

Market Power in Grocery Retailing: Assessing the Evidence for Canada

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Market Power in Grocery Retail: Assessing the Evidence in Canada

This study is one of three commissioned by the Competition Bureau on the topic of market power and the potential for anti-competitive behavior in the food retailing industry in Canada. Similar issues have been raised in the US and Europe, as a result of recent waves of supermarket mergers, and perceptions expressed in trade journals and the press regarding a “power shift” toward food retailers, to the possible detriment of consumers, manufacturers and farmers. This report deals with the empirical side of the topic.

I begin by providing background information on the structure of food retailing in Canada to provide some context for understanding the debates. Second, I present and comment on numerous statistics that are typically used to evaluate the structure and performance of the industry, and how it may have evolved in the past decade in Canada. Third, I critically survey the econometric and other empirical literature dealing with market power in food retailing. This includes articles in the structure-conduct-performance tradition (SCP), the “new empirical industrial organization” (NEIO) approach, and the papers assessing the impact of vertical restraints in food retailing.

Finally, I offer some conclusions regarding competition and market power in Canadian food retailing. It will be evident to the reader, however, that there are comparatively few empirical studies on food retailing, still fewer that look at Canada. Moreover, taken as a whole, the existing studies often make conflicting assumptions,

suffer from econometric identification problems, and do not arrive at a fixed conclusion. Any policy advice is therefore rather tentative, unfortunately.

I. Introduction and Background

The food sector represents about one-quarter of total retail trade in Canada, or almost \$60 billion per year. Food is sold through various categories of vendors: supermarkets, grocery stores, warehouse/discount stores, combination stores, convenience stores, department stores, and specialty food shops (e.g., butchers, bakeries). Most of the concern about retail market power is with supermarket chains. These account for approximately half of retail food sales in Canada.

There is no formal taxonomy for the various retailers, but supermarkets are generally characterized as stores with over 15,000 square feet of selling space, with very diverse products for sale, and located within a 15 minute drive from the clientele (Competition Commission, 2000). Supermarkets provide consumers with the maximum in “one-stop shopping.”¹ The definition of a “chain” used by Statistics Canada is an enterprise with more than four stores, which is assumed to confer on it certain advantages in wholesaling, warehousing, advertising, and the use of electronic technology, compared to independent retailers.² The top five supermarket chains in Canada by sales are Loblaws, Sobeys, Canada Safeway, Metro, and A&P.

¹ Large supermarkets, with over 30,000 square feet and service counters, are often called “superstores,” in contrast to “traditional supermarkets” that are smaller and purely self-service.

² In the US, a chain consists of more than ten stores. Trade analysts prefer to distinguish independent retailers on the basis of decentralized (i.e., non-corporate) decision-making and adaptation to local market preferences, rather than the number of stores owned.

Supermarkets compete primarily with each other within a city, but there is growing evidence that smaller grocery stores, specialty shops, so-called alternative format stores (warehouse clubs and deep discount stores) and fast food restaurants affect the pricing and other strategic decisions of supermarkets.³ Thus, although the Office of Fair Trading in the UK and the Federal Trade Commission in the US regard supermarkets in a given metropolitan statistical area as a distinct market for the purpose of interpreting competition law, empirical work on market power in food retailing must be careful to test for competition between different types of retailers.

Aside from increasing the data requirements, the partial overlap between the supermarket market and the markets serviced by other food store formats raises a deep and thus far unresolved measurement issue. Indeed, this issue arises even within the strict supermarket definition of the market. The problem is that food retailers compete not by price alone, but also through several dimensions of service quality. Service includes the number and diversity of products carried, including fresh foods at a deli or the existence of an on-site restaurant, the attractiveness of the displays, the quality of the private label brand, the size of the store, its location, product promotions and advertising, etc. As a result of non-price competition through service quality, grocers do not price each item as a proportional markup over unit cost, but instead price each of their products as part of a strategic whole, taking into account opportunities for price discrimination across products, as well as the price and service responses of competitors. Similarly sized stores in the same city therefore can and do charge different prices for the same foods without one store necessarily charging systematically higher prices than another.

³ There is a useful schematic illustration of the different types of food retailers in Marion (1998), where eight retail food store formats are compared in terms of price (high-low) and assortment of products (broad-

Researchers have attempted to address this issue of pricing multiple food products by constructing a food price index of a representative bundle of foods purchased in supermarkets, rather than studying the prices of individual food items. However, this does not quite resolve the problem, because it turns out that there is a surprising amount of non-overlapping of brands and products even between similarly sized supermarkets, let alone across all food store formats.⁴ Regardless of how a grocery food price index is constructed, coverage will be incomplete.⁵ This issue is central to the debate on whether the existing empirical literature supports the contention that retailers are exploiting long-term market power over consumers. The reason is that any spurious variation in product prices across stores due to the aggregation procedure can mask the relationship between the price index and the market concentration ratio. A related question, stemming from the prevalence of differentiated supermarkets, is whether the costs of retailing are separable across items. Given that a single supermarket may stock as many as 36,000 types of

narrow).

⁴ If all supermarkets sold the same items, or even the same categories of items, then a testable hypothesis is that as the concentration ratio falls, so does the price index. However, Kaufman and Handy (1993) cite a 1973 FTC staff survey, “revealing that an average of only 11 percent of all items at any given store were available at all major competitors surveyed.” Geithman and Marion (1993) are more optimistic, citing studies showing that, “For a large number of products, the leading brand and package size was carried by over 75% of the stores.” They note, however, the “enormous problems of comparability” in meat and produce.

⁵ As one illustration of the type of problem that can arise from the incomplete coverage of products in a market, suppose that supermarkets are monopolistically competitive, differentiating themselves by selling some categories of food or merchandise not sold by competitors. For example, Loblaws Superstores in Calgary contain a liquor store, but Safeway and Co-op do not. A change in market structure that confers additional market power to the remaining firms might manifest itself through higher prices for the goods that are unique to each store, but not necessarily raise the prices of the goods sold by all of the stores. An estimate of the industry’s performance based on a food price index constructed from commonly sold items could be misleading in that scenario. An alternative index that is store-specific, however, poses aggregation issues in an SCP study, amounting to “comparing apples and oranges” (Geithman and Marion, 1993). I return to the problem of food price aggregation later.

products (stock keeping units), a cost function that is not separable is econometrically intractable.⁶

Most of the empirical literature on market power in food retailing deals with the price-setting power that stores may or may not command over consumers as a result of stunted competition. However, the current concern in the industry is in regard to the buying power of retailers versus wholesalers and manufacturers. In the past, the relatively high market concentration in the food manufacturing sector largely pre-empted this question, but supermarket mergers in the 1980s and 1990s have allegedly sharply raised supermarket concentration ratios domestically and internationally. Sexton (2000) notes that the farm sector in the US takes in only 23 per cent of value added in the food system in 1998, compared to 31 per cent in 1980 and 41 per cent in 1950, and asks whether this is attributable to the combination of manufacturer and retailer buyer power.

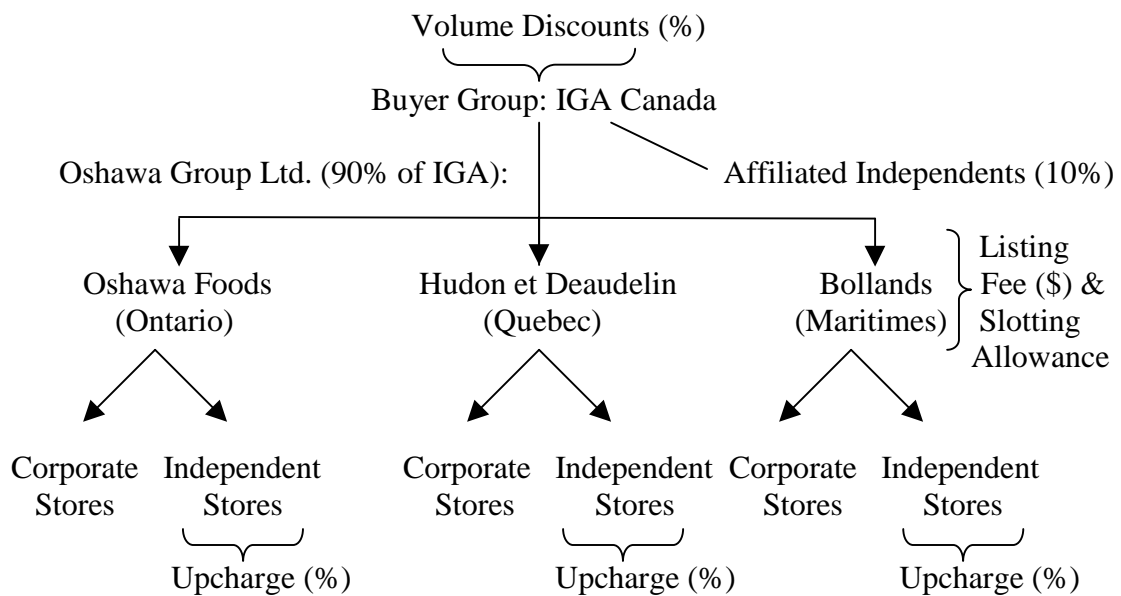
It is generally assumed, especially in trade journals, that any evidence that retail market concentration ratios are positively related to food store prices is a demonstration of market power not only over consumers (monopoly seller power) but also over inputs (monopsony buyer power). This is intuitive, since it is the scarcity of retailer shelf space, or the allocation of that capacity, that is the ultimate source of both types of power. Theoretically, however, monopoly and monopsony power need not accrue together. Furthermore, the significance of a concentration ratio may differ, depending on whether one is interested in retailer monopoly power or monopsony power.

In particular, it is the local area supermarket concentration ratio that is of interest in studying retail seller power, but buyer power is more likely to be related to the

⁶ The average supermarket in the US has 36,426 SKUs; in Canada the average is 17,857, although the figure is close to 24,000 in Ontario and Quebec (*Canadian Grocer 1999 Executive Report*).

concentration ratio in a larger geography, perhaps national or international. Large grocery chains are vertically integrated with a wholesaler, but independent grocers can also enjoy buyer power through voluntary affiliations that consolidate purchasing with a single large wholesaler, or through franchise arrangements with a corporate retail chain. It may be useful to illustrate the role of buyer groups in the corporate hierarchy in order to explain at what business level strategic decisions occur. I give the example of IGA in 1997, that is, prior to its take-over by Sobeys in late 1998.⁷ Other buyer groups operating at the time included Distribution Canada (i.e., A&P, Co-Op, Sobeys, Metro-Richelieu), Loblaws, and Provigo.

Figure 1: Illustration of 1997 IGA Buyer Group



⁷ Oshawa Foods, Hudon et Deaudelin, and Bollands had changed names to Agora, shortly before their purchase by Sobeys.

The illustration shows that a buyer group exists primarily in order to purchase large volumes of food from manufacturers, qualifying the group for bulk discounts. The buyer group itself can consist of various corporate retail entities, in this case subsidiaries of the Oshawa Group, and some independents. Thus, for example, the Ontario division Oshawa Foods sponsored corporate stores under the banners of Food City, Price Chopper, Food Town, Dutch Boy and Dutch Girl, IGA, etc., as well as a large number of independent IGA franchises. Listing fees and slotting allowances are determined at this level, e.g., Oshawa Foods, Hudon et Deaudelin, and Bollands. Pricing would also largely be determined at this level, although individual stores may have some (limited) flexibility in price and service, particularly the independent stores, which also pay their corporate sponsor a three per cent upcharge on wholesale purchases.

Although the structure depicted in figure 1 has been superseded by the acquisition by Sobeys of IGA stores across Canada, it provides a concrete example of where business policy decisions typically occur in the industry. In short, the concentration ratio of buyer groups may be the most appropriate for measuring retailer monopsony power, while the concentration of corporate retailers best measures monopoly power and the power to impose non-price vertical restraints in the industry.

Another general issue warranting commentary is that the different empirical studies of food retailing contain different maintained hypotheses about the underlying model of the industry. Some researchers have characterized the food retailing industry as “workably competitive” (e.g., Binkley and Connor (1998) cite Adelman (1948) and Stigler (1950)), others have analyzed it as monopolistically competitive (e.g., Benson and Faminow, 1985) or, alternatively, as oligopolistic (e.g., Baumol et al., 1964, Holdren,

1968, and Marion et al., 1979a). Both of the models of imperfect competition are consistent with an empirical finding that food prices are higher in more concentrated geographical markets, but their implications for retailer power differ. A monopolistically competitive industry is associated with relatively low entry barriers and non-strategic pricing (i.e., lack of “market power,” even though the firms face downward sloping demand curves), while the strategic behavior of oligopolies is consistent with high entry barriers and few players.⁸ As Farris and Ailawadi (1992) note, “Power is a concept that must be grounded in some action or *potential* for action to give it meaning.” West (1981a,b) does provide evidence, using data for the Vancouver area, that supermarket chains locate their stores strategically to pre-empt entry by rivals, which is consistent with oligopoly behavior.

An identification problem also arises from the implicit assumption about the structure of the food manufacturing industry. Examining profit margins to test for retailer power can lead to different conclusions, depending on whether the manufacturing sector is assumed to be competitive, oligopolistic, or vertically collusive. In general, the implicit modelling choice of each researcher can render the comparisons of empirical results across papers somewhat problematic.

Having discussed some general background issues relating to the empirical side of the retail market power issue, I turn now to a description of trends in the Canadian food retail industry.

⁸ In regressions of reduced form price or profit equations, monopolistic competition through enterprise differentiation among grocers might be distinguished empirically from oligopoly through a nonlinear specification of the concentration ratio. Evidence that market power accelerates at critical levels of concentration may demonstrate the market power of retailer oligopolies. Explicit measures of barriers to entry in grocery retailing can also assist in discriminating between models of imperfect competition. The lack of suitable locations for new supermarkets has been cited as a barrier to growth in Canada, although Cotterill (1993) notes that the problem of scarce locations is only likely to matter in small towns, not cities.

II. Trends in Canadian Food Retailing

In this section, Canadian data for the past decade are presented on a number of variables that are commonly used to judge the structure and performance of the food retail industry. Despite some sharp critiques of structure performance studies in food retailing (e.g., Anderson, 1993), the view that market power and profit are closely associated continues to inform both public policy-making and industry financial analysis (e.g., Eng and Schroeder, 1998). I discuss the issues surrounding SCP studies in detail in my review of econometric work later.

Most of the data I present are national, rather than local (e.g., by size of census agglomeration areas).⁹ While this may be appropriate for capturing elements of buyer power and overall profitability, it is inaccurate for assessing local retail selling power. On the other hand, given the relatively few supermarket chains operating in Canada, and their recent foray into cross-provincial acquisitions, the national statistics on structure and performance are likely highly correlated with developments in regional and local markets.¹⁰ Farris and Ailawadi (1992) similarly use aggregate US data on profits in food retailing and food manufacturing to draw broad conclusions about changes in retail market power. Kaufman (1999) notes that the national trend in US food retail concentration “provides an indicator of the net effect of internal growth, firm consolidation, and divestitures among the largest food retailers.”

⁹ Local and provincial data on the structure and financial performance of supermarkets do not exist.

¹⁰ National concentration ratios in food retailing most likely understate provincial concentration ratios, given that the major chains operate primarily in their home-province. However, since 1998, Loblaw's has

Sales

Table 1 shows the annual sales for supermarket chains, supermarket plus grocery store chains, and independent grocers, as well as total retail sales of all goods. The category of “grocery store” includes convenience stores, which do not compete directly with supermarkets. Ideally, one would want to see independent supermarkets broken out separately from independent grocery stores, but that data is not available.¹¹ From 1990 to 1998, supermarket chain food sales have risen by 39 per cent in nominal terms, compared to 16 per cent inflation in the consumer price index over that period. Sales of the aggregate category, supermarket and grocery store chains plus independents, has risen less rapidly, 27 per cent, reflecting the fairly constant level of sales by both the independents and grocery chain stores over the decade. Total retail sales (food and non-food) grew by 28 per cent from 1990-98, almost identical to the growth in food retail sales but considerably less than for supermarket chains. Figure 2 provides a graph of the data from table 1.

Table 1: Retail Sales¹²

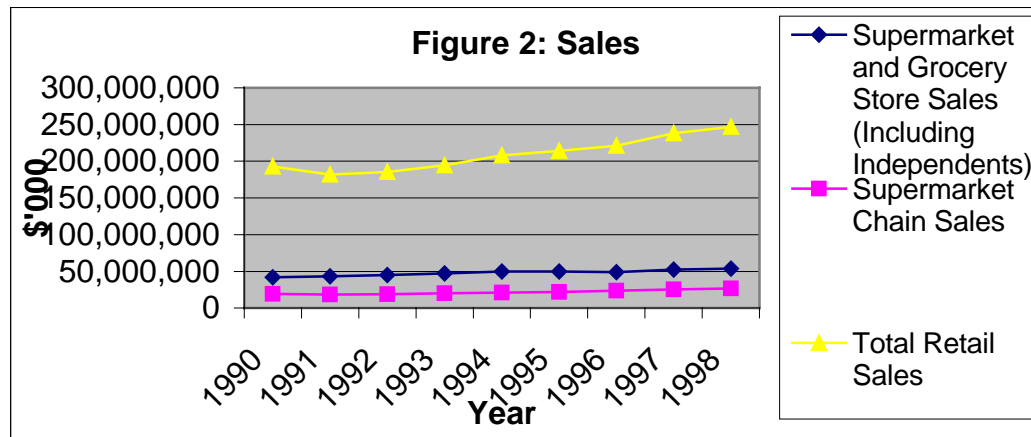
Year	Supermarket Chain Store Sales (\$000)	Supermarket and Grocery Store Sales (Including Independents) (\$000)	Total Retail Sales (\$000)
1990	19,030,519	42,127,000	192,558,000
1991	18,319,609	43,038,900	181,615,000
1992	18,666,816	44,860,000	185,170,000
1993	20,056,415	47,206,900	194,325,000

acquired Provigo in Quebec; Nova Scotia-based Sobeys has acquired the Oshawa Group in Ontario, and Quebec-based Metro is entering Ontario via its acquisition of the Loeb banner from Provigo.

¹¹ Foodland, Fortinos, Freshmart, IGA, Metro, No Frills, Your Independent Grocer are some of the better known franchised independent supermarkets. Unaffiliated independents include a few supermarkets, such as Staffen’s Markets in Ontario, but are mainly “the thousands of smaller grocery stores...dotting the country.” (*Canadian Grocer*, Jan/Feb 2000, and Jan/Feb 2001).

¹² The second column is from *Retail Chain and Department Stores*, Statistics Canada. The third column is from *Retail Trade, Monthly*, Statistics Canada. The fourth column is from *Retailing in Canada*, Statistics Canada.

1994	20,921,892	49,722,300	207,841,000
1995	21,843,729	49,657,500	213,774,000
1996	23,771,980	48,804,200	220,870,000
1997	25,397,157	52,185,900	237,837,000
1998	26,491,526	53,574,400	246,641,000



Number and Size of Stores

Table 2 provides information on the structure of the Canadian food retail industry. It shows the number of corporate chains, the total number of stores owned by chains, the average size of the selling area in a supermarket chain store (“floor space accessible to the public”), and the average weekly sales per supermarket chain store. The average selling space of a supermarket is often used as a measure of quality, because it summarizes the potential for convenient “one-stop-shopping.” The data show some evidence of consolidation among corporate chains, with the number of supermarket chains falling from a decade high of 49 in 1993 to 44 in 1998; grocery store chains fell from 46 in 1993 to 36 in 1998. The number of stores belonging to supermarket chains has

remained fairly flat over the decade, while grocery chain stores have declined appreciably. The average number of supermarkets per chain was 30.5 in 1990 and 34 in 1998. The decline in the number of supermarket chains and the increase in the average number of supermarkets per chain provides some anecdotal evidence that supermarket concentration has increased at the national level.

*Table 2: Chain and Store Characteristics*¹³

Year	Supermarket Chains	Grocery Store Chains	Supermarket Chain Stores	Grocery Stores	Total Selling Space of Supermarkets (Square feet)	Average Sales Per Square Foot of Chain Supermarkets (\$)
1990	48	46	1,464	2,738	30,761,015	563
1991	47	42	1,415	2,624	30,288,693	550
1992	46	43	1,394	2,348	30,449,026	546
1993	49	46	1,403	2,230	32,049,626	558
1994	42	42	1,369	2,288	33,292,438	575
1995	41	37	1,380	2,141	37,441,915	551
1996	43	35	1,447	2,413	31,563,909	645
1997	40	36	1,443	2,368	38,380,486	626
1998	44	36	1,497	2,085	42,916,696	607

Concentration Ratios and Relative Profitability (1980-88)

Concentration ratios, unfortunately, are no longer published by Statistics Canada for the food retailing industry, the last data point being 1988.¹⁴ Table 3 presents the four-firm concentration ratios (CR4) for food retailing as well as for food manufacturing from

¹³ The data are from *Retail Chain and Department Stores*, Statistics Canada.

¹⁴ The historical national concentration ratios reported in table 3 stem from the Corporations and Labour Unions Returns Act (CALURA), Part I. Concentration ratios for the food retailing industry cannot be calculated from the successor to CALURA, the Corporations Returns Act (CRA). However, the data underlying Statistics Canada's publication *Retail Chain and Department Stores* may, in fact, be ideal for obtaining up-to-date CR4 figures for supermarket chains nationally and possibly at a disaggregated level as well. These were unavailable in time to be included in this report, but can be obtained from Statistics Canada at a cost of \$2000-\$3000 and at least a one-month time delay. Contact Michael Scrim at Michael.Scrim@Statcan.ca for this. Data on *local US* food retailer concentration is available just until 1987 (Sexton, 2001).

1980-1988. A comparison of CR4 in retailing with the manufacturing CR4 is important for assessing retailer power, under the hypothesis that market power in upstream and downstream industries are offsetting or “countervailing.” Galbraith’s (1952) theory of countervailing power is that the presence of strong sellers begets strong buyers and vice versa.¹⁵ Thus I also present the *ratio* of the return on equity (ROE) between food retailing and food manufacturing for 1980-1988 in figure 3, together with the *ratio* of CR4 in food retailing and manufacturing, and the price index for food purchased in stores relative to the CPI.¹⁶

The ratio of retail/manufacturing CR4 shows a general decline in the relative concentration of food retailing during the 1980s, due to the strong downward trend in food retailing concentration. This pattern may reflect the apparent decline in the profitability in food retailing relative to food manufacturing during most of that period. These trends also coincided with a decline in the price of food purchased at stores, relative to the consumer price index during the first half of the sample, followed by a fairly constant relative price of food purchased in stores.

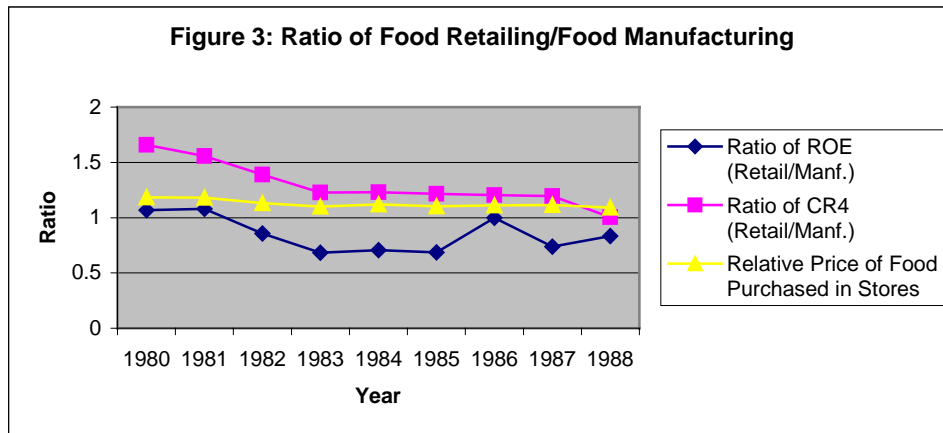
It is interesting that Diekmeyer (2001) notes in the trade publication, *Canadian Grocer*, that food manufacturers in Canada are responding to “large retailers stringent demands” with “a round of consolidations of their own.” I discuss the empirical literature on countervailing power in the food industry later.

¹⁵ Interestingly, an article by Peter Diekmeyer, “Are Canada’s Retailers Ripe for the Pickin’?” appearing in the *Canadian Grocer*, June 1, 2001,

¹⁶ The ROE for 1980-1988 is not published by Statistics Canada. I calculated the ROEs for each sector as the ratio of profits to equity using the CALURA data. For food retailing, using CANSIM series labels, this is D793483/D793482, and for food manufacturing it is D796579/D796578. These ROE values are significantly higher than the ROEs that are published by Statistics Canada for the later period, 1990-1998, possibly because the CALURA data is reporting gross profits, rather than net profits. Although the ROEs that I calculated for 1980-1988 cannot be compared with the published series for 1990-1998, the ratio of

Table 3: Concentration Ratios (1980-88)¹⁷

Year	CR4 Food Retailing	CR4 Food Manufacturing
1980	.50	.30
1981	.46	.30
1982	.44	.31
1983	.41	.34
1984	.38	.31
1985	.35	.29
1986	.37	.30
1987	.35	.30
1988	.33	.32



ROEs (food retailing/food manufacturing) should be a reasonable measure of trends in relative sector profitability.

¹⁷ The CR4 ratios are obtained CALURA data, using sales by top four firms divided by total sales in the industry. For food retailing (which includes all forms of food retailing by large corporations) the relevant CANSIM numbers are: D793460, D793480; for food manufacturing, the numbers are D792574, D792589.

All of these trends seem to corroborate the empirical analysis of US data from 1972-1990 by Farris and Ailawadi (1992), where the authors concluded that their various profitability ratios show a *decrease* in the relative profitability of food retailers. They conjecture various reasons for why, “The ability of retailers to obtain promotional allowances from manufacturers, even if it is growing, has not automatically led to increased retailer power and profits.” However, Park and Weliwita (1999) claim that US grocery store profitability has risen in the 1990s, “suggesting a shift in industry competitive conditions.” In the United Kingdom, supermarket profits declined since 1996 and the real price of food fell by 9.4 per cent from 1989 to 1998 (Competition Commission, 2000).

It must be noted that the four largest food retailers in Canada and the US are not the same today as in 1988. Table 4 shows the annual sales of the five largest food retailers in Canada. The figures are reported in the *Canadian Grocer* magazine’s *Who’s Who* Annual Directory of Chains & Groups in Canada for 2000-2001, but can correspond to sales in either 1999 or 2000, depending on the firm’s fiscal reporting period. The *four* largest firms accounted for approximately 75 per cent of total Canadian food store sales.

Table 4: Canada’s Largest Supermarket Chains in 2000

Supermarket Chain	Total Sales (\$000)
Loblaw Companies	18,780,000
Sobeys	11,000,000
Canada Safeway	4,940,000
Metro	3,995,000
Great A&P	3,200,000
Total Sales of the Top Five	41,915,000

SOURCE: *Canadian Grocer, Who’s Who 2000-2001*

Of course, it is possible that retailers exercise market power against consumers but not against manufacturers. The question is then whether profitability may have risen in *both* retailing and manufacturing due to increased market concentration in retailing, with the sectors acting like an integrated monopolist and sharing the profits through lump-sum payments (e.g., slotting allowances). Data on food retailing profitability can help address this possibility.

Profitability in Food Retailing (1990-1998)

Turning to the more recent data on profitability, table 5 shows the data from 1990-1998 on gross margins (revenues minus cost of goods sold, divided by revenues) for supermarket chains and for grocery store chains. The table also shows the return on equity for both food retailing and the industrial food sector¹⁸ and the price index for food purchased in stores, along with the CPI. The gross margin in supermarkets has been pretty constant throughout the decade, and has risen somewhat in the grocery store sector.

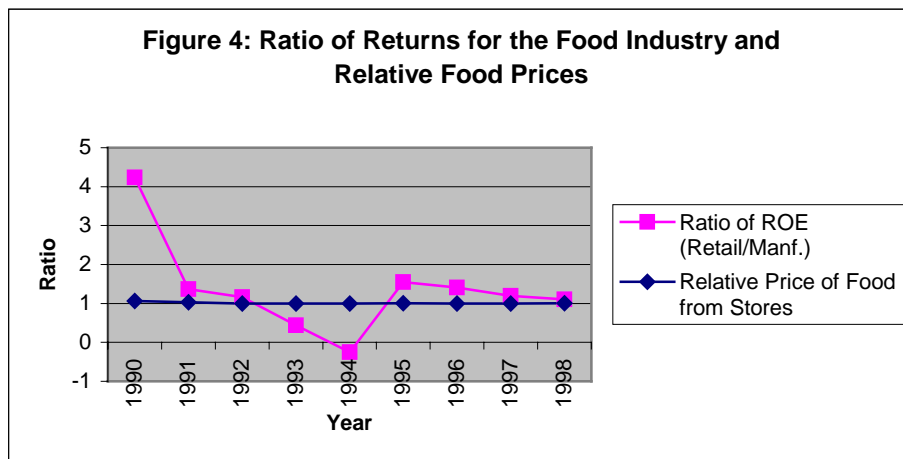
*Table 5: Profitability*¹⁹

Year	Gross Margin Supermarket Chains	Gross Margin Grocery Store Chains	ROE Food Retailing	ROE Food Manufacturing	Price Index Food Purchased in Stores	CPI
1990	20.7	21.7	37.1	8.8	99.2	93.3
1991	21.1	24.1	11.7	8.6	101.5	98.5
1992	20.7	23.7	7.3	6.3	100	100
1993	20.3	23.3	3.5	8.0	101.8	101.8
1994	21.8	25.4	-2.2	9.0	101.9	102
1995	22.0	24.6	13.5	8.7	104.6	104.2
1996	21.7	25.8	13.4	9.5	105.9	105.9
1997	21.0	25.6	13.0	10.9	107.5	107.6
1998	21.7	26.0	10.8	9.8	109.2	108.6

¹⁸ This includes food manufacturing, wholesaling, agricultural production, commercial fishing and fish processing. In my discussion, I refer to the industrial food sector simply as “food manufacturing.”

¹⁹ The second and third columns are from *Retailing in Canada*, Statistics Canada. The fourth to seventh columns are from CANSIM, numbers D376672, D376382, P200002 and P200000, respectively.

Return on equity in both food retailing and food manufacturing have risen a bit in the second half of the decade, but this may be reflecting the recession in the early 1990s. The ratio of ROE between food retailing and food manufacturing is shown in figure 4, together with the relative price of food purchased in stores (compared to the CPI). It shows that profitability in food retailing compared to food manufacturing fell during the first half of the 1990s, before rising back to the 1991 ratio. In the meantime, movements in the food price index have mimicked the CPI.



These casual observations support my conclusion for the 1980s: there is no evident increase in food retailer profitability and market power. This is also consistent with the view of Kaufman (1999), who reviews recent US grocery mergers and acquisitions, and ascribes the sharp increase in the four-firm concentration ratio in US grocery retailing from 1996 to 1998 to consolidations aimed at achieving scale economies

in electronic technologies, procurement, marketing, and distribution. He notes that most of the supermarket mergers occurred in non-overlapping markets and have not resulted in a rise in the grocery store sales deflator.

Other Common Benchmarks

Other benchmarks of performance that are used by industry analysts are: the average number of items carried by a supermarket (a measure of consumer benefits from reduced search costs), the sales per square foot (a measure of capacity utilization), private label sales (a measure of retailer success in vertical competition with manufacturers), the share of sales controlled by warehouse clubs (a measure of competition by alternative format stores), and average sales per labour hour (a measure of labour productivity).

Table 6 provides figures for these variables for supermarkets in 1990 and 1998.

Table 6: Common Benchmarks

	1990	1998
Sales Per Customer Transaction	\$20.69	\$24.40
Average Price Per Item	\$1.64	\$1.96
Sales Per Labour Hour	\$134.06	\$143.70
Average # of Items Carried	17,268	17,857
Share of Private Label Sales	15.4%	21.8 %
Weekly Sales Per Sq. Ft.	\$10.52	\$13.10
Share of Warehouse Clubs	4.5 % (in 1996)	5.4 %

SOURCE: *Canadian Grocer, Executive Report*, 1991 and 1999.

III. Survey of Empirical Literature

Before discussing the empirical evidence on market power in food retailing, it is perhaps useful to summarize the main questions we seek to address, and to categorize the publications that I review in terms of the answers they provide. The empirical work on food retailing can be organized using the following template.

Box 1: Questions and Methods

- I. Policy issue: Is there excess profit in food retailing? If yes, is this due to
 - a. Lower costs of the largest retailers?
 - b. Superior quality or successful advertising by differentiated retailers?
 - c. Market power due to substantial long-term entry barriers?
 - i. Is there retailer seller power?
 1. Are local market concentrations of sellers high?
 2. Do vertical restraints impede retail market entry?
 - ii. Is there retailer buyer power?
 1. Is there a high concentration of buyer groups?
 2. Do vertical restraints exploit retailer buyer power?
 - iii. Is there a retailer/manufacturer bilateral monopoly?
- II. Methods of analysis.

- a. Structure-conduct-performance (reduced form estimation)
- b. New empirical industrial organization (structural estimation)
- c. Empirical analysis of vertical restraints
- d. Informal empirical work (not based on statistical estimation)

Another template shows which papers affirm significant food retailer power and which contradict it. Note that all of these studies relate to US data. I am unaware of econometric studies on market power in Canadian food retailing, although some inferences can be drawn from financial analyst reports and trade publications. It would seem, however, that grocery retailing in Canada has historically been at least as concentrated as in the US.

Box 2: Answers and Methods

Is there market power in food retailing?	Yes	No
Reduced Form Estimation (SCP)	Cotterill (1999) Marion (1998) Binkley and Connor (1998) Farris and Ailawadi (1992)* Cotterill (1986) Marion et al. (1977, 1979a,b) Lamm (1981) Hall, Schmitz, and Cothorn (1979)	Kaufman (1999)* Connor, Rogers, and Bhagavan (1996) Kaufman and Handy (1989) Newmark (1990)
Structural Estimation (NEIO)	Schroeter, Azzam, and Zhang (2000) Kadiyali, Chintagunta, and Vilcassim (2000)	Park and Weliwita (1999)
Do vertical restraints enhance market	Yes	No

* A brief summary of this non-econometric study is given in section II above.

power and damage competition in food retailing?	Bloom, Gundlach, and Cannon (2000)	Sullivan (1997) Mixon and Upadhyaya (1996) Sass and Saurman (1993)
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I turn now to a critical summary of the findings from the publications listed above, which include most, if not all, of the empirical literature on food retail market power.

A. Reduced Form Estimation Studies

Price theory suggests that, if there are barriers to entry in a market, an oligopoly of firms producing an identical product will earn excess profits by charging a price above marginal cost; and the fewer the firms in the industry, the higher price and profit are expected to be. This is the basis for the reduced form equation estimation in the structure-performance paradigm, in which price margins, profits, market power and industrial concentration are closely related variables. The first papers to test this hypothesis in food retailing are Marion et al. (1977, 1979a,b), Hall, Schmitz, and Cothorn (1979), Lamm (1981), and Cotterill (1986). The data sets used in these studies are rather dated now, but they remain the benchmarks against more recent studies are compared.²⁰ Note that, unlike reduced form estimation across diverse manufacturing industries, food retailing is a single industry but with geographically distinct markets. This means that not only profits but also product prices can be compared across the sample markets. Moreover, the underlying production technologies are surely similar across the markets, reducing concerns about misspecification of costs, which render SPC studies problematic in cross-industry studies. A general problem with these models, however, is that it can be difficult

(some say impossible) to know whether the explanatory variables are capturing the effects of market structure, market demand, or supply costs.

Marion et al. (1977, 1979a,b) estimate the relationship between local market structures and both the profits and prices of supermarket chain stores in the 36 US cities from 1970-1974. Their pooled sample includes observations on corporate chains operating stores in multiple markets, which means that, to some extent, the same management teams are deciding on prices in the different markets. Prices in each market are for a fixed basket of branded goods. Profits are measured as the profit-sales ratio, which is equivalent to price minus average accounting cost, divided by price. The exogenous structural variables are the local market four-firm concentration ratio (CR4) and the individual firm's relative market share (firm's share of the market divided by CR4). The market share variable is an attempt to control for individual firm success and market power due to enterprise differentiation or superior management acumen, which are viewed as short-run advantages, not reflective of barriers to entry and long-term market power. The reason that a firm's market share is normalized by the concentration ratio is because share and concentration are highly correlated, but relative share and concentration are not. A nonlinear relationship is also tested in the linear regressions by transforming the CR4 variable. This is to detect if there exist critical concentration ratios for oligopoly power. City size is included as a control variable, potentially capturing differences in land prices and wages, or economies of scale. Growth in market demand captures short-run profit opportunities in local markets.

²⁰ The data precede what Geithman and Marion (1993) call the "explosive decade of 1977-1987" in terms of increased concentration in grocery retailing.

The main conclusions of this study are that, other things held the same, food retail prices and profit margins are each positively related to both relative market share and the concentration ratio. The R^2 varies from about .8 to .9 across specifications after correcting for heteroskedasticity. The authors view these results as supporting the idea that profits arise *both* from enterprise differentiation (in the sense of monopolistic competition) and oligopoly power. This is consistent with their view that advertising imposes a substantial barrier to entry in grocery retailing, but it should be noted that the welfare implications of the two sources of market power need not be the same. The nonlinear specification of the concentration ratio did not reveal any critical values for market power.

The statistical significance levels of the coefficient on market concentration in these profit regressions are not robust across subsamples, as noted by Anderson (1993). He also critiques the Marion et al. research for not adequately controlling for inter-market differences in costs, especially those arising from differences in wholesale prices, market concentration, or economies of scale in larger markets. These criticisms stem from the argument of Demsetz (1973), that market concentration is correlated with profits because efficient (i.e., low-cost) firms acquire greater market shares over time, not because of pricing power.

In the case of the Marion et al. study, there are several responses to the Demsetz critique. First, Cotterill (1993) notes that the products priced in the study are from national manufacturers and therefore wholesale costs are unlikely to vary much in the different markets (save for transportation costs). Second, the inclusion of a relative

market share variable ought to pick up differences in firm-specific efficiencies. Third, efficiencies might explain profit variations but not price variations.

A more recent version of the Demsetz critique is that food retailing is essentially a joint product, bundling items for sale with service quality. Since the provision of service is costly, a positive correlation between price and concentration may simply reflect the fact that firms in concentrated markets and with higher market shares offer more services, charging higher prices to cover the costs. Indeed, service levels are considered to be high in large supermarkets (superstores), because of their extensive counter service, promotions, customer reward schemes, etc., and a given population can presumably support fewer superstores than it can smaller grocers.²¹ Since Marion et al. have no control variables for service levels, their finding that market concentration causes higher price could be spurious. However, this could explain the price results, but not the positive relationship between structure and profits, as noted above.

The study by Hall, Schmitz, and Cothorn (1979) looks at the wholesale-retail price margin for beef across 19 standard statistical metropolitan areas (SMSA's) with varying levels of food retailer concentration. They use seven years of data from 1967-1973, which helps focus on long-term market relationships. Their wholesale price is the local price for a steer carcass and the retail price indexes are constructed from the local store prices for several cuts of beef. Their unit cost data is therefore a better measure of input costs than the accounting data used in Marion et al., although it is for a very narrow set of goods. They include a wage index to proxy for other cost differentials.

²¹ On the other hand, high-income service-seeking individuals may prefer smaller, better located grocers, suggesting that price and concentration could be negatively correlated.

Their hypothesis is that food retailers in concentrated local markets can raise their price-cost margin, therefore profits, either by exercising market power against consumers or oligopsony power against food processors. Applying an error components statistical model to the pooled data set, the authors find that margins are positively and significantly associated with CR4. An increase of 10 per cent in local market concentration raises beef prices by four to five percent, according to their estimated coefficients. The coefficient on local retail store wage rates is also positive and statistically significant.

An issue with the Hall et al. study is again the Demsetz quality critique. For example, supermarkets with a larger meat selection may face higher costs from spoilage. A final point about this study is that, while it provides evidence that market concentration is related to retailer power, it is actually inconsistent with the more recent finding of Binkley and Connor (1998). They find, on the contrary, that prices for “fresh and refrigerated goods,” including beef, are unrelated to CR4, but they do find the positive structure-price relationship for dry, branded goods. I discuss Binkley and Connor’s paper below.

Lamm (1981) specifies an equation relating food prices to market concentration, barriers to entry, marginal costs, demand-side variables, and firm size. The price variable is the BLS index for an approximately homogeneous market basket of food for a family of four across 18 SMSA’s from 1974-1977. Marginal costs are proxied with the BLS producer price index for finished consumer goods and local hourly wages for retail clerks, noting that these two inputs represent together about 88 per cent of a retailer’s variable costs. Land price differences are captured with geographically determined dummy variables. Lamm use average store size (average sales per store among top four

firms) to capture barriers to entry stemming from the capital requirements of building a large store, and tries different concentration ratios in the regressions (CR1, CR2, CR3, CR4).

From linear regression analysis on the pooled data set, all of the variables are found to be statistically significant, except when the 1-firm concentration ratio is used, and they have the expected signs, except for the store size variable. Prices are found to decline with store size, which is contrary to the author's expectation regarding barriers to entry, but perhaps this is capturing scale economies, rather than barriers to entry. A 10 per cent increase in CR4 is predicted to raise prices by .5 per cent. Lamm also argues that interpreting the two-, three-, and four-firm concentration ratios as measures of oligopoly power assumes implicitly that the firms have an equal market share. In a separate set of regressions, therefore, the concentration ratios are replaced with the actual market shares of the leading firms to test whether the sum of their coefficients equals the coefficient found in the regressions with concentration ratios. From this evidence, Lamm concludes that individual market shares provide additional information on price effects, and that growth in the second largest firm's share raises prices the most. While Lamm is careful to control for cost differences, which are all statistically significant cost shifters, the question of differential service quality levels is not considered. Moreover, the BLS food price index is apparently unsuitable data for inter-city price comparisons (Kaufman and Handy, 1993).

The last of the pioneering papers in this area is Cotterill (1986). He uses a unique data set on 35 individual supermarkets operating in 18 local markets, obtained from by subpoena from the major grocery chains in Vermont. Price indexes were created for each

store in the sample based on 121 representative product prices observed at a given store during one month in 1981. The price index is regressed against a measure of market concentration (the Herfindhal, CR1, CR4 and firm-shares are each tried in separate regressions) and several control variables, including population growth in the prior decade to capture short-run disequilibrium, per capita income to measure local income effects on demand; sales per square foot to proxy for capacity utilization; and the surface area of the store, both linearly and quadratically, to capture differences in service quality or enterprise differentiation.²² The distance between a supermarket and its warehouse is included as a cost-side variable, but wholesale costs and wages are omitted. Cotterill argues that wages differences are unlikely to be important, while procurement costs of the (mainly two) chains in the study should be similar across these geographically close markets. A dummy variable for independent stores is used to capture their expected higher costs.

Cotterill finds that the various concentration ratios are all strongly related to prices. The OLS regression over the whole sample and full set of variables (and using Herfindal) generates an R^2 of .62. He also finds that a firm's relative market share is not statistically significant if included with the one-firm concentration ratio for the local market.

The principal criticism that can be levied against Cotterill's work are that his results may be particular to Vermont, where local market concentration ratios are very high---CR4 equals 100% in 14 out of 18 of the markets in his study. Of course, like the

²² Cotterill speculates that small supermarkets are differentiated by superior locations, while large supermarkets (e.g., more than 16,000 sq. ft.) are differentiated by large product arrays. Compared to medium sized supermarkets, the small and large ones may command quality premiums. His statistical results confirm this belief.

preceding papers, there is no direct control for the quality of services in a supermarket, leading to the possibility that the true relationship is between price and service costs, not market power. The fact that the per capita income is statistically insignificant in the regressions, however, reduces the likelihood of different demands for service quality across the markets. Finally, the limited number of products included in the price index--- less than one per cent of supermarket items, even if the products are “representative”--- leaves open the possibility that supermarkets compete more aggressively on other products, such as fresh foods.

Kaufman and Handy (1989) is the first study to reject the hypothesis that market concentration confers market power on grocery retailers. The study also departs from the literature in the procedure for obtaining a price index. The authors collected prices from a survey in 1982 on about 170 items per store across diverse food categories, including national branded dry goods and fresh foods. As this was a national survey of 616 supermarkets in 28 randomly selected cities, the approach of calculating a price index for individual stores on the basis of an identical basket of items, as in previous research, was rejected as unworkable, in favour of more loosely defined comparable items. In other words, the price index considered various brands as perfect substitutes in calculating the price index.

The price index of Kaufman and Handy has generated enormous controversy. Geithman and Marion (1993) reject this approach outright, saying that it is a comparison of apples and oranges, rendering the price index meaningless. Kaufman and Handy (1993) reply that the alternative, using a narrower basket of identical (national branded) foods commonly found in all supermarkets, is more problematical. The reason is that on

any given week, a supermarket may promote several categories of national brands, while raising the prices of more idiosyncratic products, including private labels. Thus an “average price” of foods at a given supermarket may not be reflected in the price of a narrow basket. Both sides in this debate over price index methodology make a reasonable point. It would be reassuring if the studies led to similar conclusions about the structure-performance relationship, but they do not. Kaufman and Handy find that firm market share and nor the Hirfindahl index are negatively but insignificantly related to supermarket prices.

Newmark (1990) conducts structure-performance OLS regressions on a new data set, based on the total basket price for 35 narrowly defined, commonly purchased grocery items, from 13 cities in Florida plus 14 other US cities, surveyed on two specific dates in 1987 and 1988. He includes median household income as an explanatory variable, which turns out to have a positive and very statistically significant impact on the local grocery price index, unlike any of the preceding studies. The income variable explains 60 per cent of inter-city price variation in his sample. At the same time, the CR4 variable is insignificantly different from zero, as are city population size, population growth in the prior decade, and local sales per store. Newmark interprets his results as confirming the Demsetz quality critique of structure-performance studies. That is, high income households prefer supermarkets that provide high service levels; the cost of quality service is reflected in the prices of the local markets.

There are several reasons to view Newmark’s results with some skepticism. First, the number of grocery items in the food price index is very small. The items chosen may be so-called signal goods, that households use to compare prices across stores. The

demands for most other grocery products may be far less elastic. Second, the market concentration ratios and price indexes are likely to be from larger cities---the survey was coordinated by newspapers---rather than smaller areas of retail competition (Cotterill's local areas were mostly small---less than 100,000 residents). Since grocery retail concentration ratios are known to be comparatively smaller in large cities, concentration may be less important in Newmark's sample, than in towns, or neighbourhoods in a city. Finally, Newmark's interpretation of the positive coefficient on income as capturing unmeasured service levels is debatable, as it may be capturing labour costs, rather than a demand-side effect.²³

Binkley and Connor (1998) study the concentration-grocery price relationship in the "new competitive environment," where warehouse stores and fast food restaurants compete with supermarkets. A grocery price index is tabulated from 26 food items, from a publication on inter-city cost of living differences, across 95 cities, averaged from 1986-1988. A significant novelty in this paper is that the prices are not used to calculate a "representative basket" of foods purchased by a household. Instead, the authors use a statistical method (principal components) to determine which prices tend to be correlated within a supermarket. In other words, each supermarket prices some items above and some below the average for all the cities. Are there distinct groups of goods whose prices tend to vary together at each supermarket? Using this method, Binkley and Connor identify two groups, "dry" pre-packaged branded foods (including prepared frozen foods), and "wet" fresh perishable foods (meat, dairy, fruit and vegetables). However,

²³ Yu and Connor (1999) claim that improvements in Newmark's data, such as defining the price variable as a relative price instead of an absolute price, omitting small stores from the calculation of the concentration ratio, using a different measure of income, and including a dummy variable for Florida,

they find that the price correlations even within these groups is quite low. This strongly suggests that a store does not apply a similar markup across its range of products, which casts some doubt on previous research that uses the cost of purchasing a narrow basket of representative items as the price index. Binkley and Connor conduct separate regressions on the two groups of foods.

Another innovation of this study is to include measures of non-supermarket competition-- warehouse stores and fast food restaurants. Enterprise differentiation effects are controlled for with several variables: average store size, share of total sales going to small stores, the percentage of supermarkets owned by a chain. The number of grocery items with significant quarterly price changes across the sample is also included in the regressions as a proxy for disequilibrium, as supermarkets responded to the emergence of warehouse stores with new pricing strategies. Local grocery sales, population growth and density, average income, and regional dummy variables are used as demand-side control variables. Cost differences are proxied with the average retail wage, cost index for rental housing, and electricity cost.

Binkley and Connor find that the competition variables as a group (F-test) are statistically significant for both wet and dry foods. The coefficient on CR4 is positive and marginally statistically significant (at 10%) for dry foods, but negative and insignificant for wet foods. They interpret this as showing that the prices for “traditional center of the store,” nationally advertised manufactured foods are relatively more sensitive to the effects of market concentration. This is an interesting finding that may help explain why

reverse Newmark’s result by finding a strongly positive relationship between concentration and food prices.

Newmark (1990) and Kaufman and Handy (1989) previously found no market concentration effects in their food price indexes.

The presence of a warehouse store in the area has a negative effect on the prices of both food groups, but is statistically insignificant for dry foods. This seems somewhat surprising since warehouse stores compete using low-cost displays of a narrow line of nationally branded manufactured products. However, Binkley and Connor note that supermarkets may be relying on warehouses to segment the market according to income elasticities. If price sensitive consumers shop in the warehouse stores, leaving higher-income, service-oriented customers for the supermarkets, then supermarkets may respond by *raising* prices on goods sold by warehouses, rather than competing on the basis of price. This view is corroborated by the positive and (marginally) significant coefficient on the income variable in the dry goods regression, but it still seems rather hard to square with the finding that wet food prices do respond to warehouse competition. Competition from fast food restaurants, measured by per capita metropolitan fast food sales, turns out to be important in the regressions. This may explain why supermarkets have increasingly been adding fast food counters in their stores. The final substantive finding is that the cost variables as a group are significant in the dry goods category, where wage and rent differentials impact positively on prices. This contradicts Cotterill's view that variable costs are unimportant for explaining retail food price variations. Unfortunately, Binkley and Connor do not report elasticities or sample means for the variables, making it difficult to judge the economic significance of the coefficient values.

Binkley and Connor's study illustrates a general difficulty with structure-performance studies in food retailing, outlined in my introduction. The hope in this

research area is that retail prices are comparable across markets, because grocers produce more or less the same “good.” However, it would seem that substantial variations exist in the product-service mix of supermarkets, creating problems in SCP research that resemble the well-known controversies in the application of these methods across manufacturing industries. Nevertheless, even with Binkley and Connor’s statistical method for establishing price indexes and their comparatively more recent data set, they provide some further evidence that market concentration may matter for pricing, even in the presence of competition from alternative retail formats.

Marion (1998) also pursues the question of how warehouse stores have affected supermarket competition. He uses the annual inflation rate in the BLS food-at-home price index in 25 SMSAs over 15 years (1977-1992), as the dependent variable.²⁴ He runs regressions against the change in per capita income, the change in operating costs (CPI for food plus rent), the change in retail payroll costs relative to sales,²⁵ and three types of structural variables. These are the change in CR4, a series of binary variables reflecting discrete ranges of warehouse store food market share, and a binary variable that distinguishes between the presence of warehouse store that is owned by supermarket firms already in the local market, versus *per se* new warehouse store entrants.

Marion run linear regressions on his pooled data set, finding that food price inflation drops as warehouse store shares increase up to 20 to 30 percent of the food market. However, the coefficients are significant only at the 10 per cent level on a one-tailed test; a two-tailed test is more appropriate in view of the finding of Binkley and

²⁴ The reason why Marion uses the inflation rate rather than the index level has to do with the manner that the index is calculated across time periods. Effectively, the change in the BLS index captures the indirect effect of new warehouse stores on the prices at existing supermarkets, rather than a price level effect that directly reflects the low prices at warehouse stores.

Connor (1998), that warehouse stores may be causing supermarkets to *raise* the price of their dry foods. When Marion estimates his equation separately for the subperiods of 1977-1984 and 1985-1992, the effect of warehouse competition goes away, which he interprets as evidence that supermarkets have learned to compete with warehouse stores through non-price factors (service). This finding is consistent with Binkley and Connor's story. The change in the concentration ratio is positively and significantly related to food price inflation over the whole sample, where a 10 percentage point change in CR4 implies a .3 per cent change in food prices. The change in the concentration ratio is not statistically significant in the second half of the sample period, however. Marion concludes that studies omitting warehouse store competition as a determinant of retail food prices may be misspecified. Overall, his results suggest to me that the supermarket industry is undergoing competitive changes, so that the relationship between price and concentration is unstable.

The last paper I examine that uses SCP methods in food retailing is Cotterill (1999). This paper is novel in directly confronting the Demsetz quality critique, through an explicit account of service quality, using price and characteristics data on individual firms in 34 cities and towns in southwestern US states. Cotterill provides two types of regressions: reduced form and structural. In the structural model, five statistically distinct types of grocer services are identified using factor analysis, out of 27 different types of possible services listed in a survey of supermarkets. These services are labour intensity (e.g., price marked on package, bagging of groceries, etc.), the breadth of a supermarket's product line, product promotions, "old time services" (home delivery, phone orders, no uniforms or name tags), and other consumer services (express lane, handicap carts, etc.).

²⁵ Marion argues that this relative wage cost variable controls for productivity effects.

The service variables, which are orthogonal by construction, are regressed against variables that are plausibly related to the choice of service levels at each store. Thus the presence of local competition from a warehouse store, the physical size of the store, whether the store is traditional in the sense of not having service counters,²⁶ the market concentration ratio, and so on, are explanatory variables for the service variables. The fitted values for the service variables then appear in the structural equation for the supermarkets' price, along with the three-firm concentration ratio and various demand variables (income and growth) and cost variables (local area wage rates, distribution costs, unionization, and store size). In a separate regression, Cotterill estimates the reduced form equation, where services do not appear in the price equation directly, but only indirectly through the exogenous variables.

Cotterill is using firm-level data on 107 supermarkets, rather than aggregate price indexes. He computes a firm-specific price index using observations on 115 products, including meats, produce, national brands, and private labels. His data stems from a supermarket survey on a specific date in 1982. The reduced form equation shows that the concentration ratio is positively and statistically significantly related to supermarket prices. A ten per cent increase in CR3 generates a .9 per cent increase in prices. The structure-price relationship is confirmed in the structural model, where fitted values for the service variables are explicitly included in the price equation. This allows Cotterill to reject the Demsetz quality critique, concluding that supermarkets exploit oligopoly power to raise prices. Among the control variables in the reduced form, only the size of the store and the unionization binary variable are statistically significant. The R^2 of the reduced

²⁶ The "traditional supermarket" explanatory variable would seem to me to be strongly correlated with the error term in the service equation for "breadth of products," since the definition of this variable includes

form regression is .35. The store size variable appears both linearly and quadratically, with results suggesting that superstores (over 30,000 sq. ft.) enjoy economies of scale that place downward pressure on prices.

Cotterill also runs the regressions on subsamples consisting of just the chains and affiliates, and individual chains (Safeway and Kroger). The subsample estimates confirm his result regarding the effect of the concentration ratio. However, when replacing concentration with individual market shares of the supermarkets, he finds that this is also statistically significant and positively related to price. Cotterill interprets this as indicating that supermarkets also enjoy market power through enterprise differentiation (i.e., the monopolistic competition model). For unexplained reasons, the author does not report regressions where both the concentration ratio and the relative market share of firms are explanatory variables, which would allow the researcher to potentially discriminate between alternative sources of market power, even though he advocates this in Cotterill (1993). Note that, as in Cotterill's Vermont study, the areas under consideration are comparatively small---only three of the 34 cities or towns have populations exceeding 100,000, and in almost one-third of the local markets, the four-firm concentration ratio is 100 per cent. Thus the finding of a positive relationship between price and concentration may not be generalizable to larger markets, where the concentration ratios are typically smaller.

Finally, a very different type of SCP study is conducted by Connor, Rogers, and Bhagavan (1996), where the objective is to determine if changes in supermarket retail power has "countervailed" the power of manufacturers. This assesses supermarket buyer power, rather than seller power *per se*. The authors suggest that retailer clout stems from

service counters.

the proliferation of new food products, scanner technology, increased concentration in local supermarkets, the decline in the effectiveness in food advertising, and the increase in the number of private food labels. It is this latter trend that is used in this study to measure supermarket power over manufacturers. Since manufacturers of private labels tend not to be the leading national food manufacturers, but somewhat smaller firms with lower costs because they advertise less, an increase in private label sales should help fringe manufacturers. The prediction is, therefore, that an increase in retailer power reduces---countervails---the market power of leading national food brands through vertical competition, in the form of private label sales.

The authors use data from the three years 1967, 1977, and 1987 across 48 processed food product classes to compute how the concentration ratio in manufacturing has been affected by private label sales. Control variables include the initial manufacturer concentration ratio (to allow for reversion to the mean), the annual growth in manufacturer shipments, and the change in the advertising-to-sales ratio. Private label sales are found to be statistically insignificant in the regressions. The authors conclude that there is no statistical support for the hypothesis that retailer vertical competition has inhibited the increasing rate of concentration in US food manufacturing either over the period 1967-1987 or 1977-1987. The R^2 is below .1 in the regressions. Despite the interesting findings, the change in private label sales is only one possible way in which retailer power may manifest itself in the food system. As such, the study is exploratory rather than definitive.

B. Structural Estimation Studies

Dissatisfaction with the model identification problems arising from reduced form equations has led to a number of articles explicitly designed to exploit the structure of oligopoly models. These so-called new empirical industrial organization (NEIO) models specify the first-order conditions for the profit maximizing behavior of a single oligopolist. A key behavioral parameter is the conjectural variation of the oligopolist, which measures the degree to which a firm takes into account its rivals' reactions to its own output choice. The parameter can vary continuously between values implying perfectly competitive behavior or pure collusion. Thus an econometric model can specify simultaneously the first-order condition of the firm, the market equilibrium condition, a market demand function, and an endogenous relationship for the conjectural variation variable, with cross-equation restrictions imposed. Under rather restrictive conditions, the model can be econometrically identified and an estimate for the conjectural variation parameter can be obtained. From this, one can infer the degree of oligopoly power in the market. More complicated versions of the model allow for vertical oligopoly interaction between food manufacturers and supermarkets.

Despite the attractiveness of a detailed structural model, the application of NEIO methods to food retailing has some drawbacks. First of all, the problem of a lack of firm-level data means that in practice market level data are used in the estimation. What is the meaning of a firm's first-order condition in the aggregate? Researchers have interpreted this as representing the average behavior in the market, but this meaning is unclear. As a result, the conjectural variations parameter is often interpreted a-theoretically as simply an empirical index of market power. A second problem is that analytical tractability

requires simple specifications for marginal costs. However, food retailers stock tens of thousands of products and bundle these with an array of services. NEIO methods require that the cost function be strongly separable across all products and services---an unlikely maintained hypothesis in the econometric implementations (Sexton, 2000). Third, there are problems of econometric identification in NEIO models. That is, observations on output and price, resulting from shifts in the demand curve can be consistent with different values of the conjectural variations parameter, depending on the slope of the market demand curve. Identification can only be achieved if there is at least one statistically significant interaction term between price and an exogenous variable in the demand function. The basic point is that demand curve rotations are needed for identification of the model, not just demand curve shifts. Despite these problems, a structural approach allows for more analytically precise hypotheses of market power and provides intuition that is often lacking in the SCP studies.

The first NEIO study in food retailing is by Park and Weliwita (1999). Its aim is to determine the source of food retailer market power, and ascertaining whether market behavior is consistent with oligopoly in US national data from 1967-1992. The market power index (i.e., the conjectural variation parameter) is unobservable, but is modeled as a linear function of a technology variable and two proxies for industry conditions.

The percentage of stores with scanning technology is one explanatory variable for market power. The usual argument is that information provided by optical scanners improves the bargaining position of retailers relative to manufacturers (Farris and Ailawadi, 1992). A second variable is the average weekly sales per checkout, representing the success of supermarkets vis-à-vis competition from fast food restaurants,

warehouse and convenience stores. Finally, a dummy variable for 1983 to 1992 captures a period of intense supermarket merger activity.

The authors also stress that leveraged buyouts and restructurings were fundamental influences on long-term supermarket costs during the intense merger activity in the sample period. The argument is that chains replaced short term liabilities with long-term debt, which significantly reduced costs. Therefore, marginal costs are specified as a function of current liabilities, long-term debt, the price index for processed foods, and food retail indexes for the cost of labour, capital, and energy. The demand function relates a food-at-home price index to annual sales in US food retailing.²⁷ Demand shifters include disposable income, a price index for food consumed away from home, and the ratio of female/male earnings (a proxy for the opportunity cost of preparing meals at home). The demand shifters are assumed to interact non-linearly with the retail price of food, in order to achieve econometric identification of the market power index.

The model is estimated using non-linear three-stage-least squares. The model explains 98 per cent of the variation in food retail prices and the estimates imply reasonable values for the elasticity of demand and the shape of the marginal cost function. The financial variables are statistically significant, as are energy and capital prices, but not wages. The market index parameter is econometrically identified, but only the dummy variable for merger activity is statistically significant. Park and Weliwita do not reject the hypothesis that the coefficients on the scanner variable and average weekly sales per store are jointly equal to zero. The conclusion is, therefore, that US food retailers act like price takers.

²⁷ The input and output price indexes stem from the same publication, *Food Cost Review* (USDA).

Despite the interesting contrast of this work with the SCP studies, Park and Weliwita's paper is problematical on several counts. First, the scanner data is only available since 1984, so that the data are interpolated back to 1974, roughly when scanners were introduced in grocery stores. More substantively, the scanner and average weekly sales data represent productivity improvements, according to the authors. This suggests that retailer costs should fall, but it is unclear why this in itself confers seller power to retailers. It seems more appropriate to specify these variables as exogenous in the marginal cost equation and to use some measure of market concentration to explain the market power index. Moreover, this paper attempts to find retail market power using aggregate US data, rather than local market data, and aggregates all forms of grocery retailing in the measure of price and output. Thus both the data and the empirical specification of market power may be inappropriate.

Schroeter, Azzam, and Zhang (2000) is another attempt to test for retailer market power, but explicitly in the context of vertical competition between food retailers and food manufacturers. The model allows for estimation of the seller power of manufacturers, and *both* the seller and buyer power of retailers.²⁸ Thus there are three conjectural variations parameters to be estimated in all, making this article more complicated than the previous one. The main point of the study is to test a series of hypotheses on market power in the wholesale market: bilateral price-taking, retailer price-taking, and manufacturer price-taking. The possibility of vertically collusive behavior in the wholesale market is not tested. The endogenously determined food retail seller power is simultaneously estimated in each case.

²⁸ A very detailed discussion of the econometric identification problem in NEIO models is provided in this article.

The data is monthly from 1990 to 1994 for the US, with retail and wholesale beef price and quantity indices constructed similarly to the method of Hall, Schmitz and Cothorn (1979), discussed earlier. The price of pork is a demand shifter, while average hourly earnings of grocery store workers and a time trend are explanatory variables for the marginal cost curves.

The estimation procedure is to specify price-taking behavior on one side of the wholesale market, in order to obtain the market index parameter for the other side of the wholesale market. There are, therefore, four systems of equations to be estimated using maximum likelihood (including an artificially nested model). The authors find that the null hypothesis of bilateral price-taking in the wholesale market is rejected in a pairwise comparison with retail price-taking, but not in a comparison with manufacturer price taking. Furthermore, a nonnested test rejects retail price-taking in favour of manufacturer price-taking. These results lead the authors to conclude that food retailers enjoy market power in the wholesale market, but manufacturers do not. This gives some evidence in favour of the sentiment that supermarkets have acquired buying power in the wholesale market.

There are a couple of troubling empirical results in this study. The first is that the implied marginal cost function for food retailers is below zero at most sample points, even if it is upwards sloping. Moreover, the only shift variable in the retail marginal cost equation, the wage rate, is statistically insignificant. The second issue is that, in all of the estimated models, the estimate of food retail market monopoly power---i.e., as sellers---is positive but very statistically insignificant. This leaves the puzzle of why supermarkets enjoy oligopsony power but not retail seller power. Thus, while the study suggests that

retailers have market power, its implication for the debate on the effect of local supermarket concentration on consumers places it closer to the side of Kaufman and Handy, than to Cotterill and Marion, in the structure-performance studies reviewed above. Perhaps the work of Binkley and Connor (1998) can reconcile these results. Recall that they find that local retail concentration is significant for dry foods, but not for wet foods, including meat.

The final NEIO study in food retailing is by Kadiyali, Chintagunta, and Vilcassim (2000). They model the vertical interaction between multiple food manufacturers of a given product and one retailer. The idea is that each manufacturer behaves strategically with respect to each other and with the retailer. The retailer, who may also control a private label brand, takes account of the market demand curve for each brand in setting its proportional price-cost markups to maximize its profits. The model allows for Stackelberg or Nash vertical interactions in the “channel.” A key feature of the model is that a firm’s market power, as given by its conjectural variations parameter, and the firm’s share of total profits in the channel---the difference between retail seller prices and the marginal costs across the vertical sectors---are analytically synonymous. This provides an explicit measure of a firm’s total “market power” in the channel.

Three stage least squares is used to estimate the model on firm-specific weekly data from 1989 to 1993 for two product categories: frozen orange juice and canned tuna fish. Wages, the number of private label deals occurring during a week, and seasonal dummies are the control variables in the estimation. There as many as 16 conjectural variations parameters to estimate for one product category. The authors find that the major retail chain in the sample has substantial pricing power, both in frozen orange

juice, where it has a private label, and in tuna, where it has no significant private label. Also, the retailer prices less aggressively in the product category where it has a private label. Manufacturers, on the other hand, price close to competitively. Finally, Stackelberg models are rejected in favour of Cournot specifications of behavior.

The authors provide details on a number of data shortcomings. One of these is the absence of slotting allowances and other vertical restraints that could alter the profit-sharing picture. On the other hand, if manufacturers treat these costs as fixed, then the first-order conditions for optimal pricing may not be affected anyway. The validity of assumption in the model that retailers apply a fixed markup on manufacturer wholesale prices has been questioned by Cotterill and Putsis (2001). Another issue is that only one retailer is assumed. The model is already very complicated, although the authors note that future work should be broadened to allow for horizontal competition between retailers. On the whole, this study suggests that a particular major food retailer has significant buyer power and seller power.

C. Vertical Restraint Studies

The debate over the role and effect of vertical restraints in the food industry is closely related to the question of supermarket buyer and seller power. The articles examined above, dealing with market power in the food channel, focus only on price interactions, abstracting from profit-enhancing vertical restraints, such as slotting allowances and exclusive territories. The essence of the debate is whether vertical restraints are primarily anti-competitive devices, or whether they contribute to cost-savings or better targeted marketing.

Sass and Saurman (1993) examine the role of exclusive territories, where a manufacturer allows only a single retailer to market its products in a geographic area. Exclusive territories could be used by a manufacturer to enforce monopoly pricing at the retail level (by preventing competition from retailers in other areas), with profit-sharing in the channel occurring through higher wholesale prices or other means. On the other hand, exclusive territories could be used as a means of internalizing marketing externalities. For example, advertising activity and quality control on the part of the retailer may be suboptimal if some of the benefits accrue to rival retailers. The article studies the market for beer, where exclusive territorial assignments are common.²⁹

The authors use linear regressions to estimate both a reduced form for the equilibrium price of beer, and a supply-demand structural model. They do not have data directly measuring retailer “service quality” variables, but they reason that indirect evidence on the role of exclusive territories can be inferred from differences in market demands across jurisdictions that allow or ban the practice. Sass and Saurman identify states in the US where the law on exclusive territories is either mute, banned, or explicitly mandated. The latter possibility means that the law leaves no doubt that the exclusive territories are a legal business arrangement. It is assumed that otherwise firms hedge against the possibility that antitrust legal challenges may occur, even if an explicit ban is not currently in place. Only the state of Indiana has a ban on the use of exclusive territories (during the sample period).

The price of beer is averaged across cities in each of 32 state. Values of the variables are averaged over the period 1982-1987 to capture long-run relationships. A

²⁹ In its report, the Federal Trade Commission (2001) quotes a panelist representing supermarkets who states that exclusive contracts are absent in core grocery products (page 40). The case of beer may be an

host of reasonable control variables are used in the regressions. The estimated reduced form equation shows that banning exclusive territories reduces the retail price of beer (by 14 per cent), while mandating its use raises the price. The reduced form results are, however, consistent with either the market power hypothesis or reduced market demand due to supply-side marketing externalities that curb retailer initiatives. Therefore, to shed additional light on the source of the price effects of exclusive territories, a structural model of supply and demand is estimated.

The equilibrium of the fitted structural model is consistent with the reduced form estimates. In this case, both the ban in Indiana and the presence of mandated exclusivity have significant effects on beer demand. The ban reduces beer demand by 12 per cent and mandating raises demand by 10 per cent, suggesting that exclusive territories encourage dealer-provided services that consumers value. The estimated supply curve suggests that state mandates of exclusivity reduce supply, while a ban increases supply. The supply curve findings are consistent with either monopoly output levels, or higher marginal costs arising from dealer marketing services. However, the authors stress that the demand-side estimates are only consistent with the view that exclusive territory arrangements shift the demand curve outwards, and that summing over all groups---consumers, retailers, wholesalers, and brewers---the estimates indicate that exclusive territories raise net social welfare.

It must be said that the results provide relatively weak evidence one way or the other. The coefficient on the ban may be picking up Indiana-specific effects (as the authors admit), the product category (six-packs of beer) is very narrow, and there are no directly observed service variables in the model.

exception, therefore.

Mixon and Upadhyaya (1996) extend the Sass and Sauerman study of study vertical restraints in the beer industry. Their hypothesis is that, if exclusive territories are made illegal, manufacturers respond by increasing their own advertising, as an imperfect device for offsetting the loss of dealer-promotions and services. The focus is solely on Indiana, using annual data from 1950-1976. The key structural variable in the regression for national beer advertising in Indiana is the year of the court decision that banned exclusive territories in that state, represented by a binary variable that equals one after 1967. A time trend, population, the percentage of the state that is metropolitan, and lagged beer industry profits are the other explanatory variables.

The estimated coefficient on the ban of exclusive territories is positive and statistically significant, suggesting that the amount of national, manufacturer-level advertising of beer in Indiana increased after 1967, other things held equal. However, the data on actual levels of beer advertising by manufacturers are not known. Mixon and Upadhyaya therefore approximate the variable with the share of beer sales in Indiana relative to total beer sales in the US, times national expenditures on beer advertising. This proxy for advertising in Indiana assumes, perhaps wrongly, that national advertising of beer will increase more than Indiana's share of sales will fall, as a result of the ban on exclusive territories. Moreover, there is no control in the model for exogenous changes in national advertising, except for the court decision in Indiana. It is also unclear why local dealers should have a comparative advantage in advertising, in the first place, compared to the national manufacturers. Thus the theory and evidence from this study, supporting the notion that exclusive territories play an important role in promoting valuable

advertising, must be regarded as weak. Furthermore, it seems unlikely that the findings on advertising in the beer industry are generalizable to groceries.

Sullivan (1997) considers how general trends in prices and margins in the US square with alternative rationales for slotting allowances, which are fixed payments by manufacturers to retailers for carrying new products. Slotting allowances are widely cited as evidence that supermarkets have acquired market power at the expense of food manufacturers. One possibility is that slotting allowances resemble resale price agreements in facilitating monopoly retail pricing. For example, the argument of Shaffer (1991) is that monopoly retail pricing can occur in equilibrium, despite Bertrand-Nash competition between supermarkets, if the wholesale price margin is sufficiently high. The excess profits of the manufacturers or wholesalers can be recovered by the retailers through slotting allowances. Competition between manufacturers to place products on retail shelves makes the payments viable in equilibrium.

On the other hand, risk-sharing of the cost of failed product innovations, between retailers and manufacturers, can be an efficiency-basis for slotting allowances, as in Sullivan's theoretical model. Sullivan assumes that supermarket shoppers care about the sum of the money price of foods and the transactions costs associated with finding the products and brands they are looking for. Thus retailers can charge a money price equal to the difference between a customer's total willingness-to-pay and the search cost. In a given supermarket, search costs are assumed to decline when the store carries more products.

Upstream, a competitive manufacturing sector introduces new products until the marginal development costs are equated with expected marginal revenue, which is

uncertain because not all products turn out to be valued by consumers. In this model, an exogenous increase in the supply new products (e.g., due to a decline in development costs) reduces search costs, thereby raising the money price consumers will pay for food items. If this increased margin is insufficient to pay for the retailer marginal cost of stocking new and more products, then a slotting allowance is charged to manufacturers to allow the competitive retailers to break even in equilibrium.

Examining the data, Sullivan rejects the hypothesis that slotting allowances are a coordinating device for monopoly pricing, because the food-at-home price index has not risen relative to the CPI. On the other hand, several trends are consistent with her theory. The primary evidence is that the number of new products introduced by food manufacturers increased dramatically beginning around 1982, which is attributed to the availability of scanner data to lower development costs. It was also at this time that the existence of slotting allowances in food retailing began.

Sullivan's study is interesting, but in the end it rests on the casual observation of a few national trends. It does not constitute formal statistical testing, and is consistent with alternative efficiency-enhancing roles for slotting allowances. To rectify this shortcoming, Azzam (2001) proposes an empirical method to formally test the relationship between slotting allowances and price-cost margins. However, the data for it is not currently available, as slotting allowances are privately negotiated in secrecy.

Finally, there is a paper by Bloom, Gundlach, and Cannon (2000) that reports the views on slotting allowances expressed on a scale of 1 to 5 by 802 executives of food manufacturers, supermarkets, and wholesalers. The survey consists of a long and detailed list of questions that are motivated by alternative hypotheses about the reasons and

effects of slotting allowances. Example questions include the following. Do slotting fees help lower retail prices? Can they signal the potential success of a new product? Do slotting fees enable new product costs to be equitably shared among channel members? Do these fees cover the new product costs incurred by retailers? Are slotting fees simply a bid for shelf rental space? And so on.

There is a clear tendency in the manufacturing respondents' answers to stress the negative side of slotting fees, while retailer representatives do the opposite. For instance, retailers would claim that the fees are inadequate for covering new product costs incurred by retailers. Nevertheless, there are some points that respondents from both ends of the food channel tend to agree on. They agree that slotting allowances have tended to raise retail prices, suggesting that the fees promote the exercise of supermarket power. They also agree that the fees play a useful role in apportioning shelf space to the oversupply of new products, lacking in "truly innovative features." On the other hand, all types of respondents downplay the role of slotting fees as a signal or screening device for indicating the manufacturer's private information about the expected success of a new product.

IV. Conclusions

In this paper, I have reviewed the trends in price, profitability, productivity, and competition in Canadian food retailing, and critically assessed the econometric and other empirical evidence on the presence of supermarket seller and buyer power.

The national trends in Canada do not provide evidence that relative food prices are rising or that supermarket profits have increased relative to food manufacturer profits.

Moreover, the very recent wave of supermarket acquisitions in Canada may have increased local levels of competition, as the major chains cross provincial boundaries. On the other hand, the consolidation of the supermarket sector may have increased retailer buyer power, but it is too soon for this to be reflected in the data.

The inescapable conclusion from the structure-performance studies on local US grocery markets is that the evidence on retail market power is very mixed. Major studies have reached opposite conclusions. Even the studies that do find market power are divided between whether this stems from enterprise differentiation or from oligopoly power in the presence of long-term barriers to entry. Moreover, the data used in most of these studies precedes or coincides with a period of significant technological changes: the rise of warehouse clubs and the introduction of optical scanners. Some of the evidence (e.g., Marion, 1998) suggests that the supermarket industry has been operating in turmoil as a result of these innovations. Padberg (1992) thus warns that conclusions drawn from the empirical studies of food retailing are probably not generalizable to other supermarket areas or other time periods.

The recent contributions of studies using structural estimation techniques based on game-theoretic interactions between manufacturers and retailers are useful for stressing relationships between the variables, that are absent in reduced form equation estimation. The evidence from these is also mixed, but tipped slightly toward the finding that retailers have some market power. However, for identification and tractability, these papers assume perhaps unrealistically simple forms for demand and cost functions in the grocery industry.

Finally, despite the apparent outcry of manufacturers against slotting allowances, the empirical studies on vertical restraints in food and beverages tend to side with the view that such practices have an efficiency basis. However, the principal merit of these studies is their timeliness, rather than the conclusiveness of the arguments or the quality of the data. Articles in trade publications often stress the difficulties that vertical restraints place on small manufacturers. It may well be that slotting allowances, for example, have a useful resource allocation role to play, but small producers are lost in the “rounding off” that occurs in an indiscriminate application of the large-scale modern procurement systems of the supermarkets. In that case, small manufacturers may be damaged by vertical practices, such as slotting allowances and pay-to-stay fees.

My general conclusion from a review of the evidence is that there may be supermarket seller power in highly concentrated local retail markets, but probably not much otherwise. That is, the data in the US appears to support the hypothesis that local areas with comparatively sparse populations and four-firm concentration ratios exceeding 90 per cent, or one-firm concentration ratios exceeding 50 per cent, are environments where food retail pricing power exists. For cities, where the population base supports four or more more supermarket chains and an important grocery fringe, the evidence supporting the hypothesis of statistically and economically significant market power is much weaker. To the extent that retail seller power and retail buyer power are connected, the oligopsony power of food retailers is probably also limited.

These general conclusions on supermarket competition in Canada are consistent with those of the Competition Commission in the UK, which assesses the industry as being “broadly competitive,” and with the Federal Trade Commission in the US, which

finds “relatively little evidence on the existence of retail market power.” However, the reports of both commissions express concerns about the potential abuse of vertical restraints, especially in light of the scant formal empirical work on this issue. The Competition Commission notes that supermarket chains having at least an eight per cent share of the market typically engage in a range of “practices in relation to suppliers,” that manifest some buyer power.

Finally, there is an evident lack of empirical research on the industrial structure of grocery retailing in Canada. A place to start would be to compute local market supermarket concentration ratios from the retail sector data sets of Statistics Canada. Greater documentation of alleged anti-competitive behavior through vertical restraints in Canada would also facilitate research on the topic.

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