Research Notes/Notes de recherche

Buyer Concentration: The Inshore Groundfish Processing Industry in Nova Scotia*

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Assessments of the influence of industrial structure on behaviour and performance usually emphasize the structural implications of seller concentration (see, for example, Bain 1951; Clarke and Davies 1982; Geroski 1981; Pickford 1983; Porter 1979). It is less usual to look at buyer concentration (for exceptions, see Monopolkommission 1977 and Bradfield 1988), yet in some industries the market power of buyers is a critical factor in the pricing behaviour of the industry.

This is argued to be the case for the Nova Scotia port market—that is, the market established between fishermen and processors. The Nova Scotia groundfish processing industry has been described as a bifurcated industry with "inshore" plants, on the one hand, and "offshore" plants, on the other (Shaffer and Associates 1981; Steinberg 1984; Task Force on Atlantic Fisheries 1982). In these studies the inshore processing sector is characterized as competitive, with a relatively large number of buyers and sellers and ease of entry. The offshore processing sector, in contrast, is characterized as having high buyer concentration and high barriers to entry. These studies conclude that higher concentration in the offshore sector results in lower prices being paid to fishermen for fish in both sectors (Steinberg 1984: 26).

This view of the industry is misleading. Price determination in the offshore sector is influenced more by vertical integration than buyer concentration. In general, offshore plants own their vessels. Trawler crews are paid on the basis of a "lay arrangement", by which each crew member is paid a portion (for example, 1 per cent) of the value of the total catch. The lay arrangement is set by annual negotiations between the trawler union and the processing company. Thus, rather than negotiating a "price" for the fish, incomes are negotiated. Based on previous and expected catches, a "price" per pound of fish is then set which will roughly yield the negotiated income.[1] Offshore "prices" are therefore artificial devices to allow calculation of crew incomes and cannot be considered in the same way as inshore prices.[2]

But what about the inshore sector?[3] Is there oligopsonistic market power? What determines buyer concentration in the inshore sector? What are the implications of differences in buyer concentration for prices?

To answer these questions, we look in this paper at buyer concentration in the inshore sector of 25 Nova Scotia ports and assess both its determinants and its importance in ex-vessel price determination. More specifically, the first section provides a brief overview of the Nova Scotia inshore groundfish processing industry in 1984 and calculates measures of buyer concentration in the 25 ports, while the second section analyzes the determinants of buyer concentration. The third section looks at the extent to which buyer concentration affects ex-vessel prices, and the conclusions reached follow.

Market Structure and Buyer Concentration in Nova Scotia Ports

Fish processing comprises over 10 per cent of all manufacturing in Nova Scotia and represents 35 per cent of Nova Scotia's total exports (Statistics Canada, Bull. No. 65-202). Within the province, 16 per cent of the population lives in small fishing communities, where fish

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[1] Current lay arrangements include not only different prices for different species of fish but also different prices for different quality grades.

[2] When one company tried to increase the "price" of fish in the lay arrangement while at the same time lowering the percentage share to keep total income constant, the proposal was refused by the union.

[3] For the purposes of this paper the inshore sector of the groundfish processing industry is defined to be all plants purchasing groundfish from inshore boats (by definition, boats less than 100 feet length overall, but, in practice, mostly boats under 65 feet), whether the plants also purchase from offshore boats or not. Thus, some plants supplied primarily by offshore trawlers also participate in the "inshore" market.

harvesting and processing provide 25 per cent or more of the employment opportunities (Task Force on Atlantic Fisheries 1982: 70).

Nova Scotia fish processors are generally price-takers in the fresh whole and frozen block markets but have some market power in the fillet (both fresh and frozen) and salt fish markets (Mazany et al. 1987). The market power of Atlantic Canada processors in the product market has increased over the past three years as the decline in U.S. domestic landings has increased the demand for foreign supplies.

In 1984 there were 101 groundfish processing plants in Nova Scotia. Of these, 97 purchased at least part of their groundfish supplies from inshore boats. Approximately 2,400 inshore boats landed groundfish in Nova Scotia ports in 1984 (Department of Fisheries and Oceans 1987). Thus, in the aggregate, the port market tends to be characterized by few buyers relative to the number of sellers.

For administrative purposes, Nova Scotia is divided into two statistical/regulatory regions by the federal Department of Fisheries and Oceans: Scotia-Fundy and Gulf. According to the data available on the groundfish purchases in 25 ports in the Scotia-Fundy region for 1984, these ports accounted for 70 per cent of the Scotia-Fundy inshore groundfish landings and 67 per cent of total Nova Scotia inshore groundfish landings. These ports represented the top ports for inshore groundfish landings. The data on total purchases of groundfish by company and port were available on a monthly basis and were divided into inshore purchases and offshore purchases. From these data it was possible to calculate inshore buyer concentration measures for each port.

Of the several concentration indices available, no one index has clear superiority over another.[4] Two measures, a concentration ratio (CR) and the Hirschman-Herfindahl index (HHI), are used in this paper (see Table 1 for both the concentration ratios and HHI for the 25 ports taken in aggregate and Table 2 for the CR and HHI measures for the individual ports).[5] For the Scotia-Fundy region as a whole, buyer concentration is not high. The top buyer overall in the 25 ports accounted for less than 12 per cent of total purchases, the top four

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[4] For a survey of such measures, see Curry and George (1983) and Wiriyawit and Veendorp (1983).

[5] The concentration ratio used here measures the cumulative market share of the largest buyers (usually the top four and eight buyers). The HHI uses the sum of the squared values of the firms' market shares. Unlike in the concentration ratio where each firm is weighted equally, in the HHI each firm is weighted by its share. Thus, larger firms receive more weight in this index. More formally, if s_j is the market share of the jth firm, the concentration ratio is measured by $CR = \sum_{j=1}^{k} s_j$, where k is the number of largest buyers, and the Hirschman-Herfindahl index is given by $HHI = \sum_{j=1}^{n} (s_j)^2$, where n is the number of firms.

Table 1
CONCENTRATION MEASURES, ALL PORTS

		Measure
CR:	Top buyer	0.1152
	Top 2 buyers	0.2112
	Top 3 buyers	0.2693
	Top 4 buyers	0.3218
	Top 8 buyers	0.4872
	Top 20 buyers	0.7695
HHI		0.0449

Note: Total number of buyers = 86.

buyers for only 32 per cent, and the top eight for slightly less than 50 per cent. The HHI also indicates a low level of concentration.

On a port-by-port basis, the situation is quite different. Half of the ports had four or fewer buyers. In these ports, with two exceptions, the top buyer accounted for over 85 percent of the total purchases. In all but one of these cases the top buyer accounted for over 95 per cent of the groundfish purchases.

In ports with more than four buyers, the top two buyers accounted for approximately 50 per cent or more of the purchases. In these ports the top four buyers accounted for over 98 per cent of total purchases for six ports and over 70 per cent for the remaining six ports. In the six ports with more than eight buyers, the top eight buyers accounted for over 95 per cent of total groundfish purchases, except for one port, where they accounted for almost 90 per cent of the purchases. The HHI shows a similar pattern of concentration. Thus, on the basis of port concentration measures, it appears that there is a high degree of concentration even when there is a relatively large number of buyers.[6]

Port-by-port concentration measures may be misleading if the relevant "port market" comprises more than one port—that is, if fishermen sell to buyers in several ports. Although in theory fishermen can sell to numerous buyers, the existence of various ties, both economic and social, formal and informal, means that in practice most fishermen are bound to only one buyer (Barrett and Apostle, 1989; Wilson 1980). In this sample over 90 per cent of fishermen sold to only one buyer, with 99 per cent selling to only two buyers. Of those selling to two or more buyers, over 80 per cent sold to buyers in the same port.

[6]This is partly because the total number of buyers reported for the whole year in each port is somewhat misleading for ports with a large number of buyers. On a month-to-month basis the actual number of buyers is much smaller. There tends to be three or four main buyers, who buy for most of the year. The rest are occasional buyers, buying only during a few months of the year. On a monthly basis the number of buyers ranged from one to nine.

Table 2
CONCENTRATION MEASURES BY PORT

| Port | Concentration Ratio (CR) | | | | | HHI | Total No. of Buyers |
	Top Buyer	Top 2 Buyers	Top 3 Buyers	Top 4 Buyers	Top 8 Buyers		
1	0.251	0.475	0.601	0.722	0.952	0.169	17
2	0.395	0.550	0.693	0.823	0.878	0.235	16
3	0.422	0.606	0.718	0.829	0.994	0.266	12
4	0.270	0.505	0.643	0.759	0.971	0.181	12
5	0.349	0.506	0.632	0.710	0.952	0.195	11
6	0.334	0.513	0.661	0.801	0.996	0.217	10
7	0.332	0.570	0.777	0.981	1.000	0.270	8
8	0.373	0.684	0.983	0.995	n.a.	0.356	7
9	0.811	0.994	0.998	0.999	n.a.	0.800	6
10	0.684	0.789	0.989	0.999	n.a.	0.640	5
11	0.585	0.933	0.995	0.996	n.a.	0.533	5
12	0.770	0.959	0.997	0.998	n.a.	0.738	5
13	0.854	0.955	1.000	1.000	n.a.	0.905	4
14	0.453	0.934	1.000	n.a.	n.a.	0.495	3
15	0.960	0.997	1.000	n.a.	n.a.	0.922	3
16	0.964	0.991	1.000	n.a.	n.a.	0.930	3
17	0.997	0.999	n.a.	n.a.	n.a.	0.994	3
18	0.979	1.000	n.a.	n.a.	n.a.	0.959	2
19	0.998	1.000	n.a.	n.a.	n.a.	0.996	2
20	0.659	1.000	n.a.	n.a.	n.a.	0.551	2
21	0.985	1.000	n.a.	n.a.	n.a.	0.970	2
22	0.988	1.000	n.a.	n.a.	n.a.	0.976	2
23	1.000	n.a.	n.a.	n.a.	n.a.	1.000	1
24	1.000	n.a.	n.a.	n.a.	n.a.	1.000	1
25	1.000	n.a.	n.a.	n.a.	n.a.	1.000	1

Thus, it is appropriate to view the individual port as the relevant market.

Determinants of Buyer Concentration

What are the main determinants of buyer concentration in Nova Scotia ports? The literature suggests economies of scale, barriers to entry, and size of market (Curry and George 1983: 219-220). Which of these are relevant to the groundfish processing industry? Economies of scale do not appear to be a significant factor in either fresh fish or salt fish processing, which is what most inshore processors do.[7] Barriers to entry in the inshore sector are relatively low. Capital costs, a significant barrier to entry in a number of industries, are not an important barrier for either fresh fish or salt fish processing; the plant and equipment needs for both products are relatively simple and inexpensive. Thus,

[7]Field interviews. There do, however, appear to be economies of scale in frozen fish processing.

low capital costs, *ceteris paribus*, make entry relatively easy and work to decrease concentration.

Size of market is a major determinant of concentration. The optimal number of firms is defined as the size of the market divided by optimal firm size: *ceteris paribus*, the larger the market, the lower the level of concentration (Pashigian 1969). In the case of groundfish processing the size of the wholesale/retail market is more important than the size of the port market in determining concentration. For example, Port 24 in Table 2 has the twelfth highest landings of the 25 ports yet only one buyer, while Port 6 has the sixth lowest landings, with one of the lower CRs and HHIs in the sample. In general, ports closest to the U.S. market and large local markets, such as Ports 1-8 and Port 14, tend to have lower concentrations than ports farther away from these markets.

Limited supplies of fish, stemming from quotas, limit the number of processing plants in a port.[8] Moreover, there is excess capacity in the groundfish processing industry (Department of Fisheries and Oceans 1983). While in the long run this capacity might be expected to adjust to the amount of fish available, in the short run there is a high degree of competition for fish. Furthermore, because of employment considerations both the federal and provincial governments have been reluctant to let plants close, thereby preventing adjustment (Task Force on Atlantic Fisheries 1982). Thus to secure fish supplies, existing processors have developed many informal and formal ties with fishermen, making it more costly for new entrants to bid fishermen away.[9] Although processors are forbidden to own fishing vessels (excluding those owned before 1979), a processor will often provide a fisherman with financing and other services with the implicit understanding that the latter will supply his fish exclusively to that processor. The fisherman remains the nominal and legal owner of the boat, but the processor is the *de facto* owner.

The regulation prohibiting processors from owning fishing vessels does not prevent fishermen from owning processing plants. This asymmetry in the regulation, coupled with low capital costs for setting up a fresh fish processing plant and the dramatic rise in wholesale prices in the United States since 1985, has resulted in a number of fishermen, either on their own or in co-operation with other fishermen, setting up their own processing plants to supply the U.S. fresh fish market.

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[8] This ignores, of course, overfishing (and misreporting). There are also some imports of whole fish from the United States for salting, but this amounts to less than 1 per cent of total Nova Scotia groundfish landings (Department of Fisheries and Oceans 1987).
[9] For a good description of the kinds of ties that exist, see Willet (1986) and Barrett and Apostle (1989).

Thus, on the one hand, difficulties in securing a regular supply of fish, resulting in a tendency toward vertical integration, work to increase concentration. On the other hand, expansion of the product (wholesale) market, with a resultant rise in prices, together with the low capital costs of starting up a fresh fish processing plant and the asymmetry of the regulation of vertical integration in the inshore sector, work to decrease concentration. The implication is that, on a cross-section basis, one would expect to find lower buyer concentration in ports closer to the U.S. market—that is, in ports where it is easy to supply the fresh fish market in the United States.[10] Of the 11 ports in the sample located in Southwest Nova Scotia, seven have top buyer concentration ratios of less than 35 per cent. Only three have top buyer concentration ratios greater than 80 per cent and an HHI of 0.8 or more, while one port has a top buyer concentration ratio of slightly less than 60 per cent. In contrast, the other ports in the sample, by definition farther away from the U.S. market, have quite high levels of concentration, with the exception of two ports with top buyer concentration ratios of less than 50 per cent. These two ports are located near Halifax, the largest city in Nova Scotia, and thus are also near a relatively large market for fresh fish.

Price Effects of Buyer Concentration

What are the implications for pricing? Economic theory states that, *ceteris paribus*, an oligopsonist will pay less than the perfectly competitive factor payment to a factor of production. Although econometric models of the demand for groundfish have been developed at the retail level (see, for example, Crutchfield 1985; Tsao et al. 1982), there has been little modeling at the ex-vessel (port market) level.[11] In this sample we do not have enough information to estimate a complete model of supply and demand for fish at the ex-vessel level, which would tell us precisely whether oligopsonistic power was being exerted. But a simple correlation analysis indicates a small negative correlation between the degree of concentration and the price paid, suggesting that ports with less concentration do have higher prices. Although significant, the relationship is weak (correlation of -0.1419) and may be spurious. Also, high degrees of concentration in and of themselves need not imply oligopsonistic behaviour.

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[10] These ports are located in what is known as Southwest Nova Scotia, in the counties of Queens, Shelburne, Yarmouth, and Digby.
[11] But see Georgianna and Hogan (1986), who estimate a simple time-series model regressing monthly U.S. ex-vessel prices on the wholesale price. Note that all these studies use time-series data, whereas the regression reported here is based on cross-section data.

Such factors as number of buyers (rather than concentration of buyers), nearness to the U.S. market, and other structural characteristics also play a role in influencing price.[12] To test for any correlation between ex-vessel prices and various structural characteristics, as well for any relationship between wholesale prices and ex-vessel prices, the following regression was run:

$$P = a_1 + a_2PW + a_3BUYERS + a_4SW \qquad (1)$$

$$P = b_1 + b_2PW + b_3HHI + b_4SW \qquad (2)$$

where P is the average weekly ex-vessel price for groundfish in a given port measured in cents per pound; PW is the Boston Blue Sheet wholesale price, also measured in cents per pound; HHI is the Hirschman-Herfindahl index for a given port; BUYERS is the number of buyers in a port; and SW is a dummy variable equal to 1 if the port is located in Southwest Nova Scotia and thus close to the U.S. market.

Using weekly data from 1984 for the 25 ports, two regressions were run because including HHI and BUYERS together in a single regression caused multicollinearity problems.[13] There was serious autocorrelation, as might be expected in a market where ex-vessel prices remain relatively stable over several months. After correcting for first-order autocorrelation, the results were:

$$P = \begin{array}{cccc} 45.265 & + .0208PW & + .500BUYERS & + 3.458SW \\ (33.528) & (1.813) & (1.967) & (2.373) \end{array} \qquad (1)$$

$$P = \begin{array}{cccc} 47.397 & + .0174PW & + 1.208HHI & + 4.029SW \\ (27.741) & (1.531) & (-0.783) & (2.658) \end{array} \qquad (2)$$

where the numbers in parentheses are t-statistics. The R^2s are 0.6311 and 0.6297, respectively. The coefficient for the wholesale price is significantly different from zero at the 10 per cent level (one-tail test) and of the expected sign in both equations. It has only a small correlation with the ex-vessel price, suggesting that ex-vessel prices are not greatly influenced in the short run by swings in the wholesale prices. This is consistent with pricing in the ports, where ex-vessel prices are set for a season. The number of buyers has a larger correlation with the ex-vessel price. The coefficient for the concentration of buyers, in contrast, is not significantly different from zero. This suggests that the threat of competition, even from relatively small buyers, may be more important than the concentration of buyers *per se* in determining price. The fact that the port is located in

Southwest Nova Scotia has the largest impact on price: the ex-vessel price in a port in Southwest Nova Scotia will be almost four cents higher than in other ports. This result is borne out by looking at the average prices in each port. If anything, the regression result understates the difference.

These results are meant to be only indicative; they are not intended to be a test of an oligopsonistic model of the port market. Such a test would require information on costs, as well as information on what price each individual processor paid rather than an average port price. But they do suggest that buyer concentration alone is not a sufficient explanation of port market pricing behaviour.

What then does determine ex-vessel prices? It is first necessary to distinguish between price determination in the short run—and thus determinants of inter-port price differences at a given point in time— and price determination in the long run. In the long run, prices reflect the wholesale, and thus retail, markets. Over a period of years ex-vessel prices follow the trend in wholesale prices. In the short run, however—that is, on a daily, weekly, or even monthly basis—there is no significant correlation between wholesale prices and ex-vessel prices. This is supported by the regression results, where the correlation of the U.S. wholesale price with the ex-vessel price is negligible.

Ex-vessel prices are set for the "season", which is roughly April through September, depending on the port. This year's ex-vessel prices are essentially determined by last year's ex-vessel prices, plus any adjustment to reflect long-run changes in the wholesale market. Prices from one buyer to another are remarkably similar. While this could result from facing the same costs and the same markets (see Scherer 1980), there is also no doubt that the processors discuss prices among themselves. Competition for the scarce supplies of fish tends to be non-price in character, but under-the-table payments are not unknown—for example, various services such as bait, ice, or dockage may be provided free or at low cost. Thus, although recorded port prices may appear unchanging, the actual "price" paid for the fish may vary.[14]

While ports close to one another have similar if not identical prices, prices do vary from port to port over large distances. Prices in Southwest Nova Scotia are generally higher than prices in the rest of the province for a number of reasons. First, as discussed above, proximity to the U.S. market gives fishermen both easier access to knowledge about what is going on in the wholesale market and the alternative of shipping fresh fish directly to the U.S. market rather than using a processor as intermediary. The availability of this

[12]Field interviews; also see Gardner Pinfold Consulting Ltd. (1986).

[13]Regressions using the top buyer concentration ratio had results similar to those using the HHI.

[14]Unfortunately, no reliable information on the magnitudes is available.

alternative increases the fishermen's opportunity costs, implying that processors must pay more if they wish to prevent fishermen from choosing this alternative. The result is not only higher recorded ex-vessel prices, but, as just mentioned, implicit payments through the provision of services and attempts to integrate vertically through creating ties of obligation. Second, fish caught off Southwest Nova Scotia are of better quality (larger, firmer, and freer of parasites) than those caught elsewhere in the province. To the extent that higher-value products can be made from these fish, some of this higher value is passed on to the fishermen.

In ports close to (relatively) large urban centres, buyer concentration tends to be lower and the number of buyers higher than in other ports. The lower concentration and potential competition from even marginal buyers, together with the potential for fishermen to sell directly to the urban wholesalers and retailers, imply less market power on the part of processors and higher prices in these ports. Thus, price differences among ports can be explained by differences in the existence (lack) of potential competition for fish supplies, the existence (lack) of alternative markets for the fishermen, quality differences, and the value of the product being produced.

Summary and Conclusions

An analysis of buyer concentration in 25 ports in the Scotia-Fundy administrative region of Nova Scotia, representing 67 per cent of the total inshore groundfish landings in the province, reveals significant concentration at the local level, particularly in those ports outside Southwest Nova Scotia. High levels of concentration arise primarily from difficulties in obtaining adequate fish supplies and from distance to large urban markets.

Buyer concentration is not as significant in influencing price differences among ports as is the threat of potential competition (reflected by the number of buyers) and the existence of an alternative market such as the United States and Halifax. Other factors, such as quality of the fish and the ability to supply fish year-round, also appear to explain inter-port price differences.

Influences from the wholesale and retail markets appear to have little or no impact on prices in the short run, although in the long run trends in ex-vessel prices follow those of wholesale prices. This stems from the fact that ex-vessel prices in Nova Scotia are set for the season, with the processors, not the fishermen, absorbing the short-run changes in wholesale prices.

Lack of data prevents a more rigorous testing of a theory of oligopsonistic power in port markets. The results in this paper suggest, however, that while the inshore groundfish processing industry in Nova Scotia is characterized by an oligopsonistic structure, this does not translate into market power, particularly in ports where potential competition exists.

References

Bain, J. S. 1951. "Relation of Profit Rate to Industry Concentration", Quarterly Journal of Economics, 65(3):293-324.

Barrett, L. G., and R. A. Apostle. 1989. "Formal and Informal Economic Ties Between Fishing Boat Captains and Fish Buyers in Nova Scotia", Journal of Sociology, 14(1):1-23.

Bradfield, M. 1988. Regional Economics: Analysis and Policy in Canada. Toronto: McGraw-Hill Ryerson.

Clarke, R., and S. W. Davies. 1982. "Market Structure and Price Cost Margins", Economica, 49(195):377-387.

Crutchfield, S. R. V. 1985. "Impact of Groundfish Imports on the U.S. Fishing Industry", Canadian Journal of Agricultural Economics, 33(12):195-207.

Curry, B., and K. D. George. 1983. "Industrial Concentration: A Survey", Journal of Industrial Economics, 31(3):203-256.

Department of Fisheries and Oceans. 1983. Atlantic Shore Processing Capacity Study. Ottawa: Minister of Supply and Services.

Department of Fisheries and Oceans. 1987. Canadian Fisheries Annual Statistical Review, 1984, Vol. 17. Ottawa: Minister of Supply and Services.

Gardner Pinfold Consulting Ltd. 1986. "An Analysis of Price Formation in Port Markets in Atlantic Canada". Report prepared for the Department of Fisheries and Oceans, October.

Georgianna, D. L., and W. V. Hogan. 1986. "Production Costs in Atlantic Fresh Fish Processing", Journal of Marine Resource Economics, 2(3):275-292.

Geroski, P. 1981. "Specification and Testing of the Profits-Concentration Relationship: Some Experiments for the U.K.", Economica, 49(191):279-288.

Mazany, R. L., L. G. Barrett, and R. A. Apostle. 1987. "Market Segmentation: Nova Scotia Fish Processing and the U.S. Market", Marine Policy, 11(1):29-44.

Monopolkommission (ed.). 1977. Missbraeuche der Nachfragemact and Moeglichkeiten zu ihrer Kontrolle im Rahmen des Gesetzes gegen Wettbewerbsbeschraenkungen. Baden-Baden, West Germany: Nomos Verlag.

Pashigian, P. 1969. "The Effect of Market Size on Concentration", International Economic Review, 10(3):291-314.

Pickford, M. 1983. "The Determinants of Seller Concentration in New Zealand Manufacturing Industry", Australian Economic Papers, 22(41):374-383.

Porter, M. 1979. "The Structure Within Industries and Companies' Performance", Review of Economics and Statistics, 61(2):214-227.

Scherer, F. M. 1980. Industrial Market Structure and Economic Performance. Chicago: Rand McNally.

Shaffer, M., and Associates. 1981. "Structure, Behaviour and Performance of
    the Atlantic Groundfish Industry". Report prepared for the Department of
    Fisheries and Oceans.
Statistics Canada. *Exports: Merchandise Trade*. Bull. No. 65-202, monthly.
Steinberg, C. 1984. *Structure and Price Determination in Maritimes Port Markets: A
    Study of Fishermen/Buyer Relations*. Canadian Industry Report of Fisheries
    and Aquatic Sciences, No. 149. Ottawa: Department of Fisheries and
    Oceans.
Task Force on Atlantic Fisheries. 1982. *Navigating Troubled Waters: A New
    Policy for the Atlantic Fisheries*. Ottawa: Supply and Services.
Tsao, E., W. E. Schrank, and N. Roy. 1982. "U.S. Demand for Selected
    Groundfish Products, 1967-80", *American Journal of Agricultural Economics*,
    64(3):483-489.
Willett, L. T. 1986. "Gangen Harbour: A Study of Relations Between Fishing
    Captains and Fish Buyers", Land and Sea Project, Field Study No. 2,
    Gorsebrook Research Institute for Atlantic Canada Studies, Saint Mary's
    University, Halifax.
Wilson, J. 1980. "Adaptation to Uncertainty and Small Numbers Exchange:
    The New England Fresh Fish Market", *Bell Journal of Economics*, 11(2):491-
    504.
Wiriyawit, C., and E. C. H. Veendorp. 1983. "Concentration Measures as
    Indicators of Market Performance", *Quarterly Review of Economics and
    Business*, 23(3):44-53.