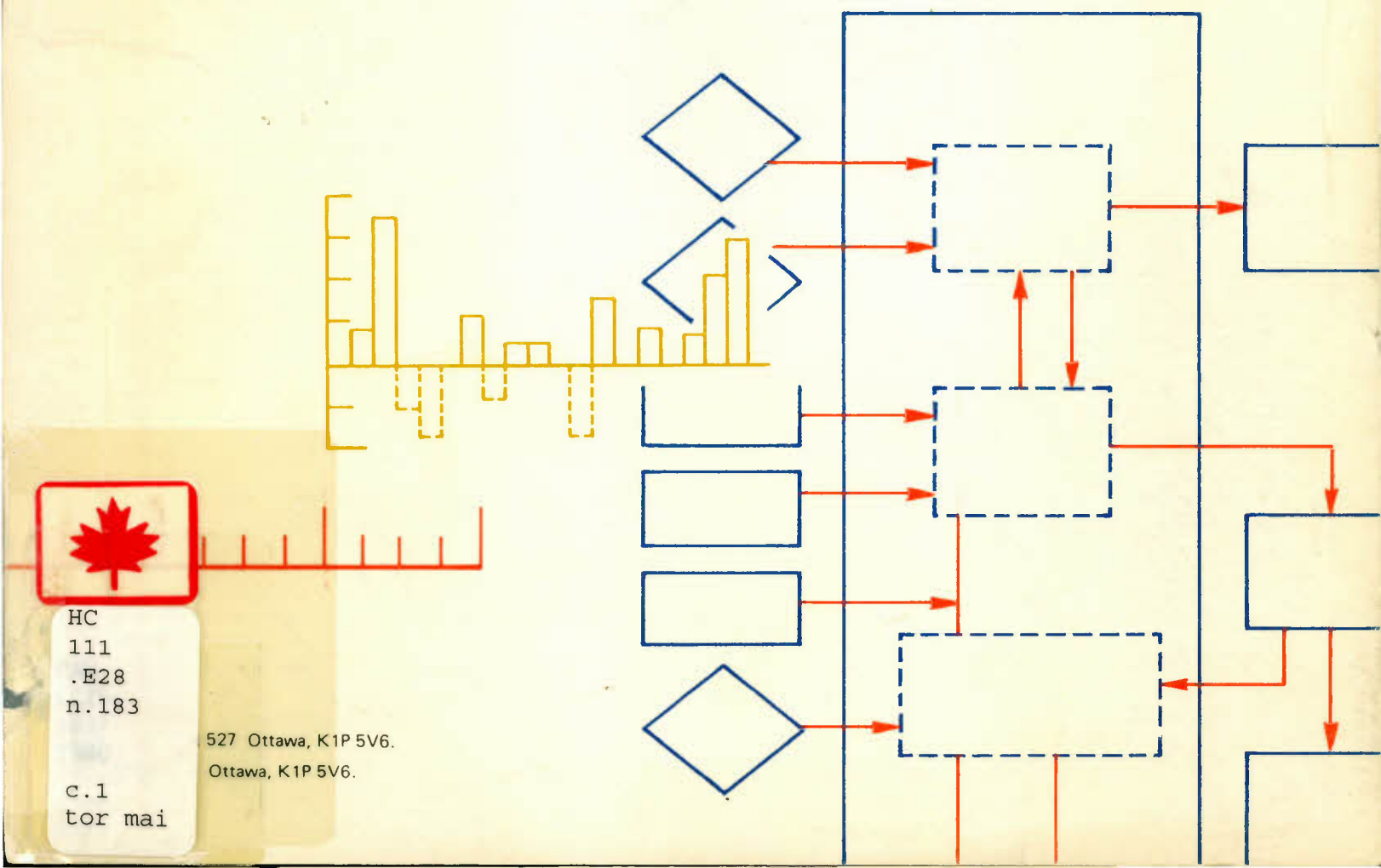
A paper prepared for the

Economic Council of Canada

[redacted]

Un document préparé pour le

Conseil économique du Canada



DISCUSSION PAPER NO. 183

Productivity in the Retail Grocery Trade: A Newfoundland - Ontario Comparison

by

Walter S. Good

Econometric Analysis by J. Wilby

The findings of this Discussion Paper are the personal responsibility of the authors and, as such, have not been endorsed by Members of the Economic Council of Canada.

Discussion Papers are working documents made available by the Economic Council of Canada, in limited number and in the language of preparation, to interested individuals for the benefit of their professional comments.

Requests for permission to reproduce or excerpt this material should be addressed to:

Council Secretary
Economic Council of Canada
Post Office Box 527
Ottawa, Ontario
K1P 5V6

November 1980

ISSN-0225-8013

Acknowledgement

The author of the main report and the author of the econometric appendix are indebted to all the grocery retail organizations that graciously provided the information upon which this study is based. In addition, they wish to acknowledge the work of Gary Renouf and Graham Macmillan who assisted in the data collection phase, to Réal Cournoyer who undertook a great deal of the initial econometric work on the unweighted regressions, and to Richard Zuker who incorporated the results into Chapter 5 and Appendix B of the Economic Council consensus document, Newfoundland: From Dependency to Self-Reliance. The work also benefited from the constructive criticism of other staff at the Economic Council, most particularly David Slater and Lawrence Copithorne.

Table of Contents

List of Tables

Page

List of Figures

ABSTRACT

This report relates the findings of a comparison of establishment-level productivity in the retail grocery trade between the Provinces of Newfoundland and Ontario. This industry was one of several randomly selected for detailed study and analysis by the Economic Council of Canada as part of its Newfoundland Reference.

The institutional structure of the retail food industry is quite different within the two Provinces. Food sales in Ontario are dominated by chain store organizations and group independents who account for 73.0 percent and 17.2 percent of total food store sales respectively. Sixty-four percent of sales in Newfoundland, by contrast, are made by unaffiliated independents and only 36.0 percent by the corporate chains. Group independents are virtually unknown in Newfoundland although there are a number of consumer cooperatives that sell grocery products at the retail level.

At the aggregate level, food store productivity in Ontario is significantly higher than in Newfoundland on almost every measure of output. While food stores in Newfoundland are generally less productive than those in Ontario, this situation does not necessarily hold for all sectors of the industry. Corporate chains, for example, while accounting for less than half the percentage of food store sales they represent in Ontario, are at least as productive and considerably more profitable. Independent stores, on the other hand, are by far the least productive sector in either Province, although much more so in the case of Newfoundland. This is particularly true of the unaffiliated independents that are not consumer cooperatives. It is the low productivity of this independent sector in Newfoundland that accounts for the relatively poor performance of the entire industry within the Province. Because of their large number and significant cumulative share of total food store sales, their effect on the productivity of the entire retail food industry is quite significant.

Reducing the size of this independent sector and encouraging the establishment and expansion of vertically integrated and coordinated food marketing systems, whether independent or corporately owned, would appear to be the quickest way to achieve a higher aggregate level of productivity in the retail grocery trade.

A section on econometric analysis draws on some of the hypotheses raised in the text and attempts to test these using the tools of econometric analysis. The results are in some respects at variance to those in the prevailing literature - for example economies of scale are found to be both present and pervasive in the retail grocery industry.

*This study, one of nine undertaken as part of the Establishment-Level Productivity Study in the Economic Council's Newfoundland Reference was used in the preparation of Chapter 5 of the Economic Council's main report, Newfoundland: From Dependency to Self-Reliance, Supply and Services Canada, Hull, Quebec, Catalogue Number EC22-85/1980. The bulk of the work was undertaken during 1979 and remarks made are generally relevant to that year.

RÉSUMÉ*

Dans le présent document, l'auteur donne les résultats au niveau de l'entreprise, d'une comparaison de la productivité du commerce de détail des aliments dans les provinces de Terre-Neuve et de l'Ontario. Cette industrie a été choisie au hasard parmi de nombreuses autres en vue d'une étude détaillée effectuée par le Conseil économique du Canada dans le cadre de son Mandat sur Terre-Neuve.

La structure institutionnelle de l'industrie de l'alimentation au détail est assez différente d'une province à l'autre. Le gros des ventes des produits alimentaires en Ontario vont aux chaînes de magasins et aux commerces indépendants regroupés qui détiennent respectivement 73,0 et 17,2 % du total des ventes de produits alimentaires. Par contraste, 64 % des ventes à Terre-Neuve sont faites par des magasins indépendants non affiliés et 36,0 % seulement par les chaînes de magasins. Les commerces indépendants regroupés sont quasi inexistants à Terre-Neuve, mais on y trouve un certain nombre de coopératives de consommateurs qui vendent des produits alimentaires au détail.

Prise globalement, la productivité des magasins d'alimentation en Ontario est sensiblement supérieure à celle de Terre-Neuve et cela, pour presque toutes les mesures de la production. Même si le secteur de l'alimentation au détail de Terre-Neuve est généralement moins productif que celui de l'Ontario, il ne faut pas en déduire qu'il en va de même pour tous les secteurs de l'industrie. Ainsi, les chaînes de magasins, même si elles ne comptent que moins de la moitié du pourcentage des ventes par rapport à l'Ontario, sont tout aussi productives et beaucoup plus rentables. De leur côté, les magasins indépendants sont de loin les moins productifs dans l'une ou l'autre province, mais ils le sont encore beaucoup moins à Terre-Neuve. Cela est particulièrement vrai des magasins indépendants non affiliés qui ne sont pas non plus des coopératives de consommateurs. La faible productivité des magasins indépendants à Terre-Neuve est la cause de la performance relativement faible de toute l'industrie dans la province. En raison de leur nombre considérable et de leur importante part globale du total des ventes de produits alimentaires, leur effet sur la productivité de l'ensemble de l'industrie alimentaire au détail est assez considérable.

Il semble que le moyen le plus rapide d'atteindre un niveau global plus élevé de productivité dans le commerce de détail des aliments serait de réduire le nombre des magasins indépendants et d'encourager l'établissement et l'expansion de systèmes de commercialisation formés d'éléments verticalement intégrés et coordonnés, qu'il s'agisse de magasins indépendants ou de chaînes détenues par des sociétés.

Dans une section économétrique, l'auteur relève quelques-unes des hypothèses posées dans le texte et leur fait subir l'épreuve de l'analyse économétrique. A certains égards, les résultats diffèrent de ceux de la documentation habituelle : par exemple, il est démontré que les économies d'échelle existent et qu'elles sont même générales dans le commerce de détail des aliments.

*La présente étude est l'un des neuf ouvrages faisant partie de l'Etude sur la productivité au niveau de l'établissement, réalisée par le Conseil économique aux fins de son Mandat sur Terre-Neuve. Elle a servi à la rédaction du chapitre 5 du rapport principal du Conseil Terre-Neuve -- Au-délà de la dépendance, Approvisionnements et services Canada, Hull, Québec, n° de catalogue EC22-85/1980F. Comme elle a été en grande partie effectuée en 1979, les remarques portent généralement sur cette année-là.

I INTRODUCTION

Following the 1977 release by the Economic Council of the report entitled "Living Together: A Study of Regional Disparities", the government of Newfoundland and Labrador successfully approached the Prime Minister of Canada to have the Economic Council of Canada carry out an indepth study of the province, including an inquiry into the difficulties in making production efficiency in Newfoundland as high as elsewhere in Canada. One research project carried out under this program is the "Establishment-Level Productivity Study."

The two main goals of the Establishment-Level study are to determine if statistically significant productivity differences exist between similar establishments within the same industry in Newfoundland and Ontario and to explain the reasons for these productivity differences where they appear. Identifying reasons behind productivity differences should lead to constructive policy recommendations which can serve to reduce the economic disparity between the two provinces.

One of the industries selected for detailed study at the establishment level was the retail grocery trade, Standard Industrial Classification Code 5411. This industry is composed primarily of "grocery, confectionery and sundries stores", "combination stores (grocery stores with fresh meat)" and "grocery stores". In 1971 these three store groups represented 95.0 percent and 78.3 percent of the total food stores in Newfoundland and Ontario respectively, and accounted for 96.0 percent and 86.3 percent of total food store sales within each province.[1]

II OVERVIEW OF THE INDUSTRY IN NEWFOUNDLAND AND ONTARIO

Importance of Food Store Retailing

In 1977 food stores in Canada sold over $15 billion in merchandise representing 25 percent of total Canadian retail trade. Most of this volume moves through "combination stores" or retail outlets in which the sales of a balanced line of food products form the dominant business activity with fresh meats, fish and poultry accounting for at least 20 percent but less than 60 percent of total sales. These "combination stores" alone represent 18.6 percent of total retail sales in the country (Table 1) which amounts to 74.4 percent of total food sales.

The importance of "combination stores" varies considerably within different parts of the country. For example, using data from Table 1 it can be demonstrated that this type of retail institution accounts for only 53.9 percent of the retail food trade in Newfoundland versus 78.2 percent in Ontario.

Food store sales per capita in 1978 averaged $538.02 for Newfoundland and $727.18 for Ontario (Table 2). This represents a 110-120% increase over per capita sales during 1971. While this is a substantial increase over an eight year period, per capita food sales in relation to personal disposable income has declined from 13.3 percent to 11.4 percent in Newfoundland and 11.3 percent to 10.0 percent in Ontario. While Newfoundlanders continue to spend a smaller absolute amount but a larger share of their personal

Table 1

Retail Trade - 1977

Combination Stores and Grocery, Confectionary and Sundries Stores

	Canada		Newfoundland		Ontario	
	Total Sales (000)$	% of Total	Total Sales (000)$	% of Total	Total Sales (000)$	% of Total
Combination Stores	11,442,496	18.6	149,515	13.2	4,629,917	20.4
Grocery, Confectionary and Sundries Stores	2,928,335	4.7	125,440	11.0	873,561	3.8
All Other						
Food Stores	1,041,046	1.7	3,570	0.3	436,886	1.9
All Other Retail Stores[1]	46,239,386	75.0	857,910	75.5	16,770,557	73.9
Total, all Stores	61,651,263	100.0	1,136,435	100.0	22,710,921	100.0

1 Includes all other retail trade exclusive of food and groceries.

Source: Statistics Canada, Catalogue 63-005, Retail Trade, March 1978 edition.

Table 2

Per Capita Personal Disposable Income

and Food Store Sales for Ontario and Newfoundland

1970-1978

	Ontario				Newfoundland			
	Personal Disposable Income $	% Change	Food Store Sales $	% Change	Personal Disposable Income $	% Change	Food Store Sales $	% Change
1970	2939.		347.12		1718.		245.68	
1971	3189.	+ 8.5	361.03	+ 4.0	1893.	+ 10.2	250.99	+ 2.2
1972	3571.	+ 12.0	378.76	+ 4.9	2108.	+ 11.4	256.43	+ 2.2
1973	4059.	+ 13.7	417.42	+ 10.2	2441.	+ 15.8	283.82	+ 10.7
1974	4700.	+ 15.8	486.58	+ 16.6	2974.	+ 21.8	343.76	+ 21.1
1975	5354.	+ 13.9	560.17	+ 15.1	3485.	+ 17.2	420.68	+ 22.4
1976	6000.	+ 12.1	618.65	+ 10.4	3851.	+ 10.5	477.03	+ 13.4
1977	6591.	+ 9.9	658.78	+ 6.5	4209.	+ 9.3	487.60	+ 2.2
1978 (est.)	7240.	+ 9.8	727.18	+ 10.5	4740.	+ 12.6	538.02	+ 10.3
8 Year Average		+146.3		+109.5		+175.9		+119.0

Source Maclean-Hunter Research Bureau as reported in the Canadian Grocer, February, 1979.

disposable income on food products the gap has shrunk from 2.0 percent to 1.4 percent during this interval. This indicates that although food retailing still accounts for a significant proportion of consumer's disposable income in both provinces it is by no means the fastest growing retail trade sector.

Structural Aspects of the Retail Grocery Trade

The institutional structure of the retail food industry is also quite different within the two provinces. Food sales in Ontario and the country as a whole are dominated by chain store organizations or "organizations operating four or more retail outlets in the same kind of business, under the same legal ownership". These are also commonly referred to as "corporate chains" as, in most cases, organizations with common ownership of four or more units are publicly or privately incorporated companies. The growth of these chains has been most spectacular in Ontario where, by 1972 they held 69.8 percent of total food store sales (Table 3). By 1978 this had slowly increased to 73.0 percent or a total of $4.5 billion. Most of these chain outlets would be classified as either supermarkets or convenience stores.

Corporate chains, on the other hand, have never achieved the same level of market penetration in Newfoundland. While the chains doubled their share of the retail food market from 17.5 percent to 35.1 percent between 1968 and 1975 their position has increased only

Table 3

TEN-YEAR FOOD STORE SALES TRENDS

1968-1978

	CANADA					ONTARIO					NEWFOUNDLAND				
	Trend of Sales		Distribution of Sales			Trend of Sales		Distribution of Sales			Trend of Sales		Distribution of Sales		
	Grocery and Combination Stores (000) $	% Change	Total Independents Corporate Chains %	Group Indep. %	Unaffil. Indep. %	Grocery and Combination Stores (000) $	% Change	Total Independents Corporate Chains %	Group Indep. %	Unaffil. Indep. %	Grocery and Combination Stores (000) $	% Change	Total Independents Corporate Chains %	Group Indep. %	Unaffil. Indep. %
1968	5,985,589	+ 5.3	46.9			2,257,403		59.3	24.7	16.0	124,068		17.5		82.5
1969	6,400,942	+ 6.9	48.4			2,403,581	+ 6.5	61.2	23.1	15.7	126,281	+ 1.8	19.0		81.0
1970	6.849,224	+ 7.0	51.4			2,621,077	+ 9.0	63.1	21.4	15.5	128,021	+ 1.4	21.5		78.5
1971	7,260,204	+ 6.0	53.1			2,781,035	+ 6.1	64.4	19.7	15.9	131,043	+ 2.4	23.0		77.0
1972	7,721,282	+ 6.4	57.1			2,958,082	+ 6.4	69.8	15.8	14.4	135,909	+ 3.7	25.9		74.1
1973	8,594,929	+ 11.3	58.1			3,301,310	+ 11.6	70.7	16.8	12.5	152,466	+ 12.2	29.3		70.7
1974	10,262,851	+ 19.4	59.8			3,918,928	+ 18.7	72.2	17.6	10.2	186,147	+ 22.1	33.3		66.7
1975	11,983,868	+ 16.7	59.3			4,577,805	+ 16.8	72.2	17.7	10.1	230,996	+ 24.1	35.1		64.9
1976	13,155,857	+ 9.8	59.4			5,112,838	+ 11.7	70.8	18.5	10.7	266,054	+ 15.2	35.4		64.6
1977	14,370,831	+ 9.2	60.1			5,503,478	+ 7.6	72.4	17.6	10.0	274,955	+ 3.3	35.7		64.3
1978	16,251,748	+ 13.1	59.9	26.4	13.7	6,140,141	+ 11.6	73.0	17.2	9.8	306,078	+ 11.3	36.0		64.0

Source: Maclean-Hunter Research Bureau as reported in the Canadian Grocer, February, 1979.

marginally over the past three years.

Also of importance in Ontario and the rest of Canada are the group independents or a number of independent retailers who are associated together in a voluntary group usually sponsored by a wholesaler.[2] Most of the large vouluntary groups in Canada have a national organization through which franchises are granted to wholesalers who, in turn, service retailers who operate under a common store name. These group independents accounted for 26.4 percent of Canadian food sales and 17.2 percent of Ontario food sales during 1978 but are virtually unknown in Newfoundland.[3] The largest proportion of food sales in this province, 64 percent, is accounted for by unaffiliated independents who are unattached, separately owned stores serviced by wholesalers of their choice.

These structural differences in Newfoundland can be primarily attributed to its geographic isolation, the wide dispersion of its fairly limited market, and the fragmented nature of the food distribution system on the island. Chain stores have tended to concentrate their efforts in provinces with large urban areas and higher population density. In areas like Newfoundland where density of population is low and widely dispersed with very few urban markets, the non-affiliated independents have typically predominated over the voluntary groups and chain operations.

Only five corporate chain organizations presently operate in Newfoundland led by a national chain, Dominion, with 15 stores, a regional chain, Sobeys, with 9 stores and three small, local

companies. As indicated in Table 4 the number of chains and the number of stores operated by these chains has not changed significantly since 1969. Eleven out of 36 stores in operation during 1976 were located in the city of St. John's.

Ontario, in contrast, had 36 chain operators in 1977 with 1774 individual stores. This figure has also remained reasonably constant since 1971. The dominant supermarket operations in the province are:

Dominion - 221 stores

Loblaws - 139 stores

A & P - 98 stores

Steinberg (including Miracle Food Mart) - 78 stores

Food City - 45 stores[4]

It would appear from Table 4 that average sales per store in Newfoundland are considerably higher than in Ontario or Canada as a whole. This is somewhat misleading as these statistics also include convenience store chains which typically have a large number of outlets but a relatively small (less than $500,000) average sales volume per store. For example the Becker Milk Co. Ltd. had 580 stores in Ontario in 1978 with an average sales volume of approximately $240,000.[5] If only the 700 or so supermarkets operating in the province could be considered their average sales volume would undoubtedly be substantially higher than the $2.6 million indicated for the Newfoundland chains during 1976.

Table 4

GROCERY AND COMBINATION CHAINS

	CANADA				NEWFOUNDLAND				ONTARIO			
	Chains (number)	Stores (maximum)	Total Sales (000) $	Sales per store (000) $	Chains (number)	Stores (maximum)	Total sales (000) $	Sales per store (000) $	Chains (number)	Stores (maximum)	Total Sales (000) $	Sales per store (000) $
1969	73	2831	3,101,212	1,095	6	35	x	x	28	1416	1,486,695	1,050
1970	89	3063	3,522,287	1,150	7	42	x	x	33	1520	1,652,716	1,087
1971	91	3306	3,964,093	1,199	6	35	x	x	36	1692	1,849,537	1,093
1972	94	3244	4,409,149	1,359	7	40	x	x	36	1582	2,063,846	1,305
1973	81	3227	4,993,677	1,547	6	35	47,018	1,343	35	1597	2,334,789	1,462
1974	82	3249	6,053,313	1,863	5	34	65,050	1,913	33	1606	2,833,359	1,764
1975	81	3301	7,087,397	2,147	5	36	82,452	2,290	34	1663	3,295,399	1,982
1976	78	3314	7,622,375	2,300	5	36	95,102	2,642	35	1666	3,522,985	2,115
1977	75	3423	8,653,707	2,696	4	28	n.a.	n.a.	36	1774	3,971,622	2,239

x - not available
Source: Statistics Canada, Catalogue 63-210, Retail Chain Stores.

Concentration in the Retail Grocery Market

Although the market penetration of the corporate chains in Newfoundland is much less than for any other province in the country, the same situation may not hold true for its major market, the city of St. John's. Mallen reports that in 1973 the city ranked fourth of all major markets in Canada in terms of local market concentration -- behind only Thunder Bay, Edmonton and Regina.[6] The four largest corporate chains had a market share of 86.5 percent. Although relatively few chains operate within the province those that do appear to have a real hold on its major centre.

This high level of concentration, he feels, leads to overcapacity within the market in terms of overstoring and, perhaps, inefficiencies in operations. Fewer firms in a market, at least fewer firms with significant market shares, seem to generate more, rather than less stores than more broadly competitive market conditions.[7]

In addition, high concentration levels as in St. John's appear to be positively correlated with the profitability of the chains, especially net operating income. This higher profitability, according to Mallen, would appear to be primarily attributable to the level of concentration rather than more efficient operations as there was no correlation between concentration and operating expenses or sales per employee as measures of operational efficiency.

The net result, Mallen feels, is that chains in St. John's are realizing perhaps as much as 1.5 percent in "excess" profits and that

supermarket floor space within the market is being underutilized to the extent that average operating costs are 4.9 percent higher than the "ideal".[9] A potential operating cost savings of this magnitude would imply that sales per square foot in these stores are only half or a third of what they should be for optimum efficiency.

This total potential cost savings for St. John's of 6.4 percent is much higher than that indicated for Toronto (2.5 percent), Ottawa (2.0 percent), Hamilton (2.7 percent), London (1.4 percent) and other major Ontario centres where no excess profits are being realized and existing chain store capacity is being more efficiently utilized.

III FACTORS INFLUENCING THE RETAIL GROCERY TRADE IN NEWFOUNDLAND

Dispersion of the Population

Newfoundland has only six cities of over 10,000 population including one census metropolitan area of more than 100,000 people, St. John's. These cities combined comprise 39.8 percent of the population of the province and account for 39.9 percent of its total food sales (Table 5). By contrast Ontario has 57 cities of 10,000+ population including 10 census metropolitan areas. These 57 communities contain 83.6 percent of the total population and account for 83.4 percent of total food store sales within the province.

Modern supermarkets of 20,000+ square feet require a trading area of at least 10-15,000 people to generate the kind of sales volume required to support them. This may be even larger in Newfoundland where per capita food sales are some 25 percent lower than

Table 5

Cities of 10,000+ Population in Newfoundland

	Population (June, 1978 est.)	Number of Households	Food Store Sales $'000	% of Provincial Total
Carbonear	11,700	3,300	6,295	2.1
Corner Brook	24,500	5,800	13,182	4.3
Grand Falls	15,400	3,450	8,286	2.7
Labrador City	17,700	3,930	9,523	3.1
St. John's	146,500	37,100	78,820	25.8
Stephenville	10,600	2,300	5,703	1.9
TOTAL	226,400	55,880	121,802	39.9

Source: Canadian Grocer, 1979 Food Brokers Issue and Market Survey, Feb. 1979.

in the Ontario market. In addition to the area around these six cities the only other population centres likely to have a trading area sufficiently large to support a supermarket type operation include: 1) Marystown & Burin, 2) Grand Bank & Fortune, 3) Dunville, 4) Gander, 5) Port aux Basques, and 6) Happy Valley - Goose Bay (see Figures 1&2). Many of these communities already have one or more chain stores in operation and if St. John's has as much overcapacity as Mallen suggests the opportunities for further expansion of the corporate chains presently operating in the province or for the entrance of new chains may be extremely limited.

Transportation

The geographic isolation of the province and the separation of the island of Newfoundland from the rest of Canada by the Gulf of St. Lawrence create a unique transportation situation for the province in relation to the rest of the country. It is largely dependent on outside sources for its food supplies with many grocery products originating in Quebec, Ontario, or in the case of most fresh fruits and vegetables, the southern United States.

The primary transportation route for food supplies to the island is via the Mainland-Newfoundland ferry service from North Sydney to Port aux Basques and Argentia. In 1976 this service handled 392,214 tons of rail freight and 238,340 tons of truck freight to the island.[10] The volume of rail freight increased gradually from 1970-1975 but suffered a substantial drop off in 1976. Truck volume, however, has

Figure 1

LOCATION OF PRESENT SUPERMARKETS AND POTENTIAL AREAS OF SUPERMARKET DEVELOPMENT IN NEWFOUNDLAND

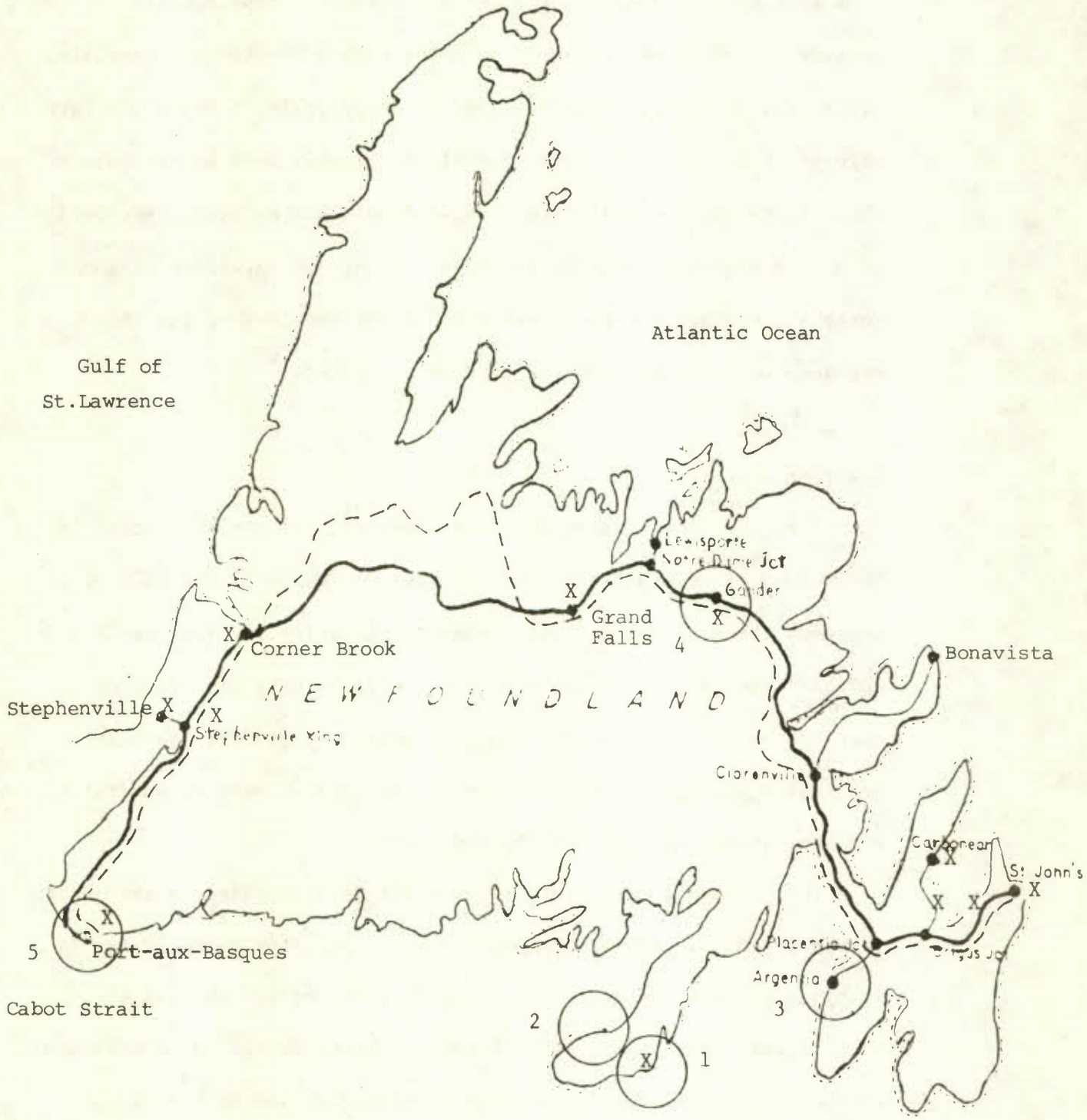
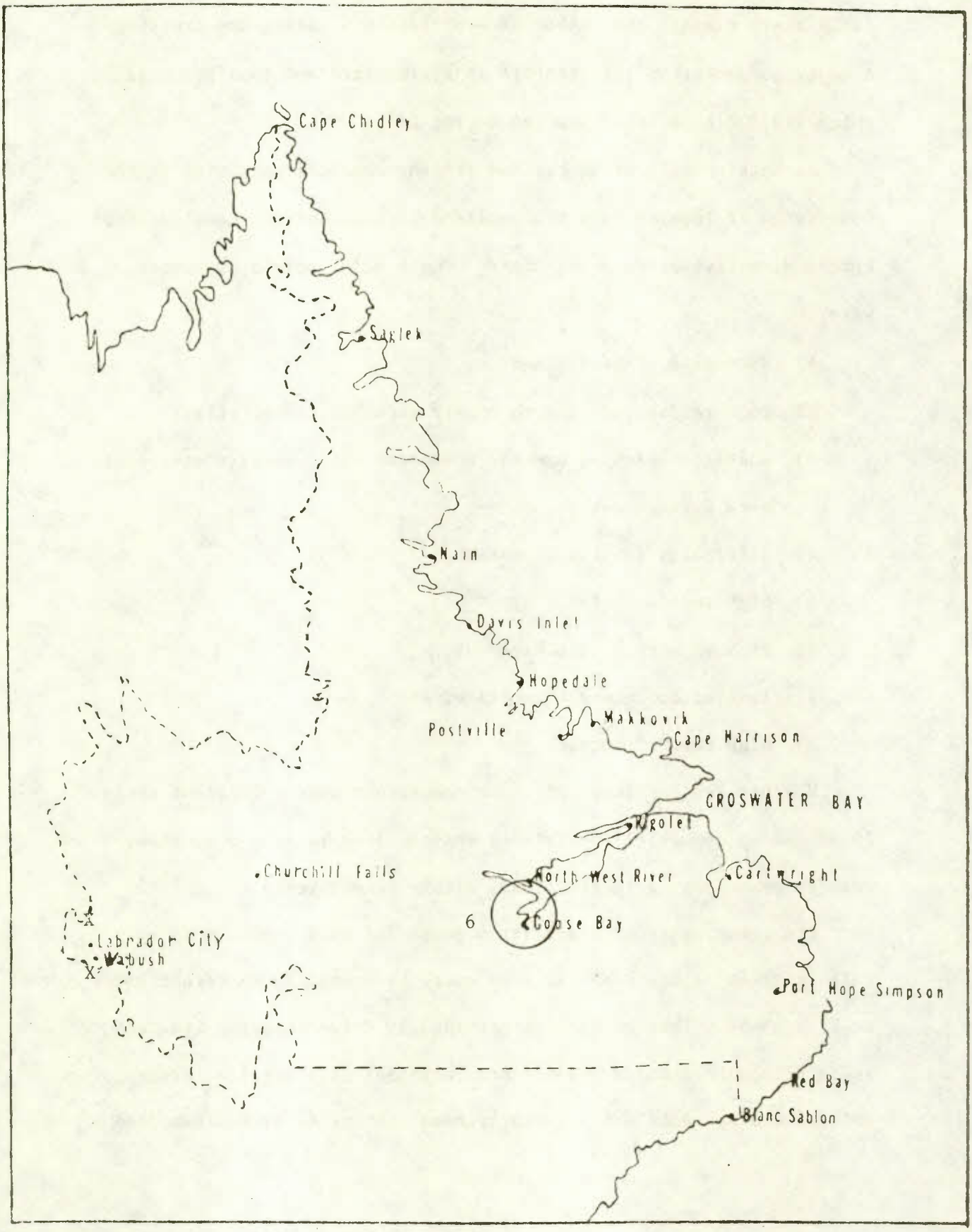


Figure 2

LOCATION OF PRESENT SUPERMARKETS AND POTENTIAL AREAS OF SUPERMARKET DEVELOPMENT IN LABRADOR



X Location of Present Supermarkets

Potential Areas of Supermarket Development

increased steadily and quite dramatically since 1970 with a particularly sharp rise in the number of semi-trailers making the crossing. A major component in this traffic is agriculture and food products of which 119,500 tons were imported during 1976.

An opinion poll of CN carload freight services conducted by the Commission of Inquiry into Newfoundland Transportation revealed widespread dissatisfaction among users. Their major points of concern were:

1) excessive transit times;
2) poor reliability due to highly variable transit times;
3) unavailability of special equipment, eg., refrigerated rail cars during peak seasons;
4) difficulty in tracing damages;
5) high incident of damage;
6) lack of access to management;
7) lack of door-to-door service; and
8) high cost of service.[11]

Whether real or imagined these complaints were sufficient that 29 of the 65 companies interviewed shifted from rail to some other mode of transport, primarily road, within recent years.

The other major transportation route for food products is by rail or truck to Montreal and from there by steamship to Corner Brook or St. John's. This service is provided by Chimo Shipping Ltd. and Newfoundland Steamships Ltd. A new container line service between Halifax and St. John's has recently been instituted by Newfoundland

Container Lines Ltd. but it is not known how large a role they play in the transportation of food products to the island.

Air transport plays only a minor role in the transport of food products to the province. Some food stuffs are shipped by DC-8 freighters operated by Air Canada to St. John's five days a week. In addition, Eastern Provincial Airways and Labrador Airways provide some capacity for winter food supply shipments to coastal communities in Labrador.[12]

CN Marine provides most of the cargo capacity to coastal Labrador from communities outside the region. The western part of Labrador receives the bulk of its food supplies by rail, primarily from Montreal.

The expressed concern by business users within the province regarding the dependability and reliability of the transport system, particularly rail, can have considerable implications for operational efficiency. This lack of perceived dependability by business concerns which rely on the transport system for the movement of large quantities of goods has a particular significance, chief of which is the high inventories which must be carried to ensure product availability. Many companies interviewed by the Commission of Inquiry indicated they carried excess inventory as they felt that transit times, for orders being delivered, vary so much as to render them unreliable. This is reflected in an annual inventory turnover ratio of 16.0 times for the retail food industry in Newfoundland in contrast to a national ratio of 17.4 times.[13] This excess inventory

translates into higher costs of warehousing, staffing, interest and overhead for the Newfoundland businessman.

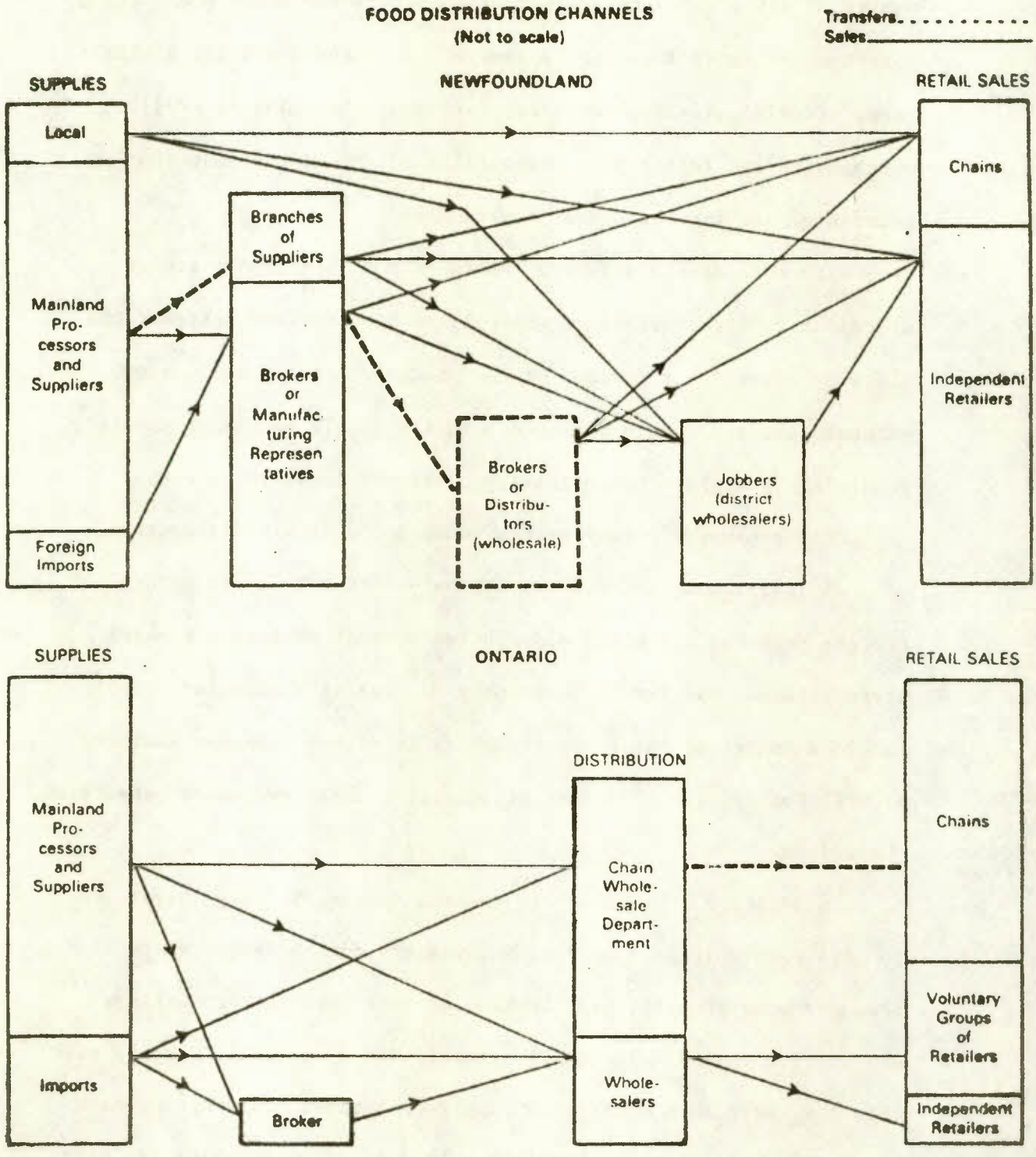
The people interviewed regard rail as being the least reliable with trucking the most reliable. This largely explains the rapid growth of truck transport to the island in recent years even though substantial savings in transport costs per hundred-weight can be realized for large, 80,000 lb., carload shipments destined for St. John's.

Channels of Distribution

Traditionally many important differences have existed between Newfoundland and the rest of the country with respect to the distribution channels through which food products move from manufacturers to consumers. Figure 3 summarizes this distribution of food supplies and indicates the more fragmented and complicated system in Newfoundland as compared to Ontario.

In the past many mainland manufacturers and processors have relied on local brokers or distributors on an exclusive or semi-exclusive basis to serve the Newfoundland market while using their own sales force to service a range of wholesalers and the corporate chains in the rest of the country.[14] In comparison, brokers in mainland Canada typically handle mostly imported products and lower volume, less widely advertised food lines manufactured by smaller Canadian processors. As shown in Figure 3 this additional layer of distribution is not present, as least in the same form or to the same

FIGURE 3



Source: Food Prices Review Board, Food Prices in Newfoundland: Comparison with Mainland Regions, Nov. 1974, pp. 23.

extent, in Ontario.

This additional layer in the distribution system takes on a number of different forms. Some brokers strictly perform a selling function for which they earn a commission. Others provide a wider range of sales services including invoicing, handling of credit, warehousing and delivery or essentially acting as the processor's sales organization throughout Newfoundland.

With this system many processors only sell to their broker/distributor, irrespective of whether the Newfoundland customer can place an order for a carload of the product. As a result, many products carry a double markup due to the double handling, possibly resulting in higher than necessary costs for local retailers.

This exclusive agency system seems to be slowly disappearing. Several individuals interviewed estimate that only 20-25 percent of grocery products are still distributed through exclusive broker/distributors. The recent bankruptcy of several wholesalers has forced a number of large manufacturers to either look for another distributor to represent them or establish their own sales network on the island.

In addition, the corporate chains, feeling it very inefficient to deal with a large number of wholesalers for the broad range of products they require, have looked for more satisfactory arrangements. Two chains have jointly established a wholesale company with whom they have both negotiated supply contracts. This arrangement gives the wholesaler the required volume to order supplies in large carload shipments directly from mainland processors, provides the

chain organization with a single source of supply for most of its grocery products, and serves as a distribution centre for its private label merchandise.

In another instance, a Nova Scotia wholesaler owned by one of the major chains has recently aquired the assets of a bankrupt Newfoundland wholesaler. Undoubtly this chain will switch most of its grocery purchases from its present source of supply to its new affiliate. This volume will enable the new company to also deal direct in large volume shipments for most of its purchases and permit it to serve as a distribution centre for most or all of the company's stores on the island.

Another unique feature of the food distribution system in Newfoundland is the prevalence of a comparatively large number of small wholesalers or jobbers who service independent retailers, especially those in outlying and rural districts.[15] These district wholesalers tend to operate most actively from the Conception Bay area in eastern Newfoundland, out of Lewisporte on the north central coast and out of Corner Brook along the west coast. The area of operations of these wholesalers vary considerably but many travel long distances, at times over very rough roads and often to serve many low-volume customers.

Food wholesaling in Ontario, by comparison, is dominated by a relatively small number of large organizations supplying a limited geographic area from modern, efficient distribution centres located around the province. The most important of these are National

Grocers Co. Ltd. with 13 branches throughout Ontario, M. Loeb Ltd. with 3 divisions in the province and the Oshawa Group Ltd. with six distribution centres. Other important regional wholesalers include Knechtel Wholesale Grocers Ltd. and Lumsden Brothers Ltd.[16] All of these wholesalers also sponsor one or more voluntary groups within the province.

Voluntary Groups

As previously indicated wholesaler-sponsored, voluntary groups are virtually non-existant in Newfoundland except for a small group of stores operated as part of a corporate chain on the west coast of the island. Both the 1967 Royal Commission on the Economic State and Prospects of Newfoundland and Labrador and the 1974 report of the Food Prices Review Board strongly recommended the encouragement of voluntary chain groups of retailers to improve purchasing and other marketing functions, preferably sponsored by a strong wholesaling unit.

To date, no action has been taken by the industry or otherwise which is likely to result in the establishment of such a group. The issue has not been ignored and has been explored on several occasions but rejected for the following reasons:

1) Several wholesalers sponsor such groups in the neighbouring maritime provinces but generally agree that it is not economically feasible to undertake the supply and servicing of such a group from a mainland location, even though this is

presently being done to a limited degree.

2) The key to a successful voluntary group is a strong, well financed wholesaler. There is some question as to whether a wholesale organization presently exists on the island which has the finances and field supervisory people and is capable of providing the necessary support to retail members so essential for the effective development of a strong, voluntary group.

3) Establishing such a voluntary group can be an expensive proposition for the wholesaler. It may not be worth the investment in time and money required to develop such a group given the island's scarce and widely dispered population base, the independent nature of many Newfoundland retailers and the highly competitive situation that already exists in many of the Province's major markets.

4) The majority of the Province's present independent food retailers are extremely small and undercapitalized. Cash flow and access to credit are perpetual problems and many of these operations have poor credit ratings with their suppliers. Most voluntary group stores operate under "check with next order" or "net 7 days" terms of purchase from their sponsoring wholesaler. These arrangements represent a drastic change from the net 30 days, 2%/10 net 30 days and the 1%/15 days purchase arrangements many Newfoundland stores receive from their present suppliers. Due to their present poor credit situtation it would be extremely difficult for them to meet the purchase require-

ments of any sponsoring group wholesaler.

5) The economies of scale and purchasing may be different in Newfoundland than in the rest of the country. A new wholesaler would have considerable difficulty in building up sufficient volume to purchase in the most economic container or 80,000 lb. carload lots from a single supplier. The fragmented wholesaling and brokerage system means that retailers have traditionally bought from a number of wholesale organizations rather than purchasing almost exclusively through a single wholesaler as has been the practice in the rest of the country. As well, where manufacturers still use brokers on the island they work to protect these brokers so the sponsor of any voluntary group would still have to buy from the broker rather than directly from the manufacturer. This additional middleman may eliminate some of the economies of scale resulting from direct purchases from the manufacturer.

These considerations do not necessarily mean that wholesaler sponsored voluntary groups will never be an important factor in grocery retailing in the Province, but merely serve to point out that establishing such a group is not quite as simple and straight forward as these earlier reports have made it appear. The territorial rights for the province for the two largest voluntary group franchises in Canada are owned by wholesalers in the maritimes. One of these already operates on the island in a limited way with a chain of company owned stores. Either or both may, at some future time, de-

cide to aggressively pursue further opportunities by setting up an operation of their own in the province or by licencing some other wholesale organization to operate the franchise on their behalf.

In addition, another affiliate of the corporate chain who acquired the assets of the bankrupt Newfoundland firm presently sponsors two small voluntary groups in Nova Scotia. They may see some opportunity to expand this operation from their new facility on the island.

Consumer Co-operatives

While no voluntary group stores exist in Newfoundland there are approximately 17 consumer co-operatives that sell grocery products at the retail level. These co-operatives are of two basic types: direct charge stores that are restricted to the members of the co-op who contributed capital funds for the establishment of the facility and pay a fixed charge each week to defray expenses, and others that are open to the public for shopping purposes and whose profits are paid back to the co-op membership in the form of patronage dividends.

All consumer co-ops in the province are affiliated with Newfoundland Co-op Services which is responsible for co-op development and fostering co-op ideals within the province. The wholesaling of food products for member societies, however, is handled primarily by Co-op Atlantic of Moncton, New Brunswick who hold the franchise for Co-op and Harmonie brand private label products in the area. Co-op

Atlantic provides its affiliated stores with a range of services very similar to those provided by a sponsoring wholesaler to its voluntary group members. The services include preprinted order forms, some accounting services, personnel training, a central meat program, an advertising program and engineering services.

In addition, individual societies may also have a management agreement with Co-op Atlantic whereby the manager of the store is provided by the wholesaler, or be operationally integrated and have all employees employed by Co-op Atlantic.

Transportation of merchandise to these stores is across the Gulf by semi-trailer from the company's branch in Sydney, Nova Scotia except in the case of Labrador. The Labrador City area is supplied by rail from Montreal while shipments for Goose Bay are sent by rail to Lewisporte, Newfoundland and up the coast by C.N. vessel twice a year.

IV METHODOLOGY

Obtaining the Information

The information for the comparative productivity study was obtained from a series of personal interviews with owners and/or managers of selected firms. Initial contact with each establishment in Newfoundland was made by a letter from the Premier of the province (Appendix A), followed by a letter from the Chairman of the Economic Council (Appendix B). Establishments in Ontario received only a letter from the Chairman of the Economic Council. These letters served to introduce potential respondents to the project,

briefly explained the purpose of the study, and requested the cooperation of the recipients in the efforts of the Council.

These letters were followed by a telephone call from the interviewer in charge of the project and an initial meeting was arranged between the respondent and the interviewer. During this initial meeting discussions were held regarding the overall situation of the store and an attempt was made to secure the cooperation of the respondent in providing the detailed information required for the background and financial questionnaire at the same time. Otherwise, arrangements were made for another meeting at which the detailed information could be obtained. In the case of the major corporate chains discussions were somewhat more involved.

Following the data collection process the interviewer compiled the results and a small confidential report was prepared for each respondent in the sample illustrating his own operating and financial ratios as compared to the operating and financial ratios for the industry as a whole in his province.

At the completion of the field work the individual company reports were delivered to the management of the company from which the data was taken. Each company's individual report and the data provided to the interviewer were held in strict confidence.

The Sample

The initial sampling frame for this comparative study of the

retail grocery trade was a comprehensive data base of Newfoundland and Ontario industries provided by an independent supplier. Information available for each establishment included the four-digit Standard Industrial Classification (S.I.C) code, the name and address, an identification number, and the number of employees.

The retail grocery trade was one of a random sample of industries selected in Newfoundland for the overall Establishment-Level Productivity Study. Within this industry stratification was carried out on the basis of size of establishment, measured by the number of employees. This took the form of one stratum comprising the larger establishments from which all establishments were chosen, and a second stratum from which two replicates of a probability proportional to size systematic sample were chosen. For the retail grocery trade this resulted in a sample of 24 individual establishments in Newfoundland and 26 in the province of Ontario.

After selection of the primary sample it became evident that the coverage of the original file was questionable. For example:

1) Many entries on the list were considerably out of date resulting in a high proportion of non-completions due to change in ownership, out of business, etc.

2) Many entries on the list and in the sample were general stores, combination restaurant-grocery stores, delicatessens and other outlets not typically considered part of the mainstream of grocery store retailing.

3) A survey of the entire list indicated that only a few of the

corporate outlets in Newfoundland and Ontario were actually part of the original population on the list provided by the supplier.

To overcome these difficulties some supplementary sampling was conducted with more intensive efforts directed towards the corporate chains and independent "combination" stores in both provinces.

The Survey

The information obtained from each respondent was very comprehensive. Two different questionnaires were used; one a background document and the other a financial document to obtain operating information for the company's fiscal year ending in 1978 (see Appendix C).

The background document was intended to deal with such matters as:

- type of organization
- major competition
- ownership of warehouse facilities
- pricing policies
- promotional policies
- purchasing practices
- store operation and technology
- labour policies and practices
- accounting practices
- manpower situation

- store size and customer transactions
- assessment of firms problems, strengths and weaknesses.

The financial document required the respondents to provide:

- a detailed profit and loss statement
- a breakdown of sales by product category
- an unconsolidated balance sheet
- a depreciation schedule.

A balance sheet showing a breakdown of assets, liabilities, and owner's equity at the store level was typically not available for most multi-store operations.

V PRODUCTIVITY IN RETAIL DISTRIBUTION

Defining Productivity in Retailing

Productivity is defined as a ratio between output measured in specific units and any input factor, also measured in specific units.[17] Statistics relating to productivity have generally been stated in terms of output relative to manhours of labour and the resultant figure referred to as the productivity of labour. Actually, productivity can just as easily be stated in terms of any other factor of production, such as output per dollar of capital invested.

Simple in concept, productivity in retail distribution is, however, difficult to measure.[18] What a distributor really sells is a set of tangible services performed in order to make the physical goods he handles more useful to buyers. It is for performing such services that he finds it possible to charge a higher price to his

customers than he pays his suppliers.[19] When changes are proposed to improve the efficiency of a retail operation we must make sure that what really results is a reduction in the price per unit of service and not a reduction in services the buyer wants and is willing to pay for.

> "Until they have found ways to put measures of service units produced against measures of expenses incurred, studies of "efficiency"... fail to be persuasive."[20]
>
> state Cox, Goodman, and Fichandler.

For example, if a retailer drops a service while increasing sales per manhour, has a productivity improvement occurred?

One school argues that productivity improvements only occur when:

1) the same amount of services are delivered at lower cost; or

2) more services are provided for the same cost; or

3) more services are provided at a lower cost to consumers.

If the saving realized by the retailer is not passed on to the consumer, only an efficiency improvement has occurred. The savings must be passed on to the consumer in terms of the benefit of a lower price or increased service, in order for a productivity improvement to occur.

Another school holds that a productivity improvement occurs when a retailer achieves a cost reduction which is passed through to the consumer, regardless of service level. This viewpoint contends that consumers judge the value of services by their everyday decision to

buy or not to buy.[21]

In this report we will hold to the latter view as it is impossible to compare in detail the service offerings of all respondents included in the study. Their ability or inability to attract customers, as measured by the utilization of their physical facilities will be one of the primary factors influencing overall establishment productivity.

Measures of Productivity

Considerable debate has also taken place regarding appropriate measures of output to be used in determining productivity for the distributive trades. Cox et. al suggests a value added approach with value being placed on intangible services provided by the retailer.[22] Nooteboom suggests the use of the term "efficiency" rather than "productivity" because the latter concept is associated with the "volume" of "real" output, which we cannot measure in retailing. He feels it is justifiable to take sales turnover, i.e., per labour hour or per square meter(foot) shop-space, as a measure of output because shops of the same type are reasonably homogeneous with respect to the value added per guilder (dollar) sales.[23]

To confuse matters further a Retail Council of Canada study suggests that because of this lack of clarity of productivity measures it has defined productivity as operating and economic performance, rather than in the more classical sense.[24] Another report merely says that there is no "right" productivity measure for

all purposes but, different measures can be calculated for specific purposes by altering the numerator and/or the denominator of the ratio.[25]

In this report we have attempted to combine a number of typical industry operating measures of performance with more traditional productivity measures for various segments of the retail grocery trade within each province. For example, we have compared the relative performance and productivity of both corporate chains and independent stores between Newfoundland and Ontario and also their relative performance within each province.

Typical examples of the kind of operating measures used for each comparison include:

1) Sales/square foot

2) Gross margin/sales ratio

3) Stockturn ratio

4) Net operating profit/sales ratio

5) Average sales per dollar of wages, salaries and benefits paid

6) Number of weekly transactions per checkout

7) Average weekly sales per checkout

8) Average sales per manhour paid

9) Efficiency ratio = gross margin/sales ratio x stockturn rate.

In addition, in order to facilitate comparison with the other industries in the Establishment-Level study a measure of "value added" has been developed for the retail grocery trade. This has been defined as the surplus available to pay for labour, furniture

and fixtures, and equipment since most food stores rent their premises at "arms length" from other business. The few exceptions that own their own premises have been treated "as if renting" by modifying their financial statements. In actual practice "value added" has been calculated as the establishment's net operating income before taxes and extraordinary income + wages, salaries and benefits paid + interest charges + leased equipment charges + its allowance for depreciation.

This concept permits the comparison of establishments on the basis of:

10) Value added per square foot

11) Value added per dollar of wages, salaries and benefits paid.

Bloom suggests that while most firms usually compare total output with labour input to measure productivity performance, the concept of "total factor productivity" may be a more useful and relevant measure.[26] Total factor productivity relates net output to the associated total factor input, i.e., the input of both labour and capital. Output per manhour provides only a partial picture of the productivity situation whereas total factor productivity yields results that demonstrate the balance and the tradeoffs that have been made among the various factors of production.

Calculation of total factor productivity is not as simple as the determination of output per manhour primarily because of the difficulty in estimating the value of capital inputs to be used in the analysis. One recommended measure is net investment (taking account

of depreciation) multiplied by the before tax rate of return earned by the company on its capital.[27] Unfortunately this approach is not feasible for this study as appropriate data is not available from all of the respondents.

Another suggested approach that has been employed is a short-cut method in which machinery and equipment are converted to "equivalent manpower".[28] This is based on the idea that machinery and equipment represent "invisible manpower" and that a more comprehensive set of inputs is obtained by adding the invisible manpower to the visible manpower of the actual work force.

In implementing this method it is necessary to determine the value of machinery, furniture, fixtures and equipment used during the period in question and then to express this value in terms of equivalent manhours. In our case the former figure can be roughly equated to the annual depreciation charge plus any leased equipment charges incurred by the establishment. This results in the following expression for total factor productivity:

12) Total Factor Productivity =

$$\frac{\text{Value added}}{\text{Total manhours worked} + \left(\frac{\text{Depreciation + Leased Equipment Charges}}{\text{Average hourly wage}}\right)}$$

This can also be broken down into its components to obtain expressions for total labour productivity and total capital productivity:

13) Total Labour Productivity =

$$\frac{\text{Value added}}{\text{Total manhours worked}}$$

14) Total Capital Productivity =

$$\frac{\text{Value Added}}{\text{Depreciation + Leased Equipment Charges}}$$

Average hourly wage

The validity of this approach depends on the validity of a number of underlying assumptions. The approximation of "value added" in distribution must be a reasonable approximation of net output in a manufacturing sense. The figures used for depreciation and leased equipment charges will reflect acquisitions acquired over many years and is it realistic to convert this figure to equivalent manhours simply by dividing by the present year's average hourly wage?

This short-cut procedure, in effect, uses equal weights in combining labour input and capital input, which may or may not represent the true contribution of each type of input in each establishment. Finally, while this method does attempt to include one type of capital, it does not provide a measure of total productivity since land, buildings and purchased goods and services are not included.[29] This last factor should not pose a problem since all establishments have been treated on an "as if rented" basis.

Factors Affecting Establishment-Level Productivity in Food Store Retailing

Economies of Scale

Economies of scale can be said to exist when average costs decline as the scale of operation increases. Potential gains in efficiency may encourage firms to increase the size of operating units.

Costs may also be significantly affected by the degree to which facilities are utilized. If costs go up steeply as the degree of utilization declines, large incentives may exist to emphasize merchandising and selling efforts. Individual competitors strive for higher volume in order to get better utilization of their facilities. In this way, the behaviour of costs represents an important determinant of competitive behaviour within an industry.[30]

Several empirical studies of supermarket-type establishments in a number of countries have essentially arrived at the same basic conclusions:

1) store size has little effect on store operating expenses; that is, economies of scale do not appear to be present at the store level.

2) store utilization has a very significant effect on store costs; in general, costs appear to be significantly affected by store utilization with the general relationship of high costs associated with low rates of utilization and as utilization rates increase cost levels begin to decline at first and then appear to level out.[31]

The National Commission on Food Marketing comments that the variations in cost attributable to size of store may be present but rarely amount to more than 2 cents per dollar of sales when moving from very small stores to very large stores. The variation in costs attributable to utilization, however, often varies by more than a 10 cent change in cost (or 10 percent of the sales dollar).[32]

This difference due to size of store was measured over a range of stores from 4,000 - 16,000 square feet of selling area. When comparisons are drawn between stores of 10,000 and 16,000 square feet, the differences in costs almost disappear completely. In fact, there is some tendency for the cost level to begin to increase again after reaching a low point at about 10-12,000 square feet.[33]

This viewpoint is further supported by Mallen and Haberman who found the overall optimum store size was 14,245 square feet (selling space) at a utilization rate of $11.25 per square foot per week.[34] This optimum generated the lowest average cost equal to 10% of sales (direct store operating expenses excluding transportation, warehousing and head office administrative charges).

There is some indication that economies of scale may exist in small food stores if not to any degree in supermarket operations. All of the previous studies employed average cost as the dependent variable as opposed to output or productivity. A study of food stores in Oslo, Norway employed gross margin dollars for each retailer as the measure of output and number of persons employed per store and the square footage of the store as inputs. Smaller stores

were segregated from larger, supermarket types in the analysis.[35]

Logarithmic regression functions were used. The two equations below represent the production functions for grocery stores and supermarkets, Og and Os being outputs for each. The figures enclosed in the parentheses are standard errors of the coefficients.

$$Og = -.34 + 1.34\ Lg + .18\ Sg \qquad R^2 = .85$$
$$\qquad\quad (.12)\ \ (.10)\ \ \ (.07)$$

$$Os = .81 + .91\ Ls + .04\ Ss \qquad R^2 = .83$$
$$\qquad\quad (.20)\ \ (.07)\ \ \ (.08)$$

L and S reflect the labour and store square footage variables, respectively.

If the sum of the coefficients for these two variables may be regarded as reflecting the effect upon output that would result from the simultaneous expansion of the store in terms of labour and size, the expansion rate of output is 1.52 (1.34 + .18) relative to inputs for the smaller stores. This suggests very sharp economies of scale for these stores. At the same time, the coefficient of labour for supermarkets, 0.91, is considerably lower than for grocery stores, and the coefficient for size is not significant. The authors conclude that there appear to be economies of scale in food retailing for smaller stores, but that these either greatly diminish or disappear altogether for larger establishments.

Economies of scale undoubtedly do exist at the corporate or firm level. Larger size and centralized purchasing for multiple units enables companies to take advantage of volume rebates, promotional allowances, listing fees and other discounts and allowances available from many manufacturers. Shipments can also be coordinated into full

truckloads or carloads which travel at much cheaper rates than less than carload or less than truck load shipments from a single source. This has the effect of improving the efficiency of purchasing and reducing the cost of goods for the larger companies.

Newfoundland firms have only recently moved in this direction. The gradual demise of the brokerage system and the establishment of captive distribution centres by the two major chains enables them to keep their store-door cost of merchandise down to a level below that of other firms. These purchasing economies combined with more effective management of their private label programs through their captive warehouses probably results in a store-delivered cost of merchandise at least 2-3 percent lower than that of other food retailers on the island.

Shopping centres are increasing in importance in Newfoundland. Larger chains are in a better position to compete for this desirable retail space and, in many cases, are actively pursued by developers to serve as a traffic generator for the small specialty stores within the centre. This locational advantage combined with their ability to spread advertising expenses over a number of stores gives the chain organization additional economies in relation to the independent food store.

Technological Innovation

A number of new technical developments and innovations have arrived on the scene within the past few years which may be expected

to have some effect on productivity in food retailing. These include more energy efficient compressor systems, flexible grocery shelving systems, digital electronic meat and produce scales, electronic ordering devices, market-ready (boxed) beef, faster, more efficient checkout counters, energy control devices, upright frozen food display units, and so forth. However, the development which is expected to have the greatest impact on store level productivity is the automated front end or the adoption of electronic point-of-sale systems. Mel Dobrin, president of Steinberg's Ltd., has termed the electronic checkout with code scanning "the most significant recent development in food retailing."[36]

Electronic point-of-sale (POS) systems range from simple electronic cash registers which are suitable for use in small retail establishments to sophisticated, computer-controlled systems which can be equipped with electronic scanners and have the capacity to perform energy management functions and other operations. Costs for these systems run from around $2,500 for a simple, single, standalone register to as much as $150,000 for a full scale, computer-driven, scanning operation in a large supermarket with 10 checkout lanes.

These systems can make possible a number of improvements in retail store operation including:

- improved productivity at the point of sale
- better utilization of sales personnel and checkout stations
- better control over inventories resulting in reduced inventory investments

- credit verification
- better checking and control of cash
- simpler cash register operations, with correspondingly reduced training cost
- the potential for better management information[37]

An early test in a U.S. store with gross weekly sales of $140,000. indicated potential savings of over $12,000 per month for a computer-driven scanning operation with no price marking of individual products.[38] Bloom reports potential savings of 1.16% of sales with a similar system in a store with a $4 million annual sales volume.[39] An independent supermarket operation in Ontario indicated their checkout productivity increased somewhere between 5% and 20% with a scanning system, as compared with the electronic register operating without scanning.[40] Canadian supermarket managers feel that the savings they will realize as a result of implementing these systems will not be as large as indicated in U.S. tests and reports. This difference is due to the higher initial capital investment required in this country for similar kinds of front end equipment and the fact that most installations to date still have each product individually priced, thus eliminating a considerable portion of the potential savings. In addition, present supermarket productivity is generally considered to be higher in Canada than the U.S.[41] so there is not as much room for improvement with the introduction of electronic POS systems.

Electronic cash registers were first introduced to the

Canadian scene in the early 1970's with the first major supermarket installation in Ontario in 1972. By 1975 over 250,000 electronic cash registers had been installed with the number expected to double during 1976.[42] The first installation of a fully-automated checkout system was at a Steinberg store in Dorval, P.Q. in 1974 followed by an independent I.G.A. store in Delhi, Ont. in 1976 and a second Steinberg's installation at a Miracle Food Mart store in Toronto during 1977. Since then the development has spread very rapidly with Safeway and Super Value establishing full front end scanning operations in British Columbia as well as Food City, Dominion, Loblaw's, Zehr's, Miracle Food Marts and others.[43] Our survey shows 14.1 percent of Ontario chain supermarkets are equipped with computer-driven systems, but only some of them have scanners.

To date, no scanning systems exist in Newfoundland. This is undoubtedly due to the fact that an establishment should be turning a minimum of $150,000, and preferably $200,000, per week in order to economically justify the installation of a computer-driven system. Very few stores in the Province would meet this requirement. One manufacturer recently announced a standalone scanning system that is considerably cheaper per checkout lane than a computerized system.[44] This variation of the technology may be more appropriate for the Newfoundland market but no installations presently exist.

Table 6 illustrates the penetration that electronic cash registers, as such, have achieved into various types of food stores in Newfoundland and Ontario from the results of the survey. No clear pattern seems to emerge. At the aggregate level only 8.0 percent of

Newfoundland food stores have electronic registers of any type compared to 32.3 percent in Ontario. However, this difference would appear to be primarily attributable to the large number of small independent stores that do not have this type of equipment. Within the other categories the percentage of stores equipped with electronics is significantly higher in Newfoundland than in Ontario. This may be due to the level of sophistication of the systems being installed. Most major chain stores in Ontario are being equipped with computer driven systems or high-level standalone systems that are capable of being upgraded to full systems. On the other hand, the Newfoundland chains, particularly the local chains, may be equipped with electronics but with low-level systems that primarily duplicate the function of the mechanical registers they replaced. The difference between the two levels in the capital investment required to make the switch is substantial. With their large number

Table 6

Establishments Equipped With Electronic Cash Registers -

Ontario and Newfoundland,
Survey Results

Ontario			Newfoundland		
Corporate	Independents		Corporate		
Chains	Affiliated	Unaffiliated	Chains	Co-ops	Independent
%	%	%	%	%	%
21.8	33.6	34.1	30.5	75.3	5.1

of stores Ontario chains may have to go slower in order to afford the kind of systems they feel they require.

The larger chains also engage in extensive testing of equipment from a number of manufacturers before committing themselves to any particular course of action. Testing takes time and this may delay the diffusion of any particular technological development such as front end electronics throughout their organization on any major scale.

These percentages in both provinces compare extremely well with the situation in the U.S. where although the absolute number of front end scanning systems in operation is considerably higher than in Canada, 201 at the end of 1977,[45] only 10 percent of U.S. supermarkets had electronic cash registers of any kind.[46]

Bucklin and Norris recently proposed a number of hypotheses which may explain some of these differences in the extent of the diffusion of this particular innovation within retail food stores.[47] For example, they suggest that:

> "Regional differences in the rate of diffusion of innovations will be positively associated with market structures reflecting greater concentration and profit."

Mallen's study reported that the concentration level of supermarket chains in St. John's is amongst the highest in Canada and that this high concentration level appears to be positively correlated with the profitability of chains. This type of situation, according to Bucklin and Norris, would promote more rapid adoption of new

innovations than more broadly competitive situations. This view would seem to be supported by the information in Table 6.

The authors also suggest that:

"The rate of diffusion in a regional market will be in direct proportion to the market strength of local supermarket firms." While a number of local chains operate in Newfoundland, they are not very strong from the standpoint of market share, accounting for less than 6 percent of total retail food store sales within the province in contrast to 30 percent for the two major chains. These smaller chains, however, have almost universally adopted some type of electronic front-end equipment. Perhaps this indicates that flexibility and the ease of formulating policy are more important factors in determining the rate of diffusion than market position. Large regional and national organizations may feel more constrained by the external effects of their actions and be unwilling to innovate in one market for fear that this action will commit them elsewhere.

The literature suggests that larger firms are more likely to require more extensive testing of innovations than smaller organizations. Small organizations and individual operators, however, tend to respond erratically to new opportunities and their adoption rate will vary widely and unpredictably. This, perhaps, explains the significant variations that exist in the adoption rate of electronic cash registers among unaffiliated independents in each province, Newfoundland co-operatives, and members of voluntary groups in Ontario.

It is interesting to note that while Newfoundland may lag behind Ontario in the initial introduction of new technology because of its relatively remote location, small market size, lack of suporting infrastructure and other reasons, the rate of adoption of even new, sophisticated computer technology can exceed that of Ontario, at least in particular sectors of an industry.

Product Mix

A modern food store may have upwards of 8-10,000 individual items on its shelves at any particular point in time. Traditionally these items have been grouped into three main departments - grocery, meat, and produce, for information purposes. The characteristics of products within each department in terms of gross profit on sales, inventory turnover, sales per man-hour, etc. are quite different so the overall sales mix of products from each category can have a considerable effect on store performance and productivity.

A typical sales mix for U.S. supermarkets in 1976 was reported as being:[48]

Groceries - 72.0%

Meat - 21.0%

Produce - 7.0%

Included in the grocery figure is an average of 4.1 percent in non-food or general merchandise items. Similar information for Canadian independent food stores indicates a slightly different picture:[49] Groceries - 69.1%

Meat - 21.4%

Produce - 9.5%

It would appear these stores tend to put more emphasis on produce sales and less on general merchandise than the typical U.S. operator.

Both these thrusts represent efforts by retailers to escape the frozen (or shrinking) gross profit margins that have existed in their traditional grocery lines in recent years. Both produce and non-food items typically carry higher gross margins and yield better inventory turnover than their grocery items. A small shift in the retailer's sales mix towards these two product lines can have a substantial impact on the store's overall bottom line performance. This is illustrated in Table 7 where a 30 percent increase in produce sales results in an overall gross margin improvement of 0.23 percent, most of which goes into net profit which improves 8 percent from 2.87 percent to 3.10 percent of sales, before taxes for the typical operator.

Many Ontario chains have also introduced specialty meat and cheese departments, delicatessens, instore bakeries and other featured departments into their stores which, while they are more labour intensive and increase total labour costs, generate gross margins that are considerably higher than the dry grocery lines that constitute the bulk of their sales.

The same kind of situation holds true for non-foods. For the past several years non-food sales have grown at a faster rate than

Table 7

Change in Operating Performance of a Typical Independent Food Store with a 30 Percent Increase in Produce Sales

	Average		With 30% Produce Increase	
	% of Sales	Gross Profit	% of Sales	Gross Profit
Groceries	70.6	16.2	68.1	16.2
Meat	21.1	16.3	21.1	16.3
Produce	8.3	25.8	10.8	25.8
Total Store	100.0	17.01	100.0	17.24
Operating Expenses		14.14		14.14
Pre-Tax Profit		2.87		3.10

Source: "Increased Sales of Fresh Can Improve Bottom Line." Canadian Grocer, May, 1978, pp. 23.

total store sales in the U.S. and account for over 50 percent of net profit in many stores.

The growth of this area has been somewhat slower in Canada but general merchandise has taken over as much as 27 percent of the selling space in some supermarket outlets and may contribute 35 percent of gross profits in some of the larger stores.[50] One national chain aims for 23-25 percent of gross profit from non-food items. The most popular non-food items in food stores include health and beauty aids, housewares, hardware, pet supplies, soft goods, pantyhose, magazines, paperbacks, photo finishing, and automotive supplies.

A number of more radical marketing innovations have recently appeared on the Ontario scene in response to intense competition and shrinking profits, primarily in the major urban markets. These thrusts represent attempts by the larger chains to increase present store volume, decrease store operating costs or improve overall gross margins. The most important of these include:

1) Generic Merchandising.

Generic or no-name products with prices as much as 50 percent below those of branded lines were introduced by Loblaw's in 1978. They have since grown to 10 percent of the firm's sales even though they make up only 1.5 percent of the products on the stores' shelves. David Nichol, the president of Loblaw's Ltd. predicts that generics will account for 25 percent of all grocery sales in North America within five years.[51]

It is anticipated that these products with their rock-bottom prices and plain packaging will prove to be immensely popular with the consumer and that the lower per-unit (but not necessarily percentage) profit will be offset by increased volume sales. In addition, it is hoped that generics will mean a net reduction in advertising budgets once the initial start-up investment has been incurred.

Some other chains have followed suit and introduced their own lines of no-name products. Others have been reluctant to make the necessary investment and try to compete with the no-names through more competitive pricing of their own private label products.

2) Box Stores.

No-frills box stores or "baby sharks" are limited-assortment, limited-service stores. They are usually little more than warehouse outlets 6,000-8,000 square feet in size, selling less than 500 individual items. They have no refrigeration and no produce or other perishable products. Typically, items are not individually price-marked, carry-out service is not provided, customers bring and pack their own bags, and other services provided by an average supermarket are not available.

Gross margins in these outlets are low, perhaps 10-12% of sales, but labour, occupancy, and energy costs as well as the initial capital investment required to set up the operation are also very low because of their use of non-union and part-time

labour and the bare-bones nature of the operation.

There are now three box store chains in Ontario. Their sales may approach $400-$500 per square foot, or substantially higher than the figure for regular supermarkets.

3) Super Stores and Combination Stores.

Super stores and combination stores are large outlets typically 50,000 to 60,000 square feet or more. Super stores are basically just large supermarkets with their primary emphasis on food products but with a number of higher gross margin specialty departments and a limited assortment of general merchandise items.

Combination stores, on the other hand, offer a wide selection of food, drug, and general merchandise (usually hard goods) products which can all be checked-out through a single series of cash registers. Non-food items may account for 35-40 percent of sales in these outlets. Their gross margin of 40-50 percent or higher in comparison with 20 percent on groceries can result in an average gross margin for the store significantly higher than that realized by concentrating on food products alone.

Many industry people feel the super combo will become the dominant force in food retailing in the U.S. and Canada and a number of chain organizations such as A&P, Safeway, Steinberg, and Dominion Stores have recently embarked on substantial expansion programs with this type of outlet.[52]

None of these innovations presently exist in Newfoundland. It would appear that stores there face a somewhat different competitive

situation and are more traditional in their overall sales mix than those in Ontario. Good quality imported produce is difficult to obtain due to transportation and storage problems. Domestic produce, on the other hand, is only seasonally available and has not been marketed on any kind of organized basis. Most farmers not only produce, but sell their own vegetables. As a result, there is no co-ordinated system for the washing, grading and packaging of domestic produce or ensuring that the market is provided with the volume and consistency of supply that it requires. Under these conditions, the large retail organizations rely on wholesalers who utilize mainland Canada or United States producers as secure sources for produce supply.

Several proposals are presently being considered for the establishment of centralized storage, processing, and marketing facilities across the island and producer-controlled, vegetable marketing associations are being established in an attempt to make a larger supply of high-quality product available to the wholesalers and retailers on a continuing basis. These efforts should work to the advantage of the Newfoundland farmer and also permit retailers to pay more attention to the potential market and profit opportunities available through the produce section of their stores.

Newfoundland operators also do not seem to put the same kind of emphasis on the non-food area. Other than health and beauty aids and housewares, very few stores carry any extensive range of general merchandise items. This may be due either to a lack of adequate

space or a lack of interest. If the present situation continues Newfoundland store owners may find their gross margin percentage being subject to the same type of downward pressure as stores in Ontario.

VI THE RESULTS

Ontario vs. Newfoundland

Table 8 illustrates that on almost every measure of output retail food store productivity in Ontario is significantly higher than in Newfoundland. The exceptions occur on those output measures where labour input is expressed in monetary rather than physical terms - Sales/$ of payroll and Value Added/$ of payroll. These deviations can be explained by a difference in the weighted average hourly employee wage rate between the two provinces of over 22 percent; $4.10 per hour in Ontario in contrast to $3.18 in Newfoundland.

Lusch and Ingene in a recent comparison of alternative measures of inputs and outputs in retail production functions suggest that the most robust measure of output is value added while the most robust measures of inputs are physical, rather than monetary.[53] Specifically they recommend either manhours worked or number of full-time equivalent employees as a measure of labour input in retailing and square feet of selling space as a proxy for total capital input, since it varies with investments in working capital and fixed capital. Use of these measures indicates a difference of 29.2 percent in the produc-

Table 8

Retail Food Store Productivity Ratios:
Ontario vs. Newfoundland
Weighted Average, All Stores

RATIO	ONTARIO	NEWFOUNDLAND
	(64)[1]	(32)
1) Sales/Square Foot *	$ 309.55	$ 230.74
2) Gross Margin/Sales	.1941	.1667
3) Stockturn Ratios	21.27	16.10
4) Net Operating Profit/Sales *	.0155	.0303
5) Sales/$ of Payroll *	$ 10.05	$ 12.77
6) Transactions/Checkout **	1024	542
7) Sales/Checkout **	$9530.89	$5094.16
8) Sales/Manhour *	$57.85	$39.86
9) Efficiency Ratio[2] *	4.27	2.91
10) Value Added/Square Foot *	$ 38.54	$ 27.24
11) Value Added/$ of Payroll *	$ 1.24	$ 1.51
12) Total Factor Productivity	$ 6.55	$
13) Total Labor Productivity **	$	$ 4.71
14) Total Capital Productivity	$ 75.09	$

* differences are significant at the .05 level

** differences are significant at the .01 level

(All T tests are 2-tailed tests. In the case of productivity ratios where there exists the maintained hypothesis that productivity is lower in Newfoundland, the one-tailed test (which is less restrictive) might have been more appropriate. If a one-tailed test had been employed for the productivity ratio the only difference in this table would be that the Value Added/$ of Payroll ratio would become significant at the .01 level.)

1 Number of observations in each sample.

2 Gross Margins as a per cent of Sales times Stock Turnover.

tivity of capital and 34.4 percent in the productivity of labour between the two provinces as shown by ratios 10 and 13 in Table 8.

One apparent contradiction from the data is that while Newfoundland food retailers are significantly less productive they appear to be somewhat more profitable (ratio 4). This can be explained by:

1) a proportionately large number of small independent stores in the province with working proprietors whose wages are not reflected in the operating statements for their stores.
2) a significant difference in the average hourly employee wage rate paid between the two provinces.
3) generally lower expenditures for promotion, occupancy and other costs of doing business between the two provinces

Corporate Chains: Ontario vs. Newfoundland

While food stores generally in Newfoundland are less productive than those in Ontario, the same situation does not necessarily hold for all sectors of the retail food industry. In Newfoundland, corporate chains, while accounting for less than half the percentage of food store sales they represent in Ontario, are at least as productive and considerably more profitable as shown in Table 9. The values for Value Added/Square Foot and Total Labour Productivity or value added/manhour, while not statistically significant, appear to be somewhat higher in Newfoundland.

Most other measures are also higher in Newfoundland especially those with a monetary measure of labour input (ratios 5 and 11)

Table 9

Retail Food Store Productivity Ratios:
Corporate Chains - Ontario vs. Newfoundland
Weighted Average

RATIO	ONTARIO	NEWFOUNDLAND
	(44)[1]	(15)
1) Sales/Square Foot	$ 345.48	$ 395.15
2) Gross Margin Sales	.2029	.1957
3) Stockturn Ratios	25.82	20.67
4) Net Operating Profit/Sales **	.0016	.0350
5) Sales/$ of Payroll **	$ 10.36	$ 14.27
6) Transactions/Checkout **	1258	674
7) Sales/Checkout	$13179.69	$13435.37
8) Sales/Manhour	$79.06	$86.88
9) Efficiency Ratio	5.35	4.71
10) Value Added/Square Foot	$ 37.03	$ 44.54
11) Value Added/$ of Payroll **	$ 1.11	$ 1.61
12) Total Factor Productivity	$ 7.63	$ 8.57
13) Total Labor Productivity	$ 8.47	$ 9.79
14) Total Capital Productivity	$ 76.61	$ 68.26

* differences are significant at the .05 level

** differences are significant at the .01 level

[1] number of observations in each sample

reflecting a lower weighted average wage rate in the province for both supermarket employees and managers.

Some ratios, however, are substantially higher for Ontario. The Stockturn ratio appears to be higher due to the higher average inventory levels maintained by Newfoundland supermarkets (although the difference was not found to be statistically significant). Transactions/Checkout is much higher for Ontario due to different consumer shopping habits between the provinces, the relative infrequency with which Newfoundland shoppers patronize a supermarket, and the distance many Newfoundlanders have to travel to reach a supermarket, especially outside St. John's. Many important ratios, however, indicate no significant difference in the performance of corporate chain stores in the two provinces.

These data would appear to contradict some of the conclusions of Mallen in his study of economic concentration in the Canadian retail food industry. As profit levels for Newfoundland chains are high in relation to the food industry generally there is some support for his thesis that "excess" profits are being realized, perhaps attributable to the essentially duopolistic nature of the market in most major centres across the island. There is no indication, however, that this high concentration level had led to overcapacity in terms of overstoring, inefficiencies in operations, or underutilization of supermarket floor space. The indications, in fact, are just the opposite with Sales/Checkout essentially the same and Sales/Square Foot marginally, but not significantly, higher at $395.15 in Newfoundland in contrast to $354.48 in Ontario. This would imply

that his total potential cost savings for St. John's of 6.4 percent is a gross overestimation and the actual real impact of the present economic structure on supermarket prices and profits is marginal at best. The present high level of profitability of these chains would appear to be attributable to their ability to maintain gross margins at levels reasonably comparable to those of Ontario chains and to keep costs down through lower average wage rates, smaller percentage expenditures on promotion and advertising, shorter operating hours, and other operating efficiencies as indicated in Table 10.

Independent Stores: Ontario vs. Newfoundland

Independent stores include all stores in either province that are not part of a corporate chain even though they may be affiliated members of a vertical distribution system as in the case of voluntary group stores and cooperatives.

On average, these independent stores are by far the least productive sector in either province although much more so in the case of Newfoundland. Because of their relatively large number in Newfoundland by comparison with Ontario these independents strongly influence the overall performance of the total retail food sector within the province. The relative productivity performance of all independents is indicated in Table 11 and portrays a picture very similar to the overall provincial situation. The Ontario stores perform significantly better on every ratio except those where labour input is expressed in monetary rather than physical terms.

Table 10

Comparative Operating Statistics:
Corporate Chains - Ontario vs. Newfoundland
Weighted Average

RATIO	ONTARIO	NEWFOUNDLAND
	(44)[1]	(15)
1) Gross Margin/Sales Ratio	.2029	.1957
2) Dollars of Inventory/Sales Ratio	.0387	.0484
3) Promotion Expenditures/Sales Ratio **	.0083	.0053
4) Part-time Employee Hours/ Total Employee Hours	.4317	.2875
5) Employee Wage Rate per Hour	$6.62	$4.21
6) Management Wage Rate per Hour	$11.49	$8.42
7) Hours of Operation per Week	69.1	61.2
8) Number of Full Time Employees per Store	20.28	18.50
9) Number of Part Time Employees per Store	34.35	17.40

* differences are significant at the .05 level

** differences are significant at the .01 level
Statistical tests not available for ratios 5-9

1 Number of observations in each sample.

Table 11

Retail Food Store Productivity Ratios:
Independent Stores - Ontario vs. Newfoundland
Weighted Average

RATIO	ONTARIO	NEWFOUNDLAND
	(20)[1]	(17)
1) Sales/Square Foot *	$282.80	$189.38
2) Gross Margin Sales	.1860	.1543
3) Stockturn Ratios	18.26	14.26
4) Net Operating Profit/Sales	.0285	.0279
5) Sales/$ of Payroll	$9.78	$12.11
6) Transactions/Checkout *	885	493
7) Sales/Checkout **	$7624.00	$3768.10
8) Sales/Manhour *	$46.51	$31.04
9) Efficiency Ratio	3.52	2.39
10) Value Added/Square Foot *	$39.69	$22.89
11) Value Added/$ of Payroll	$1.36	$1.46
12) Total Factor Productivity **	$5.95	$3.56
13) Total Labor Productivity **	$6.47	$3.75
14) Total Capital Productivity	$74.05	$68.35

* differences are significant at the .05 level

** differences are significant at the .01 level

[1] number of observations in each sample

Within the independent segment in each province it is possible to observe whether the operations that are part of some vertically coordinated marketing system are more productive than those that are not. In actuality, this may not be a true comparison as virtually all of the independent operators that are part of some vertically integrated system can be classified as supermarkets but many of the other independents are variety stores, general stores, specialty stores and similar operations which may have a quite different production function.

Table 12 compares the relative performance of stores that are members of wholesaler-sponsored voluntary groups with all other independent food stores in Ontario. The overall picture is quite mixed with the independent stores outperforming the voluntary group members on some measures and vice versa. This undoubtedly reflects the different operating characteristics of the types of stores contained in the two groups. For example, the other independents have lower Sales/Square Foot, and a lower Stockturn ratio but a much higher Gross Margin/Sales ratio reflecting a different product mix or the more specialized nature of their business. Many of these outlets concentrate on the high margin, low turnover product lines sold through most larger supermarkets such as delicatessen products or baked goods.

The comparison of net productivity measures presents a similar picture with Value Added/Square Foot being marginally higher for the other independent stores but Total Labour Productivity being higher

Table 12

Retail Food Store Productivity Ratios:
Voluntary Group Stores vs. Other Independents - Ontario
Weighted Average

RATIO	VOLUNTARY GROUP STORES	OTHER INDEPENDENTS
	(14)[1]	(6)
1) Sales/Square Foot	$312.20	$229.36
2) Gross Margin Sales **	.1672	.2324
3) Stockturn Ratios **	23.32	12.03
4) Net Operating Profit/Sales	.0230	.0418
5) Sales/$ of Payroll **	$ 10.63	$ 8.17
6) Transactions/Checkout	953	729
7) Sales/Checkout	$8438.54	$6113.19
8) Sales/Manhour *	$55.88	$32.86
9) Efficiency Ratio	4.18	2.80
10) Value Added/Square Foot	$ 38.80	$ 41.42
11) Value Added/$ of Payroll	$ 1.32	$ 1.44
12) Total Factor Productivity	$ 6.44	$ 5.24
13) Total Labor Productivity	$ 6.94	$ 5.76
14) Total Capital Productivity	$ 87.72	$ 57.74

* differences are significant at the .05 level

** differences are significant at the .01 level

[1] number of observations in each sample.

for the voluntary group stores, although these differences are not significant because of the small sample size.

In comparison to the Ontario chains the voluntary group stores perform reasonably well. Their utilization rate and stockturn ratio is almost as high but they appear to have some problem in achieving a comparable Gross Margin/Sales figure. This may be due to their concentration on traditional lines of grocery products with very few stores having higher margin specialty departments. Notwithstanding this problem their Net Operating Profit/Sales level appears somewhat higher because of their lower average wage rate and a number of working proprietors whose salaries are not included in the aggregate statistics.

Table 13 presents a similar comparison for Newfoundland separating the productivity performance of retail cooperatives from that of other independent food stores in the province. It is obvious from the data that the productivity of independent food stores is substantially lower than retail cooperatives on virtually every measure of performance except Sales/$ of payroll and Value Added/$ of payroll, which are not significant. This is because the wages of working proprietors are not reflected in the payroll statistics. As most of these independent outlets are essentially "mom & pop" type establishments the effect of this omission is significant. In fact, the performance of this particular segment is substantially lower than any other segment in either province.

In relation to the retail coops and the Newfoundland sample as a

Table 13

Retail Food Store Productivity Ratios:
Cooperatives vs. Other Independents - Newfoundland
Weighted Average

RATIO	COOPERATIVES	OTHER INDEPENDENTS
	(4)[1]	(13)
1) Sales/Square Foot **	$396.61	$141.76
2) Gross Margin Sales	.1633	.1477
3) Stockturn Ratios **	22.10	11.21
4) Net Operating Profit/Sales **	.0065	.0416
5) Sales/$ of Payroll	$ 10.90	$ 13.04
6) Transactions/Checkout	428	533
7) Sales/Checkout **	$9943.62	$2572.21
8) Sales/Manhour **	$58.11	$23.89
9) Efficiency Ratio *	3.61	1.92
10) Value Added/Square Foot	$ 44.86	$ 17.84
11) Value Added/$ of Payroll	$ 1.23	$ 1.64
12) Total Factor Productivity**	$ 6.06	$ 2.87
13) Total Labor Productivity **	$ 6.57	$ 3.01
14) Total Capital Productivity	$ 77.14	$ 64.13

* differences are significant at the .05 level

** differences are significant at the .01 level

[1] number of observations in each sample.

whole, Value Added/Square Foot for the other independents is only 40 percent and 65 percent of that achieved by the other segments, and Total Labour Productivity 46 percent and 64 percent respectively.

It is this dismally poor productivity performance of the other independent segment of the Newfoundland market that accounts for the relatively poor comparative performance of the entire sector within the province. Many of these outlets are small confectionary and variety stores providing a subsistence level of income to the working proprietor. They average $175,000 in sales annually and 1230 square feet in size although many are much smaller than that. Because of their relatively large number and significant cumulative share of total food store sales their effect on the productivity of the entire retail food sector is quite significant.

Productivity of the retail cooperatives, on the other hand, compares favourably with corporate chains within the province and also with the performance of corporate chain stores and voluntary group members in Ontario. Value Added/Square Foot is virtually identical to the Newfoundland chains and Total Labour Productivity, while lower than the local chains, is only slightly less than the value added per manhour achieved by the voluntary group stores in Ontario.

Profitability of the cooperatives, however, is not as high as that of the corporate chains. This appears to be attributable to the higher average wages paid by the coops and more extensive use of full time labour combined with a Gross Margin/Sales ratio which is

3.24 percent lower than the chains.

VII SUMMARY AND CONCLUSIONS

The survey results indicate that, in fact, significant differences in productivity do exist in the retail grocery trade between Newfoundland and Ontario. This difference is primarily attributable to the extremely poor performance of the segment of independent stores in the province that is not part of any vertically integrated or coordinated market system. Because of their relatively large number and significant share of total retail food sales they have considerable impact on the aggregate performance of the entire retail food sector.

This would indicate that the primary problem in food retailing is the retail structure present in the province. Other segments of the industry, retail cooperatives and corporate chain stores, have a level of productivity performance at least equal to that of similar types of stores in Ontario.

Further evidence to support this view of lower productivity at the aggregate level in Newfoundland can be demonstrated by a comparison of the number of retail food establishments per capita. Previous studies have found this measure of retail structure to be an important determinant of retail productivity.[54] In 1971, Newfoundland had 4.27 grocery stores per 1,000 population in comparison to 0.95 in Ontario (Table 14). These stores were much smaller, had far

Table 14

Grocery, Confectionery and Sundries stores, Grocery stores, and Combination stores, 1971.

	CANADA	ONTARIO	NEWFOUNDLAND
Total Stores	30,444	7,301	2,231
Population (000)	21,568	7,703	522
Stores per 1,000 pop.	1.41	0.95	4.27
Sales per store	$244,974	$205,027	$53,294
Paid employees per store	3.59	3.29	0.82
Sales per employee	$ 68,238	$ 62,318	$64,995
Payroll per employee	$ 5,477	$ 4,467	$ 3,248

Source: Canada Catalogue 97-707 Vol. VII (7-7).

fewer paid employees per store, and paid these employees only 73 percent of the average wage of employees in Ontario-based operations.

Surprisingly, labour productivity as measured by sales per employee appears to be 4.3 percent higher in Newfoundland. When, however, the number of working proprietors is taken into account Newfoundland sales per worker drop drastically to $29,526 while Ontario has a more moderate decline to $47,222.

According to Takeuchi and Bucklin few establishments per capita is associated with higher labour productivity.[55] Their cross-sectional comparative study of the United States and Japan indicated that in Japan, with a similar profusion of small independent outlets as Newfoundland, every 1 percent decline in the number of retail outlets per capita causes labour productivity to increase by 0.5 percent. This implies that the opportunities for labour productivity improvement in Newfoundland through increase in the size of the average store may be substantial. The transition from the small-to-medium-size store may offer relatively more opportunity for productivity improvement than from the large to the super-large store.

Legislators and public policy makers have a variety of options which permit them directly and indirectly to influence retail structure. In the direct sense, potent tools exist in the powers to license, tax, and control the use of capital, as well as the terms of employment and wages. Indirectly, government policies toward the protection of small-scale retailers play an important role. Still more indirectly are policies concerning the development of transpor-

tation systems, the construction and improvement of roads, and programs for the relocation or increased urbanization of the population. These influence the size of trading area of an individual retail location and affect the capacity of wholesale organizations and retail chains to develop integrated distribution systems.

The adoption of policies to promote improved retail productivity may involve certain tradeoffs. Smaller stores typically offer the consumer greater convenience. A significant reduction in the number of stores may mean less convenience and higher transportation costs for the customer. These may more than offset any potential savings in purchase costs. In addition, the dislocation of any significant number of working proprietors will increase unemployment and the social welfare costs for the province.

Nevertheless, because of the extremely low productivity of these small independents it would appear that almost any measure that will improve the present retail structure would be worthwhile. Specifically, the following proposals would warrant serious considerations:

1) Promotion of the establishment of peninsular service centres and improving the peninsular road system as suggested by the Economic Council in its report Newfoundland: From Dependency to Self-Reliance. This would mean the establishment of larger retail trading areas and more markets that have the size to support larger retail food establishments.
2) Improving the level of service provided for mainland/Newfound-

land freight movement, particularly volume shipments in truck-loads or carloads. Specifically, service levels should be improved in regards to decreased time in transit, more reliable time in transit, and reduced loss and damage. This may require the implementation of a number of recommendations contained in the Report of the Commission of Inquiry into Newfoundland Transportation such as:

- phasing out the railroad or improving the reliability of carload services
- upgrading and shortening the Trans Canada Highway
- encouraging the development of a Newfoundland based fleet of temperature controlled trucks and promoting the expansion of inter-provincial truck services to provide more capacity, more frequent service, and greater service coverage
- expansion and improvement of the service level on the Gulf ferry service for truck freight movements

The net result of these recommendations will mean better service, probably at lower cost, for food wholesalers and large retailers. This may lead to further rationalization of the wholesale distribution system in the province, an acceleration of the demise of the exclusive brokerage system, the creation of larger, stronger wholesale units, and improved service for those chain stores and cooperatives that are supplied from mainland distribution centres.

3) Elimination of government policies that support very small-

scale retailers. This would include refusing to license any store below a certain size for the sale of beer and wine, and liberalizing municipal by-laws and provincial statutes that may restrict the hours and days of operation of supermarkets and chain stores.

4) Encourage and financially support the establishment of or participation in retail food management training programs for employees and managers presently working in the industry. The survey results indicate that most present food store employees and managers are, at best, high school graduates with very little or no technical or university training.

Atlantic Wholesalers Ltd. in New Brunswick, for example, runs a management course for its retail managers which is reported to have resulted in a noticeable improvement in store efficiency, a 13% reduction in staff turnover, and an increased customer count.[56] In addition, the company also runs on-the-job training programs in subject areas such as cashiering, grocery, produce, meat, and bakery.

Cornell University at Ithaca, N.Y. has an extensive offering of home study courses on many aspects of supermarket management that employees of several Ontario corporate chains are encouraged to take at company expense.

An investment in training of this type can quickly increase the present relatively limited supply of adequately skilled retail managers who can operate large-scale, multi-establish-

ment, and vertically coordinated retail systems.

5) Provide additional moral and financial support to Newfoundland Co-Op Services or some other agency who would be responsible for promoting and encouraging the establishment of additional consumer co-operatives across the province to sell grocery products at the retail level.

The present wholesale supplier of these co-operatives, Co-Op Atlantic, should be encouraged to establish or acquire branch distribution facilities on the island or the present co-op grocery stores might establish their own co-op wholesaler to improve the efficiency of distribution and, perhaps, lower the cost of merchandise for their outlets.

Implementation of these recommendations would provide considerable inducement for the expansion of the chains and cooperatives presently operating in the province, encourage the entrance of one or more new coprorate chain organizations into the market, or, perhaps, accelerate the establishment of a wholesaler-sponsored voluntary group. All are likely to have a significant impact on the overall level of productivity in the retail food sector.

Encouraging the establishment and expansion of vertically integrated and coordinated food marketing systems, whether independent or corporately owned, would appear to be the quickest way to achieve a higher aggregate level of productivity in the retail food sector. This growth should not necessarily emulate present developments in Ontario with the emphasis on larger supermarkets, box stores, super

stores and combination stores. Perhaps a different type of retail outlet would be more consistent with the market structure that exists in the province. This might take the form of a chain of small 4,000 to 6,000 square foot mini-markets which bridge the gap between a standard supermarket operation and the many small retailers that presently exist. Such an outlet would carry a broader product line than many of the existing operators but not as extensive as a standard supermarket, remain open 60 to 70 hours a week, yet attempt to hold their prices at or near the level of the present corporate chains. This type and size of retail food store may find significant market opportunity not only in the larger communities indicated in Figures 1 and 2 as present or possible sites for supermarket-type operations but also in smaller communities which have a potential retail trading area of at least 4-5,000 people such as Clarenville, Lewisporte, Deer Lake, St. Albans, Springdale, and St. Anthony.

As economies of scale appear to be relatively insignificant at the establishment level a smaller, mini-market outlet should have an operating cost structure very similar to the larger chain stores, be significantly more productive than the "mom & pop" type operations it might replace, and be quite profitable at the same time.

FOOTNOTES

1 Statistics Canada, Catalogue 97-707 Vol. VII (7-7).

2 The most well known of the voluntary groups in Ontario include I.G.A., Red & White, Clover Farm, Lucky Dollar, Maple Leaf, and Foodtown stores.

3 This is not completely true as one wholesaler based in Nova Scotia has several stores on the island operating under the banner of a voluntary group but which are actually part of a corporate chain.

4 Canadian Grocer, Survey of Chains and Groups, August, 1978.

5 Ibid.

6 Mallen, B., "A Preliminary Paper on the Levels, Causes and Effects of Economic Concentration in the Canadian Retail Food Trade: A Study of Supermarket Market Power", Reference Paper No. 6, Food Prices Review Board, Feb. 1976, pp. 66.

7 Ibid. pp. 123.

8 Ibid. pp. 137.

9 Ibid. pp. 169.

10 Report of the Commission of Inquiry into Newfoundland Transportation, Volume 1, July, 1978, pp.101.

11 Ibid. pp.105.

12 Ibid. pp. 69.

13 Ibid. pp. 144.

14 "Food Prices in Newfoundland: Comparison with Mainland Regions", Food Prices Review Board, Nov., 1974, pp.22.

15 Ibid. pp. 26.

16 Canadian Grocer, "Survey of Groups and Chains", August, 1978.

17 Bloom, G.F., "Productivity in the Food Industry: Problems and Potential". The MIT Press, Cambridge, Mass., 1972, pp. 22.

18 Retail Council of Canada, "Analytical Base Study: The Canadian Distribution Industry". Volume II, Feb., 1978, pp. 89.

19 Cox, R., C.S. Goodman, and T.C. Fichandler "Distribution in a High Level Economy" Prentice-Hall, Englewood Cliffs, N.J., 1965.

20 Ibid.

21 This discussion has been reproduced from: Retail Council of Canada, op. cit., pp. 70.

22 Op. cit.

23 Nooteboom, B. "Cross-Section Studies of Efficiency in Retailing, Part I: Individual Grocers and Butchers." Report 7717/ES, Erasmus University, Rotterdam, 1977, p. 1.

24 Retail Council of Canada, op. cit., pp. 91.

25 "Canadian Manufacturing Industries Structure and Performance with Particular Reference to Productivity" Productivity Branch, Office of Economics, Department of Industry, Trade and Commerce, Ottawa, 1972, p. 17.

26 Bloom, op. cit., p. 60.

27 Kendrick, J.W. and D. Creamer, "Measuring Company Productivity: Handbook with Case Studies." The Conference Board, Studies in Business Economics, No. 89, 1965, p. 20.

28 Ibid. p. 73.

29 Ibid. p. 76.

30. National Commission of Food Marketing, "Organization and Competition in Food Retailing. Technical study No.7, June, 1966, pp. 139. For further discussion of these topics see the Econometric Appendix.

31. Savitt, R. "Economies of Scale in Canadian Supermarkets" Proceedings of the Canadian Association of Administrative Sciences, Edmonton, Alta., 1975. - also see Tilley, R.P.R. and R. Hicks, "Economies of Scale in Supermarkets "Journal of Industrial Economics, Nov., 1970, pp. 1-5.

32. National Commission on Food Marketing, op. cit., pp.143.

33. Ibid, pp.149.

34. Mallen, B. and M. Haberman, "Economies of Scale: A Determinant of 'Over Storing and Super Storing'?" Proceedings of the Canadian Association of Administrative Sciences, Edmonton, Alta., 1975.

35. Arndt, J. and L. Olsen, "A Research Note on Economics of Scale in Retailing," Swedish Journal of Economics, 77, No. 2, 1975, pp. 207-221.

36. "The Grocer's World of Rapid Change.", Canadian Grocer, July, 1976, pp.9.

37. "See 60% Terminals with Optical Scanning by 1980." Canadian

Grocer, July, 1976, pp.30.

38. "Electronic Checkout Test: $12,055 per month Savings." Canadian Grocer, June, 1976, pp. 16.

39. Bloom, op. cit., pp.219.

40. "Trottier Reports on Electronics" Canadian Grocer, Jan., 1977, pp.3.

41. Rigert D., "Canadian Retail Productivity Said 19% Higher Than in U.S.," Canadian Grocer, Dec., 1978, pp. 41.

42. "Sees 60% Terminal With Optical Scanning by 1980", op.cit., pp.30.

43. For more information on this subject see: "Safeway, Super Value units said well-received initially" Canadian Grocer, June, 1978, pp.16; "Trottier Reports on Electronics" op.cit., pp.3, "9 More Full Scanner Stores Seen for '78", Canadian Grocer, Dec., 1977, pp.26; "Traffic Said Building Well as Patrons Accept Scanner", Canadian Grocer, Dec., 1977, pp.28; and "Zehr's Introduces Scanning Operation at Waterloo Store", Canadian Grocer, Sept., 1978, pp.23.

44. "Now UPC Scanning Without a Computer", Canadian Grocer, Dec., 1978, pp.21.

45. "201 Scanners in Use in U.S. Supermarkets" Canadian Grocer, March, 1978, pp.25.

46. "Does Electronic POS Pay Off?" Chain Store Age Executive, Sept., 1977, pp.64.

47. Bucklin, L.P. and D. G. Norris, "The Diffusion of Innovation in Supermarkets," Proceeding of the American Marketing Association 1979 Educators' Conference, Minneapolis, Minn., 1979, pp. 382-385.

48. "45th Annual Report of the Grocery Industry," Progressive Grocer, April, 1978, pp.174.

49. "Annual CFRG/Canadian Grocery Figure Exchange (1977)," Canadian Grocer, Dec., 1978, pp.3.

50. "What Canadian Chains Are Doing with G.M." Canadian Grocer, March, 1979, pp.27.

51. "Generic Merchandising," The Business Journal, September, 1979, pp. 18.

52. See for example: "1980s Supermarket - Giant Food/Drug Combo," Canadian Grocer, July, 1978, pp. 3-4, "Safeway: Selling Nongrocery Items to Cure the Supermarket Blahs," Business Week, March 7, 1977, pp. 52-58, "A&P Puts Big Money On Its Family Marts," Business Week, January 23, 1978, pp. 50-51.

53. Lusch, R.F. and C.A. Ingene, "The Predictive Validity of Alternative Measures of Inputs and Outputs in Retail Production Functions," Proceeding of the American Marketing Association 1979 Educators' Conference, Minneapolis, Minn., 1979, pp. 330-333.

54. See: Takeuchi, H. and L.P. Bucklin, "Productivity in Retailing: Retail Structure and Public Policy," Journal of Retailing, Vol. 53, No. 1, Spring, 1977, pp. 35; and Bucklin, L.P., "A Synthetic Index of Marketing Productivity," American Marketing Association Combined Proceedings, E.M. Mazze (ed.), 1975, pp. 556-60.

55. Ibid, pp. 36.

56. "Retail Training Pays Off for Atlantic," Canadian Grocer, October, 1977, pp. 37.

APPENDIX A

Letter to Newfoundland Firms

from the Premier of the Province

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

THE PREMIER

ST. JOHN'S
A1C 5T7

August 17th, 1978

Dear

Following the 1977 release of the Economic Council's study of regional economic disparities, my Government successfully approached the Prime Minister of Canada to have him request that the Economic Council of Canada carry out an in depth economic study of the Province, including an enquiry into the difficulties sometimes encountered in making production efficiency in Newfoundland as high as elsewhere. The Economic Council have advised me that they must interview a large number of establishments in Newfoundland in order to get a close look at what factors may be causing the low value of output per worker that shows up in the aggregate statistics for many Newfoundland industries.

Since the Economic Council's findings on the links between low productivity and high unemployment provide something of a fresh approach that has not been central to many other federal and provincial economic development programs in past, we are optimistic about the usefulness of their findings. Quite apart from the results they will publish in their final reports, the Economic Council is also willing to provide each establishment

interviewed with a confidential analysis of its own data relative to the average industry experience it finds in Newfoundland and elsewhere in Canada.

Your establishment is one of those that will be contacted by the Economic Council in their study. I invite you to give them your full co-operation.

Sincerely yours,

Frank D. Moores
PREMIER

APPENDIX B

B1: Letter to Newfoundland Firms from the Chairman of the Economic Council

B2: Letter to Ontario Firms from the Chairman of the Economic Council

ECONOMIC COUNCIL OF CANADA • CONSEIL ÉCONOMIQUE DU CANADA

P.O. Box 527
C.P. 527
Ottawa, K1P 5V6

Chairman's Office
Bureau de la Présidente

Dear

In response to a request from the Government of Newfoundland and Labrador, the Prime Minister of Canada has asked the Economic Council of Canada to carry out a detailed study of the province. An important part of the study will focus on the difficulties sometimes encountered in making production efficiency in Newfoundland as high as elsewhere. To obtain this information it will be necessary to interview many establishments in Newfoundland, including your company. In the next few weeks the Co-ordinator of this study, Dr. Lawrence Copithorne, and his staff are planning to contact you to briefly discuss some of the data to be collected and to make arrangements for a longer interview at a later date. At this second interview a member of his research team will be collecting relevant background information and the data that is necessary to calculate typical financial ratios, such as the ratio of labour costs to total costs and the rate of return on assets. This information will be treated in strict confidence, with only aggregated industry statistics based on information taken from several firms being made public.

The two interviews would take about four hours of your time. I realize this is an inconvenience, but hope that you will nevertheless be able to help us. Moreover, you may find it beneficial to discover how your establishment's financial ratios compare with the average in your own industry, as other firms have in the past, who have participated in similar surveys. This confidential comparison of your own establishment with the rest of your industry will be given to you in person after the completion of our work.

Yours sincerely,

Sylvia Ostry

Sylvia Ostry
Chairman

ECONOMIC COUNCIL OF CANADA • CONSEIL ÉCONOMIQUE DU CANADA

P.O. Box 527
C.P. 527
Ottawa, K1P 5V6

Chairman's Office
Bureau de la Présidente

Dear

In response to a request from the Government of Newfoundland and Labrador, the Prime Minister of Canada has asked the Economic Council of Canada to carry out a detailed study of the province. An important part of the study will focus on the difficulties sometimes encountered in making production efficiency in Newfoundland as high as elsewhere. To obtain information on this problem, we are in consultation with business management in a select group of Canadian establishments from whom we are receiving advice on what the important productivity issues are, and on the major barriers to productivity improvement. We are also receiving, in strict confidence, some financial and background data from each participating establishment. In each industry, an analyst is preparing an industry report containing an economic analysis of the factors affecting productivity and a presentation of the regional averages of typical financial ratios such as labour costs to total costs and the rate of return on assets. He is also preparing a confidential report for each participating establishment showing its financial ratios compared to the regional averages. Information in the industry reports will be considered by the Economic Council when it draws up its recommendations on productivity and employment in compliance with the Prime Minister's request.

Your establishment is one of those that has been selected for consultation in this project. In the next few weeks, the co-ordinator for this study, Dr. Lawrence Copithorne, and his staff will be contacting you to discuss the project and

to make arrangements for a longer interview at a later date when the more detailed information can be collected. The two interviews may take a couple of hours of your time. I realize this is an inconvenience, but hope that you will nevertheless be able to help us. Moreover, you may find it beneficial to discover how your establishment's financial ratios compare with the average in your own industry, as other firms have in the past, who have participated in similar studies. This confidential comparison of your own establishment with the rest of your industry will be given to you in person after the completion of our work.

Yours sincerely,

Sylvia Ostry

Sylvia Ostry
Chairman

APPENDIX C

Econometric Analysis

by

Jonathan Wilby

Appendix C

Econometric Analysis

This appendix attempts to test some of the hypotheses raised in the report using the tools of econometrics. This is a useful exercise for while statistical methods can detect the presence, or absence, of statistically significant differences they do not, of themselves, show these differences to be linked to the productivity differences to be explained. Econometric methods on the other hand are able to detect whether a particular characteristic is an important determinant of productivity.

While the analysis is based on a sample of grocery stores in Newfoundland and Ontario and is designed to explain differences in performance (as measured by labour productivity) between these provinces, it may be of interest to a wider audience. Recent years have witnessed increasing interest in the determinants of productivity in retailing industries - of which this is one - as well as some controversy over the optimum size for grocery outlets. This appendix presents evidence on both these (related) issues and suggests results somewhat at variance with those of most previous studies on the question of optimum size.

Methodology

Sample

The sample is that used for the derivation of the statistical results and, as such, has been discussed previously. The full sample consists of 97 observations most of which contain data on all the characteristics under observation. This, therefore, provides a data base large enough to yield good results as well as small enough to be manageable.

Establishment and Industry Averages

From data such as this two different (arithmetic) means can be derived i.e. the establishment mean and the industry mean. The (unweighted) establishment mean is derived by totalling the value of a particular characteristic across the industry and then, dividing by the number of observations (mathematically $\frac{1}{n}\Sigma\frac{Yi}{Xi}$ where Y is value added and X is number of man hours). The industry mean on the other hand is derived by totalling the respective numerators and denominators and dividing the former by the latter i.e. $\frac{\Sigma Yi}{\Sigma Xi}$.

Of the two methods the latter is probably the more useful since the former implicitly attaches the same degree of importance to each establishment whether, that establishment produces 1 or 99 per cent of the industry's output.

Since the industry mean was considered preferable most of the calculations appearing in the body of the report are industry means. However, regression analysis uses the establishment as the unit of observation and will produce as a predicted value the establishment mean not the industry mean. In other words the analysis explains establishment and not industry performance.

The Weighting System

Standard statistical tests should only be applied - without modification - where the sampling method used is Simple Random Sampling. As was pointed out in the text the sampling method used for the present survey deviates from Simple Random Sampling in a number of respects. For example rather than sampling once from the total population of retail grocery outlets a number of sub-samples were drawn each from a different subsection of this population - this increases the efficiency of the total sample. Furthermore, in many of these sub-samples the larger observations were given a greater probability of selection; a procedure which further increases the efficiency of the total sample. The application of such methods, however, invalidates the use of conventional statistical tools. To allow the use of such tools a weighting system was designed whereby the weight is calculated as the inverse of the probability of selection for any given establishment. When appropriate use is made of the weighting system means, variances, etc., can be derived which are applicable to the total population rather just the sample.[1]

While the case for weighted statistics seems overwhelming, the case for weighted regressions is less powerful. The choice of the most apposite regression technique for data from complex sampling designs is an extremely involved matter and the following section does little more than touch on some of the pertinent issues.[2]

Such Monte Carlo experiments as have been carried out suggest that Ordinary Least Square estimates tend to biased for unequal probability designs. This bias can be quite severe (more than 10 per cent) although when the correlation between the independent variables and the design variables is high the bias will be lower.[3] Weighted regressions tended to perform better in terms of bias but were found to be inefficient in many cases. On the whole, though weighted regressions were preferred to their unweighted counterparts although both were deemed inferior to a Maximum Likelihood Estimation method which is unfortunately not available at the Council.

These experimental results establish a presumption in favour of weighted regressions, however, a number of other points should also be taken into consideration. Firstly, weighted regression techniques require a considerable degree of faith in the data, particularly when dummy variable techniques are used -- as was the case in the present regressions. Since the magnitude of a dummy variable is almost entirely, if not totally, independent of the size of an establishment (dummy variables are assigned either a value of 0 or 1) the large weights of small firms (in one case in excess of 600) are not counteracted by low data values. This has the implication that one small

establishment may determine the significance or insignificance of a particular variable. The only way to avoid this problem is to engage in the seemingly arbitrary procedure of excluding certain small firms from the regression sample.

Secondly, where the regression specification is close to the true specification weighted and unweighted regressions should yield similar results. In the present case, regression coefficients for the two methods were in many respects similar suggesting, perhaps, that the final regression specification is quite a good one.

Thirdly, few packages are available for calculating weighted regressions. The package used for the present calculations does provide the correct weighted variable coefficients but does not produce correct estimates of the t-statistics (estimates are too large). An alternative package which does compute weighted regressions is available at the Council but is less easy to use.

When these points are taken into account it appears that the case for using weighted regression in the event of unequal probability designs is not overwhelming. This conclusion, however, may not hold if one wishes to analyse the relative importance each independent variable has in accounting for movements in the dependent variable. In this case there is a general presumption in favour of weighted regressions for reasons to be discussed later.

For computational reasons, most of this paper concentrates on the results of unweighted regression. A short section at the end of the paper examines the results of weighted regression.

Regression Specification

The breadth of data coverage was sufficient to allow the examination of a vast array of hypotheses concerning the industry. To date regressions have been run using only one dependent variable leaving a considerable amount of useful work to be carried out on the data in the future.

Since the characteristic of most interest is that of productivity it was decided to use a measure of this quality as the dependent variable. This point is worth emphasizing since many of the previous studies used average cost as the dependent variable. It is possible that this explains why the results of the present study were different in some respects from this previous work.

The particular productivity measure chosen was value-added/man-hour. Value-added is the preferred measure, for reasons discussed in the text, while man-hours is perhaps the best measure of labour input which in turn is probably most pertinent to the theory on which the report is based.

Regressions using a wide variety of independent variables were run. The results of some of these runs are displayed in Table 1.

Table 1

Regressions Explaining Labour Productivity in the Grocery Store Industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)[1]	(9)
Constant	3.43 (4.85)**	3.38 (4.62)**	4.03 (6.40)**	3.05 (6.00)**	3.71 (4.38)**	5.52 (9.76)**	3.42 (4.15)**	2.80 (6.10)[2]	0.59 (1.06)
Floor 1	0.37 (4.81)**	0.37 (4.79)**		0.48 (2.26)**	0.36 (4.3)**		0.44 (5.56)**	0.20 (2.55)	0.18 (2.52)
Floor 1 sq.	-0.008 (-3.79)**	-0.008 (-3.78)*		-0.01 (-2.56)*	-0.008 (-3.48)**		-0.009 (-4.17)**	-0.005 (-1.85)	-0.004 (-1.91)
F1			2.42 (3.97)**	0.71 (0.72)					
F2			1.87 (3.28)**	-1.07 (-0.69)					
F3			3.40 (5.12)**	-0.21 (-0.11)					
F4			3.01 (4.05)**	-0.08 (-0.03)					
Sales sq. ft.	0.01 (6.63)**	0.01 (6.59)**	0.01 (7.46)**	0.01 (6.16)**	0.01 (5.59)**	0.01 (6.85)**		0.01 (8.77)	0.04 (8.57)
Sales sq. ft. squared									-0.0005 (-5.68)
Capacity Utilization per hour of Operation							27.88 (5.40)**		
Chain						1.33 (2.91)**			
Co-op	-1.87 (-2.8)**	-1.95 (-2.7)**	-1.94 (-2.89)**	-2.72 (-3.34)	-1.97 (-2.85)**	-1.77 (-2.48)*	-2.50 (-3.33)**		
Independents					-0.38 (-0.6)				
DTech I3	-1.49 (-2.56)**	-1.50 (-2.56)*	-1.38 (-2.33)*	-1.27 (-2.20)*	-1.52 (-2.59)*	-2.62 (-4.56)**	-1.41 (-2.28)*		
MH-SF	-0.23 (-3.27)**	-0.23 (-3.26)**	-0.26 (-3.48)**	-0.22 (-3.1)**	-0.22 (-2.92)	-0.35 (-5.11)**	-0.23 (-2.26)*	-0.24 (-4.72)	-0.30 (-6.66)
Nfld.		0.13 (0.3)							
F Value	40.65	34.64	31.57	27.23	34.64	38.46	33.87	48.84	59.10
R^2	0.735	0.736	0.746	0.76	0.736	0.68	0.70	0.68	0.77

R^2 value is unadjusted for degrees of freedom.

* significant at 95% level; ** significant at 99% level.

Variable definitions:

Floor 1 - Amount of production floor space in 000's ft.

Floor 1 sq. - The square of the above.

F1 - A dummy variable taking the value of 1 when Production Floor space is between 5,000 and 10,000 feet.

F2 - Dummy variable for Production Floor space 10,000 - 15,000 feet.

F3 - Dummy variable for Production Floor space 15,000 - 20,000 feet.

F4 - Dummy variable for Production Floor space more than 20,000 feet.

Sales sq. ft. - Sales per square foot.

Sales sq. ft. squared - The square of the above.

Chain - Dummy variable taking value of 1 where organization is a chain.

Co-op - Dummy variable for Co-ops in Newfoundland.

Ind. - Dummy variable for Independents.

DTechI3 - Dummy variable taken value of 1 or establishments where managers felt their technology was worse than average.

MH-SF - Man-hours to square feet.

Nfld. - Dummy taking value of 1 or establishments in Newfoundland.

1 (8) and (9) are weighted regressions.

2 T-statistics are not based on the correct weighted variance formula and will be overly-optimistic. For this reason, asterisks are not used. On the other hand, the F and the R^2 statistics are correct.

Of the equations shown the first is probably the best. The unadjusted R^2 value is quite high, the F value is the highest of any of the unweighted regression equations shown and all T statistics are significant (all except one are significant at the 99 per cent level). Furthermore, when a provincial dummy is added as in equation (2) it is clearly insignificant and adds nothing to the explanatory power of the equation. For these reasons equation (1) is the equation upon which most weight will be placed in the ensuing analysis.

It is tempting to view the size of a variable's regression coefficient as a measure of its importance. Such a temptation should be strongly resisted. The reason for this is that the coefficients depend on the unit of measurement used and are therefore not necessarily comparable (for example, by making the unit of measurement of an independent variable larger, the size of its coefficient will decline). A variety of methods for making these coefficients more meaningful are available. The one used here is shift share analysis. According to this method the effect of an independent variable on the dependent variable can be determined by multiplying the coefficient of the variable with its mean value. Table 2 presents the results of this method of analysis on Regression 1. The analysis is applied both at the aggregate level and at the provincial level (in the latter case the variable's coefficient is multiplied by the mean values for each respective province). Finally, the provincial effect for Newfoundland is subtracted from that of Ontario producing the last column. This column helps to explain the reasons for interprovincial productivity differences.

Table 2

Explanation of the Productivity Differential between Newfoundland and Ontario[1]

Dependent variable labour productivity[2]

Causal Factor	Regression Coefficients	Contribution of each factor to productivity			Ontario's Advantage
		Overall	Newfoundland	Ontario	
Constant	3.43**	3.43	3.43	3.43	0
Size (as measured by floor space)	0.37**	3.94	2.68	4.59	1.91
Size squared	-0.008**	-1.44	-0.73	-1.79	-1.06
Total Size	n.a.	2.50	1.95	2.80	0.85
Utilization (as measured by Sales/sq. ft.)	0.01**	3.22	3.11	3.28	0.17
Co-op	-1.87**	-0.16	-0.47	n.a.	0.47
Technology	-1.49**	-0.22	-0.42	-0.12	0.30
Labour - Capital Ratio (MH - SF)	-0.23**	-1.27	-1.42	-1.15	0.27
Predicted	n.a.	7.50	6.18	8.23	2.05*[3]
Actual (unweighted)			6.16	8.20	

(1) This table is based on equation 1 in the previous table and also the mean values (unweighted) of the explanatory variables.

(2) The productivity figure cited is $ per man-hour.

(3) The total arrived, from summing figures for Ontario's advantage differs marginally from that estimated by subtracting Newfoundland's predicted productivity from Ontario's predicted productivity. This is due to rounding error.

The most important conclusions to be drawn from this table seem to be the following. The amount of production space is the most important variable (this conclusion should be modified for reasons to be examined later) followed by the utilization variable. Other variables appear to be somewhat less important. As well as having the greatest aggregate effect size differences also contribute most to interprovincial differences the capacity utilization variable the effect of which is also surpassed by several other variables (this conclusion is not parelleled in the case of the weighted regression).

Analysis of Specification

a) Economies of Scale

Economic theory does not make unambiguous predictions regarding the relationship between size and efficiency. Nevertheless, it is commonly accepted that, at least up to some point, larger firms may be able to perform more efficiently than smaller firms. The reasons for this are numerous, however, they can be divided into two basic types. On the one hand there may exist 'real' economies of scale (an example of which is the greater degree of specialization permitted by increased size) which occur when an increase in size allows a greater physical output to be produced with an unchanged level of physical inputs. On the other hand there may exist 'pecuniary' economies of scale (such as volume rebates, promotional

allowances) arising from the improved market position afforded by increased size. The additional gains to be captured from further increases in size may, however, be lessened as output increases, and since certain diseconomies of scale may also be present (for example effective control may become harder to achieve), it is conceivable that at some point diseconomies of scale may be the dominant factor.

In the present industry the role of economies of scale, and by implication the rationale for large supermarkets, has often been questioned. Such a view is by no means without empirical support.[2] Savitt,[3] for example, ran regressions (for seven groups of large stores) which contained, among other variables, a size and size squared term. In only two of the groups was the size variable found to have the predicted sign and in neither case was it found to be significant at the 95 per cent level (the size squared term was insignificant for all groups). Furthermore, for both groups the estimated gains to be made from increased size were found to be extremely small.

The present regressions use a different dependent variable to those of Savitt, nevertheless it is still interesting to compare the results. As Table 1 shows, the size variable (Floor 10) was strongly significant. To get an accurate appreciation of the scale effect, however, it should be taken in conjunction with the squared term. Since the latter variable has a negative sign, the implication is that economies of scale proceed until a certain stage but subsequent to this diseconomies of scale arise (at the square term

dominates the linear term). This implies that there exists an optimum size for a grocery store which can be ascertained by differentiating the combined size terms (i.e. = 0.3720447 Floor 1 - 0.00844692 Floor 12) and setting the result to zero. This yields an optimum size of 22,023 square feet which is rather higher than Mallen and Haberman's estimate of 14,245 square feet. On the other hand the estimate is considerably lower than the size of the largest establishment in the present survey (over 36,000 square feet).

The impact of an increase in size is shown in Table 3. Since the relationship between size and labour productivity is non-linear, the gain (or loss) to be made from an increase in size is not constant; nevertheless, it can be readily appreciated that size is an important determinant of efficiency. Regressions were also run on a subset of the sample i.e. chain stores. The results are displayed in Table 4. This sample was chosen for two reasons: a) the size of stores in this group in probably comparable with those examined by Savitt; b) it allows a comparison with the Norwegian study (p. 38 of report) which found significant economies of scale in small food stores but not to any degree in supermarket type organizations. While the results were somewhat different to those presented in Table 1 it can be seen that the coefficients for both Floor 1 and Floor 1 sq. have not been markedly altered. Furthermore, the estimated optimum size of 21,985 sq. ft. is very similar to that for the full sample. Thus, the present results do not bear out the findings of the Norwegian study in suggesting that economies of scale are present

Table 3

The Relationship Between Productivity and Size in Dollars per Manhour - Derived from the Unweighted Results

Size in Sq. Ft. Production Floor Space	Productivity Level Compared to Hypothetical Establishment of 0 square ft.	Productivity Level Compared to Previous Size Category
0	$0	
5,000	+ $1.65	+ $1.65
10,000	+ $2.88	+ $1.23
15,000	+ $3.68	+ $0.80
20,000	+ $4.06	+ $0.38
25,000	+ $4.02	- $0.04
30,000	+ $3.55	- $0.47
35,000	+ $2.67	- $0.88
40,000	+ $1.36	- $1.31

Table 4

Regression Explaining Labour Productivity for Chain Stores in the Grocery Industry

Constant	3.87 (2.32)*
Floor 1	0.42 (2.90)**
Floor 1 sq.	-0.009 (-2.75)**
Sales sq. ft.	0.018 (6.6)**
MH SF	-1.07 (-4.65)**

Variables are as defined in Table 1.

mainly in small food stores; rather they suggest that such economies are present in much larger stores as well.

One problem with regression analysis is that the specification can only be an approximation to the true relationship - the present estimates, for example, are most relevant near the mean values. While this problem is to some extent inevitable, a variety of alternative methods were tried. Regression (3) in Table 1 shows one of these alternatives where the size measure was split into various size classes. The coefficients represent the performance of these size classes as compared to the smallest class (0 - 5000 sq. ft.).[4] Although this measure does not allow the derivation of an optimum size it does show an optimum size category of 15,000 - 20,000 sq. ft. with the largest size category performing nearly as well.

These results are not incompatible with those derived using the Floor 1 and Floor 1sq. categories. Indeed when the two are run in conjunction, as in regression (4), the Floor 1 and Floor 1sq. terms dominate suggesting that the new variables add little to the equation.

Another method used was to sort the sample according to size and then divide it into two groups of similar size (as measured by Floor 1). The results obtained for the group of larger stores were broadly similar to those obtained from Regression (1) (although one variable was insignificant) the estimated optimum size being 22545 sq. ft.[5] For the smaller group a much smaller optimum size was

obtained this being 7599 sq. ft. However in this case the squared term was marginally insignificant.

Returning now to the original specification it can be seen that interprovincial differences in the size of grocery stores provide the most important explanation for interprovincial productivity differences. When the two scale effects are considered together they explain 89 cents of the inter-provincial productivity difference or almost half of the total difference. The implication to be drawn is that if it is desired to make productivity levels between the provinces more comparable policies designed to increase the average size of stores in Newfoundland would seem to be in order. Some policies which could be useful in this regard will be discussed later.

Capacity Utilization

The sales per square foot term serves as a measure of capacity utilization. Previous studies have shown capacity utilization to be an important determinant of efficiency and in this respect the present study was no exception. Indeed when both of the size effects are taken into account the capacity utilization effect becomes the most important variable at both an aggregate level and in the provinces individually. It might be expected that as the rate of utilization becomes very high productivity would begin to decline.[6] For this reason a capacity utilization squared term was inserted in the regression. This was not found to be significant.

Given the importance of capacity utilization it would be useful to come to an understanding of its determinants. The present data bank might help in this respect. One factor commonly mentioned is advertising for it is through this medium that customers may be attracted to a particular store. On the other hand, successful advertising by one store may spur others to increase their advertising expenditures, leading to at least some offset.

Before concluding discussion of this variable one further point should be made. Although the regression shows utilization to be the most important determinant of productivity it also shows it to play only a marginal role in explaining interprovincial productivity differences - indeed Ontario is estimated to gain only 17 cents (see Table 2) from its more favourable utilization rate.

Business Organization

It was suggested in the text that the organizational dimension may be quite important in explaining productivity differences. More specifically it was argued that chain stores, whether in Ontario or Newfoundland, appear to be highly productive while independents appear rather less productive, particularly in Newfoundland.

Regression analysis, however, showed this dimension to be of only minor significance when other variables were taken into account.

The role of the chain variable, for example, while seemingly very important, became insignificant when incorporated into an equation with the size variables. The reason for this finding may simply be that the higher productivity of chains is a product of their larger size and not due to any innate quality these stores possess. On the other hand, it does seem possible that these stores have advantages in other respects (through the use of sophisticated management control systems, for example) and that their insignificance in regression analysis is merely a consequence of multicollinearity. Certainly when the chain variable is run omitting the size variables (regression (6)), it is highly significant, although because of the high correlation with size variables, too much weight should not be attached to this result.[7]

The high collinearity between the chain dummy and the size variables therefore makes it difficult to establish the exact nature of their relationship with productivity. However, even supposing that chain stores do not of themselves lead to higher productivity, the method of organization is still important because the chains tend to be the larger stores.

Since the types of stores categorized as Co-ops differed between the provinces a separate dummy variable was used for each province. Of these only the dummy variable for Newfoundland was found to be significant and this with a negative sign. When interpreting this result considerable caution is in order for the implication is not that Newfoundland Co-ops are less productive on average than other

stores but rather that when other factors (such as store size and utilizaton rate) have been taken into account Newfoundland Co-ops have a lower than predicted level of labour productivity. One reason for this finding may be that these stores are less concerned with profit-maximization than chains and independents and place more emphasis on other goals. Some evidence pertinent to this point will be discussed later.

It is perhaps worthwhile making a few brief remarks about the desirability of further co-op development in Newfoundland. Firstly, although these stores do not perform as well as predicted (when other factors are taken into account), they appear to perform substantially better than the independents in Newfoundland and so should perhaps be encouraged to expand for this reason. Secondly, these co-ops are of a rather different kind than those in Ontario (as has been discussed in the report) and the co-op variable for that province was not found to be significant in the regression analysis. Co-ops of the Ontario type (voluntary groups) then should perhaps, therefore, be encouraged to enter Newfoundland.[8] Finally, since new chain organizations do not appear to be entering Newfoundland as had once been hoped, further extension of the co-ops, where practicable, may be a desirable way of increasing labour productivity in that province.

The dummy variable representing the independent stores was not found to be significant indicating that the lower productivity of

these establishments is explained by the other factors in the regression.

Technology

Questions were asked in the survey concerning specific technological innovations. In only one case, however, was sufficient information supplied for enough firms to allow testing in regression analysis. In this case the innovation, the electronic cash register, was not found to have a significant effect on productivity.

Questions were also asked concerning managers perceptions of the technologies being used in their stores. A dummy variable was created taking a value of one where managers considered their technology to be inferior to that of the industry as a whole. This dummy variable (Dtechi3)[9] was found to be significant at the 95 per cent level indicating that managers were aware of the state of their establishment's technology compared with that of the other establishments. Clearly a qualitative variable of this kind is less precise than would be ideal for which reason the results in Table 2 should be treated with caution. On the other hand the fact that the variable was significant at all suggests that technology does help to explain interprovincial productivity differences.

Labour Intensity

The last variable (MH SF)[10] is designed to capture the effects of movements along the isoquant. Labour productivity measures are often criticized for only examining the productivity of one input. By inserting this variable it can be determined to what extent lower productivity is a result of higher labour (lower capital) intensity (capital being defined in terms of square feet). The shift share analysis suggests that the effect is of some importance although it only explains a small proportion of the total interprovincial productivity difference. Thus one cannot explain lower labour productivity in Newfoundland in terms of the use of more labour-intensive methods as justified by different relative prices.[11]

It was suggested earlier that Newfoundland Co-operatives may place more emphasis on goals other than profit maximization than do other stores. One such goal might be the employment of more labour, evidence of which would be a reduced negative coefficient on the Co-op dummy when the labour-capital variable is introduced. This in fact was found to occur although apparently it only provides part of the explanation for the Newfoundland Co-ops lower than predicted labour productivity.

Other Variables

Brief mention should be made of variables not found to be significant in the regression analysis. Education variables for both

labour and management, measuring such things as the number of years of formal schooling, were found to be insignificant. This is, perhaps, not surprising in an industry such as this where the skills required (at least those of the workers) can often be acquired in a short period of time. Variables concerning accounting practices were also found to be insignificant. This is somewhat more surprising although one might suspect that any particular technique would only have a small, and perhaps undetectable effect, on productivity. Variables concerning spatial characteristics (such as distances from suppliers, markets) were not defined sufficiently precisely and/or were not present in enough cases to be used in the analysis although, as mentioned in the report, they do appear to be important.[12] Finally, variables measuring turnover rates, the effects of unemployment insurance compensation and the presence of Unions were also found to be insignificant.

Conclusions from the Unweighted Results

The results presented here suggest somewhat surprisingly, in light of previous literature, that economies of scale are quite pronounced in the industry. As such they suggest that the increasing prevalence of large supermarkets is, in certain respects at least, a good thing. On the other hand the significance of the square term also suggests that economies of scale can be reaped only over certain ranges of output and that beyond a certain point diseconomies of scale predominate. Furthermore, the optimum store size, although rather larger than estimated in an earlier study, is well below the size of

the largest stores in the sample (but above that of the largest establishment in Newfoundland). Put simply, big is beautiful, with respect to labour productivity but bigger is not always better.[13]

As in other studies the role of capacity utilization was found to be important and, indeed, was discovered to be the most important variable. Furthermore, the estimated relationship was a linear one suggesting that, at least for the range of utilization levels found in the present sample, the utilization rate is never too high. On the other hand the variable explained little of the inter-provincial difference.

When "corrected" for size and utilization effects structural variables were, with but one exception, found to be insignificant, although since a particular type of organization may be associated with larger size stores the conclusions to be drawn are somewhat more ambiguous than might appear at first. Certainly the presence of more chain organizations in Newfoundland would appear to be desirable, if higher labour productivity is the dominant objective, although it appears unlikely, at the moment, that new chain organizations are prepared to step into the Newfoundland arena.

The preceding statements are perhaps a little facile in terms of the policies they suggest. Small stores are presumably small for a good reason and their size may be optimal in isolated areas.[14] On the other hand an overly fatalistic attitude may also be inappropriate. It seems to be the case, for example, that people

are prepared to travel long distances (particularly for work) when the incentives are there. One idea which might be feasible, therefore, is to encourage the institution of large, or medium sized, stores in 'service centres' which, while small in themselves (perhaps 3,500), can be easily reached by 15,000 or more people.[15] Other ideas are presented in the body of this report (pp. 70-71).

Finally, a few words concerning the limitations of these results are in order. While the preferred regression explains a considerable part of the predicted productivity level there still remains a substantial unexplained residual (the constant term). This suggests that there is a variable (variables) missing from the equation and also apparently from the data bank itself. It should also be noted that the sales/sq. ft. is only partially determined by the establishment itself. For this reason it would be interesting to go somewhat further than possible in this appendix by examining the determinants of this capacity utilization variable.

Weighted Regressions

The most satisfactory weighted regression is (9) in Table 1. Regression (8) which uses the same specification, except for the omission of the capacity utilization squared variable, is also presented since it is this regression which appears in the Consensus Document. Weighted regressions were only run over a relatively limited number of variables, for which reason there may exist a preferred alternative specification, although the author thinks it

unlikely that any specification will be more than marginally superior to (9).

An initial difference between the weighted and unweighted regressions is the lower level of predicted productivity (see Tables 2, 7 and 8). This is hardly surprising since, generally speaking, it is the small establishments with high weights which have the lowest levels of labour productivity. The constant terms of the weighted regressions are also lower, particularly for Regression (9) where the capacity utilization squared variable was introduced.

The impact of the size and size squared terms is markedly attenuated for the weighted regressions - and indeed the squared term becomes insignificant. The implication here is perhaps that economies of scale are a more important phenomenon amongst larger establishments - a conclusion which is in accordance with results on page 10. Nevertheless, economies of scale still are important as demonstrated by Table 5. If the squared term is included an establishment of 20,000 feet is estimated to have nearly a $2.00 advantage over a very small establishment. While less than half of the estimated advantage suggested by Regression (1) the figure involved is not a negligible one. It is also interesting to note that the estimated optimum size of a grocery store - based on equation (9) of 20,893 square feet (that from equation (8) is 21,768 square feet) is quite similar to that based on Regression (1).

Table 5

The Relationship Between Productivity and Size in Dollars per Man-hour - Derived from the Weighted Results

Size in Sq. Ft. Production Floor Space	Productivity Level Compared to Hypothetical Establishment of 0 Square Feet	Productivity Level Compared to Previous Size Category
0	$0	
5,000	$0.77	$0.77
10,000	$1.33	$0.56
15,000	$1.69	$0.36
20,000	$1.83	$0.14
25,000	$1.76	-$0.07
30,000	$1.48	-$0.28
35,000	$1.00	-$0.48
40,000	$0.30	-$0.70

Table 6

The Relationship Between Productivity and Capacity Utilization - Derived from the Weighted Results

Capacity Utilization in Sales/Sq.Ft.	Productivity Level Compared to Hypothetical Establishment with 0 Capacity Utilization	Productivity Level Compared to Previous Utilization Category
0	$0	
100	$3.53	$3.53
200	$6.10	$2.57
300	$7.71	$1.61
400	$8.37	$0.76
500	$8.06	-$0.31
600	$6.80	-$1.26
700	$4.57	-$2.23

The results for the utilization measure provide further comparisons and contrasts with the unweighted regressions. The estimate of the linear utilization term in Regression (8) is very close to that of the unweighted regressions. The t-statistic is somewhat higher although too much emphasis should not be placed on this for reasons stressed elsewhere. Addition of the squared utilization variable improves the overall equation quite noticeably as Regression (9) attests. Not only are both utilization variables strongly significant (a result which would almost certainly hold if the correct variance formula were used) but the F value and the R^2 values also improve. Furthermore, the constant term declines markedly in size indicating that the additional variable explains much of the previously unexplained portion of labour productivity.

The squared utilization term suggests that at very high levels of utilization labour productivity will start to decline if utilization is further increased. As an indication of the importance of capacity utilization it is interesting to look at Table 6. This table suggests that a utilization rate of about $400 per square feet will lead to a productivity gain of about $8.00 over the lowest conceivable utilization rates.[18] In fact the regression suggests the optimum utilization rate is around $418 per square feet which is actually very much lower than the level attained by some stores (the highest figure is over $770 per square feet.)

The Co-op variable becomes insignificant when weights are applied while the technology variable becomes (counter-intuitively)

positive. These results may provide an indication of the difficulties of using dummy variable techniques in combination with weighted regressions. (This problem was discussed in the earlier section entitled 'The Weighting System'.) Finally, the labour-capital ratio coefficient remains relatively unchanged in both regressions though its value increases slightly in Regression (9).

It is when the shift share analysis is applied that differences between unweighted and weighted results become most apparent (see Tables 2, 7 and 8). The effect of the scale variables is drastically attenuated falling several fold from the levels attained in the unweighted regression. Part of the explanation has already been presented this being that the coefficients of the scale variable decline (thus the curve representing the relationship between size and labour productivity has a more gentle slope when weights are used). An even more important reason remains to be discussed. The shift share results are the product of the regression coefficients and the appropriate mean - it is because the weighted means are so different from their unweighted counterparts that the shift share results in Tables 7 and 8 differ so markedly from those in Table 2. To take just one example the unweighted mean floor size in Newfoundland is over 7,000 square feet. The weighted floor size is under 2,000 square feet.

While there may be some dispute as to whether weighted or unweighted regressions are preferred there can be little doubt that weighted means provide a better estimate of the population mean than

Table 7

Explanation of the Productivity Differential between Newfoundland and Ontario for the Weighted Regression[1]
Dependent Variable Labour Productivity

Causal Factor	Regression Coefficients	Contribution of each factor to productivity			Ontario's Advantage
		Overall	Newfoundland	Ontario	
Constant	2.80	2.80	2.80	2.80	0
Size (as measured by floor space)	0.20	0.81	0.36	0.90	0.54
Size squared	-0.005	-0.21	-0.04	-0.25	-0.21
Total Size	n.a.	0.60	0.32	0.65	0.33
Utilization (as measured by Sales/sq. ft.)	0.01	3.68	2.38	3.95	1.57
Labour - Capital Ratio (MH - SF)	-0.24	-1.63	-1.55	-1.65	-0.10
Predicted	n.a.	5.45	3.95	5.75	1.80
Actual			3.18[2]	5.91	2.73

1 This table is based on equation 8 in Table 1 and also the mean values (weighted) of the explanatory variables.

2 To remove the difference between predicted and actual values which is rather large in the case of Newfoundland a provincial dummy could be added. Since this dummy is insignificant it was not used here.

Table 8

Explanation of the Productivity Differential between Newfoundland and Ontario for the Weighted Regression[1]

Dependent Variable Labour Productivity

Causal Factor	Regression Coefficients	Contribution of each factor to productivity			Ontario's Advantage
		Overall	Newfoundland	Ontario	
Constant	0.58	0.58	0.58	0.58	0
Size (as measured by floor space)	0.17	0.70	0.31	0.77	0.46
Size Squared	-0.004	-0.19	-0.04	-0.22	-0.18
Total Size		0.48	0.27	0.55	0.28
Utilization (as measured by Sales/ sq.ft.)	0.04	9.96	6.42	10.68	3.26
Utilization Squared	-0.00005	3.55	-1.97	-3.88	-1.91
Total Utilization		6.41	4.45	6.80	1.35
Labour-Capital Ratio	-0.30	-2.05	-1.94	-2.07	-0.13
Predicted		5.45	3.36[2]	5.86	1.50
Actual (weighted)			3.18	5.91	2.73

1 This table is based on equation 9 of Table 1.

2 The difference between predicted and actual labour productivity could be removed by introducing a provincial dummy. Since the dummy is insignificant it was not used.

unweighted means. Weighted means are representative of the population from which the sample is drawn; unweighted means are not. Unweighted means are only relevant to the sample itself for which reason the results presented in the unweighted section are probably of greater relevance to larger grocery stores (since it is these which are over-represented) than to grocery stores in general.

Table 8 shows capacity utilization to be both the most important determinant of productivity and the most important determinant of the inter-provincial productivity gap. When weights are introduced, differences in capacity utilization between the provinces becomes quite pronounced. This is because the small stores in Newfoundland, which are so dominant in terms of sales, and which generally have a low level of capacity utilization, bring down the estimated average level of capacity utilization quite substantially (much more so than those in Ontario) when weights are used.

Weighted regressions then suggest capacity utilization to be the key factor in explaining productivity. This finding is in line with earlier studies, although, in contrast with many of these, the weighted regressions suggest economies of scale to be both significant and pervasive. Results differ between weighted and unweighted regressions; policy prescriptions may not. The most promising course of action, according to the unweighted regressions, is to increase the market share of larger sized grocery stores and reduce that of the small independents. The finding that capacity utilization is also a major determinant of inter-provincial productivity disparities does

not negate such a conclusion, the more so as it is the small independent stores in Newfoundland which have the lowest level of capacity utilization (Table 13 in the body of the report shows the other independents in Newfoundland to have an industry average Sales/Square Foot figure of $141.76 compared to $396.61 for the Co-operatives and $395.15 or the corporate chains). An increase in the market share of larger sized stores would, according to the evidence presented here, also lead to an increase in capacity utilization.

Footnotes

1. For a detailed discussion of various aspects of the weighting problem see D. Royce "Newfoundland-Ontario Productivity Study", Economic Council mimeo, February 1980.

2. For further information on this topic see D. Royce, op. cit., R. Cournoyer (1980) "Regression Analysis and Weighted Samples," internal Economic Council of Canada report, K. Brewer and R. Mellor, "The Effect of Sample Structure on Analytical Surveys," Australian Journal of Statitics 15(3) 1973 and D. Holt and T. Smith, "Regression Analysis of Data from Complex Surveys," Royal Statistical Society Conference, Oxford, 2-6 April 1979.

3. The design variable for the present survey was intended to be the number of employees according to the lists of a Private Credit Rating Firm. However, since these lists excluded many of the major chains they were supplemented by other sampling frames. Thus, while the original design variable was quite highly correlated with the explanatory variables the final design is much less highly correlated.

4. See for example R. Savitt, "Economics of Scale in Canadian Supermarkets", CAAS 1975 Conference, Marketing Division, The University of Alberta; and B. Malen, "A Preliminary Paper on the Levels, Causes and Effects of Economic Concentration in the Canadian Retail Food Trade: A Study of Supermarket Market Power", Reference Paper No. 6, Food Prices Review Board, Feb. 1976, pp. 66.

5. R. Savitt, opus cit. Savitt's sample included only the larger stores and is thus somewhat different to that of the present survey. The actual group surveyed was those Canadian stores that: 1) had yearly sales in 1973 of more than $500,000; 2) had total square foot (selling and storage) of between 7,500 and 10,000; and 3) had three or more check-out counters. The authors divided his sample (333 observations) into seven artificial but comparable categories and ran the same regression specification on each category.

6. Five size classes, each containing an approximately equal number of observations, were used. To avoid the well-known dummy variable trap only 4 dummies were created; these were for the four largest size classes.

7. These results confirm those derived from the sample of chain stores in suggesting that economies of scale are a pervasive phenomenon for a large range of store sizes.

8. The idea being similar to that behind the U-shaped average cost curve. This variable was found to be significant by Savitt, opus cit.

9. A variety of methods exist purporting to cope with the problem of multicollinearity. The author considers that these methods should be used with caution since they are often based on statistical considerations rather than those of economic theory.

10. There appear to be a variety of reasons why Co-op organizations of this kind have not entered Newfoundland. These are discussed in the report.

11. The sign of the coefficient on this variable was negative as predicted.

12. A higher value of MH-SF indicates the use of more labour intensive methods. Since the increased use of one factor, the other remaining constant, is presumed to lead eventually to decreasing returns one would expect the sign on the coefficient to be negative.

13. All the above assumed firms are using the optimal degree of labour intensity as dictated by relative factor prices. It is possible, however, that Newfoundland establishments may be more labour intensive than relative factor prices suggest. To this extent it would be in their interest (presuming profit maximization to be their goal) to shift towards capital intensive methods.

14. See the paper by H. Takeuchi and L.P. Bucklin entitled "Productivity in Retailing: Retail Structure and Public Policy", Journal of Retailing, Vol. 53, No. 1, Spring 1977.

15. The survey did not include any hypermarkets (50,000 - 60,000 sq. ft.). Since these stores may well be more efficient than those examined here, their inclusion may modify the present results.

16. Indeed, as many respondents to Savitt's questionnaire indicated, stores size is often greater than desired since operators may be obliged to take whatever space is available. It was also found that operators use a wide variety of criteria in choosing store size and that efficiency was usually only a minor factor in their decision.

17. This idea is developed more fully in a paper by P. M. Reid entitled "From Bays to Peninsulas: Settlement and Transportation Patterns in Newfoundland". Economic Council of Canada, memiograph, July 1980.

18. Since the utilization rate and its square are highly correlated too much emphasis should not be placed on these results (this high degree of correlation may account for the fact that the squared variable was insignificant for the unweighted regressions). On the otherr hand, while the actual magnitudes may be in doubt there is every reason to believe both variables are important determinants of labour productivity.

APPENDIX D

Background and Financial Questionnaires

Used in the Study

INDEPENDENT GROCERY RETAIL STORES

A. Establishment and Firm Identification

1. Name of Establishment _____

   Date of Commencement _____

2. Name of Firm _____

3. Type of Organization:

   1. Single Proprietorship _____
   2. Partnership _____
   3. Private Company _____
   4. Public Company _____

4. Describe the chain of ownership and history of ownership:

   _____

   _____

   _____

   _____

5. Who are your major competitors and how do they transport their product to your market?

MAJOR COMPETITORS	HOW MANY MILES MUST THEY TRANSPORT THE PRODUCT	WHAT MODE DO THEY TRANSPORT THEIR PRODUCT
A. _____	_____	_____
B. _____	_____	_____
C. _____	_____	_____

6. Where is the market for this establishment?

   1. Neighbourhood ___%
   2. Town/City ___%
   3. District ___%
   4. Province ___%

B. Distribution Questions

1. Do you use warehouse facilities? _____

   Are they: 1. owned? ____

   2. rented/leased? ____

2. Are your warehouse(s)

   1. National

   2. Regional ___

   3. In each major city

C. Pricing Questions

1. How do you set your price?

   1. Cost + standard markup

   2. Suggested list price

   3. Price follower ___

   4. Price setter

   5. Price is regulated

D. Questions on Promotion

1. What is advertising costs as a percentage of total promotion costs? ____%

2. What % of advertising costs do you spend on:

   Television ___% Magazine ___% Circulars ___%

   Radio ___% Catalogues ___%

   Newspaper ___% Direct Mail ___%

E. Purchasing

1.

MAJOR INPUTS	TYPICAL DELIVERY TIME (WEEKS)	HOW MANY POSSIBLE SUPPLIERS	TYPICAL DISTANCE FROM SUPPLIERS	MODE*	ARE VOLUME DISCOUNTS AVAILABLE
MEAT					
FRESH PRODUCE					
GROCERIES					

* 1. Road; 2. Rail; 3. Ship; 4. Air

2. Is delivery reliable? Yes ___ No ___

3. Who makes the decision to purchase new products?
   1. Head office
   2. Local manager ____
   3. Yourself

4. Who makes reorder decisions?
   1. Head office
   2. Local manager ____
   3. Yourself

F. Store Operating and Technology

1. _____

_____

No. of weeks that store is open _____

Average No. of Hr./Wk. that store operates _____

Average No. of Employees _____ Full-time _____ Part-time _____

3. In relation to your major competitors do you think your technology is:
   1. superior
   2. the same _____
   3. inferior
   4. don't know

4. In relation to the industry do you think your technology is:
   1. superior
   2. the same _____
   3. inferior
   4. don't know

5. What were the most recent changes in your operations?

   _____

   _____

   _____

6. When did you make this change? (year) _____
   When was it first available? (year) _____

G. Personnel

1. What is your labour turnover rate? F.T. ____% P.T. ____%
2. Are there unions present in this establishment? _____
   If yes, name of union _____
   group(s) covered _____
3. How many days have you lost due to labour disputes?
   1977 _____ 1976 _____ 1975 _____
4. Do you set your wage rates through:
   1. Collective bargaining
   2. Follow the industry
   3. Individual negotiation _____
   4. Classification systems
   5. Other; specify _____

   _____

5. Do you have any trouble in hiring personnel? _____
   If yes, is it because; 1. Lack of qualified people
   2. Remoteness of location
   3. Willingness to work _____
   4. Can't compete with current wage rates

6. Do you recruit through the:
   1. Media
   2. Schools
   3. Present employees
   4. Inventory of applications _____
   5. Industry associations
   6. Manpower
   7. Promotion of part time employees
7. Method of paying employees:
   1. annual wage
   2. weekly wage
   3. hourly wage _____ What rate? _____
   4. piece work
   5. straight commission
   6. salary + commission
   7. other
8. Method of paying management personnel:
   1. annual salary
   2. weekly wage
   3. hourly wage _____ What rate? _____
   4. piece work
   5. straight commission
   6. salary + commission
   7. other
9. Does unemployment insurance affect your ability to hire and keep personnel?
   1. Not at all
   2. Partially _____
   3. Quite a bit
10. Do you have a formal training program for
    1. Employees _____
    2. Management _____

H. Finance

1. What is your debt/equity ratio? _____

2. What is your firm's major source of working capital?
   1. Family
   2. Bank
   3. Sales _____
   4. Parent company
   5. Government grant
3. Do you receive any form of:
   1. Subsidies ____
   2. Loan guarantees ____
   3. Equipment grants ____
   4. Other, specify _____

I. Accounting

1. How do you handle your accounting?
   1. An in-house accountant at headquarters
   2. A bookkeeper at the store
   3. An external accountant on contract or fee basis _____
   4. By yourself
2. Are your financial statements:
   1. Yearly
   2. Quarterly _____
   3. Monthly
3. Do you have:
   1. An inventory control system ____
   2. Cash budgets ____
   3. Sales forecasts ____
   4. Flexible budget techniques ____
   5. Long range planning ____
   6. Discounted cash flows ____
   7. Electronic cash registers ____
   8. With computer hook up ____
   9. Purchase boxed beef ____
   10. In store bakery ____

J. Technology

1. Do you find out about new technology primarily from:

   1. In-house operations
   2. Trade journals
   3. Suppliers
   4. Industry associations _____
   5. Competitors
   6. Parent company
   7. Government agencies

K. Objectives and Problems

1. Rank objectives:

   1. control _____
   2. Family employment _____
   3. Increase market share _____
   4. Geographical expansion _____
   5. Maintain stable income _____
   6. Maximize profits _____

2. What are your major problems?

   1. _____
      _____
   2. _____
      _____
   3. _____
      _____

L. Education and Experience

1.

	EMPLOYEES	ESTABLISHMENT MANAGEMENT	HEADQUARTERS MANAGEMENT
Average years of schooling			
Average years of technical training			
Average years of university			
Per cent with university degrees	- -		
Average years experience of employees on their present job; your firm + other firms and related experience			

2. (a) Does any co-operative effort occur between yourself and other firms? _____

(b) If yes, do you:

- make joint purchases _____
- share information _____
- joint selling _____
- common facilities or services as in transportation or wholesaling _____

General

1. Floor space:

- selling space square feet _____
- total space square feet _____

2. Transaction Data:
   - total number of selling transactions _____
   - total returns _____
3. What are your terms of purchase? _____
   What are your terms of credit sale? _____
4. Are age of receivables a problem? _____
5. Estimate of market share _____
6. What are the firm's strengths and weaknesses?

_____

_____

_____

_____

_____

_____

7. Number of checkout lanes _____

Fiscal Year Ending _____

PROFIT AND LOSS STATEMENT

Net Sales	_____	
Cost of Goods Sold	_____	
Gross Profit		_____
Operating Expenses		
Management Salaries	_____	
Management Benefits	_____	
Other Salaries	_____	
Other Benefits	_____	
Total Salaries & Benefits		_____
Leased Equipment Expense	_____	
Delivery	_____	
Advertising & Promotion	_____	
Store Rental	_____	
Depreciation	_____	
Interest	_____	
Other Expenses	_____	
Total Operating Expenses		_____
Net Operating Profit (Loss)		_____

Balance Sheet as of _____

ASSETS

CURRENT

Cash & Certificates of Deposit	_____
Accounts Receivable	_____
Inventory	_____
Other	_____
Total Current Assets	_____

FIXED

Total Assets	_____

LIABILITIES

CURRENT

Accounts Payable	_____
Current Portion of Long-term Debt	_____
Other	_____
Total Current Liabilities	_____

LONG-TERM

Mortgage Payable	_____
Bank Loans	_____
Notes Payable	_____
Less: Principle due in one year	(_____)
Total Long-Term Liabilities	_____
Total Liabilities	_____

SHAREHOLDERS EQUITY

Capital Stock	_____
Retained Earnings	_____
Total Shareholders Equity	_____
TOTAL LIABILITIES & SHAREHOLDERS EQUITY	_____

DEPRECIATION SCHEDULE FOR THE YEAR ENDED _____

Asset	Cost	Accumulated Depreciation	Depreciation Rate	Depreciation Expense
Land				
Pavement				
Buildings				
Furniture				
Equipment				
Vehicles				
Other				