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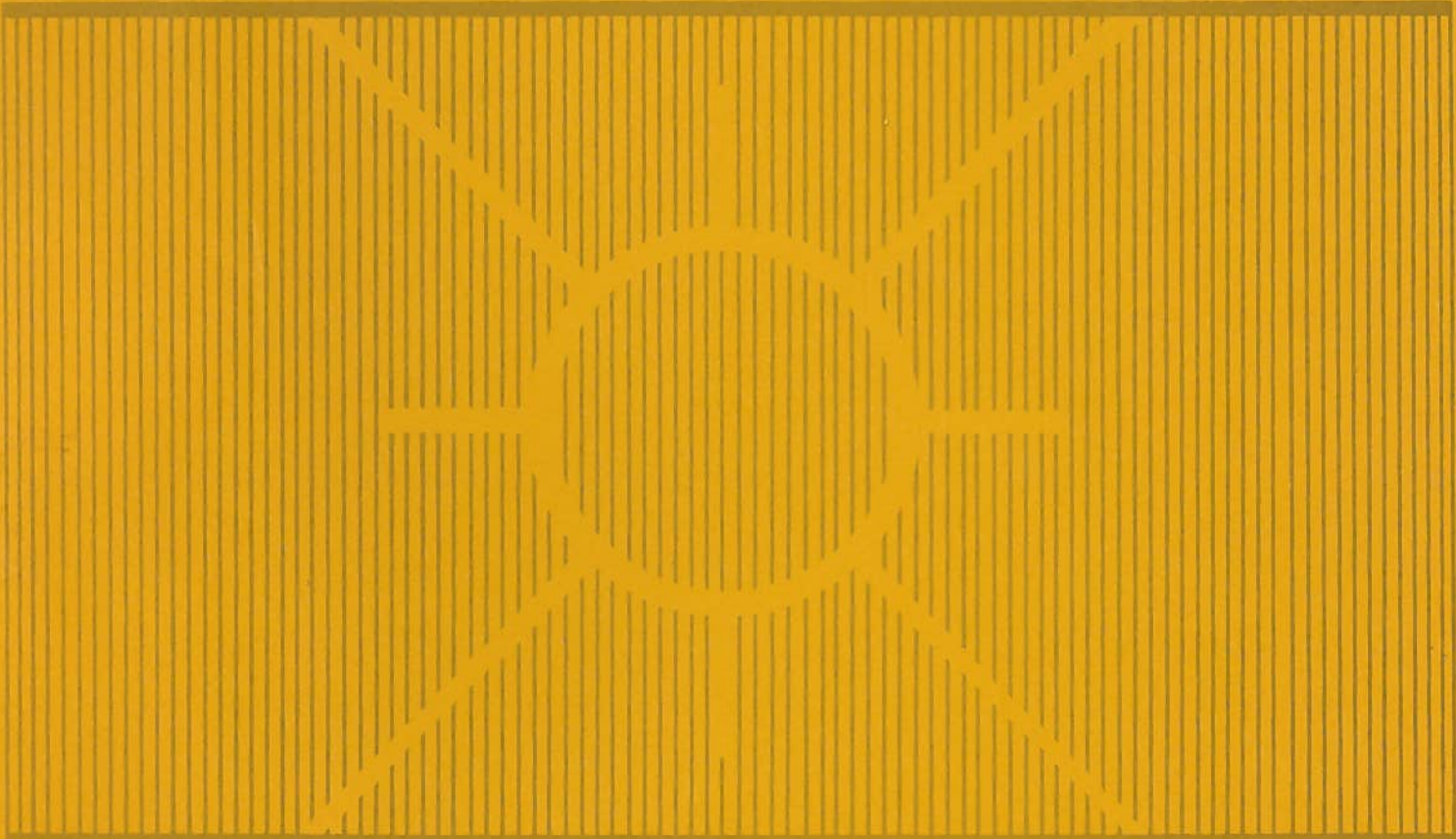
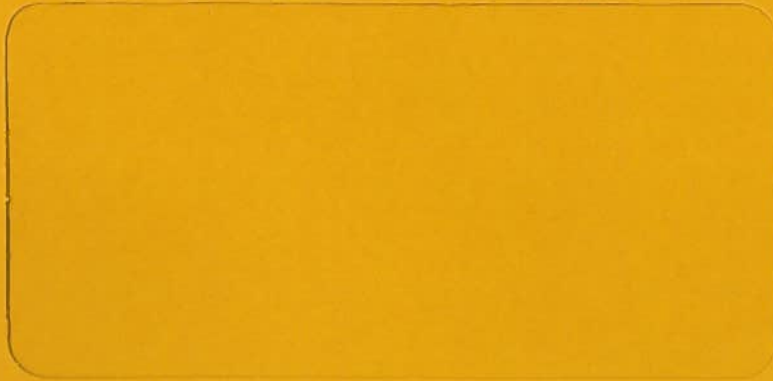
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FUTURE ORGANIZATION OF U.S. FOOD
SYSTEM: IMPLICATIONS FOR AGRICULTURE

by

Bruce W. Marion*

WP-49

November 1980

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Americans have long been concerned about the concentration of power-- whether in public or private hands. This is reflected in the division of powers in government dictated by the Constitution. Similarly, a market economy for the U.S. has been preferred over a centralized economy--in part because power is more dispersed.

I first learned that the structure of markets was important on my grandfather's dairy farm in upstate New York. My granddad was a strong supporter of cooperatives; before the advent of a milk cooperative, he had learned the hard way that few alternative milk handlers led to low prices for the farmer. In those days, the "relevant market" for our milk was handlers within a 10-15 mile radius of our farm.

Today, larger bottling plants and rapid transportation have substantially changed the relevant market for dairy farmers. My brother-in-law in upstate New York sells his milk to a Kosher handler in New York City, nearly 200 miles away. However, with the rapid decline in the number of milk handlers, in part because of cooperative consolidations, my brother-in-law has about the same number of potential buyers for his milk as my granddad had 35 years ago, and voices the same concern about too few market alternatives.

What's happening to our food system and where are we headed? Unless there are significant changes in the law or concerted government action to alter the change forces currently in motion, I believe we are headed for even more severe competitive problems than we have experienced to date. This is nothing new. The trends toward more concentrated, less price competitive markets has been with us for some time.

A Perspective of the Food System

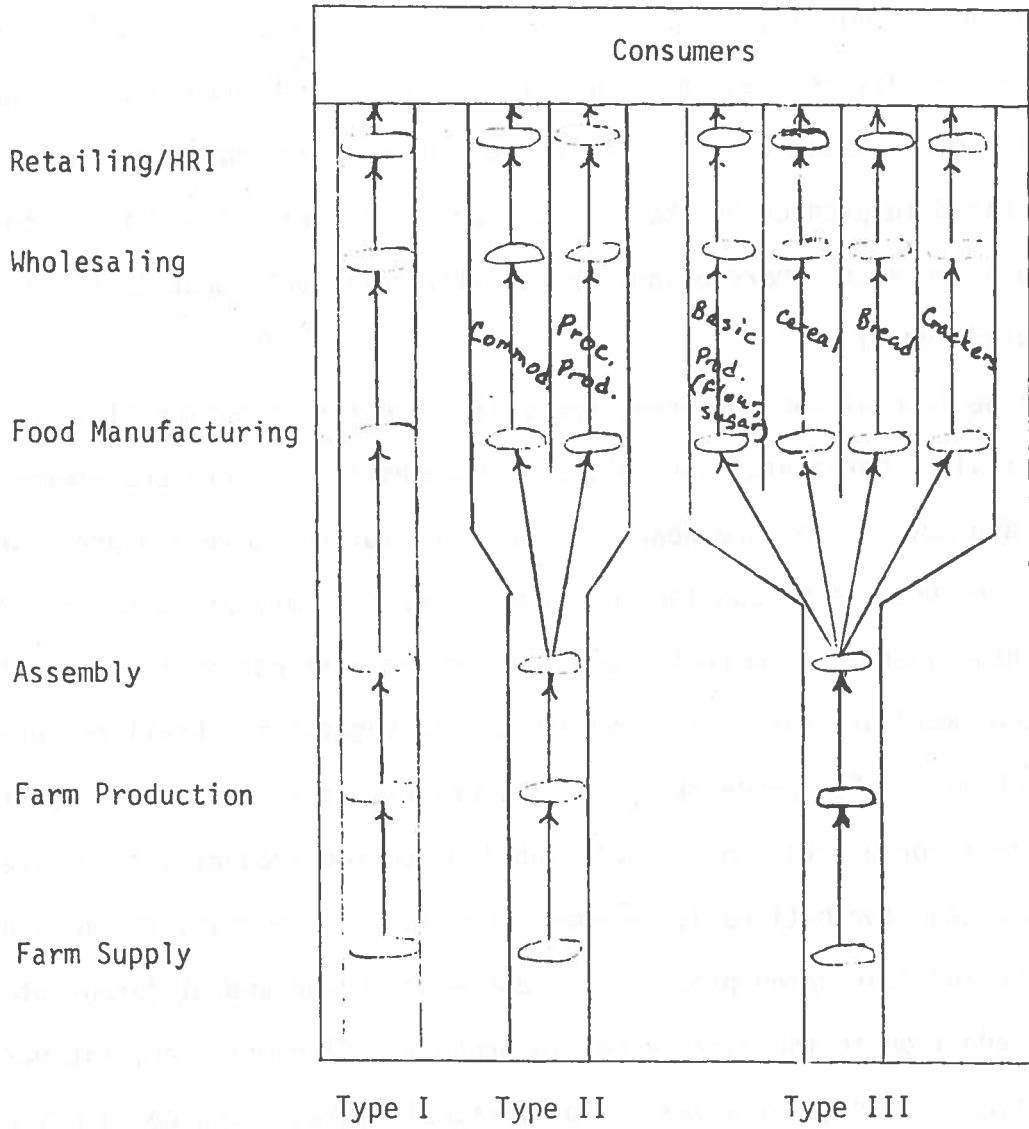
In examining the organization of the U.S. food system, we need to con-

sider:

- 1 - Vertical organization--how are commodity subsectors organized, what are the vertical linkages and who has control over various decisions?
- 2 - Industry or market structure--what are the characteristics of groups of competing sellers or buyers such as butter manufacturers, cereal manufacturers or the buyers of fed beef. Accurately defining relevant product and geographic markets is an essential first step.
- 3 - Aggregate structure--industry or market structure may not reflect aggregate economic power. Theoretically, we could have only 10 food marketing firms, each of which had a 10 percent market share in every food marketing industry. Although industry concentration would be modest ($CR_4 = 40$, aggregate concentration would be very high.

While I will primarily emphasize 2 and 3 in the balance of this paper, a few comments are warranted on the vertical organization of commodity subsectors. A wide variety of vertical organizations exists for the various agricultural commodities. For commodities such as lettuce, broilers, eggs and beef, the journey to market involves little processing. The identity and perishability of the commodity is largely maintained from farm to consumer (Type 1, Figure 1). For many commodities, however, while a portion moves through the subsector with little or no physical transformation (bottled milk, fresh apples, peaches, etc., fresh pork, fresh potatoes, carrots, tomatoes, etc.) a portion is also processed into branded products (Kraft cheese, Land-o-Lake butter, Mott's apple sauce, Oscar Mayer bacon, Wise potato chips, Hunt canned tomatoes). In these commodities, the subsector branches at the manufacturer/processor level into a commodity branch and one or more processed product branches (Type 2, Figure 1). The

Figure 1. Illustration of Different Types of Commodity Subsectors



third major type of organization (Type 3, Figure 1) characterizes relatively nonperishable commodities in which some processing is required before they are consumable (the grains, oilseeds, sugar, salt, cocoa beans and coffee beans). These tend to be "ingredient" commodities that are most frequently combined with other commodities to produce a consumer product. Thus, flour, shortening, sugar and salt are combined to produce Nabisco crackers, Keebler cookies or Wonder bread. Wheat and sugar are combined to produce Sugar Frosted Flakes. Chocolate, sugar, nuts and other ingredients are combined to produce Snickers candy bars. In these commodities, there are also basic products where brands are usually relatively weak (e.g., flour, granulated sugar).

If we look at the different types of subsectors from the standpoint of vertical or horizontal control, some interesting differences emerge. Brands and advertising are nearly nonexistent for relatively unprocessed commodities but are of considerable importance for many processed commodities. Thus, these sources of market power and forward vertical control (manufacturer → consumer) are rare for fresh fruits and vegetables, broilers, eggs and fresh meat. For processed products, brands and advertising range from unimportant for generic and private label processed products, to moderately to very important for nationally branded products. In general, the more highly processed and fabricated products are easier to brand and differentiate.

In addition to the differences in product differentiation, the various commodities also display a variety of vertical linkages and coordination arrangements. Vertical integration via ownership or contractual arrangements are most common in the commodity subsectors (poultry and eggs, beef and pork) and processed fruit and vegetable systems, and are relatively uncommon in the ingredient type commodities. This difference in

vertical coordination and control likely stems from many factors--perishability, variations in supply and price, the existence of futures contracts, and the importance of tight vertical coordination. Vertical control, unlike horizontal control, does not necessarily convey market power. Thus, the integrated broiler system is tightly coordinated from the feed mills and hatchery supply flocks all the way to retailers. However, since there are still about 100 integrators, there is not sufficient concentration of sales at any stage in the broiler system to allow supply control and administered prices. Vertical integration of this type may affect the rights and returns of farmers--but is not likely to affect the price paid by consumers unless system efficiency is affected. In the case of broilers, most of the evidence indicates efficiency has increased, resulting in lower consumer prices.

Thus, at this stage in the evolution of our food system, the commodities where vertical integration is most prevalent are those involving little processing and little market power at the manufacturing/processing stage. Market power tends to exist primarily in the more highly processed products.

Because of the concentration of sales among a few firms, brand differentiation, and/or barriers to new entry, several food manufacturing industries have considerable influence over the prices paid by consumers. For example, in 1972, the four leading companies accounted for 90 percent of the soft drink business, 84 percent of breakfast cereals sales, 84 percent of chewing gum sales and 95 percent of canned soup sales (Appendix Table 1). Where the structure of these industries allows firms considerable discretion in the products offered and the prices charged, higher consumer prices generally result.

Hence, the various commodity systems tend to be quite different in the degree of market power, vertical control and the role of consumers. With this as a background, let us turn our attention to the structure of each stage in the food system.

Producer-First Handler Markets

Unfortunately, our level of ignorance concerning the characteristics of producer-first handler markets is pretty high. We do know that:

- Agricultural production has become more concentrated among large farmers; i.e., the number of sellers of a given commodity has declined--although still large in absolute numbers in most cases.
- The number of buyers has declined. For example, the number of cheese and butter manufacturing plants has dropped sharply, as has the number of breweries. The number of fruit and vegetable canning companies has declined as has the number of meat packers, milk bottlers, egg packers and broiler processors.
- The share marketed through marketing cooperatives has increased for some commodities and held steady in others (Table 1). The importance of bargaining cooperatives probably hasn't changed much in the last decade or so.
- Direct marketing and the use of various types of contracts has increased--resulting in increased problems in price discovery and price reporting.

However, we don't know:

- How the size of the relevant market has changed. A decline in the number of buyers and sellers nationally or in a state doesn't necessarily mean that individual farmers have fewer buyers to bid for their output.
- The market shares of leading buyers--including cooperatives--in relevant economic markets. For example, although Table 2 indicates that the four largest cooperatives in each commodity in 1971-72 accounted for less than 40 percent of national production, except for rice and sugar, these figures understate cooperative market shares in relevant markets. Data on market shares in specific commodities

Table 1—Farm level share of the market handled by farmer cooperatives, major selected years

Functional group and commodity	Cooperative Share of Market									
	1950-51		1960-61		1964-65		1969-70		1974-75	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Number of cooperatives handling and percent of cash farm receipts										
Product marketed										
Cotton & cotton products	550	12	561	22	581	25	554	26	494	26
Dairy products	2,072	53	1,609	61	1,346	65	971	73	631	75
Fruits & vegetables	951	20	607	21	592	25	499	27	436	25
Grain & soybeans	2,740	29	2,661	38	2,596	40	2,539	32	2,540	40
Livestock & livestock products	753	16	532	14	479	13	546	11	572	10
Poultry products	760	7	567	10	410	9	295	9	167	9
Other	405	15	284	22	224	25	189	27	164	35
Total	7,276	20	6,548	23	6,009	25	5,415	26	4,817	30
Number of cooperatives handling and percent of farm supply expenditures										
Farm supplies purchased										
Feed	4,406	19	4,412	18	4,363	18	4,214	17	3,744	18
Seed	3,636	17	3,912	19	3,962	21	4,007	16	3,553	16
Fertilizer & lime	3,352	15	4,276	24	4,409	30	4,294	28	3,865	30
Petroleum	2,677	19	2,798	24	2,773	26	2,774	29	2,624	35
Farm chemicals	na	11	3,014	18	3,329	16	3,721	18	3,328	29
Other supplies & equipment	5,937	5	4,558	7	4,858	7	4,856	7	4,224	10
Total	7,409	12	7,016	15	6,763	15	6,209	15	5,554	18

Source: Randall Torgerson, "An Overall Assessment of Cooperative Market Power", in Agricultural Cooperatives and the Public Interest, NC 117 Mono. #4, University of Wisconsin, Sept. 1978

Table 2—Estimated Share of Cash Farm Receipts Accounted for by the 4 and 8 Largest Local and Regional Cooperatives Ranked by Gross Marketing Volume in Various Commodity Groups, 1971-72.

Cooperative Size Group	COMMODITY GROUP											
	Beans & Peas	Cotton	Dairy	Fruit & Vegetables	Grain ^a	Livestock	Nuts	Poultry	Rice ^a	Sugar	Tobacco	Wool & Mohair
Locals:												
1st-4th	5.0	0.6	1.7	1.9	0.6	(b)	0.6	1.0	12.1	N/A	N/A	2.2
5th-8th	1.7	(b)	1.3	1.1	(b)	(b)	(b)	0.6	4.6	N/A	N/A	0.5
1st-8th	6.7	0.9	3.0	3.0	1.0	0.5	0.9	1.6	16.7	N/A	N/A	2.7
Regionals:												
1st-4th	19.7	15.1	29.2	12.1	10.7	4.3	33.4	5.4	44.9	45.6	21.9	19.1
5th-8th	4.7	3.3	10.1	5.3	6.5	1.9	4.1	2.1	—	9.9	1.7	3.3
1st-8th	24.4	18.4	39.3	17.4	17.2	6.2	37.5	7.5	—	55.6	23.6	22.4
Weighted Cash Farm Receipts (Thousand dollars)												
	187,000	1,607,000	6,918,000	4,342,000	10,772,000	21,316,000	675,000	3,952,000	473,000	691,000	1,366,000	46,000

N/A not applicable

^a There is reason to suspect that the share of cash farm receipts accounted for by the 4 and 5th-8th largest regional grain cooperatives and the 4 largest regional rice cooperatives are overstated. This overstatement results from the double-counting of volume that occurs when intercooperative transfers take place between cooperatives in a given size class. The share of cash farm receipts accounted for by the 4 and 5th-8th largest regional grain cooperatives are estimated to be overstated by no more than 0.4 percentage points and 1.1 percentage points, respectively; the share accounted for by the 4 largest regional rice cooperatives is estimated to be overstated by no more than 9.7 percentage points.

^b Less than 0.5 percent.

Source: John Schmelzer and Gerald Campbell, "An Overview of the Number, Size, Diversification and Market Share of Agricultural Marketing Cooperatives in Various Commodity Subsectors", in Agricultural Cooperatives and the Public Interest, NC 117 Mono. #4, University of Wisconsin, Sept. 1978.

(oranges, cheese, fluid milk, etc.) and in relevant geographic markets (e.g., regional markets for fluid milk) would be much more revealing.

I suspect that buyer concentration is high in many producer-first handler markets; monopsony power is likely a problem in some commodities and areas. I also suspect that marketing cooperatives are generally pro-competitive in producer-first handler markets; if nothing else, they usually assure farmers access to markets. But, the above is largely speculation. I have relatively little in the way of hard facts.

Thanks to the Packers and Stockyards Administration, we do have some data on the concentration of livestock slaughtering activities by state. For example, Willard Williams calculated the following from P&SA data:

Beef

- The 10 largest states in steer and heifer slaughter accounted for 80 percent of the steers and heifers slaughtered in 1977.
- The average market shares of the largest packers in each of these states was:

	<u>1970</u>	<u>1977</u>
Largest packer	18.2%	24.1%
Largest four packers	52.5%	61.4%

Pork

- The 10 leading hog slaughter states accounted for 69 percent of the hogs slaughtered in 1977.

- The four largest packers in each of these states slaughtered 82 percent of the hogs, on average.

Iowa Beef, the nation's largest beef slaughterer, grew rapidly during the last decade--more than doubling the number of head slaughtered. They have moved strongly into boxed beef which now accounts for roughly half of the wholesale beef marketed. Their relatively recent joint venture with Northwest Feeders will foreclose a significant portion of the beef supply in the Washington-Oregon area from other packers. Nationally, smaller and less efficient slaughterers may face future problems of both access to supply and ability to compete in the wholesale market.

Although there have been few empirical studies of the effects of buyer concentration, Jesse and Johnson found a significant positive relation between contract prices for sweet corn and the number of competing processors available to farmers. A Canadian study of farm grain markets also indicated that farmers benefit as the number of buyers increase. These limited results are consistent with the performance suggested by theory. However, much more research is needed.

Food Manufacturing

Increased buyer concentration in producer-first handler markets reflects, in part, the increases in concentration that have occurred in food manufacturing. It is important to examine the structural changes occurring in food manufacturing at both the aggregate level and the industry or market level.

Although there are approximately 20,000 food manufacturing companies, the largest 200 food manufacturing companies held 81 percent of the assets of all

food manufacturing companies in 1978. This compared to 68 percent in 1963 (Parker and Connor). Although these figures are probably biased upwards, they do reflect the trend in aggregate concentration.^{1/} The largest 200 companies in shipments of manufactured food and tobacco products in 1975 accounted for 64 percent of total shipments. Advertising usage by food manufacturers is even more concentrated; the largest 200 food manufacturing companies did 85 percent of all media advertising and 100 percent of network television advertising by food manufacturing firms. The eight largest advertisers of manufactured food products alone, accounted for one-third of all manufactured food advertising in 1976 (Table 3). Advertising as a percent of sales increases rapidly as the size of company increases (Fig. 2).

The largest food manufacturers are typically highly diversified multinational companies. For the 200 companies with largest shipments of manu-

^{1/} These figures refer to the concentration of total assets in companies classified by Internal Revenue Service as food manufacturing companies. For example, all of Beatrice Food's assets are included, even though approximately 25 percent of the company's sales (and probably a larger share of assets) stem from non-food products such as Samsonite luggage, Airstream trailers and Hart sports equipment. Since large food manufacturers have become more diversified over time, the above calculation procedure creates a stronger upward bias in recent years than in earlier years. However, the calculation procedure of IRS also poses a bias in the opposite direction. Companies such as Proctor and Gamble, LTV and Cargill are not classified as food manufacturing companies even though each of these companies had over \$1 billion in sales from manufactured food and tobacco products in 1975. The food manufacturing assets of these companies are not included in the above figures unless the companies reported their company assets by division or type of business. The magnitude of this downward bias has probably increased also over time as more non-food companies have entered food manufacturing.

On balance, asset concentration figures appear to be overstated. As one indication, the 200 companies with largest U.S. shipments of manufactured food and tobacco products (whether or not they are classified as food manufacturing companies) accounted for about 64 percent of total U.S. food and tobacco processing shipments in 1975 (Connor, p. 45). Since the asset concentration figures cited earlier were based upon the 200 largest companies, ranked by assets, that were classified as food manufacturing companies, some difference in the sample of firms would be expected. The shipment concentration figure appears to be less subject to bias than the asset concentration figure.

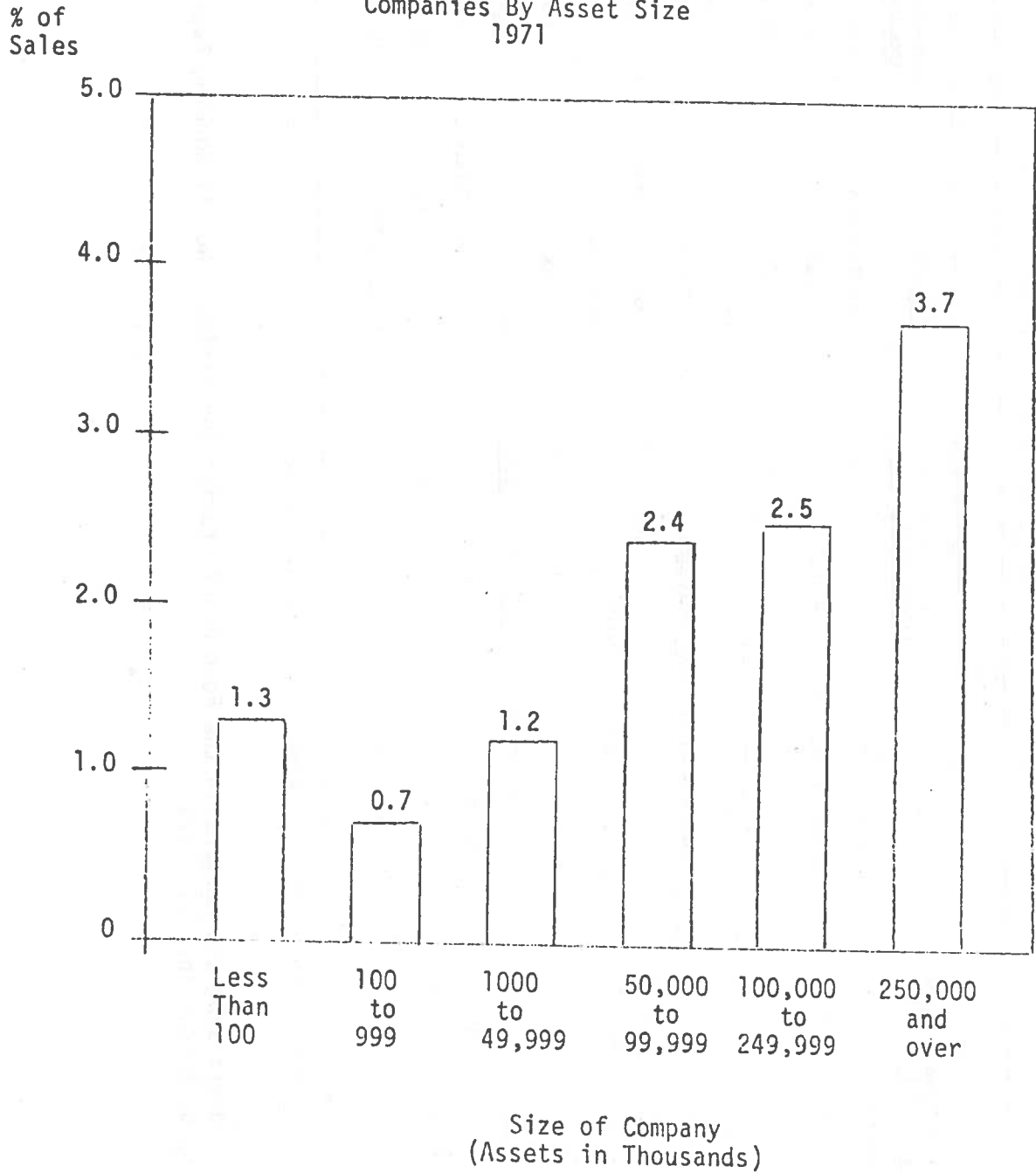
Table 3 - THE EIGHT LARGEST MEDIA ADVERTISERS OF MANUFACTURED FOOD PRODUCTS, 1967, 1972, 1976¹.

Company	1967			1972			1976		
	Expenditures (thousands)	Share %	Company	Expenditures (thousands)	Share %	Company	Expenditures (thousands)	Share %	Company
General Foods	89,200	8.67	General Foods	94,118	8.60	General Foods	184,044	10.05	
Coca-Cola	46,532	4.52	General Mills	45,537	4.17	General Mills	82,490	4.5	
General Mills	43,355	4.21	Kellogg	55,305	3.23	PepsiCo	59,763	3.26	
Kellogg	40,293	3.31	Kraftco	35,772	3.22	Kraft	57,534	3.14	
Top 4 Totals	219,290	21.31	Top 4 Totals	211,532	19.23	Top 4 Totals	383,831	20.96	
Kraftco	28,277	2.75	Coca-Cola	37,573	3.07	Procter & Gamble	55,017	3.00	
PepsiCo	26,217	2.55	PepsiCo	33,144	3.03	Coca-Cola	51,733	2.82	
Campbell Soup	25,633	2.49	Heublein	28,865	2.64	Kellogg	51,277	2.80	
Whigby	23,235	2.26	Procter & Gamble	28,028	2.56	Nestle	50,759	2.77	
Second 4 Totals	103,362	10.05	Second 4 Totals	123,615	11.30	Second 4 Totals	208,786	11.39	
Top 8 Totals	322,652	31.36	Top 8 Totals	335,147	30.63	Top 8 Totals	592,617	32.35	
Industry Totals	1,029,047	100.	Industry Totals	1,044,320	100.	Industry Totals	1,831,480	100.	

1. Advertising expenditures in network and spot television, magazines, and newspaper supplements.

Source: Loys Mather, "Advertising and Mergers in the Food Manufacturing Industries", NC 117 Working Paper 36, University of Wisconsin, July 1979.

Figure 2.
Advertising of Food Manufacturing
Companies By Asset Size
1971



Source: Loys Mather, "Advertising and Mergers in the Food Manufacturing Industries", NC 117 Working Paper 36, University of Wisconsin, July 1979.

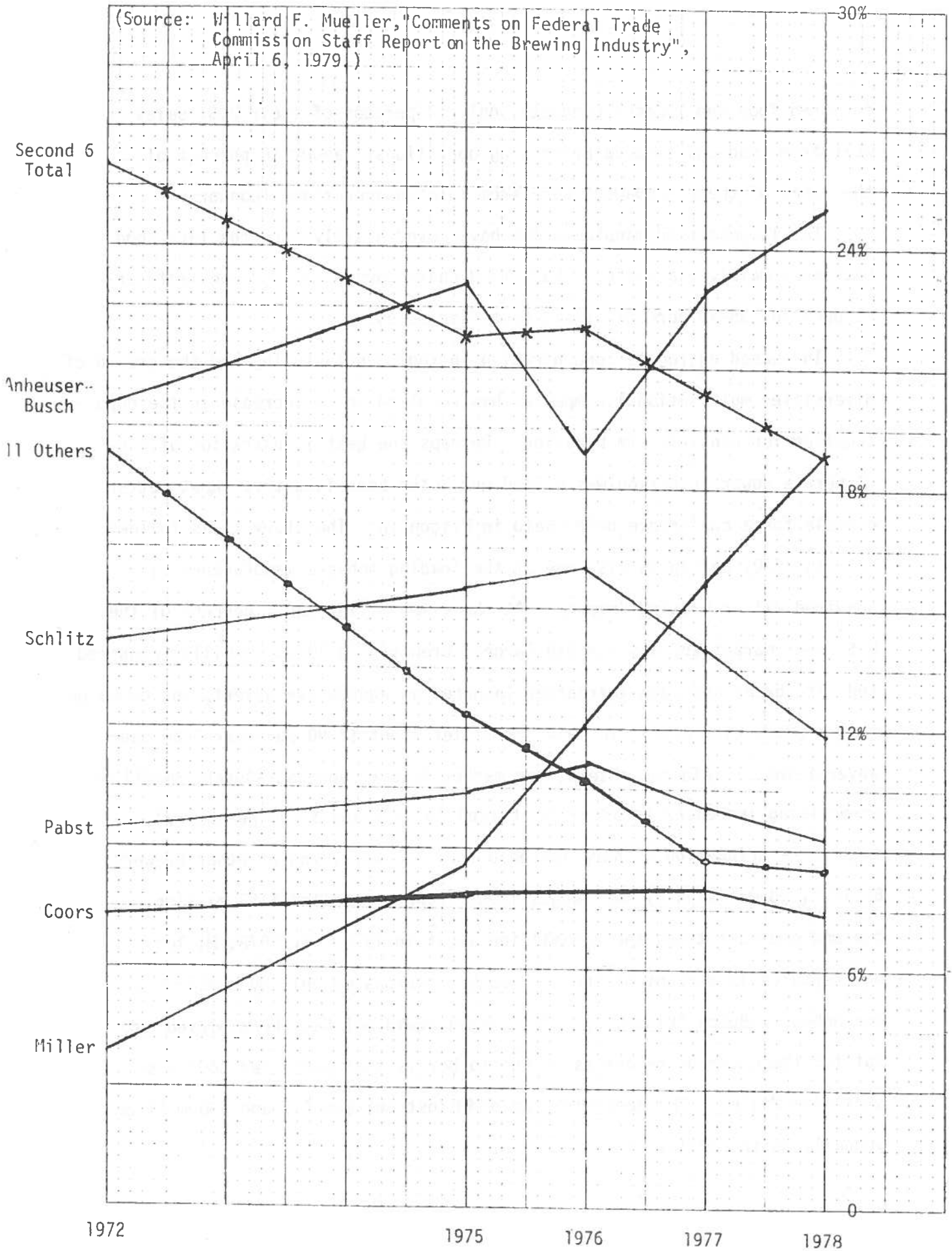
factured food and tobacco products, only 52 percent of their U.S. sales were from food and tobacco processing operations; about 16 percent of the sales of these companies were from foreign operations (Connor).

The largest food manufacturers have moved heavily into the fast food business, mainly via merger. Fast food chains owned by food manufacturers account for 35-40 percent of all fast food sales.

Increased aggregate concentration in food manufacturing and the growth of diversified multinational companies has resulted in an increase in the opportunities for conglomerate behavior. Perhaps the best illustration of conglomerate power in action was played out in the beer industry. What better example for a conference being held in Wisconsin! The story is as follows.

In 1970, Philip Morris, one of the leading tobacco manufacturers, acquired Miller Brewing Company. At the time, Miller had 4 percent of the U.S. beer market and was the 8th largest brewer. In 1972, PM-Miller acquired the Lite brand and soon thereafter launched an aggressive advertising campaign to introduce Lite beer. In 1974, PM-Miller spent \$2.90 per barrel on beer advertising, triple the rate of the market leader, Anheuser-Busch. Pm-Miller advertising increased to \$3.00 per barrel in 1975 and \$3.90 per barrel in 1976 -- triggering a sharp increase in the advertising of other brewers. By 1977, advertising by the largest four brewers totalled \$157 million, two and one-half times the \$63 million spent in 1972. By 1978, Miller had captured 19 percent of the beer market, surpassed only by number one Anheuser-Busch (Figure 3). This drama could not have been played out but for the enormous resources of Philip Morris that were used to cross subsidize Miller. The beer division of PM lost between \$17 and \$30 million annually during 1971-1975.

Figure 3. Percent of Total Shipments of 11 Leading Brewers, 1972-1978



Although the major brewers have not emerged unscathed from the intense rivalry of the 1970's, the major losers have been the small and medium sized brewers, and in the long run, consumers. The market share of brewers other than the top five dropped from 45 percent in 1972 to 27 percent in 1978. Consumers have been persuaded not only to switch to the brands of leading brewers -- but to switch to premium and super premium brands. The latter accounted for 30 percent of beer sales in 1970; by 1980, premium and super premium brands are expected to account for 70 percent of beer sales.

Obviously, conglomerates are not always as successful as Philip Morris has been in the beer industry. Research does reveal that a conglomerate acquisition of a food manufacturing company is generally followed by a significant increase in advertising (Mather). At this point in time the antitrust agencies have never challenged "predatory" advertising -- even though the consequences may be similar to predatory pricing.

Although the foregoing documents the dramatic change that occurred in the beer industry in the 1970's, other food manufacturing industries have followed a much different scenario. Rogers has examined the changes in four-firm concentration from 1958 to 1972 for 86 U.S. food and tobacco product classes (Table 4). On average, these product classes have shown a gradual increase in concentration from 46.1 to 48.5. However, when classified by level of advertising, important differences appear. Concentration in product classes with no media advertising, which are pri-

marily producer goods, declined slightly during this 14 year period. For product classes in which there was advertising, the more highly advertised classes were higher in concentration and had the greatest increases in concentration.

Econometric analysis confirms what Table 4 suggests -- the advertising to sales ratio for product classes is positively and significantly related to change in concentration. When advertising expenditures are broken out by media, television and radio advertising have a strong positive effect on change in concentration; newspaper, outdoor and magazine advertising have no significant effect.

Rogers' results are similar to those of Mueller and Rogers in examining the change in concentration of all manufacturing industries. The results are of particular importance because they shed insights into why certain industries are increasing in concentration while others are stable or declining. Economies of scale in production -- the reason given so frequently by economists and businessmen to justify concentrated industries -- does not appear to be a major force compelling American industries to become more concentrated. Rather, mergers and product differentiation activities in consumer goods industries--including the technical and pecuniary advantages of large scale product development and advertising--appear to be major factors in the increased concentration of consumer goods industries.

Advertising obviously has a role in a market economy in providing information to potential buyers about alternative products and services. However, advertising can also be used to restructure markets and to encourage consumers to live in an illusory world in which products are sold on the basis of their

Table 4 - Average Unweighted Four-Firm Concentration Ratios by Categories of Advertising Intensity for 86 U.S. Food and Tobacco Product Classes, 1958 to 1972

Year	All Product Classes ^{1/} N=86	Product Classes' Advertising-to-Sales Ratio ^{2/} (mean A/S for category)			
		0% (0) N=30	0 to 1% (0.5) N=19	1 to 3% (1.7) N=13	Greater than 3% (6.5) N=24
1972	48.5%	42.6%	37.4%	54.0%	61.5%
1967	47.0	43.0	36.2	53.2	57.2
1963	46.1	42.1	36.5	50.9	56.0
1958	46.1	43.8	36.8	51.1	53.8
Change 1958-1972	+2.4	-1.2	+0.6	+2.9	+7.7

^{1/}All five-digit product classes in the two-digit Standard Industrial Classification (SIC) Major Groups 20 (food) and 21 (tobacco) where the data are comparable from 1958 to 1972; except for SIC 20164 (other poultry, small game), SIC 20210 (butter), and SICs 20513 to 20517 (sweet bread-type products). They were omitted due to data problems. In SIC 20820 (beer) data were used at the broader four-digit SIC level to reflect the close substitutibility of the five-digit product classes. In refined sugar SICs 20620 and 20630 were combined into one market because once refined, beet and cane sugar are indistinguishable to the consumer.

^{2/}The advertising-to-sales ratio (measured in percent) is constructed from each product class' advertising expenditures in eight measured media for 1967 and its 1967 value of shipments.

Source: Richard T. Rogers, "Advertising and Concentration Change in U.S. Food and Tobacco Product Classes, 1958-1972", Contributed Paper presented at AAEA Meeting, July 31, 1980

"image." It is hard for me to rationalize that consumers are better off because they spend 30-50 percent more for ReaLemon than for identical concentrated lemon juice under another brand; or that they have realized \$500 million in benefits because 70 percent will buy premium or super premium beer in 1980 compared to 30 percent in 1970 -- when blind taste tests reveal they are unable to distinguish between brands. Such rationale defies common sense.

While product differentiation has increased for some national brands, the growth of generic brands has provided consumers with an economy alternative for some products. Those product categories which have national brands, private labels and generic brands provide consumers with considerable choice. This is generally not true for the most highly differentiated products such as breakfast cereals, soups, candy bars and cigarettes -- where estimated overcharges to consumers are also the highest. Parker and Connor estimated that consumers paid about \$12 billion more for food in 1975 because of x-inefficiency and monopoly profits. By industry, their estimate of consumer overcharge ranged from zero in meatpacking to 29 percent for breakfast cereals. The competitive structure of food manufacturing industries obviously carries important consequences for all of us as consumers.

Parker and Connor estimate that two-thirds of the value added in food manufacturing in 1972 came from moderate to very highly concentrated oligopolies (CR_4 of 50 or above). The proportion of value added originating in highly or very highly concentrated industries increased from 24 percent in 1958 to 30 percent in 1972 (Table 5).

Many large food manufacturers are moving away from commodity-type markets such as fresh meat (e.g., Swift), fluid milk (e.g., Borden), fresh poultry and eggs (e.g., Purina) and increasing their commitment to processed products that lend themselves to differentiation. This is not surprising -- the latter products

Table 5

Classification of Food and Kindred Products Manufacturing Industries
According to Bain's Concentration Types, 1972

Bain's industry concentration type 1/	Number of industries		Percent distribution of						
	National	Local 2/	Total	Value added		Value of shipments			
				National	Local 2/	Total	National	Local 2/	Total
I. Very highly concentrated	3	1	4	3%	7%	10%	2%	5%	7%
II. Highly concentrated oligopolies	8	2	10	11	9	20	9	9	18
III. High-moderate concentrated oligopolies	10	2	12	23	14	37	17	10	27
IV. "Low-grade" oligopolies	11	-	11	10	-	10	12	-	12
V. Unconcentrated industries	10	-	10	23	-	23	36	-	36
Total	42	5	47	70	30	100%	76	24	100%

1/ Joe S. Bain, Industrial Organization, John Wiley & Sons, 1959, pp. 124-133. Bain's type I, very highly concentrated class, includes industries whose top 8 firms control 90 percent or more of production or whose top 4 control 75 percent or more. The equivalent percentages for type II are 85-90 percent for the top 8 or 65-75 percent for the top 4. Type III, 70-85 percent for the top 8 or 50-65 percent for the top 4. Type IV, 45-70 percent for the top 8 or 35-50 percent for the top 4. Unconcentrated industries would fall below type IV.

2/ Industries identified as local market industries in The Structure of Food Manufacturing Technical Study Number National Commission on Food Marketing 1966, pages 31 and 37. Concentration data for the five industries are from same source and Economic Report on the Dairy Industry, Federal Trade Commission, 1973.

Source: Russell Parker and John Connor, "Conglomeration and Consumer Loss in the Food Manufacturing Industries", NC 117 Working Paper 30, University of Wisconsin, Apr. 1979

are more profitable and less subject to the fickle nature of commodity markets.

The present trends suggest two major types of food manufacturing companies for the future:

1. Large diversified manufacturers of branded products in which advertising and product proliferation are emphasized and commodity type products de-emphasized.
2. Large companies which concentrate on commodity type products (e.g., fresh meat, fluid milk, eggs, etc. and private label and generic brands of more highly processed products.) for both food retailing and HRI outlets. These companies will learn to live with the risks of commodity price gyrations and will emphasize technical efficiency and vertical coordination.

Agricultural cooperatives may be compelled to take over commodity type businesses (e.g., fluid milk bottling) as diversified manufacturers withdraw from these businesses and concentrate their resources on differentiable products. This is already occurring to some extent. I do not mean to imply that there will be no room for well managed small and medium sized firms in food manufacturing. A "competitive fringe" may continue to exist in many industries -- serving primarily the private label and generic product markets. Inflation has taken a heavy toll on some of these firms due to the sharp increase in capital required to finance inventories. This is particularly a problem for manufacturers of batch produced perishable commodities such as fruits and vegetables where commodities must be processed soon after harvest and held in inventory for future sales.

The future of small food manufacturers will be more promising if consumer concern for stretching their food dollars results in continued growth of generic and private label products. Small companies are ill-prepared to compete in the branded product ballgame with P & G, Philip Morris or General Foods.

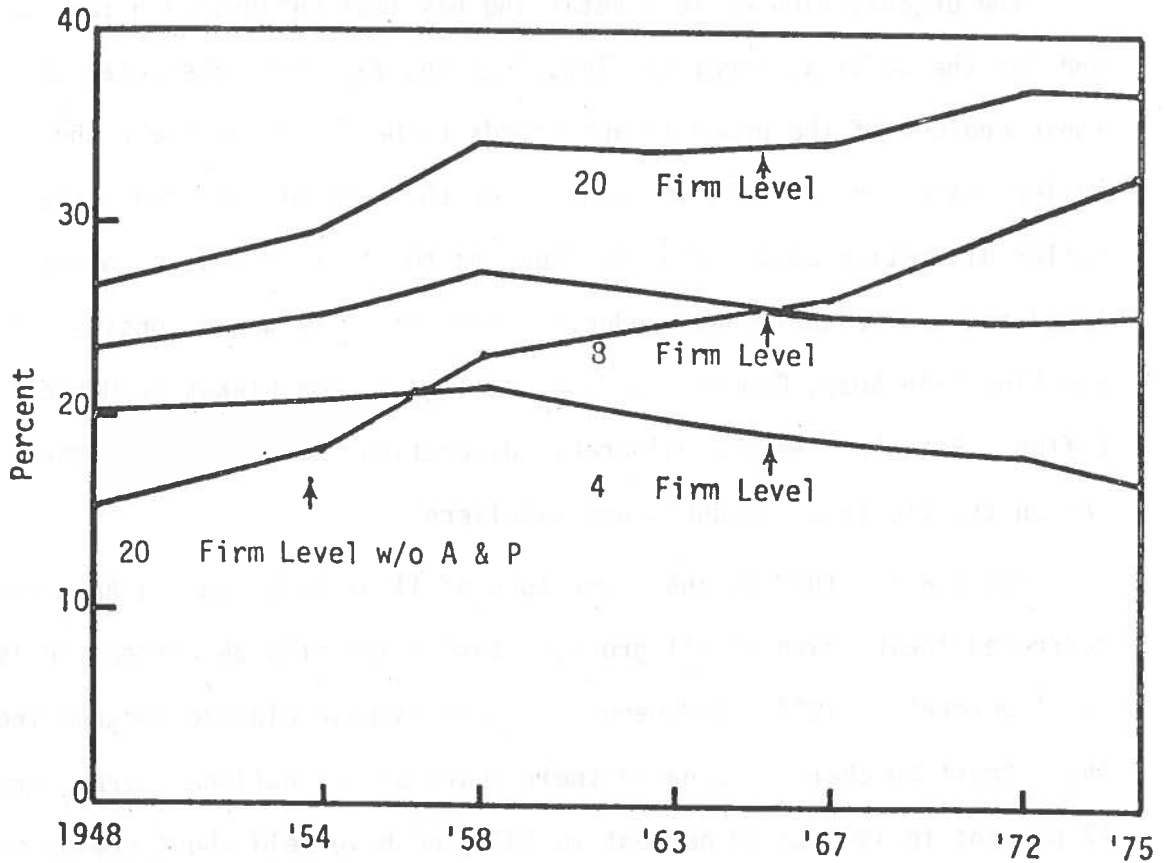
Food Retailing

The organization of food retailing has implications both for consumers and for the vertical array of firms from the farmer to the retailer. Through their choices of the products and brands to be placed on their shelves, retailers have considerable influence over the rest of the food system. Retailer discretion concerning the products to stock is less on highly advertised and well established products. Few retailers would consider not stocking Tide Soap, Campbell's Soup, Kellogg's Corn Flakes or Maxwell House Coffee. Retailers have considerable discretion, however, on lesser brands and on private label products and suppliers.

Nationally, food chains (operators of 11 or more stores) have gradually increased their share of all grocery store sales from 35 percent in 1948 to 61 percent in 1977. Independent retailers have claimed the remainder. The largest 20 chains increased their share of the national market from 27 percent in 1948 to 39 percent in 1972 and have held about steady since then (Figure 4). National concentration of grocery wholesaling is similar to concentration in retailing with the largest 20 wholesalers accounting for about 39 percent of wholesale grocery sales in 1979. Together, the largest 20 grocery chains and the largest 20 grocery wholesalers account for an estimated 53 percent of the volume sold through retail grocery stores.

National trends tell us something about the likely winners and losers in the future. Although several large chains have experienced difficulties in the 1970's (e.g., A & P, Food Fair, National Tea, Allied Stores, First National Stores, etc.), the largest 20 chains still maintained their national market share from 1972 to 1977. Several of these chains have retrenched and reorganized. I expect supermarket chains to continue to expand their market

Figure 4. Percentage of Grocery Store Sales Made by the 4, 8 and 20 Largest Retail Grocery Chains, 1948-1975



Source: Marion, B.W., W.F. Mueller, R.W. Cotterill, F.E. Geithman, and J.R. Schmelzer, The Food Retailing Industry: Market Structure, Profits and Prices, Praeger Publ., N.Y. 1979.

share in the future while independent retailers decline.

National concentration also tells us something about retail buyer concentration. With increasing national concentration among grocery chains and grocery wholesalers, the power of wholesale/retail buyers may pose an increasing problem in the future.

Mergers involving grocery chains have increased dramatically during the last five years and have added fuel to the trend toward increased national concentration. European companies have been active in acquiring U.S. food chains; foreign companies are now estimated to control 10 percent of the U.S. grocery store business.

Some innovations in the type of retail stores stemmed from mergers. Aldi Brenner, a German controlled chain headquartered in Iowa, introduced the limited assortment or box store to the U.S. The main appeal of these stores has been substantially lower prices. Since then, Jewel, A & P, Safeway and other U.S. chains have developed box stores and their relative, the warehouse store. While the future of these economy oriented, no frills stores is not clear, at least for the moment they have stimulated price competition in some areas.

Although national trends are important to understand, competition among food retailers as sellers takes place in local markets. Data on concentration of grocery retailing in SMSAs (Standard Metropolitan Statistical Areas) reveals a steady increase from 45.5 in 1954 to 52.4 in 1972 (Marion et al.). Estimates for 1977 indicates this trend has continued. Of particular concern is the growing number of SMSAs with either a dominant chain and/or high four-firm concentration. For example, Washington, D.C. has two dominant chains -- Safeway and Giant -- which together control 61 percent

of the market. In Denver, the largest four retailers do about 85 percent of the grocery store business; the largest two do over 70 percent. In Cincinnati, the largest four chains do about 50 percent of the business -- but Kroger by itself does approximately 30 percent. Whereas in 1954, only 5 percent of the SMSAs in the U.S. had four-firm concentration of 60 percent or more, this had increased to 25 percent of the SMSAs in 1972 (Figure 5).

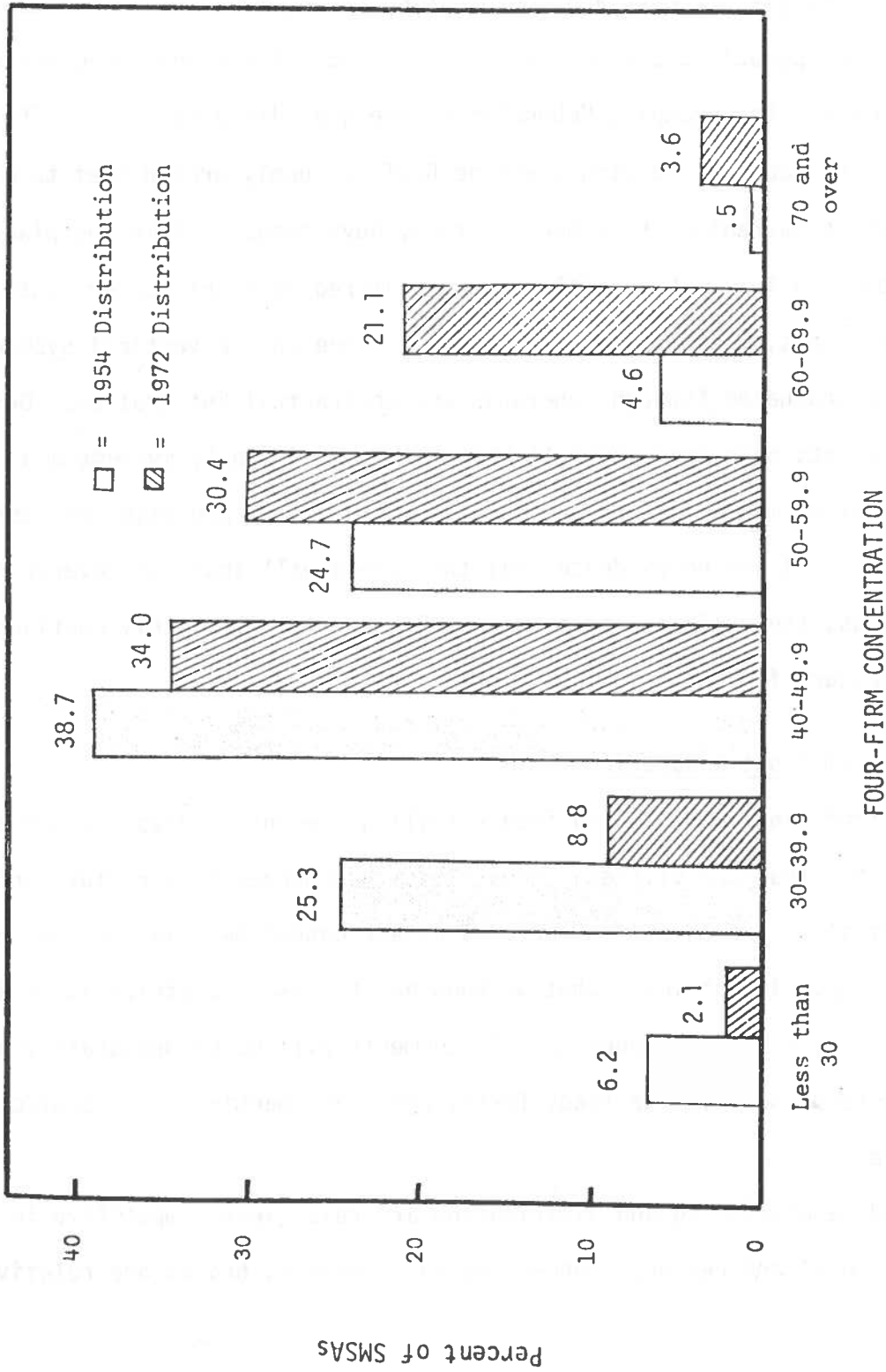
What are the consequences of these changes? Our research shows that food retailing behaves similar to other industries; the prices paid by consumers and the profit realized by retailers are directly related to the market share held by individual firms and the four-firm concentration ratio (Marion et al.). For 1974, we estimate that consumers paid about \$660 million more for food in metropolitan areas because of non-competitive retail markets. Most of this can be attributed to a few metropolitan areas. A large number of metropolitan areas are still relatively competitive. Unfortunately, present trends indicate that this number is likely to decline.

Hotels, Restaurants and Institutions

The HRI business has experienced considerable change during the last 10-15 years, yet we have few facts to document what has occurred. We all know that fast food chains have grown rapidly. In 1972, fast food chains did 30 percent of the restaurant business; their market share has almost surely grown since then. Many of these chains are owned by food manufacturing companies, including 5 of the largest 8 chains. Large institutional feeders have also emerged to serve airlines, universities, hotel chains, etc.

The traditional supply network that serviced a fragmented HRI industry

Figure 5. Percentage Distribution of Four-Firm Concentration for an Identical Sample of 194 SMSA's^{a/}, 1954 and 1972.



^{a/} The sample is limited to those SMSA's for which the Bureau of Census calculated four-firm concentration ratios in both 1954 and 1972.

Source: Marion, B.W., W.F. Mueller, R.W. Cotterill, F.E. Geithman, and J.R. Schmelzer, *The Food Retailing Industry: Market Structure, Profits and Prices*, Praeger Publ., N.Y. 1979.

had difficulty supplying the large quantities of uniform and tightly specified products demanded by restaurant chains and large institutional feeders. Hence, new supply networks and coordinating arrangements have emerged, usually incorporating portion control, tight specifications and contractual arrangements. For example, McDonalds -- the granddaddy of the fast food chains -- has contracted with Keystone Beef to supply ground beef to many McDonalds restaurants. Keystone, in turn, buys feeder cattle and places them in custom feed lots. Fed cattle are slaughtered in plants under contract to Keystone. Thus, from feedlot to restaurant, the entire vertical system is tightly coordinated through ownership and contractual integration. Developments in HRI markets have encouraged tightly coordinated supply systems and transferral of many food preparation functions to the processor or fabricator level. I see no evidence that this trend will abate or reverse itself. Thus, the evolving structure of HRI markets will likely continue to exert pressure for change on the rest of the food system.

Agricultural Input Industries

In food manufacturing and food retailing, recent studies provide a good idea of the structure of these industries, the changes in structure and the impact of structure on performance. The same cannot be said for the agricultural input industries. What we know about these industries is an island surrounded by a sea of ignorance. My comments will be commensurately brief and will focus only on the feed, fertilizer, farm machinery and pesticide industries.

Feed manufacturing and distribution are relatively competitive in structure; national and regional concentration is modest, brands are relatively

unimportant and entry barriers are modest. Farmer cooperatives sell nearly one-fifth of the feed in the U.S. The economies of scale in feed grinding and mixing are not great, making it feasible for large farmers to perform these functions on the farm. These factors tend to enhance competition in the feed industry.

With relatively little market power, one of the alternative means of gaining customers is to "purchase" their right of choosing the type of feed. Hence, most large feed manufacturers have become involved in contract integration with poultry and egg producers and to a lesser extent with hog producers and beef feedlots. Of all the input industries, feed manufacturing has the greatest amount of direct control over farming. Ownership and contractual integration into hog production seems likely to increase as disease control and improved technology has made "hog factories" more feasible. The vertical relationship between feed manufacturers/distributors and farmers is probably the most interesting part of this system to watch.

In the farm machinery system, the manufacturer stage is generally highly concentrated for both field machinery and farmstead equipment. Brands of field machinery are very important, contributing to high entry barriers. Sizeable economies of scale and the necessity of a dealer network make entry even more difficult. The seven "full-line" companies operate on a world wide basis. In 1972, the largest four accounted for about one-half of world farm machinery sales. In the U.S., the largest four tractor manufacturers did about 80 percent of the tractor business in 1978; concentration was even higher (89 percent) for the top four combine manufacturers. The seven full-line companies are large diversified firms with farm machinery accounting for about 50 percent of their sales.

Farm machinery sales are heavily affected by farm income and are hence quite variable. Cooperatives manufacture and distribute some farmstead equipment but little if any field machinery. Although the structural characteristics of the farm machinery industry indicate that performance may be relatively poor, there is little direct evidence concerning the conduct or performance of this industry.

The fertilizer industry seems to be relatively competitive, structurally. Concentration is low to moderate in manufacturing ($CR_4 = 23\%$ for nitrogen, 53% for potash and 50% for phosphate) and product differentiation is low. Entry barriers are significant because of scale requirements and possible problems in gaining access to necessary feedstocks -- especially natural gas. Several large petroleum and chemical companies are important manufacturers of fertilizer and pesticides. In times of fertilizer shortage, petroleum companies have a particular advantage due to their access to natural gas. Cooperatives manufacture about 20 percent of nitrogen and phosphate fertilizers and sell approximately 30 percent of all fertilizer. They likely serve as an important pro-competitive force in this industry.

Physical distribution, storage and retailing seem to have taken on more importance with the shifts of manufacturing closer to the sources of raw material and the need to continuously operate newer nitrogen plants. These functions plus the access of manufacturers to raw materials may be important parts of the fertilizer system to watch in the future.

The pesticide system involves three stages: manufacture, formulation and retailing. The last two stages are atomistic with easy entry. However, pesticide manufacturing is highly concentrated, has relatively high product differentiation and high entry barriers. Although facts are scarce, in 1978,

the four leading brands of corn insecticide accounted for about 84 percent of the market (Hamm). The highly diversified chemical and petroleum companies that dominate the pesticide industry emphasize non-price forms of competition such as advertising and new product development. Pesticide advertising expenditures by chemical companies in 1978 was nearly 80 percent higher than in 1976. Although cooperatives distribute approximately 30 percent of all pesticides, they are not an important competitive factor in manufacturing these products. The development of more private label pesticides and more information on the relative performance of different pesticides could enhance competition and allow farmers to be more effective buyers.

Implications for the Future

J. B. Penn predicts that the structure of farming is headed toward a bimodal organization; one mode will be the large commercial farms which although relatively few in numbers will produce the bulk of agricultural production in the future; the second mode will be small part-time farms which will be large in numbers but small in total production and where non-farm income will exceed farm income. I have no reason to disagree with J. B. The changes occurring in the input supply and product marketing systems will encourage the commercial mode of farming. The second mode will exist largely for non-economic reasons and will find it increasingly difficult to interface with the large-farm oriented input supply or product marketing systems. Part-time farmers will have difficulty finding a market for some commodities -- much as small broiler producers do today -- and will tend to concentrate on commodities such as grains, oilseeds and cow-calf operations in which market access is not foreclosed.

Agricultural cooperatives will become more important to farmers and consumers. For farmers, cooperatives will be an alternative source of input supplies that has less incentive to exploit monopoly power or temporary shortages in supplies than proprietary firms; in product marketing, cooperatives will assure farmers access to markets for many commodities and provide farmers some protection against monopsony power in producer-first handler markets. I expect cooperatives to become more involved in food processing and manufacturing, particularly for less differentiated products. For consumers, these products may provide important alternatives to highly advertised branded products.

However, I see cooperatives faced with a growing dilemma of who to serve. It will become increasingly difficult to be an effective actor in the industrialized input supply-production-marketing system without abandoning small farmers, the one man-one vote principle and in some cases, federated organization. It will be interesting to see how cooperatives deal with this problem.

The evolving characteristics of the product marketing system suggest that "thin markets" and price reporting will become greater problems in the future unless different exchange institutions (e.g., forward deliverable contracts and/or electronic markets) or new rules of the games are implemented.

The trends in food manufacturing and food retailing indicate that consumers will benefit less from effective competition in the future; retail prices and the marketing margin will likely increase relative to farm prices.

Antitrust policy has been largely ineffective in dealing with the major threats to competition in the food system. Without new legislation, conglomerate mergers (including product and market extension), excessive, predatory and misleading advertising, and entrenched monopoly power are difficult if not impossible to challenge. Given the awesome power of big business in Washington, new legislation is not likely without a strong mandate from the public.

Administered pricing in the input supply and food marketing system is likely to become more prevalent. Although the effect of administered pricing on inflation is still not clear, the evidence to date indicates that it compounds the difficulty of controlling inflation through monetary or fiscal policies. Preliminary results of research in the NC 117 core group indicate that the level of advertising is positively related to the rate of price increase for different manufactured food products. Highly differentiated products also tend to exhibit less price flexibility. If the above effects of administered pricing are correct, the food system of the future will contribute more to the problems of inflation and unemployment than it has in the past.

The evolving nature of the food and fiber system will not be without benefits. I expect the industrialized food system of the future will be more tightly coordinated and technically more efficient. One of the major challenges we face as agricultural economists is to assess the trade-offs involved and to identify the changes in institutions and public policies that may reduce the problems resulting from the organization of the food system while retaining those benefits that are important to the public interest. This is a major challenge indeed.

Appendix Table 1. Four Firm Concentration Ratios for Selected Five Digit Product Classes, Grocery and Tobacco Manufacturing, 1948-1972

SIC	Product Class	1972 Value of Shipments (mil. dollars)	Four-Firm Concentration Ratio			
			1972	1967	1963	1958
			-----Percent-----			
20111	Meatpkn - Fresh & Frozen Beef	11,771.1	30	26	26	31
20112	Meatpkn - Veal	241.5	27	37	36	41
20113	Meatpkn - Lamb & Mutton	330.5	55	57	54	60
20114	Meatpkn - Fresh & Frozen Pork	4,220.9	37	33	36	39
20115	Lard	171.0	37	33	33	41
20116 & 20136	Processed Pork	2,413.5	22	22	25	30
20117 & 20137	Sausage Products	3,264.4	17	19	20	22
20118 & 20138	Canned Meats	1,106.3	41	34	39	42
20119	Hided, Skins & Pelts	579.9	30	32	33	33
20139	Nat. Sausage, Caseins	114.3	40	32	37	n. a.
20161 & 20162	Hens & Chicken Dressing Plants	2,335.3	18 ^{a/}	17	14	12
20163	Turkey Dressing Plants	539.0	40	28	23	23
20172	Liquid, Dried & Frozen Eggs	156.7	36	43	33	30

20221	Natural Cheese	1,400.0	36	38	34	n. a.
20222	Processed Cheese	1,134.0	60	72	67	n. a.
20231	Dry Milk Products	880.3	45	35	22	22
20232	Canned Milk Products	427.7	69	62	66	78
20233	Concent. Milk, Bulk	131.9	29	31	41	38
20234	Ice Cream Mix & Ice Milk Mix	227.7	16	15	17	23
20240	Ice Cream & Ices	1,519.3	27	32	34	35
20261	Bulk Fluid Milk & Cream	1,258.8	23	17	15	16
20262	Pkg. Fluid Milk & Products	5,078.9	19	25	25	26
20263	Cottage Cheese	340.9	27	36	32	32
20264	Buttermilk & Flav. Milk Products	423.0	29	31	31	30

20321	Canned Baby Food	346.7 ^{b/}	95	93	95	94
20322	Canned Soups ^{c/}	645.0 ^{b/}	95	93	92	90
20323	Canned Dry Beans	305.8 ^{b/}	50	49	44	46
20331	Canned Fruits	928.4 ^{b/}	35	34	37	n. a.
20332	Canned Vegetables	1,067.1 ^{b/}	35	38	34	n. a.
20334	Canned Fruit Juice	709.2 ^{b/}	29	31	31	n. a.
20335	Canned Vege. Juice	155.7 ^{b/}	62	62	55	58
20336	Catsup & Tomato Sauces	603.3 ^{b/}	56	55	49	55
20338	Jams & Jellies	200.1 ^{b/}	40	35	31	28
20341	Dried Fruits & Vege.	466.4	32	32	39	n. a.
20342	Soup Mixes, Dried	126.7	75	73	84	n. a.

Appendix Table 1. cont'd.

SIC	Product Class	1972 Value of Shipments (mil. dollars)	Four-Firm Concentration Ratio			
			1972	1967	1963	1958
			-----Percent-----			
20352	Pickles & Other Pickle Products	362.5 ^{b/}	38	29	23	20
20353	Meat Sauce	151.3 ^{b/}	50	47	45	35
20354	Mayonnaise & Salad Dressing	576.0 ^{b/}	52	55	56	n.a.
20371	Frozen Fruits & Juices	730.0 ^{b/}	41	30	28	34
20372	Frozen Vegetables	914.4 ^{b/}	35	34	39	45
20373	Frozen Specialties	1,582.5	49 ^{a/}	49	46	
20411	Wheat Flour, Except Mixes	1,626.7	37	37	40	n.a.
20412	Wheat Mill Prod.	222.6	37	35	38	40
20415 & 20455	Flour Mixes & Refrig. Dough	791.9	61	59	60	n.a.
20430	Cereal Breakfast Foods	934.6	84	82	82	80
20440	Milled Rice & By-Products	671.2	42	45	46	44
20460	Wet Corn Milling	786.8	63	64	65	68
20471	Dog & Cat Food	1,317.4	54	46	42	38
20511 & 20512	Bread & Rolls	3,341.0	31 ^{a/}	28	24	25
20513	Sweet Yeast Goods	430.2	24	19	21	20
20514	Soft Cakes	552.4	48	39	31	32
20515	Pies	224.0	41	40	27	23
20521	Crackers & Pretzels	715.0	68	71	71	77
20522	Cookies & Ice Cream Cones	976.5	55	51	52	n.a.
20610	Sugar Cane Mill Prod. & By-Prod.	419.6	43	42	47	n.a.
20620 & 20630	Refined Cane & Beet Sugar ^{d/}	2,612.8	62	63	64	67
20651	Bar Goods (Except Solid Choc. Bars)	427.7	66	54	48	51
20652	5¢ & 10¢ Specialties	244.1	51	48	51	42
20653	Package Goods (Except Solid Choc.)	713.5	37	31	24	23
20654	Bulk Goods (Except Solid Choc.)	134.5	31	28	26	23
2066	Chocolate & Cocoa Products	724.0	72	74	71	69
20670	Chewing Gum & Base	384.8	84	81	86	83
2074	Cottonseed Oil Mill Prod.	410.8	42	44	40	44
2075	Soybean Oil Meal Products	2,552.2	52	55	48	37
2076	Vegetable Oil Mill Prod.	272.1	45	46	54	61
2077	Animal & Marine Fats & Oils	977.1	17	18	18	19
20791	Shortening & Cooking Oils	1,643.6	50	53	51	50
20792	Margarine	586.3	54	47	50	46
2082	Malt Beverages	4,038.6	52	40	34	29
20830	Malt & Malt By-Products	219.9	49	42	37	50

Appendix Table 1. cont'd.

SIC	Product Class	1972 Value of Shipments (mil. dollars)	Four-Firm Concentration Ratio			
			1972	1967	1963	1958
			-----Percent-----			
2084	Wines, Brandy & Brandy Spirits	407.9	53	48	44	35
20851	Distilled Liquors, Except Brandy	153.7 ^{b/}	49	50	51	55
20853	Bottled Liquors Except Brandy	1,396.3 ^{b/}	51	53	58	61
20860	Bottled & Canned Soft Drinks ^{d/}	4,800.5	89	89	89	89
20871	Flavoring Extracts	119.0	23	18	27	28
20874	Other Flavoring Agents	529.9	68	59 ^{c/}	51	n.a.
20910	Canned & Cured Seafood, Inc. Soup, (Except Frozen)	585.0 ^{b/}	38	34	33	n.a.
2092	Fresh & Frozen Pkg. Fish	1,000.2 ^{b/}	21	24	23	18
2095	Roasted Coffee	2,163.3	64	57	54	46
20980	Macaroni, Spaghetti & Noodles	353.8	34	31	28	25
20991	Desserts - Ready to Mix	267.2	80 ^{c/}	81 ^{c/}	86	81
20992	Chips (Potato, Corn, etc.)	1,042.1	49	41	41	35
20993	Sweetening Syrups	167.3	53	54	63	n.a.
21110	Cigarettes	3,589.4 ^{b/}	84	80 ^{c/}	80 ^{c/}	80
21210	Cigars	357.3 ^{b/}	55	58	59	54
21310	Chewing & Smoking Tobacco & Snuff	257.5 ^{b/}	60	50	53	53
21412	Tobacco, Stemmed	1,194.4 ^{b/}	72	76	82	86

Note: These are national concentration figures and seriously understate the concentration in local market industries (20240, 20261, 20262, 20263, 20264, 20511, 20513, 20514, 20515 and 20860). The exception is 20860 in which the concentration figures used are for soft drink syrup manufacturing (20873) and are reasonable estimates of local concentration in soft drink bottling. The degree of understatement is illustrated by 20262. Manchester found an average CR₄ of 47 in 144 fluid milk markets in 1969-70. National concentration was about 22.

n.a. Not Available

^{a/} Data for 1972 are weighted averages of two or more new 1972 SIC classes.

^{b/} Value of Production

^{c/} Estimated by Richard Rogers

^{d/} 20620 and 20630 were combined (refined cane and refined beet sugar). CR₄ is simple average of two classes.

^{e/} CR₄ figures are for 20873, flavoring syrups for use by soft drink bottlers.

Source: 1972 Census of Manufactures, Concentration Ratios in Manufacturing, Bureau of Census, Oct. 1975

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