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# MINNESOTA AGRICULTURAL ECONOMIST

NO. 632 OCTOBER-NOVEMBER 1981

## Agriculture: Essential to Minnesota's Economy

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### IN THIS ISSUE

Most Minnesotans acknowledge the importance of agriculture to the state's economy. But standard measures of industrial performance, employment, and income, do not demonstrate this presumed prominence. This article presents a more intensive analysis of the role of farming in Minnesota, revealing that the state's agriculture is not only significant, but that its economic health ultimately affects the well-being of all Minnesotans.

### Agriculture as a Basic Industry

Agriculture's role in Minnesota is measured by its sales and purchases, the work force it supports, and its contribution to the state's economic base. Most Minnesotans acknowledge agriculture's importance. Traditional statistical profiles, however, fail to accurately portray this importance when concentrating only on the size of agriculture's work force, net income, and total sales.

Statistical findings show the contribution of agriculture to Minnesota's economic base—the export-producing sector essential to the Minnesota economy. The export-producing industries bring the first dollars into the state to circulate from one economic activity to the next and eventually to pay to bring in other products essential to economic survival but not produced in Minnesota.

In some years, agriculture accounts for as much as 40 percent of total Minnesota exports to other states and countries. It also serves as a market for many input-supplying industries and a principal source of raw materials for the even larger (in total sales dollars) food products manufacturing industry. And it serves as a buffer industry between the United States and the Minnesota economy. When it fails to do that, the Minnesota economy is sharply and sometimes adversely affected by the general business cycle, as in 1980.

When much depends on sustaining the favorable competitive position of Minnesota industry, the role of agriculture as a highly productive basic industry becomes even more important. Agriculture's importance is examined here in the context of both the traditional statistical measures cited earlier and as a basic industry in the state.

### Industry output and income payments

In 1977, the agriculture industry gross output in Minnesota exceeded \$4 billion (in 1972 dollars): an annual growth rate of 5.1 percent, from \$3.2 billion in 1972.

Largest annual rates of output increase were estimated for agriculture, finance, insurance, real estate, and services. For mining and construction, the estimated changes were negative (in constant dollars).

Income payments to agricultural resource owners for primary inputs used in Minnesota increased from \$1.2 billion in 1972 to \$1.6 billion in 1977 (in 1972 dollars): an annual growth rate of 5.9 percent.

Largest annual rates of increase in the value added by primary inputs were estimated for agriculture, finance, insurance, and real estate, and the smallest for mining and construction. The relative changes in the value added,

varied more than the relative changes in gross output for 1972-77.

### Employment and earnings

Economic importance of agriculture-related industry is also represented by employment and earnings. Employment in agriculture increased less rapidly than the industry average while earnings in agriculture increased more rapidly as shown in table 1. In 1977-79 agricultural employment actually declined. However, wide differences occurred among individual industries. Mining and food products manufacturing employment, for example, declined during 1972-77, while trade and service employed increased faster than the industry average.

Employed work force earnings are shown in both current and constant 1972 dollars to separate real increases from the large inflationary impact (of 7.3 percent per year) on total earnings. The increase in real earnings was only 3.2 percent per year (compared with 10.5 percent in current dollars). The percentage increase in agricultural earnings was the largest of the 13 industry groups—nearly twice the industry average.

Unlike total earnings, constant dollar earnings per position declined in four of the 13 industry groups during the five years from 1972 to 1977. Losses in real earnings were estimated for trade and state government employment. The largest gains were estimated for employment in mining and agriculture. Indeed, for the trade and service industry groups, the sharp increases in total jobs were accompanied by losses in dollar earnings per job.

### Industry purchases and sales

Industry purchases and sales in Minnesota totaled \$45.4 billion (in 1972 dollars) in 1977. The agriculture industries accounted for \$4.2 billion and the

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**Table 1. Estimated employment and earnings (in 1972 dollars) of employed civilian work force in specified industry, Minnesota, 1972 and 1977**

Industry	Employment			Earnings		
	1972	1977	Annual change 1972-77	1972	1977	Annual change 1972-77
	(thou.)	(thou.)	(pct.)	(mil. \$)	(mil. \$)	(pct.)
Agriculture	153.3	156.1	0.4	989.0	1,285.7	5.4
Agr. serv., for., fish.	4.6	6.9	8.4	37.4	50.4	6.1
Mining	13.0	12.8	-0.3	163.2	183.7	2.4
Construction	77.9	81.4	0.9	906.9	977.0	1.5
Food products mfg.	53.4	50.7	-1.0	519.0	530.7	0.4
Other manufacturing	261.9	293.1	2.3	2,733.6	3,259.1	3.6
Trans., comm., util.	90.6	97.4	1.5	1,060.5	1,232.4	3.1
Wholesale trade	93.5	120.7	5.2	963.7	1,267.8	5.6
Retail trade	214.2	229.3	1.4	1,292.7	1,316.6	0.4
Fin., ins., real est.	74.2	88.7	3.6	721.7	884.9	4.2
Services	372.6	486.7	5.5	2,095.8	2,698.7	5.2
Total, private	1,409.3	1,624.2	2.9	11,483.5	13,685.9	3.6
Fed., civilian	29.2	29.6	0.3	335.5	349.7	0.8
State and local	228.9	252.9	2.0	1,736.4	1,865.6	1.4
Total, civilian	1,667.4	1,906.7	2.7	13,555.4	15,902.2	3.2

Source: U.S. Department of Commerce, Regional Economic Information System, Unpublished Data, 1980.

food products manufacturing industries for \$5.6 billion in purchases. Together, the two accounted for \$9.8 billion, or 21.5 percent, of total in-state purchases of the Minnesota private business sector. The proportion of net exports of all industry originating from the agriculture and food products manufacturing industry groups was even higher—\$3.3 billion (in 1972 dollars), or 41.4 percent of the total.

Total purchases of the Minnesota agriculture industry group in each of the three sectors—intermediate, primary, and import—are summarized as follows:

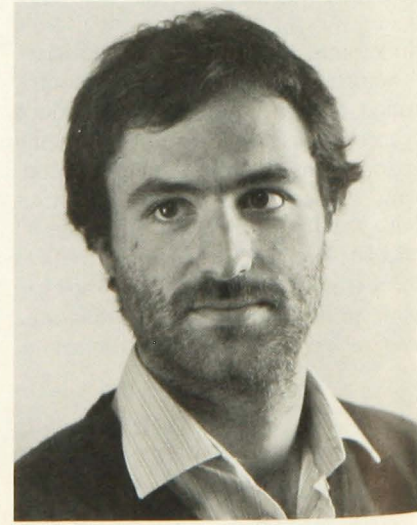
Input sector	Total purchases				
	All industry	Food prod. mfg.	Food prod. as prop. all ind.	Per \$1,000 product output	Per food product worker
	(mil. \$)	(mil. \$)	(%)	(\$)	(\$)
Intermediate	18,528	4,081	22.0	731	80,478
Primary	22,460	1,036	4.6	185	20,427
Import	4,460	469	10.5	84	9,256
All sectors	45,448	5,586	12.3	1,000	110,161



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The summary data show that total purchases of the agriculture industry group from the three input sectors ranged from 7.3 percent to 11.2 percent of all industry purchases in 1977. Intermediate input purchases were the largest, not only as a proportion of all industry intermediate purchases, but, per \$1,000 of agricultural industry output and per agricultural industry worker.

Major in-state agricultural input suppliers are the agricultural industries themselves, the food products manufacturing industries, transportation industries, and trade and service industries. So, the agricultural industries make large purchases from a wide variety of Minnesota industries.

Output disbursements of the agricultural industry group vary greatly depending on the location and nature of the agricultural processing. The dominance of in-state agricultural processing activities is shown in the first table to the right.

So, total intermediate product sales were \$3.3 billion in 1977, or 17.8 percent of all industry intermediate product sales. Total intermediate product sales (to industries in Minnesota) and intermediate product purchases (from industries in Minnesota) were nearly \$5.4 billion (in 1972 dollars).

The food products manufacturing industries accounted for twice the intermediate purchases of the agricultural industry group and three times these exports in 1977. Intermediate purchases totaled \$4.1 billion, or \$792 million more than the intermediate sales of the agricultural industry group. Total employment in this industry was only 50,713, or 3.1 percent of the state total of 1,926,251.

Distribution of food products manufacturing industry purchases from the three input-supply sectors in 1977 is shown in the middle table to the right.

Intermediate input purchases from industries in Minnesota were the largest, followed by intermediate input purchases (imports) from industries in rest-of-nation. Many of these purchases originated from the agricultural industry group in Minnesota and in rest-of-nation.

Output disbursements of the food products manufacturing industry group differed sharply from the agricultural

Demand sector	Total disbursements				
	All industry	Agriculture	Agr. as prop. all industry	Per \$1,000 agr. output	Per agr. worker
	(mil. \$)	(mil. \$)	(%)	(\$)	(\$)
Intermediate	18,528	3,289	17.8	782	20,180
Local final	19,017	298	1.6	71	1,824
Export	7,903	620	7.8	147	3,803
All sectors	45,448	4,207	8.9	1,000	25,807

Input sector	Total purchases				
	All industry	Agriculture	Agr. as prop. all industry	Per \$1,000 agr. output	Per agr. worker
	(mil. \$)	(mil. \$)	(%)	(\$)	(\$)
Intermediate	18,528	2,085	11.2	496	12,792
Primary	22,460	1,649	7.3	392	10,117
Import	4,460	472	10.6	112	2,898
All sectors	45,448	4,206	8.9	1,000	25,807

Demand sector	Total disbursements				
	All industry	Food prod.	Food prod. as prop. all ind.	Per \$1,000 food prod. output	Per food product worker
	(mil. \$)	(mil. \$)	(%)	(\$)	(\$)
Intermediate	18,528	1,663	9.0	298	32,798
Local final	19,017	1,272	6.7	227	25,073
Export	7,903	2,652	33.6	475	52,290
All sectors	45,448	5,587	12.3	1,000	110,161

output disbursements. Exports accounted for 47.5 percent of the total value of food products manufacturing output, which was equivalent to 33.6 percent of all industry exports, as shown above.

Each food products manufacturing job produced, on the average, \$52,290 of exports of rest-of-nation demand sectors. Also, about 30 percent of the total output was disbursed to other industries and 25 percent, to local final markets, largely households.

## Interregional trade

Interregional trade is represented by the imports from, and exports to, rest-of-nation and world supply and demand sectors. The livestock and crop agricultural industry group in Minnesota was a net exporter in 1977. Industry outshipments to rest-of-nation and abroad were larger than inshipments of gross output from rest-of-nation industries to the

crop and livestock agricultural group in Minnesota. Inshipments of livestock and crop agricultural industry outputs from rest-of-nation also were less than corresponding Minnesota industry outshipments.

Food and feed grain outshipments totaled 4.6 percent of Minnesota industry exports in 1977. Wheat and corn were the principal export commodities. Oil-bearing crops, largely soybeans, were the next largest category of industry exports. These were followed by exports of sugar beets (to plants in North Dakota and Iowa) and miscellaneous livestock products, such as wool and honey. Dairy farm exports were largely raw milk shipments to dairy processing plants in adjoining states.

Deficit supplies of agricultural industry outputs were estimated in 11 of 19 individual commodity groups in agriculture. For these industries, total requirements exceeded total supplies in varying proportions. Inshipments of meat animals, although less than 20

percent of total meat packing industry requirements, accounted for 63 percent of the imports of agricultural products from rest-of-nation. Other crops, including grass seed, tobacco, fruits, tree nuts, and vegetables were the next largest category of imports, accounting for 24 percent of agricultural imports from rest-of-nation. Forest and fisheries products and agricultural, forest and fisheries services were third in total import value.

Agricultural exports to rest-of-nation industries and markets are small compared with the imports of intermediate inputs from agricultural industries. Largest among the export markets are rest-of-nation livestock farms. Rest-of-nation dairy and poultry farms also are important domestic markets for Minnesota agriculture. In comparison, rest-of-nation food products manufacturing industries are less important markets.

Imports of agricultural industry inputs originate from a variety of rest-of-nation industries. Rest-of-nation food products manufacturing industries are important input sources of dairy and livestock farms. Rest-of-nation energy and transportation related industries also are important input sources, along with rest-of-nation marketing-related industries.

In 1977 the total trade volume for the food products manufacturing industries was more than \$4.5 billion, of which \$2.7 billion was due to exports of the excess supply of manufactured food products. This is a large part of the total interregional trade between Minnesota and rest-of-nation industries and economic sectors. Manufactured products exports were 33.6 percent of all exports to rest-of-nation purchasing.

Meat and dairy products accounted for 75 percent of all Minnesota food products exports. Among the nine industries in this group, a deficit supply was estimated for one industry—Sausages and Other Prepared Meats. Yet, the total imports of intermediate inputs from rest-of-nation industries for the meat and dairy products industries were only 6.2 percent of all imports. So, the meat and dairy products industries were an important trading asset to Minnesota because of the large positive export trade balances.

Grain products and oil products manufacturing industries also were important in Minnesota's interregional trade. Total exports of the individual industries in this industry group were 5.7 percent of all industry exports while total imports from these industries in rest-of-nation were 1.3 percent of all imports from rest-of-nation industries.

Agriculture-related exports originate from farm and factories in three-fourths of Minnesota's 87 counties. If the farm and food product exports were eliminated, total industry employment and income would be reduced 25-30 percent, depending on the indices used and the particular stage in the export-trade cycle. So, agriculture, because of its importance as a basic industry, supports a much larger proportion of the Minnesota economy than represented by its 8.5 percent of total Minnesota employment

### Minnesota Industry in the 1980s and 1990s

Minnesota industry is projected to expand in almost every sector, according to the most recent (1980 prepared) United States Department of Commerce forecasts. However, the overall economic forecasts of employment, population, and total earnings show declining rates of increase for both Minnesota and the United States. During 1969-78, for example, total industry jobs increased annually at 2.5 percent in Minnesota and 1.9 percent in the United States. The forecast series shows annual increases of 1.8 percent and 1.6 percent, respectively, for 1978-90.

Both the Minnesota and the United States forecast series assume an ex-

**Table 2. Projected earnings and employment trends in specified industry, Minnesota, 1978-1990<sup>1</sup>**

Industry No. Title	Total Earnings			Total Employment		
	Estimated 1978	Projected 1990	Annual change 1978- 1990	Estimated 1978	Projected 1990	Annual change 1978- 1990
	(mil. \$)	(mil. \$)	(pct.)	(thou.)	(thou.)	(pct.)
1. Agriculture	1,209	1,611	2.7	126	121	-0.3
2. Agr. serv., for., fish.	55	86	3.8	10	13	3.2
3. Mining	261	356	2.6	17	17	0.0
4. Construction	1,114	1,803	4.1	104	134	2.1
5. Mfg., nondur. goods	1,600	2,375	3.4	147	166	1.0
6. Mfg., dur. goods	2,479	4,376	4.8	220	294	2.4
7. Trans., comm., util.	1,319	2,083	3.9	99	116	1.3
8. Wholesale trade	1,346	2,109	3.8	117	145	1.8
9. Retail trade	1,749	2,638	3.5	342	416	1.6
10. Fin., ins., real est.	952	1,651	4.7	95	132	2.8
11. Services	2,560	4,781	5.3	408	550	2.5
12. Fed., civilian	369	517	3.3	30	32	0.5
13. Fed., military	46	60	2.2	19	19	0.0
14. State and local	1,904	2,777	3.2	255	294	1.2
<b>Total</b>	<b>16,934</b>	<b>27,244</b>	<b>4.0</b>	<b>1,989</b>	<b>2,452</b>	<b>1.8</b>

<sup>1</sup>Source: U.S. Department of Commerce, Regional Economic Analysis Division, Regional and State Projections of Income, Employment and Population to the Year 2000, *Survey of Current Business*, 60(1): 44-70, 1980.



panding national and world economy and increasing labor productivity and personal income. Indeed, an increasing share of the annual increase in personal income is attributed to increasing labor productivity. By 1990, more than half of the total population would be employed. In 1978, total jobs numbered slightly less than half of the total population (49.6 percent in Minnesota and 46.4 percent in the United States).

The industry forecasts again show above-average overall growth for the Minnesota economy in 1978-90; for example, Minnesota growth rates would exceed corresponding United States growth rates by at least 10 percent for individual industry groups as follows:

Earnings	Employment
Farm	Farm
Mfg., nondurables	Agr. serv., for., fish.
Mfg., durable goods	Construction
Fed., civilian	Mfg., nondurables
	Mfg., durable goods
	Services

Three industry groups—durable goods manufacturing, retail trade, and services—are identified as the leading growth industries in the Minnesota economy. These industries account for over 62 percent of the forecast 1978-90 employment increase of 463,000.

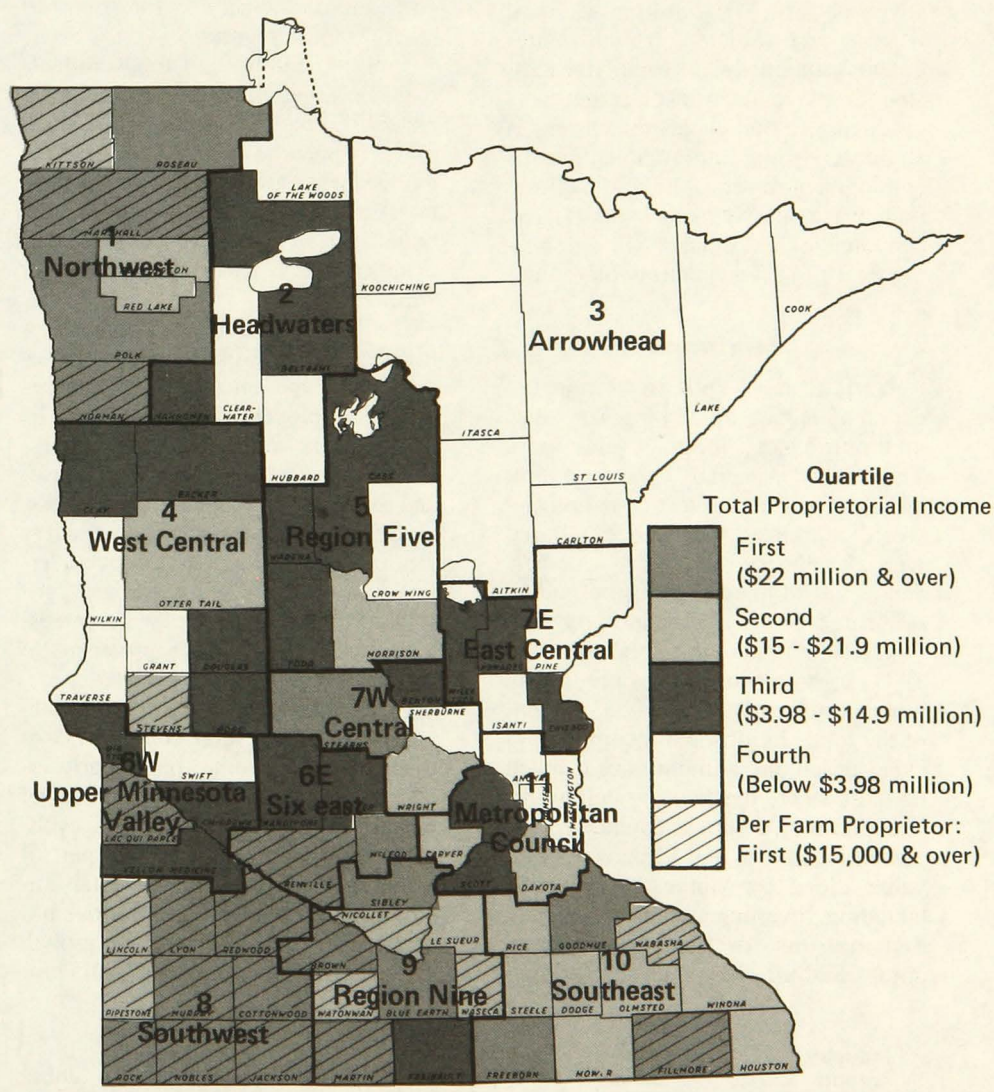
The Minnesota industry projections for individual years are not only mid-points of moving averages of earnings and employment, but they also are weighted heavily by the above-average nonagricultural industry growth in the 1970s, especially in the three-years 1977-79. For this reason, the projected 1980 earnings are well above the reported values. The reported 1979 earnings (that is, wages and salaries, other labor income, and owner income) total was \$105 million above the projected total (in 1979, 1980 dollars). The 1980 reported total was nearly \$1.5 billion below the projected total with the increase being slightly more than half of the projected increase. Total earnings are likely to fall even further below projected levels in 1981.

To make up for the recession-related deficits, above-average earnings would be required in the post 1981 years of general economic recovery. If industry in Minnesota is unable to achieve as high or even higher levels of economic activity in the 1980s than achieved in the 1970s, then the 1990 projections

would not be realized. Currently lagging growth in total earnings would continue through the 1980s. But, if the Minnesota economy sprints ahead, as implied by these projections, then the 1980s would become the most prosperous in Minnesota history. More likely there will be a delay in achieving the projected high levels of earnings and employment presented earlier.

County ranking of farm ownership income levels, as presented in figure 1, provides a measure of the farm income component in total personal income. Farm ownership income is net farm income, that is, cash receipts from marketings, less production expendi-

tures, plus inventory adjustments and imputed interest and rent. The inventory adjustments may result in large changes in the derived net income figure, while imputed interest and rent typically result in a larger derived income than indicated by cash receipts less expenditures. The first quartile ranking of farm ownership income per farm owner is presented, also, to identify the state's principal areas of high farm productivity. Personal income per farm owner household is larger than land ownership income because of other income receipts, including earnings in nonfarm positions.



**Figure 1. County ranking in total farm proprietorial income and farm proprietorial income per farm proprietor in Minnesota, 1979.**  
**Source:** U.S. Department of Commerce, Regional Economic Measurement Division, Regional Economic Information System, 1981.



The geographic distribution of farm and nonfarm earnings correlates with still another important dimension of the shift to services—the turn-around in population growth and services-producing employment in many Minnesota counties. Much of the net population growth—85 percent in 1970-75, and 77 percent in 1975-79—has occurred in the more rapidly growing counties within 100 miles of downtown Minneapolis-St. Paul, except for Hennepin and Ramsey counties. Selected northern Minnesota counties also share in the population turn-around.

Changes in county rankings in non-farm employment only partly follow population change. Employment growth is most concentrated in the seven-county Metropolitan Council Region and selected growth center counties statewide. Much of the out-state employment growth is services-producing, although manufacturing is an increasingly important source of employment in rural Minnesota. Basic nonfarm employment growth is concentrated in the extended Minneapolis-St. Paul-St. Cloud metropolitan area.

## Summary

Agriculture's role in Minnesota economy is measured in industry sales and purchases, income, and jobs. These sales, especially exports of farm and food products to rest-of-nation and world markets, are large compared with all industry sales. Forty-one percent of all Minnesota industry exports originated in the agriculture and food products manufacturing industries in 1977. In-state purchases of production inputs were nearly as large—33 percent of the total. In jobs and income, however, agriculture's importance is much less. In 1977, the two agriculture-related industry groups accounted for 11 percent of all jobs and 12 percent of all value added by Minnesota industry, including government. The percentage distributions for the two industry groups and all other industry follow:

Simple numerical comparisons among the industry groups for 1972-77 show percentage increases in the sales, purchases and value added as follows:

Industry group	Total sales	Export sales	In-state purchases	Value added
	percent			
Agriculture	18.3	18.8	26.3	15.9
Food products	24.1	24.7	28.2	33.2
All other	15.7	1.2	18.0	18.5

Of the three industry groups, the largest increases were estimated in food products manufacturing, particularly in export sales and value added. Total sales are included for comparison with export sales, which dropped sharply in constant dollar value, for the "all other" industry group.

Both agriculture and food products manufacturing in Minnesota are projected to increase total sales and earnings, but not total employment. In these two industry groups, the increases in total sales lag behind the increase in output per worker. The latter also accounts for increases in real earnings per worker.

Unlike the agriculture-related industries, the services-producing industries generally experienced large increases in total employment in the 1970s. The largest employment increases were reported in the trade, finance, insurance, and real estate, and personal, business, and professional service industry groups. Except for trade, above-average employment increases are projected for these industries in the 1980s. Total earnings also are projected to increase at above-average rates.

State and local government revenues track the several components of total personal income, particularly total earnings, and various indicators of business activity. Because of the cyclical sensitivity of an important part of Minnesota's basic industry, total employment in the affected industries has declined, sharply reducing the growth in total earnings compared with pro-

jections. Coincidentally, low farm income levels further reduced growth in total personal income. The adverse ripple effects of reduced employment and income levels in the basic industries have been felt in the services-producing industries in lagging growth in sales and earnings. So, the earlier revenue growth rates could not be sustained during the 1980 and 1981 recessions. However, a cyclical upturn in basic industries would be followed by sharp increases in total earnings and income, including government revenues.

Industry group	Export sales	In-state purchases	Value added	Jobs
	percent			
Agriculture	7.8	11.2	7.3	8.5
Food products	33.6	22.0	4.6	2.6
All other	58.6	66.8	88.0	88.9





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**NO. 632 OCTOBER-NOVEMBER 1981**