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# Capital Formation in Food Processing

Anthony E. Gallo and Walter Epps

This exploratory research looks at the role of capital expenditures in the food manufacturing industries in the face of industry productivity changes and industry restructuring. Food processing's position as the economy's largest manufacturing industry in shipments is compared with its share of total capital expenditures. Gross capital stock, net capital stock, gross constant stock, and net constant stock are examined to estimate changing capital base. Rates of change in multifactor and output per man hour productivity are compared with rates of change in new capital expenditures. Major industrial reorganization has taken place in food processing because of mergers, acquisitions, and leveraged buyouts. The change in capital expenditures following these transactions is examined to determine their impact on industry investment.

## Industry Background

The food processing industry employed about 1.6 million people in 1992, about 200,000 less than were employed in 1958. Yet, food processors in 1992 were feeding 255 million people, an increase of 75 million since 1958. Moreover, the industry has made major contributions to accommodate changing demographic lifestyles--two-worker households, changing incomes, more single-member households--by introducing convenience and microwave foods. Productivity growth varies sharply among different food processing industries, but most have shown increases in labor productivity. Amidst all of this, the industry considerably raised debt levels in the 1980s, so that food is now one of the most leveraged industries in the American economy.

The U.S. food manufacturing sector, essentially a group of 72 industries ranging from meatpacking plants to breweries, has one of the most unique industrial organizations of any industry in the U.S. economy. Food manufacturing is the largest manufacturing industry in the American economy, accounting for about 14 percent of all manufacturing shipments. However, food processing is a slow-growth industry, growing at about half the pace of growth in the general economy. Consequently, food's contribution to GNP has fallen in the long term. But, concentration is rising sharply, with the top 50 firms accounting for 65 percent of value added in 1987 compared with 35 percent in 1963. The number of food processing firms fell from 33,000 in 1963 to 16,000 in 1987. During the 1980s, food processing was the leader in leveraged

buyouts and mergers. Many of the 72 food processing industries are oligopolistic, characterized by intense price and nonprice competition. In 1992, food manufacturers introduced nearly 13,000 new products and spent about \$13 billion in direct consumer advertising. In terms of performance, food manufacturing is the second most profitable manufacturing industry in America, pharmaceuticals being first. Like other nondurable goods industries, food processing is one of the lowest spenders on research and development, although a great deal of research is purchased from suppliers.

## Capital Expenditures

In 1992, food processors will spend nearly \$10 billion in new plant and equipment to modernize about 380 plant projects (Table 1). That \$10 billion is an addition to the current cost gross stock of capital. In 1991, this measure of fixed capital amounted to \$200 billion, or roughly 9.2 percent of all manufacturing fixed private capital. About half of that fixed capital merely reflects replacement of existing plant. The current net stock of fixed capital amounted to \$109.4 billion (Table 2). Adjusted for price increases (in 1987 dollars), the cost net stock of capital in 1991 was \$95.2 billion. Food's constant cost fixed capital has thus about doubled since 1947 compared with a quadrupling for all manufacturing, slightly above the increase for nondurables. Much of that growth, however, took place during the early fifties. Since 1960, the differential has narrowed considerably, and since 1970, fixed capital formation for food has grown at about the same rate as for non-food.

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**Table 1**  
**U.S. Food Plant Construction**

Year	New construction	Major renovations or expansions	Total <sup>1/</sup>
	----- Number -----		
1984	119	82	201
1985	146	149	295
1986	159	173	332
1987	198	141	339
1988	187	182	369
1989	183	157	390
1990	219	201	456
1991	146	159	305
1992	170	216	376

<sup>1</sup> Projects planned, under construction, or completed during that year. Some redundancies exist from year to year, because a project under construction in one year may have been completed in the following year.

Of even greater interest is the growth of the capital base between 1985 and 1991. During this period, the food processing industries experienced the largest leveraged buyouts and mergers in U.S. history (Tables 4 and 5). Nearly 2,000 mergers in food processing took place during this period, and the value of recorded mergers was more than \$100 billion. Debt levels in the food processing industries rose from \$98 billion in the first quarter of 1985 to \$270 billion in the fall quarter of 1991. The debt-to-equity ratio rose from 77 percent to 111 percent (Figure 1). Capital formation rose 14.3 percent, slightly above the increase for nondurable goods, and considerably above the increase for all manufacturing (Figure 2).

Thus, two trends became apparent. First, the rate of capital formation in food manufacturing kept up with the rest of American industry over the past few decades. Second, structural changes, such as merger and leveraged buyout activity, increased concentration, the decline in the number of firms, and a sharp increase in debt, appear not to have had any discernible impact on new plant and equipment expenditures.

#### *Employment, Output and Productivity*

The \$400 billion food processing market employed about 1.6 million people in 1993, or about 9 percent of all manufacturing employees. Over the long run, food processors' share of total manufacturing employment

has remained at around 9 percent (Table 7). However, as the U.S. economy has become more service oriented, food's share of total U.S. employment declined from 2.4 percent to 1.5 percent. Whereas the economy grew at a 3 percent rate between 1972 and 1991, U.S. food production rose at a 1.7 percent rate. Consequently, food as a share of GDP declined from 9.5 percent to 6.8 percent.

Employment in food manufacturing declined from 1.8 million in 1972 to 1.6 million in 1991. Thus, over the long run, U.S. food processors increased production to feed an additional 40 million Americans (plus exports) with a 10 percent drop in production workers.

Changes in productivity vary widely among the various 49 food processing industries. Among select food processing industries, changes in output per man-hour between 1982 and 1988 ranged from 8 percent for meat packing plants to 48 percent for soft drink bottlers (Table 9). Therefore, productivity increases for food processing as a whole may differ drastically from that of individual four-digit SIC industries. Nevertheless, the industry average shows that labor productivity (output per man hour) for food and kindred products rose at about 2.7 percent between 1949 and 1988 (Table 10). This rate is essentially the same as for nondurable goods and all manufacturing.

Capital productivity for food and kindred products however appears to have risen considerably more than that for all manufacturing (Table 11). Whereas capital productivity rose 1.1 percent for food between 1949 and 1988, nondurable goods showed no increase and all manufacturing showed a decline.

Multifactor productivity rates showed food rising much less than nondurable goods and all manufacturing, meaning a drop in energy, materials, and services productivity.

**Table 2. Fixed capital in food manufacturing**

<u>Year</u>	<u>Current cost gross stock</u>	<u>Current cost net stock</u>	<u>Constant cost gross stock<sup>1</sup></u>	<u>Constant cost net stock<sup>1</sup></u>
----- <i>Billion Dollars</i> -----				
1947	12.8	6.9	78.7	42.0
1958	20.1	10.2	86.2	43.7
1963	22.1	11.5	89.8	46.6
1967	27.1	14.7	97.1	52.3
1972	39.8	22.4	109.3	61.1
1977	70.7	40.3	125.5	71.3
1982	124.4	70.1	144.7	81.5
1983	129.7	72.3	146.8	81.8
1984	135.5	74.8	149.0	82.2
1985	141.8	77.9	151.8	83.3
1986	150.8	82.0	153.7	83.6
1987	159.7	86.7	157.0	85.2
1988	168.8	91.5	160.1	86.8
1989	130.8	98.2	164.5	89.5
1990	190.4	103.8	169.1	92.4
1991	200.2	109.4	173.5	95.2
1992				

<sup>1</sup> 1987 dollars.

Source: (2)

**Table 3. Constant Cost Net Stock of Fixed Capital in Food Manufacturing**

<u>Year</u>	<u>Food</u>	<u>All manufacturing</u>	<u>Food as percent of total</u>
----- <i>Billion dollars</i> -----			
1947	42.0	240.6	17.5
1958	43.7	366.7	11.9
1963	46.6	404.1	11.5
1967	52.3	516.6	10.1
1972	61.1	672.6	9.7
1977	71.3	759.9	9.4
1982	81.5	917.4	8.9
1983	81.8	916.4	8.9
1984	82.2	928.4	8.9
1985	83.3	949.5	8.8
1986	83.6	954.1	8.8
1987	85.2	964.3	8.8
1988	86.8	973.4	8.9
1989	89.5	998.7	9.0
1990	92.4	1,025.1	9.0
1991	95.2	1,041.2	9.1

Source: (2)

**Table 4. Food processing mergers<sup>1</sup>**

Year announced or completed	Rank among in value all industries	Value	Foreign purchases of U.S. firms		U.S. purchases of foreign firms	
			Number	Value	Number	Value
		<i>Million \$</i>	<i>Number</i>	<i>Million \$</i>	<i>Number</i>	<i>Million \$</i>
1982	4	4,952	4	131	5	154
1983	8	2,712	9	253	6	105
1984	2	7,948	8	2,994	5	96
1985	5	12,854	8	257	10	70
1986	4	8,432	13	1,246	9	98
1987	6	7,951	13	2,888	14	800
1988	1	53,209	22	8,541	14	1,569
1989	7	8,261	17	4,222	14	2,260
1990	12	7,666	15	1,074	10	4,769
1991	14	3,100	8	453	14	721
1992	10	4,328	8	446	26	2,976

<sup>1</sup> Includes only large mergers in which the value of the transaction was recorded.

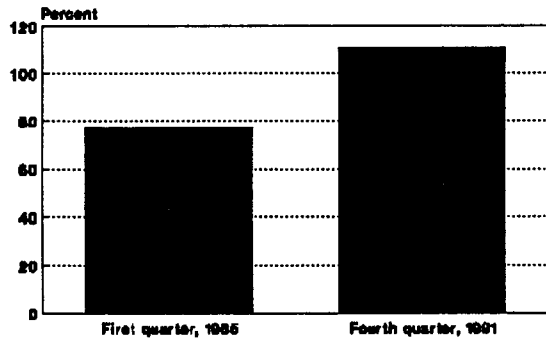
Source: (4)

**Table 5. Food marketing mergers among the 100 largest transactions in history**

Buyer/seller	Rank among transactions	Price	Year announced
		<i>Million \$</i>	
Kohlberg, Kravis, Roberts & Company/RJR Nabisco Inc.	1	24,562	1988
Philip Morris Company/Kraft Inc.	3	13,100	1988
Grand Metropolitan PLC/Pillsbury Company	11	5,636	1988
Philip Morris Company/General Foods Corporation	12	5,628	1985
Kohlberg, Kravis, Roberts & Company/Beatrice Companies	14	5,362	1985
R. J. Reynolds Industries, Inc./Nabisco Brands, Inc.	19	4,906	1985
SSI Holdings Corporation/Safeway Stores, Inc.	24	4,198	1986
Private group, led by two top company executives/Southland Corporation	29	3,723	1987
Unilever N.V. - Netherlands/Cheesebrough-Pond's Inc.	38	3,093	1986
Nestle S.A. (Switzerland)/Carnation Company	41	2,885	1984
Seagram Company Ltd (Canada)/Conoco, Inc.	47	2,576	1981
Beatrice Foods Company/Esmark Inc.	49	2,509	1984
Kraft, Inc./Dart Industries, Inc.	57	2,400	1980
Nabisco, Inc./Standard Brands, Inc.	78	1,827	1981
Private group, led by Merrill Lynch & Co./Supermarkets General Corp.	80	1,801	1987
Pantry Pride, Inc./Revlon, Inc.	91	1,639	1985

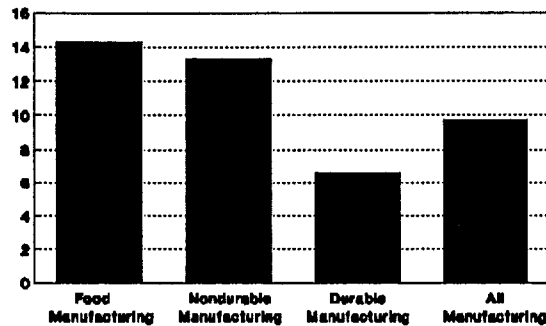
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**Figure 1**  
Debt to equity ratio: Food and Tobacco Processing Industries



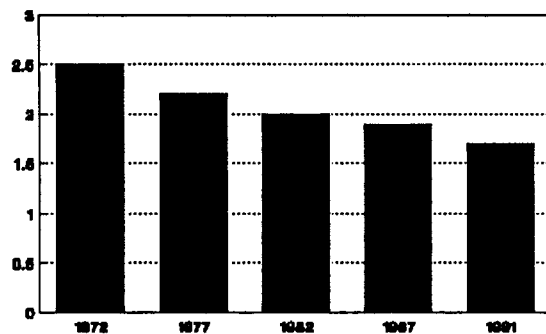
Source: (1)

**Figure 2**  
Increase in constant net stock of fixed capital, 1985-1991



Source: (2)

**Figure 3**  
Food Processing: Share of value added to GNP



Source: (3)

**Table 6**  
Annual Compounded Growth in Net Stock Of fixed capital

Item	1947-1991	1970-1991
	Percent	
Food	1.8	2.3
Nondurable goods	3.0	2.7
All manufacturing	3.4	2.4

Source: (2)

**Table 7**  
Food Share of Employment, Selected Years

Year	Employment		Food as % of total	
	All	Food	manufacturing employment	All employed
	Thousands		Percent	
1991	18,445	1,600	9.0	1.5
1987	19,624	1,621	8.5	1.6
1982	18,781	1,635	8.7	1.8
1977	19,682	1,711	8.7	2.1

Source: (5)

**Table 8**  
Food's Share of Product Shipments

Year	Industry shipments		Food's share	
	All	Food	of shipments	of GDP
	Billion dollars		Percent	
1991	2,826	387	13.7	6.8
1987	2,475	329	13.3	4.7
1982	1,960	280	14.3	8.9
1977	1,358	192	14.4	9.7
1972	756	115	15.2	9.5
1967	588	183	14.9	10.3

Source: (3)

**Table 9. Labor Productivity in Food Processing**

Year	Red Meats	Milk	Preserved fruit and vegetables	Bakery products	Sugar	Beer	Soft Drinks
<u>Index of output per person per hour (1982=100)</u>							
1967	74.8	62.9	73.8	82.8	77.1	47.4	66.6
1972	85.0	85.1	83.1	94.1	90.4	66.1	75.4
1977							
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	103.2	105.7	101.1	103.5	109.1	107.2	106.6
1984	104.2	110.5	104.8	103.4	110.4	112.5	114.9
1985	106.4	118.9	104.7	105.1	116.7	106.3	119.9
1986	104.5	119.5	107.9	110.7	121.8	124.3	128.4
1987	105.9	125.0	113.0	109.7	139.3	135.1	138.6
1988	108.2	130.1	112.1	102.7	138.2	141.6	148.4

Source: (5)

**Table 10**

**Labor productivity growth rates, selected periods**

Period	Food and kindred products	Nondurable goods	All manufacturing
<i>Percent</i>			
1949-88	2.7	2.6	2.6
1949-73	2.8	3.0	2.7
1973-88	2.6	1.9	2.5
1949-78	2.8	2.9	2.6
1979-88	2.4	1.5	2.7

Source: (5)

**Table 12**

**Multifactor productivity growth rates, selected periods**

Period	Food and kindred products	Nondurable goods	All manufacturing
<i>Percent</i>			
1949-88	0.6	1.0	1.3
1949-73	0.8	1.4	1.6
1973-88	0.3	0.4	0.9
1949-79	0.6	1.1	1.2
1979-88	0.7	0.9	1.6

Source: (5)

**Table 11**

**Capital productivity growth rates, selected periods**

Period	Food and kindred products	Nondurable goods	All manufacturing
<i>Percent</i>			
1949-88	1.1	0.0	-0.2
1949-73	1.6	0.5	0.2
1973-88	0.2	-0.8	-0.8
1949-79	1.2	0.1	-0.1
1979-88	0.6	-0.4	0.4

Source: (5)

**Conclusions**

- Food manufacturing, although a leader in new products introductions among all industries, is not capital intense compared with other industries. Food accounts for about 9 percent of capital expenditures and 14 percent of manufacturing output.
- Fixed capital formation for food manufacturing has risen at about the same rate as that for other industries in America. Growth in capital productivity

has been considerably above the average for all industries.

- Industry restructuring in the 1980s appears to have had little impact on capital formation growth in food processing.
- Growth in output over the long term has been about 1.8 percent yearly, accompanied by a decline in employment. Hence, labor productivity has averaged about 2.5 percent over the long run.

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