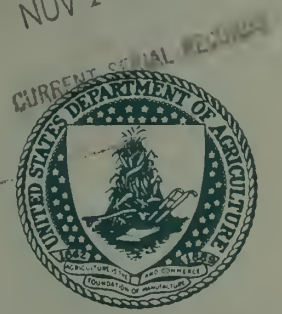


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Measures of Market Structure Change in The Florida Fresh Citrus Packing Industry

By Paul L. Farris and Daniel I. Padberg

ECONOMIC QUESTIONS frequently relate to changes in market structure over time. A number of recent studies have attempted to make projections of one important set of characteristics--the number and size distribution of firms--for selected industries or groups of firms, and to deal with associated conceptual problems.¹ The technique employed in these studies is a Markov chain process. The underlying idea in this type of analysis is that structural changes in an industry are movements toward equilibrium. Transition probabilities, derived from changes in numbers of firms of specific sizes during a given period, are used to project the number and size distribution of firms after a specified number of similar periods have elapsed. An equilibrium industry structure can be generated by increasing the number of periods indefinitely. A future industry structure computed from transition probabilities is not a forecast but rather an indication of tendencies. With this qualification, transition probabilities can be used to determine whether there are tendencies toward substantial structural change, such as increased concentration, in an industry within a particular time period, and to quantify such tendencies.

One of the usual drawbacks in employing a Markov analysis is lack of data. Several studies have been based on data which did not include the entire industry; other studies have used data which were available only for selected years; still others have relied on estimates or on combinations of data which were not conceptually consistent.

This study employs a Markov chain process to analyze market structure change in the Florida fresh citrus packing industry. The physical volume of interstate shipments of citrus by each firm in each season since 1939

is known.² The analysis seeks to (1) project the number and size distribution of firms to 1972-73, (2) develop attrition rates applicable to firms in each category, and (3) evaluate the Markov chain process as a quantitative technique in market structure analysis. The availability of complete, detailed data permits experimentation with several time periods.

Relative Position of the Fresh Fruit Sector

Citrus production in Florida has grown rapidly during the past half century. Today Florida accounts for over one-fourth of the world's production of oranges and nearly three-fourths of the grapefruit. In the 1961-62 season 78 percent of all U.S. citrus was produced in Florida. Around 75 percent of citrus production in Florida is oranges. Grapefruit is second in importance, although it is declining somewhat. Other citrus fruits produced in Florida include tangerines, limes, and specialty fruits such as Temple oranges, Murcotts, and Tangelos.

Almost all Florida citrus was utilized in fresh form until the late 1930's. Early processed products were mainly single-strength juices from low-quality fruit. Production of better juice became possible in the late 1930's, and processing began to expand. The outbreak of World War II brought a sharply rising demand for canned juices. Production of oranges also rose during the early 1940's, and although fresh use expanded, the processing sector expanded even more. By the 1944-45 season, processing took about one-third of the Florida orange crop.

In the 1945-46 season frozen concentrated orange juice was introduced commercially and had a rapid and dramatic effect on the industry.

¹See, for example, I. G. Adelman, "A Stochastic Analysis of the Size Distribution of Firms," *Jour. Amer. Statis. Assoc.*, vol. 53, 1958, pp. 893-904.

²The data are from audited reports. They were made available for this research by the Fruit and Vegetable Division, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C.

In the 1961-62 season 65 percent of the orange crop was used to make frozen concentrate, 16 percent was processed in other ways, and only 19 percent was sold in fresh form. The fresh market took 28 percent of all Florida oranges, grapefruit, and tangerines in the 1961-62 season.

This analysis deals with a declining sector of the industry. While the processing sector of the industry was growing rapidly, the fresh fruit sector gradually declined from around 35-45 million boxes of interstate shipments in the early postwar years to around 30 million boxes a decade later. The fresh sector has also had considerable year-to-year fluctuation in volume, mainly because of variations in production.

Concentration and Size Distribution of Firms

The output of the Florida fresh citrus packing industry is not highly concentrated in a few firms. The proportion accounted for by the largest 4 was around 10 percent during the early 1940's, declined slightly during the early

postwar years, then rose to 14.5 percent in 1960-61. The largest 8 reached 26.0 percent in 1960-61, and the largest 20, 46.3 percent.

No firm was among the largest 20 in every season during the entire period, 1939-40 through 1960-61. Nevertheless, 3 firms were in the largest 20 in 21 of the 22 seasons, 1 firm was in the largest 20 in 20 seasons, and 4 firms were in the largest 20 in 19 seasons.

There has been both a declining number and a change in size distribution of firms since World War II. The number of firms shipping under 200,000 boxes per year has declined more rapidly than the larger shippers (fig. 1).³ The change in size distribution is illustrated in figure 2, where cumulative market shares by size categories are shown for each of 4 years, proceeding from the largest shippers to the

³The size categories were established in consultation with Agricultural Marketing Service personnel who have been working closely with the industry over a period of years. The years were selected at 4-year intervals starting with the 1948-49 season (August 1 through July 31).

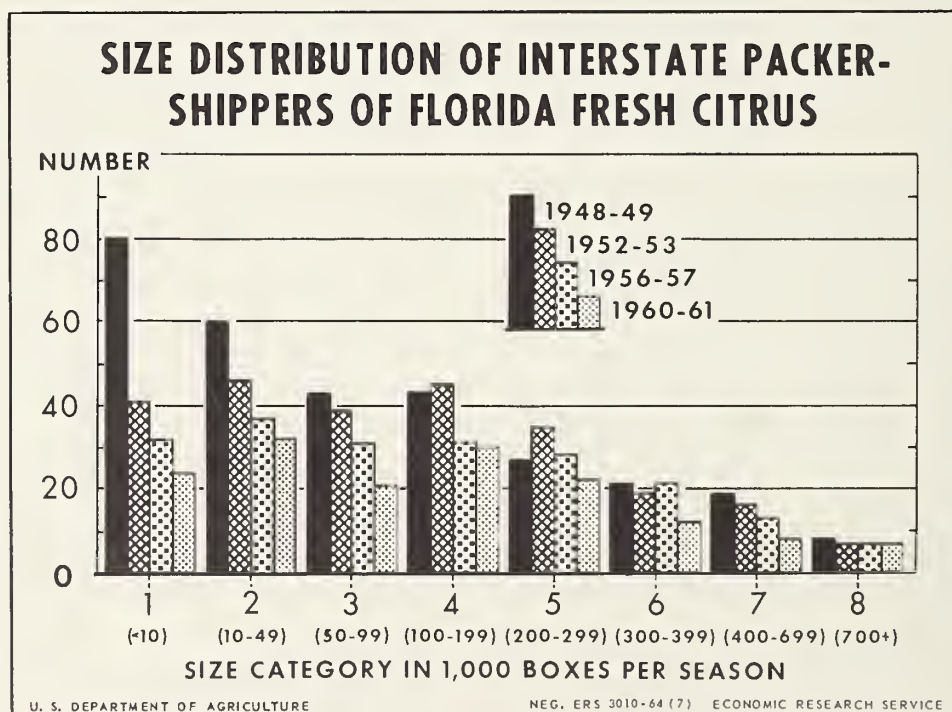


Figure 1

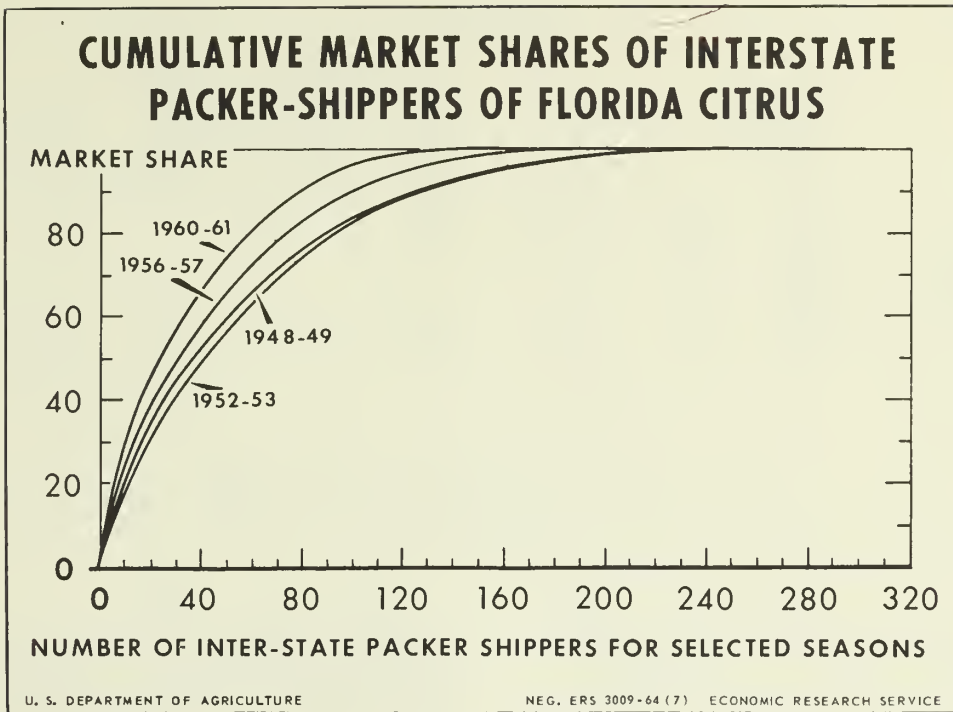


Figure 2

smallest. A movement of the curve to the left from 1 year to another 4 years later indicates increased concentration during the 4-year period. Here we see that there was little change from 1948-49 to 1952-53, but there were noticeable changes during each of the two succeeding 4-year periods.

Most of the packer-shippers were single-plant firms, with few ownership ties to other packer-shippers. The data, therefore, can be interpreted in terms of firms or plants.⁴

Assumption that Firm Growth is Stochastic

A key assumption in employing Markov chain processes in market structure analysis is that firm growth is stochastic. That is, growth by firms in a given size category takes place according to probabilities of movement as-

⁴There were a number of vertical ties. These ties varied from complete ownership by processing plants and groups of growers to various contractual arrangements.

signed to that category. Such probabilities can be estimated from firm movements among categories in selected periods. To obtain some evidence on this question for the Florida fresh citrus packing industry, all firms in operation in two periods, 1952-53 to 1956-57 and 1956-57 to 1960-61, were classified by whether firm volume rose or declined in each period. The results were as follows:

Direction of volume change, 1952-53 to 1956-57	Direction of volume change, 1956-57 to 1960-61	
	Up	Down
	<i>Firms</i>	<i>Firms</i>
Up (60 firms).....	15	45
Down (58 firms).....	19	39
Total (118 firms)....	34	84

The null hypothesis that the rows and columns were independent was tested to determine whether a firm's volume trend in the second 4-year period was independent of what it was in the first 4-year period. The test indicated

Table 1.--Changes in size, new entries, and exits from business, interstate packer-shippers of Florida fresh citrus, 1948-49 to 1952-53

Size category ¹	Number of firms in category in 1948-49	1952-53 size category of firms remaining in business								Number of exits by 1952-53
		1	2	3	4	5	6	7	8	
1	<i>Firms</i> 80	<i>Firms</i> 21	<i>Firms</i> 6	<i>Firms</i> 1	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i> 52
2	60	4	22	6		1	1			26
3	43	1	9	16	8			1		8
4	43		1	8	23	6				5
5	27			1	5	16	4	1		0
6	21				1	5	7	3	1	4
7	19					2	5	8	1	3
8	8				1			2	5	0
Total	301	26	38	32	38	30	17	15	7	98
New entries, 1948-49 to 1952-53	--	15	8	7	7	5	2	1	--	--
All firms, 1952-53 .	--	41	46	39	45	35	19	16	7	--

¹ Volume range in each size category is shown in figure 1.

the null hypothesis could not be rejected at the 5 percent level,⁵ which is consistent with the assumption that firm growth in this industry is stochastic.

Assumption that Transition Probabilities from Alternative Time Periods are Stable

Transition probabilities derived from firm movement patterns among size categories within a time period are assumed to reflect underlying influences on market structure. They provide insights into the probable culmination of forces at work if nothing interferes with them.

An important question is whether the transition probabilities are stable over time. There is probably much variation among industries. Within any given industry there may be periods of stability, but changes may occur as a structure develops through time. The changes are likely to be associated with changes in external influences on market structure.

A new technological innovation, for example, might favor large firms more than small ones. Variations in demand brought about by changing economic conditions may affect rates of firm growth and rates of firm entry and exit. A shift in antitrust policy could counter a tendency toward concentration of industry output into a

few firms. Thus in treating Markov chain projections as forecasts it is necessary to consider whether relationships of the past are accurately identified and whether they will prevail in the future.

Nevertheless, the discovery of differences or of similarities in transition probabilities may be useful in determining tendencies in respect to number and size distribution of firms, the possible effects of external forces, and consequently what guides may be appropriate in formulating public policies toward an industry.

Development of Transition Probabilities and Projections

Table 1 shows the movement patterns used to develop transition probabilities between the 1948-49 and 1952-53 seasons. Exhibit A shows a matrix of transition probabilities derived from table 1. This is a 9 x 9 matrix with rows and columns corresponding to each of the eight size categories plus an extra row and column for entries and exits. The computation of entry probabilities requires an arbitrary determination of the number of potential entrants. The number selected was 10,000. This arbitrary selection does not affect the economically relevant portion of the results.⁶

To project the industry structure in 1972-73, the matrix was raised to the sixth power and

⁵For the test used, see Bernard Ostle, "Statistics in Research," Ames: The Iowa State University Press, 1958, pp. 68-72.

⁶ See Adelman, op. cit., pp. 899 and 901.

EXHIBIT A

P _{1948-49 to 1952-53}	=	.26250	.07500	.01250					.65000	
		.06667	.36667	.10000		.01667	.01667		.43332	
		.02325	.20930	.37210	.18605			.02325	.18605	
			.02326	.18605	.53488	.13953			.11628	
				.03703	.18519	.59259	.14815	.03704		
					.04762	.23810	.33332	.14286	.04762	.19048
						.10526	.26316	.42105	.05263	.15790
					.12500			.25000	.62500	
		.00150	.00080	.00070	.00070	.00050	.00020	.00010	.99550	

Table 2.--Projected industry structure in 1972-73 of interstate packer-shippers of Florida fresh citrus, based on transition probabilities from selected periods

Size category	Volume shipped interstate	Projected number and percent of firms in each category in 1972-73, based on transition probabilities for--							
		1948-49 to 1952-53		1952-53 to 1956-57		1956-57 to 1960-61		Aggregate of latest 2 periods	
		Firms	Per-cent	Firms	Per-cent	Firms	Per-cent	Firms	Per-cent
1	Under 10	24	11.2	26	21.3	20	22.5	23	22.5
2	10 - 49	29	13.5	22	18.0	18	20.2	19	18.6
3	50 - 99	33	15.4	18	14.8	12	13.5	15	14.7
4	100 - 199	49	22.9	16	13.1	17	19.1	16	15.7
5	200 - 299	44	20.6	14	11.5	10	11.2	12	11.8
6	300 - 399	18	8.4	12	9.8	4	4.5	7	6.9
7	400 - 699	13	6.1	8	6.6	4	4.5	5	4.9
8	700 and over	4	1.9	6	4.9	4	4.5	5	4.9
Total	--	214	100.0	122	100.0	89	100.0	102	100.0

multiplied by the 1948-49 size distribution of firms:

$$C_{1948-49} P_{1948-49}^6 = C_{1972-73}$$

to
1952-53

Projections to 1972-73 were also developed from the 1952-53 to 1956-57 and 1956-57 to 1960-61 base periods. Projections for each size category are shown in table 2, along with percentage distributions. Projections from average probabilities for the latest two periods are also shown. The probability matrix underlying this projection was obtained by averaging the movement patterns for the latest two periods. Final "steady state" projections are shown in table 3.

The projected structures in 1972-73 indicate that the industry is tending toward fewer firms. Projections from each successively later 4-year

period indicated fewer firms in 1972-73 than were projected from the immediately preceding period. Projections from the average probability matrix for the latter two periods fell between the projections from the latter two individual 4-year periods.

A Chi-square test was used to determine whether there were differences in projected number of firms in each size category among the three 4-year periods.⁷ The results showed that the 1948-49 to 1952-53 period yielded a projected size distribution in 1972-73 significantly different at the 5 percent level from

⁷ In this test the projected distributions were treated as the observed. The expected distributions were obtained by averaging the projected distributions by size category, obtaining the average proportion in each category, and using these proportions to derive the expected number of firms in each category for each projection based upon the total number of firms in each projected size distribution.

Table 3.--Projected industry structure in final equilibrium of interstate packer-shippers of Florida fresh citrus, based on transition probabilities for selected periods

Size category	Volume shipped interstate.	Projected number of firms in each category in final equilibrium, based on transition probabilities for--			
		1948-49 to 1952-53	1952-53 to 1956-57	1956-57 to 1960-61	Aggregate of latest 2 periods
	<i>1,000 boxes</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>
1	Under 10	24	25	18	22
2	10 - 49	28	17	8	13
3	50 - 99	33	13	6	9
4	100 - 199	49	9	7	8
5	200 - 299	44	7	2	4
6	300 - 399	18	5	1	2
7	400 - 699	12	3	0	1
8	700 and over	4	4	0	2
Total	--	212	83	42	61

Table 4.--Projected industry structure in the 1960-61 season, interstate packer-shippers of Florida fresh citrus, based on transition probabilities for selected periods, compared with observed industry structure in 1960-61

Size category	Volume shipped interstate	Projected number of firms in each size category in 1960-61 based on transition probabilities for--		Actual number of firms in each size category in 1960-61
		1948-49 to 1952-53	1952-53 to 1956-57	
	<i>1,000 boxes</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>
1	Under 10	26	29	24
2	10 - 49	33	31	32
3	50 - 99	35	25	21
4	100 - 199	48	25	30
5	200 - 299	41	23	22
6	300 - 399	18	18	12
7	400 - 699	14	12	8
8	700 and over	5	7	7
Total	--	220	170	156

size distributions projected from either of the latter 4-year periods. There was no significant difference in projected size distributions from either of the latter 4-year periods.

In the earliest of the three periods unusual changes were occurring, primarily (1) substantial economic adjustments following World War II and (2) the rapid growth of the frozen concentrate sector of the industry in the early 1950's. Consequently, the latter two periods are probably more homogeneous in terms of the economic environment of the industry. Trends during these years are likely to be more indicative of future developments than trends during the 1948-49 to 1952-53 period.

A further indication of the change in economic environment which apparently occurred in the

early postwar period is noted in comparing the industry structures for 1960-61 as projected from earlier periods with the structure which actually existed in 1960-61 (table 4). The projected number and size distribution of firms from the 1948-49 to 1952-53 period differ significantly from the observed structure in 1960-61. The projections from the 1952-53 to 1956-57 period are reasonably close to the actual number and size distribution in 1960-61.

Comparative Analysis Based on Alternative Trends in Industry Volume

Total industry volume shipped interstate trended downward during the period of this

study. For each of the three periods analyzed, volume was lower at the end than at the beginning of the period. Hence, there is built into the foregoing projections the assumption of further declines in total industry volume. If industry volume should stabilize or increase, projections of number and size distribution of firms based on declining industry volume would be misleading.

Inasmuch as the possible effect of differing trends in industry volume is a question of considerable interest, available data were analyzed to determine the nature of such relationships. Year-to-year fluctuations in in-

dustry volume made it possible to select years between which industry volume did not decline (table 5). Two additional sets of years were selected to represent (1) a period when industry volume was approximately the same in the beginning and ending years (1957-58 to 1960-61) and (2) a period when industry volume was substantially higher in the ending than in the beginning year (1958-59 to 1961-62).

Projections from periods of declining industry volume and stable industry volume both indicate the industry is tending toward fewer firms (table 6). Only if industry volume grew to about twice the season average volume for

Table 5.--Volume of interstate shipments, number of firms, and average volume per firm, interstate packer-shippers of Florida fresh citrus, 1952-53 to 1961-62

Season	Volume of interstate shipments	Number of firms shipping interstate			Average volume per firm shipping interstate			Percent of firms shipping 200,000 boxes or more interstate	Percent of interstate shipments, by firms shipping 200,000 boxes or more
		All firms	200,000 boxes or more	Under 200,000 boxes	All firms	200,000 boxes or more	Under 200,000 boxes		
	1,000 boxes	Firms	Firms	Firms	1,000 boxes	1,000 boxes	1,000 boxes	Percent	Percent
1952-53....	39,937	246	77	169	162	383	62	31	74
1953-54....	43,937	241	84	157	182	415	58	35	79
1954-55....	40,621	225	77	148	181	415	59	34	79
1955-56....	38,784	216	73	143	180	421	56	34	79
1956-57....	35,424	199	69	130	178	401	60	35	78
1957-58....	27,368	190	50	140	144	375	62	26	68
1958-59....	27,444	165	54	111	166	392	57	33	77
1959-60....	30,087	157	60	97	192	405	60	38	81
1960-61....	27,180	155	49	106	175	412	66	32	74
1961-62....	33,517	153	62	91	219	446	64	41	83

Table 6.--Projected industry structure in 1972-73, interstate packer-shippers of Florida fresh citrus, based on transition probabilities for selected periods

Size category	Volume shipped interstate	Projected number and percent of firms in each size category, based on transition probabilities for--					
		1956-57 to 1960-61 and declining volume		1957-58 to 1960-61 and stable volume		1958-59 to 1961-62 and increasing volume ¹	
	1,000 boxes	Firms	Percent	Firms	Percent	Firms	Percent
1	Under 10	20	22.5	18	17.7	20	13.0
2	10 - 49	18	20.2	15	14.7	10	6.5
3	50 - 99	12	13.5	12	11.8	10	6.5
4	100 - 199	17	19.1	19	18.6	19	12.3
5	200 - 299	10	11.2	13	12.7	26	16.9
6	300 - 399	4	4.5	9	8.8	10	6.5
7	400 - 699	4	4.5	7	6.9	15	9.7
8	700 and over	4	4.5	9	8.8	44	28.6
Total	--	89	100.0	102	100.0	154	100.0

¹ 1973-74 projections rather than 1972-73 because projection periods are in multiples of the length of the 3-year base period (1958-59 to 1961-62).

the late 1950's and early 1960's would the number of packer-shippers remain around 150. The projections clearly show that increased volume would be handled by an expansion in volume per firm rather than by a larger number of smaller firms. There would be a substantial increase in the number of firms handling 700,000 boxes or more per season.

In this particular industry annual volume per plant can be readily expanded by operating more days during the harvest season. There appears to have been a longer-run tendency during the past decade toward larger volume per firm (table 5).

Projections of Numbers of Packer-Shippers by Least-Squares Regression

The substantial long-time downward trend in the number of packer-shippers that ship fresh citrus interstate is clearly evident. However, when volume increases, there is a tendency for numbers of packer-shippers to increase (or decrease more slowly).

To project the impact of these two influences--the time trend and volume--into the future, a least-squares regression model was developed. The period chosen for computing the relationship was from the 1952-53 season through 1961-62. This period comes after the early postwar adjustment period and begins about the time frozen concentrate production began to be important.

The relationships are more likely to change in proportional amounts than in absolute amounts so the regression was run with all variables converted to logarithms. It is assumed that the number of firms will decrease a certain percentage each year rather than a certain absolute number. Likewise, the influence of volume change on number of firms is assumed to be more stable in percentage than in absolute terms.

$$\text{Log } Y = 7.0 + .15 \log X_1 - 3.07 \log X_2 \quad R^2 = .98$$

(.10) (.34)

Where: Y = number of interstate packer-shippers

X₁ = fresh industry volume shipped interstate (1,000 boxes)

X₂ = time (53, 54,62)

The projected total number of firms in the 1972-73 season ranges between 80 and 101 as assumed industry volume ranges between 14 million and 65 million boxes (table 7). Using 65 million boxes (the volume projected for 1973-74 on the basis of volumes from 1958-59 to 1961-62), the projected number of firms in 1973-74 is 97. The least-squares projections indicate that fluctuations in volume will have even less influence on number of firms than was indicated in the Markov projections.

Table 7.--Projections of number of interstate packer-shippers of Florida fresh citrus, selected seasons, based on least-squares regression

Season	Assumed industry volume (million boxes)							
	14	17	23	30	35	40	50	65
	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>	<i>Firms</i>
1964-65..			124	129	132	134		
1968-69..		98	102	107	110	112	116	
1969-70..		94	98	103	105	107	111	
1972-73..	80	83	87	90	92	94	97	101
1973-74..	77	79	83	86	88	90	93	97

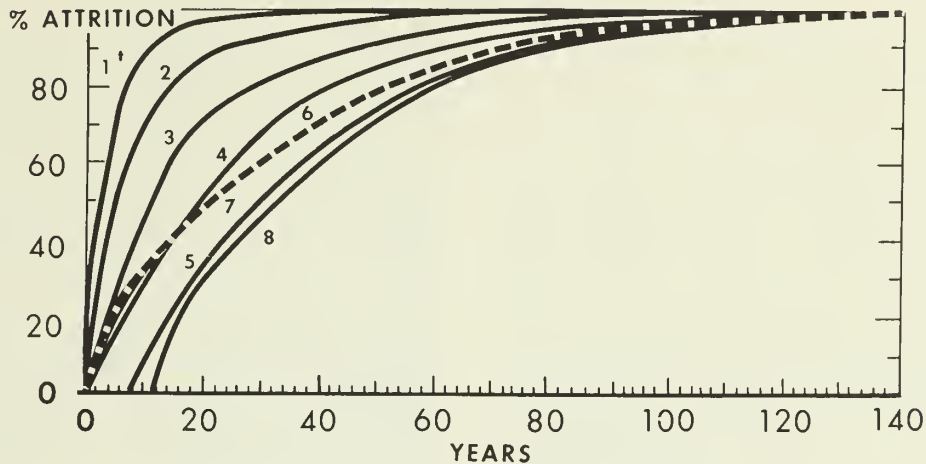
Two additional regressions, each using the same explanatory variables, volume and time, were run to compare large firms with small firms. The dependent variable in one model was the number of packer-shippers with volumes less than 200,000 boxes per season, and in the other, the number with volumes of 200,000 or more boxes per season. Projections from these two models showed that, with projected constant industry volume in the future, the decline in number of firms shipping less than 200,000 boxes per year would be expected to continue. With expanding industry volume, the number of firms handling 200,000 boxes or more annually would expand. This pattern of firm growth is consistent with tendencies shown by the Markov projections.

Half-Life Expectancy of Firms

The transition probabilities used for projecting the number of firms expected in various

EXPECTED ATTRITION OF INTERSTATE PACKERS-SHIPPERS OF FLORIDA FRESH CITRUS

by Year and Size Category*



* BASED ON MOVEMENT PATTERNS DURING 1948-49 TO 1952-53 PERIOD.
 † SIZE CATEGORY OF FIRM: 1, 2, 3, ETC. BROKEN LINE REPRESENTS BOTH 6 AND 7.

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Figure 3

size categories may also be used to evaluate life expectancy of individual firms.⁸

The attrition rate of firms in a given size category is asymptotic, so life expectancy cannot be evaluated nor compared in total. A measure which has been found useful is the half-life. Half-life for firms in category *i* may be defined as the number of years required for the firms initially in category *i* to decline 50 percent. Expected attrition rates have been computed from transition probabilities from the 1948-49 to 1952-53 period. The data for

⁸ The expected percent attrition of firms initially in category *i* (A_i) during the first $K+1$ periods may be represented by

$$A_i = \sum_{k=0}^K (P^L)_i^k P_{jn}$$

where the matrix P^L is the first $N-1$ rows and columns of the transition matrix P and where $(P^L)_i^k$ denotes the *i*th row of the matrix P^L to the *k*th power, and where P_{jn} is the first $N-1$ elements of the *N*th column of the matrix P (the exit vector). A FORTRAN program for evaluating expected attrition in all categories simultaneously is available from either of the authors. Also available is a FORTRAN program for computing projected size distributions from Markov transition matrices.

the first 36 periods are shown in figure 3. As time in this formulation is measured discontinuously in periods of *T* duration, linear interpolation may give more accurate results.

Half-life projections are presented in table 8 for various base periods. These data demonstrate vastly greater stability of large firms. It is also apparent that the length of half-life varies according to trend in total industry volume.

The half-life measure aids in understanding the dynamics of market structure change. It should be of use to individual market participants and to prospective entrants. Owners of assets employed in firms with a very high attrition rate may be able to learn whether expansion would bring greater stability. Expectations of falling, stable, or rising total industry volume affect risks of attrition.

Summary and Implications

As in many agricultural industries, there has been a marked trend in the Florida fresh citrus packing industry toward fewer firms. The pro-

Table 8.--Estimated half-life in years for interstate packer-shippers of Florida fresh citrus, by size category, selected projection base periods

Size category	Declining industry volume			Stable industry volume	Increasing industry volume
	Projection base period				
	1948-49 to 1952-53	1952-53 to 1956-57	1956-57 to 1960-61	1957-58 to 1960-61	1958-59 to 1961-62
	<i>Years</i>	<i>Years</i>	<i>Years</i>	<i>Years</i>	<i>Years</i>
1	4	4	4	3	6
2	8	8	8	6	6
3	12	8	8	9	9
4	20	12	12	12	21
5	32	16	16	21	over 300
6	24	20	16	21	over 300
7	24	20	28	39	∞
8	32	36	40	54	∞

jections in this paper generally indicate a further decline, possibly to around 90 interstate packer-shippers in the early 1970's compared with 153 in the 1961-62 season. An increasing share of the volume will be handled by large firms. If fresh volume should rise above levels of the late 1950's and early 1960's, practically all of the increased industry volume is expected to be handled through an expansion in volume per firm rather than by a larger number of firms.

The half-life of firms was estimated, taking into account size of firm and trend in total industry volume. The results show substantially longer half-life expectancies of large firms, and an inverse association between attrition of firms and the direction of change in total industry volume.

This study indicates that Markov chain projections from alternative periods within a similar general economic environment did not differ significantly. The substantial technological change which occurred in the Florida citrus industry in the early postwar period appeared to have altered the general economic environment of the fresh sector. Projections from a period early in this development were sub-

stantially different from projections from later periods. Also, alternative trends in total industry volume appeared to influence directions of change in the number and size distribution of firms.

The severe freeze which occurred in December 1962 could alter industry structure, although the impact is expected to be less than that of the technological development of frozen juice concentrate. If replanted groves are owned by firms inclined toward larger-scale operations, the result might be an increase in the size of new packing plants constructed and a change in the future size distribution of firms in the industry. Other developments could also modify future directions of change in market structure.

Markov chain projections have uses other than as a basis for appraising prospective changes in market structure. They are of value in describing tendencies which prevailed in a particular period. Observation of these tendencies for successive periods through time helps to characterize and to understand changes in market structure, to relate changes to possible causes, and to develop guides which may be useful in considering public policies toward an industry.

Incorporating Soil Differences Within Regions in an Interregional Competition Model

By Norman Whittlesey and Earl O. Heady

Structure of the Models

RESEARCH ON THE interregional allocation of farm production has been underway for several years under the joint auspices of Iowa State University and the U.S. Department of Agriculture. A number of linear programming models applicable to the major field crops--wheat, cotton, soybeans, and feed grains (corn, oats, barley, and grain sorghums) have been devised.¹ Other models incorporating livestock and a variety of refinements in technique are in process. The major purpose of this research is to ascertain what would be an efficient interregional allocation of farm production in the United States under specified assumptions. The objectives of these studies are (a) to find the interregional allocation of production under specific objective functions, (b) to indicate the amount and location of land that might be withdrawn from field crop production to bring supplies and utilization into balance, and (c) to study the effect of different types of supply control policies on interregional production patterns and the magnitudes of land-use shifts.

This paper discusses two models representing recent refinements. Model I assumes that all of the cropland within a region is of equal productivity. Model II divides the cropland within a region into three groups reflecting differences in productivity. Soil differences within regions were incorporated to provide more realistic and complete representation of the production possibilities within regions.

To show the effects of recognizing differences in soil productivity within regions, the results from model I and model II are compared.

¹Earl O. Heady and A. C. Egbert, "Efficient Regional Allocation of Farm Products and Programmed Supply Prices," *Agr. Econ. Res.* 16: 1-11, Jan. 1964. Also see A. C. Egbert and Earl O. Heady, "Regional Adjustments in Grain Production: A Linear Programming Analysis," U.S. Dept. Agr., Tech. Bul. 1241, 1961.

The models used here follow a basic pattern which has been reported in the earlier studies cited. They differ from models used in the earlier stages of the project in that they have (a) more demand regions and more producing areas, (b) transportation activities to provide for the optional distribution of food and feed products, and (c) input-output data that are projected to estimate as accurately as possible the conditions of 1965.

The 144 producing regions were delineated along county lines to form regions that are relatively homogeneous with respect to climate, historical yields, and production costs. The regions include approximately 96 percent of the national production of the seven crops named above. Geographic areas not suited to the crops (e.g., mountainous, grazing, and similar regions) are excluded from the programming regions.

The 48 States were divided into 31 demand regions based on State boundaries. A regional demand requirement was specified for each of the three major products: food wheat, feed grains, and oilmeals. The demands represent discrete quantities for livestock, human, industrial, and export uses in each demand region. A single national demand was specified for cotton lint. Demand constraints are based on 1965 projected levels of population, per capita consumption, and "normal" price levels. Foreign exports, being somewhat indeterminate, were set at 1957-61 average levels. To provide a proper spatial allocation of production, the product demands at each coastal consuming region include expected exports. Each of the two models had similar demand requirements for food and feed products. These commodity requirements are listed in table 1.

An activity for each crop was included for all regions previously producing the particular crop. Cropland availability served as the overall constraint on production in each producing

Table 1.--Demands for specific commodities employed in models I and II

Commodity	Unit	Quantity ¹
Corn	Million bushels	4,337.9
Oats	do.	1,143.7
Barley	do.	478.5
Grain sorghums	do.	456.3
Wheat	do.	1,047.8
Soybeans	do.	676.4
Cotton	Million pounds	6,466.0

¹ During the actual programming all demands for feed grains and wheat were expressed in their feed unit equivalents. Thus, demands could be satisfied by those grains with a comparative advantage in production and location.

region. Additional acreage restraints for wheat, feed grains, and cotton in each producing region were used to simulate various land retirement or supply control schemes. These restraints were based on the historical acreages of each crop in each region. Soybeans, not currently in surplus, were restricted to the use of not more than 40 percent of total cropland in each region. This restriction was imposed as an estimate of the acreage that could be used to produce soybeans without reducing yields or increasing production costs. Hence, the four major producing activities (wheat, feed grains, soybeans, and cotton) are each restrained by total cropland plus an acreage quota restraint reflecting the base acreage of that crop (except as noted above for soybeans).

Approximately 1,400 transportation activities were included to allow an optimum distribution of production among consuming regions. The movement of products was assumed to originate and terminate at the center of each consuming region. Transportation costs were not included for crops produced and consumed within a consuming region. A transfer activity for each consuming region allowed the use for livestock feed of any wheat not needed for human consumption. The cost of this activity was zero, thereby simulating a multiple-price plan for wheat (assuming that the price of food wheat would be maintained at or near its current level). This assumption induces the use of larger amounts of wheat for feed than under our recent one-price plan for wheat.

The objective function for each model is one of minimizing national costs of production

and interregional transportation costs. The objective function is:

$$(1) \quad \text{Min } f(X) = CX$$

where C is an $nk + t$ row vector including production and transfer and transportation costs conforming to k crops, n producing regions, and t transfer and transportation activities; X is an $nk + t$ vector representing levels of crop production, transfer, and transport activities. We also have the conventional restraints:

$$(2) \quad AX' \geq b' \quad \text{and} \quad (3) \quad X \geq 0$$

where A is a coefficient matrix of $(nk + t)$ $(nk + mp)$ order (conforming with the n regions and k land restraints representing the regional crop activities, the m demand regions and the p regional demand restraints), and b is an $nk + mp$ column vector reflecting the maximum acreage restraints within each producing region and the minimum demand requirements in each consuming region.

Soil productivity differences exist within regions, as well as between regions. Recognition of this variability can add realism to spatial equilibrium models by allowing submarginal land even in the most productive areas to be retired. In areas which have least competitive advantage, based on average coefficients, above-average cropland can continue in use. In model II, cropland in each of the 144 producing regions was divided into three classes and acreage restraints were specified for each class. The most productive land was designated Class 1, with Class 2 and Class 3 progressively less productive.

We have grouped land in the 144 regions by Land Use Capability Class and Subclass, a classification used by the Conservation Needs Inventory Committee of the U.S. Department of Agriculture. This classification was originally designed to indicate the susceptibility of land to erosion or other hazards, but we used it as the best available method of classifying soil according to productivity. Shrader and Landgren pioneered this approach, using CNI soil classes to rank soils for corn productivity

in the North Central region.² Their success was sufficient to encourage the use of a similar method in this study.

Demand restraints and total regional acreage restraints were the same for both models. The only major difference between the two models is the assignment of acreage restraints to classes of soils and estimation of coefficients for each class.

Model I Production Results

The results from model I indicate that 41 million acres of cropland now used for cotton, food wheat, feed grains, and oilmeals would not be needed to meet projected requirements. This assumes that production is allocated efficiently among regions and that the structure of the model and data used are reasonably appropriate. (Soybeans have a rapidly increasing demand and were allowed to exceed the historical soybean acreage.) The land could be converted to less intensive agricultural uses or to nonagriculture. The amount and location of this land by regions are indicated in figure 1. With the objective function used here, an efficient allocation of production among regions, to eliminate surpluses and conform with regional comparative advantage, would concentrate land diversion in the Northern Plains and the Southeast, with other areas having relatively less diverted land. The areas diverted are major regional aggregates with low yields, less efficient technologies, or small inefficient farms. In contrast, the major feed and livestock regions east of the Missouri River, the major winter wheat regions, and the field crop regions of the Pacific States would remain in production. The results of model I suggest that if currently applied Government programs were to be discontinued, these regions would become more important in the Nation's agriculture and food production.

Production of at least one crop was specified for nearly every producing region. Approximately 80 percent of the aggregate wheat base and feed grain base was needed to fulfill assumed regional and national demands. About 76 percent of the total cotton base was used.

²William D. Shrader and Norman E. Landgren, "Land use implications of agricultural production potentials," unpublished paper, Ames, Iowa, 1962.

Soybeans exceeded their base acreage by about 11 percent. Approximately 82 percent of the 223.9 million cropland acres available in the model was needed to meet the specified demands. The remaining land, as indicated by figure 1, would be diverted to less intensive agriculture or to nonagricultural uses.

Interregional Transportation, Model I

Patterns specified for interregional flows of the three commodity aggregates (wheat for food, feed grains, and oilmeals) were developed. The general movement of feed grains was from the Corn Belt into the Southern and Eastern States. The States shipping the largest amounts were Illinois and Iowa. Kansas and Montana produced and shipped substantial amounts of wheat for use as feed grain. Under the assumptions of model I, 310 million bushels of wheat would be used for livestock feed. This amount contrasts with average use in recent years of 50 million to 80 million bushels. According to the results from this model, wheat can be produced as a livestock feed more cheaply than the four major feed grains in the Mountain States, the Pacific States, and Kansas. Wheat was also fed to livestock in Wisconsin and parts of the Southeast.

Food wheat was indicated to be in surplus in the Great Plains States and Montana. A deficit supply existed elsewhere. North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma supplied most of the excess demand for food wheat of the eastern United States, while Montana regions shipped wheat to the Pacific coast. Most of the wheat demands in the Pacific coast regions were for export purposes.

Because of combined advantages in production and location, the soybean producing regions of Nebraska served as the main shippers of oilmeal to Mountain and Pacific States. The Nebraska regions also served as the producing origin for a considerable amount of oilmeal that moves to the Southeast. Otherwise, the Central Corn Belt served as the main source of oilmeal shipments to other regions. An efficient national production pattern under the specified assumptions would require increased production of soybeans and oilmeal in the Mississippi Delta. However, the East and South would continue as deficit areas and would still depend upon the Corn Belt for a portion of their oilmeal supply.

LOCATION OF SHIFTS IN CROPLAND USE UNDER ASSUMPTIONS OF MODEL I

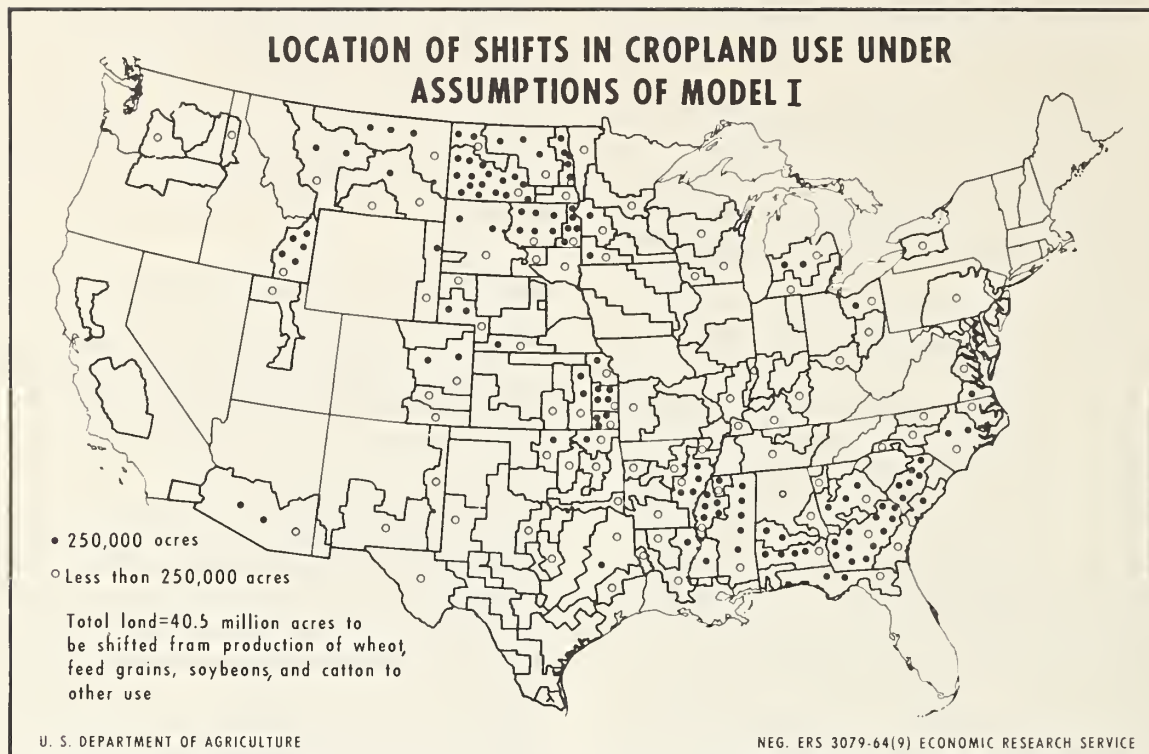


Figure 1

An indication of the efficiency of production achieved by the solution as formulated in model I is the average equilibrium product prices (excluding fixed costs) shown in table 2. Prices received by producers and those paid at points of consumption are shown separately. The difference between the two sets of prices represents transportation costs. The prices received indicate that wheat and feed grains can be produced at nearly the same cost per unit. However, the prices paid show that a much greater percentage of wheat than of feed grains must be transported before it is consumed.

The production and transportation patterns resulting from the two models were similar. However, the aggregate results indicate some significant changes brought about by model II (table 2). The most important change was the amount and distribution of unused cropland. By permitting the disposal of submarginal rather than average cropland within regions, approximately 8.1 million fewer acres were required to satisfy the product demands. In addition, there was a much wider distribution of unused cropland, as shown in figure 2. Many areas of the central Corn Belt and the Great

Table 2.--Output, prices received, and prices paid for specified commodities, models I and II

Item	Units	Model I	Model II
Wheat production.....	Mil. acres	47.0	45.8
Feed grain production....	do.	102.4	96.7
Soybean production....	do.	19.9	21.3
Cotton production....	do.	14.1	11.5
Unused cropland.....	do.	40.5	48.6
Wheat used for feed..	Mil. bu.	310.3	279.5
Average prices received: ¹			
Wheat.....	Dol. per bu.	.83	.80
Feed grain.....	do.	.83	.80
Soybeans.....	do.	.93	1.04
Cotton.....	Dol. per cwt.	31.99	24.43
Average prices paid: ¹			
Wheat.....	Dol. per bu.	1.12	1.12
Feed grain.....	do.	.92	.89
Soybeans.....	do.	1.07	1.17

¹ The differences between prices received and prices paid are a result of transportation costs incurred when moving commodities from the producers to the consumers. Cotton was not transported in our models.

Plains were left with some unused land, where model I indicated employment of all land. The greatest concentrations of land withdrawal were still in the Southeastern States and the Northern Plains States. Greater diversification of crop

LOCATION OF SHIFTS IN CROPLAND USE UNDER ASSUMPTIONS OF MODEL II

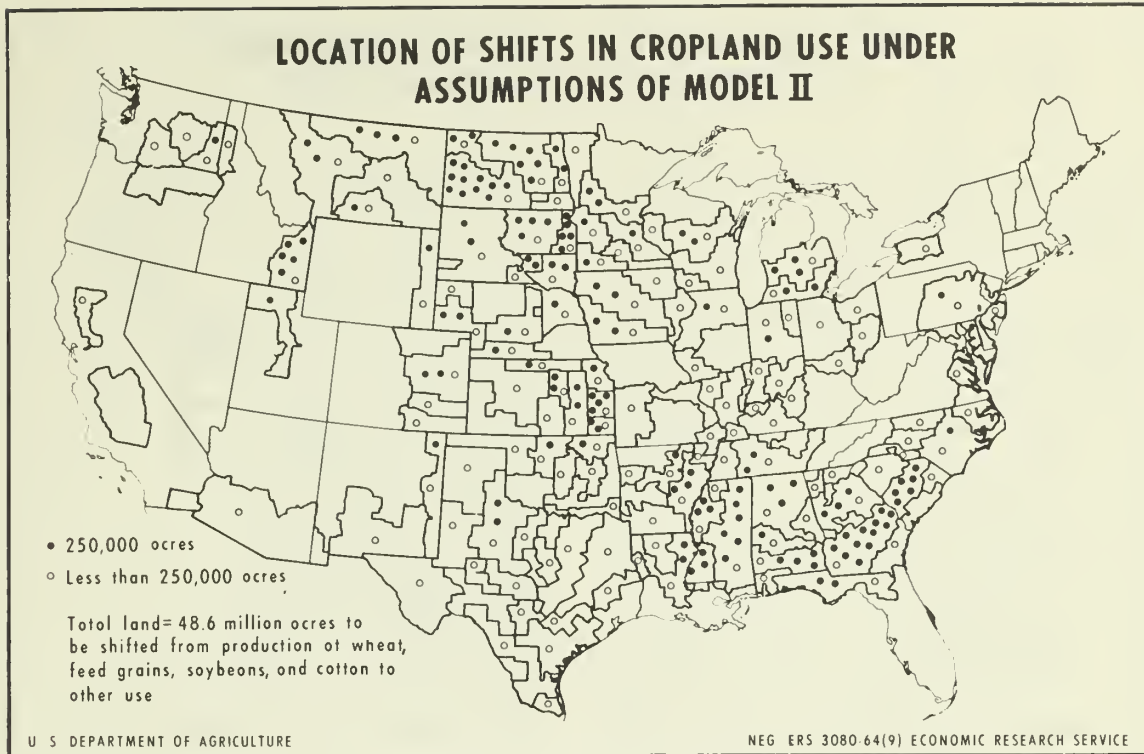


Figure 2

production also occurred as a result of the increased number of production restraints. Several regions had a more diversified cropping pattern under model II than under model I.

Figure 3 has been included to focus upon the changes in land use patterns brought about by model II. Model II affected total land use in North Dakota more than any other State. Wheat was increased over 1 million acres in this State with only a slight decrease in feed grain acreage.

Most of the decrease in total wheat acreage occurred in the Eastern and Southern States. Wheat production shifted westward, in terms of both acres and bushels, under model II. Several States west of the Missouri River showed increases in wheat production; the opposite was true for States east of this line. Most States, including the Great Plains States, showed decreases in total land devoted to the specified crops, but recognition of land quality differentials allowed these States to expand wheat production. Even under the assumptions of model I the Western and Great Plains States could produce wheat as cheaply as those in the East. These States could not exploit this

advantage, however, because of their distance from centers of consumption. The range in land qualities was greater in the West than in the East. Recognition of this point shifted the comparative advantage of wheat production westward.

Feed grain production was increased slightly under model II, to offset a decrease in the use of feed wheat (table 2). However, fewer acres of feed grains were required because they utilized the more productive land, allowing other land to be shifted to other crops (or to be diverted from crops).

Mississippi and Louisiana were the only States to increase feed grain acreage under model II. This increase was accompanied by an even greater decrease in cotton acreage, however. Significantly, the increase in feed grains in Louisiana did not come at the expense of feed grain production in the Corn Belt. It was the non-Corn Belt States which absorbed the 5.8-million-acre decrease in feed grains. The Corn Belt strengthened its comparative advantage in feed grain production despite a decrease in total land use in these areas. Wheat and soybean production were reduced

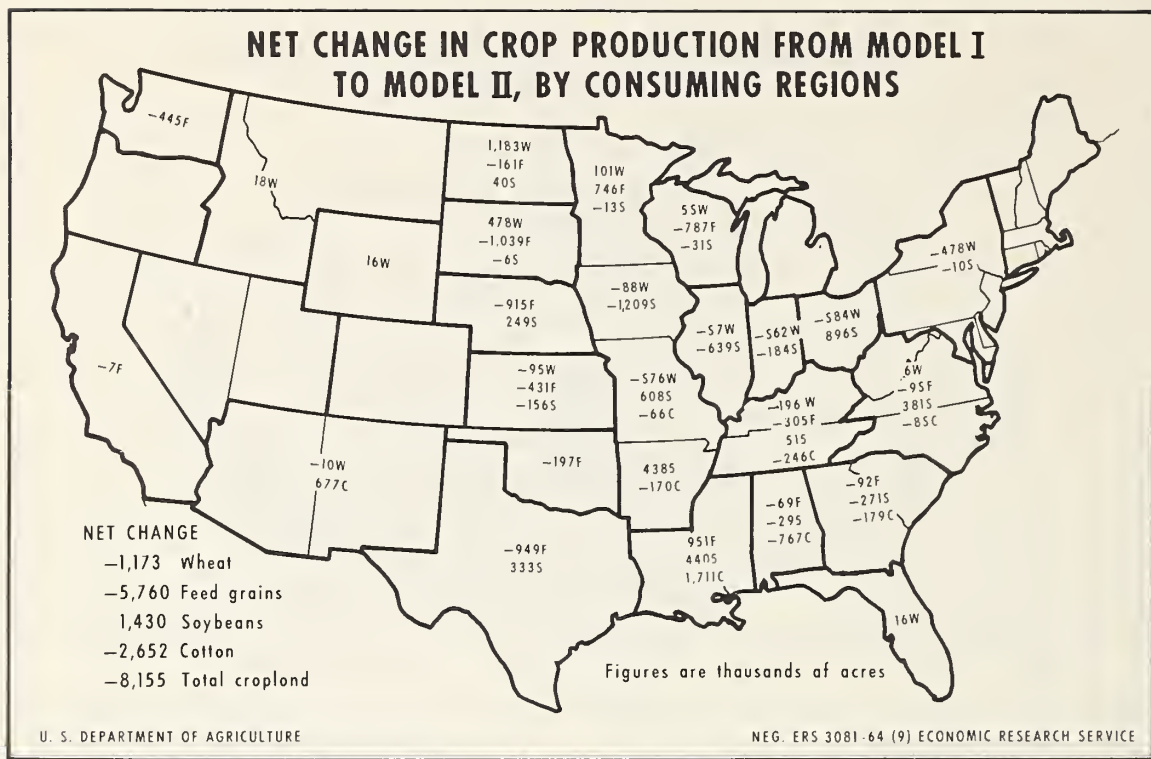


Figure 3

in the Corn Belt to maintain the high level of feed grain acreage.

Production of soybeans, the crop most competitive with feed grains for land, was shifted onto land of "below average" productivity under model II. Thus, a considerable amount of soybean production was moved from the Corn Belt into the Southern and Eastern States. Iowa actually reduced soybean acreage by 1.2 million acres. Ohio had the largest single increase, however, of 896,000 acres. The Southern States of Arkansas, Missouri, Mississippi, Louisiana, and Texas all shared in the expanded soybean acreage. Because the average yield of soybeans is lower on this land, unit production costs are higher and soybean acreage is greater. Higher production costs caused the equilibrium price of soybeans to go up in model II (table 2).

Wheat equilibrium prices were not greatly affected by model II despite a shift in production location. Ohio reduced its own production and increased inshipments by about 21 million bushels, raising its equilibrium wheat price by 9 cents per bushel. Illinois, a self-sufficient region in the model, had wheat pushed onto land with higher unit production costs, raising

the price of wheat by 10 cents per bushel. All other regions had smaller changes, usually reductions, in wheat prices.

Feed grains, accounting for over 50 percent of total acreage used, often utilized the better quality of land at the expense of wheat and soybeans. Consequently, feed grain equilibrium prices were considerably reduced in model II. Nearly all of the Corn Belt States and States importing from the Corn Belt had a drop of about 5 cents per bushel of corn. Texas, Oklahoma, New Mexico, and Arizona, each allowing cotton to utilize Class I land, had increases in feed grain prices. North Dakota, because of a large increase in wheat production, had slightly higher feed grain prices.

Oilmeal prices were increased rather uniformly in all areas. Soybeans, by utilizing poorer qualities of land in most regions, had higher unit costs of production.

Cotton was affected more than any other crop by the application of the second model. Cotton dominated the best land wherever it was grown, greatly reducing the acreage and increasing the average efficiency of production. In addition, greater concentration of cotton in the

Southwest resulted under model II. All of the Southeastern cotton-producing States were reduced in cotton acreage.

Both models limited the regional production of the problem crops (wheat, feed grains, and cotton) by acreage quotas based upon historical production records. In addition to the regional crop acreage quotas, cropland acreage restraints were applied to represent individual regional capacities. The dual of the programming models produced a set of imputed values for the restraining production factors. Here we find another major difference between the two models. Model I imputed much higher values to the crop quotas and lower values to cropland than model II. This difference between the models becomes quite important if one is considering the application of crop acreage quotas to limit the production of problem crops. Model II, by being more representative of actual crop acreage quotas and cropland constraints, resulted in more realistic rental values of the restraining production factors.

Conclusions

In model I average cropland was removed from production within regions. Model II allowed the diversion of land by grades within regions. This difference resulted in changes in land use patterns, equilibrium product prices, and imputed rental values of production factors between the results of the two models. We believe the recognition of interregional soil quality differences in model II has added an element of

realism to interregional competition programming models which was not present in earlier models by Heady, Egbert, Henderson, and others.

Further analysis may include simulation of alternative program characteristics by manipulation of the quota restrictions, product demands, or price assumptions applied to the models.

Not all questions regarding the benefits and effectiveness of alternative supply control programs will be answered by these programming models. Nevertheless, we feel that this approach has advantages over some of the past methods of evaluating, a priori, alternative farm policies. We can now provide more accurate estimates of the potential regional and aggregate effects of alternative agricultural programs. It is possible to consider the separate effects of such things as changes in price level, variations in export demands, increased application of new technology, and different methods of land retirement. It is hoped that the derived information will be useful in considering agricultural policies and programs for the future. While realism of the models has been increased by dividing land into classes, the results are still of long-run nature. The usefulness of the models for more intermediate or short-run policy questions would be increased if other resource restraints in addition to land could be added, and if behavioristic restraints could be added. Further, the more effective consideration of the time dimension would facilitate an analysis of the process of adjustments through time and greatly increase the information available for consideration in policy decisions.

Book Reviews

Transforming Traditional Agriculture.

By Theodore W. Schultz. Yale University Press, New Haven, Conn. 212 pages. 1964. \$6.

ONE OF THE comparative advantages possessed by Professor Schultz is that he typically addresses himself to important issues and clarifies or illuminates them, if he does not always resolve them. This particular effort is not an exception, though it is, for reasons that will be given later, considerably less convincing than some of his other analytic achievements.

The importance of a highly productive agriculture for economic growth and development is finally gaining recognition. But the problem of how to bring about the great increases in farm output that are necessary is still largely unresolved. What is required is the transformation of traditional agriculture to modern agriculture--the former being defined by Schultz as "farming based wholly upon the kinds of factors of production that have been used by farmers for generations."

What are the reasons for the low productivity of agriculture in areas where traditional methods prevail? Some have emphasized personal traits, particularly lack of industry and thrift. Others have emphasized the need for "more" capital. "Not so," says Schultz. People in traditional agriculture do not work as hard as they might because the marginal product of their labor is very low. They do not save and invest as much as they might because the marginal productivity of capital is also very low. In short, "there are comparatively few significant inefficiencies in the allocation of the factors of production in traditional agriculture." This is indeed a sweeping pronouncement.

What traditional agriculture needs is not "more of the same," whether it be labor or capital, but new factors, including both modern

capital inputs and farm people possessing the skills to convert these inputs into profitable income streams. Achievement of this, however, is a complex and time-consuming process. It requires action by the suppliers of new factors (private firms, nonprofit organizations, and governments) "to discover, develop, produce, distribute, and thus make available to the demanders the new set of factors of production." On the other hand, it requires the creation of a new set of demanders who will understand and exploit the profitmaking potential inherent in the new technical factors. But in order to equip these demanders with the requisite knowledge, there is a further requirement of more and better education for farmers, particularly at the elementary and secondary levels.

In the course of developing this general position, Schultz looks into a number of specific topics. He examines and rejects the doctrine that the marginal productivity of agricultural labor in many poor countries is zero, though I think he gives it more attention than it deserves. He rightly challenges the notion that the creation of farms of very large size provides a royal road to economic growth for traditional agriculture, but in so doing largely bypasses the problem of optimal size of farms in areas that are in the process of transition from traditional to modern agriculture. Also, he properly chides economists for hiding their ignorance about new capital formation under the rubric of "technological change."

On the whole, Schultz states his case well and his reasoning is cogent. His use of empirical data is skillful. Why, then, is it not wholly convincing? This is due to the fact that his empirical data are scanty in relation to the important propositions he is trying to establish. His book reminds one of the brief of an able and articulate lawyer who believes that he has a good case, but is rather short on key witnesses and pertinent court decisions.

The case for the allocative efficiency of traditional agriculture is based on Sol Tax's notable study of a Guatemalan Indian economy and a doctoral dissertation by W. David Hopper, which deals with the economic organization of a village in North Central India. These two studies do lend support to Schultz's general thesis, but the sample is woefully small, and I am sure that he would have been much happier if he could have found a few more studies of comparable caliber. The refutation of the theorem about the zero value of agricultural labor is based on skillful interpretation of materials relating to the Indian influenza epidemic of 1918. However, it does seem rather fortuitous that the implicit coefficient of labor in agricultural production derived from very aggregate data in the period 1916-20 should coincide with the coefficient indicated by a few sample surveys made nearly a half a century later.

In making his case for the efficiency of traditional agriculture, Schultz lays great stress on the very low marginal return to capital. But in doing this, he appears to take the position that relatively large outlays for conspicuous consumption in poor agricultural areas are evidence of the low productivity of capital. This seems to ignore the consumer preference side of the matter. After all, examples of "wasteful consumption" are certainly by no means uncommon in countries where returns on investment are relatively high.

I think that the greatest disagreement with Professor Schultz's views will center on his conclusions that the way out for traditional agriculture must be almost entirely a long-run affair in which research and education play the critical roles. These are indeed necessary if a poor country is to realize its ultimate potentials, but many people who have worked in the underdeveloped areas are strongly convinced that very significant advances can be made in agricultural productivity by the introduction of some relatively simple improvements in traditional inputs, such as fertilizer, and by providing various sorts of managerial assistance at the village level. It is true that some efforts to do this have failed, but there is a substantial body of opinion to the effect that the reason lies in such things as inadequate planning, faulty organization, and lack of re-

sources, rather than from any basic conceptual defect. Those who hold these views also believe that there is room for what is known as "adaptive research"--relatively short-run investigations of the more productive use of existing knowledge in the present environment.

In other words, long-time programs focusing on research and education are not inconsistent with very substantial improvements in productivity during the short run. In fact, these two approaches should lend support each other. On this particular issue, however, probably only time will provide the answer.

Despite these reservations about Schultz's analysis, it should be on the reading list of people who are studying, or are engaged in, programs designed to raise the agricultural productivity of poor countries. His book will provide them with many of the questions they should ask, and with clues to the right answers. These contributions are real even if Schultz cannot buttress every point in his analysis with decisive empirical support.

J. P. Cavin

Federal Aid to Depressed Areas: An Evaluation of the Area Redevelopment Administration.

By Sar A. Levitan. The Johns Hopkins Press, Baltimore. 288 pages. 1964. \$6.95.

IT IS NOT OFTEN that an evaluation of a "program" is made so early in its history. However, the Area Redevelopment program is an innovation, and probably calls for departing from the usual in its examination. This volume is a fairly detailed and sometimes tedious analysis of the Area Redevelopment Act and subsequent operations as a program. The author served on the staff of the congressional committee that wrote the legislation. He presents in considerable detail some of the early history of area redevelopment legislation.

To a considerable degree the book is concerned with problems and difficulties which have dogged the program from its inception. However, little attention is given to how the Area Redevelopment Administration solved its problems. The book is organized primarily around the various features of the legislation, such as

the designation of area eligibility, industrial and commercial loans, loans and grants for public facilities, training the unemployed for jobs, and community planning.

In Levitan's summary of problems, he devotes considerable attention to how the ARA "set up shop." It is his contention that the major problem surrounding ARA operations has been the "delegate-agency" concept, whereby the program is operated by delegating considerable responsibility to various departments and agencies. One of these was the Department of Agriculture, which was made responsible for various aspects of the program in rural areas. Those who have had experience with the program have encountered problems associated with confusion in administrative channels, delay of decisions, and differing concepts of area development. The author does not suggest that these problems might be due to the delegate-agency concept. The reader is left with the impression that perhaps the problem lies with the agencies themselves rather than with the administrative technique.

On the whole, the Area Redevelopment Act and the Area Redevelopment Administration come off fairly well in Levitan's evaluation. He indicates that 2 years of operations do not provide sufficient experience for such a long-range program. He should have added that one of the difficulties has been the promise of too much too soon. The entire program has been a subject of criticism because there was not common understanding that area development and redevelopment are long-term ventures.

The "worst mistake" committed by ARA according to Levitan was its attempt to assist too many communities. By this, one would have to conclude that the criteria for area designation were drawn too loosely, although Levitan does not say this specifically. The excessive designation of more than 1,000 areas to be assisted was as much the result of legislative definition as of administrative decision by ARA. Part of the problem is laid at the door of the Department of Agriculture. The positive contributions of USDA are not enumerated in this book.

This is a well documented book; it is obvious that the author has searched diligently for pertinent material. In the larger sense, overlooking so much emphasis on problems, the book is

fairly objective. As one with some association with the program, this reviewer has to point out that no one in the Department of Agriculture reviewed the manuscript before its publication, or at least such review is not acknowledged. However, in the preface the author states that several of the delegate-agencies did review the manuscript along with many people outside the Government.

The author makes only a passing reference to the great importance of research in policy formulation. His critique of the program dwells too heavily on the problems of administration and not enough on the lack of basic research and policy formulation, though he says that these have been slighted by the program. The program has proceeded on a project-by-project, area-by-area basis, thus precluding the required regional approach.

Those interested in area development and redevelopment will find this book highly interesting in its dealing with the Nation's only declared redevelopment program. Students of administrative techniques will be interested in how the delegate-agency concept has performed in this instance and what it promises or might not promise for other types of program.

John H. Southern

*A Monetary History of the United States
1867-1960.*

By Milton Friedman and Anna Jacobson Schwartz. Princeton University Press, Princeton. 860 pages. 1963. \$15.

WITHOUT A DOUBT this National Bureau of Economic Research publication by Milton Friedman and Anna Jacobson Schwartz is one of the more significant economic works to be published in recent years. Basically, the authors are concerned with the history of the stock of money from 1867 to 1960. The stock of money consists of currency plus time and demand deposits of commercial banks. The authors have constructed a continuous series of the stock of money for the 1867-1960 period, which is in itself an important contribution. This series, its components, and related series appear in appendixes.

The authors start with 1867 because that is the earliest date at which they could begin a continuous series of estimates of the money supply. They trace the money supply, its determinants, and its influences through the periods of: Greenbackism; Silver Politics and Secular Price Decline; Gold Inflation and Banking Reform; Early Years of the Federal Reserve System; The High Tide of the Reserve System; The Great Contraction; New Deal Changes in the Banking Structure and Monetary Standard; Cyclical Changes, 1933-41; World War II Inflation; Revival of Monetary Policy; and The Postwar Rise in Velocity.

Accompanying the historical narrative is a careful, very detailed analysis of the association of fluctuations in the money stock with other economic variables such as money income and prices. The finding of the authors that in the past money has been an important and often autonomous variable, which can mitigate or eliminate economic fluctuations, is, of course, not new. But the strong empirical evidence that Friedman and Schwartz have accumulated in support of this thesis may win sufficient converts to prevent another policy debacle like that of the 1930's.

Somewhat disconcerting are two footnotes appearing in the first 5 pages. They are: "For a full description of these estimates (of the money supply) and their derivation, see our companion volume, 'Trends and Cycles in the Stock of Money in the United States, 1867-1960,' a National Bureau study, in preparation," and "See our forthcoming volume, 'Trends and Cycles,' for a discussion of the reasons we use the term money to refer to currency plus all deposits in commercial banks."

In the first instance, official estimates of demand deposits and time deposits in commercial banks are different from the Friedman-Schwartz series and it would be helpful if the authors had inserted an appendix explaining the differences. A similar problem occurs with the next footnote. Many economists, including myself, treat time deposits as near-money and define the medium of exchange to include currency plus demand deposits. In view of widespread professional disagreement over the definition of M, the authors might have previewed their forthcoming book by a few more pages in this already large publication.

Money plays a significant role in economic history whether or not the money supply includes time deposits, but in some instances differing degrees of importance would be attached to money. For example, Friedman and Schwartz find their M (including time deposits in commercial banks) declined by 2.6 percent from August 1929 to October 1930 (p. 307). Using the narrower definition (currency plus demand deposits), M fell by 5.9 percent. Also, the authors find that "in October 1930, the stock of money was almost the same as it had been in November 1929 and nearly 2 percent below its level at the end of December 1929." Again using the narrower definition, M, in November 1930, was 2.1 percent below its level of November 1929 and 5.8 percent below its level at the end of December 1929. If the concept of M used by the authors is not the proper one, then their basic thesis, that money is important, would remain intact, but in many instances their historical interpretations would be substantially different.

In conclusion, "A Monetary History" is an important contribution to the literature on monetary economics. It is required reading for monetary economists and economic historians. It is an extremely well written and exceptionally interesting book which will make enjoyable reading for other economists as well. Finally, lest the sight of 700 pages of text frighten away some prospective readers, I would like to point out that the real length of a book is a function of the interest the authors generate in their readers, which makes "A Monetary History of the United States 1867-1960" a very short book.

Gene L. Finn

Agricultural Protection and Trade

By J. H. Richter. Frederick A. Praeger Company, New York. 148 pages. 1964. \$5.

THIS LITTLE BOOK resolutely attacks the problem of how "to reconcile national support for agriculture with the need for maintaining agricultural trade." The current conflict in the field of agricultural policy and trade between the United States and the Common

Market (EEC) in the forthcoming Kennedy Round of trade negotiations is taken as an illustrative case study of decisive importance. It provides a survey of the problems involved, a good analysis of the Community's evolving agricultural policy, and some useful suggestions for policymakers and negotiators.

The first two chapters state the now familiar problem of imbalance in agriculture resulting from the combined effects of rapidly advancing technology, increasing output, inelastic demand, unstable prices, government support, and restrictions on trade. Chapter 3 points out the well known weaknesses of GATT for handling agricultural trade and discusses the inability of governments to apply GATT rules to agricultural trade. Dr. Richter chides the GATT contracting parties for having approved, in March 1962, a special code for EEC agriculture which he describes as a far cry from a really international code of conduct for agriculture. Chapters 4 and 5 describe the Common Agricultural Policy of the Common Market and point out how the EEC agricultural developments have suddenly highlighted the whole problem of international agricultural trade and agreements.

Chapter 6 describes the relationship between Community countries and the Associated Overseas countries. In chapter 7, a seminar on trade policy indicates that the United States itself is not entirely blameless with respect to trade barriers. That chapter also contains a somewhat querulous criticism of the famous U.S.-EEC chicken war, asserting that U.S. spokesmen made some serious errors in representing U.S. claims and that the EEC seriously violated its own regulations in its unseemly haste to erect high levels of protection for EEC poultry meat producers.

Chapter 8 moves into the broader area of reconciling national agricultural policies with maintenance of trade. Here the author asserts that the major claims put forward by the United States are neither realistic in terms of prospects nor likely to be profitable if achieved. Chapter 9 neatly points out how the Pisani Plan serves French interests very well but is weak in several important areas, such as proposed levels of farm product prices (too high) and the relation of commercial trade to concessional trade and to supply management.

In chapter 10, the proposal for a common EEC grain price level with adjustment subsidies as offered by Mr. Mansholt is commended as a useful concept. But it is also criticized for having a price level which is too high, and for failing to link deficiency payments under the plan with some effective means of supply control. In chapter 11, the Mansholt Plan for representation of EEC agricultural interests in GATT negotiations is shown to be long on agricultural protection and short on reasonable obligations leading to solution of the agricultural trade problem.

Chapter 12 is the key chapter. In it the author sets forth his ideas as to certain basic needs for successful resolution of the many problems discussed earlier in the book. Three necessary tenets are set forth at the outset: international political and economic cooperation; recognition of the principle of efficient resource utilization and its counterpart, expanding trade; and lastly, recognition of the need for political realism and graduality in adjustment. From these tenets, four derived principles are obtained. These are:

1. Avoidance of further increase in agricultural protection.
2. Avoidance of further impediments to expanded consumption.
3. Exercise of economic common sense.
4. Acceptance of international commitments regarding national agricultural policies.

Possibilities regarding agreement on both international and internal prices, the use of product neutral subsidies in concert with product price support, and the interlocking of demand supplementation with supply control through a concept called commercial output are discussed.

A need is indicated for several international commodity agreements and one overall functional agreement. Grains, butter, nonfat dry milk, and meat are commodities for which international agreements are suggested. In chapter 13, the United Kingdom is complimented for its recent cereal and livestock product plans, which put the U.K. in a position to negotiate with the EEC and other countries on international agricultural agreements.

The book concludes with a chapter in which it is indicated that outsiders must accept some "costs" of EEC integration in agriculture. It is conjectured that EEC agricultural output will probably continue in the near future to

increase faster than the growth of its own demand for the products of agriculture.

Dr. Richter has posed the problem and has suggested the main lines of attack upon it. He has covered the subject well in an easily readable and good survey. Apart from the concept of commercial output, which may prove to be highly useful in negotiations, the book offers little that is new. Government representatives are still faced with the problems of how to move through the swamps and thickets of conflicting interests, politically sensitive issues, and serious differences as to what constitutes both economic common sense and international reasonableness.

P. E. O'Donnell

Proceedings of the Eleventh International Conference of Agricultural Economists.

Oxford University Press, London. 567 pages. 1963. \$11.20.

THE THEME of this conference, held at Cuernavaca, Mexico, was the role of agriculture in economic development. It dealt with the problem of growth in a general context, including both "rich" and "poor" countries, considering social, cultural, political, and institutional facets sometimes labeled as non-economic, and probing a wide variety of topics such as concepts, theories, measurements, methods, experiences, and policies.

In his presidential address Sherman E. Johnson threw a challenge to members in the form of his guidelines for economic development. Some of these in brief form are: (1) increased supplies of food and other farm products are essential to rapid economic development in any country; (2) there is no moral justification for "plowing under" a generation or more of farm people in order to achieve faster economic growth; (3) improved technology is a key to productive employment and higher output and its most important variable is investment in people who must learn new technical and management skills; (4) a universal system of elementary public education is essential for a successful development program; (5) the potential conflict between needed investment for output expansion

and more equitable sharing of the national product must be reconciled; (6) institutional arrangements will need to be modified to encourage voluntary savings and provide more equitable taxation, thus channeling income into public or private investment for continued expansion; (7) the farm sector can contribute at least a proportionate share of its current income for initial investment in development; and (8) economic growth is a means to an end--better living for all people--which should be clearly stated and widely accepted.

Ingvar Svennilson, in his paper on "The Concept of Economic Growth," points out that economic concepts are often defined in ways that seem objective while actually reflecting subjective value judgments, that narrow definitions are often applied to problems of economic policy where broader concepts correspond to actual political attitudes, and that measurable indexes of development necessarily neglect some important growth considerations.

Simon Kuznets, in "Economic Growth and the Contributions of Agriculture," recognizes the element of ambiguity in the title since any sector is part of an interdependent system. He provides some functional model schemes useful in differentiating components of agriculture's contribution and measuring them. S. L. Mansholt focuses inquiry on the increasing importance of regional agreements for agricultural markets, such as the European Economic Community. The structures of agriculture that have evolved over past decades, especially those from a "glasshouse" climate created by national policy, are destined for change as a consequence of the harsher climate they will be subjected to in the regional trade community.

A. K. Cairncross, in "The Use of Foreign and Indigenous Capital in Economic Development," argues that experience is much less relevant to present-day problems than is generally imagined. A review of the role of agriculture in economic development in various countries includes Nigeria, Brazil, Burma, Uzbek S.S.R., Ireland, and the Federal Republic of Germany. He discusses "Developments in Patterns of Farm Units" in terms of new lands and new settlements, the consolidation of agricultural holdings and improvement of their internal structure, and the experience of large-scale collective and state farms of the U.S.S.R.

O. V. Wells acknowledges that lack of any large body of helpful literature dealing with "Market Structure for Economic Development" necessitated his using an a priori approach in discussing the topic. He points out that the relative bargaining power of the various market interests, including political and institutional strengths, is always a real and often a controlling factor retarding or speeding up marketing improvement.

D. G. Karve of India suggests, in "Organizing a Unified Agricultural Development Programme," that "occupational and social reformation must needs be formulated and implemented by democratic methods." Sir John Crawford, discussing the "Use of Surpluses for Economic Development," suggests that where surplus disposals were useful in promoting development, the results were more accidental than due to intelligent national and international planning.

The section concerned with "Environmental Conditions for Agricultural Development" includes papers and discussions of the educational, sociological, institutional, and health and nutrition environments.

Research methods in the development framework are discussed by Earl Heady and extension work by Arthur Jones. Mordecai Ezekiel attacks the formidable problem of using research findings in policy issues, drawing mainly on experiences in the United States and international organizations such as FAO.

A most important feature of the book is the discussions that follow each of the major papers where concepts and theories are challenged and alternative viewpoints are presented. They cover a wide area of current thought concerning agricultural growth and the role it plays in general economic development.

Clarence A. Moore

The Ecology of Malnutrition in Five Countries of Eastern and Central Europe.

By Jacques M. May. Hafner Publishing Company, New York. 292 pages. 1963. \$10.50.

FOOD RESOURCES and dietary practices of East Germany, Poland, Yugoslavia, Albania, and Greece are the subject of this book written

by a physician and geographer. It is volume 4 of "Studies in Medical Geography," written under a contract with the U.S. Army.

The author describes each country and discusses for each one adequacy of food resources, types of diets, and nutritional disease patterns. The concluding evaluations for each country deal with "normal times" and "times of stress."

The purpose of the volume is not clearly stated but probably can be inferred from occasional statements about how "in times of stress" an army might or might not be able to procure food from the domestic economy.

A more explicit admission of the military point of view of the book would help the reader understand why the author constantly implies that self-sufficiency in foods is a great advantage. Many countries have survived and even prospered without this but in time of war domestic food resources may be crucial.

The ecological framework used by Dr. May is an awkward way of dealing with problems that are basically matters of economics. However, if the point of the book is to determine what the food supplies of each country might be if it were isolated, as in time of war, then the biological analogy is not so farfetched. Even so, the tools of agricultural economics could be used in considering such circumstances and would be vastly more helpful in analyzing conditions in "normal times."

Theodora Mills

The Managerial Mind.

By David W. Ewing. Free Press of Glencoe, New York. 218 pages. 1964. \$5.95.

THIS IS something different. Most management books stress "how to do it." This is a more reflective volume which approaches the subject from the standpoint of the mind of the manager. Those who wish to learn how to be better managers may get many valuable insights from it.

"The aim of the book is to identify for the manager and the prospective manager certain values and attitudes that distinguish the administrator from men in other callings,

vocations, and professions." This approach centers attention on the things that set the administrator apart, that make his contribution significant.

As the author says, "This volume is not about personality traits but about values, points of view, and ideas; not about executives in general but only about those whose job is primarily to supervise the work of others" (p. xvi).

How does one distinguish the managerial mind from other "minds"? The answer is simple: "The most important feature of the managerial mind is its commitment to the life and growth of the organization" (p. 3).

According to the author, "the manager's sense of commitment to the organization," no matter whether it be a business or a government or other type of institution, "means that he places a high priority on the processes of administering, supervising, and coordinating" (p. 5). Another interesting expression is that "the administrator's commitment to his department or enterprise is sharpened by his fear of what will happen if he does not battle for its survival" (p. 8).

The author uses an interesting analogy. "The manager's way of thinking is not unlike that of the doctor's. . . It is the life, the organism that counts" (p. 10-11).

The book is filled with epigrammatic comments which keep the reader on the qui vive. The following are random samples:

"The managerial mind stops working when it gives in to pressures to conform" (p. 33).

"To be productive means sometimes, at least, to be very tough" (p. 70).

"Great leaders do not always leave strong organizations. Great managers do" (p. 105).

"Teaching is important to the manager because it underlies the chances for success of almost everything he tries to do for the organization" (p. 141).

While Ewing states that the book is one of reflections and not of research findings, the reflections are based on broad knowledge of the pertinent literature gained by him as Associate Editor of the Harvard Business Review. He draws heavily on reported research and Harvard case studies, and thus the book is much more than one man's opinions.

The chapter titles are lively and enticing: "Dilemmas of the Managerial Mind," "The Importance of Nonconformity," "Tensions and the Managerial Environment," "The Managerial Zest for Problems," "The Impact of the Managerial Mind," and "Is the Managerial Mind Creative?"

The concept "value added to distribution" has proved useful to marketing men. The author has neatly adapted this idea to the field of management by using the phrase, "value added by administration." He says, "A productive organization consists of more than the number of people in it, their skills, their motivations, their equipment. A productive organization is made up of the right people at the right places at the right times with the right purposes and equipment. . . Value added by administration is what keeps things moving" (p. 15).

This book has many merits. It will encourage self-analysis by managers. It provides an understanding of the manager's role in an organization. It is an antidote to stereotyped thinking which underestimates the complexities of good administration. This book will help young men know better whether management is their dish and it will help organizations know better what kind of managers they need.

This reviewer has found "The Managerial Mind" a refreshing book. It is interestingly written and free of cant. The style of the prose is easy and communicative and the organization of the book carries the reader logically to a final analytical chapter.

Joseph G. Knapp

The Conduct of Inquiry: Methodology for Behavioral Science.

By Abraham Kaplan. Chandler Publishing Company, San Francisco, Calif. 428 pages. 1964. \$8.

THE METHODOLOGY of the behavioral sciences has rightly occasioned considerable attention from scientists and philosophers of science. This volume by Professor Kaplan certainly represents one of the most comprehensive treatments of behavioral science methodology known to this reviewer. As a philosopher

of science, Kaplan accomplishes the difficult task of taking a "bird's eye view" of the nature and scope of methodology as it relates to the behavioral sciences in general. In doing so, he has emphasized the unity of the various behavioral sciences rather than the qualities that distinguish one from the other.

Professor Kaplan's philosophy is reflected in the following quotation: "I believe that the most important contribution methodology can make to science is . . . to help unblock the roads of inquiry."

Although his focus is primarily on the nature, scope, and contributions of methodology--potential as well as current--he recognizes the fallacy of the "myth of methodology." This is a recurring theme in this volume--the "myth" that methodology can, by itself, ensure progress in the discovery of truth. Appropriately, and sometimes dramatically, Kaplan spells out the dangers of confusing means and ends.

The book is organized into 10 chapters, each of them appropriately subdivided into meaningful content areas. In general, the topics discussed include methodology per se, concepts, laws, theories, experimentation, measurement, statistics, models and model-building, and values.

Certain topics deserve special mention here, because this reviewer believes them to have particular relevance to the behavioral sciences. The author's discussions of experimentation and observation seem especially meaningful and lucid.

He identifies many of the problems confronting the behavioral scientist while "observing" a subject; and he describes various ways of controlling or adjusting for errors of observation. Kaplan insists that "the argument that the behavioral scientist cannot experiment because his subject matter does not lend itself to manipulation is embarrassingly superficial."

In discussing some of the problems of measuring human behavior, Kaplan takes special

note of the tendency on the part of some researchers to practice the "mystique of quantity." He points out that statistics is never really the source of knowledge; rather it is observation that is the true source. Statistics is appropriately treated as an analytical tool. "The magic of numbers cannot produce cognitive rabbits out of truly empty hats."

The discussion of "models" and "model-building" is meaningful and timely. Kaplan points out the potential contributions of models to scientific analysis. However, he is equally perceptive in distinguishing limitations, citing "oversimplification" as possibly the major failing of model-building.

The chapter on theories rightfully emphasizes the great practicability of theory. Here again, however, the author is quick to note problems associated with theorizing in the behavioral sciences.

In the opinion of the reviewer, Professor Kaplan renders a real service in probing the place of values in science. He recognizes that values per se are appropriate subject matter for investigation. He also discusses their role in providing a basis for a professional code of ethics, and in influencing the selection of problems to be investigated.

In conclusion, Professor Kaplan's depth of knowledge of science generally, and the behavioral sciences in particular, is very apparent. This volume is certainly consistent with his view of the philosopher as one who "must be willing to stand apart from the fashions in science, art, politics, or religion, and to say, 'However . . .'"

This would make an excellent text for a graduate course in the philosophy of science. It should also attract favorable attention from behavioral scientists, both those in training as well as those already functioning in a professional capacity.

Ward F. Porter

Selected Recent Research Publications in Agricultural Economics Issued by
the U.S. Department of Agriculture and Cooperatively by the
State Universities and Colleges¹

BENNETT, ROBERT M. INTERSTATE HAULING OF CALIFORNIA-ARIZONA FRESH FRUITS AND VEGETABLES BY RAIL AND TRUCK. U.S. DEPT. AGR., MKTG. RES. RPT. 673, 36 pp., AUGUST 1964.

Data were gathered in interviews with 93 fresh-produce shippers. The extent to which rail and motor carriers are used for out-of-State shipments of fresh produce depends on their ability to provide transportation commensurate with the needs of fruit and vegetable handlers. Rates and service features both greatly influence a firm's choice of the mode of transport to be used.

BOGUMILL, JOHN P., AND O. HALBERT GOOLSBY. FINANCIAL PROCEDURES UNDER PUBLIC LAW 480, EMPHASIS ON TITLES I AND IV OF THE AGRICULTURAL TRADE DEVELOPMENT AND ASSISTANCE ACT. U.S. DEPT. AGR., FOREIGN AGR. ECON. RPT. 17, 20 pp., MAY 1964.

The report describes a P.L. 480 program completely, from its inception with a formal government request through the final distribution of currencies generated by sales of U.S. agricultural surpluses abroad. It is the first time that these procedures have been compiled under one cover and presented in a nontechnical manner.

GARLOCK, FRED L., AND PHILIP T. ALLEN. TECHNICAL APPRAISAL OF THE 1960 SAMPLE SURVEY ESTIMATES OF FARM DEBT. U.S. DEPT. AGR., ECON. RES. SERV., ERS-167, 28 pp., JUNE 1964.

In the late fall and winter of 1960-61 the Bureau of the Census made a survey of farm debt as part of its 1960 Sample Survey of Agriculture. This report is part of an appraisal that is being made as a basis for improving future debt survey techniques. It indicates that estimates of the farm debt based solely on the survey data result in understatements of the farm debt.

GAVETT, EARLE E. TRUCK CROP PRODUCTION PRACTICES, SAN JOAQUIN COUNTY, CALIFORNIA, LABOR, POWER, AND MATERIALS, BY OPERATION. U.S. DEPT. AGR., ECON. RES. SERV., ERS-166, 50 pp., JUNE 1964.

Eighth in a group of publications containing information on labor requirements, production practices, and costs involved in the production of truck crops for fresh market and processing.

GAVETT, EARLE E. TRUCK CROP PRODUCTION PRACTICES, MARION COUNTY, OREGON, LABOR, POWER, AND MATERIALS, BY OPERATION. U.S. DEPT. AGR., ECON. RES. SERV., ERS-169, 35 pp., JUNE 1964.

Ninth in a group of publications containing information on labor requirements, production practices, and costs involved in the production of truck crops for fresh market and processing.

GAVETT, EARLE E. TRUCK CROP PRODUCTION PRACTICES, YAKIMA COUNTY, WASHINGTON, LABOR, POWER, AND MATERIALS, BY OPERATION. U.S. DEPT. AGR., ECON. RES. SERV., ERS-172, 42 pp., JULY 1964.

Tenth in a group of publications containing information on labor requirements, production practices, and costs involved in the production of truck crops for fresh market and processing.

HATCH, ROY E., AND D. S. MOORE. PRODUCTION AND PRODUCTION REQUIREMENTS, COSTS AND EXPECTED RETURNS FOR COTTON, GRAIN SORGHUM AND MAJOR FRESH MARKET VEGETABLE CROPS ON LOAM SOILS--LOWER RIO GRANDE VALLEY OF TEXAS. TEXAS AGR. EXPT. STA., MP 719, 55 pp., JUNE 1964. (ECON. RES. SERV. COOPERATING.)

Budgets are developed showing potential production levels, associated costs and expected returns per acre for cotton and grain sorghum with various levels of water application. Budgets for the major fresh market vegetable crops are developed for one level of water application only.

HAVAS, NICK. PILOT FOOD STAMP PROGRAM: IMPACT ON RETAIL FOOD STORE SALES IN AVOYELLES PARISH, LA. U.S. DEPT. AGR., ECON. RPT. 55, 7 pp., MAY 1964.

Sales in retail food stores in Avoyelles Parish rose 7 percent after introduction of a pilot food stamp program. The report describes findings of research to measure the effects of the program in a representative sample of 73 retail food stores. Dollar value of the food coupons redeemed at stores during the program period totaled nearly \$45,000, or 9 percent of sales value.

¹State publications may be obtained from the issuing agencies of the respective States.

HESTER, O. C., AND RICHARD L. BOGGS. MARKET POTENTIALS FOR MODIFIED EDIBLE FATS AND OILS. U.S. DEPT. AGR., MKTG. RES. RPT. 659, 30 pp., MAY 1964.

Improvements through research and development could increase use of modified animal fats and vegetable oils by 82 million pounds above normal growth in several specialty markets by 1967. The most promising use of these fats and oils is in protective coatings for various foods. Confectionery coatings are the next most important possibility.

HOLLON, DAN S. HOUSEHOLD CONSUMERS' ACCEPTANCE OF INSTANT SWEETPOTATO FLAKES. U.S. DEPT. AGR., MKTG. RES. RPT. 663, 23 pp., JULY 1964.

Sweetpotatoes processed in a new way--by cooking, dehydrating, and flaking them before canning--have a considerable commercial potential as instant sweetpotatoes. Most homemakers who tried the new product said they would buy it if it were available locally. A panel of some 200 Virginia homemakers liked the convenience, taste, and other features of the canned flakes in a study conducted by USDA's Statistical Reporting Service.

JAMISON, JOHN A. THE CALIFORNIA FRESH DECIDUOUS FRUIT INDUSTRY: STRUCTURE, ORGANIZATION, AND PRACTICES. CALIF. AGR. EXPT. STA., UNIV. CALIF., GIANNINI FOUND. RES. RPT. 275, 161 pp., APRIL 1964. (ECON. RES. SERV. COOPERATING.)

Data on the type and amount of fruit handled, the physical plant operated, and the functions performed by California marketing firms provide a basis for evaluating the major elements of market structure, the level of marketing efficiency, and some implications for price and income determination.

JANSMA, J. DEAN, AND W. B. BACK, LOCAL SECONDARY EFFECTS OF WATERSHED PROJECTS: A CASE STUDY OF ROGER MILLS COUNTY, OKLAHOMA. U.S. DEPT. AGR., ECON. RES. SERV., ERS-178, 28 pp., MAY 1964. (OKLA. AGR. EXPT. STA. COOPERATING.)

Local economic benefits of watershed projects arise from (1) net primary income to the direct recipients of products and services from the projects, and (2) net secondary income through multiplier effects of the primary income. Local primary income has been estimated by the Soil Conservation Service in project planning. This study represents an initial step in research to devise methods for making reliable estimates of local secondary income.

JOHNSON, HUGH A. RURAL RESIDENTIAL RECREATION SUBDIVISIONS SERVING THE WASHINGTON, D.C. AREA, 1963. U.S. DEPT. AGR., AGR. ECON. RPT. 59, 31 pp., AUGUST 1964.

Thirteen rural housing developments built for recreational uses were studied in northwestern Virginia and nearby West Virginia. Ownership of lots in these developments is usually a prerequisite to membership in private clubs organized to serve the owners and their invited guests. This study shows that there is a limited overall market for residential recreation subdivisions. The demand is created by urban people who generally want family-oriented recreation in a rural setting.

KRENZ, RONALD D. PLANNING PRODUCTION WITH VOLUNTARY DIVERSION PROGRAMS. N. DAK. AGR. EXPT. STA., BUL. 449, 16 pp., JULY 1964. (ECON. RES. SERV. COOPERATING.)

In the 1962 and 1963 crop years various crop diversion options were included in the Government farm programs for wheat and barley, and they may be included in future programs. This study showed that diversion programs in general will reduce production even with higher yields from fallow the second year.

McELROY, ROBERT C., REUBEN W. HECHT, AND EARLE E. GAVETT. LABOR USED TO PRODUCE FIELD CROPS: ESTIMATES BY STATES. U.S. DEPT. AGR., STATIS. BUL. 346, 43 pp., MAY 1964.

Man-hours of labor used per acre have declined for nearly all field crops. During the 1953-63 decade, the decrease in total labor for field crops was about 2.2 billion man-hours. Increasing mechanization and other technological factors accounted for most of the decline. In addition to averages for the United States, man-hours of labor used per acre of field crops in 1959 in each State are presented in the report.

McGRATH, EDWARD J. DISTRIBUTION PATTERNS OF RICE IN THE UNITED STATES. U.S. DEPT. AGR., ECON. RES. SERV., ERS-186, 27 pp., JULY 1964.

Data were collected by mail questionnaires from rice millers and repackagers for rice distributed during August 1960-July 1962, in comparison with a similar study 5 years earlier. The data showed an overall increase in domestic rice distribution of 26 percent or 3.3 million hundredweight during 1957-62.

MICHALSON, E. L. MACHINERY COSTS AND PERFORMANCE DATA FOR WHEAT-PEA FARMS IN THE PALOUSE ANNUAL CROPPING REGION. WASH. AGR. EXPT. STA. CIR. 437, 8 pp., JULY 1964. (ECON. RES. SERV. COOPERATING.)

The report is designed as a quick reference for farm planners, farmers, and researchers. Data include typical performance rates, speed, field efficiencies, man-hours per acre, and operating costs for new farm machinery. Types and sizes of farm machines are those commonly used or being purchased to replace older machinery in the Palouse wheat-pea farming region.

MOORE, ELMER J. RURAL RECREATION ENTERPRISES IN NEW ENGLAND: INVESTMENTS, RETURNS, AND PROBLEMS. U.S. DEPT. AGR., AGR. ECON. RPT. 56, 27 pp., MAY 1964.

A survey of 32 operators in New England showed that average total receipts ranged from \$322 for fish bait sales, boat rentals, and guide service to \$198,000 for summer camps. Average total costs were \$777 and \$173,000, respectively, for the two groups. Corresponding returns to management and family labor amounted to a loss of \$455 for the first group and a gain of \$25,000 for the latter group.

NEWTON, FRANKLIN E., E. W. S. CALKINS, AND ANSELM C. GRIFFIN. FIBER AND SPINNING PROPERTIES OF COTTON AS AFFECTED BY CERTAIN HARVESTING AND GINNING PRACTICES, YAZOO-MISSISSIPPI DELTA, 1959-60. U.S. DEPT. AGR., MKTG. RES. RPT. 656, 27 pp., JUNE 1964.

The study was made on 93 bales of Deltapine 15 cotton grown in the Delta area of Mississippi. All cotton was mechanically harvested except for six bales that were hand-picked. The test results show that the fiber and spinning quality of cotton properly harvested by mechanical pickers (spindle type) is equal to cotton harvested by hand.

REICHARDT, ALAN W., WILLIAM F. LAGRONE, AND LUTHER G. TWEETEN. RESOURCE REQUIREMENTS, COSTS AND EXPECTED RETURNS; ALTERNATIVE CROP AND LIVESTOCK ENTERPRISES: MAJOR BOTTOMLAND SOILS OF EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA. OKLA. AGR. EXPT. STA., PROC. SER. P-476, 44 pp., MAY 1964. (ECON. RES. SERV. COOPERATING.)

This report presents enterprise budgets which can be used by farmers and other decision-makers to plan adjustments in crop and livestock enterprises. Data apply specifically to the bottomland soils of the Arkansas, Red, and Washita Rivers of east central and south central Oklahoma, but may be generalized to other bottomlands that have similar average yields and other coefficients.

ROSS, JOHN E., AND EDWARD H. SHANKLIN. SOME EFFECTS OF GIN DRYING AND CLEANING OF COTTON ON FIBER LENGTH DISTRIBUTION AND YARN QUALITY. U.S. DEPT. AGR., MKTG. RES. RPT. 666, 12 pp., JULY 1964.

Lint cleaning improves grade of cotton but bale values to producers are not necessarily increased if premiums for grade differentials are relatively narrow. Drying did not contribute to grade improvement. Either drying or lint cleaning results in weaker, lower-grade yarns. In addition, net clean cotton costs to mills are generally higher for cotton so handled.

RUSSELL, SARGENT. PRODUCER DELIVERY PATTERNS IN NEW ENGLAND MILK MARKETS. U.S. DEPT. AGR., MKTG. RES. RPT. 672, 111 pp., JULY 1964. (MAINE AND VERMONT AGR. EXPT. STATIONS COOPERATING.)

Describes annual and seasonal milk delivery patterns for 3,547 farms. Analysis of these data indicated that changes described by group averages did not describe the changes for most individual farms. From July 1, 1959, to June 30, 1962, about 25 percent of the farms reversed their direction of change in level of annual average daily delivery of milk and about 70 percent had two or more significantly different seasonal patterns.

SARGENT, ROBERT L., JACK R. DAVIDSON, AND LAWRENCE A. JONES. AVAILABILITY OF RURAL HOUSING CREDIT IN MONTANA. MONT. AGR. EXPT. STA., BUL. 586, 41 pp., JUNE 1964. (ECON. RES. SERV. COOPERATING.)

Residents of Montana's small towns and rural areas do not have as favorable housing credit as people in larger towns and cities. Local banks are the only lending institutions in many rural areas. Most of these banks have small resources. Because farm production and other business loans have higher priority, many banks make relatively few rural home loans.

SCHLEGEL, WOODROW A. SPANISH AGRICULTURE: ITS COMPETITIVE POSITION. U.S. DEPT. AGR., FOREIGN AGR. ECON. RPT. 18, 68 pp., JULY 1964.

Spain is a relatively poor country, both in natural resources and in economic development. It began to strengthen its position in the community of nations in 1951. Today this still highly agricultural country is a member of the OECD, IMF, IBRD, and GATT. Spain's international financial position has been improving since 1959. By the end of January 1964 its gold and foreign exchange reserves amounted to \$1,199 million.

SCHWARZWELLER, HARRY K. FAMILY TIES, MIGRATION, AND TRANSITIONAL ADJUSTMENT OF YOUNG MEN FROM EASTERN KENTUCKY. UNIV. KY. AGR. EXPT. STA., BUL. 691, 39 pp., MAY 1964. (ECON. RES. SERV. COOPERATING.)

This study focused on a population of young men reared in eastern Kentucky, a traditionally familistic, low-income rural area of the Southern Appalachian Region. Ten years after enrollment in the eighth grade, many of these youths had moved away from eastern Kentucky. Comparisons between the migrant and nonmigrant segments demonstrate that the social situation of the migrant is not very favorable for replacing family ties with neighborhood and community ties.

SHAPIRO, HARVEY. FARM PERSONAL PROPERTY TAXES, 1957-62. U.S. DEPT. AGR., ECON. RES. SERV., ERS-176, 21 pp., JUNE 1964.

Taxes levied on farm personal property in 1961 totaled \$270 million, or about 29 percent more than in 1957. Farm real estate taxes also increased 29 percent during the same period. Rising State and local revenue needs and the recent trend toward increasing investment per farm are responsible for the large growth in farm personal property taxes during 1957-61.

SMITH, THOMAS B. OPERATING PROCEDURES AND LABOR UTILIZATION IN COTTONSEED OIL MILLS, 1961-62 SEASON. U.S. DEPT. AGR., ECON. RES. SERV., ERS-179, 27 pp., JULY 1964.

A survey of 118 cottonseed oil mills showed wide variations in labor use per ton of seed crushed. The pattern of labor utilization was frequently quite different in mills with similar operating volumes. The pattern of labor use revealed by the survey may help mill operators to determine whether they are making efficient use of labor.

SPURLOCK, HUGHES H. TRENDS AND DEVELOPMENTS IN JAPAN'S ECONOMY AFFECTING THE MARKET FOR U.S. FARM PRODUCTS, 1950-62. U.S. DEPT. AGR., FOREIGN AGR. ECON. RPT. 16, 79 pp., MAY 1964.

Japan is one of the largest importers of farm products in the world. Some 30 percent of its imports are supplied by U.S. farmers with payment in dollars. Japan considers the United States the most dependable source of supply for agricultural imports and the best export customer for Japanese products. Other nations are attempting to get a larger share of the Japanese trade, thus increasing competition for the United States.

STRICKLER, PAUL E., AND BURTON J. HARRINGTON. LIQUID PETROLEUM FUEL USED BY FARMERS IN 1959--AND RELATED DATA. U.S. DEPT. AGR., STATIS. BUL. 344, 20 pp., MAY 1964.

The amount of liquid petroleum fuel purchased per farm in 1959 was larger than ever before, but the total quantity purchased declined, mainly because of the decrease in number of farms and in crop acreage. Farmers spent over \$1.5 billion for fuel and oil used in their business in 1959, or about 6 percent of total production expenses.

UMSTOTT, HAVEN D. PUBLIC LAW 480 AND OTHER ECONOMIC ASSISTANCE TO UNITED ARAB REPUBLIC (EGYPT). U.S. DEPT. AGR., ECON. RES. SERV., ERS-FOREIGN-83, 33 pp., JUNE 1964.

Surplus agricultural products have been sent to the United Arab Republic in substantial amounts since 1955. Public Law 480 represented about three-fourths of the total U.S. economic aid to the UAR from July 1945 through June 30, 1962. Under Title I of this law wheat and flour, feed grains, rice, tobacco, dairy products, fats and oils, poultry, and other agricultural commodities have been made available to the Egyptian Government for local currency. The UAR is the largest Title I signatory country in Africa and the third largest in the world.

VERMEER, JAMES, ERLING HOLE, AND BOYD A. CHUGG. COSTS OF FARM MACHINERY IN CROP PRODUCTION IN NORTHWESTERN OHIO, BY SIZE OF FARM. U.S. DEPT. AGR., ECON. RES. SERV., ERS-175, 23 pp., AUGUST 1964.

Total machinery costs per acre of use averaged about a third lower on large farms than on small farms, and a fifth lower than on medium-sized farms. This study by USDA sampled three sizes of farms--60 to 100 acres, 140 to 180 acres, and 260 to 380 acres--obtaining major part of income from sale of corn, soybeans, and small grains. Costs included expenses of tractors and implements and charges for driver labor for each of 182 farms.

WILLIAMS, DORWIN, LAWRENCE A. JONES, AND FRANK MILLER. FINANCING RURAL HOMES IN MISSOURI. MO. AGR. EXPT. STA., UNIV. MO., RES. BUL. 857, 47 pp., APRIL 1964. (ECON. RES. SERV. COOPERATING.)

In two survey areas of Missouri, the availability of credit was considered "moderate" or "ample" for qualified applicants who wanted to buy homes in the small towns and were satisfied with 50 to 60 percent loans to be repaid in about 5 years. Both insured and conventional credit was scarce for those who needed long-term, high-percentage loans or who wanted to buy a nonfarm home outside of town.

WUNDERLICH, GENE. LAND REFORM IN WESTERN INDIA: ANALYSIS OF ECONOMIC IMPACTS OF TENANCY LEGISLATION, 1948-63, U.S. DEPT. AGR., ECON. RES. SERV., ERS-FOREIGN-82, 46 pp., JUNE 1964.

Economic effects of the changes in tenancy legislation over 15 years in the former Bombay region are evaluated. The law and administration of land reform especially surrounding Tellers Day (April 1, 1957) are described. The effects on income distribution, investment capacities of landlords and tenants, capital formation in the community, and expectations and incentives are analyzed, along with advantages and disadvantages of slower or faster pacing of land reform.

U.S. DEPARTMENT OF AGRICULTURE. AUSTRIA: PROJECTED LEVEL OF SUPPLY, DEMAND, AND TRADE OF AGRICULTURAL PRODUCTS IN 1965 AND 1975. ECON. RES. SERV., ERS-FOREIGN-62, 322 pp., MAY 1964.

Submitted to the Department of Agriculture by the Austrian Institute for Economic Research, Vienna, this study analyzes past trends and projects Austria's agricultural production, consumption, and trade for 1965 and 1975. The study also includes a section on the methodology used to make the projections.

U.S. DEPARTMENT OF AGRICULTURE. FARM COSTS AND RETURNS BY TYPE, SIZE, AND LOCATION. AGR. INF. BUL. 230, 93 pp., REVISED JUNE 1964.

This annual report contains summary estimates of costs and returns for 1963 and earlier years on 40 important types of commercial farms in 23 major farming areas in the United States, together with a brief analysis of changes that have occurred in production, prices, income, and costs for each of these types of farms.

U.S. DEPARTMENT OF AGRICULTURE. CHANGES IN FARM PRODUCTION AND EFFICIENCY: A SUMMARY REPORT, 1964. STATIS. BUL. 233, 50 pp., REVISED JULY 1964.

This is an annual publication designed specifically to present major statistical series on farm production, production inputs, and efficiency. It provides in one place the latest information for each of the several series that have been developed to appraise such things as changes in production, changes in farm inputs and practices, improvement in labor productivity, and progress of farm mechanization.

U.S. DEPARTMENT OF AGRICULTURE. FOOD SUPPLIES AVAILABLE BY COUNTIES IN CASE OF A NATIONAL EMERGENCY. AGR. ECON. RPT. 57, 210 pp., JULY 1964. (U.S. OFFICE OF CIVIL DEFENSE COOPERATING.)

Tables in the report are designed to provide rough approximations of the probable food availability within counties and States in the event the areas are cut off for a period of time from outside food sources. No special assumptions are made regarding risk of damage to persons or communities.

U.S. DEPARTMENT OF AGRICULTURE. HOME-MAKERS' ESTIMATES OF HOW LONG FOOD ON HAND COULD BE MADE TO LAST: A CIVIL DEFENSE STUDY. STATIS. RPTG. SERV., MKTG. RES. RPT. 669, 57 pp., JULY 1964.

Based on the estimates of homemakers interviewed in June 1962, if an emergency should cut off outside food supplies, large numbers of American households would be unable to exist on food stocks on hand for more than a few days. Nearly a third of the homemakers who participated in the survey thought that they would run out of the food then in their homes in about a week or less. Another third reported that their food supplies might last from 1 to 2 weeks. The remaining respondents estimated that their supplies would last more than 2 weeks.

Statistical Compilations

Crop Reporting Board, U.S. Statis. Rptg. Serv. AGRICULTURAL PRICES: 1963 ANNUAL SUMMARY. Pr 1-3 (64), 182 pp., June 1964.

Crop Reporting Board, U.S. Statis. Rptg. Serv. PRODUCTION OF MANUFACTURED DAIRY PRODUCTS, 1963. Da 2-1 (64), 63 pp., July 1964.

DeWolfe, Mildred R. HAY IN THE UNITED STATES: QUANTITIES GROWN IN A NORMAL YEAR, SURPLUS AND DEFICIT AREAS. U.S. Dept. Agr., Statis. Bul. 349, 98 pp., August 1964.

Ibach, D. B., J. R. Adams, and Esther I. Fox. COMMERCIAL FERTILIZER USED ON CROPS AND PASTURE IN THE UNITED STATES--1959 ESTIMATES. U.S. Dept. Agr., Statis. Bul. 348, 200 pp., July 1964.

U.S. Department of Agriculture. SUPPLEMENT FOR 1963 TO LIVESTOCK AND MEAT STATISTICS 1962. Agr. Mktg. Serv., Statis. Rptg. Serv., Econ. Res. Serv., Statis. Bul. 333 Suppl., 161 pp., August 1964.

U.S. Department of Agriculture. SUPPLEMENT TO STATISTICS ON THE EUROPEAN ECONOMIC COMMUNITY: VOLUME 1, AGRICULTURAL TRADE AND FINANCE (ERS-Foreign-43). Econ. Res. Serv., 77 pp., May 1964.

THE WORLD FOOD BUDGET, 1970

Every 5 years a study of the world food budget is conducted by the Foreign Regional Analysis Division, Economic Research Service. A report on the most recent study will shortly be available from USDA. Here are some highlights from the new study:

Although two-thirds of the world's people live in countries that are now diet-deficient, calorie levels for this group of people are expected to rise 8 percent by 1970. Consumption of proteins in the diet-deficit areas will rise 10 percent, and consumption of fats will be 16 percent higher.

Most of the deficit in food is accounted for by countries in the Far East and nearly two-thirds by communist Asia. The diet-deficit area of the world includes all of Asia except Japan and Israel, all but the southern tip of Africa, the northern part of South America, and almost all of Central America and the Caribbean.

The total cost of filling the world food deficit in 1970 would be \$6.8 billion. It would take 54 million metric tons of grain to satisfy the calorie deficit, and 6.5 million tons of nonfat dry milk and 3.2 million tons of soygrits to fulfill the protein deficits.

The most troublesome factors behind the deficits are denseness of population, low per capita incomes, and a population gain largely offsetting rises in income.

Production of food in the deficit area is lagging. Diet-deficit countries cannot produce enough food for themselves, nor enough other goods to trade for the food they need. Although in 35 years the net grain trade position of these nations reversed from 2.8 million metric tons exported to an expected 27 million tons imported, their food imports are still too meager.

In the diet-adequate area, however, a vast store of knowledge about food production has been accumulated. This knowledge can be adapted to the specific conditions and needs of the developing countries.

With expanding population, economic development, and improved diets worldwide over the 1960's, U. S. food exports are expected to increase 60 percent to \$4.8 billion by 1970 (and total agricultural exports to \$6.8 billion). More and more of the exports will go to the deficit countries, playing an important role in upgrading the diets of their populations.

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