATING

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	-0.013381	INTERCEPT	-0.731678	INTERCEPT	0.189622
CPRVLAG	0.146621	CPR2LAG	0.348840 *	APRGROW	1.703205 **
APRVLAG	0.605622**	APRVLAG	-0.378497	LAGPRCLM	0.001749
LAGPRCLM	-0.000025	LAGPRCLM	0.002651	AGE	-0.011564
AGE	0.001202	AGE	0.008533	AMASEX	-0.073300
AMASEX	0.132288	AMASEX	0.077071	BORDCERT	0.046267
BORDCERT	0.017153	BORDCERT	0.084528	FMG	0.034420
FMG	0.001696	FMG	0.077098	SPEC_2ND	-0.296068
SPEC_2ND	-0.054670	SPEC_2ND	-0.227246	GROUP	0.352450 *
GROUP	-0.040603	GROUP	0.062973	PARTNER	0.470650 **
PARTNER	0.027611	PARTNER	-0.020844	HOSPEMPL	0.323899 *
HOSPEMPL	-0.097306	HOSPEMPL	-0.065311	OTH_EMPL	-0.311978
OTH_EMPL	-0.136801	OTH_EMPL	0.105467	INPAHOSP	0.088521
INPAHOSP	0.147223	INPAHOSP	0.102210	OLDRVU	-1.456975
OLDRVU	-0.695337	OLDRVU	-1.942864	PCTFEMRV	-0.129174
PCTFEMRV	-0.120866	PCTFEMRV	0.323216	YNGRVU	-1.673048 **
YNGRVU	0.133767	YNGRVU	0.394391	SPECPRCP	2204.422000
SPECPRCP	-592.396277	SPECPRCP	-4434.740000	INPERCAP	0.000593
INPERCAP	0.000051	INPERCAP	-0.000362	OVER65	8.115837
OVER65	2.840955	OVER65	6.370509	PRCT_URB	-0.000609
PRCT_URB	0.000225	PRCT_URB	0.001620	WAGEINDX	-0.006152
WAGEINDX	0.022643	WAGEINDX	0.076588	TIME75	0.118094
TIME75	0.155480*	TIME76	0.001959	TIME76	0.105731
TIME76	-0.123335	AREA_2	-0.851136	AREA_2	0.253823
AREA_2	-0.249832	AREA_3	1.106843	AREA_3	-0.333950
AREA_3	0.013452	AN	-0.043757	AN	-0.497354 *
AN	-0.237068*	PTH	-0.692159	PTH	-0.867099 **
PTH	-0.242039	P	-0.867267 **	P	-0.245584
P	-0.349657**	N	-0.554870	N	0.260518
N	-0.246231*				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	174	106	175
R^2	.66	.24	.48
F-ratio	11.82	1.20	5.70
Prob > F	.0001	.2501	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-9

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, UCR, SURGICAL SPECIALTIES, PARTICIPATING

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	1.160503**	INTERCEPT	1.743017**	INTERCEPT	2.832430**
CPRVLAG	0.193865**	CPR2LAG	0.237040**	APRGROW	0.153943**
APRVLAG	0.452415**	APRVLAG	-0.468056**	LAGPRCLM	-0.001791*
LAGPRCLM	0.000176	LAGPRCLM	0.000819	AGE	-0.009552**
AGE	-0.003371*	AGE	-0.003047	AMASEX	-0.184892
AMASEX	-0.053230	AMASEX	-0.094661	BORDCERT	-0.086739
BORDCERT	-0.057521*	BORDCERT	-0.050288	FMG	0.193083**
FMG	0.030787	FMG	0.026371	SPEC_2ND	0.034071
SPEC_2ND	0.077548	SPEC_2ND	0.632324**	GROUP	-0.006018
GROUP	-0.024078	GROUP	0.011851	PARTNER	-0.015713
PARTNER	-0.067573*	PARTNER	-0.018540	HOSPEMPL	-0.098727
HOSPEMPL	-0.038761	HOSPEMPL	-0.110068	OTH_EMPL	0.292040
OTH_EMPL	-0.156392	OTH_EMPL	-1.024815**	INPAHOSP	-0.131857
INPAHOSP	-0.076902	INPAHOSP	-0.181256	OLDRVU	-0.163227
OLDRVU	-0.463630	OLDRVU	-1.029060*	PCTFEMRV	-0.095230
PCTFEMRV	-0.005166	PCTFEMRV	0.077301	YNGRVU	-0.411794*
YNGRVU	-0.303151**	YNGRVU	-0.419692*	SPECPRCP	404.800306
SPECPRCP	185.590182	SPECPRCP	278.936549	INPERCAP	0.000061
INPERCAP	0.000004	INPERCAP	-0.000054	OVER65	-3.099628
OVER65	-1.536471	OVER65	-3.249753	PRCT_URB	0.000019
PRCT_URB	-0.000024	PRCT_URB	0.000077	WAGEINDX	0.009676
WAGEINDX	-0.008281	WAGEINDX	-0.031937	TIME75	0.227103**
TIME75	0.129885**	TIME76	0.176874**	TIME76	0.450595**
TIME76	0.121062*	AREA_2	-0.027300	AREA_2	-0.172508
AREA_2	-0.019867	AREA_3	-0.043569	AREA_3	-0.108717
AREA_3	-0.041743	NS	-0.027899	NS	-0.102359
NS	0.113712	ORS	-0.060362	ORS	0.449559**
ORS	0.125568*	OTO	0.535363**	OTO	0.771440**
OTO	0.369712**	U	0.083024	U	0.168212
U	0.096498	OSS	-0.352301	OSS	0.741347**
OSS	0.201949	OBG	0.038584	OBG	0.192852*
OBG	0.067880	OPH	0.062684	OPH	0.044508
OPH	0.021884				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	559	358	560
R^2	.69	.22	.39
F-ratio	39.30	3.17	11.65
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two tailed-tests).

TABLE C- 10

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, UCR, SPECIFICATION 3

General Practice		Medical Specialties	
Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	1.010392*	INTERCEPT	1.880572**
NONPART	0.087097	NONPART	0.256006**
APRGROW	0.804671**	APRGROW	-0.112468
INTER3	-0.416451	INTER3	0.896119*
LAGPRCLM	-0.001213	LAGPRCLM	0.002527**
AGE	-0.009969**	AGE	-0.003769
AMASEX	0.899029**	AMASEX	0.356067**
BORDCERT	0.197208**	BORDCERT	0.213046**
FMG	-0.173944*	FMG	0.003364
SPEC_2ND	.	SPEC_2ND	-0.311327
GROUP	-0.279531	GROUP	-0.211466
PARTNER	-0.134522	PARTNER	-0.126813*
HOSPEMPL	.	HOSPEMPL	0.274553**
OTH_EMPL	.	OTH_EMPL	0.175987
INPAHOSP	-0.252640**	INPAHOSP	0.208856*
CLDRVU	0.878898*	CLDRVU	-1.280941**
PCTFEMRV	0.386707**	PCTFEMRV	0.251243
YNGRVU	0.732546*	YNGRVU	0.450054*
SPECPRCP	1520.682000*	SPECPRCP	-202.031908
INPERCAP	0.000249**	INPERCAP	-0.000003
OVER65	-1.013756	OVER65	3.473232
PRCT_URB	-0.000202	PRCT_URB	-0.000514*
WAGEINDX	0.047604**	WAGEINDX	0.046478*
TIME75	-0.039627	TIME75	-0.051546
TIME76	-0.216590*	TIME76	0.071204
AREA_2	0.022329	AREA_2	-0.586515**
AREA_3	-0.006101	AREA_3	-0.739616**
		PD	-0.556881**
		CMS	0.133532*
Dep. Variable	CPRVU		CPRVU
DFE	157		562
R^2	.45		.34
F-ratio	5.59		10.57
Prob > F	.0001		.0001

TABLE C-10 (CONTINUED)

Other Specialties

Variable	Coefficient Estimate
INTERCEPT	-0.286755
NONPART	-0.189754
APRGROW	2.349628**
INTER3	-1.521180*
LAGPRCLM	0.002861*
AGE	-0.010201
AMASEX	0.022951
BORDCERT	-0.036431
FMG	0.020007
SPEC_2ND	-0.212437
GROUP	0.347463*
PARTNER	0.454534*
HOSPEMPL	0.327947*
OTH_EMPL	-0.296027
INPAHOSP	0.026466
CLDRVU	-2.135172
PCTFEMRV	-0.307635
YNGRVU	-1.273194**
SPECPRCP	3466.260000*
INPERCAP	0.000749**
OVER65	3.912613
PRCT_URB	-0.001163*
WAGEINDX	0.028956
TIME75	-0.025573
TIME76	-0.268294
AREA_2	-0.168626
AREA_3	-0.399859
AN	-0.468823*
PTH	-1.062929**
P	-0.059195
N	0.186057

Surgical Specialties

Variable	Coefficient Estimate
INTERCEPT	2.586512**
NONPART	-0.004444
APRGROW	0.216676**
INTER3	0.193881
LAGPRCLM	-0.001872**
AGE	-0.005574**
AMASEX	-0.185316
BORDCERT	0.009738
FMG	0.108897*
SPEC_2ND	0.320661
GROUP	0.101197
PARTNER	0.060998
HOSPEMPL	0.005796
OTH_EMPL	0.068202
INPAHOSP	-0.040622
CLDRVU	-0.202614
PCTFEMRV	-0.188646
YNGRVU	-0.275456*
SPECPRCP	334.319914
INPERCAP	0.000053
OVER65	-3.384745*
PRCT_URB	0.000153
WAGEINDX	-0.003834
TIME75	0.253233**
TIME76	0.497509**
AREA_2	-0.126890
AREA_3	-0.110769
NS	-0.161226
ORS	0.473833**
OTO	0.523192**
U	0.061417
OSS	0.169089
OBG	0.238724**
OPH	0.017661

	Other Specialties	Surgical Specialties
Dep. Variable	CPRVU	CPRVU
DFE	250	931
R^2	.47	.32
F-ratio	7.34	13.21
Prob > F	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests). A dot in place of a coefficient estimate indicates no data were available in the sample for the variable.

TABLE C-11

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, MEDICARE, GENERAL PRACTICE

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.328966	INTERCEPT	0.086136	INTERCEPT	-0.094121
CPRVLAG	0.324829 **	CPR2LAG	0.023261	APRGROW	0.488438
APRVLAG	0.522929 **	APRVLAG	-0.126894	LAGPRCLM	0.000269
LAGPRCLM	-0.000431	LAGPRCLM	-0.001033	AGE	-0.000952
AGE	0.002043	AGE	0.006772 *	BORDCERT	0.297122**
BORDCERT	0.030184	BORDCERT	0.103361 *	FMG	0.169090*
FMG	0.013080	FMG	0.046947	GROUP	-0.067876
GROUP	-0.103818	GROUP	-0.075099	PARTNER	0.117500
PARTNER	0.034860	PARTNER	0.104384	INPAHOSP	-0.272023**
INPAHOSP	-0.028671	INPAHOSP	-0.130971	PCTFEMRV	0.323084
PCTFEMRV	-0.095480	PCTFEMRV	0.034184	SPECPRCP	2429.499000**
SPECPRCP	44.576181	SPECPRCP	489.895312	INPERCAP	0.000215*
INPERCAP	-0.000010	INPERCAP	-0.000016	OVER65	-0.171962
OVER65	-0.600176	OVER65	-1.393038	PRCT_URB	0.000183
PRCT_URB	0.000041	PRCT_URB	0.000220	WAGEINDX	0.038960*
WAGEINDX	-0.001532	WAGEINDX	-0.008426	TIME75	0.061429
TIME75	-0.014438	TIME76	0.040480	TIME76	-0.082370
TIME76	0.007354	AREA_2	-0.009122	AREA_2	0.024296
AREA_2	-0.077029	AREA_3	0.019352	AREA_3	-0.241015
AREA_3	-0.048145				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	130	81	131
R^2	.90	.24	.50
F-ratio	60.73	1.45	7.37
Prob > F	.0001	.1309	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-12

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, MEDICARE, MEDICAL SPECIALTIES

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.456303	INTERCEPT	0.800813	INTERCEPT	0.840516
CPRVLAG	0.118118 **	CPR2LAG	0.006319	APRGROW	1.427564**
APRVLAG	0.703364 **	APRVLAG	-0.160697	LAGPRCLM	-0.001248
LAGPRCLM	-0.000314	LAGPRCLM	-0.001310*	AGE	-0.000569
AGE	-0.000993	AGE	0.000616	AMASEX	0.026301
AMASEX	-0.051138	AMASEX	-0.138310	BORDCERT	0.251115**
BORDCERT	0.015004	BORDCERT	-0.018189	FMG	-0.028946
FMG	0.024231	FMG	-0.010769	GROUP	0.103816
GROUP	0.019015	GROUP	0.083913	PARTNER	0.089283
PARTNER	0.001263	PARTNER	0.021324	HOSPEMPL	0.336820**
HOSPEMPL	0.080449 *	HOSPEMPL	0.256501 **	OTH_EMPL	0.625690**
OTH_EMPL	0.027265	OTH_EMPL	0.399212 **	INPAHOSP	-0.154820
INPAHOSP	-0.018807	INPAHOSP	0.137574	PCTFEMRV	0.024984
PCTFEMRV	0.021215	PCTFEMRV	-0.028211	SPECPRCP	-963.018381*
SPECPRCP	-93.234332	SPECPRCP	-138.541264	INPERCAP	0.000016
INPERCAP	-0.000032	INPERCAP	-0.000055	OVER65	5.887018
OVER65	-0.309008	OVER65	-1.687517	PRCT_URB	0.000144
PRCT_URB	0.000126	PRCT_URB	0.000266	WAGEINDX	0.084855**
WAGEINDX	0.003427	WAGEINDX	-0.008166	TIME75	0.096529
TIME75	0.025270	TIME76	0.058305	TIME76	0.016954
TIME76	0.056728	AREA_2	-0.301111	AREA_2	-0.331617
AREA_2	0.070899	AREA_3	0.187291	AREA_3	-0.341317
AREA_3	0.155269	PD	-0.049528	PD	0.003545
PD	-0.041279	OMS	-0.027234	OMS	0.090856
OMS	0.007151				
Dep. Variable	APRVU		CPRVUDIF		CPRVU
DFE	359		231		360
R^2	.75		.17		.35
F-ratio	45.83		2.01		8.39
Prob > F	.0001		.0053		.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C- 13

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, MEDICARE, OTHER SPECIALTIES

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.767559	INTERCEPT	0.708631	INTERCEPT	0.268221
CPRVLAG	0.213891 **	CPR2LAG	0.246682 *	APRGROW	1.024605 **
APRVLAG	0.496719 **	APRVLAG	−0.301104 *	LAGPRCLM	−0.001826 *
LAGPRCLM	−0.000414	LAGPRCLM	0.000024	AGE	−0.015366 **
AGE	−0.000126	AGE	0.002388	AMASEX	0.116477
AMASEX	0.083842	AMASEX	0.143001	BORDCERT	−0.013805
BORDCERT	−0.019541	BORDCERT	−0.051052	FMG	0.003272
FMG	−0.009934	FMG	0.106656	SPEC_2ND	0.004457
SPEC_2ND	0.046499	SPEC_2ND	−0.044849	GROUP	0.143805
GROUP	−0.070987	GROUP	−0.054539	PARTNER	0.292769 *
PARTNER	0.019821	PARTNER	0.096697	HOSPEMPL	−0.018046
HOSPEMPL	−0.138752 *	HOSPEMPL	−0.043922	OTH_EMPL	−0.273022
OTH_EMPL	−0.140148	OTH_EMPL	−0.077341	INPAHOSP	−0.112767
INPAHOSP	0.027224	INPAHOSP	0.193303	PCTFEMRV	−0.500012 *
PCTFEMRV	0.072121	PCTFEMRV	0.031257	SPECPRCP	5737.604000
SPECPRCP	−889.491924	SPECPRCP	−2167.440000	INPERCAP	0.000819 *
INPERCAP	−0.000103	INPERCAP	−0.000295	OVER65	8.023476
OVER65	1.629365	OVER65	3.524165	PRCT_URB	−0.001291
PRCT_URB	0.000306	PRCT_URB	0.001138	WAGEINDX	−0.082729
WAGEINDX	0.015843	WAGEINDX	0.002247	TIME75	0.350230 **
TIME75	0.220644 **	TIME76	0.141620	TIME76	0.434255
TIME76	0.090518	AREA_2	−0.460553	AREA_2	0.400668
AREA_2	−0.376325	AREA_3	0.658024	AREA_3	−0.651482
AREA_3	0.133980	AN	0.085359	AN	−0.080046
AN	−0.023463	PTH	−0.156196	PTH	−0.242744
PTH	−0.127211	P	−0.438805 *	P	−0.518819 *
P	−0.154757	N	−0.565047 **	N	0.111121
N	−0.217168 *				

	Specification 1	Specification 2	Specification 3
DEP. VARIABLE	APRVU	CPRVUDIF	CPRVU
DFE	209	129	210
R^2	.69	.30	.47
F-ratio	17.19	2.17	7.26
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-14

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN B, MEDICARE, SURGICAL SPECIALTIES

Specification 1

Variable	Coefficient Estimate
INTERCEPT	0.718245**
CPRVLAG	0.125606**
APRVLAG	0.467531**
LAGPRCLM	-0.000087
AGE	0.000005
AMASEX	0.248588
BORDCERT	-0.001433
FMG	0.014146
SPEC_2ND	0.047862
GROUP	0.002634
PARTNER	0.001608
HOSPEMPL	-0.024243
OTH_EMPL	-0.071579
INPAHOSP	-0.098533*
PCTFEMRV	0.122622*
SPECPRCP	-169.752780
INPERCAP	-0.000023
OVER65	-0.452348
PRCT_URB	0.000115
WAGEINDX	0.014553
TIME75	0.004738
TIME76	0.061605
AREA_2	-0.090555
AREA_3	0.031277
NS	-0.066761
ORS	-0.057145
OTO	0.016178
U	0.025048
OSS	0.156678
OBG	-0.013136
OPH	0.017358

Specification 2

Variable	Coefficient Estimate
INTERCEPT	1.447737**
CPR2LAG	-0.168347**
APRVLAG	-0.087292
LAGPRCLM	0.000027
AGE	0.003293
AMASEX	0.341473
BORDCERT	-0.073525
FMG	-0.034935
SPEC_2ND	0.357690
GROUP	0.028585
PARTNER	0.124987
HOSPEMPL	-0.036300
OTH_EMPL	-0.127599
INPAHOSP	-0.171762
PCTFEMRV	0.010951
SPECPRCP	485.326696
INPERCAP	-0.000049
OVER65	-7.022690**
PRCT_URB	0.000292
WAGEINDX	-0.022941
TIME76	0.030681
AREA_2	0.299452*
AREA_3	0.179475
NS	-0.051122
ORS	-0.121070
OTO	-0.257327**
U	-0.097746
OSS	-0.262108
OBG	-0.099457
OPH	0.131751

Specification 3

Variable	Coefficient Estimate
INTERCEPT	2.614869**
APRGROW	0.924573**
LAGPRCLM	-0.000607
AGE	-0.005142*
AMASEX	0.426300
BORDCERT	-0.058683
FMG	0.183750**
SPEC_2ND	0.538020*
GROUP	-0.123275
PARTNER	0.068091
HOSPEMPL	-0.334792**
OTH_EMPL	-0.111224
INPAHOSP	-0.384902**
PCTFEMRV	0.404467**
SPECPRCP	680.222589*
INPERCAP	0.000052
OVER65	-6.982185**
PRCT_URB	0.000317
WAGEINDX	-0.023107
TIME75	0.293670**
TIME76	0.433970**
AREA_2	0.112562
AREA_3	0.086927
NS	-0.384343**
ORS	0.022783
OTO	0.327674**
U	0.106226
OSS	-0.013435
OBG	0.059889
OPH	0.205007**

	Specification 1	Specification 2	Specification 3
DEP. VARIABLE	APRVU	CPRVUDIF	CPRVU
DFE	646	417	647
R^2	.59	.16	.35
F-ratio	31.46	2.66	11.89
Prob > F	.0001	.0001	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-15

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN C, UCR, GENERAL PRACTICE

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.38615	INTERCEPT	-0.49676	INTERCEPT	3.28935**
CPRVLAG	0.39213**	CPR2LAG	0.22158*	APRGRCW	1.18187**
APRVLAG	0.35292*	APRVLAG	-0.32578**	LAGPRCLM	0.00062
LAGPRCLM	0.00013	LAGPRCLM	0.00134	AGE	-0.01764**
AGE	-0.00037	AGE	0.00288	BORDCERT	0.11477
BORDCERT	0.10430	BORDCERT	0.02214	FMG	-0.01816
FMG	0.04347	FMG	0.09535	GROUP	-0.10575
GROUP	0.02186	GROUP	0.10252	PARTNER	0.06561
PARTNER	0.02697	PARTNER	0.12072	OTH_EMPL	-0.13977
OTH_EMPL	-0.05015	OTH_EMPL	0.01277	INPAHOSP	-0.18206
INPAHOSP	0.07774	INPAHCSP	0.11117	PCTFEMRV	-0.20381
PCTFEMRV	-0.12592	PCTFEMRV	-0.02788	YNGRVU	-0.39966
YNGRVU	-0.53941*	YNGRVU	0.20837	GPPRCAP	1344.97800
GPPRCAP	-65.69342	GPPRCAP	-1190.75000	INPERCAP	-0.00013
INPERCAP	0.00004	INPERCAP	0.00007	OVER65	0.85068
OVER65	0.69732	OVER65	3.13641	PRCT_URB	0.00088**
PRCT_URB	0.00005	PRCT_URB	0.00008	TIME77	0.31441**
TIME77	-0.06004	TIME78	0.01384	TIME78	0.53048**
TIME78	0.19626*	AREA_2	0.01793	AREA_2	-0.27769*
AREA_2	-0.07906	AREA_3	0.14712	AREA_3	-0.26865*
AREA_3	-0.00231				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	192	117	193
R^2	.72	.17	.45
F-ratio	24.79	1.24	8.17
Prob > F	.0001	.2372	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN C, UCR, MEDICAL SPECIALTIES

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.37804	INTERCEPT	-0.14769	INTERCEPT	1.78724**
CPRVLAG	0.20562**	CPR2LAG	-0.03693	APRGRCW	1.00129**
APRVLAG	0.47684**	APRVLAG	-0.18050*	LAGPRCLM	0.00071
LAGPRCLM	0.00034	LAGPRCLM	-0.00005	AGE	-0.00060
AGE	0.00067	AGE	0.00071	AMASEX	-0.32656**
AMASEX	0.01813	AMASEX	-0.04348	BORDCERT	0.00565
BORDCERT	-0.01595	BORDCERT	0.02486	FMG	-0.04655
FMG	-0.06568	FMG	-0.15956	SPEC_2ND	-0.23055*
SPEC_2ND	-0.20395**	SPEC_2ND	-0.42029**	GROUP	-0.09245
GROUP	0.00444	GROUP	-0.05646	PARTNER	-0.05322
PARTNER	0.06883*	PARTNER	0.01879	HOSPEMPL	-0.39886*
HOSPEMPL	0.08649	HOSPEMPL	-0.13155	OTH_EMPL	0.04951
OTH_EMPL	-0.12906*	OTH_EMPL	-0.15140	INPAHOSP	0.07471
INPAHOSP	0.11775**	INPAHOSP	0.28026**	PCTFEMRV	0.15510
PCTFEMRV	-0.09812	PCTFEMRV	0.13648	YNGRVU	0.31388*
YNGRVU	0.02365	YNGRVU	0.19764	MSPRCAP	292.82703
MSPRCAP	-67.52748	MSPRCAP	-236.77231	INPERCAP	-0.00000
INPERCAP	0.00001	INPERCAP	0.00001	OVER65	-0.17607
OVER65	1.84006	OVER65	5.54231	PRCT_URB	0.00066
PRCT_URB	0.00022	PRCT_URB	0.00027	TIME77	0.14835*
TIME77	0.06126	TIME78	0.12684	TIME78	0.31360**
TIME78	0.29485**	AREA_2	-0.10016	AREA_2	-0.04005
AREA_2	-0.04681	AREA_3	0.26962	AREA_3	0.88039**
AREA_3	0.38659*	PD	-0.04481	PD	-0.07285
PD	-0.04340	OMS	0.06175	OMS	0.12973*
OMS	0.02087				
Dep. Variable	APRVU		CPRVUDIF		CPRVU
DFE	499		325		500
R^2	.64		.16		.31
F-ratio	35.14		2.66		9.24
Prob > F	.0001		.0001		.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-17

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN C, UCR, OTHER SPECIALTIES

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	0.64692*	INTERCEPT	0.07457	INTERCEPT	1.51972**
CPRVLAG	0.28992**	CPR2LAG	0.10408	APRGROW	0.50318**
APRVLAG	0.34675*	APRVLAG	-0.30580**	LAGPRCLM	0.00413**
LAGPRCLM	0.00087	LAGPRCLM	-0.00098	AGE	0.00442
AGE	-0.00079	AGE	0.00295	AMASEX	0.74742**
AMASEX	0.21638	AMASEX	0.28482	BORDCERT	-0.10186
BORDCERT	-0.00013	BORDCERT	0.05222	FMG	-0.07571
FMG	0.07631	FMG	0.01106	SPEC_2ND	3.22375**
SPEC_2ND	0.65099*	SPEC_2ND	0.39110	GROUP	-0.33397**
GROUP	-0.07971	GROUP	-0.06896	PARTNER	-0.23180*
PARTNER	-0.01403	PARTNER	-0.00906	HOSPEMPL	0.02681
HOSPEMPL	0.16109	HOSPEMPL	0.22501	OTH_EMPL	0.00756
OTH_EMPL	0.08854	OTH_EMPL	0.20030	INPAHOSP	-1.07537**
INPAHOSP	-0.36907**	INPAHOSP	-0.30439*	PCTFEMRV	-0.30813
PCTFEMRV	-0.18665	PCTFEMRV	0.09483	YNGRVU	-0.64296*
YNGRVU	-0.15566	YNGRVU	-0.42253	OTPRCAP	483.40582
OTPRCAP	-71.53293	OTPRCAP	-30.96853	INPERCAP	0.00021
INPERCAP	0.00006	INPERCAP	0.00012	OVER65	-0.91234
OVER65	-0.34080	OVER65	0.19726	PRCT_URB	-0.00014
PRCT_URB	0.00012	PRCT_URB	-0.00032	TIME77	0.02711
TIME77	0.03361	TIME78	-0.02476	TIME78	0.12554
TIME78	0.23741	AREA_2	-0.09691	AREA_2	-0.00571
AREA_2	-0.00356	AREA_3	0.20091	AREA_3	0.87963
AREA_3	0.26441	AN	0.59279**	AN	1.73730**
AN	0.62066**	PTH	-0.35091*	PTH	-0.55760**
PTH	-0.24657*	P	0.25672*	P	0.23134
P	0.14127	N	0.40017**	N	1.16620**
N	0.37960**				

	Specification 1	Specification 2	Specification 3
Dep. Variable	APRVU	CPRVUDIF	CPRVU
DFE	263	155	264
R^2	.82	.25	.66
F-ratio	43.42	2.01	19.35
Prob > F	.0001	.0048	.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C-18

OLS ESTIMATES OF FEE INFLATION EQUATIONS: PLAN C, UCR, SURGICAL SPECIALTIES

Specification 1		Specification 2		Specification 3	
Variable	Coefficient Estimate	Variable	Coefficient Estimate	Variable	Coefficient Estimate
INTERCEPT	1.28573 **	INTERCEPT	0.67805 *	INTERCEPT	2.47109 **
CPRVLAG	0.39458 **	CPR2LAG	0.24482 **	APRGROW	1.09237 **
APRVLAG	0.16908 **	APRVLAG	-0.40164 **	LAGPRCLM	0.00216 **
LAGPRCLM	-0.00019	LAGPRCLM	-0.00046	AGE	-0.00722 **
AGE	-0.00277	AGE	-0.00037	AMASEX	-0.12070
AMASEX	-0.03826	AMASEX	-0.12177	BORDCERT	0.00190
BORDCERT	-0.01772	BORDCERT	-0.03574	FMG	0.13879 *
FMG	0.12184 **	FMG	0.07770	SPEC_2ND	-0.10319
SPEC_2ND	0.00960	SPEC_2ND	-0.17802	GROUP	0.01379
GROUP	0.02869	GROUP	0.05933	PARTNER	-0.05324
PARTNER	0.03486	PARTNER	0.04785	HOSPEMPL	0.11364
HOSPEMPL	0.02250	HOSPEMPL	0.02818	OTH_EMPL	-0.16764
OTH_EMPL	-0.16905	OTH_EMPL	-0.01022	INPAHOSP	0.09928
INPAHOSP	0.09268	INPAHOSP	0.12339	PCTFEMRV	-0.20237 *
PCTFEMRV	-0.13280 *	PCTFEMRV	-0.24770 *	YNGRVU	-0.31652
YNGRVU	-0.04592	YNGRVU	-0.17822	SSPRCAP	288.19912
SSPRCAP	311.64650 **	SSPRCAP	294.12261	INPERCAP	0.00001
INPERCAP	-0.00002	INPERCAP	-0.00002	OVER65	-4.34504 *
OVER65	-3.82311 **	OVER65	-1.96625	PRCT_URB	0.00075 *
PRCT_URB	0.00022	PRCT_URB	0.00013	TIME77	0.28067 **
TIME77	-0.00164	TIME78	0.00104	TIME78	0.37813 **
TIME78	0.22578 **	AREA_2	0.07609	AREA_2	-0.19453 *
AREA_2	0.04449	AREA_3	0.17509	AREA_3	0.21314
AREA_3	0.14347	NS	-0.15386	NS	-0.35550 **
NS	-0.07057	ORS	-0.03762	ORS	-0.34053 **
ORS	-0.06984	U	-0.18809 *	U	-0.25894 **
U	-0.11246 *	CSS	0.04604	CSS	-0.09585
OSS	-0.03150	OBG	0.00999	OBG	-0.22589 **
OBG	-0.10658 *	OPH	-0.17181	OPH	-0.41859 **
OPH	-0.14440				
Dep. Variable	APRVU		CPRVUDIF		CPRVU
DFE	546		355		547
R^2	.63		.15		.47
F-ratio	31.73		2.18		17.13
Prob > F	.0001		.0007		.0001

One and two asterisks denote coefficients statistically significant at the 5% and 1% levels, respectively (two-tailed tests).

TABLE C - 19

CROSS-SECTIONAL CHARGE REGRESSIONS

	UCR: General Practice					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	3.699569	2.0214	0.020147	0.0205	1.199122	2.0055
APRVU	.a	.a	1.256213	21.1484	.	.
NONPART	0.279194	2.6676	0.071331	1.2670	0.711468	4.7724
LAGPRCLM	0.002610	2.2240	0.000908	1.4493	-0.000373	-0.3880
AGE	0.004222	1.0149	0.004560	2.0696	0.004966	1.0924
AMASEX	0.219522	1.5288	0.001407	0.0183	1.497411	3.6777
BORDCERT	-0.134239	-1.1081	-0.046473	-0.7228	-0.031770	-0.3473
FMG	0.108030	1.2961	0.027384	0.6180	0.096942	0.9166
SPEC_2ND	.	.	.	.	.	.
GROUP	0.076790	0.3281	-0.183389	-1.4721	-0.543534	-2.0655
PARTNER	0.255643	0.8580	0.016817	0.1063	-0.146465	-1.2100
HOSPEMPL	0.046308	0.2452	0.114476	1.1438	.	.
OTH_EMPL	.	.	.	.	.	.
INPAHOSP	-0.522949	-4.2942	-0.031840	-0.4645	-0.302358	-2.7135
OLDRVU	1.032247	1.0106	-0.262041	-0.4813	0.597748	0.8116
PCTFEMRV	0.062394	0.3442	0.075546	0.7868	0.004569	0.0273
YNGRVU	0.407736	1.5514	-0.157588	-1.1118	0.928733	3.0356
SPECPRCP	-1638.340000	-0.2824	1050.180000	0.3414	-1182.650000	-1.3566
INPERCAP	-0.000678	-1.3571	-0.000267	-1.0066	0.000152	1.3071
OVER65	5.129450	0.7422	-1.873753	-0.5098	4.729494	1.8486
PRCT_URB	-0.000016	-0.0651	0.000081	0.6141	-0.000338	-1.4193
WAGEINDX	0.085543	1.5020	0.030923	1.0214	0.021709	0.9401
TIME74/TIME 76	-0.218812	-0.9668	-0.099210	-0.8267	-0.085718	-0.5905
TIME75/TIME 77	-0.201830	-0.6115	-0.111520	-0.6377	-0.302164	-1.8084
TIME76/TIME 78	-0.154081	-0.4738	0.000962	0.0056	-0.237505	-0.9490
AREA_2	.a	.a	.a	.a	-0.026408	-0.1328
AREA_3	.a	.a	.a	.a	0.269671	1.4965
DFE	174		173		275	
R^2	.29		.80		.25	
F-ratio	3.41		31.94		4.26	
Prob > F	.0001		.0001		.0001	

	UCR: General Practice					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-0.612677	-1.1291	3.210044	7.5636	-0.232737	-1.0726
APRVU	1.029116	10.0619	.a	.a	1.208921	34.1330
NONPART	0.597457	4.6630	.a	.a	.a	.a
LAGPRCLM	-0.000235	-0.2855	-0.001621	1.6399	0.000890	1.9865
AGE	0.013978	3.5005	-0.015521	-3.7163	0.002021	1.0314
AMASEX	0.672761	1.8789	.	.	.	.
BORDCERT	-0.143989	-1.8205	0.017870	0.2025	0.020083	0.5028
FMG	0.096089	1.0613	0.253047	2.1316	0.138757	2.5779
SPEC_2ND	.	.	.	.	.	.
GROUP	-0.253908	-1.1180	-0.093285	-1.0439	-0.077855	-1.9246
PARTNER	0.038457	0.3654	0.035149	0.3062	-0.035898	-0.6902
HOSPEMPL	.	.	.	.	.	.
OTH_EMPL	.	.	-0.183270	-0.6072	-0.135248	-0.9898
INPAHOSP	-0.174673	-1.8152	-0.186677	-1.9600	-0.029404	-0.6781
OLDRVU	0.205730	0.3257	.	.	.	.
PCTFEMRV	-0.048170	-0.3363	-0.275470	-1.9958	-0.036506	-0.5806
YNGRVU	0.001647	0.0059	-0.451653	-1.7180	0.064381	0.5367
SPECPRCP	-1006.820000	-1.3487	1523.778000	1.7767	283.725115	0.7276
INPERCAP	0.000038	0.3790	-0.000161	-2.2115	-0.000008	-0.2293
OVER65	3.399995	1.5495	-2.977659	-1.3479	-0.303479	-0.3026
PRCT_URB	-0.000168	-0.8229	0.001125	4.7790	-0.000019	-0.1712
WAGEINDX	-0.004557	-0.2286	.	.	.	.
TIME74/TIME 76	-0.023988	-0.1928	0.215568	2.1112	-0.102540	-2.1747
TIME75/TIME 77	-0.174751	-1.2169	0.467129	3.7534	-0.061018	-1.0444
TIME76/TIME 78	-0.049480	-0.2301	0.916160	5.5836	-0.224336	-2.7544
AREA_2	-0.079181	-0.4650	0.018349	0.1518	0.051235	0.9362
AREA_3	0.328617	2.1286	-0.157960	-1.2904	0.003004	0.0540
DFE	274		300		299	
R^2	.46		.33		.86	
F-ratio	9.96		7.93		94.99	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable.
A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-20

CROSS-SECTIONAL CHARGE REGRESSIONS

UCR: Medical Specialties

Variable	Plan A: Without APRVU — Coefficient Estimate	t-ratio	Plan A: With APRVU — Coefficient Estimate	t-ratio	Plan B: Without APRVU — Coefficient Estimate	t-ratio
INTERCEPT	2.167746	2.0252	-0.961535	-1.2329	2.403963	6.7297
APRVU	.a	.a	1.027861	23.9600	.a	.a
NONPART	0.220833	6.0291	0.121376	4.5567	0.266965	4.3335
LAGPRCLM	0.000532	1.0415	0.000879	2.3953	0.002258	4.0569
AGE	-0.001346	-0.7131	0.000824	0.6066	-0.005239	-2.8368
AMASEX	0.058683	0.7476	-0.038129	-0.6745	0.224538	2.7395
BORDCERT	0.024573	0.6588	-0.042055	-1.5612	0.197223	4.7728
FMG	0.071141	1.6097	0.051226	1.6130	0.033409	0.7206
SPEC_2ND	0.672022	2.6836	0.488575	2.7135	-0.094150	-0.4389
GROUP	0.290781	6.8749	0.166720	5.4093	-0.187385	-1.6650
PARTNER	0.117966	2.3042	0.072462	1.9677	-0.098997	-1.8969
HOSPEMPL	0.265006	3.8984	0.155794	3.1767	0.180142	2.5699
OTH_EMPL	0.137052	1.5646	0.102999	1.6364	0.099608	1.0039
INPAHOSP	-0.065730	-1.0934	0.191276	4.2987	0.179360	2.4417
OLDRVU	-0.354643	-1.1269	-0.245358	-1.0852	-1.317121	-4.5519
PCTFEMRV	-0.132275	-1.7493	-0.230580	-4.2329	0.236166	2.2643
YNGRVU	0.234060	2.0444	-0.000445	-0.0054	0.508332	3.9818
SPECPRCP	785.849372	0.7146	-376.121734	-0.4752	103.772268	0.3778
INPERCAP	-0.000008	-0.0354	0.000151	0.9443	-0.000025	-0.4582
OVER65	-0.138154	-0.0308	3.451646	1.0701	1.903926	0.7649
PRCT_URB	-0.000196	-0.7677	-0.000044	-0.2393	-0.000310	-1.7979
WAGEINDX	-0.005360	-0.1971	0.008301	0.4248	-0.003785	-0.2460
TIME74/TIME 76	0.176784	0.9628	-0.112604	-0.8502	0.181251	2.0594
TIME75/TIME 77	0.368857	1.6358	-0.077029	-0.4724	0.161215	1.5484
TIME76/TIME 78	0.338126	1.0274	-0.276078	-1.1610	0.437778	2.7939
AREA_2	.a	.a	.a	.a	-0.425015	-3.1263
AREA_3	.a	.a	.a	.a	-0.527242	-2.8985
PD	-0.319667	-5.2462	-0.046949	-1.0381	-0.570368	-8.6019
OMS	0.008930	0.2298	0.000757	0.0271	0.134258	2.9377
DFE	611		610		841	
R^2	.40		.69		.31	
F-ratio	15.98		51.86		14.17	
Prob > F	.0001		.0001		.0001	

TABLE C-20 (CONTINUED)

	UCR: Medical Specialties					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-0.492327	-2.1518	1.831607	7.9461	0.019094	0.1464
APRVU	1.226274	38.2410	.a	.a	1.089924	47.9467
NONPART	0.109896	2.9338	.a	.a	.a	.a
LAGPRCLM	0.001242	3.6790	0.000766	2.0167	0.000476	2.3593
AGE	0.004176	3.6538	-0.000711	-0.4040	0.001723	1.6333
AMASEX	0.083133	1.6735	-0.163431	-2.4209	-0.118917	-3.3010
BORDCERT	0.015166	0.5965	-0.013403	-0.3860	0.004500	0.2429
FMG	-0.007041	-0.2511	0.000744	0.0116	-0.025336	-0.7422
SPEC_2ND	0.079586	0.6135	-0.105059	-1.0367	-0.112317	-2.0776
GROUP	-0.076060	-1.1172	-0.073053	-1.7972	-0.095207	-4.3896
PARTNER	0.037846	1.1922	-0.060801	-1.5256	-0.070710	-3.3257
HOSPEMPL	0.064205	1.5117	-0.633000	-5.1131	-0.125176	-1.8715
OTH_EMPL	0.124749	2.0802	0.006444	0.0724	-0.051674	-1.0928
INPAHOSP	0.003842	0.0861	0.164511	3.0658	0.050646	1.7633
OLDRVU	0.724895	3.9644	.	.	.	.
PCTFEMRV	0.209425	3.3220	0.124326	1.8650	0.074249	2.0870
YNGRVU	0.106438	1.3669	0.174934	2.3107	0.175670	4.3498
SPECPRCP	133.532375	0.8044	492.994042	2.1312	229.716508	1.6597
INPERCAP	-0.000003	-0.0903	0.000109	1.9953	0.000041	1.4213
OVER65	0.065519	0.0435	-2.591972	-1.1552	-1.148275	-0.9590
PRCT_URB	-0.000217	-2.0840	0.000053	0.1833	-0.000321	-2.0777
WAGEINDX	-0.003710	-0.3991	.	.	.	.
TIME74/TIME 76	0.038587	0.7236	0.019249	0.2902	-0.103677	-2.9220
TIME75/TIME 77	-0.040797	-0.6460	0.108191	1.1942	-0.127643	-2.6275
TIME76/TIME 78	-0.034077	-0.3568	0.247904	1.7871	-0.305226	-4.0754
AREA_2	-0.167016	-2.0259	-0.157598	-1.6547	-0.034496	-0.7598
AREA_3	-0.224950	-2.0409	0.350830	1.7375	0.003965	0.0367
PD	-0.002282	-0.0534	-0.118723	-1.9535	-0.032326	-0.9955
OMS	0.109455	3.9616	0.064913	1.5065	0.020894	0.9083
DFE	840		914		913	
R^2	.75		.25		.79	
F-ratio	89.63		12.73		134.91	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-21

CROSS-SECTIONAL CHARGE REGRESSIONS

	UCR: Other Specialties					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-0.395221	-0.2750	-0.254644	-0.3146	2.155127	2.0381
APRVU	.a	.a	1.141493	31.5879	.a	.a
NONPART	0.338264	4.7029	0.183090	4.4871	-0.138212	-0.8115
LAGPRCLM	-0.000556	-0.8063	0.000185	0.4758	0.000150	0.1243
AGE	-0.003829	-1.3007	-0.001822	-1.0980	-0.007515	-1.3037
AMASEX	-0.096023	-1.1384	0.035763	0.7500	0.043862	0.2362
BORDCERT	0.058218	0.9953	-0.029629	-0.8962	-0.015713	-0.1393
FMG	-0.041055	-0.7228	-0.025109	-0.7849	0.004595	0.0445
SPEC_2ND	-0.216307	-0.8036	0.053757	0.3540	-0.332098	-1.2256
GROUP	-0.047278	-0.6532	0.048313	1.1819	0.221713	1.4110
PARTNER	-0.142454	-1.7327	0.007047	0.1514	0.215214	1.2506
HOSPEMPL	0.104540	1.0732	-0.006701	-0.1219	0.253721	1.9473
OTH_EMPL	0.133870	1.1996	-0.009445	-0.1499	-0.029625	-0.1631
INPAHOSP	-0.040540	-0.3289	0.140170	2.0126	0.482957	2.4721
OLDRVU	-0.017299	-0.0350	0.137215	0.4929	-1.093021	-1.7052
PCTFEMRV	-0.090841	-0.8006	-0.163928	-2.5635	-0.555368	-2.5815
YNGRVU	-0.073346	-0.3917	-0.126083	-1.1955	-1.384553	-3.8676
SPECPRCP	-135.844074	-0.0436	974.366553	0.5556	1525.675000	1.7598
INPERCAP	0.000973	1.9889	0.000475	1.7216	0.000317	1.8525
OVER65	-0.106296	-0.0108	-7.424544	-1.3395	-0.510532	-0.0892
PRCT_URB	-0.000538	-0.2707	-0.000619	-0.5537	-0.000447	-0.9718
WAGEINDX	-0.079179	-1.3931	-0.077222	-2.4125	0.004398	0.1234
TIME74/76	0.285701	0.9385	0.361058	2.1057	0.163699	0.8061
TIME75/77	0.814582	2.0443	0.548169	2.4410	0.252733	1.0807
TIME76/78	0.487620	0.8595	0.338459	1.0592	0.142989	0.3864
AREA_2	.a	.a	.a	.a	-0.404955	-1.0550
AREA_3	.a	.a	.a	.a	-0.165897	-0.4195
AN	0.121620	0.7397	-0.025297	-0.2728	-0.608536	-2.7839
PTH	-0.121082	-0.8279	0.234005	2.8150	-0.689945	-2.8126
P	-0.238967	-2.0089	0.144809	2.1269	0.077564	0.3417
N	-0.373442	-2.4226	-0.016711	-0.1909	-0.069041	-0.2981
DFE	463		462		429	
R^2	.35		.79		.28	
F-ratio	9.16		63.49		5.77	
Prob > F	.0001		.0001		.0001	

TABLE C-21 (CONTINUED)

	UCR: Other Specialties					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-0.705827	-1.1286	1.432441	3.8444	-0.089403	-0.6234
APRVU	1.311138	28.8099	.a	.a	1.088479	52.7032
NONPART	-0.072682	-0.7306	.a	.a	.a	.a
LAGPRCLM	0.001788	2.5296	0.002422	3.1743	0.000117	0.4019
AGE	0.001529	0.4524	-0.002475	-0.6062	0.004112	2.6624
AMASEX	0.065900	0.6078	0.438489	2.1728	0.103235	1.3522
BORDCERT	-0.016805	-0.2550	-0.044644	-0.6194	0.025001	0.9191
FMG	0.039662	0.6568	-0.028662	-0.3148	-0.045621	-1.3292
SPEC_2ND	-0.140259	-0.8856	2.921418	10.8318	0.139316	1.2161
GROUP	0.149571	1.6294	-0.313051	-4.4449	-0.033403	-1.2337
PARTNER	0.084770	0.8427	-0.205407	-2.5242	-0.041516	-1.3464
HOSPEMPL	0.068542	0.8977	-0.206729	-1.6776	-0.021254	-0.4562
OTH_EMPL	0.137678	1.2961	-0.128958	-0.8769	-0.011647	-0.2099
INPAHOSP	0.186110	1.6247	-0.799226	-7.7155	0.033252	0.7894
OLDRVU	1.047109	2.7439	.	.	.	.
PCTFEMRV	-0.452589	-3.6011	0.175757	1.3475	0.009214	0.1870
YNGRVU	-0.391417	-1.8474	-0.435411	-2.2198	-0.087963	-1.1849
SPECPRCP	873.895108	1.7244	209.911117	0.7386	234.053599	2.1846
INPERCAP	0.000107	1.0701	0.000072	0.6547	0.000067	1.6124
OVER65	-1.925885	-0.5760	2.385807	0.9675	-1.383687	-1.4841
PRCT_URB	-0.000190	-0.7061	0.000576	0.9853	-0.000361	-1.6330
WAGEINDX	-0.002242	-0.1077	.	.	.	.
TIME74/TIME 76	0.123069	1.0377	0.118381	0.9397	-0.060731	-1.2755
TIME75/TIME 77	-0.083318	-0.6079	0.229873	1.2945	-0.144777	-2.1506
TIME76/TIME 78	-0.152940	-0.7070	0.493880	1.8169	-0.314744	-3.0376
AREA_2	-0.198597	-0.8855	-0.075017	-0.4442	-0.055167	-0.8665
AREA_3	0.048367	0.2093	0.987338	2.3480	-0.056615	-0.3544
AN	0.099130	0.7626	1.410792	14.2682	0.089800	1.9992
PTH	0.202309	1.3804	-0.245991	-1.8795	-0.046340	-0.9364
P	0.366576	2.7573	0.349793	3.6756	-0.043543	-1.1882
N	0.016631	0.1230	1.014788	8.6322	0.052298	1.0911
DFE	428		460			459
R^2	.76		.59			.94
F-ratio	44.01		25.83			277.89
Prob > F	.0001		.0001			.0001

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-22

CROSS-SECTIONAL CHARGE REGRESSIONS

	UCR: Surgical Specialties					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-0.575518	-0.3920	-0.980914	-1.2981	2.694998	10.9191
APRVU	.a	.a	1.294140	55.4639	.a	.a
NONPART	0.076586	1.9480	0.093214	4.6063	0.024072	0.5122
LAGPRCLM	-0.001458	-2.7020	0.001104	3.9209	-0.000938	-1.8182
AGE	-0.001306	-0.6975	0.001760	1.8231	-0.007490	-4.5524
AMASEX	-0.022977	-0.1763	0.036353	0.5420	-0.006811	-0.0647
BORDCERT	-0.039970	-0.9054	-0.039627	-1.7442	0.029505	0.8583
FMG	-0.058797	-1.2788	-0.009319	-0.3935	0.114582	3.0091
SPEC_2ND	-0.175535	-1.6486	0.012955	0.2360	-0.403672	-3.5556
GROUP	0.083296	1.8298	0.031773	1.3551	0.003341	0.0529
PARTNER	0.043441	0.9293	0.026323	1.0940	0.040375	0.9612
HOSPEMPL	0.323503	3.9479	0.134898	3.1883	-0.052738	-0.7355
OTH_EMPL	0.300363	2.7217	0.161217	2.8357	0.142483	1.5423
INPAHOSP	-0.773602	-9.8897	0.012883	0.3018	-0.181980	-2.4410
OLDRVU	-0.585377	-1.6634	-0.120216	-0.6630	-0.446009	-2.4149
PCTFEMRV	-0.101493	-1.2812	0.060163	1.4719	-0.258098	-3.3942
YNGRVU	-0.214794	-1.5096	-0.090576	-1.2363	-0.422285	-4.0224
SPECPRCP	-5892.170000	-2.0660	-1240.620000	-0.8438	582.744760	3.3501
INPERCAP	0.000651	2.0580	0.000009	0.0568	0.000080	1.8240
OVER65	21.743218	2.4457	3.840046	0.8372	-3.489001	-2.5457
PRCT_URB	0.000650	1.5541	0.000160	0.7422	0.000017	0.1536
WAGEINDX	0.012309	0.5335	0.022409	1.8871	-0.014388	-1.2812
TIME74 /TIME76	-0.213071	-1.3552	-0.194904	-2.4086	0.197885	3.1178
TIME75 /TIME77	0.011017	0.0574	-0.233701	-2.3650	0.464348	6.1579
TIME76 /TIME78	-0.345883	-1.0184	-0.284210	-1.6259	0.727177	7.0053
AREA_2	.a	.a	.a	.a	-0.106246	-1.1765
AREA_3	.a	.a	.a	.a	-0.160982	-1.7388
NS	-0.000697	-0.0082	0.090549	2.0783	-0.177542	-1.8836
ORS	0.323411	4.1419	-0.045351	-1.1134	0.405175	5.7232
OTO	0.354850	1.7115	-0.032930	-0.3079	0.648291	8.3425
U	-0.144869	-1.9821	-0.006473	-0.1717	-0.038381	-0.5615
OSS	0.257304	2.6755	0.035113	0.7071	0.951751	9.7016
OBG	0.127628	2.3432	-0.062485	-2.2126	0.236652	4.3194
OPH	-0.041207	-0.6304	0.009623	0.2859	0.018424	0.3269
DFE	1108		1107		1147	
R^2	.35		.83		.36	
F-ratio	19.89		171.91		24.98	
Prob > F	.0001		.0001		.0001	

TABLE C-22 (Continued)

	UCR: Surgical Specialties					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	0.017314	0.1015	2.484393	15.1189	0.198512	1.8878
APRVU	1.105913	44.8264	.a	.a	0.983882	51.9473
NONPART	0.032504	1.0687	.a	.a	.a	.a
LAGPRCLM	-0.000133	-0.3963	0.000559	1.4133	0.000391	1.7029
AGE	-0.001298	-1.2094	-0.008740	-5.5502	-0.001008	-1.0866
AMASEX	0.001237	0.0182	-0.217531	-1.9592	-0.035926	-0.5559
BORDCERT	0.057870	2.6002	0.029249	0.8878	0.037270	1.9462
FMG	0.054280	2.1995	0.101406	2.1258	0.031333	1.1288
SPEC_2ND	-0.395384	-5.3816	0.032383	0.4289	-0.013043	-0.2971
GROUP	-0.043042	-1.0538	-0.056383	-1.6929	0.002577	0.1329
PARTNER	0.029592	1.0886	-0.009505	-0.3095	0.018642	1.0439
HOSPEMPL	-0.112350	-2.4202	0.104485	1.3385	0.000969	0.0213
OTH_EMPL	0.217997	3.6451	-0.063987	-0.7847	-0.064420	-1.3593
INPAHOSP	-0.133026	-2.7567	0.067961	1.4806	0.020987	0.7862
OLDRVU	0.438910	3.6233	.	.	.	.
PCTFEMRV	-0.010880	-0.2197	-0.027214	-0.4699	0.048320	1.4340
YNGRVU	-0.104163	-1.5249	-0.080160	-0.9184	0.014536	0.2864
SPECPRCP	117.239354	1.0371	315.087270	2.6639	32.161710	0.4664
INPERCAP	0.000026	0.9065	0.000097	2.6001	0.000037	1.6924
OVER65	-0.075325	-0.0846	-4.026556	-2.7823	0.124093	0.1469
PRCT_URB	0.000009	0.1292	0.000174	1.0108	-0.000072	-0.7169
WAGEINDX	0.003815	0.5242	.	.	.	.
TIME74/TIME76	0.036403	0.8829	0.062032	1.2761	-0.104096	-3.6611
TIME75/TIME77	0.094400	1.9075	0.222639	3.4748	-0.003543	-0.0945
TIME76/TIME78	0.198566	2.9115	0.330026	3.5377	-0.131254	-2.3890
AREA_2	0.009033	0.1544	-0.067792	-0.9585	-0.065608	-1.5960
AREA_3	0.031133	0.5183	0.030080	0.2472	-0.009732	-0.1376
NS	-0.224289	-3.6766	-0.228931	-3.3961	-0.093772	-2.3882
ORS	-0.008810	-0.1885	-0.236383	-4.7883	-0.107454	-3.7312
OTO	0.103290	1.9965	.	.	.	.
U	-0.160522	-3.6223	-0.110955	-2.1988	-0.058408	-1.9903
OSS	0.507494	7.8984	0.192718	2.7506	0.115885	2.8439
OBG	-0.066383	-1.8392	-0.162610	-4.0295	-0.014587	-0.6174
OPH	-0.029047	-0.7960	-0.372612	-5.9752	0.013372	0.3614
DFE	1446		1376		1375	
R^2	.73		.33		.77	
F-ratio	118.73		24.30		162.49	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C - 23

CROSS-SECTIONAL CHARGE REGRESSIONS

	Indemnity: General Practice					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	2.524037	1.4482	-0.233102	-0.1571	2.418171	1.7682
APRVU	.a	.a	1.004585	9.8514	.a	.a
NONPART	0.418537	4.1960	0.335954	4.0084	-0.213348	-0.5063
LAGPRCLM	-0.001335	-1.5472	-0.001023	-1.4167	-0.002308	-0.8338
AGE	0.004156	1.0122	0.001895	0.5508	0.004259	0.3599
AMASEX	-0.192950	-1.2004	-0.130962	-0.9734	1.322009	1.3945
BORDCERT	-0.189312	-1.7303	-0.223614	-2.4429	0.001743	0.0091
FMG	-0.086458	-1.0731	-0.061512	-0.9126	0.082441	0.3717
SPEC_2ND	.	.	.	.	.	.
GROUP	-0.047225	-0.2739	-0.225659	-1.5535	-0.342216	-0.6405
PARTNER	0.378324	1.2349	0.226139	0.8813	0.104787	0.4354
HOSPEMPL	-0.129114	-0.7506	-0.057333	-0.3982	.	.
OTH_EMPL	.	.	.	.	.	.
INPAHOSP	-0.468331	-4.2359	0.355317	2.8508	-0.208653	-0.7865
OLDRVU	-0.413019	-1.2767	-0.149839	-0.5513	-0.167256	-0.2559
PCTFEMRV	-0.257883	-2.0078	-0.130000	-1.2019	0.122605	0.4088
YNGRVU	-0.143210	-0.6741	-0.245146	-1.3779	-0.407356	-0.7861
SPECPRCP	399.528499	0.0735	3969.790000	0.8708	503.562950	0.1995
INPERCAP	-0.000197	-0.4286	0.000109	0.2840	-0.000124	-0.4893
OVER65	2.793577	0.4395	-4.693502	-0.8743	4.140728	0.5436
PRCT_URB	0.000302	1.2889	0.000330	1.6804	0.000341	0.5376
WAGEINDX	0.006546	0.1245	-0.032612	-0.7389	-0.022251	-0.3864
TIME74/TIME76	0.109404	0.4884	0.232645	1.2395	0.238535	0.5318
TIME75/TIME77	0.314428	0.9611	0.484063	1.7664	0.101875	0.2352
TIME76/TIME78	0.208582	0.6395	0.439681	1.6064	0.174634	0.2833
AREA_2	.a	.a	.a	.a	-0.148581	-0.3376
AREA_3	.a	.a	.a	.a	-0.176810	-0.4304
DFE	223		222		86	
R^2	.34		.54		.13	
F-ratio	5.44		11.84		.61	
Prob > F	.0001		.0001		.9091	

TABLE C-23 (CONTINUED)

	Indemnity: General Practice					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	0.628699	0.4731	2.998617	7.4954	1.811924	4.0625
APRVU	1.095612	4.1189	.a	.a	0.508711	5.1797
NONPART	-0.005028	-0.0129	.a	.a	.a	.a
LAGPRCLM	-0.002657	-1.0449	-0.000767	-1.2873	-0.000854	-1.4967
AGE	0.008825	0.8078	-0.019299	-5.1849	-0.017054	-4.7548
AMASEX	1.522742	1.7462	.	.	.	.
BORDCERT	-0.096643	-0.5468	0.068056	0.8571	0.060388	0.7949
FMG	0.019612	0.0960	-0.143544	-1.3657	-0.140581	-1.3982
SPEC_2ND	.	.	.	.	.	.
GROUP	-0.231069	-0.4702	-0.137091	-1.6815	-0.122122	-1.5648
PARTNER	0.197887	0.8906	0.015255	0.1558	0.027477	0.2933
HOSPEMPL	.	.	.	.	.	.
OTH_EMPL	.	.	-0.240389	-0.9013	-0.283520	-1.1106
INPAHOSP	0.005791	0.0232	-0.341817	-3.8095	0.140320	1.1083
OLDRVU	0.982502	1.4843	.	.	.	.
PCTFEMRV	-0.209352	-0.7294	-0.275400	-3.0665	-0.201161	-2.3097
YNGRVU	-0.380089	-0.7986	0.077737	0.3070	0.113967	0.4704
SPECPRCP	2405.490000	1.0179	2462.520000	3.3440	2297.508000	3.2583
INPERCAP	0.000092	0.3839	-0.000033	-0.4868	-0.000021	-0.3194
OVER65	-2.300287	-0.3209	1.584382	0.7487	1.155042	0.5702
PRCT_URB	0.000003	0.0056	0.000882	4.1740	0.000832	4.1120
WAGEINDX	-0.055623	-1.0396	.	.	.	.
TIME74/TIME76	0.157222	0.3812	0.192991	2.0633	0.200663	2.2424
TIME75/TIME77	-0.442743	-1.0563	0.331029	2.8987	0.289099	2.6393
TIME76/TIME78	-0.435571	-0.7444	0.474279	3.1025	0.374274	2.5375
AREA_2	-0.031027	-0.0766	-0.248611	-2.2997	-0.213949	-2.0646
AREA_3	-0.205121	-0.5436	-0.391821	-3.4790	-0.327252	-3.0175
DFE	85		278		277	
R^2	.28		.45		.50	
F-ratio	1.42		11.90		13.70	
Prob > F	..1234		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-24

CROSS-SECTIONAL CHARGE REGRESSIONS

	Indemnity: Medical Specialties					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	2.067532	1.2626	1.130477	0.6945	1.970603	3.5522
APRVU	.a	.a	0.428313	4.3142	.a	.a
NONPART	0.256405	4.8310	0.225051	4.2632	0.261634	2.8092
LAGPRCLM	-0.000586	-1.1582	-0.000576	-1.1560	0.001364	2.2109
AGE	-0.005239	-1.8255	-0.004531	-1.6000	0.000684	0.2253
AMASEX	-0.113553	-0.9784	-0.087543	-0.7646	0.403806	3.3159
BORDCERT	0.099620	1.8414	0.075244	1.4039	0.197636	2.9048
FMG	0.011487	0.1736	0.001868	0.0286	0.053197	0.7284
SPEC_2ND	-0.418331	-1.0391	-0.384621	-0.9695	-0.054584	-0.1653
GROUP	0.312874	5.0674	0.275590	4.4858	-0.188398	-1.0095
PARTNER	0.019061	0.2315	-0.031993	-0.3903	-0.040647	-0.4968
HOSPEMPL	0.330678	3.4196	0.323565	3.3959	0.193551	1.7684
OTH_EMPL	0.165997	1.2768	0.126412	0.9845	0.152000	0.9196
INPAHOSP	-0.283622	-3.7142	0.136898	1.1118	0.070278	0.7752
OLDRVU	0.522626	1.5952	0.564033	1.7468	-0.168945	-0.6829
PCTFEMRV	0.087657	1.0085	0.057440	0.6686	0.088302	0.9951
YNGRVU	0.237015	1.9626	0.196001	1.6422	0.216263	1.4804
SPECPRCP	295.822398	0.1775	392.052432	0.2388	41.205599	0.0913
INPERCAP	0.000045	0.1333	0.000070	0.2108	-0.000002	-0.0303
OVER65	2.172932	0.3286	1.748567	0.2684	2.722339	0.6655
PRCT_URB	-0.000405	-1.1160	-0.000334	-0.9356	-0.000835	-2.8537
WAGEINDX	0.013789	0.3381	0.005423	0.1348	0.035215	1.3041
TIME74 /TIME76	0.006171	0.0220	0.034764	0.1256	0.287126	1.4623
TIME75 /TIME77	0.198848	0.5754	0.228939	0.6723	0.289303	1.4763
TIME76 /TIME78	0.029100	0.0567	0.122129	0.2415	0.327793	1.2484
AREA_2	.a	.a	.a	.a	-0.744968	-3.1612
AREA_3	.a	.a	.a	.a	-0.931599	-3.1070
PD	-0.148001	-1.5588	-0.122654	-1.3088	-0.258544	-2.6170
OMS	-0.007585	-0.1397	-0.013500	-0.2523	0.112838	1.5802
DFE	580		579		390	
R^2	.24		.26		.21	
F-ratio	7.32		7.97		3.94	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-24 (CONTINUED)

	Indemnity: Medical Specialties					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	0.054875	0.1091	1.756906	5.6892	0.960528	2.8670
APRVU	0.856264	11.8306	.a	.a	0.378085	5.5710
NONPART	0.301333	3.7647	.a	.a	.a	.a
LAGPRCLM	0.001336	2.5215	0.000165	0.3998	0.000281	0.6912
AGE	0.002172	0.8325	-0.003872	-1.6193	-0.003954	-1.6851
AMASEX	0.319854	3.0518	-0.184133	-1.8958	-0.172988	-1.8148
BORDCERT	0.148049	2.5277	-0.050967	-1.0851	-0.035942	-0.7785
FMG	0.036649	0.5843	-0.010556	-0.1220	0.030246	0.3548
SPEC_2ND	0.185179	0.6514	-0.075251	-0.5673	-0.103125	-0.7917
GROUP	-0.141744	-0.8843	-0.069774	-1.2714	-0.055946	-1.0379
PARTNER	0.012462	0.1770	0.060449	1.1033	0.072615	1.3497
HOSPEMPL	0.280551	2.9762	-0.312487	-1.8694	-0.291682	-1.7780
OTH_EMPL	0.245215	1.7251	0.136773	1.1915	0.164958	1.4631
INPAHOSP	0.066897	0.8594	0.126033	2.0684	0.483417	5.5128
OLDRVU	0.410564	1.8834	.	.	.	.
PCTFEMRV	0.084881	1.1140	-0.080460	-1.3320	-0.084244	-1.4213
YNGRVU	-0.035204	-0.2767	0.234423	2.7357	0.230585	2.7424
SPECPRCP	273.906348	0.7058	-306.480621	-0.9846	-275.942955	-0.9034
INPERCAP	0.000085	1.2635	0.000089	1.2416	0.000101	1.4418
OVER65	1.680225	0.4782	4.639196	1.5066	4.574427	1.5141
PRCT_URB	-0.000796	-3.1664	0.000428	1.1584	0.000397	1.0953
WAGEINDX	0.038430	1.6573	.	.	.	.
TIME74/TIME76	0.339729	2.0143	0.056424	0.6436	0.055148	0.6411
TIME75/TIME77	-0.026981	-0.1584	0.203287	1.7181	0.160840	1.3825
TIME76/TIME78	-0.137340	-0.6001	0.280913	1.5658	0.239032	1.3567
AREA_2	-0.589134	-2.9053	-0.246047	-2.0290	-0.255490	-2.1471
AREA_3	-0.849733	-3.2993	0.140822	0.5812	0.147302	0.6196
PD	0.167400	1.8165	-0.028513	-0.3966	-0.112192	-1.5557
OMS	0.136818	2.2302	0.140002	2.5439	0.121199	2.2402
DFE	389		775		774	
R^2	.42		.16		.20	
F-ratio	10.16		6.12		7.34	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-25

CROSS-SECTIONAL CHARGE REGRESSIONS

	Indemnity: Other Specialties					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-3.743571	-1.7504	-5.264274	-2.6931	1.196816	1.1487
APRVU_	.a	.a	1.162420	8.7422	.a	.a
NONPART	0.133505	1.1097	-0.033728	-0.3034	-0.247740	-1.3680
LAGPRCLM	0.001800	2.5604	0.001785	2.7906	0.002320	1.5933
AGE	-0.005071	-1.1083	-0.005396	-1.2955	-0.005085	-0.8039
AMASEX	-0.169526	-1.4061	-0.104780	-0.9525	-0.318739	-1.5282
BORDCERT	-0.121657	-1.3094	-0.120006	-1.4188	-0.049004	-0.4140
FMG	-0.180265	-1.8579	-0.147374	-1.6670	0.031672	0.2921
SPEC_2ND	0.457280	1.2698	0.226227	0.6878	-0.206307	-0.7451
GROUP	-0.231488	-2.0510	-0.102079	-0.9833	0.027014	0.1775
PARTNER	-0.264668	-2.0312	-0.084840	-0.7047	0.280123	1.6947
HOSPEMPL	-0.281865	-1.9342	-0.261584	-1.9715	0.165456	1.1223
OTH_EMPL	-0.182353	-0.9862	-0.074904	-0.4438	-0.043180	-0.1923
INPAHOSP	0.152999	0.9365	0.389763	2.5784	0.326634	1.7331
OLDRVU	-0.346429	-0.5855	0.041541	0.0769	1.790475	2.9551
PCTFEMRV	-0.215912	-1.4163	-0.115345	-0.8283	-0.199763	-1.3097
YNGRVU	-0.689988	-3.1305	-0.360040	-1.7635	-0.308070	-1.5135
SPECPRCP	-5533.130000	-2.6170	-5286.040000	-2.7461	3226.289000	3.5967
INPERCAP	0.001956	2.9098	0.001742	2.8438	0.000385	2.3039
OVER65	2.533107	0.3917	-1.902004	-0.3219	1.893178	0.3652
PRCT_URB	0.000817	1.2758	0.000872	1.4964	0.000098	0.2294
WAGEINDX	-0.135294	-1.3687	-0.113974	-1.2661	-0.112487	-2.9280
TIME74 TIME/76	0.181157	0.3404	0.106870	0.2206	0.805181	3.5500
TIME75 TIME/77	0.980151	1.3370	0.758054	1.1351	1.072452	4.3361
TIME76 TIME/78	0.027447	0.0363	-0.017132	-0.0249	1.270841	3.3682
AREA_2_	. a	. a	. a	. a	0.475739	1.2654
AREA_3_	. a	. a	. a	. a	0.634801	1.7635
AN	-0.174480	-0.8021	0.477912	2.2583	-0.777546	-3.6787
PTH	-0.277831	-1.2978	0.036367	0.1835	-1.127708	-4.2801
P	-0.273599	-1.2979	0.610207	2.8132	-0.579485	-2.2153
N	-0.533964	-2.6526	0.401050	1.8901	-0.422345	-1.7230
DFE	365		364		253	
R^2	.25		.38		.38	
F-ratio	4.63		8.11		5.36	
Prob > F	.0001		.0001		.0001	

TABLE C-25 (CONTINUED)

	Indemnity: Other Specialties					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	0.709004	0.9215	1.140150	2.0765	0.338850	0.6183
APRVU	1.101183	14.5852	.a	.a	0.513247	5.3957
NONPART	-0.116837	-0.8725	.a	.a	.a	.a
LAGPRCLM	0.001816	1.6894	0.001858	2.1296	0.001037	1.2172
AGE	-0.007233	-1.5492	0.018974	3.0956	0.018178	3.0860
AMASEX	-0.069799	-0.4508	0.519110	1.5184	0.560223	1.7052
BORDCERT	-0.035976	-0.4119	0.017226	0.1611	-0.035337	-0.3425
FMG	0.070348	0.8788	-0.092749	-0.6522	-0.155256	-1.1324
SPEC_2ND	-0.042284	-0.2067	2.427544	6.7753	2.092105	5.9810
GROUP	0.140082	1.2445	-0.263629	-2.5433	-0.235237	-2.3588
PARTNER	0.374893	3.0696	-0.260800	-2.1434	-0.249332	-2.1325
HOSPEMPL	0.230238	2.1148	-0.338267	-1.7983	-0.375173	-2.0746
OTH_EMPL	0.091514	0.5514	0.164526	0.6269	0.176298	0.6992
INPAHOSP	0.310458	2.2325	-0.945177	-5.6635	-0.600055	-3.4761
OLDRVU	0.014831	0.0320	.	.	.	.
PCTFEMRV	-0.084192	-0.7463	-0.069926	-0.5612	0.010174	0.0843
YNGRVU	-0.285551	-1.9012	-0.348328	-1.4151	-0.287549	-1.2146
SPECPRCP	1297.115000	1.9218	770.288579	1.7373	895.937721	2.1002
INPERCAP	0.000136	1.0908	0.000202	1.1772	0.000122	0.7394
OVER65	0.615658	0.1609	-1.993355	-0.4990	-2.702558	-0.7037
PRCT_URB	0.000174	0.5535	-0.000474	-0.5191	-0.000244	-0.2774
WAGEINDX	-0.067192	-2.3564	.	.	.	.
TIME74/TIME76	0.572272	3.4041	-0.139825	-0.6882	-0.132528	-0.6790
TIME75/TIME77	-0.083142	-0.4179	-0.026476	-0.0925	-0.026499	-0.0964
TIME76/TIME78	0.042827	0.1473	0.140573	0.3290	0.173228	0.4219
AREA_2	0.278555	1.0030	-0.008731	-0.0334	0.062003	0.2468
AREA_3	0.423148	1.5908	0.375523	0.6173	0.545419	0.9319
AN	0.000218	0.0013	1.452901	10.0085	1.689926	11.5573
PTH	-0.570097	-2.8774	-0.460709	-2.1690	-0.302311	-1.4664
P	-0.094447	-0.4822	0.888624	5.5111	1.243303	7.3883
N	-0.013144	-0.0718	1.191397	6.7938	1.426364	8.1967
DFE	252		337		336	
R^2	.66		.46		.51	
F-ratio	16.61		11.20		12.76	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

Table C-26

CROSS-SECTIONAL CHARGE REGRESSIONS

	Indemnity: Surgical Specialties					
	Plan A				Plan B	
	Without APRVU		With APRVU		Without APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	-0.209455	-0.1352	-2.498998	-1.7307	3.294447	6.6207
APRVU	.a	.a	0.825839	14.6052	.a	.a
NONPART	0.040694	1.0904	0.021007	0.6073	0.105033	1.0512
LAGPRCLM	-0.001265	-3.1898	-0.000981	-2.6678	-0.001400	-1.7216
AGE	-0.003954	-2.1954	-0.004783	-2.8653	-0.004791	-1.2620
AMASEX	0.008381	0.0658	0.046583	0.3946	-0.277308	-1.1823
BORDCERT	0.011596	0.2797	-0.010284	-0.2676	0.025821	0.3516
FMG	0.010750	0.2399	-0.003151	-0.0759	0.070758	0.8766
SPEC_2ND	-0.054278	-0.5400	-0.022702	-0.2438	-0.068317	-0.2412
GROUP	0.074021	1.7053	0.123995	3.0732	0.089944	0.6195
PARTNER	0.097876	2.1804	0.177193	4.2261	0.105812	1.1520
HOSPEMPL	0.199650	2.5736	0.183903	2.5593	0.154932	1.0147
OTH_EMPL	-0.072072	-0.6506	-0.045098	-0.4395	0.343315	1.4253
INPAHOSP	-0.505249	-6.9104	-0.029270	-0.3895	-0.567580	-6.0288
OLDRVU	0.128486	0.9515	0.217128	1.7339	-0.101398	-0.2484
PCTFEMRV	-0.144955	-2.3000	-0.127573	-2.1850	0.096451	1.0534
YNGRVU	0.106728	0.9730	0.027731	0.2726	-0.484991	-3.6722
SPECPRCP	-4938.290000	-1.6670	-6404.870000	-2.3329	-68.385029	-0.1757
INPERCAP	0.000574	1.7190	0.000701	2.2634	-0.000110	-1.2425
OVER65	17.286261	1.8911	22.063727	2.6042	-5.534555	-1.9072
PRCT_URB	0.000670	1.5630	0.000781	1.9676	0.000513	2.2141
WAGEINDX	-0.002286	-0.1070	0.009028	0.4558	-0.010217	-0.4001
TIME74/TIME76	-0.047173	-0.3163	-0.134272	-0.9710	0.295713	1.8371
TIME75/TIME77	0.205757	1.1466	0.069683	0.4186	0.754151	4.2365
TIME76/TIME78	-0.085889	-0.2525	-0.264595	-0.8391	1.030296	4.4583
AREA_2	.a	.a	.a	.a	0.096205	0.5078
AREA_3	.a	.a	.a	.a	0.336613	1.8179
NS	0.201381	2.2911	0.344520	4.2016	0.140799	0.5612
ORS	0.482703	6.3696	0.307591	4.3198	0.749627	5.0258
OTO	0.187831	0.8996	0.213025	1.1016	0.679355	5.5189
U	-0.151487	-2.1672	-0.111800	-1.7254	-0.233267	-2.0199
CSS	0.134693	1.5050	0.007815	0.0938	0.758172	2.7024
OBG	0.169649	3.4164	0.386780	8.0021	0.100010	1.0374
OPH	-0.112851	-1.9471	-0.117582	-2.1904	-0.155938	-1.1012
DFE	1281		1280		701	
R^2	.35		.44		.30	
F-ratio	22.88		32.69		9.38	
Prob > F	.0001		.0001		.0001	

	Indemnity: Surgical Specialties					
	Plan B		Plan C			
	With APRVU		Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	2.459209	5.3438	2.754837	12.1302	2.039954	8.5665
APRVU	0.881834	11.8069	.a	.a	0.440731	8.1919
NONPART	0.124634	1.3647	.a	.a	.a	.a
LAGPRCLM	-0.001355	-1.8234	0.000308	0.8208	0.000315	0.8550
AGE	-0.005386	-1.5523	-0.008572	-3.8347	-0.009697	-4.4389
AMASEX	-0.439196	-2.0449	0.378879	2.2105	0.364542	2.1805
BORDCERT	0.077651	1.1546	0.064463	1.3559	0.058325	1.2577
FMG	0.074161	1.0054	0.097580	1.3991	0.076613	1.1255
SPEC_2ND	-0.217872	-0.8407	0.100909	0.9732	0.084165	0.8322
GROUP	-0.017423	-0.1310	-0.041856	-0.8664	-0.052528	-1.1144
PARTNER	0.067195	0.7999	-0.079593	-1.8421	-0.075236	-1.7852
HOSPEMPL	0.141178	1.0117	-0.068166	-0.6127	-0.019220	-0.1768
OTH_EMPL	0.403384	1.8320	0.029574	0.2525	0.061676	0.5396
INPAHOSP	-0.193207	-2.1071	-0.058591	-1.0005	0.212738	3.2220
OLDRVU	0.398619	1.0619	.	.	.	.
PCTFEMRV	0.038499	0.4593	-0.030648	-0.4855	-0.031078	-0.5048
YNGRVU	-0.384708	-3.1796	0.022039	0.2166	0.038047	0.3833
SPECPRCP	358.033162	1.0012	151.708087	0.9109	160.663136	0.9890
INPERCAP	-0.000050	-0.6147	0.000028	0.5067	0.000024	0.4512
OVER65	-8.236211	-3.0942	-0.452309	-0.2191	-0.508201	-0.2524
PRCT_URB	0.000571	2.6963	0.000163	0.6481	0.000263	1.0724
WAGEINDX	-0.052488	-2.2232	.	.	.	.
TIME74/TIME76	0.440018	2.9810	0.150578	2.1570	0.124402	1.8251
TIME75/TIME77	0.089683	0.5210	0.321537	3.4407	0.261444	2.8592
TIME76/TIME78	0.277171	1.2564	0.525156	3.8105	0.455919	3.3848
AREA_2	0.245163	1.4122	-0.151829	-1.5274	-0.147130	-1.5176
AREA_3	0.347054	2.0509	-0.270599	-1.6165	-0.269500	-1.6507
NS	0.059442	0.2592	-0.073973	-0.7950	-0.054729	-0.6028
ORS	0.435154	3.1332	-0.192178	-2.8392	-0.298200	-4.4326
OTO	0.494525	4.3541	0.410144	0.6623	0.388536	0.6433
U	-0.329333	-3.1113	-0.119232	-1.7853	-0.069398	-1.0608
OSS	0.764151	2.9805	0.210415	2.1852	0.252429	2.6838
OBG	0.271229	3.0379	-0.143633	-2.7019	-0.107261	-2.0612
OPH	-0.100879	-0.7791	-0.457534	-6.2364	-0.472787	-6.0715
DFE	700		1291		1290	
R^2	.42		.20		.24	
F-ratio	15.11		11.39		13.81	
Prob > F	.0001		.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-27

CROSS-SECTIONAL CHARGE REGRESSIONS

	Plan B Medicare: General Practice			
	Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	0.820607	2.6325	-0.260206	-1.6083
APRVU	.a	.a	1.090581	32.2095
NONPART	0.193617	2.7974	0.063903	1.8066
LAGPRCLM	-0.000353	-0.7237	0.000524	2.0982
AGE	-0.005604	-2.8245	-0.001515	-1.4921
AMASEX	-0.248137	-0.9386	-0.188113	-1.4013
BORDCERT	0.218045	4.8699	0.002318	0.0978
FMG	0.147408	3.0126	0.052284	2.0898
SPEC_2ND	.	.	.	.
GROUP	-0.158395	-1.1334	0.073443	1.0297
PARTNER	0.035638	0.5939	0.045613	1.4969
HOSPEMPL	0.875656	1.9501	0.746867	3.2754
OTH_EMPL	.	.	.	.
INPAHOSP	-0.220118	-3.6493	-0.027921	-0.8948
OLDRVU	.	.	.	.
PCTFEMRV	0.077219	0.5519	0.034503	0.4856
YNGRVU	.	.	.	.
SPECPRCP	1546.390000	3.7966	592.665785	2.8369
INPERCAP	0.000201	3.6260	0.000044	1.5366
OVER65	-0.934961	-0.7756	0.370693	0.6043
PRCT_URB	-0.000023	-0.1999	0.000055	0.9466
WAGEINDX	0.039951	3.7527	0.001187	0.2144
TIME74	-0.098715	-1.3947	0.001522	0.0422
TIME75	-0.028695	-0.3606	0.056024	1.3835
TIME76	-0.099711	-0.8397	0.072290	1.1943
AREA_2	0.034806	0.3523	0.112227	2.2345
AREA_3	-0.316039	-3.5277	0.024730	0.5295
DFE	360		359	
R^2	.48		.87	
F-ratio	15.83		105.76	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-28

CROSS-SECTIONAL CHARGE REGRESSIONS

Variable	Plan B Medicare: Medical Specialties			
	Without APRVU		With APRVU	
	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	1.758892	4.0492	-0.141764	-0.4855
APRVU	.a	.a	1.208277	28.7829
NONPART	0.256456	4.4431	0.254931	6.7453
LAGPRCLM	-0.000784	-1.4815	0.000573	1.6379
AGE	-0.003986	-2.0054	0.002130	1.6154
AMASEX	0.135573	1.3653	0.081250	1.2492
BORDCERT	0.211429	4.6925	0.021295	0.7044
FMG	-0.057923	-1.1573	-0.015918	-0.4853
SPEC_2ND	-0.532741	-2.3591	-0.014488	-0.0973
GROUP	-0.178033	-1.2087	-0.169015	-1.7525
PARTNER	0.067621	1.0382	0.010833	0.2537
HOSPEMPL	0.299460	3.9338	0.180322	3.6053
OTH_EMPL	0.253245	2.3395	0.176324	2.4860
INPAHOSP	-0.081678	-0.9948	0.157744	2.8998
OLDRVU	.	.	.	.
PCTFEMRV	-0.058203	-0.4062	-0.099451	-1.0598
YNGRVU	.	.	.	.
SPECPRCP	-430.017131	-1.3811	1.976501	0.0097
INPERCAP	0.000010	0.1600	-0.000002	-0.0371
OVER65	2.106299	0.7347	-0.705473	-0.3753
PRCT_URB	0.000186	1.0059	-0.000109	-0.8990
WAGEINDX	0.043185	2.3866	-0.003986	-0.3332
TIME74	-0.061969	-0.5918	0.025134	0.3662
TIME75	0.059179	0.4753	0.073734	0.9043
TIME76	0.121410	0.6620	0.156008	1.2992
AREA_2	-0.289641	-2.0057	-0.258399	-2.7326
AREA_3	-0.219506	-1.0984	-0.245068	-1.8729
PD	0.033665	0.2921	0.195266	2.5808
OMS	0.126823	2.9781	0.062302	2.2271
DFE	621		620	
R^2	.30		.70	
F-ratio	10.83		56.16	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C -29

CROSS-SECTIONAL CHARGE REGRESSIONS

Variable	Plan B Medicare: Other Specialties: Without APRVU — Coefficient Estimate	Without APRVU — t-ratio	With APRVU — Coefficient Estimate	With APRVU — t-ratio
INTERCEPT	0.481327	0.7570	-0.948100	-2.4244
APRVU	.a	.a	1.294374	25.9087
NONPART	-0.263410	-2.5522	0.101095	1.5697
LAGPRCLM	-0.001026	-1.5109	0.000382	0.9147
AGE	-0.008884	-2.3316	-0.000385	-0.1644
AMASEX	0.165578	1.3696	0.070938	0.9625
BORDCERT	0.053510	0.7389	0.053607	1.2156
FMG	0.062870	0.9215	0.042393	1.0203
SPEC_2ND	-0.061349	-0.3570	-0.058417	-0.5583
GROUP	0.174850	1.6865	0.033267	0.5250
PARTNER	0.291858	2.5828	0.088606	1.2794
HOSPEMPL	0.106637	1.2329	0.164446	3.1194
OTH_EMPL	-0.075216	-0.6542	0.065679	0.9353
INPAHOSP	-0.049850	-0.3898	0.081526	1.0446
OLDRVU	.	.	.	.
PCTFEMRV	-0.129146	-0.8861	0.004548	0.0512
YNGRVU	.	.	.	.
SPECPRCP	1880.090000	3.5483	240.114111	0.7303
INPERCAP	0.000417	4.1102	0.000049	0.7812
OVER65	8.711743	2.4849	3.326930	1.5511
PRCT_URB	-0.000146	-0.4870	0.000124	0.6763
WAGEINDX	-0.039575	-1.6494	-0.018511	-1.2650
TIME74	0.246508	1.8177	0.026553	0.3199
TIME75	0.729608	4.7163	0.059943	0.6136
TIME76	0.747739	3.1759	0.211492	1.4600
AREA_2	-0.021942	-0.0949	0.187224	1.3276
AREA_3	0.183629	0.7344	0.113913	0.7480
AN	-0.000531	-0.0038	0.118798	1.3834
PTH	-0.660979	-4.0717	-0.020141	-0.1977
P	-0.267199	-1.8040	0.126181	1.3796
N	-0.067882	-0.4761	0.058349	0.6710
DFE	395		394	
R^2	.42		.79	
F-ratio	10.81		52.09	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C -30

CROSS-SECTIONAL CHARGE REGRESSIONS

Variable	Plan B Medicare: Surgical Specialties			
	Without APRVU		With APRVU	
	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	2.042279	7.7738	0.014457	0.0715
APRVU	.a	.a	1.235040	33.8580
NONPART	0.054769	1.1646	0.060872	1.7594
LAGPRCLM	-0.000768	-1.9061	-0.000135	-0.4536
AGE	-0.007305	-4.2017	-0.005412	-4.2274
AMASEX	0.149925	1.1197	-0.019410	-0.1968
BORDCERT	0.016198	0.4271	0.001808	0.0648
FMG	0.157398	3.7626	0.059959	1.9399
SPEC_2ND	0.190513	1.7129	0.013725	0.1674
GROUP	-0.034784	-0.5107	-0.057004	-1.1375
PARTNER	0.056376	1.1943	0.067821	1.9529
HOSPEMPL	-0.176321	-2.3324	-0.133741	-2.4042
OTH_EMPL	0.254542	2.4622	0.218434	2.8719
INPAHOSP	-0.230331	-3.8907	-0.009598	-0.2180
OLDRVU	.	.	.	.
PCTFEMRV	0.211469	2.5706	0.179830	2.9711
YNGRVU	.	.	.	.
SPECPRCP	599.708075	3.2907	392.693705	2.9260
INPERCAP	0.000147	3.2206	0.000073	2.1584
OVER65	-4.625539	-3.1436	-2.853276	-2.6329
PRCT_URB	0.000234	1.7858	0.000056	0.5848
WAGEINDX	-0.012705	-1.0206	-0.015742	-1.7189
TIME74	0.145619	2.0034	0.049002	0.9151
TIME75	0.382850	4.4235	0.166117	2.5959
TIME76	0.467037	4.0279	0.167908	1.9580
AREA_2	0.024721	0.2475	0.169695	2.3053
AREA_3	0.030828	0.2869	0.099225	1.2547
NS	-0.473625	-5.1344	-0.061828	-0.8968
ORS	0.084510	1.4143	0.071805	1.6335
OTO	0.249401	3.9257	0.107990	2.3014
U	-0.058915	-0.8146	-0.003271	-0.0615
OSS	0.217193	2.2772	0.108122	1.5393
CBG	0.084949	1.3997	-0.060609	-1.3513
OPH	0.034582	0.6715	-0.039618	-1.0439
DFE	1351		1350	
R^2	.28		.61	
F-ratio	17.33		67.97	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-31

CROSS-SECTIONAL CHARGE REGRESSIONS

	Plan B Partial Service: General Practice			
	Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	1.477910	3.3528	-0.576219	-1.3270
APRVU	.a	.a	1.032816	9.6212
NONPART	0.518121	4.6212	0.411990	4.2560
LAGPRCLM	-0.000656	-0.7006	-0.000169	-0.2106
AGE	-0.001724	-0.5279	-0.003593	-1.2796
AMASEX	0.498839	1.8218	0.671413	2.8503
BORDCERT	0.007120	0.1157	0.039747	0.7511
FMG	0.130958	1.8379	0.069486	1.1307
SPEC_2ND	.	.	.	.
GROUP	-0.175666	-1.0037	-0.035191	-0.2333
PARTNER	-0.092410	-1.1472	-0.107628	-1.5572
HOSPEMPL	.	.	.	.
OTH_EMPL	.	.	.	.
INPAHOSP	-0.438087	-5.5132	0.071200	0.8250
OLDRVU	-0.567760	-1.6452	0.655428	2.0345
PCTFEMRV	0.235977	2.0664	0.258634	2.6396
YNGRVU	0.136519	0.6088	0.384624	1.9818
SPECPRCP	383.351818	0.6612	1064.002000	2.1180
INPERCAP	0.000070	0.8317	0.000107	1.4754
OVER65	1.347798	0.7878	1.511116	1.0297
PRCT_URB	-0.000061	-0.3619	-0.000024	-0.1669
WAGETNDX	0.038693	2.4666	0.028241	2.0919
TIME74	-0.005108	-0.0506	-0.011631	-0.1344
TIME75	-0.091021	-0.8007	-0.110979	-1.1379
TIME76	-0.063268	-0.3516	-0.097244	-0.6298
AREA_2	-0.014933	-0.1112	0.014441	0.1253
AREA_3	-0.032686	-0.2607	-0.135623	-1.2548
DFE	255		254	
R^2	.36		.53	
F-ratio	6.52		12.51	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and *t*-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-32

CROSS-SECTIONAL CHARGE REGRESSIONS

Variable	Plan B Partial Service: Medical Specialties			
	Without APRVU		With APRVU	
	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	2.917909	7.7161	0.969103	2.3229
APRVU	.a	.a	0.817161	9.3223
NONPART	0.425546	6.5200	0.449703	7.2106
LAGPRCLM	0.001204	1.8842	0.001606	2.6256
AGE	-0.006382	-3.4544	-0.004808	-2.7136
AMASEX	0.252128	3.1563	0.278397	3.6478
BORDCERT	0.174402	4.1342	0.166483	4.1326
FMG	0.112003	2.3134	0.088061	1.9023
SPEC_2ND	-0.366684	-1.3134	-0.317850	-1.1922
GROUP	-0.115746	-1.0297	-0.153210	-1.4266
PARTNER	-0.033662	-0.6150	-0.014520	-0.2776
HOSPEMPL	0.276375	3.8051	0.284284	4.0992
OTH_EMPL	0.215651	2.0323	0.241843	2.3862
INPAHOSP	-0.017762	-0.2119	0.423638	4.5567
OLDRVU	-0.144350	-0.4913	0.518802	1.7928
PCTFEMRV	-0.061530	-0.6969	-0.034025	-0.4034
YNGRVU	0.595806	4.7768	0.171581	1.3459
SPECPRCP	-115.350833	-0.4043	-47.202716	-0.1732
INPERCAP	-0.000074	-1.2924	-0.000034	-0.6236
OVER65	0.319817	0.1224	0.813728	0.3262
PRCT_URB	-0.000221	-1.2297	-0.000185	-1.0767
WAGEINDX	0.007544	0.4864	0.004275	0.2887
TIME74	0.071774	0.8090	0.078452	0.9261
TIME75	0.183700	1.7568	0.129453	1.2945
TIME76	0.448048	2.8317	0.325043	2.1435
AREA_2	-0.449910	-3.2419	-0.439607	-3.3178
AREA_3	-0.422313	-2.2169	-0.415004	-2.2818
PD	-0.547255	-8.5361	-0.253298	-3.6788
OMS	0.096790	2.0303	0.135081	2.9558
DFE	885		884	
R^2	.33		.39	
F-ratio	16.36		20.41	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

Table C-33

CROSS-SECTIONAL CHARGE REGRESSIONS

Plan B Partial Service: Other Specialties

Variable	Without APRVU Coefficient Estimate	Without APRVU t-ratio	With APRVU Coefficient Estimate	With APRVU t-ratio
INTERCEPT	0.894047	0.9665	-1.176280	-1.4109
APRVU	.a	.a	1.208466	11.3896
NONPART	-0.101401	-0.6910	-0.077994	-0.6042
LAGPRCLM	0.003969	3.8805	0.004491	4.9858
AGE	-0.009544	-1.9471	-0.006715	-1.5550
AMASEX	0.042735	0.2433	-0.042083	-0.2720
BORDCERT	0.011783	0.1220	0.063136	0.7419
FMG	-0.020906	-0.2300	-0.024627	-0.3080
SPEC_2ND	0.010620	0.0448	-0.016397	-0.0787
GROUP	0.137042	0.9872	0.169594	1.3886
PARTNER	0.169301	1.1108	0.112051	0.8353
HOSPEMPL	0.043971	0.3778	0.041544	0.4058
OTH_EMPL	-0.211759	-1.4153	-0.063163	-0.4776
INPAHOSP	0.183437	0.9907	0.540315	3.2580
OLDRVU	-0.617330	-1.5272	0.117013	0.3238
PCTFEMRV	-0.403377	-2.3643	-0.252074	-1.6732
YNGRVU	-0.839131	-2.7244	-0.577088	-2.1225
SPECPRCP	2883.345000	3.7145	2693.985000	3.9446
INPERCAP	0.000428	2.7909	0.000399	2.9616
OVER65	1.235660	0.2478	-1.155785	-0.2632
PRCT_URB	-0.000764	-1.9035	-0.000654	-1.8514
WAGEINDX	0.014270	0.4652	-0.002848	-0.1054
TIME74	0.201905	1.1505	0.188697	1.2224
TIME75	0.307147	1.5077	0.139821	0.7777
TIME76	0.122099	0.3821	0.072630	0.2584
AREA_2	-0.353744	-1.0555	-0.368530	-1.2502
AREA_3	-0.497200	-1.4577	-0.329465	-1.0969
AN	-0.168602	-0.8962	0.668644	3.6928
PTH	0.052241	0.2144	0.202376	0.9427
P	0.460782	2.3215	0.889386	4.9800
N	0.101221	0.4948	0.089243	0.4959
DFE	440		439	
R^2	.36		.51	
F-ratio	8.50		14.95	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.

TABLE C-34

CROSS-SECTIONAL CHARGE REGRESSIONS

	Plan B Partial Service: Surgical Specialties			
	Without APRVU		With APRVU	
Variable	Coefficient Estimate	t-ratio	Coefficient Estimate	t-ratio
INTERCEPT	2.669624	10.3961	1.562671	6.2599
APRVU	.a	.a	0.841979	15.3913
NONPART	0.049197	0.9871	0.120298	2.5800
LAGPRCLM	-0.000762	-1.8619	-0.000866	-2.2735
AGE	-0.006539	-3.2566	-0.006929	-4.3894
AMASEX	-0.014344	-0.1170	-0.178701	-1.5590
BORDCERT	-0.005995	-0.1650	0.018987	0.5606
FMG	0.046786	1.1457	0.058515	1.5390
SPEC_2ND	0.166362	1.5252	0.203441	2.0031
GROUP	-0.038709	-0.5715	-0.024212	-0.3839
PARTNER	0.098140	2.1517	0.030031	0.7035
HOSPEMPL	-0.043933	-0.5972	-0.033487	-0.4889
OTH_EMPL	0.055631	0.5650	0.028420	0.3100
INPAHOSP	-0.400901	-5.8910	-0.122161	-1.8541
OLDRVU	-0.687169	-3.8525	-0.144770	-0.8529
PCTFEMRV	-0.162524	-2.5216	-0.124201	-2.0683
YNGRVU	-0.031426	-0.3179	-0.037599	-0.4086
SPECPRCP	389.974801	2.1526	483.167910	2.8631
INPERCAP	0.000082	1.7964	0.000078	1.8439
OVER65	-3.931100	-2.7227	-4.662312	-3.4667
PRCT_URB	0.000121	1.0178	0.000127	1.1546
WAGEINDX	-0.009906	-0.8407	-0.017448	-1.5889
TIME74	0.227441	3.3830	0.233828	3.7360
TIME75	0.472022	5.8951	0.476493	6.3927
TIME76	0.724320	6.6130	0.756629	7.4192
AREA_2	0.011406	0.1195	-0.030018	-0.3376
AREA_3	-0.069330	-0.7079	-0.059498	-0.6526
NS	-0.049498	-0.5411	-0.235252	-2.7354
ORS	0.345077	5.0571	0.163316	2.5277
OTO	0.415859	5.4837	0.389662	5.5181
U	-0.012883	-0.1868	0.017815	0.2773
OSS	0.344716	3.7288	0.327602	3.8064
OBG	0.228933	4.3203	0.295532	5.9682
OPH	0.125273	2.2753	0.328480	6.2062
DFE	1532		1531	
R^2	.32		.41	
F-ratio	22.47		32.32	
Prob > F	.0001		.0001	

Dots in place of a coefficient estimate and t-ratio indicate no data were available in the sample for the variable. A dot followed by the letter "a" indicates the variable was not included in the regression equation specification.