Chapter 2

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American consumers spent an estimated $298 billion dollars for food during 1982. Approximately 30 percent of that amount was attributable to on-farm production activities. However, $214.5 billion of the consumer food bill, the remaining 70 percent, was attributable to postharvest activities and marketing.

Before they finally reach consumers, agricultural commodities produced on the farm must be assembled, processed, packaged, warehoused, stored, transported, and distributed through the institutional food trade wholesale and retail outlets. The subject of this memorandum is research pertaining to all the technological and economic transformations that agricultural products undergo after leaving the farm up to the time of their consumption—henceforth referred to as postharvest technology and marketing economics (PHTME) research.

The U.S. Government funds PHTME research, but the question is whether or not it should continue to do so. The food and agricultural research establishment today is facing new problems that place severe strains on the research system. As a result, there is an ongoing search for ways to improve the effectiveness of the research system while reducing costs. Because of this, some of the arguments in favor of publicly supported PHTME research are being questioned.

Some executive branch agencies, including the U.S. Department of Agriculture (USDA) and the Office of Management and Budget, have argued that it is no longer necessary to increase investment in certain types of research, including PHTME research, implying that private firms have sufficient resources to conduct their own research and that the information ultimately will become available to smaller firms. Thus, the executive branch has made numerous attempts to decrease public support for PHTME research over the last *10* years.

This memorandum presents OTA's findings and conclusions regarding the nature of the benefits and burdens of PHTME research, trends in research funding and the distribution of benefits from PHTME research, the quality of PHTME research, the roles of public and private research participants in PHTME research, and the allocation of public research responsibilities between USDA and State agricultural experiment stations (SAES). Public and private sector investment in PHTME research is discussed in chapter 3. The benefits, burdens, and quality of PHTME research are discussed in chapter 4. The roles of public and private research participants are discussed in chapter 5, and the policy and management of USDA research programs are discussed in chapter *6.*

As background for the discussion in the chapters that follow, this chapter provides a brief orientation to PHTME research. PHTME research focuses on the economic and technological transformations that agricultural products undergo once they leave the farm, so the chapter also discusses the sector of the economy in which these transformations take place, namely the food marketing sector.

ORIENTATION TO PHTME RESEARCH

PHTME research has two primary components: 1) postharvest technology research, which focuses on the biological, chemical, or mechanical transformations of agricultural products subsequent to harvest; and 2) agricultural marketing economics research, which focuses on the economic aspects of marketing agricultural products.

Postharvest technology research is biologically or physically oriented. Such research thus complements physically oriented production research (e.g., research concerned with the soil, water, and air resources and the production of farm crops). Some postharvest technology research focuses on the biological or chemical properties (e.g., compo-

sition, quality, safety, nutritional value) of agricultural products that affect the handling, storage, transportation, preservation, and effective use of such products. Other postharvest technology research focuses on the mechanical technologies used to assemble, process, package, warehouse, store, transport, and distribute agricultural products.

Agricultural marketing economics, like economics generally, is a social rather than a biological or physical science. Marketing economics focuses on the economic aspects of human and organizational behavior. Agricultural marketing economics takes two components of this behavior into account. One is behavior pertaining to demands of consumers for the combination of products and services that make up the national food supply. The second is behavior pertaining to efficiency with respect to the processing and distribution of the national food supply. In order to maximize profits, individual firms seek to minimize the resource requirements and consequently the costs of the marketing functions they perform. Based on the above components, agricultural marketing economics research is concerned with three broad areas: efficiency analysis, price analysis, and policy analysis. Efficiency analysis is concerned with the problems of increasing efficiency in the procurement, processing, and distribution of farm products. Price analysis focuses on problems related to agricultural product and input prices over time. Policy analysis is concerned with the expected or observed effects of alternative policies that influence the marketing of agricultural products (1).

PHTME research is conducted and supported by both the public and private sectors, although the types of PHTME research they conduct reflect the two sectors' differing orientations. The major participants in the public sector are USDA and SAES. Some lesser funds for PHTME research are made available by Federal agencies other than USDA, but those agencies are not considered in this technical memorandum. Also not considered here are certain non-land-grant universities, including those publicly and privately financed, that have research programs supported by public funds.

Research participants in the private sector include foundations, industry, and industry associations. Industry and industry associations' financial investments in PHTME research can be quite large, although the direction of this private research can be quite different from that of public PHTME research.

Private Sector Research

Private sector PHTME research is generally motivated by economic concerns such as profit and growth. If management expects that the rate of return will be substantial, resources are set aside for research.

Because of this profit orientation, PHTME research in private industry primarily takes the form of new product development. This includes product line extensions (e.g., new flavors, colors, package sizes, or other variations introduced to supplement existing products) as well as product improvements (e.g., modifications in the formulation of existing products, or improvements in the technologies used to process existing products). The profit orientation also leads private industry to conduct economics research, for example, in the form of demand and supply forecasts that can be used by an individual firm to make decisions concerning production levels, pricing, or purchasing of inputs.

Some firms conduct PHTME research in order to comply with or mitigate the impacts of government regulations, including those for food safety, food quality, environmental pollution levels, and labeling. This is sometimes referred to as "defensive research. " For example, where a firm is required to sell a safe and wholesome product, it may have to undertake research to establish the parameters for the safe use of its product. If a firm uses nutritional labeling or makes a nutritional claim about the product in its advertising, it must have conducted the necessary research to support the nutritional label or advertising claim.

Public Sector Research

PHTME research conducted in the public sector is focused on the concerns of society as a

whole—maintaining costs of food at a reasonable level, enhancing product quality, protecting the environment, efficiently using energy and renewable resources, increasing productivity, ensuring the safety of the food supply, using agricultural products for industrial and fuel purposes, and others.

PHTME research addresses these concerns through effort in the following types of activities:

- development of new and improved technologies and methods for processing and distribution of food products in order to increase efficiencies and improve competition;
- development, improvement, and/or adaptation of technologies for prevention or reduction of product losses caused by microbial contamination, insects, rodents, birds, etc.;
- identification of potential hazards to health and safety resulting from food or work environment and development of methods for elimination or reduction of the degree of hazard;
- development of technology for maintaining optimum quality and acceptability of food products;
- pollution reduction in the water, soil, and atmosphere through new processing technologies, waste management, and use of biodegradable materials;
- development of methods, processes, and techniques for conservation of energy and the use of alternative sources of energy;
- development of methods for enhancing the properties and uses of agricultural products;
- identification and forecasting of demand and supply relationships for agricultural commodities for use in firms as well as public policy decisionmaking; and
- evaluation of the structure and Performance of the food industry to measure the degree of industry competitiveness.

DESCRIPTION OF THE FOOD MARKETING SECTOR

Conceptually, the food marketing sector of the U.S. economy can be thought of as a link between farmers and consumers. This link has three critical dimensions: physical, pecuniary, and communicative. The physical dimension involves the flow of agricultural commodities from the farmer through the assembler, processor, wholesaler, and retailer to the consumer. The pecuniary dimension involves the flow of dollars from consumers of agricultural commodities back to the producers. The communicative dimension involves the flow of information about the nature of the physical and pecuniary flows (e.g., information about supply and demand conditions) to participants in the market system.

More concretely, the food marketing system can be described in terms of the participants in the system. Participants in the marketing system include the multitude of institutions and institutional arrangements that exist to facilitate the flow of information and trading—e.g., commodity exchanges, central markets, auctions, trade organizations, and the news media. Other participants in the system include organizations which render services as part of the system—e.g., financial institutions, processing firms, warehousing companies, retail firms, and transportation firms. The Federal Government is also involved in the system in its capacity as regulator—e.g., of food safety, grades and standards, nutrition, and competition. Inputs into the marketing system include labor, building materials, packaging, and equipment. These inputs become part of the products that are marketed.

The food marketing sector can also be described vis-a-vis the food production sector in terms of its contributions to total consumer food expenditures, its contribution to the output of the food and fiber system, its contribution to employment, and its consumption of energy.

Contribution to Consumer Food Expenditures

Consumer expenditures on U.S. farm-produced food have been consistently increasing on an annual basis since 1971 (see table 1). The trend in both on-farm production costs and marketing

Table 1.— Consumer Expenditures on U.S. Farm-Produced Foods, 1971-82

Year	Consumer expenditures (in billions)	Farm value (in billions)	Marketing bill (in billions)	Marketing bill as a percentage of consumer expenditures
1971	$114.6	$36.1	$ 78.5	68.4%
1972	122.2	39.8	82.4	67.4
1973	138.8	51.7	87.1	62.8
1974	154.6	56.4	98.2	63,5
1975	169.0	55.6	113.4	67.1
1976	183.7	58.3	125.4	68.3
1977	192.3	58.0	134.3	69.8
1978	214.3	69.4	144.9	67.6
1979	241.2	78.4	162.8	67.5
1980	260.8	81.1	179.7	68.9
1981	285.0	82.9	202.1	70.9
1982	298.0	83.5	214.5	71.9

SOURCE: U.S. Department of Agriculture, Economic Research Service, 1982.

costs from 1971 to 1982 generally has been upward. In 1982, total consumer expenditures on food reached a high of $298 billion: while the amount attributable to on-farm production costs was $83.5 billion (28 percent of the total), the amount attributable to marketing costs (i. e., the difference between the farm value or payment to farmers for foodstuffs and consumer expenditures for these foods) was $214.5 billion (71.9 percent of the total). From 1971 to 1982, the percentage of consumer food expenditures attributable to marketing costs ranged from a low of 62.8 percent in 1973 to a high of 71.9 percent in 1982.

Increases in the specific components of the food marketing bill from 1971 to 1982 are shown in table 2. By far the largest component of the bill is labor costs. Since 1971, labor costs have been consistently increasing on an annual basis; in 1982, they accounted for $97.2 billion, or 45 percent of the total $214.5 billion marketing bill, Other components of the marketing bill include packaging, which accounted for 11 percent of the bill in 1982; transportation, which accounted for 7 percent of that bill; fuels and electricity, which accounted for 5 percent; corporate profits, which accounted for 6 percent; and other items including

Table 2.—Components of the Marketing Bill for U.S. Farm. Produced Foods, 1971-82 (in billions)

Year	Labor[a]	Packaging materials	Intercity transportation rail and truck	Fuels and electricity	Corporate profits before taxes	Other[b]	Total marketing bill[c]
1971	$34.5	$8.5	$6.0	$ 2.4	$3.9	$23.2	$ 78.5
1972	36.6	8.9	6.1	2.5	4.0	24.3	82.4
1973	39.7	9.4	6.4	2.8	5.4	23.4	87.1
1974	44.3	11.8	7.5	3.7	6.1	24.8	98.2
1975	48.7	13.5	8.5	4.6	7.5	30.6	113.4
1976	53.7	14.6	9.1	5.0	7.6	35.4	125.4
1977	58.4	15.2	9.8	5.6	8.0	37.3	134.3
1978 ...., . . .	65.3	16.3	10.3	6.2	9.0	37.8	144.9
1979	73.8	18.4	11.6	7.6	9.9	41.5	162.8
1980	80.7	21.1	12.7	9.0	11.0	45.2	179.7
1981	90,7	22.9	14,1	10.9	12.0	51.5	202,1
1982	97.2	23.2	14.7	11.2	12.9	55.3	214.5

[a]Includes employee wages or salaries, and their health and welfare benefits, Also includes imputed earnings of proprietors, partners, and family workers not receiving stated remuneration.

[b]Includes depreciation, rent, advertising and promotion, interest, property taxes and insurance, accounting and professional services, and many miscellaneous items. Data for 1987-89 also include fuels and electricity.

[c]The marketing bill is the difference between the farm value or payment to farmers for foodstuffs and consumer expenditures for these foods both at food stores and away from home eating places. Thus, it covers processing, wholesaling, transportation, and retailing costs and profits

SOURCE: U.S. Department of Agriculture, Economic Research Service, 1982

depreciation, advertising, interest, and repairs, which accounted for the remaining 26 percent of the marketing bill.

Contribution to the Output of the Food and Fiber System

As shown below, the total output of the U.S. food and fiber system continues to increase, and in 1981 was estimated at $612 billion (3). The nonfarm activities or marketing provides over 85 percent of the value added to the food and fiber system's output.

Year	output (in billions)	Percentage added by: Farming	Nonfarm activities
1978	$432.7	14%	86%
1979	486.2	15	85
1980	532.8	13	87
1981[a]	612.0	NA	NA

[a]Preliminary

Number of Food Marketing Establishments and Employees

Table 3 shows the numbers of establishments and employees in food marketing industries (food manufacturing, food wholesaling, food stores, and eating places) for the years 1967, 1972, and 1977. From 1967 to 1977, both the number of food manufacturing establishments and the number of employees in such establishments declined, from 32,518 establishments and about 1.7 million employees in 1967 to 26,656 establishments and about 1.6 million employees in 1977.

During the same period, the number of food wholesaling establishments and food stores also declined, but in these establishments, the number of employees increased. The increase in the number of employees in food stores from 1967 to 1977 was substantial, from 1.4 million employees in 1967 to about 2 million employees in 1977.

Of all the establishments shown in table 3, only eating places increased in number from 1967 to 1977. Along with the increase in number of establishments, there was a substantial increase in the number of employees in eating places. In 1967, eating places employed about 1.7 million people; by 1977, the number of employees had reached about 3.4 million.

Table 3.—Numbers of Establishments and Employees in Food Marketing Industries, 1967, 1972, 1977

Industry and year	Number of establishments	Number of employees
Manufacturers:		
1967	32,518	1,725,900
1972	28,184	1,663,000
1977	26,656	1,622,100
Wholesalers:		
1967	40,055	533,837
1972	38,531	579,531
1977	37,960	601,920
Food stores:		
1967	294,243	1,444,469
1972	267,352	1,722,486
1977	251,971	1,959,008
Eating places:		
1967	236,563	1,736,693
1972	253,136	2.317.425
1977	274,337	3,425,060

SOURCE: Census of Manufacturers, Wholesale Trade, and Retail Trade, 1977

Consumption of Energy

According to the Department of Energy, an estimated 17 percent of the total energy consumed in the United States is consumed by the U.S. food and agricultural system, which includes production, marketing, and consumption (4). About half of this, or nearly 8 percent of the total, is consumed by the food marketing sector. This includes 4.4 percent for processing, 2.1 percent for transportation, 0.5 percent for wholesaling, and 0.8 percent for retailing. The production of food accounts for 3 percent of the total energy consumed, and consumption at home accounts for the remaining 6 percent.

IMPACT OF THE FOOD MARKETING SECTOR ON THE U.S. ECONOMY

The food marketing sector has a number of significant impacts on the U.S. national economy, and these are described further below. On the negative side, the food marketing sector has been a major contributor to inflation in the general economy. It has also contributed to lagging productivity. On the positive side, however, the food marketing sector contributes significantly both to the gross national product (GNP) and employment. Increased output in food manufacturing has a large impact on other sectors of the economy (3). And too, food is a significant component of U.S. import-export trade.

Contribution to Inflation

Over the past decade, there has been a significant increase in consumer prices, and inflation in consumer food prices has had a profound effect on the national economy. The annual rate of inflation in consumer food prices for the years 1951 through 1981, as well as the proportion of overall inflation accounted for by inflation in consumer food prices for those years, is shown in table 4. During the 1970's, food price inflation averaged 8 percent per year and accounted for an average of 26 percent of inflation in the general economy.

Table 4.—Contribution of Food Prices to Inflation, 1951-81

Year	Overall inflation rate (percent)	Food price inflation rate (percent)	Contribution of food prices to overall inflation (percentage points)	Proportion of overall inflation accounted for by food price inflation (percent)
1951	7.9%	11.1%	2.7	34.20/o
1952	2.2	1.0	0.4	18.2
1953	0.8	– 1.5	–0.4	–33.3
1954	0.5	–0.2	–0.1	–16.7
1955	–0.4	– 1,4	0.3	–75.0
1956	1.5	0.7	0.2	13.3
1957	8.6	3.3	0.8	22.2
1958	2.9	4.2	1.0	34.5
1959	0.8	– 1.6	–0.4	–33.3
1980	1.5	1.0	0.2	13.3
1961	1.1	1.3	0.3	27.3
1962	1.2	0.9	0.2	16.6
1963	1.3	1.4	0.3	23.1
1964	1.4	1.3	0.3	21.4
1965	1.5	2.2	0.5	33.3
1966	3.2	5.0	1.2	37.5
1987	2.8	0.9	0.2	7.1
1988	4.4	3.6	0.9	20.5
1989	5.7	5.1	1.2	21.1
1970	6.1	5.5	1.3	21.3
1971	4.3	3.0	0.7	16.3
1972	3.4	4.3	1.0	29.4
1973	6.1	14.5	3.5	57.4
1974	9.8	14.4	3.5	35.7
1975	9.1	8.5	2.0	22.0
1976	5.6	3.1	0.8	14.3
1977	6.3	6.3	1.5	23.8
1978	7.8	10.0	1.8	23.1
1979	10.0	10.9	2.0	20.0
1980	13.8	8.6	1.5	10.9
1981	9.2	8.2	1.4	15.2

[a]The proportion of overall inflation accounted for by food price inflation is derived by dividing the contribution of food prices to overall inflation by the overall Inflation rate.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, as presented by R. D. Knutson, J. B. Penn, and W. T. Boehm in *Agricultural and Food Policy (New* Jersey: Prentice-Hall, Inc., January 1983).

Food price inflation peaked at 14.5 percent and 14.4 percent in the years 1973 and 1974, respectively, and it accounted for nearly 50 percent of the inflation in the general economy during those 2 years.

Table 5 shows that much of the inflation in food prices is due to increases in the farm-to-retail price spread —i. e., marketing, The inflationary impact of the food marketing sector was especially great in the years 1974, 1975, 1976, 1978, 1979, 1980, and 1981. In 1981, for example, increases in the farm-to-retail price spread accounted for 74 percent of the increases in food prices at food stores.

From 1971 to 1981, consumer expenditures on food rose about $170 billion (from $114.6 billion in 1971 to $285 billion in 1981), and increases in the marketing bill have accounted for 73 percent of that amount (3). In some years, even though farm prices declined, consumer food prices increased because of increases in the food marketing sector. Labor and energy have been major components of these increases.

Contribution to Lagging Productivity

Historically, productivity gains in the food marketing sector have been less dramatic than those achieved in farming. Most components of the food manufacturing and distribution sectors (see table 6) are afflicted with laggard or declining growth. The problem is especially evident in the food transportation, food retailing, food service, and some food manufacturing industries.

Labor productivity growth rates in the food manufacturing sector vary considerably by industry. Although increases in labor productivity growth rates have occurred since 1972 in some industries (e. g., wet corn milling and soft drink manufacturing), in other industries (e. g., meatpacking, sugar, candy, and breakfast cereal), there have been no significant increases; in one industry (i.e., blended flour), productivity has actually declined.

In the food distribution sector, labor productivity growth rates in the rail and truck transportation have not increased significantly since 1972. In retail food stores and in eating and drinking places, productivity now is significantly below 1958-72 levels. Lagging productivity growth in the food processing and distribution sectors, in addition to contributing to lagging productivity in the general economy, has contributed to increased rates of food price inflation (2).

Contribution to Gross National Product

The U.S. food and fiber system in 1980 accounted for about 20 percent of the GNP. According to USDA, 87 percent of that (17.8 percent of total GNP) was attributable to nonfarm or market industries: 38 percent was attributable to retailing, wholesale trade, and transportation industries; 31 percent was attributable to processing and manufacturing industries; and 18 percent was attributable to services and raw materials industries (3).

Table 5.—Contribution of Food-Price Components to Price Increases at Food **Stores, 1971-81**

Year	Change in food store prices due to: Farm value of food (percentage points)	Farm to retail price spread (percentage points)	Fish and imported foods (percentage points)	Total retail price increase (percent)
1971	0.1	1.5	0.8	2.4
1972	3.0	1.3	0.2	4.5
1973	11.6	3.7	1.0	16.3
1974	3.2	9.2	2.5	14.9
1975	1.3	5.1	1.9	8.3
1976	– 1.8	2.7	1.2	2.1
1977	0.1	1.8	4.1	6.0
1978	4.5	4.6	1.4	10.5
1979	3.4	6.2	1.2	10.8
1980	1.7	4.2	2.1	8.0
1981	0.9	5.4	1.0	7.3

SOURCE Derived from Bureau of Labor Statistics data and USDA market basket statistics.

Table 6.—Productivity Growth Rates for the U.S. Food Manufacturing and Distribution Sectors: 1958-72 Compared With 1973-79

	Annual productivity growth rate (output per man hour)		Direction of change
	1958-72 (percent)	1973-79 (percent)	
Food manufacturing:			
Fluid milk	3.8%	3.5%	Reduction
Preserved fruits and vegetables	2.7[a]	1.9[d]	Reduction
Flour and other grain products	4.1[a]	4.9	Increase
Cereal and breakfast foods	2.2[c]	0.8[d]	Reduction
Rice milling	3.6[c]	2.5[d]	Reduction
Blended and prepared flour	2.9	–4.0[d]	Negative
Wet corn milling	4.O[c]	9.8[d]	Increase
Prepared feed ...	4.4[c]	2.2[d]	Reduction
Raw and refined cane sugar	3.5	1.5[d]	Reduction
Beet sugar	3.4	0.6[d]	Reduction
Candy and confectionery products	3.6[a]	0.2[d]	Reduction
Malt beverages	5.9[a]	5.3	Reduction
Distribution:			
Intercity trucking[e]	*2.6*[c]	1.1[d]	Reduction
Intercity trucking[e] (general freight)	*2.1*[c]	1.4[d]	Reduction
Railroad (car miles)	*3.8*[a]	0.8	Reduction
Bakery products	*2.7*[b]	1.0	Reduction
Retail food stores	3.0	– 1.0	Negative
Eating and drinking places	1.2	– 2.4	Negative

[a]1954-72.
[b]1957-72.
[c]1963-72.
[d]1973-78.
[e]Output per employee.

SOURCE: B. R. Eddleman, L. Teigen, and J. C. Purcell, "Productivity in U.S. Food and Agriculture: Implications for Research and Education," paper presented at the Southern Agricultural Economics Association meeting, Orlando, Fla., February 1962, p. 6a.

Contribution to Employment

In 1980, the U.S. food and fiber system accounted for approximately 23 percent of total employment in the country, a percentage which is roughly the same as the food and fiber system's contribution to GNP. The number of employees is shown in table 7. In 1980, 20.4 million (about 86 percent) of the 23.7 million people employed in the food and fiber system as a whole were employed in nonfarm industries (i.e., food processing, resources and services, manufacturing, transportation, trade, retailing, and eating establishments). Over the years, the number of employees in farming has declined, while the number employed in the food marketing sector has increased (see table 7).

Table 7.—Employment in the U.S. Food and Fiber System, 1978, 1979, 1980

	Number of employees (in millions)		
Food and fiber system activity	1978	1979	1980
Production agriculture	3.4	3.4	3.3
Non-farm	19.0	20.1	20.4
Food processing	1.7	1.7	1.7
Resources and services	2.3	2.5	2.5
Manufacturing	4.7	5.0	5.1
Transportation, trade, and retailing	7.2	7.6	7.7
Eating establishments	3.1	3.3	3.4
Total employment in the U.S. food and fiber system	*22.4*	23.5	*23.7*
Total employment in the U.S. economy[a]	100.4	102.9	104.7
Employment in the food and fiber system as a percent of the U.S. employment	22.30/o	22.80/o	*22.60/o*

[a]Represents the available work force,

SOURCE: U.S. Department of Agriculture, Economic Research Service, 1982,

Income Multiplier for Food Manufacturing

The impact of the food marketing system on the U.S. economy can also be viewed through the income multipliers that are derived from input/output analysis for the United States. The income multiplier for a particular sector of the economy is a measure of the increase in income to the whole economy resulting from an increase in output by that particular sector.

Because of the food manufacturing industry's heavy reliance on other industries for inputs, its high level of labor utilization, and its operation on a comparatively low profit margin, the income multiplier for food manufacturing is much greater than the income multiplier for other sectors of the economy (3). The weighted average personal income multiplier for food manufacturing is 9.8 (this compares to a multiplier of 4.8 for nonfood and nonfiber manufacturing, 4.0 for mining, 3.5 for services, 3.4 for transportation and housing, and 2.8 for wholesale and retail trade). This implies that a $1 million increase in output or income in the food manufacturing sector would lead to a $9.8 million increase in income in the total economy, while the total impact would be less than $5 million for a $1 million increase in income to those employed in other manufacturing.

Contribution to International Trade

Food represented about 19 percent of the total U.S. export trade in 1982 and 7 percent of the U.S. import trade. These figures are representative of the food production and marketing sectors' combined contribution to international trade over the past 15 years (3).

As shown below, the agricultural sector has provided a positive trade balance which reached a high of $24 billion in 1981, In contrast, the nonagricultural sector has a growing negative trade balance which increased to $53 billion by 1981.

U.S. Trade Balance, 1975-82(billions)

	Agricultural	*Nonagricultural*	*Total*
1975	$12.57	–$ 2.83	$ 9.74
1976	12.01	–20.67	–8.67
1977	10.20	–39.97	– 29.78
1978	14.58	–46.38	– 31.80
1979	18.02	–45.37	–27.35
1980	23.89	–47.24	–23.35
1981	24.35	–53.52	–29.17
1982	19.73	– 52.64	–32.91

SOURCE: U.S. Department of Agriculture, Economic Research Service, 1982

The principal agricultural exports are the basic commodities of wheat, corn, and soybeans. With the exception of soybean oil and soybean meal, few value-added agricultural products are exported.

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