THE FOOD MARKETING COST INDEX:

A NEW MEASURE FOR ANALYZING FOOD PRICE CHANGES

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ABSTRACT

This paper presents cost indexes of inputs used in food processing, wholesaling, and retailing. Indexes are presented for costs of labor, packaging materials, transportation services, advertising, fuel and power, other utilities, rent, maintenance and repair, business services, property taxes and insurance, supplies, and interest. Data sources and methodology used in constructing the indexes are presented.

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

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FOOD MARKETING COST INDEX: A NEW MEASURE FOR ANALYZING FOOD PRICE CHANGES

INTRODUCTION

This report describes a new index, the Marketing Cost 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.

Food price inflation has accelerated in the last couple of years and continues to be a major economic concern in 1980. 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.

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's food dollar (3). 1/ Both of these statistical series are published by USDA in Agricultural Outlook. The Marketing Cost Index, described here, will be periodically published in Agricultural Outlook.

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.

1/ Underscored numbers in parentheses refer to items listed in References at the end of this report.

The largest component of the index is employee wages and salaries, followed by packaging materials, transportation rates, and energy costs. Other cost components of the index include advertising, maintenance and repair services, insurance, interest rates, rent, and the cost of 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 is reported based on these components.

Forty price series were used in the construction of 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. The remaining series are obtained from the various sources listed in table 1. Each price is weighted by the estimated cost of inputs bought by food marketing firms in 1972 which is 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 data from the Bureau of the Census (5), (6), and (7).

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, likewise represents charges for processing, wholesaling, and retailing a market basket of food, but 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. Any disparity in the monthly 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. Over longer periods of time the Marketing Cost Index may overstate increases in marketing costs because it 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. The index should not be interpreted or used as a measure of actual costs for a firm or group of firms.

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

Cost	Relative importance 1/	Data series used
	Percent	
Labor		
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
Packaging and containers:		
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
Transportation, intercity railroad and truck	9.9	Bureau of Labor Statistics (BLS) rail freight rate index for food
Advertising:		
National	2.3	McCann Erickson, Inc. index of all media advertising costs
Local	2.6	BLS index of other commercial newspaper advertising
Fuel and power:		
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
Other utilities:		Consumer Price Index, Urban (CPI-U)
Communications	.8	CPI-U, telephone
Water and sewage	.2	CPI-U, water and sanitary services

See footnote 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/	Data series used
	Percent	
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	2/	PPI, pallets and skids
Steel wire	.2	PPI, baling wire carbon
Work clothing	.1	CPI-U, boys and mens 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, annual 1968-1979, monthly 1979-80

Year and month	Marketing Cost Index	Farm to retail price spread	Farm value	Retail price
		Percent		
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	8.6	7.8	16.8	11.3
1979	11.1	11.9	11.4	11.7
1979:				
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	1.2	-1.2	2.6	.2
December	.4	1.2	1.5	1.3
1980:				
January	1.0	2.1	-1.4	.7
February	1.5	-.8	1.2	--
March	1.0	2.9	-2.3	.9

-- = Less than .05 percent.

The 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. In addition, the index is based on fixed 1972 expenditure weights 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

In 1979, the Marketing Cost Index rose 11.1 percent, considerably more than the average annual rate of recent years (table 2). The biggest increases were for fuel and power, transportation, and interest. During the same period, the farm to retail price spread increased by 11.9 percent.

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. Variations in the rate of change in these indexes result primarily from different quantity weights for labor costs and other inputs used in performing the different functions, 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

Table 3—Changes in Marketing Cost Indexes for processing, wholesaling and retailing, 1978 and 1979

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	249.4	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	202.6	231.5	14.3	192.2	216.3	12.5
Interest, short-term	156.4	213.5	36.5	156.4	213.5	36.5
Transportation	220.5	251.3	14.0	220.5	251.3	14.0

taxes and insurance increased less in food wholesaling and retailing than in food processing.

Prior to 1979, the largest increases in farm to retail price spreads and marketing costs occurred in 1974. In 1974, the farm to retail price spread jumped 19 percent 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 increase in wage supplements was 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 Costs Index and component indexes have increased every year since 1967 (table 4). In 1979 the total index averaged 252 percent of the 1967 level. During the same period, the farm to retail spread for a market basket of farm foods increased to 217 percent of the 1967 level. The correlation between the annual changes in the marketing cost index and the farm to retail price spread was quite high from 1967 to present (r^2 = 82).

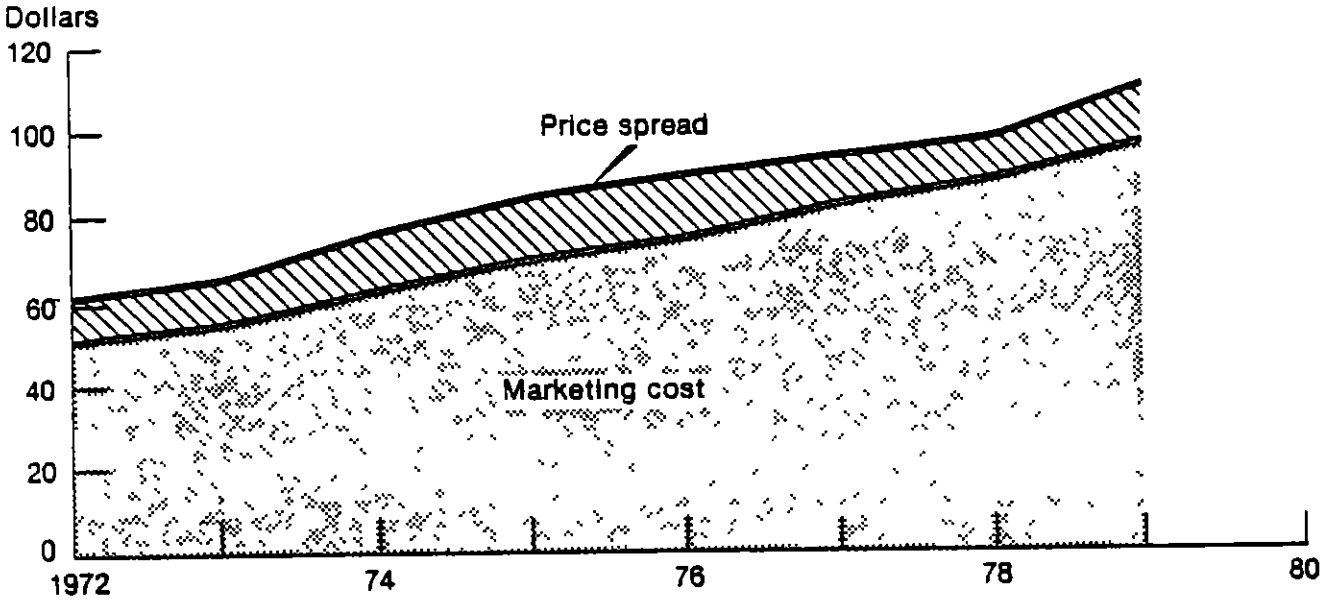
Annual changes in the farm to retail price spread and the marketing cost index were also similar between 1972 and 1979 (fig. 1). The farm to retail price spread for a market basket of domestically produced foods amounted to $61 per $100 spent for these foods in 1972. By 1979, the farm to retail price spread for these foods had risen to $111.32 out of $183.60 spent for food--and 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 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.

While 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.

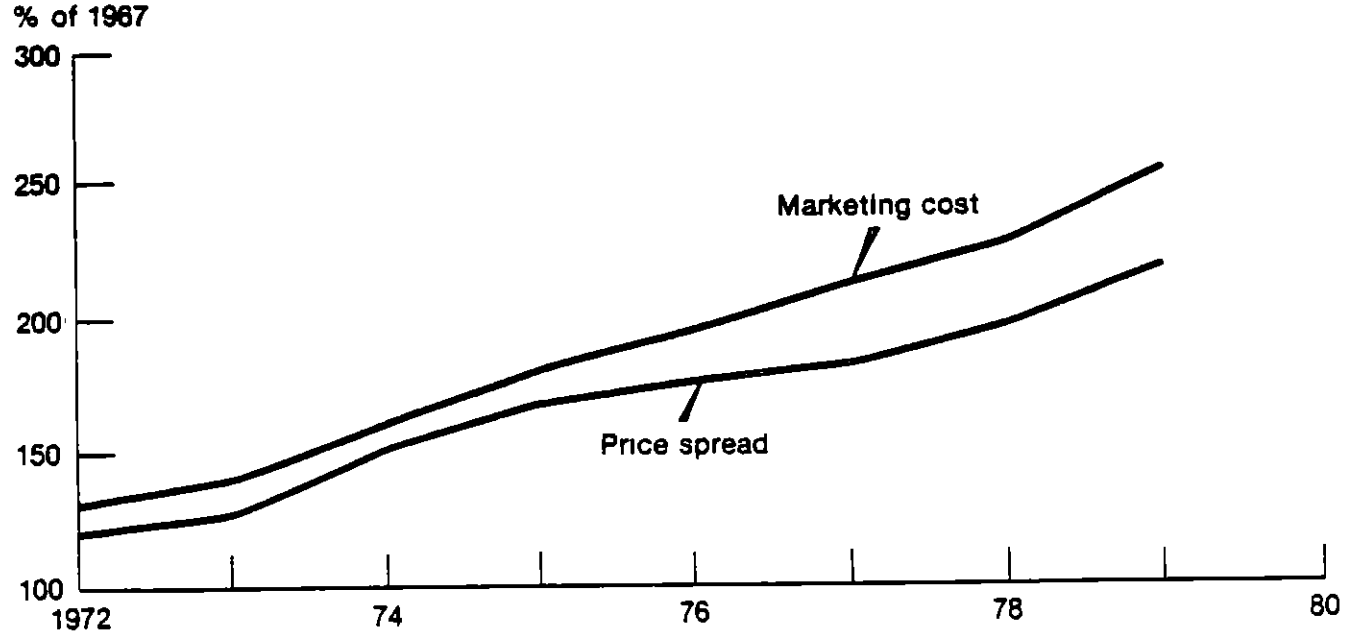
Difference between marketing cost and price spread represents depreciation, long-term interest, profits, and net income of noncorporate businesses.

USDA

Neg. ESCS 237-80 (4)

FIGURE 2

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

USDA

Neg ESCS 238-80 (4)

Table 4--Indexes of food marketing costs, 1968 to 1979

Cost item	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
						1967=100						
Labor-hourly earnings and benefits	106 5	113 7	122.5	131 9	143 3	154 2	168.7	187.4	203 8	222.4	244 4	265 9
Processing	105.9	112.7	121.2	130 9	139.9	151 3	164 4	184 1	200 1	217 6	237 2	257.8
Wholesaling	106.7	113.5	125 1	131 9	143 7	153.7	167 4	182 3	197 6	217 8	239.4	260 2
Retailing	107 0	114 8	122.6	133 0	146.4	157 3	173 7	192.9	210.3	229 4	253 8	276 6
Intermediate goods and services	101.1	105.5	111 1	116.0	120 2	127.4	152.6	172.1	185 4	198 5	212.7	240.3
Packaging and containers	96.3	99.5	103 6	106.6	110 4	117 3	149 7	174 4	184.8	192 8	204.7	228 4
Paperboard boxes and containers	95 9	99.4	101.1	102.4	105.5	115.1	152.2	170.3	176.2	176.5	179 3	201 8
Metal cans	104 4	107 1	113.1	123.8	131.8	138.5	170.3	200.2	212.1	231.4	260 8	292 5
Paper bags & related products	101.0	103.6	108.0	109.7	113.6	121 6	144.9	161.6	170 0	176.7	186 2	209.2
Plastic films and bottles	78.4	79.9	86.0	81 8	82.9	86 4	129.6	170.8	188.1	193.6	192 8	216 8
Glass containers	107.5	114.7	120.3	131.6	135 1	138 9	155.5	181.8	195 4	214.4	244 6	261 3
Metal foil	100 2	105.5	106.3	106 4	106 1	106 0	113.0	116.6	127 1	140.0	159.0	175 6
Transportation services	102 0	105.0	114.3	128 5	132.5	135.2	156.3	176.9	194 4	205.1	220.5	251 3
Advertising	102 5	107 5	109 6	108 7	113.2	118 2	124.2	136.9	152.8	166 3	179 2	197.4
Fuel and power	99.7	100 5	106.1	112.3	118.4	133 1	198.9	236.1	264.5	310 6	331.3	418.2
Electric	100 9	101.8	105.8	113.6	121.5	129.3	163.1	193.4	207.7	232.9	250 8	270.5
Petroleum	101.9	102.4	106.5	110.3	113 3	139.7	272.2	309 4	336.9	384.1	398.1	574.6
Natural gas	92 7	93.2	103.6	108.0	114.1	126.7	162.2	216.7	286.8	388.0	429 0	544 0
Communications, water and sewage	100.8	102.8	105 1	111 3	117.8	120 8	126 3	131.8	138.4	142.6	147.4	148 7
Rent	104.4	109.4	115.4	121 7	126.3	131.1	145 9	167.0	174.9	185.0	199 2	216.4
Maintenance and repair	105 8	113.7	122 3	131 5	138 0	146 7	164 3	182 2	196.1	209.2	226.4	249 7
Business services	105.0	110.0	115.6	123.5	128.2	133.3	146.8	159.7	171.3	182.5	195.2	211.0
Supplies	102.1	102 8	106 5	108 7	110.0	113 5	145.1	169 9	181.3	188.9	197 9	224.3
Property taxes and insurance	109.2	118 3	130.5	142.1	153 4	158.4	163 0	180.0	194.5	218.9	237.2	246.4
Interest, short-term	115.5	158.2	150.9	100.0	92.6	159.5	192.6	128.7	104.7	109.8	156.4	213.5
Total marketing cost index	103.5	109 2	116 1	123 0	130 5	139 4	159 8	178.8	193.6	209 2	227.1	252.2

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 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 $6.1 billion in 1978 or 2.6 times (table 6). Profits as a percentage of sales of these foods increased from 3.6 percent in 1967 to 4.2 percent in 1978.

Table 5—Indexes of Productivity as measured by output per unit of labor input, selected food industries and the nonfarm sector of the eocnomy

Year	Food stores	Eating and drinking places	Manufacturers of farm-originated foods	Nonfarm business sector of the economy
		1967=100		
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 percentage change:				
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 percentage of consumer expenditures on food for use at home, 1967-78

Year	Farm food expenditures	Profits before taxes	Profits as a percentage of sales
	Million dollars		Percent
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

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 importance of individual components of the index in terms of retail costs 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 product 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 by can be computed 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 spent for food or 8 percent, may be attributed the higher cost of fuel and power used directly in food processing, wholesaling and retailing. In addition, higher fuel and power prices added indirectly 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 percent to 7.9. During the same period, labor costs declined from 47.8 percent to 46.8 percent of the index.

THE 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 Bureau of Economic Analysis and the Bureau of the Census data available from the U.S. Department of Commerce.

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 relative importance--the base period used for most economic indicators (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 Costs

Labor costs account for about half of the Marketing Cost Index, underscoring the importance of the labor component of the index. Labor costs consist of payroll costs and wage supplements. Data from the Censuses of Manufacturers and Businesses were used to establish labor cost weights for the index. Payroll accounted for 88 percent of total labor costs for processing, wholesaling, and retailing food in 1972.

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

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

Table 8—Operating costs of processing, wholesaling, and retailing U.S. farm foods, 1972

Cost item	Cost	Percentage of total costs
	Million dollars	Percent
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
Total	43,589	100.0

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

Cost item	Total cost	Processing cost	Wholesaling and retailing cost
		Percent	
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, & 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
Supplies:			
Tires and tubes	.6	.2	.4

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

Cost item	Total	Processing	Wholesaling and retailing
		Percent	
Motor vehicle parts	0.1	--	0.1
Chemicals	.5	0.5	--
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.

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 the 1972 Enterprise Statistics (8). That report provides data on the characteristics of central administrative offices and auxiliaries that were separately reported by multiestablishment firms covered by the 1972 Economic Censuses. 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

Table 10--Relative importance of supplements to wages and salaries as a percentage of total labor cost, selected industries, 1967-1979.

Year	Food and kindred products manufacturing	All wholesale trade	All retail trade
	Percent of total labor cost		
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 1/	17.79	13.43	--

-- = Not available.
1/ Estimated.

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.

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 of Manufacturers and Businesses. Over 90 percent of 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 the U.S. Department of

Commerce, Bureau of Economic Analysis 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 service, 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 dissaggregated 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 and 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, choco-

late), 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 Producer Price Index 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.

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.

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
		Million dollars	
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 1/	4,709	843	3,866
Total	52,350	23,728	28,622

1/ Includes noncorporate income and miscellaneous costs.

Data on sales of food and wholesalers by line of business from the 1972 Census of Wholesalers were used to estimate the ratio of sales of U.S. farm foods to total sales (5). 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 Business were used to adjust wholesaling and processing costs for foods sold for away-from-home consumption (5). 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, food wholesaling, and food retailing. These data are published monthly in Employment and Earnings published by BLS.

Annual data on wage supplements published by BEA in the July issue of the Survey of Current Business 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 corresponds closely with all wholesaling. Thus, data on wage supplements for all wholesaling employees published by BEA were used to adjust the hourly earnings of food wholesaling employees to obtain an index of total labor compensation.

For 1979 and 1980, BEA quarterly 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 components of the Producer Price Index, 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 Producer Price Index 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

Radio and television advertising rates are not covered by BLS's current indexes. A BLS index for newspaper advertising is used in the Marketing Cost Index to represent local advertising in newspapers by foodstores. 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 FCC 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 a decline in circulation, then the advertising rate per thousand exposures would not change. Thus, an index of cost per 1,000 audience exposures provides the best measure of changing advertising costs

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 was selected and 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 index was not used because it was thought to be inferior to a current weighted index such as the implicit price deflator for new plant and equipment. Residential rents was not selected because residential 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 the rise in residential rents.

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 be representative of changes in short-term interest rates paid by the food industry. Rates for bankers 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 Producer Price Indexes and Consumer Price Index published by the U.S. Department of Labor.

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. The 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 costs which were not a part of the indexes of intermediate goods and services, are incorporated into the structure of the new indexes. 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.

CONCLUSION

This paper describes new Laspeyres price indexes for measuring changes in the costs of processing, wholesaling, and retailing foods. 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 labor costs 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 prices of inputs, such as fuel and power, on food prices.

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.

By the end of 1979, the Marketing Cost Index had increased to 252 percent of the 1967 level, while the farm to retail price spread had increased to 217 percent of its 1967 level. Increased productivity was the major factor responsible for the index of farm to retail price spreads increasing less than the index of marketing costs. Data on labor productivity indicate that increased labor productivity in food processing held down unit labor costs, implying 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 processing, retailing, and wholesaling food firms, whose profits increased substantially in 1979.

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