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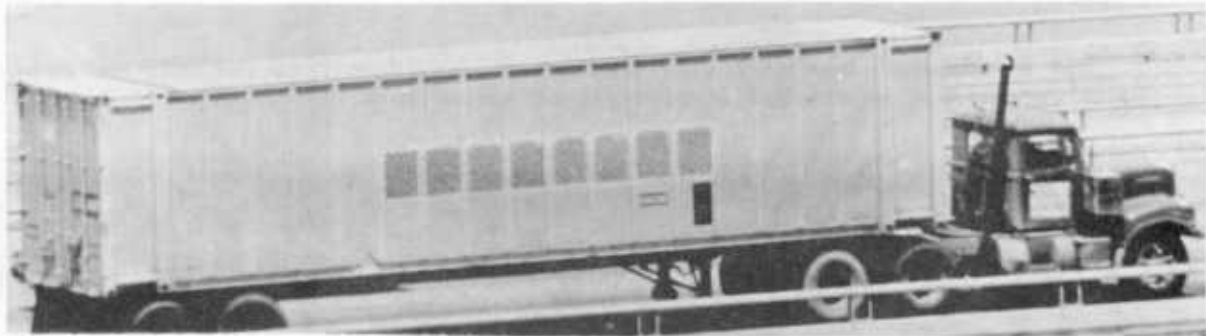
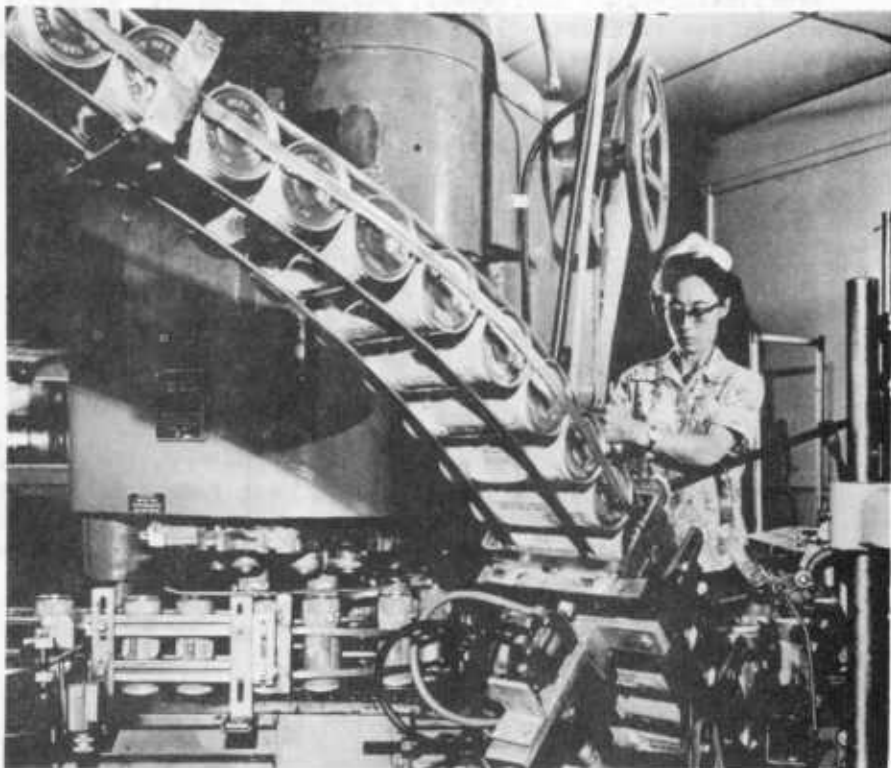
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# The Food Marketing Cost Index

## A New Measure for Analyzing Food Price Changes

Harry H. Harp



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#### ABSTRACT

A Marketing Cost Index to measure changes in prices of inputs used in food processing, wholesaling, and retailing is presented. Indexes are given for costs of labor, packaging materials, transportation services, advertising, fuel and power, rent, maintenance and repair, business services, property taxes and insurance, supplies, and interest. Data sources and methodology used in constructing the indexes are detailed. The indexes are useful in explaining the difference between prices farmers receive and consumers pay for food.

Keywords: Farm-to-retail price spreads, marketing costs, retail food prices.

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#### NOTE

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## SUMMARY

This report describes new Laspeyres price indexes for measuring changes in the costs of processing, wholesaling, and retailing food. These indexes are constructed primarily from U.S. Department of Commerce data on the relative importance of inputs used by the food industries and data from the U.S. Department of Labor on hourly earnings and prices paid for intermediate goods and services.

The new indexes of marketing costs are being used by USDA in food price monitoring, food price and marketing cost analyses, and special analyses of the impact of changes in wages and salaries and prices of inputs, such as fuel and power, on farm-to-retail price spreads. Indexes presented in the report provide better information for analyzing the farm-to-retail price spread than the previously available indexes of prices of intermediate goods and services used in food marketing. The indexes are based on more current cost weights, incorporate labor and transportation costs, and correspond more closely to the concepts of the farm-to-retail price spread for the market basket of foods for at-home consumption.

Labor costs have contributed the most to higher farm-to-retail price spreads over the years, although labor costs have not increased as fast as many other marketing cost items. Fuel and power, packaging, and transportation costs have increased significantly, particularly in 1979, adding substantially to the farm-to-retail price spread. Interest rates also jumped sharply in the last half of 1979, but their relative importance in marketing costs was not sufficient to have a major impact on the spread.

The Marketing Cost Index had increased to 252 percent of the 1967 level by the end of 1979, while the farm-to-retail price spread had increased to 217 percent of its 1967 level. The Marketing Cost Index provides a direct measure of changes in salaries and wages of workers and prices of inputs bought by food processing and distributing firms from nonfarm businesses. On the other hand, the farm-to-retail price spread reflects changes in wages and salaries and prices of inputs, but spreads also are affected by changes in productivity and profits. Increased productivity was the major factor responsible for the index of farm-to-retail price spreads increasing less than the index of marketing costs since 1967. Data on labor productivity indicate that increased labor productivity in food processing held down unit labor costs, resulting in lower farm-to-retail price spreads over the 12-year period than would otherwise have been the case.

The Marketing Cost Index increased 11.1 percent in 1979, compared with an increase of 11.9 percent in the farm-to-retail price spread index. The implication is that returns to investment and management increased in 1979 since the farm-to-retail price spread increased more than marketing costs. This finding is supported by corporate profit data for food processing, retailing, and wholesaling firms, whose profits increased substantially in 1979.

# The Food Marketing Cost Index

## A New Measure for Analyzing Food Price Changes

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### INTRODUCTION

This report describes the Marketing Cost Index, a new index designed to measure the magnitude of changes in operating costs of food processors, wholesalers, and retailers. The concepts and data sources employed are discussed and the movement in the index from 1967 to 1979 is analyzed.

Retail food prices rose 10.9 percent in 1979, as measured by the all-food Consumer Price Index for urban consumers (CPI-U) published by the Bureau of Labor Statistics (BLS). This increase was the largest in 5 years. The largest part of the 1979 rise in food prices resulted from increases in the farm-to-retail price spread which accounted for 61 cents of the consumer's dollar spent for U.S. farm foods. The farm-to-retail price spread, the difference between retail price and the equivalent farm value, represents the charges for processing and distributing food commodities after they leave the farm. Increases in farm-to-retail price spreads mainly reflect rising wages and salaries of workers and prices of inputs bought by food processing and distributing firms from nonfarm businesses, but spreads also are affected by changes in profits and productivity. On the other hand, the Marketing Cost Index provides a direct measure of changes in salaries and wage rates of workers and prices of inputs purchased by these firms.

The Marketing Cost Index complements the U.S. Department of Agriculture's (USDA) market basket data on farm-to-retail price spreads and the marketing bill data on the distribution of the consumer food dollar (3). <sup>1/</sup> Both of these statistical series are published by USDA in Agricultural Outlook, a periodical outlook and situation report of the Economics, Statistics, and Cooperatives Service (ESCS).

The new Marketing Cost Indexes are being used in USDA's food price monitoring program in cooperation with the Council on Wage and Price Stability, in outlook and situation reporting, in research on the causes of the persistent rise in marketing costs, and in special impact analyses of the effects of changing resource costs on food prices.

### DESCRIPTION OF MARKETING COST INDEX

The Marketing Cost Index measures change in prices of supplies and services used in processing, wholesaling, and retailing U.S. farm foods. The largest component of the index is employee wages and salaries, followed by packaging materials, trans-

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<sup>1/</sup> Underscored numbers in parentheses refer to items listed in the references.

portation rates, and energy costs. Other cost components include advertising, maintenance and repair services, insurance, interest rates, rent, and miscellaneous supplies and services. The index represents all nonfarm inputs used in food marketing except depreciation of buildings and equipment, long-term interest costs, and profits. Those items are not components of current operating costs.

Separate indexes are presented for labor, packaging materials, transportation services, advertising, fuel and power, other utilities, rent, maintenance and repair, business services, property taxes and insurance, supplies, and short-term interest. One aggregate index is reported based on these components.

Forty price series were used to construct the index. Seventeen of those price series are from the Producer Price Index (PPI) and 10 are obtained from the Consumer Price Index (CPI) published by BLS (table 1). Each price is weighted by the estimated cost of inputs bought by food marketing firms in 1972, the most recent year for which data are available. Weights are derived primarily from data provided by the Bureau of Economic Analysis (BEA) interindustry input/output study (4) and from the Bureau of the Census (6, 7, 8, 9).

The new index measures changes in prices for fixed quantities of labor and other inputs purchased by processors, wholesalers, and retailers of U.S. farm food for at-home consumption. Hence, it is a price index of inputs that make up operating costs. The farm-to-retail price spread, often called the gross marketing margin, represents charges for processing, wholesaling, and retailing a market basket of food, since it includes profits as well as costs.

The Marketing Cost Index is useful in analyzing changes in the farm-to-retail price spread. The correlation between the index and the farm-to-retail price spread indicates the extent to which the spread responds to changes in marketing costs. Differences in the movement of the two indexes implies a change in returns to capital investment (profit, depreciation, and long-term interest), productivity, or income to partnerships and proprietorships. However, the indexes may not accurately reflect these changes because of lags inherent to the system--purchasing of inputs in lumps, contracting, and hedging. Over longer periods of time, the Marketing Cost Index may overstate increases in marketing costs because the index is not adjusted for gains in labor productivity and substitution between inputs. On the other hand, the market basket farm-to-retail price spread for farm foods reflects changing efficiency in the use of inputs and consequently tends to show combined effects of changes in productivity, prices of inputs, and profits.

The Marketing Cost Index represents average current prices paid for inputs used in processing, wholesaling, and retailing foods. Thus, the index is useful in economic analysis as a measure of changes in hourly labor costs and prices of inputs used in performing the above functions. It should not be interpreted as a measure of actual costs for a firm or group of firms.

The new index has two major limitations. It is based on aggregations of data which are subject to problems in matching available price indexes with quantity data. It also uses fixed 1972 expenditure weights as a base because more current data are not available. Thus, the index does not reflect changes in the quantities of inputs used or technology and, therefore, it tends to overstate increases in marketing cost.

#### MOVEMENTS IN THE MARKETING COST INDEX

The Marketing Cost Index rose 11.1 percent in 1979, considerably more than the average annual rate of recent years (table 2). The biggest increases were for fuel

Table 1--Relative importance of inputs and data series used in food Marketing Cost Index, 1979

Cost	Relative importance 1/	Data series used
	<u>Percent</u>	
<b>Labor:</b>		
Wages and salaries	38.8	Hourly earnings of production workers in food manufacturing and nonsupervisory workers in wholesaling and retailing
Supplements to wages and salaries	8.0	Employer payments for Social Security and unemployment programs, pensions, health insurance and other non-wage benefits
<b>Packaging and containers:</b>		
Paperboard boxes and containers	4.6	Producer Price Index (PPI), paperboard
Metal cans and barrels	3.8	PPI, tin cans
Plastic films, bottles, and trays	2.7	PPI, polyethylene resin
Paper products, primarily grocery bags	2.2	PPI, paper and related products
Glass containers	1.4	PPI, glass containers
Metal foil	.3	PPI, metal foil
Wooden boxes	.1	PPI, wooden boxes
<b>Transportation, intercity railroad and truck</b>	9.9	Bureau of Labor Statistics (BLS) rail freight rate index for food
<b>Advertising:</b>		
National	2.3	McCann-Erickson, Inc., index of all media advertising costs
Local	2.6	BLS index of other commercial newspaper advertising
<b>Fuel and power:</b>		
Electric	2.5	PPI, electric utilities
Petroleum	3.4	PPI, diesel fuel and fuel oil
Natural gas	1.9	PPI, gas utilities
Coal	.1	PPI, coal
<b>Other utilities:</b>		
Communications	.8	Consumer Price Index, Urban (CPI-U) CPI-U, telephone

See footnotes at end of table.

Continued

Table 1--Relative importance of inputs and data series used in food  
Marketing Cost Index, 1979--Continued

Cost	Relative importance 1/  <u>Percent</u>	Data series used
Other utilities (cont.)		
Water and sewage	.2	CPI-U, water and sanitary services
Rent	3.3	Gross National Product (GNP) implicit price deflator new plant and equipment
Maintenance and repair:		
Buildings	1.4	CPI-U, housing maintenance and repair
Equipment	1.3	CPI-U, automobile maintenance and repair
Property taxes and insurance:		
Taxes	.5	CPI-U, property taxes
Insurance	.8	CPI-U, property insurance
Business services:		
Accounting, legal, and other services	2.8	GNP, implicit price deflator for services
Printing	.7	CPI-U, newspapers
Laundry	.4	CPI-U, apparel services
Postal	.3	CPI-U, postal charge
Supplies:		
Tires and tubes	.5	PPI, tires and tubes
Motor vehicle parts	.1	PPI, automobile parts
Chemicals	.6	PPI, industrial chemicals
Office supplies	.1	PPI, office supplies and accessories
Soaps and detergents	.3	PPI, soap and detergents
Towels and sanitary goods:	.1	PPI, sanitary paper and health products
Pallets and skids	<u>2/</u>	PPI, pallets and skids
Steel wire	.2	PPI, baling wire carbon
Work clothing	.1	CPI-U, boys' and men's apparel
Interest, short term	.9	Prime commercial paper (4-6 months)
Total	100.0	

1/ Based on 1972 expenditures expressed in 1979 prices.

2/ Less than 0.05 percent.



Table 2--Changes in the Marketing Cost Index, and the farm-to-retail price spread farm value, and retail price of a market basket of farm foods

Year and month	Marketing Cost Index	Farm-to-retail price spread	Farm value	Retail price
<u>Percent</u>				
1968	3.5	2.5	5.4	3.6
1969	5.5	3.0	9.0	5.3
1970	6.3	7.5	- .8	4.2
1971	5.9	2.6	.4	1.8
1972	6.1	2.1	9.4	4.8
1973	6.8	6.2	34.6	17.3
1974	14.6	19.0	7.4	13.8
1975	11.9	9.8	3.6	7.2
1976	8.3	5.4	-5.3	1.0
1977	8.1	3.4	.2	2.2
1978	8.5	7.8	16.8	11.3
1979	11.1	11.9	11.4	11.7
January	1.4	1.1	5.1	2.7
February	.3	1.5	3.7	2.4
March	.7	1.5	.4	1.0
April	1.3	1.7	-.6	.8
May	.8	2.9	-2.3	.8
June	.6	1.9	-2.1	.3
July	1.2	1.2	-.7	.4
August	.9	-.8	-1.3	-1.1
September	1.3	-1.4	2.3	.1
October	2.2	2.3	-3.2	.2
November	1.1	-1.2	2.6	.2
December	.8	1.2	1.5	1.3
1980:				
January	1.6	2.1	-1.4	.7
February	1.5	-.8	1.2	--
March	1.1	2.9	-2.3	.9
April	1.4	3.0	-3.3	0.6
May	.3	-0.9	2.7	0.4

-- = Less than .05 percent.

and power, transportation, and interest. The farm-to-retail price spread increased by 11.9 percent during the same period.

Separate Marketing Cost Indexes reveal that between 1978 and 1979, the index for wholesaling and retailing increased 10.6 percent while that for food processing increased 11.5 percent (table 3). Variations in the rate of change in these indexes result primarily from different quantity weights for labor costs and other inputs used, since essentially the same price indexes are used in both indexes. For example, because the property tax component represents a larger proportion of wholesaling and retailing costs than processing costs, and since property taxes declined in 1979, the combined index of property taxes and insurance increased less in food wholesaling and retailing than in food processing.

The largest increases in farm-to-retail price spreads and marketing costs occurred in 1974. The farm-to-retail price spread jumped 19 percent in 1974, while the Marketing Cost Index rose 14.6 percent. Prices of fuel and power increased 49.4 percent in 1974, but this was from a smaller base than the 26.1-percent increase in 1979.

Labor costs, the principal component of the index, rose by 8.8 percent in 1979, reflecting increases in hourly earnings and higher wage supplements, the latter due primarily to higher social security taxes. Prices of intermediate goods and services rose 13 percent in 1979, the largest increase since 1974.

The Marketing Cost Index and component indexes have increased every year since 1967 (table 4). The total index in 1979 averaged 252 percent of the 1967 level. The farm-to-retail spread for a market basket of farm foods increased to 217 percent of the 1967 level during the same period. The correlation between the annual changes in the Marketing Cost Index and the farm-to-retail price spread was quite high from 1967 to the present ( $r^2 = .82$ ).

Table 3--Changes in Marketing Cost Indexes for processing, wholesaling, and retailing

Index	Processing			Wholesaling and retailing		
	: 1978	: 1979	: Change	: 1978	: 1979	: Change
	: --1967=100--		Percent	: ---1967=100---		Percent
Marketing Cost Index	: 221.9	247.4	11.5	232.3	257.0	10.6
Labor	: 237.2	257.8	8.7	249.2	271.3	8.8
Packaging materials	: 207.2	230.9	11.4	187.4	210.8	12.5
Advertising	: 181.3	197.4	8.9	181.3	197.4	8.9
Fuel and Power	: 353.0	455.1	28.9	317.0	392.8	23.9
Other utilities	: 161.6	164.4	1.7	142.4	143.1	.5
Rent	: 199.2	216.4	8.6	199.2	216.4	8.6
Maintenance and repair	: 224.6	247.9	10.4	227.0	250.3	10.3
Property taxes and insurance	: 274.6	298.8	8.8	228.8	234.3	2.4
Business services	: 194.7	210.4	8.1	197.0	213.2	8.2
Supplies	: 202.	231.5	14.3	192.2	216.3	12.5
Interest, short term	: 220.5	251.3	14.0	220.5	251.3	14.0
Transportation	: 220.5	251.3	14.0	220.5	251.3	14.0



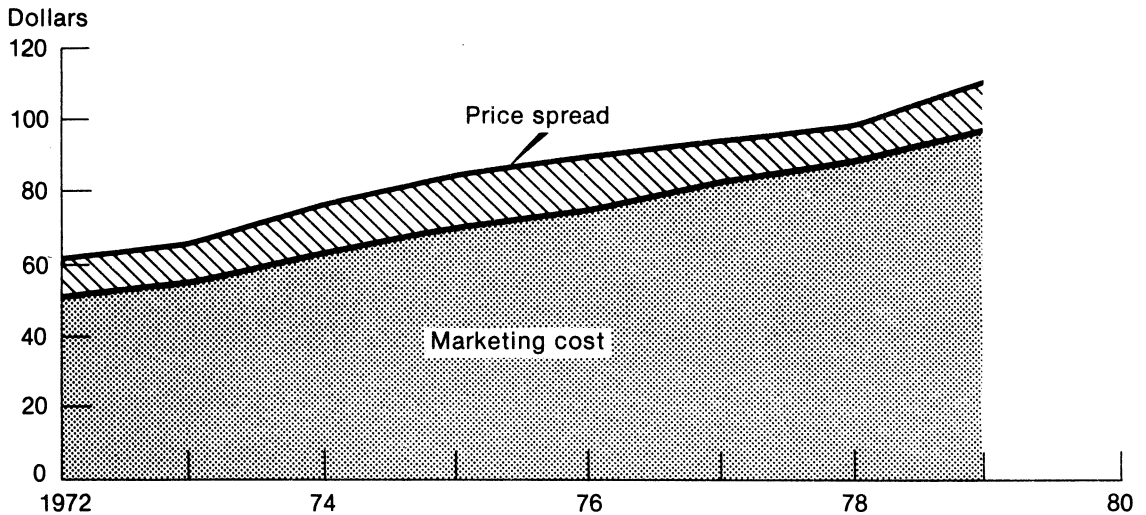
Annual changes in the farm-to-retail price spread and the Marketing Cost Index were also similar during 1972-79 (fig. 1). The farm-to-retail price spread for a market basket of domestically produced foods amounted to \$61.00 per \$100.00 spent for these foods in 1972. By 1979, the farm-to-retail price spread for these foods had risen to \$111.32 out of \$183.60 spent for food, an increase of \$50.32 in the farm-to-retail price spread. Similarly, operating costs represented by the Marketing Cost Index amounted to \$50.63 per \$100.00 spent for the market basket foods in 1972. By 1979, these marketing costs increased to \$97.72 out of \$183.60 spent for food, an increase of \$47.09 in operating costs of marketing firms. Thus, most of the increase in the farm-to-retail price spread during this period may be attributed to higher operating costs of food marketing firms.

Although annual changes in the index of farm-to-retail price spreads often correspond closely with changes in the index of marketing costs, spreads tend to increase less than the cost index, particularly during years when volume of products sold increases and costs are spread over more units. For example, volume of marketings increased substantially in 1976 and 1977, as reflected by the 5.3-percent decline in farm value in 1976 and only a 0.2-percent increase in farm value in 1977 as measured by the USDA market basket. During these years, the farm-to-retail price spread increased substantially less than the index of marketing costs.

Monthly changes in the farm-to-retail price spreads do not parallel changes in the Marketing Cost Indexes as closely as annual changes in these indexes. Lower correlation between the monthly indexes is due largely to variation in volume of product marketed, time required for spreads to adjust to changing costs, and data imperfections.

Figure 1

**Farm-to-Retail Price Spread and Marketing Costs per \$100 Spent for U.S. Farm Foods in 1972**



Marketing cost is based on an index of labor costs and prices of other food marketing inputs including packaging, transportation, and fuel and power.

Difference between marketing cost and price spread represents depreciation, long-term interest, profits, and net income of noncorporate businesses.

Impact of Productivity and Profits  
on Farm-to-Retail Price Spread

The farm-to-retail price spread has gone up less than the Marketing Cost Index from 1972 to present (fig. 2). The increased labor productivity of the food processing and wholesaling industries moderated the increase in the farm-to-retail price spread. Labor productivity increased by 30 percent in food processing from 1967 to 1978, but productivity in food retailing increased by only 3.5 percent (table 5).

Corporate profits of firms processing, wholesaling, and retailing U.S. farm foods for at-home consumption increased from \$2.3 billion in 1967 to \$6.9 billion in 1979 or 3 times (table 6). Profits as a percentage of sales of these foods increased from 3.6 percent in 1967 to 4.2 percent in 1979.

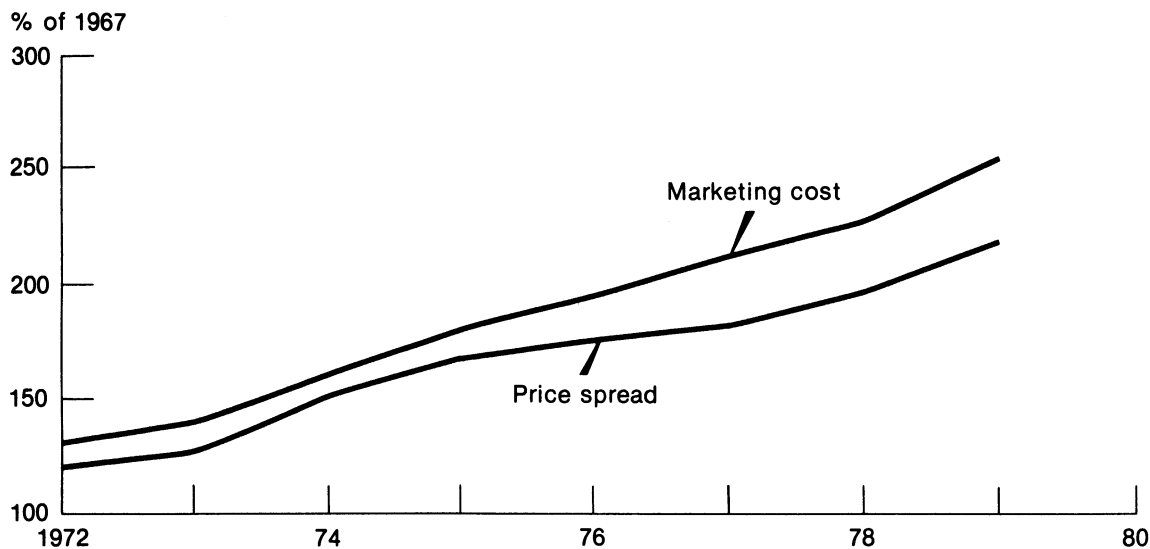
Impact of Marketing Costs on Retail Food Prices

The Marketing Cost Index provides a basis for measuring the impact of rising marketing costs on retail food prices. The first step is to express the relative importance of the total index in terms of its percentage of the retail cost of the market basket. This is accomplished by multiplying the proportion of the farm-to-retail price spread represented by the Marketing Cost Index (83 percent) by the price spread, expressed as a percentage of retail cost of the market basket (61 percent in 1979). This computation adjusts for components of retail cost which are not a part of the Marketing Cost Index. These include farm value, corporate profit, depreciation, and income of noncorporate firms. Thus, the total Marketing Cost Index represented 50.6 percent of the retail cost of the market basket in 1979. Moreover, the weight of individual components of the index in terms of retail costs

*Figure 2*

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**Indexes of Marketing Costs and Farm-to-Retail Price Spread**



*Marketing cost* is index of labor costs and prices of other food marketing inputs including packaging, transportation, and fuel and power.

*Price spread* is for a market basket of domestically produced farm foods. Represents charge for assembling, processing, transporting, and distributing these foods.

Table 5--Indexes of productivity as measured by output per unit of labor input, selected food industries and the nonfarm sector of the economy

Year	Food stores	Eating and drinking places	Manufacturers of farm-origin foods	Nonfarm business sector of the economy
			<u>1967=100</u>	
1963	89.4	93.8	92	89.3
1968	105.2	102.0	103	103.2
1969	106.1	100.4	104	102.9
1970	112.0	103.8	108	103.1
1971	112.7	100.9	112	106.2
1972	112.5	105.0	118	110.1
1973	107.3	106.7	118	112.0
1974	104.3	101.7	120	108.5
1975	105.0	102.9	121	110.5
1976	107.7	102.2	124	114.4
1977	107.8	101.1	129	116.2
1978	103.5	96.8	130	116.8
1979	--	--	--	115.5
Average annual change:			<u>Percent</u>	
1963-73	1.8	1.3	2.5	2.3
1973-78	-.7	-1.9	2.0	.8

-- = Not available.

Table 6--Before-tax profits of firms processing, retailing, and wholesaling farm foods as a share of consumer expenditures on food for use at home

Year	Farm food expenditures	Profits before taxes	Profits as a percentage of sales
	<u>-----Million dollars-----</u>		<u>Percent</u>
1967	65,734	2,345	3.6
1968	68,328	2,530	3.7
1969	71,797	2,503	3.5
1970	76,417	2,612	3.4
1971	80,365	2,740	3.4
1972	84,010	2,595	3.1
1973	96,967	3,594	3.7
1974	107,788	4,117	3.8
1975	112,634	5,118	4.5
1976	124,572	5,053	4.1
1977	128,602	5,267	4.1
1978	146,435	6,131	4.2

was 50.6 percent of their relative importance in the Marketing Cost Index. For example, labor costs, which represented 46.8 percent of the Marketing Cost Index in 1979, accounted for 23.7 percent of the retail cost.

The second step in estimating the impact of rising marketing cost on retail food prices is to multiply the cost weight as a percentage of the retail cost times the change in the cost index. The result is the percentage points change in the retail cost of the market basket attributable to the change in the costs represented by the cost index.

Finally, the contribution of changes in total marketing cost to the change in retail food prices can be computed by dividing the percentage points change computed in step two by the total percentage change in the retail cost of the market basket.

An analysis of these indexes revealed that rising prices of fuel and power used in food processing and distribution contributed substantially to higher food prices in 1979. The market basket of farm foods costing \$100.00 in 1978 rose to \$111.70 in 1979. Fuel and power used directly in food processing, wholesaling, and retailing accounted for 3.5 percent of the retail cost of market basket foods in 1978. Prices of fuel and power increased 26.1 percent in 1979 as measured by this component of the Marketing Cost Index. Thus, about 91 cents of the \$11.70 increase per \$100.00 spent for food, or 8 percent, may be attributed to the higher cost of fuel and power used directly in food processing, wholesaling, and retailing. In addition, higher fuel and power prices contributed indirectly to higher food prices through increased cost of for-hire transportation, petroleum-based packaging materials, and other goods and services purchased for food processing and distribution.

The percentages of specific cost items to the total index change to the extent that prices paid for labor, goods, and services change by different rates over time, since the index has fixed quantities. The percentages of specific items in the Marketing Cost Index usually change gradually over time but in 1979, the weights shifted more than usual. As fuel and power costs rose 26.1 percent, the percentage of these inputs in the Marketing Cost Index increased from 6.9 to 7.9 percent. Labor costs declined from 47.8 to 46.8 percent of the index during the same period.

#### COST WEIGHTS

The first step in developing the Marketing Cost Index was to determine the proportions of major categories of operating costs of food processors, wholesalers, and retailers (tables 7 and 8). These estimates were made primarily from the BEA and Census data.

Estimates of 1972 costs were expressed in 1967 prices by dividing each cost weight by a corresponding 1972 price index with a 1967 base period. This established the 1967 cost weights (table 9).

Wholesaling and retailing costs were estimated separately but combined for analysis; both wholesaling and retailing are service activities and are usually performed as integrated operations. Most retailers either operate warehouse facilities or are affiliated with wholesalers.

#### Labor

Labor costs account for about half of the Marketing Cost Index, underscoring the importance of its labor component. Labor costs consist of payroll costs and wage supplements. Data from the Censuses were used to establish labor cost weights for

Table 7--Operating costs of processing, wholesaling, and retailing U.S. farm foods, 1972

Cost item	Total cost	Processing cost	Wholesaling and retailing cost
	<u>Million dollars</u>		
Labor	21,211	8,486	12,725
Packaging and containers:			
Paperboard boxes and containers	2,030	1,978	52
Metal cans and barrels	1,452	1,451	1
Paper products, primarily grocery bags	994	431	563
Plastic films, bottles, and trays	861	740	121
Glass containers	651	649	2
Metal foil	163	162	1
Wooden boxes	25	25	0
Transportation, intercity			
Railroad and truck	4,416	2,103	2,313
Advertising	2,391	1,096	1,295
Fuel and power:			
Electric	944	282	662
Petroleum	560	282	278
Natural gas	334	168	166
Coal	35	35	0
Other utilities:			
Communications	558	121	437
Water and sewage	117	60	57
Rent	1,610	264	1,346
Maintenance and repair:			
Buildings	666	129	537
Equipment	621	205	416
Business services:			
Accounting, legal, and other services	1,437	790	647
Printing	377	374	3
Laundry	192	144	48
Postal	129	64	65
Property taxes and insurance:			
Insurance	351	118	233
Taxes	319	10	309

Continued



Table 7--Operating costs of processing, wholesaling, and retailing U.S. farm foods, 1972--Continued

Cost item	Total cost	Processing cost	Wholesaling and retailing cost
<u>Million dollars</u>			
Supplies:			
Tires and tubes	222	81	141
Motor vehicle parts	42	9	33
Chemicals	185	175	10
Office supplies	66	23	43
Soaps and detergents	142	71	71
Towels and sanitary goods:	41	5	36
Pallets and skids	10	4	6
Steel wire	61	22	39
Work clothing	32	18	14
Interest, short term	344	180	164
<b>Total</b>	<b>43,589</b>	<b>20,759</b>	<b>22,830</b>

Table 8--Summary of operating costs and shares of operating costs of processing, wholesaling, and retailing U.S. farm foods, 1972

Cost item	Cost	Percentage of total costs
<u>Million dollars</u>		<u>Percent</u>
Labor	21,211	48.7
Packaging and containers	6,176	14.2
Transportation service	4,416	10.1
Advertising	2,391	5.5
Fuel and power	1,873	4.3
Other utilities	675	1.5
Rent	1,610	3.7
Maintenance and repair	1,287	3.0
Business services	2,135	4.9
Property taxes and insurance	670	1.5
Supplies	801	1.8
Interest, short term	344	.8
<b>Total</b>	<b>43,589</b>	<b>100.0</b>

Table 9--Relative importance of costs for processing, wholesaling, and re-tailing U.S. farm foods, 1967

Cost item	: Total : : cost :	: Processing : : cost : : Percent		: Wholesaling and : retailing cost
Labor	: 44.3	18.1		26.2
Packaging and containers:	:			
Paperboard boxes and containers	: 5.8	5.6		.2
Metal cans and barrels	: 3.3	3.3		--
Plastic films, bottles and trays	: 3.2	2.7		.5
Paper products, primarily	:			
grocery bags	: 2.6	1.1		1.5
Glass containers	: 1.4	1.4		--
Metal foil	: .5	.5		--
Wooden boxes	: .1	.1		0
Transportation, intercity	:			
railroad and truck	: 10.0	4.7		5.3
Advertising:	:			
National	: 3.0	1.4		1.6
Local	: 3.3	1.5		1.8
Fuel and power:	:			
Electric	: 2.3	.7		1.6
Petroleum	: 1.5	.8		.7
Natural gas	: .9	.5		.4
Coal	: .1	.1		0
Other utilities:	:			
Communications	: 1.5	.3		1.2
Water and sewage	: .3	.1		.2
Rent	: 3.8	.5		3.3
Maintenance and repair:	:			
Buildings	: 1.3	.3		1.0
Equipment	: 1.3	.4		.9
Business services:	:			
Accounting, legal, and other	:			
services	: 3.3	2.2		1.1
Printing	: .8	.8		--
Laundry	: .5	.4		.1
Postal	: .3	.1		.2
Property taxes and insurance:	:			
Taxes	: .6	--		.6
Insurance	: .6	.2		.4

Continued

Table 9--Relative importance of costs for processing, wholesaling, and re-  
tailing U.S. farm foods, 1967--Continued

Cost item	Total cost	Processing cost	Wholesaling and retailing cost
	<u>Percent</u>		
Supplies:			
Tires and tubes	0.6	0.2	0.4
Motor vehicle parts	.1	--	.1
Chemicals	.5	.5	--
Office supplies	.2	.1	.1
Soaps and detergents	.4	.2	.2
Towels and sanitary goods	.1		.1
Pallets and skids	--	--	--
Steel wire	.2	.1	.1
Work clothing	.1	.1	--
Interest, short term	1.2	.6	.6
Total	100.0	49.9	50.1

-- = Less than 0.05 percent.

the index (6, 7, 8, 9). Payroll accounted for 88 percent of total labor costs for processing, wholesaling, and retailing food in 1972.

Wage supplements, primarily social security and unemployment taxes, pensions, and insurance, accounted for 12 percent of total labor cost in 1972. Wage supplements have increased steadily over the years and further increases in social security are scheduled. Wage supplements of food processing employees increased from 10.7 percent of labor cost in 1967 to 17.8 percent in 1978 (table 10).

Payroll costs for central administrative offices and auxiliaries of companies processing, wholesaling, and retailing food were derived from (9). This report provides data on the characteristics of central administrative offices and auxiliaries that were separately reported by multi-establishment firms. Those establishments are primarily engaged in providing centralized management and other supporting services for the owning companies, rather than for other business firms or the general public.

Data on wage supplements of central offices and auxiliaries were not available; wage supplements for these firms were assumed to be the same percentage of total compensation as for affiliated operating establishments.

All payroll costs and wage supplements for central administrative and auxiliary sales offices and branches of food processing and wholesaling establishments were allocated to the operating establishments to which they were affiliated. However, labor costs for auxiliary sales offices and branches affiliated with retailing establishments were divided between wholesaling and retailing establishments. The central administrative labor costs were assigned to food retailing, and warehousing labor costs were assigned to wholesaling.

Table 10--Relative importance of supplements to wages and salaries as a percentage of total labor cost, selected industries

Year	Food and kindred products manufacturing	All wholesale trade	All retail trade
	<u>Percent</u>		
1967	10.74	6.69	7.22
1968	10.92	6.94	7.47
1969	11.47	7.28	7.81
1970	11.83	7.21	7.84
1971	12.69	7.70	8.27
1972	13.03	9.93	9.35
1973	13.97	10.98	10.30
1974	13.81	11.54	10.44
1975	15.33	11.67	10.90
1976	16.05	12.11	11.45
1977	16.57	12.52	11.87
1978	17.35	13.10	12.44
1979 <u>1/</u>	17.79	13.43	--

-- = Not available.

1/ Estimated.

Labor costs for food retailing consist largely of payments to food store employees. However, it also includes an estimated labor cost for workers employed in retailing U.S. farm foods in drugstores and other stores not classified as foodstores.

#### Rents

Rents were based on data from the Censuses (6, 7, 8). Over 90 percent of the rents were paid for structures rather than equipment. A large proportion of total rent was paid by retail foodstores.

#### Other Goods and Services

The relative importance of packaging materials, energy, and other costs of processing, wholesaling, and retailing U.S. farm foods was derived using purchaser value direct requirement coefficients from BEA's magnetic tape of 496 industry classifications (BEA-IED 79-005). These data consist of purchases of materials and services by manufacturing industries such as meat processing from all other industries in the economy.

## Retailing

Operating costs of foodstores were determined from a combination of the input/output data for all retailing and sales ratios available from (1). This study provided the following ratios of costs as a percentage of sales:

1. Supplies (including packaging, motor supplies, cleaning, and miscellaneous items), 0.93 percent of sales.
2. Advertising, 0.91 percent of sales.
3. Utilities, 0.79 percent of sales.
4. Repairs, 0.65 percent of sales.
5. Communications and travel (including telephone, travel, and postage), 0.18 percent of sales.
6. Property taxes (store occupancy and other), 0.30 percent of sales.
7. Other purchased services, promotion, and unclassified, 2.33 percent of sales.

These cost ratios were expanded to industry dollar costs with the 1972 expenditure data.

The operating costs of foodstores, derived from (1) and USDA estimates of food expenditures, were disaggregated into costs of packaging, energy, and other more detailed cost categories by applying ratios derived from data for all retailing provided by the 1972 interindustry survey. This assumes that the operating cost structure of supermarkets is similar to the cost structure for all retailing establishments.

The relative importance of different sources of fuel and power was based on unpublished data for a few firms. This information indicated that in 1972, fuel and power costs of foodstores were distributed as follows: electricity, 75 percent; natural gas, 20 percent; and petroleum, 5 percent.

## Processing

Interindustry input/output data were used to establish cost weights for food processing. Of the 44 subindustries in food and kindred products manufacturing, 26 process principally farm food products of domestic origin; their entire purchases of inputs were used to establish cost weights. Parts of the purchases of two industries, sugar and soft drinks, were prorated to farm foods. The remaining industries process principally nonfarm foods such as seafood, imported foods (like coffee, tea, and chocolate), or nonfoods (like feeds, alcoholic beverages, and manufactured ice). Their costs were excluded.

## Wholesaling

Census data on sales and margins were used to estimate total costs of food wholesaling. These estimates were disaggregated with interindustry input/output data for all wholesaling. Cost weights were aggregated to match price indexes as closely as possible. For example, cost data for the purchase of business forms, bankbooks and binders, and periodicals were combined to represent costs for office supplies and 10 percent was added to the cost weight for office supplies not

classified elsewhere. The cost weight for total office supplies was matched with the PPI for office supplies to account for this component of the Marketing Cost Index.

The cost of inputs purchased by food processors, wholesalers, and retailers from other industries reveals the dependence of the food industry on other industries that provide goods and services used in food processing and distribution. The cost of packaging materials is a much more important cost to food processors than to food retailers, indicating a strong dependence of the food processing industry on industries manufacturing packaging materials. Rent, maintenance, and repair services, however, are more important in food retailing than in food processing.

#### Transportation

The weight of transportation in the index was based on the transportation component of the marketing bill. Transportation costs were distributed between processing, wholesaling, and retailing in proportion to the dollar cost of all other operating costs associated with these functions.

#### Items Excluded from Marketing Cost Index

Operating costs represented by the Marketing Cost Index comprise the major portion--83 percent--of the marketing bill for U.S. farm foods consumed at home (table 11). Profits, depreciation, and long-term interest account for the remainder but were not included in the Marketing Cost Index since they are not current operating expenses.

Table 11--Components of the marketing bill for U.S. farm foods purchased for at-home consumption, 1972

Cost item	:	Total cost	:	Processing cost	:	Wholesaling and retailing cost
	:		:		:	
	:		:	<u>Million dollars</u>	:	
Operating costs	:	43,530	:	20,730	:	22,800
Corporate profits before taxes	:	2,595	:	1,436	:	1,159
Depreciation	:	1,382	:	648	:	734
Long-term interest	:	134	:	71	:	63
Cost and income not elsewhere classified <sup>1/</sup>	:	4,709	:	843	:	3,866
<b>Total</b>	:	<b>52,350</b>	:	<b>23,728</b>	:	<b>28,622</b>

<sup>1/</sup> Includes noncorporate income and miscellaneous costs.

Cost data for foods were adjusted to represent only foods that originate on U.S. farms so that the Marketing Cost Index would be similar in concept to farm-to-retail price spreads. These adjustments consisted of subtracting a portion of costs for imported foods, fish, and nonfood products sold by food processors, wholesalers, and retailers. These adjustments were based on sales ratios of U.S. farm foods to total sales. The ratio used to adjust operating costs of foodstores was based on data published in Supermarket Business (2). These data indicate that U.S. farm foods represented 76 percent of foodstore sales in 1972.

Data on sales of food and wholesalers by line of business from the 1972 Census of Wholesaler Trade were used to estimate the ratio of sales of U.S. farm foods to total sales (6). U.S. farm foods represented 74.8 percent of sales of food wholesalers. Similarly, sales by class of customer by food wholesalers from the 1972 Census of Wholesale Trade were used to adjust wholesaling and processing costs for foods sold for away-from-home consumption (6). These data reveal that 72.4 percent of wholesale sales in 1972 were to food retailers.

#### INDEXING MONTHLY CHANGES

Monthly changes in the labor costs were based on indexes of changes in average hourly earnings of nonsupervisory employees and production workers engaged in food processing, wholesaling, and retailing. These data are published monthly in BLS' Employment and Earnings (10).

Annual data on wage supplements in the July issues of BEA's Survey of Current Business (5) were used to estimate a total hourly compensation. The annual rate of change in wage supplements as a percentage of total labor compensation was applied to monthly data on hourly earnings to estimate changes in total labor cost. Most of the annual adjustments for changes in wage supplements occur in January when the social security and unemployment taxes change. These taxes represent about half of total wage supplements.

BEA wage supplements data are available for only one of the three industries, food processing. These data were used to adjust the hourly earnings of food processing. These data for food processing were also used to adjust hourly earnings of food retailing workers since census data reveal that wage supplements in food retailing are similar to those in food processing.

Wage supplements as a percentage of labor compensation of workers in food wholesaling correspond closely with all wholesaling. Thus, BEA data on wage supplements for all wholesaling employees were used to adjust the hourly earnings of food wholesaling employees to obtain an index of total labor compensation.

BEA quarterly 1979 and 1980 data on wage supplements for employees manufacturing nondurables were used to estimate the increase in wage supplements because estimates for food manufacturing and wholesaling were not available.

#### Price Data

Price data for constructing the index of marketing costs for packaging, fuel and power, and supplies purchased by food processors and distributors were mainly PPI components, but data are not available from this source for business and commercial services purchased by those firms, like commercial rents and truck transportation. Most of the price series selected from the PPI for constructing the marketing cost index are wholesale prices. Marketing firms pay wholesale prices for most inputs. For a few supplies, however, the price indexes of basic material at an earlier stage

of manufacture were used because indexes for the finished product were not available. For example, an index for polyethylene resins was used for packaging film.

Business services are difficult to price because they are established privately between firms on a contract or fee basis and may be renegotiated as conditions change. Consumer Price Indexes are used in the Marketing Cost Index for some business services, such as repair and maintenance service, water and sanitary service, telephone, postal services, and laundry services. The data provide a proxy for changes in business and commercial rates for comparable services. Finally, some special indexes are used to estimate changes in some services such as advertising, rail freight rates, and interest rates, which are not covered by the PPI or CPI.

### Advertising

A BLS index for newspaper advertising is used in the Marketing Cost Index to represent local newspaper advertising by foodstores. Radio and television advertising rates are not covered by BLS' current indexes. It is difficult to obtain data on the cost of radio and television advertising. Although the broadcasting industries are regulated in many areas of their services, advertising rates are largely free of regulatory agency interference. However, contractual arrangements of the large networks with their affiliates, advertising revenues of the individual firms, and the role of cable systems in the broadcasting industry are subject to Federal Communications Commission scrutiny. The fees for transmission of programs prepared for broadcast by wire have also been subjected to review.

Unit advertising rates change as a result of changes in charges for space in magazines or newspapers or for commercial time on radio or television. However, circulation (audience) also affects unit advertising rates. For example, if an increase in the rate schedule is offset by an increase in circulation, then the advertising rate per 1,000 exposures would not change. Thus, an index of cost per 1,000 audience exposures provides the best measure of changing advertising rates.

McCann-Erickson Advertising, Inc., in New York publishes an annual index of media advertising cost per 1,000 exposures for magazines, newspapers, network television, spot television, network radio, spot radio, and outdoor. These indexes were used for the food processing and wholesaling components of the index. Data were converted to indexes of monthly change by linear extrapolation.

### Rent

In the absence of an index of commercial rents, the implicit price deflator for new plant and equipment is used in the Marketing Cost Index to represent rents since it is assumed that changing prices of buildings and equipment are reflected in rents. Some correspondence between food sales and rents also exists since long-term leases of food retailers are sometimes tied to retail food sales through escalator clauses in rental contracts. However, food sales data are too dependent on food prices to justify using an index of food sales as a proxy for rent in analyzing the impact of rent on food prices. The Boeckh construction cost index for commercial and factory buildings was not used because it was considered inferior to a current weighted index such as the implicit price deflator for new plant and equipment. The residential rents index was not selected because such rents have been held down by owners receiving returns on investment in terms of appreciation of property values instead of relying entirely on rent increases. Rent controls in some regions have held down rent increases.



### Interest

Interest rates on commercial paper (prime, 4 to 6 months) was selected to represent changes in short-term interest costs in the Marketing Cost Index. These rates are assumed to represent changes in short-term interest rates paid by the food industry. Rates for banker acceptances (prime, 90 days), an alternative measure of interest costs, moved almost identically with the index selected. Both of these indexes are published monthly in BEA's Survey of Current Business.

### Data Needs

If better price indexes are developed or discovered, the new data will be incorporated to improve the accuracy of the indexes. These data could include rates charged for business services, such as commercial rent and truck transportation services.

### Indexes of Intermediate Goods and Services

Until January 1980, ESCS maintained and published quarterly indexes of prices for intermediate goods and services which were weighted with values of goods and services purchased in 1963. The prices used in the index also were primarily from the PPI and CPI.

When the indexes presented in this report became available for January 1980, they were substituted for the index of prices of intermediate goods and services. Indexes presented in the report provide better information for analyzing farm-to-retail price spreads for several reasons. First, the new indexes are weighted with more current cost weights. Second, labor and transportation costs which were not a part of the indexes of intermediate goods and services, are incorporated into the index. Moreover, the new indexes correspond more closely to the concept of the farm-to-retail price spread for a market basket of foods for at-home consumption. The index of intermediate goods and services included items purchased by public eating places. Thus, the new indexes provide better information for analysis of farm-to-retail price spreads and retail food prices.

#### REFERENCES

- (1) Earle, Wendall, and Willard Hunt. Operating Results of Food Chains, 1972-73. Ithaca, N.Y.: Cornell Univ., 1973.
- (2) Gralla Publications. "Consumer Expenditure Study," Supermarket Business, Sept. 1972.
- (3) Scott, Forrest, and Henry Badger. "Agricultural Marketing Costs and Charges: How They are Constructed and Used," Major Statistical Series of Agriculture, Vol. 4, AH-365, U.S. Dept. of Agr., Econ. Res. Serv., June 1970.
- (4) U.S. Department of Commerce, Bureau of Economic Analysis. "The Input/Output Structure of the U.S. Economy, 1972," Supplement to the Survey of Current Business, Vol. 29, No. 2, Feb. 1979.
- (5) \_\_\_\_\_, Bureau of Economic Analysis. Survey of Current Business, 1967-79.
- (6) \_\_\_\_\_, Bureau of the Census. Census of Wholesale Trade, 1972, Vol. 1, Summary and Subject Statistics, 1976.
- (7) \_\_\_\_\_, Bureau of the Census. Census of Retail Trade, 1972, Vol. 1, Summary and Subject Statistics, 1976.
- (8) \_\_\_\_\_, Bureau of the Census. Census of Food Manufacturing, 1972, Vol. 1, Summary and Subject Statistics, 1976.
- (9) \_\_\_\_\_, Bureau of the Census. Part 2. Central Administrative Offices and Auxiliaries, 1972 Enterprise Statistics. May 1977.
- (10) U.S. Department of Labor, Bureau of Labor Statistics. Employment and Earnings. monthly.



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