Concentration of Food Retailing in Louisiana

by

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Knowledge of the level of concentration in food markets is very important in assessing marketing margins, product innovation, advertising and promotion programs, assimilation of new technology among firms, entry and exit conditions, and a number of other behavioral and performance characteristics of firms within these markets. Changes in concentration at given levels in the marketing channel result from, among other factors, technological change, growth objectives of individual firms, changes in the availability of essential inputs, government policies and regulations, and demand changes.

Some changes in market concentration (number and size of firms) originate from factors that are national in origin while other changes result from factors at the state and/or market level. Concentration data are highly useful on a market or local level where individual firm policies and/or strategies can be evaluated. Many concentration studies, however, involve national data, the latter greatly masking local or regional influences.

Large firm market shares are usually associated with higher profits, higher production and/or selling costs, and slower product and/or service innovations (Cotterill). Concentration in food retailing usually leads to higher consumer food prices and/or lower prices for raw farm products (Marion, et al.).

This article presents estimates of changes in concentration levels in the retail grocery sector for selected Louisiana metropolitan and rural areas and compares these results with findings from previous studies of grocery store concentration at the local and national levels. The use of individual firm sales and employment data for measurement of concentration is also analyzed.

Growth in both size and number of corporate grocery chains over the last 15-20 years would suggest an increase in concentration in the grocery sector as these firms replaced the smaller independent firms, especially in metropolitan areas. However, corporate food chain growth in the rural areas could have actually increased the number of stores in these parishes as the local residents patronized the rural chain supermarkets rather than those in the metropolitan areas.

Data, Methodology and Procedures

Individual firm market share data are not published by the Census Bureau or in *County Business Patterns*. Individual firm employment data, however, were secured from the Louisiana Department of Commerce Office of Employment Security. Employment data were used as a proxy for the unknown firm sales data. Individual firm employment data were obtained for the period 1975-86 for firms operating in selected metropolitan and rural parishes in

Louisiana. Employment data on the corporate grocery chains, however, were obtained for all parishes for the longer 1965-86 period. The Concentration Ratio (CR2, CR4 and CR8) was used to analyze concentration at the SMSA, area and state levels while the Concentration Ratio, Herfindahl and Entropy measures were used to assess concentration in selected metropolitan and rural parishes. The results from this study using employment data were then compared with results of a similar study using sales data.

The Concentration Ratio and the Herfindahl Index are defined as:

$$CR_N = \sum_{i=1}^{N} S_i \qquad H_N = \sum_{i=1}^{N} S^2$$

Where:

CR_N = Concentration Ratio for N firms

H_N = Herfindahl Index for N firms

N = Number of firms

S_i = i^{th} firm's share of total employment

S^2 = i^{th} firm's share of total employment squared

Range = 0-100 for Concentration Ratio and 0-1 for Herfindahl Index.

The Entropy measure is defined as:

$$E_N = \sum_{i=1}^{N} S_i \log_2 S_i$$

Where:

E_N = Entropy measure for N firms

N = Number of firms

S_i = i^{th} firm's share of total employment

$\log_2 S_i$ = Log base 2 times S_i

Range = $0\text{-}\log_2 N$

The larger the share of total employment accounted for by a given number of firms within a market area (i.e., the larger the Concentration Ratio or the Herfindahl Index and the smaller the Entropy measure) the higher the market concentration. The Concentration Ratio compares employment share of the largest 2, 4, 8, 12 or 20 firms to total industry employment. On the other hand, the Herfindahl and Entropy measures include the employment shares of all firms in the calculation.

Previous Research

Duewer examined the number and size of meat wholesalers, grocery retailers and food service firms in the United States using USDA data and annual data from the *Progressive Grocer*. Firms were becoming larger and fewer in number. He also presented some reasons for the changes in distribution of firms by size.

Market structure in the U.S. food manufacturing industries was discussed by Connor, et al. They reported reduced concentration in meat packing and increased concentration in meat processing from 1947 to 1977. While the numbers of firms had increased at both levels, four-firm concentration ratios had increased for meat packing and decreased for meat processing.

Limitations on the availability of individual firm data have reduced the number of studies of concentration in grocery retailing at the metropolitan area level. Grinnell, Parker and Rens used 1972 Census of Business data to estimate grocery store concentration for 274 metropolitan areas over the 1954-72 period. Using the Concentration Ratio and the Herfindahl Index, they reported increasing concentration at this level. Their CR4 estimates for 1972 ranged from a low of 26.3 in Charleston, South Carolina to a high of 81.1 in Cedar Rapids, Iowa. Their Herfindahl Index averaged .0987 with a high of .22 in Denver - Boulder, Colorado to a low of .0313 in Huntington - Ashland, West Virginia.

Grocery store concentration at the national level is much lower, however, as the geographic scope of national markets dilutes the concentration. The *1982 Census of Retail Trade* reports CR4, CR8 and CR20 concentration ratios of 16.4, 24.1 and 35.6, respectively, for grocery stores in the United States.

Sherer (1980) reported that a 40 percent market share within a relative market is sufficient to suggest single price leadership. Shepherd (1982) classifies a four-firm concentration ratio greater than 60 as indicative of tight oligopoly conditions in the market and a CR4 less than 40 as suggestive of workable competition. Greer (1984) reported an average

four-firm concentration of 52.4 in national grocery retailing in 1975.

Value of sales, output, assets, value added and employment are used as data in concentration studies. While value of sales or value added data are usually preferred for concentration studies, only alternative sources are frequently available. Since larger firms tend to be less labor intensive and more capital intensive than small firms, the use of employment data will understate the relative importance of the larger firms (White, Sawyer). Therefore, the use of employment data requires acceptance of the assumption that technology affects all sizes of firms at given market levels in the same way, or recognition that employment-based concentration measures tend to understate concentration measures based on sales data.

Louisiana Grocery Store Concentration

Grocery store CR2, CR4 and CR8 estimates for 1975, 1980 and 1986 are given in Table 1 for seven urban and eight rural Louisiana parishes. These data indicate an increase in concentration in two urban parishes and a decrease in the remaining five urban parishes over the period. Four-firm concentration ratios ranged from 46.5 to 76.5 for 1986. If an urban parish is accepted as constituting a market, grocery store concentration in three parishes (Caddo, East Baton Rouge and Orleans) equal or approach Shepherd's classification as making up a tight oligopoly. Two firms control nearly 50 percent of the Orleans parish grocery market. Concentration dropped significantly in Ouachita parish over the twelve-year period.

The four- and eight-firm concentration ratios rose in five of the eight rural parishes analyzed. Four-firm concentration ratios ranged from 44.8 to 76.1 in 1986. The four-firm ratio exceeded 60 in four rural parishes in 1986. Grocery store retailing is particularly concentrated in Cameron and West Carroll parishes, located on diagonally opposite corners of the state.

Herfindahl Indexes and Entropy measures for the same three years and fifteen parishes are given in Table 2. These measures also show an increase in concentration in two urban parishes (Rapides and East Baton Rouge) and three rural parishes (Natchitoches, Avoyelles and Terrebonne). The remaining five urban and five rural parishes recorded decreasing concentration levels based on these two methods over the twelve-year period.

On an SMSA basis, grocery store concentration, as measured by the CR4, decreased in six of the seven SMSAs over the 1965-85 period (Table 3). (Single parish data for these seven SMSAs have been reported previously.) These data indicate a declining market share during the 1960s and the 1970s with an increasing market share in the 1980s. In many instances, the number of corporate chains represented in these SMSAs decreased over the period and CR8 measures could not be determined. Likewise, grocery store concentration declined on an area basis and for the state as a whole. Again, however, concentration has increased in the 1980s on an area and a statewide basis.

Comparison of Sales and Employment Bases

The Concentration Ratios reported by Grinnell, Parker and Rens for Louisiana SMSAs using grocery store sales data for 1972 offer an opportunity to evaluate employment data as a proxy for sales data in estimating grocery store concentration. Table 4 presents CR4 estimates for the seven Louisiana SMSAs using sales- and employment-based data. If the large firms are assumed to be less labor intensive than the small firms, employment-based concentration measures should be lower than the sales-based concentration measures. The CR4s based on employment data were higher than the CR4s based on sales data for five of the seven SMSAs. Employment-based CR4s ranged from 6.6 lower to 12.8 higher than sales-based CR4s. The lack of consistency between the two measures for these SMSAs generates some concern with the use of employment data in concentration studies.

Table 4

Grocery Store CR4, Concentration Ratios Based on Sales and Employment Data, Selected Louisiana SMSAs, 1972

SMSA	Sales[a]	Employment[b]	Difference
Alexandria	44.0	37.4	6.6
Baton Rouge	47.2	43.9	3.3
Lafayette	41.0	48.2	-7.2
Lake Charles	45.0	46.6	-1.6
Monroe	46.6	55.4	-8.8
New Orleans	59.6	60.0	-0.4
Shreveport	45.5	58.3	-12.8

[a] Grinnell, Parker and Rens.

[b] Louisiana study.

Table 1

Grocery Store Concentration Ratios, Selected Metropolitan and Rural Parishes, Louisiana, 1975, 1980 and 1986.

	Concentration Ratio and Year								
	1975			1980			1986		
Parish	CR2	CR4	CR8	CR2	CR4	CR8	CR2	CR4	CR8
Urban									
Caddo	43.8	66.1	87.4	24.0	38.7	55.7	37.1	59.6	76.5
Calcasieu	35.2	51.5	67.5	27.0	50.0	64.4	22.5	38.9	58.6
EBR	24.8	44.2	70.1	24.3	42.2	60.9	35.9	57.2	75.7
Lafayette	23.6	31.7	53.4	18.6	29.1	46.8	16.4	30.7	46.5
Orleans	53.7	67.7	78.4	42.1	64.0	76.5	47.1	63.9	74.2
Ouachita	52.1	67.0	79.8	33.6	50.5	68.8	24.5	42.5	55.3
Rapides	20.8	38.0	59.1	24.5	37.4	55.0	24.2	44.7	66.2
Rural									
Allen	36.4	61.7	87.3	29.8	54.8	81.0	35.1	64.4	89.3
Avoyelles	41.2	50.3	65.1	22.7	38.8	57.6	37.7	54.5	68.0
Cameron	73.0	88.9	100.0	40.0	76.9	100.0	47.8	69.9	95.6
LaFouche	40.9	54.0	71.1	35.6	49.6	66.8	28.0	46.5	60.3
Natchitoches	26.2	48.8	75.0	37.9	58.9	78.2	38.7	63.4	86.8
St. Mary	35.3	49.7	66.7	30.8	64.5	62.4	24.3	44.8	65.0
Terrebonne	22.3	41.2	58.1	27.3	43.1	60.9	28.1	53.4	73.6
W. Carroll	66.7	54.0	71.1	54.9	81.4	97.1	59.3	76.1	94.7

Source: Louisiana Department of Commerce.

Table 2

Grocery Store Herfindahl Indexes and Entropy Measures, Selected Metropolitan and Rural Parishes, Louisiana, 1975, 1980 and 1986.

	Concentration Measure					
	Herfindahl			Entropy		
Parish	1975	1980	1986	1975	1980	1986
Urban						
Caddo	.1340	.0541	.1048	4.014	5.061	4.218
Calcasieu	.0887	.0704	.0548	4.497	4.614	4.904
EBR	.0595	.0760	.1040	5.013	5.358	4.228
Lafayette	.0567	.0400	.0372	4.837	5.334	5.567
Orleans	.2334	.1310	.1379	3.748	4.177	4.140
Ouachita	.1305	.0844	.0840	4.189	4.514	4.887
Rapides	.0536	.0598	.0659	5.040	4.814	4.738
Rural						
Allen	.1241	.0992	.1155	3.426	3.677	3.516
Avoyelles	.1074	.0561	.0960	4.390	4.668	4.152
Cameron	.3156	.1720	.1643	2.128	2.625	2.906
LaFouche	.1581	.0973	.0663	4.648	4.216	4.641
Natchitoches	.0838	.1176	.1211	4.143	3.720	3.480
St. Mary	.0948	.0841	.0667	4.402	4.585	4.601
Terrebonne	.0597	.0634	.0838	4.664	4.761	4.268
W. Carroll	.2514	.0814	.2032	2.512	4.338	2.737

Source: Louisiana Department of Commerce.

Table 3

Grocery Store Concentration Ratios for Selected SMSAs, Areas and for Louisiana, 1965, 1972, 1980 and 1986.

SMSA, Area and State	Concentration Ratio and Year							
	1965		1972		1980		1986	
	CR4	CR8	CR4	CR8	CR4	CR8	CR4	CR8
SMSA[a]								
Alexandria	58.4	b	37.7	45.3	22.6	b	38.6	b
Baton Rouge	52.0	55 1	43.9	b	33.0	b	51.5	b
Lafayette	56.9	b	48.2	53.5	27.0	b	32.7	b
Lake Charles	69.9	74.5	46.7	49.0	48.0	b	38.8	b
Monroe	62.5	b	55.4	b	62.6	b	35.6	b
New Orleans	60.6	61.9	60.1	63.4	51.4	b	63.1	b
Shreveport	52.5	55.1	58.3	80.9	36.4	b	46.7	b
Area								
North	42.1	54.6	38.6	52.6	30.9	47.5	31.3	44.9
Central	45.9	50.7	32.5	37.1	26.2	31.6	40.1	49.8
Southwest	41.9	52.9	32.4	49.6	23.1	33.6	25.1	34.6
Southeast	57.5	59.0	55.4	57.8	45.2	49.4	56.3	62.0
State								
LA	42.9	51.5	36.4	47.6	25.9	35.4	35.4	46.5

Source: Louisiana Department of Commerce.

[a]Alexandria-Rapides, Baton Rouge-East Baton Rouge, Lafayette-Lafayette, Lake Charles-Cameron, Monroe-Ouachita, New Orleans-Orleans and Shreveport-Caddo.

[b]Unable to calculate using corporate chain data.

Summary and Implications

Changes in grocery store concentration were estimated for selected Louisiana parishes and SMSAs using the Concentration Ratio, Herfindahl Index and Entropy measures. Based on employment data and the Concentration Ratio, concentration increased in two of seven urban parishes and in five of eight rural parishes over the 1975-86 period. The Herfindahl and Entropy measures yielded slightly different results indicating the influence of including all firms in the determination of concentration. The reductions in concentration appear to run counter to expectations based on growth among the corporate food chains.

Three urban parishes and four rural parishes had CR4 estimates that suggest the possibility of enhanced retail food pricing in these market areas. In several parishes and in most of the SMSAs areas and for the state, concentration had increased significantly in the 1980s. These results indicate that a reversal of the general downward trend in grocery store concentration in Louisiana may have already occurred.

Industry personnel and policy makers should find these results useful in appraising expansion potential and in assessing the need to discourage further firm expansion in some Louisiana retail food markets.

In comparison to sales-based concentration measures, the employment-based measures tended to overstate concentration and were inconsistent across parishes. This result may raise a question as to the use of labor saving technology among firms in the Louisiana grocery industry in the early 1970s. *Ceteris paribus*, these data indicate that the large grocery firms in Lafayette, Monroe and Shreveport may not have been as labor efficient as were the firms in the other SMSAs during the same period.

References

Connor, John, Richard Rogers, Bruce Marion and Willard Mueller. *The Food Manufacturing Industries--Structure, Strategies, Performance and Policies*, Lexington Books, 1985.

Cotterill, Ronald W., "Market Power in the Retail Food Industry: Evidence from Vermont," *Review of Economics and Banner*, August 1986.

Duewer, Lawrence, "Changing Trends in the Red Meat Distribution System," USDA-ERS, *Agr. Econ. Rpt.*, No. 509, February 1984.

Greer, D. F., *Industrial Organization and Public Policy*, Second edition, New York: Macmillan, 1984.

Grinnell, Gerald, Russell Parker and Lawrence Rens, "Grocery Retailing Concentration in Metropolitan Areas, Economic Census Years 1954-72," USDA-ESCS, Bureau of Economics, Federal Trade Commission, unnumbered and undated.

Marion, Bruce, et al., "The Price and Profit Performance of Leading Food Chains," *American Journal of Agricultural Economics*, August 1979.

Sawyer, Malcolm, *The Economics of Industries and Firms: Theories, Evidence, and Policy*, St. Martin's Press, 1981, p. 38.

Shepherd, William, "Causes of Increased Competition in the U.S. Economy, 1939-72," *Review of Economics and Statistics*, November 1982.

U.S. Department of Commerce, "Census of Retail Trade 1982," U.S. Printing Office.

White, Lawrence, "What has been happening to Aggregate Concentration in the United States?" *Journal of International Economics*, March 1981.