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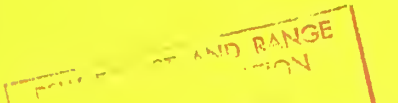
U.S. Pacific Northwest  
Forest and Range  
Experiment Station

Research Paper  
PNW-306  
July 1983



# Considering Departures From Current Timber Harvesting Policies: Case Studies of Four Communities in the Pacific Northwest

Con H Schallau and Paul E. Polzin



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## Abstract

Schallau, Con H; Polzin, Paul E. Considering departures from current timber harvesting policies: case studies of four communities in the Pacific Northwest. Res. Pap. PNW-306. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1983. 29 p.

U.S. Department of Agriculture regulations permit departures from current National Forest timber harvesting policies when "implementation of base harvest schedules . . . would cause a substantial adverse impact upon a community . . ." This paper describes the kinds of information needed for forest managers to adequately assess the relevance of the departure issue to particular planning units. The relevance of the departure issue varied, depending on: (1) future timber supply, (2) timber dependency, (3) the long-term feasibility of alternatives to current timber harvesting schedules, and (4) whether or not the growth of industries not dependent on timber might compensate for a timber shortage.

Keywords: National Forest policy, economic impact, economic importance (forests), timber harvesting policy, harvest scheduling, timber supply.

## Preface

Traditionally, forest management planning has had a long-term perspective. Public forest management has been predicated on the notion that postwar trends in the demand for timber products will continue indefinitely. A pent-up demand for housing and prospects for expanding foreign markets bode well for timber processors in the Pacific Northwest (Resources for the Future 1982). Consequently, despite the fact that the lumber industry has been suffering from its worst decline in production since World War II, National Forest management planning and priorities will undoubtedly continue to reflect a growing need for timber products.

In this report, we provide a procedure for evaluating past performance and likely future trends in the economies of small communities. We believe this procedure will be useful for analyzing a variety of decisionmaking situations. To illustrate our procedure, we chose a policy issue and examined its potential economic implications. We systematically analyzed the relevance of possible departures from current USDA Forest Service timber harvesting schedules to the economic futures of two communities in western Montana and two in the Douglas-fir region (west side of the Cascade Range) of Oregon.

Analysis of the departure issue involved a supply-side approach. The Forest Service cannot significantly influence demand for forest products for the timespan considered. Furthermore, we focused on differences; we believe timber product demand factors, unlike supply factors, are essentially the same for all four communities.

This report is intended mainly for economists and other policy analysts. Others interested in our approach and its possible use for analyzing other issues or localities may find it useful to read pages 1 to 6, to scan tables 4 to 7 and 19 to 22, then to read pages 25 and 26.

We acknowledge the comments and assistance from numerous individuals who reviewed earlier versions of this paper. Special thanks to Charles Keegan III, University of Montana, for information about the timber products industry of western Montana; and to those who provided data on detailed earnings: Thomas M. Lynch, Oregon Employment Division; Alan R. Mathany, Director, Office of Budgets, Oregon State University; and Paul R. Rafferty, Jr., Montana Division of Labor and Industry.

## Introduction

Regulations issued by the U.S. Department of Agriculture in 1979 on land and resource management planning in the National Forest System (USDA Forest Service 1979) provided timber managers with additional flexibility in establishing "harvest schedules." Before 1979, the USDA Forest Service had been adhering to a strict interpretation of sustained yield; that is, nondeclining even flow. Now departures from the "base harvest schedule"<sup>1/</sup> can be considered when "implementation of base harvest schedules . . . would cause a substantial adverse impact upon a community in the economic area in which the forest is located" (USDA Forest Service 1979). The added flexibility, however, could complicate the forest planning process because the merits of base harvest schedules must be evaluated in terms of economic impacts as well as economic efficiency. A line officer who does not believe current policies will cause adverse impacts may, however, ignore the departure (USDA Forest Service 1982).

This paper describes and illustrates a systematic analytical procedure for determining whether a departure should be considered for a particular National Forest planning unit.

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<sup>1/</sup> "The timber sale schedule in which the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade of the planning period and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity" (USDA Forest Service 1982).

## Fundamental Questions

Our examination of the departure policy is organized around a series of questions about the extent and economic role of an area's timber resource (fig. 1). A "no" to any one of the first three questions suggests that departure from the base harvest schedules—that is, nondeclining even flow (NDEF)—should not be considered:

1. Will the future timber supply be diminished? The case for departure is weak if, for the foreseeable future, the area's timber supply will be about equal to the raw material requirements of the processing industry. Despite a balance between timber supply and demand, employment in the wood processing industry may decline as new technology is adopted. Future increase in technology, however, may not precipitate "adverse impacts"<sup>2/</sup> because related employment change has been gradual in the past.

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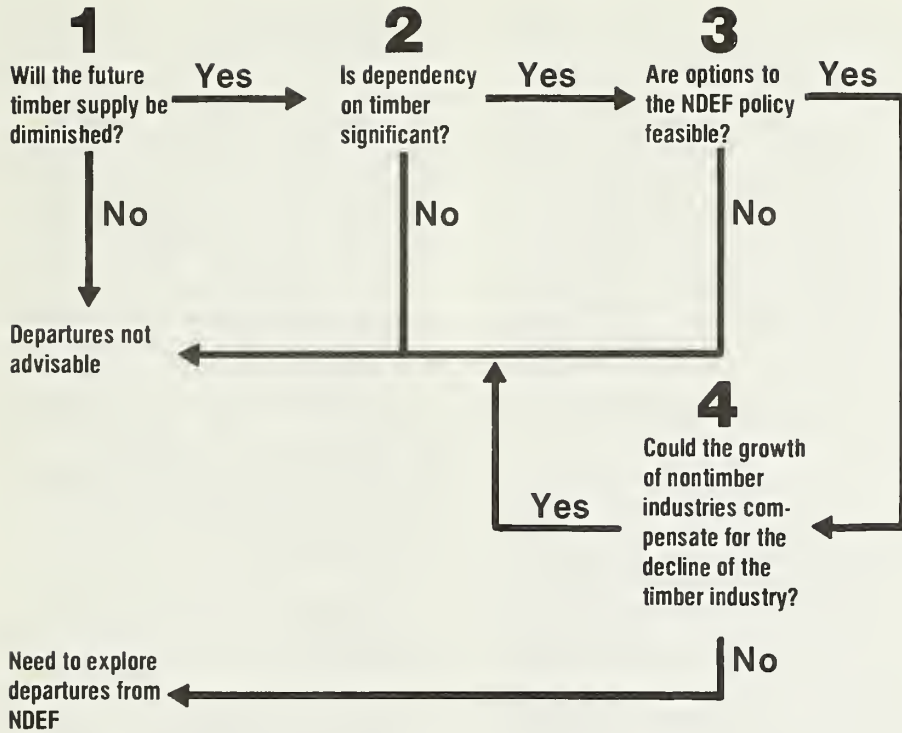
<sup>2/</sup> For this paper, an "adverse impact" is any significant and sustained loss of export base jobs and income resulting in the loss of necessary private and public services.

2. Is dependency on timber significant? The economic impact of a shortfall in timber harvesting depends on the importance of the timber industry to the local economy. A community highly dependent on timber, for instance, might be adversely impacted by a modest, but sustained shortfall. A similar decline would have less impact on a community with a more diversified economy.

3. Are options to the nondeclining even flow policy feasible? Timber production is peculiar in that you "cannot tell the product from the machine" (Duerr 1960); that is, until a tree is harvested, it is a wood-making machine. Furthermore, the annual wood production from a tree may have little bearing on when the tree is harvested because the product can be stored on the stump. Most National Forests in the Pacific Northwest contain considerable amounts of stored overmature timber. In some instances, the harvest of this stored wood could be accelerated without jeopardizing the Forest's longrun ability to produce wood (Beuter and others 1976). Elsewhere, however, more rapid rates of harvesting may not be feasible; that is, acceleration of harvesting would deplete current stocks to the point that future availability of timber from the Forest would be jeopardized.

4. Could the growth of nontimber industries compensate for the decline of the timber industry? In the past, a particular timber-dependent community might have been vulnerable to a shortfall in the supply of timber. In the future, however, a new industry or continued industrial diversification could compensate for decline of the timber industry. In such instances, there may be no need to consider departures.





In some cases, answering the four fundamental questions is simple. But to explore the departure issue in more detail, we chose examples that require a formal analysis. Our analytical procedure involves three basic components: (1) evaluating the timber supply situation and options to NDEF, (2) identifying the export base industries of an area, and (3) assessing economic trends influencing the growth of each area.

Our evaluation of the timber supply situation and the feasibility of options to the NDEF are based on published reports. We used an export base model to evaluate timber dependency and economic trends.

**Growth of Export Base—A Key Element**

Most economic growth and change in small regions can be attributed to events outside the area, and changes in the local, nonexport-producing (service or derivative) industries can be traced to changes in industries producing for markets outside the area (export base). Our assessment focuses on past and potential changes in the export base sector of each study area.

Figure 1.—Fundamental questions about the appropriateness of departing from current timber harvesting policies—nondeclining even flow (NDEF).

The concept of export base industries is straightforward; all economic activities influenced by outside factors are included. Regional analysts have used a number of methods to bifurcate local economies into export base and derivative sectors. For most industries, we have used the assignment approach (direct assignment of specific industries) for deriving estimates of the export base in our four study communities. In addition, we consulted knowledgeable public officials who helped us classify a few industries (for example, miscellaneous food preparation) into the basic or derivative categories. Though simple, this method may be the most appropriate for our communities because all are relatively small, and most of the industries include only a few similar firms that can easily be classified as export base or derivative. Like other bifurcation techniques, however, the assignment approach has drawbacks. Some export activities do not correspond to the Standard Industrial Classification (SIC) codes, developed by the Office of Management and Budget (1972), which we used to assign industries to either the export base or derivative sectors. Portions of the tourist industry are found in retail trade, services, and other SIC categories.<sup>3/</sup> In addition, certain data are not available—there is little information about the incomes of self-employed, health care professionals. In short, the following analysis of the export industries should be interpreted carefully. The figures were derived from several sources, and many are educated guesses. The data, though, are sufficiently reliable that the important characteristics of the local economy can be identified.

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<sup>3/</sup> Using employment data and a different bifurcation approach, Schuster (1980) identified the economic base of Montana and five multicounty areas. He found that the "recreation industry" accounts for about 9 percent of Montana's nonagricultural export base.

The importance of export base industries is best measured by the income earned by workers. These dollars represent a net injection into the economy and create additional income in the derivative industries as they are spent and respend in the local area. To some extent, data on earnings understate the importance of basic industries; they do not include payments by export businesses for utilities and local taxes, or purchases from local merchants. For the most part, these figures are not available. Nonlabor expenditures are discussed later. We have not referenced the number of export base workers—the persons employed in the export industry. Earnings, not the number of export base (or "basic") workers, affect the local economy. It makes little difference whether \$20,000 is earned by one basic worker or by two, each making \$10,000. Earnings and employment are closely related—more workers usually means more income. But problems may develop in export base industries that have many workers but pay low wages or have few workers and pay very high wages; looking only at employment may overstate or underestimate the importance of these industries to the local economy. On the other hand, earnings data must be adjusted for inflation so that economic activity for different time periods can be compared. To account for inflation, we used the implicit price deflator for personal consumption expenditures to convert current 1970 and 1978 dollars to a constant 1972 base (U.S. Department of Commerce, Bureau of Economic Analysis 1979).

## Long-Term Trends— The Principal Focus

A snapshot of a ball tossed into the air does not disclose whether the ball is going up or down. Likewise, we cannot assess a community's future economic performance by examining only the current situation. We must investigate past trends to gain a proper perspective.

Short-term trends in timber-related industries usually coincide with the national business cycle (Wall 1972). These short-term cycles (averaging about 40 months) may mask protracted changes in both the timber industry and the dependent economies. To avoid misinterpretation of short-term phenomena, we discuss changes over a longer period (the mid-1960's to 1978).<sup>4/</sup>

The first step in our analysis of trends is an assessment of prospects for economic growth, as they may have appeared in 1970, for each study area. We present a variety of forecasts published during the late 1960's. We then compare actual change in economic activity between 1970 and 1978 with these earlier forecasts. This comparison will help identify persistent trends, as well as any apparent short-term aberrations. Finally, for each study area, we assess the prospects for growth during the 1980's and the possible need to consider departures from the nondeclining even flow policy.

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<sup>4/</sup> Our analysis is based on economic data for 1970 and 1978, which correspond to different phases of the national business cycle. Specifically, 1970 was not as good a year as 1978 for the wood products industry. Comparable phases of the business cycle should be analyzed, but this information was not available when we initiated this study. Because of the long-term focus of our study, we do not believe this deficiency affects our conclusions.

## Comparison of Four Timber-Dependent Communities

Timber-dependent communities in the West represent a wide range of circumstances—high dependency on timber and an adequate timber supply, moderate dependency but an uncertain timber supply, and so forth. Consequently, NDEF does not have the same implications for all communities. For this reason, we chose four communities representing a diverse set of circumstances. As seen in figure 2, two of the areas are located west of the divide in Montana (Flathead and Missoula), and two are located in the Douglas-fir region (west side of the Cascade Range) of Oregon (Linn-Benton and Douglas).

The county is the smallest jurisdiction for which reliable earnings and employment data are available. Three of the four study areas are single counties. Linn and Benton Counties are combined because of geographical proximity, functional interdependence, and short commuting distances. Despite the restriction of countywide data, we believe each community corresponds to a functional economic area, representing a unique commuting and shopping zone as well as a local labor market and service area.<sup>5/</sup>

### Economic Overview of the Timber-Dependent Communities in 1970

The wood products industry was an important contributor to the economy of each study community in 1970. Dependency on timber is not, however, the only way to characterize a local economy. In this section, we examine general indicators of the economy (population, per capita income, nonfarm earnings) to provide an overview of each community.

The population figures presented in table 1 show that the communities are not equal in size. Linn-Benton is by far the largest; Douglas is second; Missoula, third; and Flathead, fourth. The largest of the timber-dependent communities (Linn-Benton) is more than three times larger than the smallest (Flathead).

<sup>5/</sup> Within a functional economic area, commuters represent a relatively small proportion of the work force (Berry 1966).

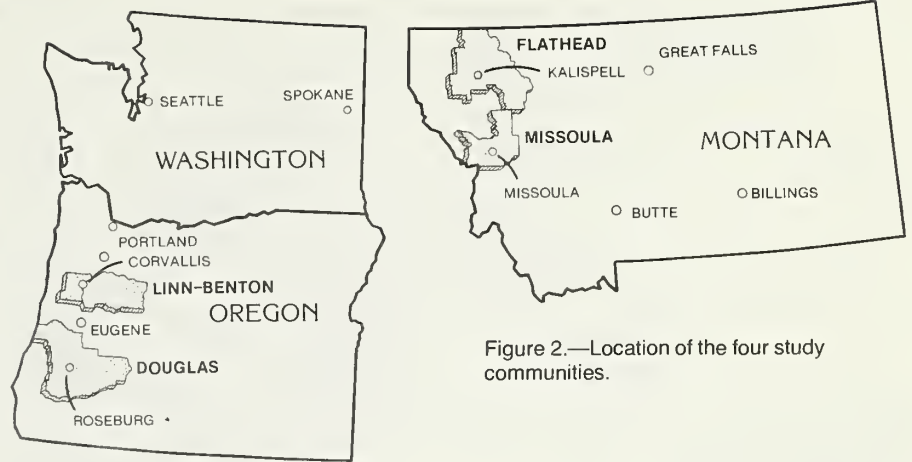


Figure 2.—Location of the four study communities.

Unlike for the national economy, there are no comprehensive indexes of economic activity, such as gross national product, for States and counties. Nonfarm earnings is often used as a measure of economic activity for small areas; it consists of wages and salaries, proprietors' income, and other income of all working persons, except those employed in agriculture. In most cases there is a high correlation between economic activity and the amount of labor required to produce it. As shown in table 1, the two Oregon communities are much larger than their Montana counterparts when measured by nonfarm earnings.

The larger population and nonfarm earnings in Oregon do not necessarily reflect the relative economic well-being of Montana and Oregon residents. Although there is no accurate measure of well-being, per capita income is a widely used indicator and 1970 figures for the study communities are presented in table 1. There is relatively little variation in per capita income among the four communities; only a 10-percent difference distinguishes the highest (Missoula) and the lowest (Linn-Benton).

Table 1—A comparison of population, nonfarm earnings, and per capita income of 4 timber-dependent communities in Montana and Oregon, 1970

Community	Population	Per capita income <sup>1/</sup>	
		Thousand 1972 dollars	1972 dollars
Montana:			
Flathead	39,460	95,591	3,439
Missoula	58,263	167,239	3,594
Oregon:			
Linn-Benton	125,495	315,775	<sup>2/</sup> 3,298
Douglas	71,743	201,005	3,464

<sup>1/</sup> Per capita income was derived from total personal income of residents, which is the income from all sources, including nonfarm earnings.

<sup>2/</sup> Weighted average for Linn and Benton Counties.

Source: U.S. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.

**Table 2—Comparison of the various components of export base industries of 4 Montana and Oregon communities, 1970<sup>1/</sup>**

Export base industry	Missoula (Montana)		Flathead (Montana)		Linn-Benton (Oregon)		Douglas (Oregon)	
	Earnings	Percentage of total export base earnings	Earnings	Percentage of total export base earnings	Earnings	Percentage of total export base earnings	Earnings	Percentage of total export base earnings
	Million 1972 dollars		Million 1972 dollars		Million 1972 dollars		Million 1972 dollars	
Agriculture	1.7	2.2	3.3	6.5	19.9	10.4	.8	.7
Other manufacturing	.7	.9	.9	1.8	6.3	3.3	7.0	6.6
Mining and other export industries	.5	.6	.7	1.4	21.7	11.4	1.5	1.4
Primary metals refining	2/	2/	10.9	21.4	2/	2/	2/	2/
Wood products	27.0	35.0	20.0	39.2	77.2	40.5	79.3	74.3
Food processing	--	--	--	--	7.8	4.1	.7	.7
Higher education	15.9	20.6	--	--	39.5	20.9	--	--
Wholesale trade	3.0	3.9	--	--	--	--	--	--
Retail trade	4.4	5.7	1.3	2.5	--	--	--	--
Transportation	8.0	10.4	6.0	11.8	2.0	1.0	1.9	1.8
Lodging	1.2	1.6	1.1	2.2	.8	.4	1.1	1.0
Federal Government	14.6	18.9	6.9	13.5	15.2	8.0	14.6	13.7
<b>Total<sup>3/</sup></b>	<b>77.1</b>	<b>100.0</b>	<b>51.0</b>	<b>100.0</b>	<b>190.5</b>	<b>100.0</b>	<b>106.8</b>	<b>100.0</b>

<sup>1/</sup>Earnings in 1972 dollars consist of wages and salaries, proprietors' income, and other labor income (mostly monetary fringe benefits).

<sup>2/</sup>To avoid disclosing data for individual firms, "Primary metals refining" is combined with "Mining and other export industries."

<sup>3/</sup>Totals may be off because of rounding.

Source: U.S. Bureau of Economic Analysis, Regional Economic Information, Washington, D.C., 1980; Montana Employment Security Commission, 1980; Helena, Montana, unpublished data, 1980; Oregon Employment Division, Salem, Oregon, unpublished data, 1980.

We analyze the export industries in terms of earnings rather than employment, because earnings affect the local economy. The components (as of 1970) of the export base in the four communities are compared in table 2.<sup>6/</sup> The wood products industry is the largest component of the economic base in each community. Even so, there is considerable variation among communities. The Douglas community, where the wood products industry accounted for the largest percentage of the economic base, is most dependent on timber. Linn-Benton is a distant second, and the Flathead and Missoula communities are third and fourth.

### Export Base of the Four Timber-Dependent Communities

The earnings data for the wood products industry understate the importance of the forestry resource sector because they include only the private wood products workers—the loggers and the sawmill, plywood, and paper plant workers. Excluded are State and Federal government employees who manage a variety of forest and related resources on public lands. In Missoula there are several USDA Forest Service offices, the headquarters of the Montana Division of

Forestry, and other government agencies related to forestry. These Missoula-based agencies had a combined total of about 1,100 employees, with estimated earnings of about \$16 million. Adding this figure to that of the private wood products industry suggests that forest resources accounted for slightly more than 50 percent of Missoula's export base in 1970. Likewise, forest resources accounted for about 50 percent of the 1970 export base for both the Flathead and Linn-Benton communities. In the Douglas community, the addition of government employees concerned with forest land management boosted the importance of forest resources to well over 80 percent of the export base.

<sup>6/</sup> The export base industries are listed in the appendix tables. We used the Standard Industrial Classification (SIC) Manual (Office of Management and Budget 1972) as a guide.

In addition to their dependency on timber, the four communities had other economic similarities. Higher education accounted for about 20 percent of the 1970 export base of both Missoula and Linn-Benton. Data for the University of Montana in Missoula and Oregon State University in Corvallis provide a good example of the advantages of analyzing the export base industries by earnings instead of employment. In 1970, the 3,000 employees of the University of Montana represented about 30 percent of the total export base employment, but only 21 percent of the basic earnings. The employment figures may overstate the importance of the universities because many jobs may be filled by students working only a few hours a week.

Missoula, in particular, and Flathead, to a lesser extent, are trade centers. For Missoula, a portion of the earnings and employment in both wholesale and retail trade is dependent on the spending of nonresidents, and this portion is included in the export base (Polzin 1977). Although they are often grouped together, the export components of wholesale and retail trade are different. In Missoula, the export component of retail trade represents the persons who come to shop, including those living on farms and ranches or in nearby towns; the tourists who stop and buy items or purchase meals from the local businesses; and the nonlocal students at the University of Montana. With the exception of nonresident students, the same holds for the Flathead area. The export component of wholesale trade, on the other hand, includes the Missoula wholesalers who supply retail stores elsewhere in western Montana.

The transportation industry is a minor component of both Oregon communities. In the Missoula and Flathead communities, however, this industry—mainly railroad jobs—accounts for a significant portion of the economic base.

Primary metals refining is a major contributor to the export base in both the Flathead and Linn-Benton communities. In fact, the Anaconda Company's aluminum refinery near Columbia Falls, Montana, accounted for about 21.3 percent of total export earnings and was the second largest component of the export base in the Flathead community. In the Linn-Benton community, primary metals refining was included in the "Other manufacturing" category to comply with State reporting requirements (to avoid disclosure of an individual firm's activity). The major facilities are the zirconium and titanium refining installations near Albany. Agriculture was relatively unimportant in the four communities. Only in Linn-Benton did it account for more than 10 percent of the economic base.

Structural differences among the communities are related to the way economic stimuli are transmitted from one sector to another. Table 3 presents export base ratios for the four communities. These ratios represent the importance of the basic industries to the total economy and may reflect the size of the multiplier (the larger the ratio the greater the multiplier). Notice that the export base ratios for the two Montana communities were larger than those for the Oregon communities. This is somewhat surprising because the Flathead and Missoula communities had smaller populations than did Linn-Benton and Douglas, and the multiplier is usually thought to be correlated with population (Tiebout 1962). The remoteness of communities in the Rocky Mountain region may account for this anomaly. As Polzin points out:<sup>2/</sup>

Because of the small size of the towns and the dispersed population, regional trade and service centers of only modest size may have a market area extending for hundreds of miles and may include ten, twenty, or even more counties. For example, Billings, Montana, with a population slightly less than 100,000 persons, has a primary trade area considerably larger than the state of Pennsylvania.

<sup>2/</sup> Polzin, Paul E. How to win friends and sleep at night while using economic base analysis. Paper presented at the 18th Annual Meeting of the Western Regional Science Association, Monterey, Calif. Feb. 1980.

**Table 3—Export base ratios for 4 Montana and Oregon timber-dependent communities, 1970<sup>1/</sup>**

Communities	Ratios
Montana:	
Flathead	1.93
Missoula	2.19
Oregon:	
Linn-Benton	1.77
Douglas	1.86

<sup>1/</sup> Derived as follows:

$$\text{Base ratios} = \frac{\text{total earnings, 1970}}{\text{basic earnings, 1970}}$$

Despite their smaller populations, the two Montana communities are regional trade centers and may be higher on the regional hierarchy of cities than the Oregon communities. This suggests that local residents have less of a tendency to shop elsewhere, and therefore their propensity to spend locally may be greater. The result may be larger multipliers. If this is the case, equal increases in export earnings have a greater impact in the Missoula and Flathead communities than in the Linn-Benton and Douglas communities.

The retirement industry is absent from our compilation of export base components. Retirement earnings (included in the transfer payments category) are a rapidly growing source of income for the four study communities. Some analysts include transfer payments as part of the export base, but we discuss them in a separate section.

In summary, there were significant differences among the four communities in the structure of their export base industries. Douglas was by far the most dependent on timber, with over 80 percent of its export base directly or indirectly associated with wood products. Wood products were a major, but not a dominant, component in the other communities, accounting for roughly 40 to 60 percent of the export base. Other industries, such as higher education and primary metals refining, also played a major role in these communities.

## 1970 Economic Outlook

To gain a long-term perspective, we will examine prospects for growth of the four communities, as perceived by various authorities about 1970. We will examine the outlook for the wood products industry first; then we will consider likely developments in other basic industries.

### Prospects for the Timber-Dependent Industries

For all practical purposes, the sawtimber supply in western Montana was being totally used in 1970. A USDA Forest Service (1959) report suggested that some reduction in sawmill capacity was appropriate. The outlook, nevertheless, was for modest increases in employment for the wood-using industries. Employment growth was expected to be much less than in the 1960's and to be in the processing of wood fiber residues (pulp and paper, particle board, and fiberboard) rather than sawtimber (Nelson 1963, Polzin 1972); that is, growth in the wood products industry was expected to result from increased utilization of the existing harvest, rather than increases in the level of harvest. Such a change would alter the relationship between timber harvesting and employment and earnings.

In contrast to the situation in western Montana, prospects for growth in the wood products industry in western Oregon were not encouraging in 1970. Log production from public lands had more than doubled between 1950 and the mid-1960's, but private harvest, which had accounted for the bulk of log production, had begun to stabilize (Brodie and others 1978). As a consequence, total timber harvest also showed signs of leveling off. Furthermore, a comprehensive analysis of public and private timber supply in the Douglas-fir region disclosed that, barring major changes in timber management policies, total timber output from all lands in western Oregon would soon decline (USDA Forest Service 1969).<sup>8/</sup> These findings more or less

conformed with Hamill's (1963) prediction of a shortfall in total log supply in the Douglas community. Because decisions of private forest-land owners could not be anticipated, however, the timing of the shortfall was difficult to predict.

The wood products industry in western Oregon was already using a high proportion of mill residues. Furthermore, reduction in the proportion of timber harvests left as logging residue was not expected to significantly affect total removal (USDA Forest Service 1973). The wood products industry in western Oregon, unlike in western Montana, was not likely to profit from increased utilization.

In summary, prospects for growth of the timber industry did not appear as favorable for Oregon as for western Montana. Although a downturn in timber supply did not appear imminent, prospects for increases for Oregon appeared unlikely. Installed sawmill capacity probably exceeded sawtimber supply in Montana, but increased activity based on the more intense utilization of the available timber supplies appeared likely.

### Prospects for the Nontimber Export Base Industries

Prognostications, circa 1970, regarding the timber industry focused mainly on the supply of sawtimber and the further utilization of residues. But for several of the base industries not dependent on timber, market factors, as well as supply factors, were important considerations. For example, the future trends in the world aluminum market were thought to be the most important determinant of employment and earnings at the refinery in the Flathead community. But there were no announced plans to increase employment or output at the Anaconda Company's facility at Columbia Falls, Montana (Bonneville Power Administration 1970), even though employment in the aluminum industry throughout the Pacific Northwest was expected to double between 1965 and 1980.

Although aluminum refining in the Flathead community was not expected to provide an immediate impetus for economic growth, processing of exotic metals was just commencing in the Linn-Benton community. Nationwide, titanium consumption was expected to grow rapidly because of increased use in the fabrication of jet engines, missiles, spacecraft, and commercial aircraft. In the Linn-Benton community, direct employment in this industry was projected to increase from 300 employees in 1970 to 1,200 in 1980 (Bonneville Power Administration 1970). In addition, Albany (in the Linn-Benton community) became the site of the Nation's only zirconium refinery. Nuclear electric plants are powered by zirconium-sheathed fuel rods. Though specific forecasts were not available, anticipated growth of the nuclear power industry was expected to require increased production of zirconium.

The University of Montana and Oregon State University, like other centers of higher education, seemed destined to contribute significantly to the economic growth and development in the Missoula and Linn-Benton communities. Enrollments at both institutions grew rapidly during the late 1960's. There was, however, some concern that the future economic stimuli generated by these institutions during the 1970's might not be as great as it was during the 1960's (Polzin 1972). These forecasts were based on the possibility of enrollment ceilings and the ending of the military draft. The demographic influences on enrollment were not fully recognized at this time. Although neither institution had attracted "think tanks" nor computer (based) and electronic industries like their counterparts in California and the eastern seaboard had, some authorities believed they would eventually.

<sup>8/</sup> The timber supply situations described in the Douglas-fir supply study report (USDA Forest Service 1969) differed significantly from the outlook described in the so-called Bonneville report (Gedney and others 1966). The latter predicted the cut in the Pacific Northwest (Idaho, western Montana, Oregon, and Washington) to increase 28 percent by 2010. This included an increase of 23 percent for western Oregon and western Washington.

Increases in Federal civilian employment were expected to be a major contributor to economic growth in Missoula and Flathead (University of Montana 1970). Expanding Federal payrolls were expected to result from new Federal programs oriented to social and human resources and growth in existing programs. In the Douglas community, Federal employment increased considerably during the 1960's—mainly as a result of forest management activities—but future growth was questionable (Gudger and Smith 1972). In the absence of new programs, Federal employment would depend mostly on the timber industry. In the Linn-Benton community, Federal Government activities were more varied (for example, Federal Water Pollution Control Administration—now Environmental Protection Agency—and the Bureau of Mines), and future trends were not thought to be as dependent on the timber industry.

In addition to affecting the multiplier, the trade center functions of Missoula and Flathead were expected to contribute directly to growth in the economic base. Throughout the postwar period, retail trade was increasingly concentrated in regional trade centers; people in the hinterland spent more of their incomes in trade centers, leading to the demise of some small towns as retail centers. This trend was likely to continue during the 1970's. But the future growth of the Missoula and Flathead communities as trade centers was uncertain because the market area of both was bounded by even larger trade centers to the west (Spokane) and the east (Great Falls and Billings).

The contribution of the trade centers to the economic base in the Missoula and Flathead communities was recognized in the early 1970's (Polzin 1972). But future growth in these centers did not appear promising because slow economic growth was projected for the rural areas served by the Missoula and Flathead merchants.

Decreased passenger rail service and the abandonment of branch lines led to sharp declines in railroad employment during the 1960's. These trends were expected to continue into the 1970's, albeit at a slower rate, and to reduce the importance of railroads to the economies of the Missoula and Flathead communities (University of Montana 1970).

In the early 1970's, tourism was recognized as a potential contributor to economic growth in western Montana (Polzin 1972). This industry was not extensively analyzed because of the lack of data. But certain negative features, such as seasonality and low wages, were recognized. Nevertheless, the Missoula and Flathead communities, because of their proximity to national parks and wilderness areas, appeared well situated to benefit from growth in outdoor recreation. Although Oregon's outdoor recreation industry was expected to grow, the impact on the Linn-Benton community would be mainly indirect because most activity would occur elsewhere (Farness and Sitton 1968). Outdoor recreation was being touted as a potential growth industry in the Douglas community (Gudger and Smith 1972), but any growth would require a well-planned promotion.

In the Linn-Benton community, agriculture and food processing were the only resource-based industries likely to exhibit significant growth during the 1970's (Farness and Sitton 1968). Agriculture was a minor component of the export base in the other three communities.

In summary, the Montana communities experienced rapid growth during the 1960's (tables 4 and 5). In contrast, the Oregon communities exhibited modest growth (tables 6 and 7). In fact, population growth in the Douglas community showed signs of weakening.<sup>9/</sup> In 1970, the outlook for the four communities was not rosy. The prospects for the wood products industry were not promising, although they seemed better in the Montana communities because of the possibility of increased utilization of the timber resources. The bright spots in the Missoula and Linn-Benton communities were the universities, and in the Linn-Benton community the demand for primary metals appeared strong.

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<sup>9/</sup> Though total population continued to grow between 1960 and 1970, there was a decrease in net migration (immigration minus outmigration) of 5,450 persons in the Douglas community during this period (Gudger and Smith 1972).

**Table 4—Summary of economic outlook for selected components of the export base of the Missoula community, Montana, 1970**

Basic industry	Experience during the 1960's	Implication for future growth
Wood products	Rapid expansion in output, employment, and labor earnings	Continued growth in employment, but more moderate than during the 1960's; sawtimber supply limited; increased employment associated with further processing of harvest
University of Montana	Rapid increases beginning in the mid-1960's	Modest growth, but full implication of changing demographics not understood
Export component of wholesale and retail trade	Not explicitly analyzed because of lack of data	Small increases because of slow growth in the trade area
Transportation	Significant decreases in railroad employment	Continued decline in railroad employment
Tourism	Not explicitly analyzed because of lack of data	Growth; but it will have only limited impact on total economy because jobs have low wages and are seasonal
Federal Government	Rapid increases in employment and earnings	Continued growth, but at slightly slower rate than during the 1950's
Retirement payments	Not assessed	Not assessed
Economy in general	Rapid growth in population, employment, and earnings	Continued growth, but at slower rate than during the 1960's

**Table 5—Summary of economic outlook for selected components of the export base of the Flathead community, Montana, 1970**

Basic industry	Experience during the 1960's	Implication for future growth
Wood products	Rapid expansion in output, employment, and labor earnings	Continued growth in employment, but more moderate than during the 1960's; sawtimber supply limited; increased employment associated with further processing of harvest
Aluminum refining	Not explicitly analyzed	Trends in employment and earnings will depend on worldwide developments in this industry
Export component of wholesale and retail trade	Not explicitly analyzed because of lack of data	Small increases because of slow growth in trade
Transportation	Significant decreases in railroad employment	Continued decline in railroad employment
Tourism	Not explicitly analyzed because of lack of data	Growth; but it will have only limited impact on total economy because jobs have low wages and are seasonal
Federal Government	Rapid increases in employment and earnings	Continued growth, but at slightly slower rate than during the 1960's
Retirement payments	Not assessed	Not assessed
Economy in general	Rapid growth in population, employment, and earnings	Continued growth, but at slower rate than during the 1960's



**Table 6—Summary of economic outlook for selected components of the export base of the Linn-Benton community, Oregon, 1970**

Basic industry	Experience during the 1960's	Implication for future growth
Wood products	Major contributor to community's economy	Processing operations expected to continue at current levels, but because of sustained yield policies, expansion is unlikely
Oregon State University	Rapid growth in enrollment	Graduate and undergraduate programs are expected to continue growing
Primary metals	A growing contributor to the economy of the community	Could experience substantial growth because of increasing demands for nuclear reactor fuel rods (zirconium) and growth of the aerospace industry (titanium)
Computer and electronic	No activity	Growth prospects good because of proximity to Oregon State University
Trade	Not an export base activity	Continued reliance on Portland, Salem, and Eugene for high order goods and services
Retirement	Not assessed	Not assessed
Economy in general	Steady, but modest growth	Timber supply constraints will hinder growth of the wood processing sector, but continued growth of higher education, primary metals, and the prospects for attracting computer and electronic firms will more than balance the poor growth prospects of the timber industry

**Table 7—Summary of economic outlook for selected components of the export base of the Douglas community, Oregon, 1970**

Basic industry	Experience during the 1960's	Implication for future growth
Wood products	Dominant component of export base; growth continued, but at slower rate	Forecasted imminent shortfall in timber supply could lead to substantial reduction in timber processing activity
Mining	Nickel mining employment static	No prospects for significant growth
Federal Government	Rapid growth related to stepped-up public timber harvesting activity	Future growth questionable because high proportion of Federal Government employment depends on public timber harvesting activities
Retirement	Not assessed	Not assessed
Economy in general	Economy exhibited signs of weakening; for example, outmigration exceeded immigration by substantial margin	Diversification could counteract decline of the timber industry, but prospects for such change difficult to assess

## Economic Growth During the 1970's

Between 1970 and 1978, economic growth of the two Oregon communities differed little from that of the Montana communities. We discuss population, nonfarm earnings, and per capita income because they are general indicators of economic growth. We also discuss trends in specific export industries.

Table 8 presents 1970 and 1978 population and migration data for the four communities and, for perspective, the corresponding figures for Oregon and Montana. Of the four communities, Flathead had the greatest rate of population growth (26.7 percent), whereas Missoula had the lowest (19.6 percent). The growth rates for the Linn-Benton and Douglas communities were about equal (22.9 and 24.2 percent, respectively). The population growth rates in all four timber-dependent communities, however, exceeded their respective statewide averages.

Migration was the major source of population growth in all four communities (table 8). New migrants accounted for nearly 78 percent of the population increase in the Flathead community and for about 66 percent in the Douglas community. Though less impressive, migration displays similar trends in Missoula and Linn-Benton. Statewide, new migrants accounted for a much greater share of the population growth in Oregon than in Montana. Therefore, in the Linn-Benton and Douglas communities, new migrants accounted for a smaller proportion of the population growth than in the State. In Montana, the opposite occurred—migrants to the Flathead and Missoula communities represented a greater proportion of the population change than for the State as a whole.

**Table 8—Resident population and migration in 4 communities in Montana and Oregon, 1970 and 1978**

Community	Population		Change, 1970-78	Net migration, <sup>2/</sup> 1970-78	
	1970	1978 <sup>1/</sup>		Number of people	Percent <sup>3/</sup>
	---Number of people---				
Montana:	694,409	785,000	13.0	44,000	48.6
Flathead	39,460	50,000	26.7	8,200	77.8
Missoula	58,263	69,700	19.6	6,500	56.8
Oregon:	2,091,533	2,444,000	16.9	241,000	68.4
Linn-Benton	125,495	154,200	22.9	17,100	59.6
Douglas	71,743	89,100	24.2	11,600	66.8

<sup>1/</sup>Provisional.

<sup>2/</sup>Inmigration minus outmigration.

<sup>3/</sup>Of 1970-78 change in population.

Source: U.S. Bureau of the Census, Current Population Reports, Series P-26, No. 78-76, Washington, D.C., 1979, table 1.

The trend in nonfarm earnings is probably the most reliable single index of local economic growth because of the high correlation between economic activity and the labor required to produce it. Nonfarm earnings is a sensitive index of economic activity because it takes into account differences in high- and low-paying jobs and may reflect changes in production not shown in the number of employees (such as a cutback in working hours or the scheduling of overtime). These figures must be interpreted carefully, however. For example, the growth rate of nonfarm earnings may overstate the actual increases in total economic activity in the local economy because wages may increase faster than production.

As can be seen in table 9, the rates of change for nonfarm earnings between 1970 and 1978 in the four communities differed by less than 10 percentage points, from a high of 68.6 percent in Flathead to a low of 59.7 percent in Douglas. The Douglas community, the most timber dependent of the four communities, exhibited the least growth in nonfarm earnings. The growth rates of all the communities exceeded the averages of their States.

**Table 9—Nonfarm earnings in 4 communities in Montana and Oregon, 1970 and 1978**

Community	1970	1978	Change, 1970-78
	- - Thousand 1972 dollars- -		Percent
Montana:	1,692,000	2,492,000	47.3
Flathead	95,591	161,189	68.6
Missoula	167,239	273,903	63.8
Oregon:	6,430,461	9,951,677	54.8
Linn-Benton	315,775	525,405	66.4
Douglas	201,005	320,920	59.7

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C., 1980; percentages derived.

**Table 10—Per capita personal income in 4 communities in Montana and Oregon, 1970 and 1978<sup>1/</sup>**

Community	Income		Change, 1970-78
	1970	1978	
	---1972 dollars---		Percent
Montana:	3,784	4,610	21.9
Flathead	3,439	4,604	33.9
Missoula	3,594	4,816	34.0
Oregon:	4,020	5,384	33.9
Linn-Benton	<sup>2/</sup> 3,298	<sup>2/</sup> 4,541	37.6
Douglas	3,464	4,675	34.9

<sup>1/</sup>Per capita income includes income from all sources.

<sup>2/</sup>Weighted average of Linn and Benton Counties.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C., 1980; percentages derived.

Trends in per capita income for the Montana and Oregon communities are shown in table 10. Per capita income increased more for the Linn-Benton and Douglas communities than for the State of Oregon between 1970 and 1978. Per capita income in both the Missoula and the Flathead community increased more from 1970 to 1978 than did per capita income for the State of Montana.

Even though per capita income in each of the four communities grew faster than its respective State average, there were significant differences between the communities. In 1970, per capita income in Flathead and Missoula was roughly 5 to 10 percent below that of Montana. By 1978, per capita income in Flathead had risen to about the average for the State of Montana, whereas in Missoula it exceeded the average for the State by about 4.4 percent. In contrast, the Oregon communities began the decade with per capita income 14 to 18 percent below the State average and did not significantly improve their relative position by 1978. The trend in Montana, however, was due to relatively slow growth in per capita income, which increased 21.8 percent compared with 33.9 percent in Oregon, rather than by differences between the communities. Low agricultural incomes during 1978 in the eastern part of Montana were a major cause of relatively slow growth of income in the State.

Per capita income increased significantly in all four timber-dependent communities. This suggests that despite the crisis, the shortages, and the energy crunch, people were better off in terms of money income in 1978 than in 1970. The rise in per capita income may somewhat overstate an improvement; although the figures are corrected for inflation, they do not account for the increase in taxes to reveal disposable income after taxes.

Despite the similarities in growth trends, the Montana communities differ significantly from those in Oregon in their role in the regional economy. Specifically, Missoula and Flathead account for a relatively large share of the Montana economy. The Oregon communities, Linn-Benton and Douglas, although larger than their Montana counterparts in both population and nonfarm earnings, represent a smaller share of State totals.

The combined population and nonfarm earnings in the communities of Flathead and Missoula represent 15.3 and 17.5 percent of totals for Montana during 1978 (table 11). In contrast, the corresponding figures for the Linn-Benton and Douglas communities are 9.9 and 8.5 percent of the totals for Oregon. The relative importance of the Montana communities is also reflected in their roles as regional trade centers servicing adjacent areas. The Oregon communities, however, are served by the trade centers of Portland, Salem, and Eugene.

In summary, the general indicators of economic growth suggest that all four study areas may be classified as rapidly growing communities. All experienced positive net migration, and their growth rates for population, nonfarm earnings, and per capita income were greater than corresponding State averages. In addition, the growth rates for all the communities were usually within a few percentage points of each other.

### Structural Differences and Economic Growth During the 1970's

The Missoula and Flathead communities are regional trade centers and, despite their smaller population, may provide a wider range of goods and services than do the Linn-Benton and Douglas communities. That is, the former rank higher in their respective regional hierarchy of cities. We speculated that the multiplier may be larger in the Montana communities. A comparison of growth in earnings in export industries with total nonfarm earnings tends to support these conclusions. As shown in table 12, the growth rates in total nonfarm earnings were similar in all four communities. But the increases in export earnings were much smaller in the Montana communities than in the Oregon communities.<sup>19/</sup>

Because of the importance of the Montana communities as trade centers, the performance of total nonfarm earnings relative to the change in the export industries is expected. But a close examination

**Table 11—Population and nonfarm earnings of 4 communities in Montana and Oregon as a percentage of State totals, 1978**

Community	Population	Nonfarm earnings
Montana:		
Flathead	6.4	6.5
Missoula	8.9	11.0
Total	15.3	17.5
Oregon:		
Linn-Benton	6.3	5.3
Douglas	3.6	3.2
Total	9.9	8.5

**Table 12—Change in earnings of export industries and total nonfarm earnings between 1970 and 1978 for 4 communities in Montana and Oregon**

Community	Export industries	Total nonfarm
	Percent	
Montana:		
Missoula	31.6	63.8
Flathead	36.3	68.6
Oregon:		
Linn-Benton	48.0	66.4
Douglas	57.0	59.7

of specific export industries reveals some changes that might not have been anticipated in 1970. Perhaps the biggest surprise was the robust performance of the wood products industry. As shown below, earnings of wood products workers increased by more than 50 percent between 1970 and 1978 in three of the four communities:

Community	Change in total wood products earnings, 1970-78 (Percent)
Missoula	73.8
Flathead	21.5
Linn-Benton	52.9
Douglas	57.0

### Changes in the Timber Industry

Some of the increase in use of residues in the Montana communities could have been anticipated in 1970, but not the extent of the increase in Missoula.

Most growth of the timber industry in the Missoula community resulted from the construction of a new, large plywood mill in nearby Bonner. With the addition of this mill, Missoula became the State's largest wood-fiber processing center.<sup>11/</sup> In 1980, Missoula's pulp and paper mill completed a major expansion that significantly increases the total volume of wood fiber processed in the community.

The construction of the large plywood plant in Missoula illustrates one of the problems of analyzing small economies; namely, that the actions of a firm or individual may have a significant impact. In this case, the opportunity for expansion in the wood products industry was identified in the early 1970's. What could not be anticipated was the nature, size, and location of the new facility. This suggests that planners must be cautious about predicting economic development. They may correctly perceive the opportunities but not anticipate the actions of an individual or a firm.

In Oregon, earnings from the sale of wood products also rose, but this did not negate the relatively pessimistic timber supply outlook in 1970 because the accelerated harvesting during the 1970's probably came at the expense of the future.

The growth of the wood products industry must be put in perspective. Table 13 shows that the wood products industry was not equally important to the growth of each community. In Missoula and Douglas, increases in wood products earnings dominated the growth in the export industries; they accounted for almost 82 percent of the total growth in the economic base of the Missoula community and about 74 percent of Douglas. In the Linn-Benton community, the wood products industry represented about 45 percent of the total increase in export earnings and 23 percent in Flathead. The wood products industry was the major cause of growth in the basic industries in Missoula and Douglas, an important but not dominant factor in Linn-Benton, and a relatively minor contributor in Flathead.

<sup>19/</sup> Agriculture is relatively insignificant in all four communities, and its inclusion in export earnings but not in total nonfarm earnings should not seriously bias the comparison.

<sup>11/</sup> Keegan, Charles P., III. Forest industries data collection systems. Bureau of Business & Economic Research, University of Montana, Missoula, Mont. 1981.

**Table 13—Change in earnings in export industries of 4 communities in Montana and Oregon, 1970-78<sup>1/</sup>**

Export industry	Missoula (Montana)		Flathead (Montana)		Linn-Benton (Oregon)		Douglas (Oregon)	
	Change, 1970-78	Percent of total change	Change, 1970-78	Percent of total change	Change, 1970-78	Percent of total change	Change, 1970-78	Percent of total change <sup>2/</sup>
	Thousand dollars		Thousand dollars		Thousand dollars		Thousand dollars	
Agriculture	-1,196	-4.9	273	1.5	-3,513	-3.9	6,583	10.8
Mining and other export industries	192	.8	-25	-.1	24,503	27.0	2,245	3.7
Primary metals	0	0	9,502	51.2	0	0	0	0
Wood products	19,957	81.9	4,310	23.2	40,585	44.7	45,196	74.2
Food processing	0	0	0	0	1,989	2.2	-591	-1.0
Other manufacturing	647	2.6	-98	-.5	17,615	19.4	3,408	5.6
Higher education	-1,006	-4.1	0	0	3,306	3.6	0	0
Wholesale trade	-1,673	-6.9	0	0	0	0	0	0
Retail trade <sup>2/</sup>	1,888	7.7	183	1.0	0	0	0	0
Transportation	480	2.0	876	4.7	1,202	1.3	-378	-.6
Lodging	655	2.7	1,707	9.2	829	.9	570	.9
Federal Government	4,429	18.2	1,839	9.9	4,285	4.7	3,915	6.4
<b>Total<sup>3/</sup></b>	<b>24,373</b>	<b>100.0</b>	<b>18,567</b>	<b>100.0</b>	<b>90,801</b>	<b>100.0</b>	<b>60,948</b>	<b>100.0</b>

<sup>1/</sup>In 1972 dollars.

<sup>2/</sup>Only a portion is in the export base.

<sup>3/</sup>Totals may be off because of rounding.

### Nontimber Sectors Continue To Expand

Primary metals refining and computer manufacturing (included in the "Other manufacturing" category) were the major contributors to growth in the Linn-Benton community. Primary metals also played a major role in the Flathead community. In Flathead, earnings in primary metals refining almost doubled between 1970 and 1978, and it was the largest single contributor to the growth of export base earnings in the Flathead community. This increase was due to the additional employment associated with converting the Anaconda Company's aluminum smelter in Columbia Falls to a new process that uses Japanese technology. The new process reduced energy needs by 18 percent and upgraded pollution control equipment (Marple and Parks 1978). Modifications were begun in 1977 and were completed in April 1980; therefore,

the 1978 data may somewhat overstate the longrun importance of this industry to the local economy because it includes the earnings of some construction workers. In the Linn-Benton community, the major new activity was construction of the Hewlett-Packard assembly plant. This facility, combined with expansion in primary metals, accounted for about 46 percent of the total increase in export earnings. The increases in Linn-Benton, at least the portion associated with the expansion in primary metals refining, were anticipated in 1970. But the modifications at the Anaconda Company's aluminum smelter in Flathead, which did not significantly change production capacity, were not expected at the start of the decade.

Missoula and Flathead continued as regional trade centers, but this specialized role did not significantly contribute to growth in the economies of these communities during the 1970-78 period. In Missoula, the \$1.9 million increase in the export component of retail trade was almost counterbalanced by the \$1.7 million decline in the export component of wholesale trade. This did not mean that Missoula wholesalers were losing customers, but simply that a greater share of their sales could be attributed to expansion of local markets. The export component of retail trade in Flathead increased about \$183,000 between 1970 and 1978 and represented less than 1 percent of the total growth in export industries.

**Table 14—Comparison of the importance of various export industries (earnings basis) for Montana and Oregon communities, 1970 and 1978**

Industry	Missoula (Montana)		Flathead (Montana)		Linn-Benton (Oregon)		Douglas (Oregon)	
	1970	1978	1970	1978	1970	1978	1970	1978
	Percent							
Agriculture	2.2	0.5	6.5	5.1	10.5	5.8	0.7	4.4
Mining and other export industries	.6	.7	1.4	1.0	11.4	16.4	1.4	1.3
Primary metals	0	0	21.3	29.3	0	0	0	0
Wood products	35.0	46.3	39.1	34.9	40.5	41.9	74.3	74.2
Food processing	0	0	0	0	4.1	3.4	.7	.1
Other manufacturing	.9	1.3	1.8	1.1	3.3	8.5	6.6	6.2
Higher education	20.6	14.7	0	0	20.7	15.2	0	0
Wholesale trade <sup>1/</sup>	3.9	1.3	0	0	0	0	0	0
Retail trade <sup>1/</sup>	5.7	6.2	2.5	2.1	0	0	0	0
Transportation <sup>1/</sup>	10.4	8.4	11.7	9.9	1.0	1.2	1.8	.9
Lodging	1.6	1.8	2.2	4.0	.4	.6	1.0	1.0
Federal Government	18.9	18.7	13.5	12.6	8.0	6.9	13.7	11.0
Total <sup>2/</sup>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

<sup>1/</sup>Only a portion is in the export base.

<sup>2/</sup>Totals may be off because of rounding.

Earnings of Federal employees contributed to the growth of the economy in all four communities. The increase in Federal earnings ranged from a low of 4.7 percent of export base industries in Linn-Benton to a high of 18.2 percent in Missoula. Because a sizable share of the Federal employees are concerned with managing public land, this suggests that the figures for the wood products industry understate the true contribution of forest resources to growth in the economies of these communities. The increase in Federal earnings were, for the most part, due to rising Federal pay scales, rather than to increases in the number of Federal workers. Contrary to the 1970 outlook, expansion of social and human resources programs did not lead to significant increases in Federal employment.

Higher education did not make a significant contribution to the growth in either the Missoula or the Linn-Benton community. In fact, earnings at the University of Montana actually declined about \$1.0 million between 1970 and 1978. The corresponding figure for Oregon State University (OSU) was an increase of \$3.3 million, representing about 3.6 percent of the total increase in the export industries in Linn-Benton. The figures for OSU may understate its contribution to total economic growth because Linn-Benton, unlike Missoula, has attracted some computer-based industries. It is difficult to classify the relatively slow growth of the universities as either anticipated or not anticipated in 1970. An astute demographer may have correctly observed in 1970 that much of the increase in the 1960's was due to aberrations caused by the postwar baby boom. On the other hand, in 1970 many observers still viewed higher education as a growth sector.

Table 14 presents the relative importance of the export base industries during 1970 and 1978 in each of the four communities and summarizes the effects of growth. In terms of timber dependency, the two Oregon communities changed little. The wood products industry still accounts for nearly 75 percent of Douglas's economic base; about 40 percent of Linn-Benton's. Timber dependency in the Montana communities went in opposite directions. Whereas Missoula is now more dependent on timber than it was at the start of the decade (46 percent in 1978 compared with 35 in 1970), the importance of the wood products industry to Flathead's economy has declined (35 vs. 39 percent). The latter was accompanied by an increase in primary metals refining. In summary, only Missoula experienced a significant change (10-percent increase) in timber dependency during the 1970's; in the other three communities, the relative importance of the wood products industry in 1978 was within 5 percent of the figure for 1970.

## Retirement Income— A Growing Component of the Export Base

Retirement income and other forms of transfer payments (transfer payments include income received for which no current services are rendered) have been one of the fastest growing components of personal income in the United States (Renshaw and Friedenber 1977). Further, Connaughton (1979) found that transfer payments were the fastest growing component of the export base sector in timber-dependent communities in northern California.<sup>12/</sup> Therefore, by looking only at the traditional export base industries, we may miss an important component of growth.

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<sup>12/</sup> The net contribution of transfer payments to the export base is equal to payments received by local residents minus their contributions to Social Security.

The economic impact of retirees is difficult to determine because some key data on the sources of income for retired persons are missing. In addition, there are conceptual problems about the correct method for analyzing retirement payments so that they are comparable to the figures for export base industries. The available data are presented, however, in an attempt to shed some light on the economic role of the retirement community in the timber-dependent communities.

Tables 15 and 16 present retirement payments from selected sources to persons in the four timber-dependent communities and the States of Oregon and Montana. The first item reports Social Security and Medicare payments. The remaining sources include payments to retired Federal civilian workers, State and local government workers, and railroad workers and pensions to military personnel. Data are not available for payments from private pension funds and dividends, interest, and rents that retirees may receive from past investments.

Table 15 shows that total retirement payments from government sources to Flathead residents increased from about \$15.5 million in 1970 to almost \$28.0 million in 1978. Even after they were corrected for inflation, retirement payments from these sources increased about 80 percent. In Missoula, the payments rose from about \$18.8 million in 1970 to about \$33.9 million in 1978, or roughly 80 percent. Total payments to all Montanans from these sources increased 74.7 percent between 1970 and 1978.

Retirement payments to residents of the Oregon communities are shown in table 16. In Linn-Benton, total retirement payments increased about 97 percent—from \$30.9 million in 1970 to \$61.0 million in 1978. Total payments to Douglas residents rose from \$20.9 million to about \$40.7 million or 94.2 percent between 1970 and 1978. Statewide, payments from these sources to Oregon residents increased about 85.4 percent between 1970 and 1978.

**Table 15—Retirement and related transfer payments from selected sources, Flathead and Missoula communities and the State of Montana, 1970 and 1978**

Retirement payments and related transfer payments	Flathead			Missoula			Montana		
	1970	1978	Change, 1970-78	1970	1978	Change, 1970-78	1970	1978	Change, 1970-78
	Thousand 1972 dollars		Percent	Thousand 1972 dollars		Percent	Thousand 1972 dollars		Percent
Social Security and Medicare	8,768	16,900	92.7	10,068	18,662	85.3	144,787	252,248	74.2
Federal civilian pensions	999	2,083	108.5	1,672	3,353	100.5	12,093	28,027	131.8
State and local pensions	569	1,401	146.2	1,320	2,946	123.2	13,809	30,517	121.0
Military pensions	2,351	3,395	44.4	2,595	3,524	35.8	29,384	40,015	36.1
Railroad pensions	2,842	4,174	46.8	3,136	5,378	71.5	13,661	22,585	65.3
All payments	15,529	27,953	80.0	18,791	33,863	80.2	213,734	373,392	74.7
Percent of personal income	11.4	12.1		8.9	10.1		8.1	10.3	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C., 1980, unpublished data.

**Table 16—Retirement and related transfer payments from selected sources, Linn-Benton and Douglas communities and the State of Oregon, 1970 and 1978**

Retirement payments and related transfer payments	Linn-Benton			Douglas			Oregon		
	1970	1978	Change, 1970-78	1970	1978	Change, 1970-78	1970	1978	Change, 1970-78
	Thousand 1972 dollars		Percent	Thousand 1972 dollars		Percent	Thousand 1972 dollars		Percent
Social Security and Medicare	21,685	44,061	103.2	14,731	30,193	105.0	481,205	917,953	90.8
Federal civilian pensions	1,605	4,221	162.9	1,202	3,222	168.1	39,444	93,860	137.9
State and local pensions	1,701	3,749	120.3	677	1,632	141.1	24,440	54,272	122.1
Military pensions	5,684	8,438	48.5	3,964	4,974	25.4	105,150	144,327	37.3
Railroad pensions	265	485	83.0	362	642	77.3	22,057	36,172	63.9
All payments	30,940	60,954	97.0	20,936	40,663	94.2	672,306	1,246,584	85.4
Percent of personal income	7.4	8.9		8.4	9.8		8.0	9.5	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C., 1980, unpublished data.



## Diversification of the Export Base

Although none of the four communities are characterized as retirement communities, the increase in these selected retirement payments has been impressive. There are still conceptual and empirical issues about the correct treatment of transfer payments in a model of local economic change, and most analysts would not simply lump them with other basic earnings without making some adjustments. A rough measure of the changing role of retirement payments in the four communities may be derived by comparing their growth rate with that of total export earnings (table 17).

In each community, retirement payments rose at a much greater rate (almost double in several cases) than total export earnings between 1970 and 1978, showing the importance of retirement payments to the economic base of each community.

**Table 17—Comparison of growth in selected retirement payments and export earnings for 4 communities in Montana and Oregon, 1970-78**

Community	Selected retirement payments	Export earnings
	Percent	
Montana:		
Missoula	80.2	31.6
Flathead	80.0	36.3
Oregon:		
Linn-Benton	97.0	47.6
Douglas	94.2	57.1

Community stability and economic diversity are related. The more diverse a region's economic base, the less likely that events in one component will dominate the economic trends. We use the "entropy" measure (the larger the index, the higher the degree of diversification) to examine diversification trends of the four communities.<sup>13/</sup> Calculations of the entropy index for the four communities are presented in table 18. Two sets of figures are shown for each community; the first corresponds to a narrow view of the basic sector and includes only the export industries; the second incorporates the simplistic assumption that retirement payments are analogous to export earnings.

<sup>13/</sup> Kort (1979) demonstrated that the entropy measure overcomes the shortcomings of traditional indexes of industrial diversification. He describes the entropy measure as follows:

Entropy in the context of industrial diversification may be defined as:

$$H^D = -\sum_{i=1}^N \left( \frac{e_i}{e} \right) \ln \left( \frac{e_i}{e} \right),$$

where  $H^D$ , the entropy measure of industrial diversification for a particular region and time period, is equal to the negative summation of the product of the regional employment proportions in the  $N$  industries and the natural logarithm of these proportions;  $e_i$  is equal to the employment in the  $i^{\text{th}}$  industry in this particular region, and  $e$  is equal to total regional employment. The ratio  $e_i/e$  is thus the regional employment proportion of the  $i^{\text{th}}$  industry in this region.

Kort (1979) chose the entropy measure or diversification because:

(1) it is single-valued in its arguments; (2) it is size and scale independent; (3) it can be modified to consider either continuous or discrete distributions; (4) there is additivity in the case of independent events; and (5) it can measure two scales simultaneously; i.e., total entropy can be decomposed into between-set and within-set components.

As measured by the entropy index, the export base of the Montana communities was generally more diversified than that of the Oregon communities in 1970. With or without retirement payments, the 1970 entropy index was greater in Missoula and Flathead than in Douglas. Linn-Benton appeared somewhat more diversified than Flathead, but less than Missoula. The figures for this measure of diversification reflect our earlier observations concerning the structure of these communities—we identified Douglas as the most timber dependent, and it has the lowest entropy value (least diversified) of the four communities.

More important than the level of diversification is its trend during the 1970's. Without retirement payments, two of the four communities (Missoula and Flathead) had lower entropy values (less diversification) in 1978 than in 1970. Even with retirement payments, Flathead experienced declining entropy values from 1970 to 1978. Linn-Benton exhibited slightly more diversity in 1978 than in 1970. Douglas, the least diversified community, was the only one with significant increases in entropy values in both cases. But the increases and decreases in the index, with and without retirement payments, were relatively small for all four communities, suggesting little change in diversification.

**Table 18—The entropy measure of the diversity of the export base industries of Montana and Oregon communities, without and with retirement payments, 1970 and 1978**

Community	Without retirement payments			With retirement payments		
	1970	1978	Change, 1970-78	1970	1978	Change, 1970-78
Montana:						
Missoula	1.7600	1.5820	-0.1780	1.9120	2.0110	+0.0990
Flathead	1.6990	1.6710	-.0280	1.8670	1.8210	-.0460
Oregon:						
Linn-Benton	1.7496	1.7613	+.0117	1.9088	1.9173	+.0085
Douglas	.9190	.9528	+.0338	1.2106	1.2523	+.0417

## Future Timber Supply: The Current Outlook

### Import Substitution and Longrun Growth

Import substitution occurs when local firms provide an increasing proportion of the goods and services purchased by residents. Import substitution is sometimes used as a strategy for promoting longrun economic growth. Because of their size, the four communities are unlikely to manufacture their own clothing or automobiles, but there may be some opportunities for import substitution in wholesale and retail trade. As the population increases, local merchants may improve the quality and expand the quantity of their goods to capture sales that were formerly provided by a nearby trade center. In wholesale trade, the distributors may decide to serve the expanding local market directly rather than from a regional center, as at Missoula and Flathead where trade represents a portion of the export base. The Oregon communities have not exhibited such tendencies. Furthermore, the Linn-Benton and Douglas communities are not likely to evolve into trade centers in the near future. Rather, they will continue to be served by the existing centers (Portland, Eugene, and Salem).

By themselves, the trends from 1970 to 1978 are revealing. They are even more significant when considered in light of some profound shifts in the timber supply situation and the changing composition of the export base sectors of the four communities.

### Western Oregon

We now have a better understanding of Oregon's future timber supply than we did in 1970. At the beginning of the decade there was still reason to believe that timber harvest levels could be maintained, if not increased, in western Oregon. But two timber supply studies (Gedney and others 1975, Beuter and others 1976) demonstrated that the current level of harvesting from public lands will not be able to compensate for a sharp decline in timber harvest from private forest ownerships.

Beuter and others (1976) state that for the Douglas community "the current total timbershed harvest can be maintained through 1995, after which a decline of about 20 percent would occur if current policies and actions are pursued." Because the boundary of Linn-Benton community does not coincide with the timbersheds in the Beuter analysis, its future timber supply situation is a little more difficult to assess. Linn-Benton, in fact, straddles the "north coast" and the "mid-Willamette" timbersheds. According to Beuter and others (1976), the north coast area will have no difficulty maintaining current output despite the decrease in output from industrial ownerships. The mid-Willamette area, however, should experience a 25-percent drop in timber output before the turn of the century.

The proximity of Linn-Benton to the Lane County timbershed complicates the picture. In the latter area, timber harvest is expected to drop about 40 percent between 1975 and 2005. Depending on their competitive strength, Lane County timber producers could increasingly seek more timber outside the county. That is, Lane County shortages could adversely impact timber processors in the Linn-Benton community. On the other hand, the Linn-Benton timber industry may benefit from the expected increase in timber production from the north coast area of Oregon.

The shortfall in timber production from forest lands in western Oregon is not inevitable. If the nondeclining even-flow constraint for public lands were relaxed, the projected harvest decline could be significantly mitigated. For example, in the Douglas community it is possible for harvest from public lands to be increased immediately by as much as 20 percent without ever dropping below the longrun sustainable harvest level of the forest (Beuter and others 1976).

## Western Montana

A comprehensive timber supply analysis is not available for Montana, so available data should be interpreted with caution. In 1978, the timber supply situation in Montana was similar to that of 1970. Softwood sawtimber growth per acre for all ownerships barely exceeded removals—97.4 vs. 91.1 board feet—whereas growth of softwood growing stock was double that of removals—33.0 vs. 16.4 cubic feet per acre.<sup>14/</sup> This relationship reflects the fact that commercial forest land in Montana still supports a surplus of smaller size and probably less desirable species (Schweitzer and others 1975). But timber statistics for the State may not provide a true indication of the future timber supply of western Montana. High roadbuilding and logging costs, for instance, will continue to impede timber harvesting on National Forests. Furthermore, closer inspection of spatial and ownership harvesting activity reveals potential problems. For example, although sawtimber removals from National Forests were only 69 percent of sawtimber growth in 1977, harvests from National Forests have been declining since the late 1960's (fig. 3). This trend can be attributed to "changes in the classification of forest land and because manpower and budgets have not been adequate to cover the special planning, sales administration, and control required" (Schweitzer and others 1975). Meanwhile, the harvest of privately owned roundwood products has been increasing. Without this increase, the shortfall in total timber production in Montana would have been greater.

In terms of timber supply, the Flathead community is more self sufficient than Missoula. For example, in 1976 the Flathead community obtained only about 30 percent of its sawtimber from outside Flathead County. The Missoula community, on the other hand, imported nearly 70 percent of its sawtimber from other counties, including a substantial proportion from Flathead's "backyard" (Flathead, Lincoln, and Sanders Counties). Furthermore, 75 percent of the

Million board feet

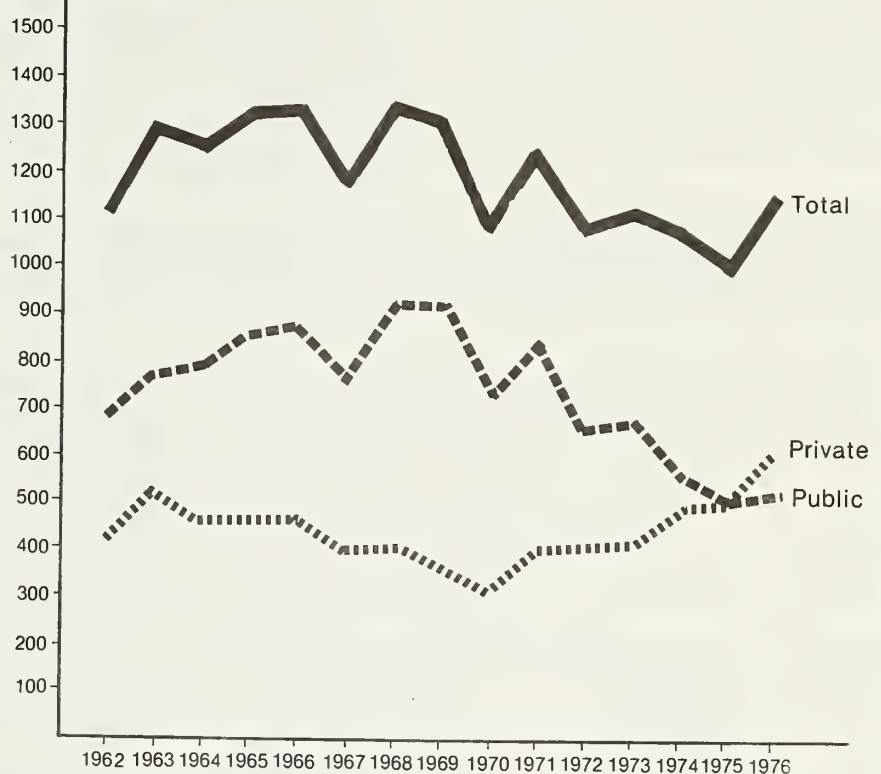


Figure 3.—Roundwood products harvested from Montana timberlands, by ownership, 1962-76 (adapted from Keegan 1980).

sawtimber received by mills in the Missoula community comes from privately owned lands. Mills in Flathead obtained only 30 percent of their sawtimber from private sources.

### Timber Supply Prospects— A Summary

If there are no changes in public and private timber management policy, much of western Oregon can expect a shortfall before the turn of the century. The Douglas community is certain to be affected by any decline in timber supplies. But this shortfall could be circumvented by a departure from the nondeclining even-flow policy.

We lack a comprehensive projection of the future timber supply for Montana. Total output has been trending downward, but few are expecting a shortfall similar to that forecasted for sections of western Oregon. Reduction of transportation costs could increase the harvest of nonsaw-log material (Schweitzer and others 1975) and, consequently, enhance the timber supply situation. But in the immediate future, the rate of decline would seemingly depend mainly on the ability of private forest-land owners to maintain current harvesting rates—that is, three times the current growth (see footnote 14). Although recommended harvest levels from the National Forests could eventually help reverse the downward trend, any appreciable increase in public timber offerings in western Montana will probably not come until after the year 2000 (USDA Forest Service 1980).

<sup>14/</sup> Stone, Robert N. Measures of forest ownership performance timber production and harvest. Forest Products Laboratory, USDA Forest Service, Madison, Wis. 1980.

## What About the Future?

The following section reviews important changes during the 1970's and their implications for the future growth of each community. Tables 19, 20, 21, and 22 summarize these discussions.

### Effects of Retirement

Extraordinary growth in retirement income was common to the four communities. This performance may not be repeated. Attempts to modify the Social Security System, for example, could

result in advancing the age of retirement and reducing cost-of-living adjustments. Nevertheless, retirement income could cushion any instability resulting from timber shortages.

### Diversity a Key Factor in the Missoula Community

In 1970, Missoula was least timber dependent of the four communities; yet the wood products sector accounted for most (82 percent) of the growth in Missoula's

export base between 1970 and 1978. We anticipated that increased utilization of logging and mill residues would lead to some growth in the wood products industry, but the extent of this growth was surprising. As a result, the Missoula community was more dependent on timber in 1978 than it was in 1970.

The ability of the timber industry to maintain a high level of production may be more closely tied to changes in timber harvest levels because there can be no

**Table 19—Summary of selected industry trends and their implications for future growth of the Missoula community, Montana**

Basic industry	Experience during the 1970's	Implications for future growth
Wood products	Extent of growth unexpected	Continued growth depends on raw material supply
University of Montana	Slight decline caused by demographic trends and fiscal constraints	Unlikely source of future growth, but because of size will cushion any adverse economic trends
Trade	Maintained trade center function but did not experience significant growth	Could grow if oil and gas development in western Montana increases; most likely will remain a relatively small component of economic base
Transportation and tourism	Some growth, but industry is not a significant component of economic base	A minor component of export base; furthermore, continued growth of tourism dependent on energy prices
Government	Grew principally as a result of pay increases	May buffer economy but no significant growth expected
Retirement	Grew faster than other components	May be constrained by political philosophy; retirement income will cushion any adverse trends
Economy in general	Exhibited significant deviations from expectations	Wood products industry could experience continued growth at expense of outlying communities; overall growth of economy appears certain

**Table 20—Summary of selected industry trends and their implications for future growth of the Flathead community, Montana**

Basic industry	Experience during the 1970's	Implications for future growth
Wood products	Modest growth	Future growth depends on raw material supply; unlike in the past, Flathead may have to compete with Missoula for local public timber
Primary metals	Substantial growth	Unlikely to expand because of energy constraints; may cushion instability in wood products industry
Trade	No marked change	Must compete with Missoula as trade center
Mining	No activity	Oil and gas development in Montana a possibility
Government	Grew principally as a result of pay increases	Administration of mineral development on public lands could result in modest increase; may cushion instability in wood products industry
Tourism	Significant growth	A minor component of export base; continued growth dependent on energy prices
Retirement	Grew faster than other components	May be constrained by political philosophy; some small retirement communities could materialize; retirement income will cushion adverse economic trends
Economy in general	Experienced significant growth as result of a primary metals refining industry and, to a lesser degree, the wood products industry	Growth will likely depend on performance of wood products industry

significant increases in the utilization of mill residues—most residues from sawmills and plywood plants are already used by the pulp, paper, and fiberboard mills. The future supply of timber depends on the status of removals from privately owned lands. If current levels cannot be maintained, wood processing plants in

the Missoula community will have to rely more heavily on publicly owned timber. This may mean competing for public timber quite distant from Missoula. Missoula's timber industry could conceivably grow at the expense of timber producers elsewhere in western Montana (for example, the Flathead community). Some of Montana's larger, more modern and

efficient wood-processing facilities are located in the Missoula community. Furthermore, Missoula's pulpmill offers a close, convenient outlet for mill residues. Missoula mills would, however, face higher raw material transportation costs if they must compete for public stumpage in outlying areas.

**Table 21—Summary of selected industry trends and their implications for future growth of the Linn-Benton community, Oregon**

Basic industry	Experience during the 1970's	Implications for future growth
Wood products	Grew at anticipated rate; was a major contributor to growth	Shortfall in private timber supply imminent; performance of local processors dependent on their ability to compete with mills in nearby counties for public timber
Oregon State University	Modest growth	Will help cushion the impact of any instability in the timber industry but not expected to contribute significantly to economic growth
Computer-based and electronic	Some growth but not a major contributor to growth	Future growth expected; could counteract any instability in the timber industry
Other manufacturing	Primary metals refining a major contributor to growth	Zirconium production will remain constant, but titanium production expected to increase
Retirement	Grew faster than other components	May be constrained by political philosophy, but retirement income will cushion the impact of any instability in the timber industry
Economy in general	Grew rapidly	Any decline in timber industry likely to be counterbalanced by increases in primary metals production and electronic computer-based industry

**Table 22—Summary of selected industry trends and their implications for future growth of the Douglas community, Oregon**

Basic industry	Experience during the 1970's	Implications for future growth
Wood products	Accounted for most of the growth	Raw material supply critical to growth
Mining	Increased, but not a significant contributor to growth	Uncertain
Government	Growth closely linked to forest-land management	No growth anticipated
Retirement	Grew faster than other components	May be constrained by political philosophy, but retirement income will help cushion the impact of any instability in the timber industry
Economy in general	Grew because of wood products industry	Little indication of diversification; consequently, public forest-land management policies crucial for growth in the immediate future

Besides wood products, the only other basic sector to experience significant growth between 1970 and 1978 was the Federal Government. This increase was mostly due to rising pay scales rather than more employees. Significant growth of this sector is unlikely in the near future. But, because it has been relatively stable, Federal employment could help cushion impacts resulting from a decrease in timber production in western Montana.

The University of Montana experienced a slight decline between 1970 and 1978 because of demographic trends and fiscal constraints. These trends will probably persist, so the University of Montana is not likely to be a source of growth in the future. Because it is the second largest component of the export base and declines will be small and predictable, the university may cushion any instability in the wood products industry.

Missoula continued to serve as a trade center, but this sector was not a significant source of growth during the 1970-78 period. Because this component plays a minor role, wholesale and retail trade are unlikely to contribute significantly to the future growth of the Missoula community's export base.

Missoula is near the "Overthrust Belt," a geological formation thought to contain recoverable crude oil and natural gas resources. Rising prices stimulated leasing of gas and oil in this community. Recent estimates indicate that development of gas and oil fields in western Montana is a strong possibility. Estimates of economically available, but as yet undiscovered, natural gas range from a low of 1.8 trillion cubic feet to a high of 20.6.<sup>15/</sup> Though these reserves are modest compared with the estimated 249.1 trillion-cubic-foot reserve (high) of the Gulf States region, development of

gas fields could diversify the economy of western Montana. Oil production is also a possibility, but current estimated reserves are insignificant.

Even if the most optimistic expectations are realized, Missoula is not likely to experience significant longrun effects from oil and gas development. Most of the impacts of gas and oil operations on employment and earnings are felt during the exploration and development stages; few workers are required to maintain an operational crude oil or natural gas well. Furthermore, the most promising areas of the Montana Overthrust Belt are east of the Continental Divide, so Great Falls and Billings would probably enjoy most of the benefits. If significant reserves of oil and gas are found in western Montana, Missoula's wholesale and retail trade sectors are likely to experience the greatest impacts.

Tourism and transportation did grow during the 1970-78 period, but these industries are a minor component of the export base and their future growth will be influenced by energy prices. Consequently, these industries are not likely to significantly influence the growth of the Missoula community.

In summary, none of the components of the export base of the Missoula community appear threatened in the near future; depending on the timber supply, that could change. Continued growth at rates experienced in the 1970's appears unlikely. The diversity of the export base may cushion any instability in the wood products industry.

### **Flathead Community and Spatial Interdependency**

The wood products industry in the Flathead community did grow between 1970 and 1978. But this growth was a distant second to that exhibited by the primary metals sector of the export base. Furthermore, Flathead was less dependent on timber in 1978 than in 1970. A high proportion of the growth of the timber sector in Flathead was the result of increased utilization (for example, by the construction of a medium density fiber-board plant). At the same time, mill residues continued to be shipped to Missoula for processing. The future of the

timber industry will depend on the supply of raw material, and the timber supply situation in Flathead could become more complicated. At present, Flathead is more dependent than Missoula on public timber, and timber processing plants in Flathead rely on nearby sources—importing only 30 percent of their sawtimber requirements. Seemingly, therefore, a decrease in the private supply would affect Missoula more than Flathead. But if the private timber supply is diminished, Missoula facilities, which already import considerable private timber from the Flathead community, may begin to compete more intensely for public timber which traditionally has been processed locally.

Primary metals refining was the major contributor to growth of Flathead's export base. This increase may not be repeated, because growth during the 1970's was a one-time event associated with the modification of the aluminum refinery at Columbia Falls. Furthermore, expanded production at this facility is unlikely because low-cost electricity is no longer available. Because it is now the largest component of the export base, primary metals could conceivably cushion instability in the timber sector.

Exploration activity in nearby areas of the "Overthrust Belt" may occur. But the most promising areas are east of the Continental Divide, and the economic impacts would be short run.

Tourism increased significantly from 1970 to 1978. Future growth will depend on energy prices, among other things. But this industry is only a minor component of the export base.

In summary, the future growth of the wood products industry in the Flathead community will depend on raw material supply. The primary metals industry is now the largest component of the export base and may cushion instability in the wood products sector. Significant growth appears unlikely in the remaining sectors of the export base.

<sup>15/</sup> Dalton, G. L.; Carlson, K. H.; Charpentier, R. R.; Coury, A. B.; Crovelli, R. A.; Frezon, S. E.; Khan, A. S.; Lister, J. H.; McMullin, R. H.; Pike, R. S.; Powers, R. B.; Scott, E. W.; Varners, K. L. Estimates of undiscovered recoverable resources of conventionally producible oil and gas in the United States, a summary. U.S. Department of the Interior, Geological Survey, open-file report 81-192; 1981.

## Answering the Fundamental Questions

### Linn-Benton Community Likely To Experience Modest Growth

The timber industry was a major contributor to the growth of the Linn-Benton community during the 1970-78 period. It will undoubtedly be affected to some degree by any future shortfall in timber supplies in western Oregon. But the impact of any shortfall will not be as severe as in the timber-dependent areas of southwest Oregon (Beuter and others 1976).

The Linn-Benton community could attract additional computer-based industries. Hewlett-Packard will probably expand its Corvallis facility, and Tektronix, Inc., has announced plans to locate a plant in nearby Lebanon. Such expansion plans could counterbalance instability in the timber industry.

Although zirconium production may remain constant, the Linn-Benton community stands to benefit from the expected growth in demand for titanium (Marple and Parks 1982). Consequently, growth of primary metals, like growth of the computer-based industry, could counteract instability in the timber industry.

Oregon State University exhibited some growth during the 1970's, but higher education is no longer regarded as a growth industry. The recent recession has caused enrollment to drop, but prospects are good for long-term growth. Demographic changes as well as fiscal constraints, however, could result in slower growth in the future.

Despite the uncertain future of higher education and the possible decline of the timber industry, the export base of the Linn-Benton community will likely continue to grow at a modest rate. The primary metals and computer-based sectors are likely to counteract any instability in the timber industry. Furthermore, the economy of Linn-Benton is less "free standing" than that of the other communities. Future development of the economy of Linn-Benton will undoubtedly benefit from the expected growth of the

larger metropolitan areas—Salem, Eugene, and Portland—of the Willamette Valley.<sup>16/</sup>

### Douglas Community Could Experience Adverse Impacts

Private timber production, which had been declining during the 1960's, stabilized during the 1970-78 period (Lloyd 1978). Harvesting from public lands, which had been increasing, leveled off. These trends may portend a more precipitous shortfall than earlier predicted. As Gudger and Smith (1972) observed, Hamill's (1963) prediction of a shortfall is optimistic to the extent that short-term private harvests deviate (upward) from long-term trends.

Douglas is the most timber-dependent community of the four communities we studied. Although there was some diversification (mainly the result of retirement income), the dominant position of the wood products industry is not likely to change in the near future. A California-based electronics firm recently (1982) announced plans to construct a new plant in Roseburg. This is encouraging, but several such facilities would have to be constructed to compensate for likely job losses in the timber-dependent sector.

In summary, the current lack of diversification in the economic base suggests that the Douglas community will not be able to attract new industries rapidly enough to counterbalance instability related to the expected timber shortfall.

<sup>16/</sup> Lawrence Halprin and Associates. The Willamette Valley: choices for the future. Prepared for the Willamette Valley Environmental Protection and Development Planning Council. Salem, Ore. 1972. 113 p.

### Will the Future Timber Supply Be Diminished?

Even though we lack a comprehensive analysis, we believe the Missoula and Flathead communities may become more interdependent with regard to timber supply. According to USDA Forest Service plans, harvesting of Federal timber may increase slightly by the 1990's. Such an increase may not be large enough, or soon enough, to counteract any decrease in the private supply. Consequently, to the extent that levels of harvesting on private lands observed during the 1970's cannot be maintained, the timber industry in western Montana could be adversely affected.

The Linn-Benton community borders the north coast area which, according to Beuter and others (1976), may witness increased timber harvesting. Consequently, local processing facilities may not be constrained by raw material shortages.

The Douglas community has been identified by many authorities as a future timber-deficit area; that is, local sources will likely not be able to supply local needs.

### Is Dependency on Timber Significant?

The answer for each of the four communities is "yes." This was preordained by our choice of study areas. But there are differences in the degree of timber dependency. The situation, moreover, has not remained static, and there were some surprises. During the 1970-78 period, Missoula became more dependent on timber, and the Douglas community exhibited little evidence of diversifying.

### Are Options to the Nondeclining Even-Flow Policy Feasible?

Lacking a comprehensive timber supply analysis, we cannot answer this question for the Missoula and Flathead communities.

According to Beuter and others (1976), feasible options to the nondeclining even-flow policy exist for western Oregon.

## Planning Implications

### Could the Growth of Nontimber Industries Compensate for the Decline of the Timber Industry?

Missoula has a diverse export base, but continued growth at rates experienced during the 1970's is not likely. The diversity, however, could well cushion any instability in the wood products industry.

Growth of the nontimber sectors of the export base of the Flathead community is uncertain. Consequently, any shortage of timber may have an adverse impact on the economy of the community.

Several sectors of the export base of the Linn-Benton community are likely to continue growing. Such growth could compensate for timber shortages.

The nontimber component of the export base of the Douglas community is small. Even if these sectors grow at the 1970-78 rate during the 1980's, they will probably not compensate for predicted timber shortages.

The need for planners and analysts to consider long-term trends should be apparent. The 1970 outlook for the timber industries of Oregon and western Montana was too modest. Current forecasts, however, suggest that the extraordinary performance of the timber industry in Oregon will not be repeated in the 1980's. Similarly, the growth of primary metals in the Flathead community will not persist because the refinery modifications, which resulted in increases during the 1970's, have been completed. Finally, the resurgence of the timber processing sector of Missoula's export base reversed earlier trends, but continued growth of this sector will depend on the ability of the Missoula timber processing facilities to compete with other areas for the uncertain timber supply in western Montana.

Of the four communities examined, Douglas appears to be the prime candidate for considering departures from nondeclining even flow. The export base is dominated by the wood processing sector—diversification is not progressing rapidly enough to counteract the predicted shortfall in timber supply.<sup>17/</sup> Furthermore, there is evidence that public timber management practices could be modified to moderate the expected shortfall and, at the same time, not jeopardize the areas's long-term timber-producing capabilities.

Departure from NDEF may be appropriate for the western Montana communities. But because of the geographical proximity and, in particular, the overlapping timbersheds, the economic futures of the Missoula and Flathead communities should be jointly assessed before a decision is made about whether or not departures should be considered for public lands in western Montana. An ad hoc approach could result in a remedy that benefits one community at the expense of the other.

A comprehensive, multiownership analysis of the western Montana timber supply situation does not exist. Until such a study is undertaken, the departure issue cannot be appropriately considered.

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<sup>17/</sup> Commercial banks in the Douglas community, unlike those in the Linn-Benton community, invested an increasing share of their funds outside the local area during the 1958-77 period (Schallau 1980). Such a trend could portend a leveling off in new business activity and population, other things being equal. The Douglas community experienced a net decline in migration during the 1960's. Data suggest that the Douglas community experienced an unprecedented drop in population in 1980 and 1981 (Oregon State Employment Division 1982); but the population growth rates exceeded those for the State of Oregon during the 1970's, so this 1-year decline may be an aberration.



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# Appendix

## Export Base Industries of Flathead, Missoula, Douglas, and Linn-Benton Communities by Standard Industrial Classification (SIC) Codes

**Table 23—Export industries of the Flathead community, Montana, by SIC code, 1972**

Industry	SIC code
Agricultural production	01, 02
Agricultural services, forestry, and fisheries	07-09
Mining	10-14
Lumber and wood products	24
Furniture and fixtures	25
Primary metals refining	33
Transportation equipment	37
Railroad transportation	40
Wholesale trade (part)	50, 51
Retail trade (part)	52-59
Hotels, rooming houses, camps, and other lodging places	70
Federal civilian	--
Federal military	--

**Table 24—Export industries of the Missoula community, Montana, by SIC code, 1972**

Industry	SIC code
Agricultural production	01, 02
Agricultural services, forestry, and fisheries	07-09
Mining	10-14
Apparel	23
Lumber and wood products	24
Furniture and fixtures	25
Pulp and paper products	26
Chemicals and allied products	28
Stone, clay, and concrete products	32
Railroad transportation	40
Transportation by air	45
Wholesale trade (part)	50, 51
Retail trade (part)	52-59
Hotels, rooming houses, camps, and other lodging places	70
Educational services, State government (University of Montana)	822
Federal civilian	--
Federal military	--

**Table 25—Export industries of the Douglas community, Oregon, by SIC code, 1972**

Industry	SIC code
Agricultural production	01, 02
Agricultural services, forestry, and fisheries	07-09
Mining, except quarrying	10-13
Meat products	201
Canned and preserved fruits and vegetables	203
Miscellaneous food preparation (fish)	209
Lumber and wood products	24
Pulp and paper products	26
Primary metals refining	33
Machinery, except electrical	35
Railroad transportation	40
Hotels, rooming houses, camps, and other lodging places	70
Federal civilian	--
Federal military	--

**Table 26—Export industries of the Linn-Benton community, Oregon, by SIC code, 1972**

Industry	SIC code
Agricultural production	01, 02
Agricultural services, forestry, and fisheries	07-09
Mining, except quarrying	10-13
Meat products	201
Canned and preserved fruits and vegetables	203
Grain mill products <sup>1/</sup>	204
Miscellaneous food preparation <sup>1/</sup>	209
Lumber and wood products	24
Furniture and fixtures	25
Pulp and paper products	26
Primary metal refining <sup>1/</sup>	33
Fabricated metal <sup>2/</sup>	34
Machinery, except electrical	35
Electrical machinery <sup>1/</sup>	36
Railroad transportation	40
Hotels, rooming houses, camps, and other lodging places	70
Educational services, State government (Oregon State University) <sup>1/</sup>	822
Engineering, architectural, and surveying services <sup>1/</sup>	891
Federal civilian	--
Federal military	--

<sup>1</sup>Linn County.

<sup>2</sup>Benton County.



Schallau, Con H; Polzin, Paul E. Considering departures from current timber harvesting policies: case studies of four communities in the Pacific Northwest. Res. Pap. PNW-306. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1983. 29 p.

U.S. Department of Agriculture regulations permit departures from current National Forest timber harvesting policies when "implementation of base harvest schedules . . . would cause a substantial adverse impact upon a community . . . ." This paper describes the kinds of information needed for forest managers to adequately assess the relevance of the departure issue to particular planning units. The relevance of the departure issue varied, depending on: (1) future timber supply, (2) timber dependency, (3) the long-term feasibility of alternatives to current timber harvesting schedules, and (4) whether or not the growth of industries not dependent on timber might compensate for a timber shortage.

Keywords: National Forest policy, economic impact, economic importance (forests), timber harvesting policy, harvest scheduling, timber supply.

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