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Farming Illustrates Linkages in U.S. and World Economies

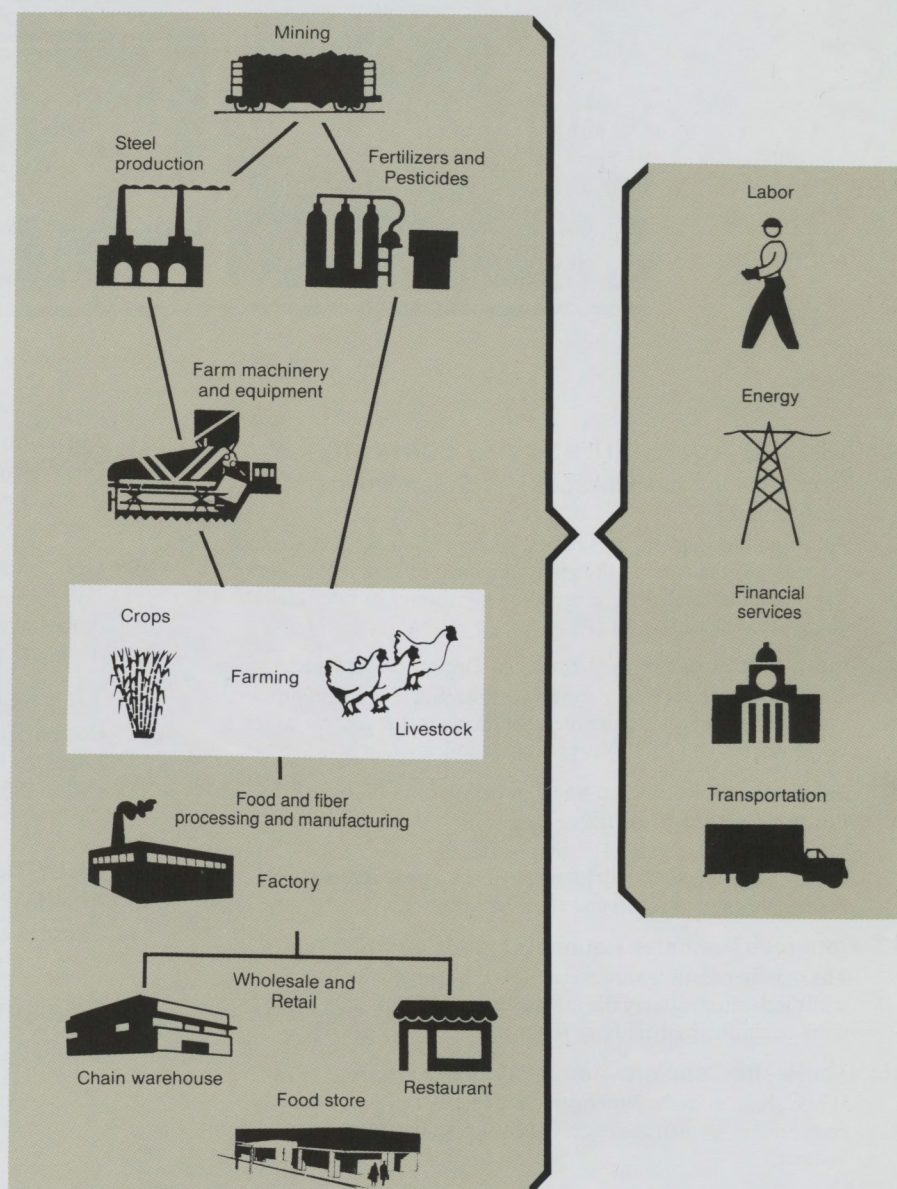
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No part of the U.S. economy stands alone. The interrelationships are many and complex. Agriculture is an important example of how events in the U.S. and world economies—from recessions at home and abroad to oil crises—can affect a single sector. Furthermore, everything from the weather to Federal policy can mean changes in agriculture that affect industries that rely on the sector.

While farming employs only about 3 percent of the workforce and accounts for 1.4 percent of gross national product (GNP), it remains important to the economy because of its links to a variety of industries. Farmers buy agricultural inputs, such as equipment, supplies, feed, seed, and fertilizer, and must pay for labor and financing. Economic activity by those who supply farmers and marketers with inputs totals another 5.2 percent of GNP. Farmers, in turn, sell their products to those who store, process, manufacture, export, distribute, or retail. These industries account for yet another 9.2 percent of GNP.

Farming has always been tied to the larger economy. However, increased use of machinery, chemicals, and other expensive technology and greater reliance on export markets have strengthened agriculture's economic linkages. As a result, economic forces outside of agriculture influence production costs and prices received as much as changes in weather (*figure 1*).

Figure 1. Examples of Linkages of the Food and Fiber System



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Farming and the General Economy

The changes in farming over the last 60 years mean farmers purchase most of their inputs. Since 1930, fertilizer application has increased thirteenfold, tractor numbers have risen fivefold, and tractor horsepower has expanded twelvefold. In 1988, fertilizer, pesticides, and energy accounted for 15 percent of all farm production expenses, or \$18.2 billion. As more funds are spent on purchased inputs, the amount of borrowed capital increases.

Increased debt exposes farmers to greater financial risks generated by financial markets adjusting to general economic conditions. Short-term and real estate interest now account for approximately 13 percent of farm production expenses, up from 5 percent in 1960.

Extensive use of purchased inputs also increases agriculture's vulnerability to rising costs and interruptions in supplies. Prime examples include the oil price increases of 1974, 1979, and 1990 and the runup in interest rates in the early 1980's.

Since agriculture is linked to a wide variety of industries, its practices and policies affect the general economy. For example, high farm prices can mean increased net farm incomes. In turn, farmers spend additional income either on consumer goods or capital equipment. This spending multiplies through the entire economy to bring about higher levels of production, income, and employment in other sectors.

Trade Links U.S. Agriculture and World Economies

The world economy, including agriculture, has become much more interdependent in the last several decades. The United States is the world's largest exporter of agricultural products, with 1 out of every 3 acres farmed for export. U.S. agricultural exports consist mostly of crops and their products. Feed grains accounted for about 33 percent of exports in 1986-88, compared with 5 percent in 1926-30. Booming exports of feed grains and oilseeds mean higher

prices for crop farmers at the expense of livestock producers. As specialization in livestock production has increased, however, U.S. livestock producers, in competition with their counterparts around the world, must pay higher prices for feed.

U.S. exports of high-value agricultural products, such as manufactured foods, have grown from 39 percent of U.S. farm trade in 1926-30 to about 51 percent in 1986-88. Trade in high-value products involves the food processing industry, while exports of grains and other raw products use only transportation and handling services.

USDA's Economic Research Service analysts estimate that each dollar earned from agricultural exports stimulates another \$1.52 of output in the U.S. economy. Thus, the \$40 billion of export sales in 1989 generated an estimated additional \$61 billion in supporting activities required to produce and transport products for export (figure 2). Approximately 85 percent of this additional eco-

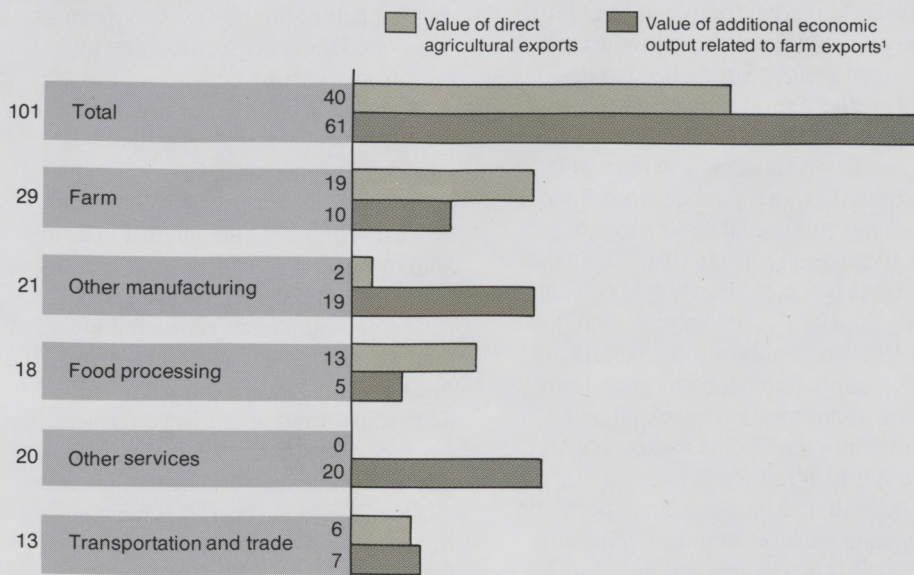
nomie activity is earned by the nonfarm sector. The food processing sector earned \$4.8 billion from exports. Other manufacturers, including petroleum refiners and tobacco and fertilizer firms, collected \$18.8 billion. The value of additional trade and transportation totaled \$7.4 billion and other services, such as utilities, amounted to \$19.3 billion.

In terms of employment, U.S. agricultural exports generated 1.06 million full-time civilian jobs in 1989. Of these, around 426,000 farm workers—13 percent of the farm labor force—were producing for export.

U.S. consumers spent more than \$6.5 billion on commodities that cannot be produced profitably in the United States. These imports, which are noncompetitive, include coffee, cocoa, and bananas. While spending for noncompetitive imports has remained fairly constant for the last 12 years, spending for competitive imports has more than doubled to \$15.6 billion in 1989. Competitive imports

Figure 2. Farm Exports Stimulate Added Economic Activity

Billion dollars, 1989



¹Additional economic output includes the business activity needed to produce the supporting goods and services for export.

Source: Compiled from ERS data.

compete directly with U.S. products, including meat, dairy products, fruits, nuts, vegetables, sugar, and wine.

Importing competitive commodities reduces income and employment in U.S. agriculture and its connected industries. The estimated loss to the U.S. economy of the \$15.6 billion worth of competitive imports in 1989 is around \$40.4 billion. However, this ignores the value of trade to consumers, the economic activities associated with importing, and the foreign exchange which provides nations with funds to buy U.S. products. *(For more information on the value of trading see "U.S. Trade in Competitive World Markets" in this issue.)*

Farm Crisis Illustrates Linkages

The 1970's and 1980's saw boom and bust times in American agriculture. The factors underlying these rapid changes over the two decades clearly illustrate many of the interrelationships between agriculture and the domestic and international economies.

Increased foreign consumption in the 1970's stimulated unprecedented growth in the world market for agricultural imports, particularly for those produced in the United States. Strong foreign demand pushed export volume and commodity prices to all-time highs early in that decade. Annual growth rates in U.S. agricultural exports jumped from 4 percent in the 1950's and 1960's to more than 10 percent in the 1970's. The value of exports increased nearly 500 percent during the 1970's, and volume more than doubled. Boosted by strong exports in 1973, real net farm income (gross farm income minus total expenses, adjusted for inflation) reached its highest level since World War II.

The optimistic outlook for exports and rising land values encouraged vigorous investments by farmers and investors in the late 1970's. Many farmers purchased acreage to expand their operations and

nonfarmers saw farmland investments as a hedge against inflation. While the demand for land was increasing, more farmers held on to their investments, diminishing the supply of land for sale. As a result, land prices rose much faster than the inflation rate.

Many farmers who financed land and machinery investments found they could rely on further borrowing against rapidly rising equity values to meet cash-flow needs. With over half the returns on farm investment coming from capital gains, the strategy appeared sound.

The tide turned in the 1980's, however, as the world trade situation weakened and interest rates rose. Foreign production grew in response to the higher prices of the 1970's. Foreign per capita consumption rose at less than two-thirds the pace of the 1970's, due to a worldwide recession induced by monetary policy adjustments designed to slow inflation. High real interest rates and the appreciating international value of the U.S. dollar contributed to a debt crisis in developing countries that stifled import demand. Many countries limited or reversed their growing dependence on imports. While world trade stagnated over the first half of the 1980's, U.S. farm exports fared even worse, dropping by a third from the 1981 high.

Reduced exports depressed commodity prices, and U.S. monetary policy changes designed to fight inflation increased real interest rates. With prices down and expenses up, interest in farmland ownership waned. Reduced demand for farmland led to decreased prices, and farm asset values fell more than a third between 1981 and 1986. The decline in land values after 1981 left little cushion for debt-burdened farmers since land accounted for about 70 percent of farm assets. Rising real interest rates increased the cost of borrowing to finance debt, financially squeezing many farmers.

The farm sector began to rebound in 1986 as legislative changes in Federal farm programs helped improve the U.S.

competitive position abroad. The volume of U.S. agricultural exports grew about 26 percent in 1986-88. Farmland values began to rise in 1987, reflecting higher expected returns from current operations and Government programs. Production costs also declined as costs for energy and other manufactured inputs declined and interest rates fell.

Dramatic swings in the farm economy during the last two decades have affected many related industries. Agricultural input industries have undergone considerable changes, including extensive corporate reorganizations, mergers and acquisitions, plant closings, and reduced plant capacities.

A booming farm sector in the 1970's encouraged input industries to increase capacity and employment to meet the growing demand for inputs. But by the 1980's, input use had declined substantially as agricultural exports, land values, and farm prices fell, and surplus stocks rose. Crop acreage, the most important input, declined as land idled by farm programs grew from an average of 5 million acres in 1974-81 to over 38 million in 1982-86. Over 11 million input-intensive corn acres were set aside in 1982-86, compared to just over 1 million in 1974-81.

Farming Is Linked to Many Industries

From fertilizer to foodservice, farming helps support a wide array of industries. Together, these agriculturally connected industries comprise the food and fiber system—one of the largest sectors in the U.S. economy. The total food and fiber system includes food, pet food, alcoholic beverages, tobacco, flowers, plants, seeds, farm firewood, clothing, household textiles, and footwear.

One way of looking at the economy is to consider the contribution of each segment to GNP. Since every segment buys goods and services from others, its contribution to GNP is calculated by the value

Linking Agriculture to the Economy

it adds to the goods and services that it purchases. The value added throughout the economy adds up to the total GNP.

Many industries provide inputs both to farming and to the processing and distribution of farm products. Phosphate mines in Florida and elsewhere, for in-

stance, provide an essential fertilizer ingredient. Other mines provide the ores that become metals for fabrication into farm machinery, the cans that hold food, and other articles used throughout the farm and food system. The timber indus-

try supplies materials for farm buildings, grocery sacks, and cardboard cartons.

Industries that provide services such as financial, insurance, and communication totaled 20.5 percent of the food and fiber system's contribution to GNP in 1989. The Government also supplied resources—grazing land and irrigation water—and services such as flood control and marketing information.

Labor is also an important input to food and fiber production. Putting food on the table and clothes on our backs requires many more nonfarmers than farmers. Farmers and their hired workers accounted for 11.7 percent of the people in the food and fiber system in 1989, and farming contributed only 8.7 percent of the total value of the system's products.

Food processors accounted for 11.4 percent of GNP in 1989 and employed 6.1 percent of the workers. Manufacturers of textiles, leather products, and tobacco products added another 5.6 percent of GNP and employed 6.5 percent of the workers.

The food and fiber system contributed \$820.6 billion, or nearly 16 percent of GNP, in 1989 (*table 1*). The input industries—ranging from fertilizer and pesticides to salt and tin cans—form the largest component of the food and fiber system, accounting for about 33.2 percent of the food and fiber system's contribution to GNP in 1989. ■

Table 1. Food and Fiber System Accounted for Nearly 16 Percent of GNP in 1989

Industry	Contribution to GNP			Workers		
	Billion dollars	Percent of food and fiber system	Percent of GNP	Thousand	Percent of food and fiber system	Percent of total economy
Farming	71.4	8.7	1.4	2,458.9	11.7	2.0
Total inputs ¹	272.8	33.2	5.2	5,356.3	25.4	4.3
Mining	24.9	3.0	.5	96.9	.5	.1
Forestry, fishing and agricultural services	9.2	1.1	.2	107.7	.5	.1
Manufacturing	70.1	8.5	1.3	1,247.8	5.9	1.0
Services	168.6	20.5	3.2	3,903.9	18.5	3.2
Total manufacturing and distribution ¹	476.3	58.1	9.2	13,245.6	62.9	10.7
Manufacturing:						
Food processing	93.9	11.4	1.8	1,292.1	6.1	1.0
Textiles	39.2	4.8	.8	1,328.4	6.3	1.1
Leather	.4	—	—	7.4	—	—
Tobacco	6.4	.8	.1	36.5	.2	—
Distribution:						
Transportation	30.9	3.8	.6	550.7	2.6	.4
Wholesaling and retailing	232.0	28.3	4.5	6,219.4	29.5	5.0
Food service	73.5	9.0	1.4	3,811.1	18.1	3.1
Total food and fiber system ¹	820.6	100.0	15.8	21,060.8	100.0	17.0

— = less than 0.05 percent

¹May not add due to rounding.

Source: ERS data.