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Trade Restrictions and Trade Reversal: Lessons from the U.S.-Canada Herring Dispute

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Abstract *This paper analyzes international trade in value added products when free trade and perfect competition in the market for an intermediate product, such as raw fish, are the exception rather than the rule. Current evidence from the General Agreement on Tariffs and Trade (GATT) regarding disputes between countries, such as the U.S.-Canada dispute over trade in raw herring, suggests that bilateral trade in raw fish among major exporters of seafood products may not be completely free of structural and political barriers.*

The study presents models showing that restrictions on the exportation of raw fish from an exporting country can make possible monopsony behavior by fish processors in a rival exporting country and they outline the market behavior of the players under such circumstances. The analysis illustrates how, under such conditions, economic forces contribute to the creation of trade disputes. It further demonstrates how expansion of the demand for final product may, through trade reversal pressures, dilute the market power of the processor monopsony and make trade restriction policies irrelevant.

Keywords roe herring, trade reversal, trade restrictions, monopsony, trade dispute, GATT, market imperfection, free trade, fishery management, comparative advantage reversal.

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Introduction

In much of the fishery economics literature, it is assumed that seafoods are produced under condition of perfect competition in both the raw fish and fish processing sectors and that free trade prevails in international markets. This paper analyzes international trade in value added products when free trade and perfect competition in the market for an intermediate product, such as raw fish, are the exception rather than the rule. The limited number of fish processors in many coastal regions of seafood exporting countries provides a base for the exercise of monopsony power by those processors vis-a-vis their raw fish suppliers. Recent evidence from disputes between the U.S. and Canada in the matters of trade in unprocessed Pacific herring, Atlantic groundfish, and some Pacific salmon species suggests that bilateral free trade in raw fish between major exporters of seafood products may not be a reasonable analytical assumption (*e.g.*, see Office of the U.S. Trade Representative, 1986). Reasons for this include both government restrictions and market structure constraints. Understanding the mechanism of trade in unprocessed fishery products between these two countries may yield insights into bilateral trade issues elsewhere.

The study specifically draws on features of the particular U.S.-Canada dispute between Southeast Alaskan and Northern British Columbian processors, over trade in unprocessed roe herring. The objective is to develop analytical models showing the behavior of two rival seafood exporting countries competing in the same import market when monopsony exists in the processing sector of one of these countries, made possible, at least in part, by export restrictions in the other. The analysis illustrates how, under certain conditions, economic forces contribute to the creation of trade disputes. It further demonstrates how expansion of the demand for the final product may, through trade reversal pressures, dilute the market power of processor monopsony and make trade restriction policies irrelevant. There are lessons here for other markets as demand growth leads to trade liberalization.

The remainder of this paper is organized as follows: the first section provides an overview of the dispute between Canada and the U.S. In the second section we abstract from the specific details of this dispute and present an analytical model of U.S.-Canada seafood trade in general, in which Canada exports raw fish to U.S. processors and both countries export the final product to a third country. The third section shows the results of an export embargo on raw fish from Canada to the U.S. processors in the presence of oligopsonistic behavior by the U.S. fish processors with respect to their raw fish suppliers. It compares the economic impacts of both market conditions (the export embargo and oligopsony behavior) with the free trade situation of the second section. The fourth section illustrates how expansion of the demand for final product, through trade reversal pressures, dilutes the market power of the processor monopsony in the U.S. and makes restrictive trade policies (the export embargo) by Canada irrelevant. The fifth section compares the U.S.-Canada free trade equilibriums after demand expansion with the results obtained in the previous section. The sixth section presents conclusions and draws policy implications.

An Overview of the United States-Canada Pacific Roe Herring Trade Dispute

Japan is the principal country in the world in which there is a strong consumer demand for kazunoko, considered a food delicacy and made from herring roe.[1] Historically, the major source of supply of roe-bearing herring has been the waters off northern Japan. While landings from this area have declined since 1926 (the earliest date for which records are available) a significant and abrupt drop in production occurred in 1977, from which there has been no recovery (Atkinson and Katsuyama, 1981). This occurred at the same time that many nations, including the U.S., Canada and the Union of Soviet Socialist Republics (USSR), extended jurisdiction over their respective fisheries zones. The exclusion from (or significant restriction within) U.S. and USSR waters of Japan's distant-water fleets added to the decline in Japanese landings in the late 1970s.

The continued domestic demand for kazunoko in Japan and the sharp decline in domestic supply provided new export opportunities for both Canada and the U.S. (ibid.). The response to this new opportunity elicited rather different economic and political strategies in the two countries, however. Within an economic environment characterized by increasing cross-border tension, these divergent trade strategies produced conditions which ultimately brought the U.S. and Canada into direct conflict.

Starting in the mid-1970s, Canada prohibited the export of unprocessed Pacific herring (*Culpa havengus pallasi*), pink salmon (*Oncorhynchus gorbuscha*), and sockeye salmon (*O. nerka*) (Canada Fisheries Act, 1970).[2] In 1984–85, Canadian buyers for the first time began to purchase Pacific roe herring directly from U.S. fishermen in the Kah Shakes herring-roe fishery (and subsequently the Sitka Sound fishery) of Southeast Alaska. Prior to the entry of Canadian buyers, U.S. processors had enjoyed a market with many of the characteristics associated with a classic oligopsony: that is, a small number of buyers and many sellers. In this

[1] Herring roe (kazunoko) is a traditional food used, primarily, as a part of the New Year's celebration in Japan. Kazunoko is said to symbolize long life and prosperity, and obtains a very high price in the Japanese market. Pacific herring is the preferred source of kazunoko by the Japanese. As a result, virtually all the U.S. and Canadian harvest of Pacific roe-bearing herring and herring roe ultimately finds its way onto Japanese markets. Herring roe from Pacific sources tends to enter the market for "high end" uses. However, this is only one of several product forms in Japan, each having its own set of importers who may import to produce one or more of the product forms. Thus it is not inappropriate to think of the Japanese import market as being competitive in nature.

[2] No equivalent regulations governed the export from Canada of such economically important species as chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), or chum salmon (*O. keta*). Despite the availability of, among others, these latter three species of Canadian-caught salmon, there appears to have been virtually no effort by U.S. processors, operating in Southeast Alaska (immediately adjacent to the British Columbia fisheries) to import Canadian-caught fish for processing; this despite the fact that, in some years, chinook (and on occasion coho) were in relatively short supply in Southeast Alaska fisheries. On the other hand, historical records indicate that, in some years, when pink salmon were in particularly great supply in Southeast Alaska, raw pink salmon were shipped to British Columbia plants for processing, thus relieving the glut in the U.S. fisheries. Furthermore, the U.S. did not have equivalent reciprocal restrictions on the movement of unprocessed U.S. catches to Canadian processors.

case many herring fishermen, competing to harvest a highly perishable product within an extremely short period, confronted a very small number of potential buyers for their catch. Price and landings data for the years immediately preceding the entry of Canadian buyers into these fisheries suggest that U.S. processors consistently paid less per metric ton to U.S. fishermen than Canadian processors paid Canadian fishermen. And when Canadian buyers entered the Southeast Alaska herring fishery, ex-vessel prices were quickly bid up by between 50% and 100% over opening offerings by U.S. processors (Brown and Blaxall, 1986; Nelbro Packing Company, 1986). Based upon ex vessel price information provided by the U.S. industry, and according to the petitioner's complaint filed with the U.S. Trade Representative (USTR),

> "Because Canadian processors recognized that they need to pay higher prices to U.S. fishermen in order to overcome the fisherman's loyalty to their existing U.S. buyers, Canadian buyers offered substantially higher prices for herring than U.S. processors in southeastern Alaska in 1985, particularly in Kah Shakes, nearest the Canadian processors. Some price pressure was experienced in Sitka as well, and additional Canadian quota reductions in 1986 are expected to stimulate a significant geographic expansion of Canadian roe herring buying activity.
>
> At Kah Shakes in 1985, for example, opening prices in the range of $800 per ton (based on 10% roe content) jumped to $1200 to $1250 per ton within two hours because of Canadian-based processors' bidding" (Office of the United States Trade Representative, 1986).

The petitioners reportedly had information which suggested that Canadian processors had, in the 1985 fishing season, already begun to solicit U.S. fishermen for the 1986 season with promises of even higher base price offers, for Southeast Alaska roe herring. (*ibid.*)

While other factors may have contributed to the absolute increase in prices paid for roe herring during this period, many of which will be treated in subsequent sections of this analysis, the relevant issue in the U.S./Canada trade dispute over access to Southeast Alaska fisheries dealt with "relative" price changes. These were attributed to the entry of Canadian buyers on the U.S. fishing grounds, as cited above.[3]

Under these conditions, Southeast Alaska processors understandably perceived a threat to the economic status quo. In a coordinated effort to counter the effects of Canada's entry into their market, Southeast Alaska herring processors struck back with a series of political actions aimed at what they considered to be unfair trade practices.[4] They expressed significant concern to the Alaska Gover-

[3] This trend has continued through the 1993 season, although to varying degrees depending on the quality of the catch and Japanese market strength, according to industry sources. In the 1993 fishery, for example, the presence of one Canadian buyer, in particular, reportedly resulted in upward pressure on ex vessel prices in, at a minimum, the Sitka Sound roe herring harvest (personal communication, Harold Thompson, Sitka Sound Seafoods, June, 1993).

[4] It should be noted that Canada had, prior to this time, not been rigorously consistent in enforcement of its regulations against export of "unprocessed" herring. It was determined by staff of the National Marine Fisheries Service, Fisheries Trade Services Division that,

nor and Legislature and to the U.S. administration about the restrictive Canadian regulations, arguing that there were inherent inequities in an arrangement in which Canadian buyers could purchase unprocessed roe herring directly from U.S. fishermen but U.S. processors could not purchase directly from Canadian fishermen.

In late 1986, the USTR, acting on behalf of the Southeast Alaska fish processors, initiated an action against Canada under provisions of Section 301 of the Trade Act of 1974. The USTR, in consultation with the petitioners, ultimately sought relief through arbitration provisions of the GATT. Although the Section 301 petition cited alleged violations by Canadians pertaining to restraint of trade of pink salmon, sockeye salmon and Pacific herring, and the list of petitioners ultimately included processors from both Alaska and Washington State, as suggested above, the initial source of the dispute centered on the lucrative Pacific herring roe fisheries in Southeast Alaska and northern British Columbia.[5]

In 1988, the GATT Council, reviewing the dispute, ruled in favor of the U.S. Canada advised the U.S. that it could accept the adoption by the GATT Council of the reports of the GATT panel and would act to remove the offending export restrictions (letter of Canadian Minister for International Trade to USTR, March 21, 1988). Subsequently, Canada "officially" revoked the offending prohibitions on export of raw herring, pink and sockeye salmon. In their place, however, Canada imposed new regulations which require that Canadian fishermen "land" their catch in Canadian ports "for inspection" before export. The USTR argued that the effective result was that the originally offending prohibition on direct export of raw fish from Canada had been reinstated, although the new regulations were extended in include all species of fish (personal communication, Office of the U.S. Trade Representative, January 1993). These new export rules have been challenged by the U.S. under provisions of the U.S.-Canada Free Trade Agreement (FTA), which had been entered into by the two countries during the time the dispute was being adjudicated under GATT (Johnston and Queirolo, 1990. For further discussion see Leitz and Wright, undated (a) and undated (b); and McDorman, 1990). At the present time, the two nations are evaluating an interim agreement negotiated under FTA in February 1990 and assessing options to that agreement, which is scheduled to be revisited in 1993.

In the next section we present a highly simplified partial equilibrium trade model which allows us to analyze this intra-industry trade dispute and the likely consequences of interventions in raw fish markets by either the U.S. or Canada,

as late as 1977 and 1978, Canadian processors were selling unprocessed Pacific herring to U.S. firms in the Seattle, Washington area for interim cold storage and refrigeration before shipping the product back to British Columbia, Canada, where the roe was then stripped (personal communication, Matteo Milazzo, National Marine Fisheries Service, Washington, DC, 1986).

[5] The harvest of roe-bearing herring progresses sequentially up the North American west coast, beginning in San Francisco Bay (in November), proceeding through Washington state (although poor stock conditions have virtually eliminated the herring fisheries there in recent years), then northward along the British Columbia coast, to the Southeast Alaska coast. The fishery then continues north and west along the Alaska coast, terminating in the Norton Sound area, near Nome (in June). In the early to mid-1980s, the period during which the dispute arose, the U.S. harvest accounted for between half and three-quarters of the total North American catch. The Southeast Alaska fisheries, however, represented only about 15% of the U.S. total.

or both, on their domestic fishermen and processors. We believe the analysis provides insights into how demand changes can affect the sustainability of market imperfections.

An Analytical Model of United States-Canada Intra-industry Trade in Roe Herring

In this section we present an elementary model of trade in an intermediate product (raw fish) between two countries, where both are exporting the finished product (processed fish) to a third country, which is assumed to have no market power. The model follows and modifies previous analytical models on trade in both intermediate and final goods introduced in the literature by Corden [1971], and expanded by Houck [1986], Nakamoto, Halloran, and Martin [1990], Lindsey and Johnston [1989]. However, our model differs from previous ones in that it (a) allows for three countries, (b) employs the large country assumption, (c) admits the possibility of monopsony behavior by the processors of one of the participant exporting countries,[6] (d) allows the other exporting country to impose restrictions on exports and (e) deals with trade in a natural resource-based product.

Our objective is not to restrict our analysis to the specific U.S.-Canada dispute but, rather, to illustrate how, in general, trade disputes may be resolved through changing, often predictably, economic conditions. Thus we are somewhat selective in which facts of the case we incorporate in the model and a bit cavalier in the assumptions we impose on biological and relative cost conditions. Nonetheless we have retained many of the essential features of this particular dispute. The assumptions underlying the markets for the final product—processed fish (F) in the U.S., Canada, and Japan, raw fish (R), and value-adding, nontradeable inputs (V) in the U.S. and Canada are stated next.

We assume the world consists of three countries; these are, for ease of exposition, U (U.S.), C (Canada), and J (Japan). Countries U and C both produce a homogenous tradeable final product F, by utilizing two inputs of production, R and V, that are also produced domestically. Production of F is characterized by fixed input-output ratios (i.e., F is produced via a Leontief-type production function) in U and C.[7] Input R is harvested by U and C from different stocks of fish. Input V is considered to be a composite input consisting of labor and capital. Input R is a tradeable input only between U and C while V is a nontraded input. There is no domestic demand for F in either U or C; F is demanded only by J in the world market. The final product F is not traded between U and C but is exported by both U and C to J. All countries are "large countries" in all markets. Finally, for analytical expediency we assume that all three countries have identical currencies and that transportation costs among these countries are zero.

In Figure 1 we assume, for graphic convenience, that one unit of R is combined with one unit of V to produce one unit of F. Panels (a), (b), and (c) of Figure 1, represent fish markets in U, C, and J, respectively. In panels (a) and (b), the

[6] While not treated as such here, the structure of the Canadian industry has been viewed by some as oligopsonistic (see Pearse, 1980).

[7] This assumption is made for analytical convenience only. Relaxing it would not materially affect the results.

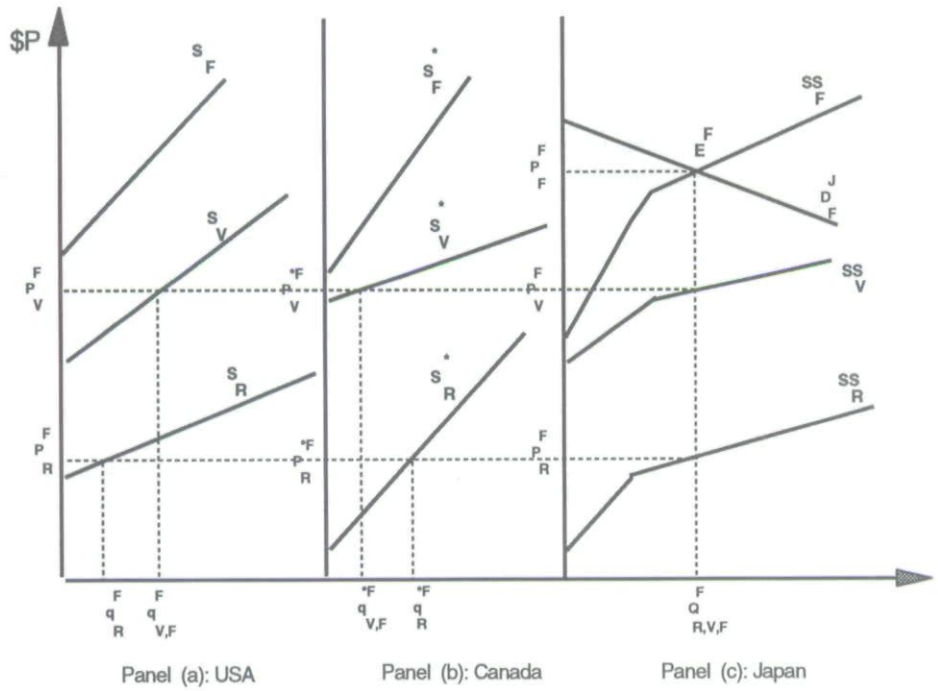

Figure 1. Free Trade Equilibriums in the USA, Canada and Japan.

supply curves of raw fish,—assumed to be upward sloping[8]—and the value adding inputs are respectively labeled S_R and S_V for the U.S., S_R^* and S_V^* for Canada (henceforth, variables for Canada are marked with an asterisk).

In an open access fishery the relevant long run, sustainable, supply curve may include positively and backward sloping portions. However, the roe herring fisheries in Southeast Alaska and Northern British Columbia are highly regulated. Indeed both fisheries are governed by allowable catch quotas that are conservatively set to preclude resource depletion. It is not inappropriate therefore, to think of the raw fish supply curves in this analysis as long run, sustainable relationships, recognizing that this precludes treatment of dynamic issues.

By assumption, the intercept (the set up cost) for S_R is higher than the intercept for S_R^* due to the U.S. fishermen's higher access cost associated with remoteness, but the slope of S_R is lower than the slope of S_R^* since labor costs, landing taxes and capital costs are higher in Canada than the U.S. The supply curve of V in Canada is higher and flatter than its corresponding curve in the U.S. That is, while Canada is the more costly supplier of V at low levels of processing, at higher levels the average cost declines such that it falls below that of the U.S. for similar processing levels in part because of stricter regulations on disposal of waste from processing facilities in the U.S. This may result from higher capital costs in Canada but larger plant sizes and fewer size diseconomies in that coun-

[8] We further assume that there is a price below which no fishing activity occurs and, at the other extreme, that there is a point at which the supply curve becomes vertical, which is a level of harvest established by management authority.

try.[9] These curves slope upward because higher prices result in increased demand for inputs and, thus, higher input prices (for example, labor must be imported from increasingly distant locations). In panels (a) and (b), curves labeled S_F and S_F^* are the vertical summation of the curves S_R and S_V, and S_R^* and S_V^*, respectively. In panel (c), the demand in Japan for the imports of processed fish is labeled D_F^J. In that same panel, the curve labeled SS_R is the horizontal summation of the supplies of R in panels (a) and (b), and the curve labeled SS_V is the horizontal summations of supplies of V in panels (a) and (b). The curve labeled SS_F in panel (c) is the vertical summation of the SS_R and SS_V curves in that panel.

United States-Canada Free Trade in R

Suppose there is free trade in R between U and C, and free trade in F between U and J and between C and J. The equilibriums in each sector are found by equating SS_F with J's demand D_F^J at point E^F in Figure 1, panel (c), (henceforth the superscript "F" denotes the values of variables under free trade). In equilibrium, J imports $Q_{R,V,F}^F$ of processed fish. The aggregate production of $Q_{R,V,F}^F$ by U and C requires a total of $Q_{R,V,F}^F$ units of each input R and V in panel (c), with corresponding prices of P_R^F and P_V^F, respectively. At equalized factor V prices of $P_V^F = P_V^{*F}$, U allocates $q_{V,F}^F$ units of V to produce $q_{V,F}^F$ units of F, and C allocates $q_{V,F}^{*F}$ units of V to produce $q_{V,F}^{*F}$ units of F. With free trade factor R prices are equalized at $P_R^F = P_R^{*F}$, U's fishermen supply q_R^F unit of R, and C's fishermen supply q_R^{*F} units of R, of which $q_{V,F}^{*F}$ goes to domestic processors (utilization from domestic supplies of R) and the rest is exported in the round to U. To produce $q_{V,F}^F$ units of F in U requires $q_{V,F}^F$ units of R to be combined with $q_{V,F}^F$ units of V. Thus, with free trade in R, U imports $(q_{V,F}^F - q_R^F)$ units of R from C, which is equal to the $(q_R^{*F} - q_{V,F}^{*F})$ units of R exported from C.

Canadian Export Embargo on R and the Exercise of Monopsony Power by U.S. Processors

In the second section above, it was shown that, under free trade, Canada would, probably, be an exporter of raw fish to the U.S. In fact this situation never arose because Canada prevented such trade by imposing an embargo on the export of unprocessed herring to the U.S., presumably to protect its fish processing industry under the "infant industry" protection argument. This is considered next.

Let U.S. fishermen have the choice of selling their harvested raw fish in the U.S., Canada, or both. Assume further, that Canada imposes an embargo on exports of raw fish and that, simultaneously, U.S. processors arrange a collusive oligopsony[10] in buying raw fish from U.S. fishermen (henceforth we treat this oligopsony as if it were a monopsony). Under these conditions, the new equilib-

[9] Alternatively, one may consider the situation where the supply of V in Canada is everywhere above that of the U.S., largely as a consequence of higher Canadian wage rates and the private costs of social services assessed on Canadian firms. The results of this study do not change.

[10] The assumption that U.S. processors enter into a "collusive oligopsony" is an analytical construct and is not intended to suggest that U.S. processors actually undertook this action.

rium values are indicated with superscript "M" in Figure 2, and are determined as follows.

First, we construct the residual demand for F facing the U.S. processors (labeled as D_r in panel (a)) by horizontally subtracting S_F^* from D_F^J at all price levels. Second, we construct the U.S. processors "derived demand" for raw fish (DD_R) from their fishermen by vertically subtracting S_V from D_r at each quantity. Third, we construct the curve MFC_R as the marginal factor cost of raw fish to U.S. processors. Then, the U.S. processors impose a monopsony price of P_R^M (the price on S_R corresponding to the quantity $q_{R,V,F}^M$, determined by the intersections of DD_R and MFC_R) on their fishermen. The resulting final product is supplied to the Japanese market, in competition with final product from Canada's market. Note that this monopsony position can be sustained as long as the Canadian price (P_R^{*M}) is lower than that in the U.S. since, at those price levels, U.S. fishermen would have no economic incentive to ship to Canadian processors. This discrepancy, in turn, follows from Canada's export ban on raw fish, leading to higher utilization of domestic supplies than in free trade ($q_{R,V,F}^{*M} > q_{V,F}^{*F}$), but lower utilization in total, of Canada's raw fish ($q_{R,V,F}^{*M} < q_R^{*F}$) and corresponding lower ex-vessel prices.

A comparison of the value of the model's variables under a Canadian export embargo on raw fish and monopsony behavior by U.S. processors with the values of the model's variables under free trade indicates that for prices: $P_R^M > P_R^F > P_R^{*M}$, $P_V^M < P_V^F = P_V^{*F} < P_V^{*M}$, $P_F^M = P_F^{*M} \geq P_F^F$, and for quantities of V and F: $q_{R,V,F}^M < q_{V,F}^F$, and $q_{R,V,F}^{*M} > q_{V,F}^{*F}$. Under these new conditions Canadian processors utilize the entire domestic catch of raw fish ($q_{R,V,F}^{*M}$) and thus export a higher volume of

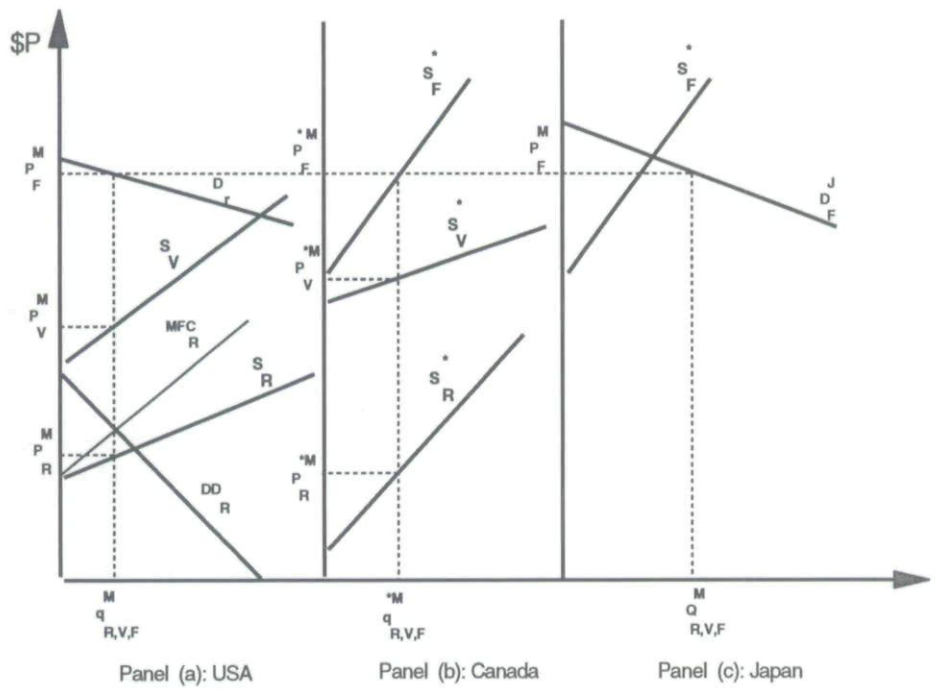

Figure 2. Equilibriums under Canadian Export Embargo on R and Monopsony Behavior by U.S. Processors.

processed fish to Japan than the volume they were supplying under free trade. The U.S. processors are unable to import any R from Canada and utilize only their own domestically caught R ($q^{M}_{R,V,F}$), which is purchased at monopsony prices. These prices, however, are higher than what is paid to Canadian fishermen by Canadian processors and higher than the "free trade" prices to U.S. fishermen because of removal of competition from Canadian supplies. These particular price relationships follow from the assumption made here about the supply functions in the two countries. They appear to be reasonable approximations of the actual situation, however: because of the higher U.S. price, Canadian fishermen have an incentive to export R to the U.S. and, thus, to prevent this, Canada keeps in place its export embargo on R. This is consistent with a situation in which two market imperfections (monopsony in the U.S., and an export embargo by Canada) can effectively coexist and sustain.[11]

Demand Expansion in Japan and Trade Reversal

This section illustrates how an expansion of demand in the import (Japanese) market for the final product, can mitigate the effects of the market imperfection in both the U.S. and Canada. In fact the Japanese import demand for herring roe has increased considerably in recent years (Bill Atkinson's News Report, 1991–92). Reasons for this include:

a. An increase in the value of the Japanese yen relative to both the U.S. and Canadian dollars.

b. The imposition of extended fisheries jurisdiction by both the U.S. and Canada, cutting off Japanese access to the waters of these countries as both harvesters of fish and "over the side" purchasers of fish. This reduced Japan's domestic supply of kazunoko and hence increased its demand for imports (D^{J}_{F} may also be treated as Japan's excess demand curve).

c. An increase in personal incomes in Japan.

d. An increase in the Japanese population.

e. An increase in the price of substitute fish products in Japan, because of (b), above.[12]

In Figure 3, as D^{J}_{F} increases to $D^{J'}_{F}$, D_r and DD_R shift up to D'_r and DD'_R, respectively. In the presence of monopsony in the U.S., and a continued export embargo on R in Canada, the new equilibrium values of the model's price and quantity variables are indicated with a superscript ($'$). The new levels of prices in the U.S. and Canada for raw fish indicate that $P^{*M'}_{R} > P^{M'}_{R}$. Because of the price difference this monopsony arrangement cannot survive and the "equilibrium" is not sustainable. Thus, Canada's export embargo is no longer relevant since Canada shifts from having an incentive to export raw fish to being an importer of raw fish. The increased demand in Japan has made the trade restriction unnecessary and led to trade reversal. In the U.S. the processors can no longer maintain their monopsony position because the U.S. fishermen now can sell at higher prices to Canadian buyers. In summary, demand expansion has reduced the incidence of

[11] Actual price relationships did not mirror those discussed here. This may be a consequence of asymmetrically-held information, a hypothesis we are currently exploring.

[12] In the more general case, other factors, such as an import subsidy could also lead to increased demand facing the exporting countries.

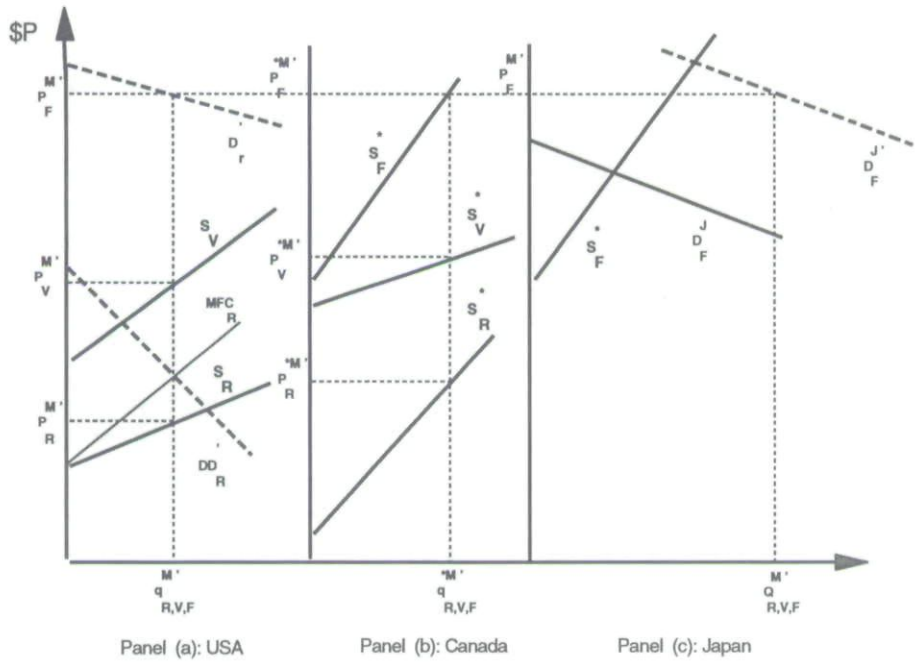

Figure 3. Demand Expansion in Japan and Trade Reversal in R.

market imperfections in the U.S. and Canada and has led to trade reversal in a traded intermediate product.

Note that the trade reversal in this model is neither because of changes in factor intensities due to the changes in the factor prices, nor due to direct domestic demand expansion in any of the exporting countries (demand-based trade reversal). These are the usual explanations for trade reversal (see, for example, Ethier, pp. 134–6). With regard to the former case, our production technologies in both exporting countries are characterized by fixed proportions; thus, any changes in the factor prices due to the existence of monopsony or the export embargo do not change the factor intensities. In the latter case, trade reversal happens because the domestic demand in an exporting country expands to such an extent (say due to the increase in population or income) that its domestic price is higher than the price in the market of its importing partner's market and thus the exporting country becomes an importing country. In our model, after demand expansion in Japan, the U.S. and Canada still hold their positions as exporters of the final product, yet their pattern of trade in the intermediate product is reversed. One may label this kind of trade reversal as "foreign demand based trade reversal."

The results, once again, follow from the relationships among supply curves. Specifically, at relatively low levels of demand in Japan, and in the absence of either monopsony pricing or export controls, Canada, under our assumptions, is the low-cost producer of raw fish but the high cost processing country. Thus, Canada, with a comparative advantage in raw fish harvesting, exports to the higher harvesting cost country. At the higher level of demand in Japan, Canada's comparative advantage switches from raw fish production to processing. At higher levels of production of the final product, average harvesting costs in the

U.S. are so much lower than those in Canada and U.S. processing costs so much higher, per unit, that it pays the U.S. to export raw fish to Canadian processors.

It is not clear that these are, in fact, the circumstances that prevail, in general, in the two countries. As we have noted repeatedly, the foregoing analysis abstracts in significant ways from the specific details of the U.S./Canada GATT dispute. That case, as it related to Pacific roe herring, pertained only to the trans-boundary conflict between U.S. processors operating in Southeast Alaska and Canadian buyers representing processors located in the extreme northern coastal regions of British Columbia.

Nonetheless, Japanese demand for herring-roe, in its several product forms, has increased[13] and Canada has purchased relatively large quantities[14] of raw herring from U.S. fishermen in the Southeast Alaska roe herring fisheries. As reported in the U.S. Section 301 Petition of Icicle Seafoods, Inc., *et al.*, submitted to the Office of the United States Trade Representative, in April of 1986,

> "The Canadian processors' estimated share of the Kah Shakes herring catch rose from less than 20% of the catch in 1982 to nearly 40% in 1985 (805 of 220 tons). In three years, U.S. processors' supply dropped by 660 tons, or nearly one-third of the fishery, all lost to Canadian processors. Similarly, in Sitka, the Canadian share grew from zero in 1984 to an estimated 300 tons in 1985 out of a catch of 7500 tons."

The U.S. petitioners clearly regarded Canadian competition in these markets as an economic threat, while Canada apparently recognized an economic opportunity.

More important, perhaps, the foregoing suggests that analysis of trade patterns involving both intermediate and final goods may require examination of cost relationships beyond those associated with current production levels. For example, where cost disparities are a consequence of differences in external economies and diseconomies—certainly a strong possibility where trade is in products having a natural resource base (so that real externalities are significant) and where the exploitation of that natural resource represents a significant economic sector in a region (so that pecuniary externalities play a large role)—the results suggested here seem quite reasonable. At least, in our judgment, they merit more attention than they have received to date.

Demand Expansion in Japan and Free Trade in R

In the absence of imperfections in the U.S. and Canadian R markets, as D_F^J increases to $D_F^{J'}$ the equilibrium in each sector is found by equating SS_F and $D_F^{J'}$ at

[13] See, for example, Bill Atkinson's newsletter, various issues.

[14] Canadian buyers have, to date, limited their purchases of raw roe-herring from U.S. fishermen to the fisheries in Kah Shakes and Sitka Sound. These are the two principal herring fisheries in Southeast Alaska. While Kah Shakes and Sitka Sound herring fisheries are large, relative to the balance of the Southeast Alaska herring fisheries, the total Southeast catch has historically represented only approximately 15% to 20% of the aggregate Alaska herring harvest. It is, in fact, the geographic proximity of these fisheries to Canadian processors and their temporal proximity to the British Columbia fisheries (occurring as they do immediately after the aforementioned) which have made the trans-boundary buying excursions by Canadian processors logistically feasible.

point $E^{F'}$, and the new equilibrium values are indicated with a superscript (F′), Figure 4. At equalized factor V prices of $P_V^{F'} = P_V^{*F'}$, U allocates $q_{V,F}^{F'}$ units of V to produce $q_{V,F}^{F'}$ units of F, and C allocates $q_{V,F}^{*F'}$ units of V to produce $q_{V,F}^{*F'}$ units of F. With free trade factor R prices are equalized at the new level of $P_R^{F'} = P_R^{*F'}$, at which U's fishermen harvest $q_R^{F'}$ units of R, in total, of which $(q_R^{F'} - q_{V,F}^{F'})$ are exported to Canada. C's fishermen supply $q_R^{*F'}$ units of R to their domestic processors. To produce $q_{V,F}^{*F'}$ units of F in C requires $q_{V,F}^{*F'}$ units of R to be combined with $q_{V,F}^{*F'}$ units of V. Thus, with free trade in R and the absence of market imperfections, C imports $(q_{V,F}^{*F'} - q_R^{*F'})$ units of R from U, which is equal to the $(q_R^{F'} - q_{V,F}^{F'})$ units of R exported from U.

Conclusion

This study was originally inspired by features of the U.S.-Canada dispute between Southeast Alaskan and Northern British Columbian processors over trade in unprocessed raw herring. Examination of this dispute led the authors to consider, in the abstract, behavior of two rival seafood exporting countries competing in the same import market when monopsony exists in the processing sector of one of these countries, made possible, at least in part, by export restrictions in the other. By going substantially beyond the specifics of that dispute the authors realized that a broader point was at issue, namely, that while economic forces underlie most trade disputes, they may, if allowed to play themselves out, render reactive policies unnecessary: in the present case, that expansion of the demand for the final product may, through trade reversal pressures, dilute the market power of processor monopsony and make trade restriction policies irrelevant.

These findings are highly dependent on the relative positions of the supply

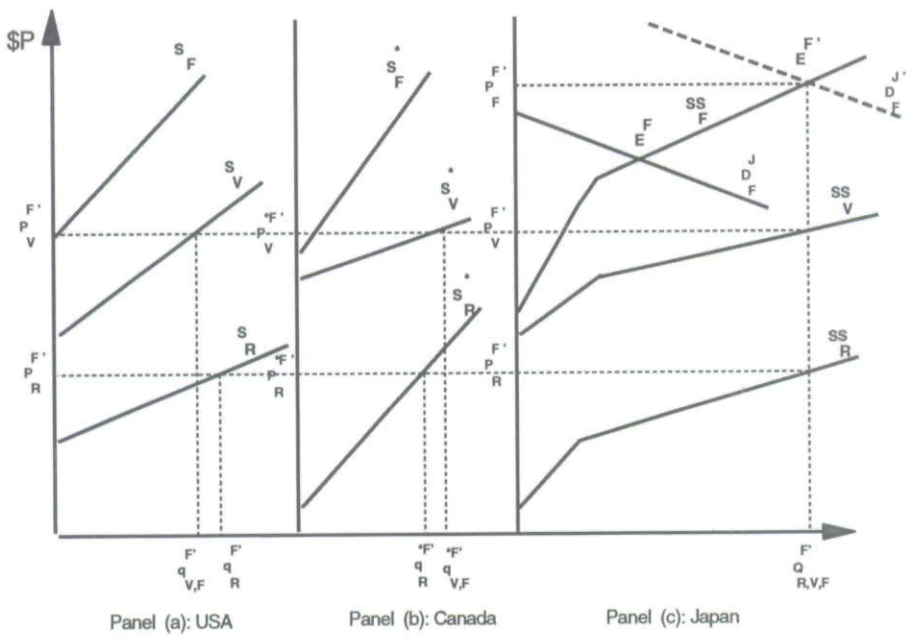

Figure 4. Free Trade Equilibriums After Demand Expansion in Japan.

curves—of both R and V—in Canada and the U.S. although they can be generated under a variety of assumptions about that relationship. In the above discussion, as output increases, Canada changes from having a cost advantage in fishing to having a cost advantage in processing vis-a-vis the U.S.

Suppose the R supply curves in the two countries are identical. Suppose, further, that the supply curve of V in Canada is higher and flatter than its corresponding curve in the U.S., as shown in all figures. In this case the results of this paper re-emerge. This means that before the demand in Japan expands, Canada, in free trade, would have an incentive to export R to the U.S. due to higher processing costs in Canada. However, as the Japanese demand increases, Canada experiences cost advantages. This leads to trade reversal, as in the example above.

Now suppose that processing costs are equal in the two countries but that the supply curve of R in Canada is lower—at low harvesting levels—than that in the U.S., as is shown in all figures. Further suppose, however, that this cost advantage disappears at higher harvesting levels—perhaps due to locational advantages for the Canadian fleet but higher fuel and labor costs in Canada—so that the Canadian supply curve intersects (from below) its U.S. counterpart. Again, the results of this model re-appear. In this case the explanation is that Canada, being the less costly harvester at low fishing levels, ships raw fish to the U.S.—or, at least, under free trade would have an incentive to do so. As Japanese demand expands, the U.S. emerges as the less costly fishing nation and, thus, trade reversal occurs once again. Thus it may be in Canada's interest to encourage sales of finished products to Japan rather than to erect barriers on raw fish exports.[15]

Other configurations could be considered. The point is that this model is useful not only in understanding events underlying the U.S.-Canada trade dispute over roe herring but may also provide insights into bilateral trade patterns in intermediate products among a large number of pairs of trading partners. It demonstrates that existing trade patterns, existing market structures and existing trade policies may change significantly, not only in response to explicit government action but also in response to changing supply and demand conditions. Perhaps, then, concern about unfair trade practices could more effectively be addressed by awaiting—or even promoting—changes in market conditions than by issuing calls for retaliation.

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[15] Although this is not necessarily costless.

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