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CANADIAN DOMESTIC AND INTERNATIONAL
INTRA-INDUSTRY TRADE

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Saint John, New Brunswick
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A Study for the Department of Industrial Regional Expansion
Government of Canada

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EXECUTIVE SUMMARY:

This study matches, for the first time, imports and exports at the enterprise level for 1979 to assess the extent of international intra-industry trade (IIT). It also reviews exports over the time period 1974 to 1979. The data were disaggregated by small and large enterprises, sector of control (foreign and Canadian), and by type of industry (predominantly IIT or non-IIT). A statistic measuring the ratio of purchased material to value-added was also calculated to assess the extent of specialization and domestic intra-industry trade.

The background leading to the study was prior evidence that, generally, Canadian manufacturers are high cost producers relative to their foreign competitors. This cost disadvantage is attributed primarily to the small scale of manufacturers and their diversity. The cost disadvantage was not a major problem for manufacturers until the 1960's because of the existence of barriers to international trade. But, the trade environment has changed dramatically since then and Canadian manufacturers must now compete at home and abroad with products produced by more efficient manufacturers. This requires extensive adaptation on the part of Canadian manufacturers if they are to compete and survive.

In particular, domestic producers of manufactured goods must increase their degree of specialization by contracting-out the production of small-run products and components. They must also increase their scale by exporting. The twin strategies of increased scale and specialization are interdependent and both are required if unit costs are to be reduced to more competitive

levels. The impact on Canada's international trade flows of this adaptation would be a simultaneous increase in both imports and exports of similar products for many industries. This is in distinction to the prevailing viewpoint that imports would increase in some industries that have comparative cost disadvantages and exports would increase in others with comparative advantages. But, imports and exports would not increase in the same industry.

The evidence from this study is that on a cross-section basis, imports and exports do increase simultaneously in many industries. The industries in which this takes place often have high levels of direct foreign investment and the trade in such cases is primarily intra-firm. This is because MNEs can specialize plants internationally and utilize their marketing organizations in each country as wholesalers to distribute the products of the plants on an international basis. They can also specialize their plants that supply components to affiliates and trade components between them that would otherwise have to be produced in uneconomic lot sizes in the plants in each country. Consequently, much IIT is between MNEs on an intra-firm basis. However, the Canadian sector of control is also extensively involved in IIT. But, IIT is not widespread across the manufacturing sector. Also, many producers are small and the larger ones have diverse production activities. Consequently, there is still considerable room for increased IIT as firms continue adapting to the more competitive trade environment. This means that imports will increase in many industries, but so also will exports. Attempts to curtail the increase in imports will only set-back the adaptation process and in the longer-run result in fewer jobs and less income in the manufacturing sector.

Some other points also emerged from the analysis. One is that the Canadian-controlled firms appear to have adapted more quickly to the changing trade environment over the latter part of the 1970' than did the subsidiaries. For instance, they had larger increases in their degree of scale, specialization and contracting-out. This would improve their productivity and may explain why the Canadian-controlled firms also had larger increases in their exports over this same time period than did the subsidiaries. Indeed, there is some evidence that the subsidiaries may have reverted to their historical role as tariff factories as competition increased and their plant utilization levels fell. That is, they engaged in contracting-in of production activities in order to fill-up their plants. This is counter-productive behaviour and would reduce their competitiveness in the longer-run if it were sustained. This may only be short-term behaviour until they define a new role for themselves. But, it is of some concern and needs further investigation because if it is a longer-term response then it has implications for Canadian incomes and employment as well as industrial policy.

Another point that emerged was that the smaller Canadian-controlled firms do not appear to source internationally their requirements for components as much as might be expected. Instead, they seem to be tied to just domestic suppliers who often are high-cost. This would harm their longer-term competitiveness and ultimately incomes and employment in the manufacturing sector. This issue also needs further investigation and a policy devised to ensure they do not unnecessarily tie themselves to inefficient suppliers.

In summary, the indications are that the Canadian manufacturing sector is responding with appropriate policies to improve their unit costs. But, they have a long way to go and there are some areas of concern about how they are responding. It is important that manufacturers understand that increased scale and specialization are important ingredients in achieving increased international competitiveness. At the same time, it is important that policy-makers understand that these activities will result in increased IIT in which imports will increase. However, exports and long-term competitiveness will also increase. It is necessary to view the increase in imports in this wider perspective rather than focusing on just the increase in imports and accede to requests to impair their entry into Canada.

PREFACE

The impetus for this study on intra-industry trade (IIT) arose out of an earlier report for the Department of Industry, Trade and Commerce on the competitiveness and international trade activities of Canadian manufacturers (Daly and MacCharles, Canadian Manufactured Exports: Constraints and Opportunities, Toronto: York University Mimeograph, 1983). There was little current analysis available in the literature at that time on the extent of both domestic and international IIT by Canadian manufacturers, yet it appeared to be a significant factor in the trade data that were being analyzed. The major purpose of this study is to fill-in and update the information on Canadian IIT. The viewpoint used in approaching the analysis was that IIT is directly related to the response of Canadian manufacturers to the increasingly more competitive trade environment at home and abroad over the last two decades. This relationship between IIT and productivity-improving, cost-reducing actions on the part of manufacturers impacts on areas of interest to governments since it has implications for commercial policy, industrial strategy and domestic employment and income policies. Therefore, it is important that up-to-date information be available on IIT if government policy is to be cognizant of this important new dimension in domestic and international trade.

The analysis of IIT requires that imports and exports be matched by product groups (or industries) at a relatively fine level of disaggregation. In this study, the matching was done initially at the level of the firm because it accords with the viewpoint outlined above that it arises from establishments trying to improve their productivity. The firm is also the

smallest unit with which imports can be identified under the present system for collecting data on imports. Since IIT is a result of plant and firm-level activities, it made sense theoretically to collect data at this level of micro economic activity rather than the usual, but more aggregated, level of the industry. IIT is partly the result of establishments contracting-out the production of minor product lines and components to foreign suppliers that would otherwise be produced less efficiently within the establishments. IIT is also partly a result of the establishments, at the same time, improving their efficiency by increasing the scale of their operations through exports. Therefore, imports and exports increase together for the similar products produced within an industry as competition increases. Statistics Canada provided data on imports and exports for 1979 using the enterprise as the connecting link between them. Export data were also available for 1974. This data were then summarized into 159 industry groups representing the 4-digit level of aggregation of the SIC concordance. The data were also disaggregated by sector of ownership of the enterprises (Canadian and foreign) and by the size of the enterprises (greater or less than \$10 million in assets). The use of CALURA identifiers also allowed the enterprise data to be aggregated up to the level of consolidated enterprises.

The response of manufacturers to increased competition which leads to increased international trade, would also lead to increased domestic trade on an inter and intra-industry basis. Firms attempting to reduce unit costs would do so by contracting-out the production of finished and unfinished goods to more efficient domestic as well as foreign suppliers when the suppliers are more efficient than internal sources of supply. This would increase the ratio of purchased-material to value-added in those industries

subject to increased competition. A technical appendix explaining these relationships in greater detail is available from the author upon request. Data from the Census of manufactures were included in the data bank which could be used to assess the existence and extent of such a response. The Census data included in the bank also related to a large number of other variables that were also of interest to this study such as shipments, sales and product specialization ratios. Other data from outside the trade and Census sources were also included in the bank, such as the effective tariff rates for each industry. The Census and other data were available for years other than 1979, unlike the import data which were restricted to just 1979.

The net result is that a comprehensive set of data on the trade and production activities of all the establishments or enterprises (depending upon the data being used) in the manufacturing sector, along with several additional variables that were calculated from this data, are available for the first time. Further, this data are all related to the common unit of the enterprise so that it can be contrasted and compared on a consistent basis for 1979. In addition, the Census and export data are available in time-series format for the years 1974 and 1979. This study can only outline the more important relationships in the data and assess their implications for trade and industrial policy. It must leave to later analyses and to others a more detailed exploration of it. However, the assembly of this integrated set of import and export data for 1979 at the plant level is a major accomplishment and allows a more balanced view of Canada's total trade performance in manufactured goods than has been possible in the past. It is to be hoped that Statistics Canada will maintain and update the bank, particularly for imports and exports, so that a time-series profile can be

developed.

In the past, except at a very macro level, imports and exports were largely analyzed and published separately because the collection and recording of them were by different systems using different nomenclatures. Yet there are many important areas of policy that require a more integrated analytical approach. For instance, when imports are reported in isolation from production and export activities, it leads to some being concerned because of the large growth in imports over the past twenty years (i.e. auto parts manufacturers and the Science Council). Consequently, there have been pressures to impose restrictions on imports even though there has also been an increasing level of exports which, at least at an overall level, have offset the reduced domestic employment and income from the relatively greater inflow of imported goods. The requests for protection are largely unwarranted in terms of the longer-run need to improve productivity and reduce unit costs in Canada to more competitive levels. Therefore, it is important that imports not be considered in isolation from exports and their net impact on domestic production. Instead, the focus needs to be on the much broader developments in international trade and competition which bring benefits generally to all Canadians.

Two ratios are used extensively in this study. They will be defined here at the outset and mentioned by name only in the balance of the study in order to reduce repetition. One is the ratio of imports to the domestic market size (or consumption). The domestic market size is the sum of the values for shipments and imports by an industry, less its value of exports. Some of the literature refers to this as an import-penetration ratio. The

other is the ratio of exports to shipments for an industry. It is often referred to in the literature as an export-orientation ratio. These ratios have also been referred to as the average import and export propensities and will be referred to as such in this study because these terms are generally more consistent with standard economic terminology.

The study is divided into several chapters which are briefly outlined here. The first chapter is an overview of the economic and trade environment in Canada at the present time for manufacturers and describes how they should be responding to it with increased exports (i.e. scale) and contracting-out (i.e. specialization) if they are to remain cost-competitive. The second chapter reviews the changing pattern of trade internationally and relates it to the growth in IIT as manufacturers have responded to increased competition. It also deals at some length with a comparison and integration of the IIT paradigm with the traditional trade paradigm. The third chapter reviews the literature on IIT and relates it specifically to Canadian trade data. The fourth chapter analyzes the data bank assembled for this study from the perspective of the IIT paradigm and assesses the extent to which Canadian trade flows (domestically and internationally) are consistent with it. The fifth chapter draws some conclusions from the analysis in the fourth chapter and makes some suggestions for Canadian commercial and industrial policies on the basis of these conclusions. This chapter closes with an outline of some areas where additional research is necessary based on incomplete or inconclusive results from the analyses.

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CHAPTER ONE

INTRODUCTION

The Changing Environment for Manufacturers:

Canadian manufacturers, on average, currently have a unit cost disadvantage of twenty to forty percent relative to their counterparts in the U.S. and Japan. (1-1) The higher rate of inflation and lower productivity improvement in Canada over the last decade relative to these other countries, to a large extent, have been offset by exchange rate changes. But, this fundamental cost disadvantage, which has existed at least since the early 1900's, still persists. At the same time, the competitiveness of the trade environment has increased. For instance, by 1987, the successive tariff reductions under the Dillon, Kennedy, and Tokyo Rounds will have reduced Canadian tariffs to about 15% of their pre-1950 level and non-tariff barriers have also been reduced. Also, commencing in 1987, almost one-half of Canadian imports will be duty-free. The average tariff on the remaining dutiable items, at eight percent, will be about one-half the level at the beginning of the 1980's. Further, since the 1960's, the products of a large number of new, efficient producers (particularly those in the Pacific-Rim countries) have entered domestic and world markets served by Canadian manufacturers and considerably increased the degree of competition.

The relatively high cost of goods manufactured in Canada, combined with the increased competition, have changed the trade environment in which domestic producers must now operate and put them in the position of striving just to survive. For instance, the 1981-1982 recession was steeper in Canada

than in the U.S. and the recovery has been more sluggish. This is the first time in this century a recession has displayed these characteristics. This situation reflects the non-competitiveness of manufacturers in an era of increased competition, which has resulted in an increased level of unemployment. The cost and productivity problems are long-standing and structural in nature so that an early reduction in the currently high level of unemployment is not apparent. The recovery itself has been largely export-led (1-2) which indicates that future growth in income and employment will depend to a large extent on the degree to which Canadian manufacturers reduce unit costs to internationally competitive levels and are thereby able to sell into export markets.

The changing trade environment has also affected the rate of return (ROI) on investment in physical assets, after allowance for inflation. The ROI in the manufacturing sector has declined significantly since the mid-1970's. (1-3) In turn, this low ROI has seriously reduced the incentive, and the cash flow available, for manufacturers to invest in new equipment. This is evidenced by their reduced spending intentions, again, in 1984. The low ROI clearly reflects the inability of domestic producers, because of the increased competition, to raise prices, cover their higher costs and maintain profit margins. Further, it means lower levels of spending on plant and equipment which will be longer-term in nature. In turn, the lower investment in physical assets by manufacturers will lower aggregate demand so that producers in the capital goods industries will not be able to lead the economy out of the recession as they have traditionally done in the past.

In summary, it is important that manufacturers in Canada become internationally cost competitive if growth in income, output and employment in the manufacturing sector is to be restored. It is now all the more important that manufacturers address the causes of their high costs and correct them. At the same time, the public sector must also do its share of cost-reducing. The tendency over the past 20 or 30 years to add social overhead costs as a result of emphasis on income redistribution policies has resulted in a "loose" fiscal policy. But, more recently, it has been necessary to have "tight" monetary policies, partly to offset the inflation-inducing fiscal spending. (1-4) The net result is that the deficits due to social programmes can only be financed through high interest rates and the use of foreign capital. This tends to keep the foreign exchange rate higher than is warranted for improved export competitiveness and employment in the manufacturing sector. From the perspective of just the manufacturing sector, it would be more appropriate to have a tighter fiscal policy (which implies less income redistribution) and a looser monetary policy. This would lower interest rates, improve capital spending and depreciate the value of the Canadian dollar in foreign exchange markets, all of which would lead to increased exports, income and employment in the manufacturing sector. The greater number of employment opportunities this mix of policy would generate might also reduce the need for some income redistribution programmes currently directed at the unemployed.

Past Developments in Costs and Productivity:

A major reason for the high cost of Canadian manufacturers is their relatively small size and high levels of diversity, by international standards, which reduce productivity and increase unit costs. (1-5) The

quality of management also appears to be a contributing factor. (1-6) Both of these are, in part, attributable to past high Canadian tariff levels in conjunction with small domestic markets.

The size of the domestic market in Canada is small compared to those accessible to producers elsewhere in their home countries (e.g. the U.S., Japan and the EEC). In addition, the Canadian market is dispersed over more than four thousand miles so that it is fragmented further into several smaller local and regional markets. Yet, manufacturing plants here tend to be about three-quarters the size of their counterparts in the U.S. (1-7) These large plants, in relation to the available market in Canada, historically led manufacturers to increase their rate of capacity utilization by producing a wider variety of products (horizontal diversification) and engaging in a relatively larger number of production activities (vertical diversification) than counterpart plants in the U.S. (1-8)

The costs associated with diversity are due to several influences which can only be briefly summarized here. In the case of horizontal diversification, in which many products are produced in job lots by small run sizes, the costs are related to: increased change-overs; reduced opportunity to garner the benefits of learning-by-doing; the improper matching of small-scale, labour-intensive production methods with equipment that is often highly automated and designed for continuous runs at high rates of output; increased investment in inventories; and increased complexity which adds to the costs of administration in both the factory and office organizations.

In the case of vertical diversification, in which a wide variety of

activities are undertaken and many components are manufactured within the firm for use in its final products, the same cost-increasing factors are at work as in the case of horizontal diversification. In addition, there are the costs associated with the loss of contact with productivity-improving technical changes in what would otherwise be the supplying industries for these components and activities. There is also the potential for increasing inefficiency in the production of components because there is no external market test to keep the internal, transfer-prices efficient.

The tariff structure which protected domestic markets from imported goods, in conjunction with the high unit costs of the manufacturers which prevented them from exporting, led managers to turn inward and make the mission of their firms to serve just the small Canadian market. The inward-looking viewpoint that such a role engenders has influenced the style and quality of management in Canada. It was possible to get-by without having to be as innovative as would be necessary in a more competitive environment. It was also possible to focus on just domestic issues and ignore the need for any change that would otherwise be imposed by international developments and competition.

The profile of the average Canadian manager reflects the influence of this historical environment. Managers here tend to be older, to have moved through the ranks more slowly, to be less well-educated and generally less experienced than managers elsewhere in the world. Consequently, they are less flexible and open to change, although this is now improving with the increased number of graduates from management programmes in recent years.

(1-9) The lack of flexibility and openness to change shows-up, for instance,

in the tardiness of management in adopting new technologies relative to their foreign-based competitors. (1-10) To some extent, these attitudes have carried-over into the present trade environment even though they are no longer appropriate. More recently, it has shown-up in the managerial gap between Japanese and Canadian managers in such areas as slower adoption of quality circles, significantly lower levels of "on-time" delivery and other inventory control techniques, a much lower proportionate use of CAD/CAM methods, less efficient plant layouts and a much lower use of permanent employment practices which results in poorer employee relations and lower productivity. This managerial gap between Canadian and Japanese managers partly explains the lower productivity and higher unit costs between Canada and Japan than between Canada and the U.S. which was noted before. The lower levels of awareness of Canadian managers, their relative lack of openness to new ideas and their slowness in adopting the latest state-of-the-art practices are making productivity improvement and the transition to freer trade more difficult for Canada than perhaps is necessary.

The relatively high degree of horizontal and vertical diversification had the expected effect of increasing rates of plant utilization and reducing the per-unit, fixed costs of capacity. But, the diversity also added to unit costs by increasing complexity and creating product-specific diseconomies of scale. (1-11) These latter cost-increasing influences from diversity more than offset the benefit from increased absorption of fixed costs. The net result was that Canadian manufacturers incurred cost disadvantages compared to larger and more specialized foreign producers. In the past, trade barriers could be relied upon to protect the high-cost domestic producers from the competition of goods imported from the efficient foreign

manufacturers. However, this is no longer possible with the freer international trade environment which has developed over the past two decades and will continue into the foreseeable future. Yet, the majority of Canadian producers have continued in their traditional import-competing role of just serving the domestic market as small, diversified manufacturers rather than becoming larger, specialized export-competers selling into foreign markets. It is these smaller and diversified import-competing firms that now must improve their unit costs if they are to become competitive and survive.

This will be no easy accomplishment. As Table 1 shows, the Canadian manufacturing sector is characterized by its relatively large number of small producers by international standards and many of them, including a significant portion of even the larger producers, are diversified. Further, the management ideology in many cases is not oriented toward thinking internationally which inhibits their ability to consider using exports as a means to specialize while at the same time allowing them to grow and become larger-scale firms. Yet this is the major viable means for overcoming their low productivity which is related to them being small and diverse producers.

The influences of tariffs and small domestic markets are apparent in the productivity comparisons between the sectors of control which are presented in Table 1. Value-added per production worker (with the value for the Canadian sector of control expressed as a ratio of that for the subsidiaries) is shown for different plant sizes. Plant size is expressed in terms of the number of employees working in the plant. The proportions that the plants in each size category, and the sales of these plants, represent of total plants and sales in the manufacturing sector are also shown in the Table.

TABLE 1-1

Selected Comparisons Between Sectors of Control
Plant-Level Data for 1974
Manufacturing Sector

Plant Size Measured In Employees	Value-Added/ Production Worker (Ratio Cdn. to Fgn.)	Percentage Of Plants:		Percentage Of Sales:	
		Cdn.	Fgn.	Cdn.	Fgn.
Fewer than 50	.50				
50 to 200	.67	88%	6%	19%	5%
200 to 400	.75				
Greater 400	1.00	2%	4%	23%	53%

Sources: Daly & MacCharles, op. cit.
Statistics Canada, various publications

For the smaller plants, there clearly is a performance difference between the subsidiaries and the Canadian-controlled enterprises, with the subsidiaries being about fifty percent more productive. It is only when the plants in the Canadian sector become larger that the difference disappears. The lack of a significant difference in productivity between the sectors of control for the larger establishments is attributed to the Canadian-controlled ones being able to garner the benefits of size and be as effective as the subsidiaries in terms of the quality of their management, their access to knowledge and their ability to produce in adequate volumes.

The significant difference in productivity between the sectors for the smaller plants is attributed to two major influences. One is that the subsidiaries are able to import minor product lines as well as components from efficient foreign affiliates. The affiliates are able to produce them using high-volume production methods whereas the subsidiaries would have to do so at a higher cost in Canada, because of the small domestic demand and

the additional diversity it would add to their plants, or else acquire them from domestic suppliers with similar cost disadvantages. The Canadian-controlled plants do not have access to large and efficient affiliates. Therefore, they can only choose between the latter two options which increase their costs and lowers their productivity relative to the subsidiaries.

The other influence which gives the smaller subsidiaries improved productivity, is their access to the management, production and product expertise and knowledge of their parents and affiliates. The smaller Canadian-controlled manufacturers cannot readily acquire this knowledge or else must internally produce it at a higher cost and a lower quality. (1-12) The net result is that the smaller Canadian-controlled manufacturers have lower productivity and higher costs than do their counterparts in the foreign sector of control. Note that the smaller plants in the Canadian sector, in terms of numbers, dominate the manufacturing sector. They also represent a significant amount of the production and sales for this sector. Further, even the larger firms in both sectors of control are often high-cost, in comparison to counterpart producers in the rest of the world, because of their diversity. (1-13) Consequently, small scale and high levels of diversity are significant cost problems for Canadian manufacturers, especially for those in the Canadian sector of control.

Cost Reduction and Intra-Industry Trade:

The import-competing firms should respond to the changing trade environment with its increased level of competition by reducing their unit costs through increased specialization and scale. This response would

influence the domestic and international trade flows for Canada. An increase in specialization would result in more contracting-out of minor product lines and intermediate goods to efficient suppliers (at home and abroad) and increase the imports of manufactured goods. An increase in scale, given the small size of the domestic market, could only be accomplished by increasing exports. Consequently, the general impact of increased scale and specialization by manufacturers would be an increase in the international two-way flow of similar goods, or intra-industry trade (IIT). This would show-up as a simultaneous increase in both imports and exports for those industries undergoing rationalization. There also would be an increase in the ratio of purchased material to value-added.

The process by which intra-industry trade is created has two distinct aspects. One is related to firms engaging in product specialization. When a firm concentrates on the production of just its major product line and exports that line, it may purchase the dropped minor lines from other specialized producers in the industry at home or abroad in order to continue offering a complete product range to its customers. Such actions, as already noted, would increase both imports and exports of similar goods produced within the industry and create intra-industry trade.

Instead of purchasing the minor lines itself, the specialized producer could let firms in the wholesale sector purchase them for inclusion with the major line purchased from the specialized producer. In this case, unless the imports by the wholesaler are consolidated with those of the manufacturer, specialization would not result in intra-industry trade being recorded in the international trade data for the manufacturing sector alone. This is because

the imported goods would be recorded in the wholesale sector's activities rather than in the manufacturing sector's so that imports would not appear to be increasing as manufactured exports increased.

Foreign-controlled manufacturers in Canada would be more prone to act as their own wholesalers, compared to Canadian-controlled firms, because they can purchase minor lines and components from foreign affiliates. The subsidiaries act as both manufacturer and wholesaler in this circumstance. Since both these activities would be caught in the measurement of the trade data for the manufacturing sector, specialization by the subsidiaries would show an increase in intra-industry trade. Canadian-controlled firms would be more apt to let wholesalers perform this task since they lack the necessary international affiliations to engage in it. Also, because of their access to international affiliates, the subsidiaries should also be able to use them as wholesalers and thereby gain access to international markets. This would tend to raise the export propensities for major product lines by the subsidiaries, even as their import propensities with affiliates for minor product lines would also be raised, relative to their Canadian-controlled counterparts. Therefore, it would be expected that the higher the level of foreign investment in an industry, the higher would be the industry's level of international intra-industry trade.

The second component causing intra-industry trade is related to the process of production specialization. Manufacturers attempting to improve their unit costs would contract-out the manufacture of semi-finished materials and components to more efficient domestic and foreign suppliers (as well as switching purchases between domestic and foreign sources of supply as

relative prices changed between countries and producers). This would cause imports to increase for the supplying industries, particularly since Canadian suppliers tend to be high-cost producers because of their small scale and diversity. At the same time, manufacturers in the supplying industries that were attempting to reduce their unit costs to internationally competitive levels by engaging in product specialization and increased scale through exports would increase the exports of these same supplying industries. The combined events of increased imports through foreign sourcing by manufacturers outside the supplying industry along with increased scale and specialization through exports by manufacturers within the supplying industry (both of which are a response to freer trade and increased competition) would result in an increased two-way international flow of goods for industries producing such intermediate goods.

IIT as an Adjunct to Traditional Trade Theory:

The adjustment in resources and trade flows outlined above is different than would be expected or predicted by the traditional theory of trade using the Heckscher-Olin-Samuelson model (HOS) of comparative advantage. In the HOS paradigm, resources are reallocated between firms in different industries as competition is increased from international sources of supply. This is in distinction to the reallocation of resources, according to the IIT paradigm, that takes place mainly within firms in an industry. Also, the adjustment in trade flows in the HOS model would result in exports increasing and imports declining in industries with international comparative advantages, and the opposite happening in industries with disadvantages. In the IIT model, imports and exports would be expected to rise simultaneously in many industries. The different results between the two approaches results largely

from the different emphasis in each model. The IIT model is based on the firm as the adjusting agent whereas the HOS model is based on the concept of industries. This difference is elaborated upon more fully below because of its importance for trade and industrial policy for Canada.

In the HOS model, it is not possible for firms to reduce costs through productivity improvements (such as by engaging in increased scale and specialization), because they are all assumed to be producing to international levels of efficiency. Any cost problem is presumed to be due to the relatively high domestic price of one or more of the firms' major inputs which cannot be reduced further because of the high domestic demand for them, relative to supply. Consequently, since the firms cannot change the prices of inputs and given the internationally competitive output prices in the industry, firms with cost disadvantages must close down and the resources they utilized have no alternative but to leave the industry and seek employment with other firms in industries that are internationally cost-competitive. The opposite would be the case for those industries in which products can be produced with comparative cost advantages because of low input prices, compared to other countries, arising from the relative abundance of major inputs. As a result, the resource reallocation process in the HOS model caused by increased international competition, is achieved by labour and other inputs moving from industries with increasing import penetration (relative to market size) to industries with increasing export success.

The HOS model can be adapted to handle the case of firms improving their efficiency through the use of the concepts of increasing returns to scale and

forced changes in a nation's endowment levels of critical inputs. This brings it closer to the intra-industry resource reallocation results predicted by the IIT model. But, the underlying idea of comparative advantages and disadvantages at the level of industries still remains with its concomitant prediction that import and export propensities will move in opposite directions for an industry as trade is liberalized. The problem is that this prediction is inconsistent with the actual developments in trade patterns more recently in which there have been simultaneous increases in the propensities and which are better explained by the IIT model. Further, the concept of specialization by industry (based upon some relatively large endowment of a factor of production in a country), rather than by firm, seems to be increasingly less relevant in an era of increasing international flow of resources, people, technology and knowledge along with the ability of nations to change their endowments of factors through public policy.

a) Factor endowment ratios. Normally, because of the long lead-time needed to alter endowment ratios, they are usually taken to be fixed. But this assumption now appears to be less valid than supposed, based on the evidence that some nations have developed industrial strategies on the premise that they are changeable and have been able to quickly change them (relative to historical standards). This approach to public policy uses what is called the "dynamic" comparative-advantage model and is often combined with attempts to ensure any increased stock of factors is available particularly to home-country exporters so that they can compete in international markets. It has particular application to the Pacific-Rim countries and helps to explain their success in penetrating the international markets for high-technology goods in recent years. (1-14) Consequently,

there is no longer the same justification for believing that the availability and prices for factor inputs (other than unskilled labour), are relatively different between countries and significantly influence which manufactured products will be imported and exported. Instead, it is the ability to be internationally productive and cost competitive within firms, rather than industries, that determines which products will be exported and imported. Further, if comparative advantages do exist, they are often acquired and are firm-specific rather than industry-specific (such as a technological lead, a marketing advantage or an expertise in management). Exports determined by which firms have specific advantages results in intra-industry rather than inter-industry resource reallocation as some firms become "winners" while others become "losers" within an industry on the basis of their firm-level advantages.

b) Recent Developments in Trade Patterns. As already noted, the results of the two models are different with respect to how import and export propensities would be expected to change over time. In an HOS world, international trade flows would be inter-industry and resources would be attracted into the firms and industries that were successful in export markets from those firms and industries that were not. The products with a comparative advantage would differ from country-to-country depending upon the resources that were relatively abundant and cheap in each country and the relative amount of them used in each product. Trade would then be possible in different products between countries, with each country specializing in the products of some industries for export and importing the products of other countries' industries. Industries in which producers were internationally competitive would have increasing export propensities and

decreasing import propensities. The opposite would be the case for industries in which the products were produced by manufacturers who were not internationally cost competitive. Thus, export propensities would increase and import propensities decrease for some industries in a country while the opposite would happen for other industries.

In the IIT model, the resource reallocation is mainly within firms in an industry as they reduce their inefficiency and become internationally competitive. As a result, both the import and the export propensities would increase for an industry in which this rationalization process is going on, as has already been discussed. One of the dominant features of international trade over the past twenty years has been the simultaneous increase in both imports and exports, across a wide range of industries in the manufacturing sector, between the industrialized nations which have relatively similar factor endowment ratios. (1-15) At the same time, there has been an absolute decline in the level of employment in manufacturing. These relationships are explainable, at least in part, by the IIT model. The IIT model not only explains the increase in both propensities but also explains the reduction in manufacturing employment through the improved efficiency that accompanies the increased scale and specialization which underlies increases in IIT. Therefore, the IIT paradigm appears to have some relevance in explaining actual trade flows which are not handled as well by the HDS model. (The major exception to the simultaneous growth in both propensities across a wide range of industries is for Japan. An explanation of this is the Japanese insistence on quality products and reliability in suppliers because of their use of "on-time production and inventory control methods. This precludes imports from distant suppliers in the industrialized nations

and a consequently higher propensity to use Japanese-made components. Therefore, Japanese imports have not risen commensurate with exports as they have elsewhere).

Integration of the IIT and HOS Paradigms:

The intent is not to leave the impression that the IIT model is better than the HOS model. In fact, the two models are complementary since they explain different phenomena in the trade data even for a given industry. The HOS model is useful for explaining the basic trade balances and trade flows that have developed in the past for many manufacturing industries (particularly those that are heavy users of primary materials and resources in which Canada has a comparative advantage). It is also useful for explaining Canada's relatively large exports from the resources sector. But the IIT model is relevant for explaining the changes in these trade balances and flows more recently as the trade environment has changed and inefficient manufacturers have been forced to improve their unit costs in order to survive. In other words, the IIT paradigm extends rather than replaces the insights provided by the HOS model when international trade is made freer in a country that has small-scale and diversified manufacturers. In this case, any subsequent resource reallocation process is mainly within firms in an industry as they reduce their inefficiency and become internationally competitive.

The IIT paradigm is particularly appropriate for analyses of Canadian trade flows because the assumptions in it accord well with the cost and trade environment here and more recent changes in them. Canada is moving from being a small, protected economy that has inefficiently used resources in the

manufacturing sector, toward being an open economy with increasing competition, freer trade and consequently more efficient resource reallocation. The changes in trade flows that have resulted from this are better explained by the IIT than the HOS model because of the relevance of its assumptions in describing such an environment.

However, the differences in the two models do lead to somewhat different commercial and industrial policies. In the case of inter-industry trade, the policy stress is on picking potential winners based on assumed prior knowledge of what are the industries with comparative advantages, along with subsidies for the firms in these industries to promote exports and assist them in becoming international "stars". The IIT model stresses resource reallocation within firms as a country moves from a closed economy with small domestic markets and manufacturers to an open economy with competition in its markets from internationally efficient firms. Resource reallocation is largely within firms in an industry as they build on their firm-specific advantages, specialize and increase their scale through exports. This is in contra-distinction to resources being reallocated between firms in different industries according to the HOS model. Thus, resource reallocation would be expected to be quicker and smoother with intra-industry trade which considerably reduces the costs of dislocation and unemployment and the need for government assistance to smooth the transition process. Also, there is emphasis on increased exports through cost reductions and internal decision-making by the firms themselves rather than the promotion of exports through government-initiated responses.

Policies to identify potential stars are particularly difficult to apply

in Canada because of the relatively large number of smaller plants that have a productivity problem, as noted in Table 1. Thus, the development of an industrial policy here based on the HOS paradigm, poses a policy dilemma for governments. The likelihood of a significant number of these firms surviving and growing is not high. The birth rate of small firms is high and they are the potential source of tomorrow's "stars", but the death rate is also high. This situation is further complicated because the type of knowledge at the micro level that is required to predict with some accuracy which firms will succeed and are worthwhile subsidizing is not available to governments. The information required on such items as the products, markets and management ability of the firms that are likely to survive does not exist even among the firms' bankers who have a day-to-day working relationship with them. It is unlikely government planners, who are further removed from the situation, would be able to identify the winners ahead of time. The type of knowledge needed to implement an industrial strategy that requires picking potential winners just is not available in either the private or public sectors.

The use of the IIT paradigm, however, would suggest there is no need to try and pick winners ahead of time. Instead, it indicates that since only each firm is capable of deciding where its comparative advantage lies, let each one do so along with allowing them to develop the necessary strategies to take advantage of it in international markets. In this situation, the main policy role of the government may be limited to just advising manufacturers the reasons for them being high cost producers so that they can more quickly see the the route to cost-reduction is through increased exports, scale and specialization. The also gets around the emphasis, which flows from the HOS model, on identifying industries that could have

advantages based on present factor endowment ratios and its inherent short-range viewpoint. It detracts from perhaps more appropriate longer-run public policies directed at changing areas of comparative advantages (such as through better management training and increased funding of the social and management sciences to determine ways of encouraging faster adoption of known technical changes) to overcome deficiencies in stocks of resources.

For all the above reasons, plus the need to assess the strength of the increase in intra-industry trade because it provides an indication of the degree to which manufacturers are appropriately responding to their changing trade environment, it is important to establish the extent of and growth in IIT in Canadian trade flows both internationally and domestically. One of the major tests used in this study for the existence and extent of IIT, is the association of high and increasing import propensities with high and increasing export propensities across industries. This would be in distinction to the inter-industry adjustment process in which high and increasing import propensities would be associated with low and decreasing export propensities (and vice versa). Such evidence for the existence of IIT in the trade data for the Canadian manufacturing sector, as well as the extent of it relative to total trade, is the major focus of this study.

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CHAPTER TWO

THE CHANGING TRADE ENVIRONMENT FOR CANADIAN MANUFACTURERS

Features of Post-WW II Trade:

One of the major features of trade in manufactured goods since WW II has been the growth in the two-way flow of similar items (i.e. differentiated but closely substitutable products) between the industrial nations. (2-1) The value of total world trade in current prices increased by over ten-fold between 1955 and 1976, from about \$90 Billion to almost \$1000 Billion, with manufactured goods increasing its share by about twenty percent, from 48% to 58% of the total. About sixty percent of the increase in the trade of manufactured goods was between the industrial nations in Europe and North America. It has been estimated that about sixty percent of total trade is now of the two-way type in which an industry both imports and exports its products. (2-2)

Another major feature has been the relatively static nature of total employment in the manufacturing sectors of the industrial nations as a whole, with some nations even recording declines, while the level of trade has grown substantially. In the case of Canada's manufacturing sector, both the import and export propensities for manufactured goods increased by fifty percent between 1966 and 1979 (and this simultaneous growth in both propensities was also observed for many individual industries). This represents a significant growth in international trade for Canada relative to domestic production and consumption. (2-3) Yet, employment here for the total manufacturing sector

increased by only seven percent.

The growth in international trade was paralleled by a similar change in levels of domestic trade, as measured by the ratio of purchased material to value-added. Between 1966 and 1979, this ratio increased for the manufacturing sector in Canada by twenty percent. (2-4) An increased level of trade in intermediate and final goods between producers, as firms contract-out to improve unit costs, raises the value recorded for purchases relative to value-added even though net economic activity is unchanged. The reason is that this trade between firms, where goods are purchased rather than internally made within the buying firm, increases the "double-count" of economic activity.

The traditional theories of trade do not explain these phenomena as well as does the IIT paradigm. For instance, they explain trade in dissimilar rather than similar goods. And they rely on the existence of different factor endowment ratios in each country to produce the different costs that are needed to cause trade flows from low to high-cost countries. Yet, much of the increase in post-WW II trade is in similar goods and the industrialized nations have similar endowment ratios. Further, the traditional trade models predict that any increased level of trade should be accompanied by increased rather than static or decreased employment in the manufacturing sectors of such countries.

Environmental Factors Influencing Trade:

It appears the Post-WW II trade patterns have been shaped by influences other than just those normally emphasized by the traditional trade models,

although some of the changes in the trade environment are consistent with them. For instance, there has been a significant decline in the barriers to trade, including reduced tariffs, lower transportation costs and cheaper communications. There also has been a noticeable increase in the number of producers in the last decade or so in the Pacific-Rim countries which has added to the degree of competition in many national markets. These factors would account for some of the increased levels of trade and would be consistent with the usual models. However, when this movement to freer trade is combined with the existence of small, high-cost producers then the IIT paradigm provides a better explanation of the observed changes in the pattern of trade and employment.

Prior to, and immediately after WW II, most of the industrial nations had highly protected domestic markets as a result of the depression in the 1930's and the erection of trade barriers to maintain domestic levels of employment. In the case of the European nations and Canada, each national market was small relative to the rate of output that could be produced by a world-scale production facility. This was not the case for the U.S., since it had large domestic markets with free trade internally. Consequently, producers there had been able to specialize and produce at large and efficient rates of output much earlier than those in most of the other industrial countries, without having to rely on export markets to absorb the output from the large, efficient plants in the U.S. However, producers in countries with small national markets could not achieve access to world markets because of trade barriers along with their high costs and were relegated to being relatively small and also diversified in order to achieve full utilization of their plants. Consequently, production in these

countries was relatively inefficient, by U.S. standards, as a result of producers incurring the product and plant-specific diseconomies of scale associated with being small, diverse manufacturers.

However, the series of trade liberalization agreements entered into over the past twenty-five years as a result of GATT-sponsored negotiations (the effects of which have become strongly cumulative by the mid-1980's) have allowed manufacturers in the smaller industrial countries to specialize and increase their scale by being able to take advantage of the opportunities these agreements created for increased exports. Further, those that have not voluntarily done so are now being forced to do so in order to survive because of the increased competition which has accompanied trade liberalization and the growth of new producers. It is this combination of small, diversified manufacturers in a world of increasingly freer trade and increased competition that has resulted in the particular type of trade flows termed IIT and the employment changes noted above.

The increased competition resulting from trade liberalization and more producers forces domestic prices down. Domestic firms must improve their productivity and reduce costs if they are to survive. They can do so by increasing their scale through exports and reducing their diversity through specialization. Firms may specialize in products that are differentiated in order to find a market niche in which they can excel and succeed in export (and domestic) markets. At the same time, similar but differentiated products are imported to satisfy the demand of domestic consumers. Diversity is reduced by contracting-out the production of finished goods and components to domestic and foreign suppliers so that purchased materials increase

relative to value-added. The increased efficiency in production, as a result of increased scale and specialization, maintains a relatively constant level of employment as levels of output are increased. The net result, as already outlined in the prior chapter, is that both imports and exports increase simultaneously in those industries undergoing rationalization, while domestic employment remains relatively constant.

Canadian Lag in Adjusting to Changed Trade Environment:

The Western European nations moved toward larger market size and free trade internally some time ago with the introduction of the European Economic Community (EEC) and other common market groups. This has allowed the producers in these nations to move toward increased scale and specialization along with lower unit costs that are closer to those achieved earlier by U.S. producers. It also explains the earlier development of two-way trade flows in similar products between the European countries relative to Canada. Japan also has a much larger national market than Canada which has allowed producers there to move toward higher levels of scale, specialization and unit costs without having to resort to external trade to do so. The Japanese experience is similar to that for the U.S. and helps to explain why both countries have much lower levels of two-way trade than for Canada and individual European countries (although the Japanese inventory control methods, using "on-time" delivery and production procedures, have mitigated against the extensive use of contracting-out to foreign suppliers and large increases in imports because of the logistical problems associated with doing so).

Canada has lagged the rest-of-the-world in moving toward increased scale

and specialization as evidenced by the relatively large number of small manufacturers here (Table 1-1) who have continuing high costs relative to U.S. producers. This cost premium has historically ranged from twenty to forty percent for several decades, although it has tended to narrow more recently. (2-5) But, its chronic nature reflects the continuing different degrees of scale and specialization between the two countries as well as different qualities of management as indicated by the slower adoption of state-of-the-art technologies. This cost premium persists in spite of the availability from the rest-of-the-world of the latest management and technical knowledge, relatively similar factor stocks and similarity of wage rates with those in the U.S. This suggests it is the different degrees of scale and specialization as well as the quality of management between the two economies that are causing the basic structural cost problem for Canadian manufacturers.

Therefore, it would appear Canada has the most to still gain of all the industrial nations from the movement to freer trade in terms of improved productivity, lower unit costs and higher real incomes that would accompany increased scale, specialization and two-way trade. This has been confirmed by recent research which shows there would be significant improvements in productivity and real incomes if Canada unilaterally adopted a policy of multilateral free trade. There would also be a doubling in the volume of trade for manufactured goods, with a significant increase in two-way trade as manufacturers specialized, increased their scale through exports and contracted-out to more efficient suppliers at home and abroad. The net result would be considerable growth in employment within the manufacturing sector. (2-6) Another study also found that an increase in scale and

specialization would significantly reduce the unit costs of Canadian manufacturers. While this latter study was based on a small sample of thirty firms, rather than the whole manufacturing sector, and was biased toward small to medium-size producers, it showed that cost reductions averaged about twenty percent. This is close to the unit cost gap that currently exist between Canada and the U.S. Such cost reductions generally in the manufacturing sector would help to boost exports and employment as well as two-way trade as the firms specialized, export and import major and minor product lines as well as components. (2-7)

Consequences of Lag for Canadian Trade:

The high unit costs of production in Canada, relative to countries with firms that are larger in scale and more specialized, has affected the nation's relative trade performance over the last decade or so. There have been major shifts in trade patterns world-wide and they have not been advantageous to Canada. This shows-up in Canada's large net trade deficit on manufactured goods that increased over the 1970's as well as in the declining share of world trade held by Canada. The decline in market share has been masked, however, by the increased volume of world trade which has caused total Canadian exports to increase even as market share declined. The impact of high costs and declining market share show-up in the data shown in Table 2-1 on the increases in the volume of exports (i.e. real rather than nominal dollar flows), by selected countries for the period 1970-1979.

TABLE 2-1

Increase in Volume of Exports
Manufactured Goods
1970-1979
Selected Countries

<u>Country</u>	<u>Percent</u>	<u>Ratio:</u> <u>U.S. = 1.00</u>
Japan	122%	1.54
Italy	110	1.39
France	103	1.30
Netherlands	89	1.13
United States	79	1.00
Canada	70	.89
Germany	63	.80
United Kingdom	55	.70

Source: Report of the President on U.S. Competitiveness, op. cit., Table 111-8.

The decline in the Canadian share of world trade is also noticeable in the data on the source of imports, by country, for the U.S. as shown in Table 2-2. While this Table is for U.S. imports only, that market represents the major one for Canadian exports. Also, while other countries may be increasing their imports at the same time as they increase their exports to the U.S. and reduce Canadian market share there, these other countries have not increased their imports from Canada sufficiently to offset the loss of Canadian market share in the U.S. Hence, the widening trade deficit for Canada on manufactured goods. This inability to be cost and price effective so as to penetrate markets in the developing and Pacific-Rim countries is creating a major trade problem for Canada and helps to explain why our world market share has declined in the past fifteen years or so.

TABLE 2-2

U.S. Import Shares
Manufactured Goods
1967 and 1976

<u>Source of Supply</u>	<u>Percentage of Imports</u>		<u>Change in %</u>
	<u>1967</u>	<u>1976</u>	
Canada	26.5%	24.6%	(1.9)%
EEC (9 Countries)	28.4	20.5	(7.9)
	-----	-----	-----
	54.9	45.1	(9.8)%
Japan	14.0	18.9	4.9
Taiwan, Mexico, Hong Kong	4.9	9.3	4.4
Developing Countries	15.8	21.7	5.9
	-----	-----	-----
	34.7%	49.9%	15.2%
Miscellaneous	10.4	5.0	(5.4)
	-----	-----	-----
Total	100.0%	100.0%	0.0%
	-----	-----	-----

Source: I.T.C., Canada's Trade Performance, 1960-1977,
op. cit., Table 7-9.

The changing patterns of international trade captured in the above data for the 1970's are partly a result of the improved unit costs of the producers in other countries as they increased their degree of scale and specialization and also improved the quality of management. They also partly reflect the improvement in unit costs arising from increases in the relative availability of key factor inputs such as knowledge, labour skills and net investment in capital goods for some of these countries. The rates of growth in net capital stock as well as knowledge and skilled labour through education and training have exceeded those for Canada in many cases as is shown by Table 2-3.

TABLE 2-3

Factor Endowment Ratios
Selected Countries

Country	<u>Capital Per Worker</u> <u>Constant 1966 U.S.\$</u>		<u>Skilled Labour</u> <u>Per Worker</u>	
	1975	<u>1975</u> 1963	1975	<u>1975</u> 1963
Japan	\$ 8242	3.35	7.79	1.50
Korea	1003	4.16	3.06	1.52
Mexico	2969	2.02	6.53	1.52
Germany	9422	1.66	12.07	1.44
France	11353	2.01	14.43	1.46
Italy	6560	1.70	8.03	1.52
U.S.	11270	1.22	14.35	1.16
Canada	12463	1.38	13.73	1.20
U.K.	6010	1.64	12.79	1.48
Netherlands	8984	1.64	14.77	1.44
Sweden	12438	1.61	19.15	1.31

Source: Adapted from Report of the President,
op. cit., Tables V-1 and V-2.

Note: Skilled labour is the number of professional,
technical and kindred employees.

The comparisons in Table 2-3 should be interpreted with caution since many of the countries are in different stages of economic development which would influence the ratio of capital per worker. Other non-comparabilities also exist. However, the highest rates of growth in capital per worker were for the Pacific-Rim and EEC countries. The relatively low rate of growth for Canada reflects in part the initially high level from which it started in 1963.

Note that the rate of growth in skilled labour per worker in most countries was over twice as great as that for Canada with the only exception being the U.S. This reflects in part the higher levels from which Canada and the U.S. started relative to the developing and Pacific-Rim countries. But,

this does not explain the lower growth rates relative to the other industrial nations. It is consistent with the fact that the U.S. and Canada were among the countries with the largest fall-off in productivity and international market share of all the industrial countries over the 1970's. In addition, the Pacific-Rim countries concentrate their key factor inputs in the export-producing sector so that they are not far behind Canada and the other industrial nations in terms of their access to the knowledge and skills needed to be competitive in international markets (Table 2-4). The growth in the stocks of factors has continued in these developing countries into the 1980's, so that it would be reasonable to conclude that their ability to be competitive has increased even further. Canada's future comparative advantage would appear to be in those goods requiring large inputs of capital, primary materials and resources unless it is prepared to adopt public policies to improve the knowledge and skills of its work force.

TABLE 2-4

Capital and Skilled Labour Per Worker
Embodied in Manufactured Exports
Selected Countries

<u>Country</u>	<u>K/L Ratio</u>		<u>S/L Ratio</u>	
	1975	<u>1975</u> 1965	1975	<u>1975</u> 1965
Japan	\$10493	1.17	9.1	1.28
Korea	5229	.47	4.5	1.37
Mexico	13463	.81	8.8	1.28
Germany	10326	1.00	9.6	1.00
France	10147	.92	9.1	1.11
Italy	8339	1.09	7.3	1.01
U.S.	9206	.99	12.4	1.08
Canada	14224	.75	9.8	1.04
U.K.	9350	.96	10.6	1.09

Source: Adapted From Report of the President,
op. cit., Table V-5.

Table 2-4 shows, as would be expected, that based on the relative factor endowment ratios shown in Table 2-3, Canadian manufactured exports contained high levels of capital per worker because of the large amounts of primary material and resources embodied in them, which are manufactured by capital-intensive production techniques. However, the content of capital per worker in Canadian exports declined between 1965 and 1975, as it did for most countries. The skilled labour per worker in Canadian exports was not much different by 1975 than for Japan and Mexico (reflecting their ability to concentrate these skills in their export sectors) and the EEC countries. The U.S. had the highest ratio in its exports, but the Pacific-Rim countries and Mexico were closing the gap between themselves and the other industrial nations. Korea, one of the lesser-developed, Pacific-Rim countries was exporting goods with low capital and skilled labour per worker, although the skilled labour content was increasing quickly. Because of the relatively low wages in Korea and similar countries, their exports of unskilled-labour intensive goods would be extremely cost-competitive relative to similar Canadian goods destined for export and domestic markets.

Summary:

Canadian manufacturers exist in a volatile environment that is undergoing significant changes leading to increased competition unknown here in this century. World trade patterns are undergoing realignment as factor endowment ratios change in many countries and those in the developing and Pacific-Rim countries are approaching those of the industrial nations, including Canada. Most of the industrial nations have reallocated resources, or are well along in the process of doing so, within their manufacturing sectors to more efficient uses through manufacturers increasing their levels

of scale and specialization. Canadian markets have traditionally been highly protected so that Canadian manufacturers have been slower to respond to this changing environment. But, it is no longer possible to ignore these influences since Canadian barriers to imports are falling and cost-competitive goods produced elsewhere are entering markets served by Canadian manufacturers. Consequently, the share of world markets held by manufacturers in Canada has declined. The major causes of the high unit costs of production here are related to the small scale and diverse nature of production systems in Canada along with a less skilled management sector.

It is important that domestic manufacturers identify their strengths, or areas of comparative advantage, and specialize in those products and production activities that can utilize them most effectively and give the companies dominance in a niche within the international markets for their products. The firms themselves can also develop strengths internally through increased training and education of workers and management. The opportunity to specialize and grow that is provided by export markets would then allow them to reduce their costs and find an international market niche.

It is important that Canadian manufacturers catch-up to the rest-of-the-world in terms of adapting to the changing trade environment through increased scale and specialization. These private sector initiatives may have to be accompanied by public sector initiatives to improve the quality of management education and the skills in the labour force. No doubt many manufacturers have made such a transition over the past few years as competition increased and they had to reduce costs in order to survive. Chapter five will explore for evidence of such behaviour. But, more of it

will be needed in the future. In the process of improving their unit costs, there should also be an increase in intra-industry trade. The next chapter will review the development of the IIT concept in the international trade literature and relate it to studies done on the trade in manufactured goods for Canada and other nations.

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- 2-5. Ibid., Chapter 2.
- 2-6. Harris, R. and Cox, D., as reported in au courant, (Ottawa: Economic Council of Canada, 1983, Vol. 4, No. 3), page 8. Their study shows that with complete multilateral free trade by Canada there would be an increase in the size and specialization of manufacturers that would significantly improve productivity, increase real incomes and boost the output of manufactured goods. At the same time the volume of trade would almost double due to the increase in two-way trade as both imports and exports increased as a result of increased specialization and greater contracting-out.
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CHAPTER THREE

LITERATURE REVIEW AND ANTECEDENT STUDIES OF IIT

Introduction:

This chapter will review the historical development in the international trade literature of the major ideas associated with the IIT model along with the major criticisms of it. It will also present the results of the major prior studies on IIT, with particular emphasis on those that are related to Canada. The analysis will be undertaken from the standpoint of assessing the relative importance of the concepts from the traditional trade theory models (i.e. relative factor endowments and comparative advantage) and from the IIT model (i.e. product-specific economies of scale and product differentiation) in explaining levels and changes to them more recently in Canadian production, exports and imports for manufactured goods. It will also touch on the two related issues of intra-firm trade by the subsidiaries and the transfer prices used in recording it.

IIT Themes in the Literature:

Grubel and Lloyd are generally credited with presenting the first full theoretical description of IIT along with an empirical analysis covering the 1960's for Canada and the other industrial nations. (3-1) Their basic contribution was to explicitly state the relationships between increased competition from freer trade, the response by manufacturers to this change in the environment in the form of increased scale and specialization, and a consequent increase in IIT. They also developed an index for measuring the

extent of IIT in the total trade data for a country that is still extensively used by researchers.

Grubel and Lloyd's work drew on prior developments, which were mainly in the literature on industrial organization and micro economic theory. Their major contribution was in pulling them together and relating them to emerging themes in the international trade literature. It is of interest that the developments in the industrial organization literature were partly Canadian in origin and a result of research here on the reasons for the long-standing non-competitiveness of Canadian manufacturers. This research attributed the high unit costs of Canadian manufacturers to their small size and diversity which created product-specific diseconomies of scale. (3-2) In turn, the Canadian research was based on concepts developed earlier by Alchian and Hirschleifer and which have been applied more recently by the Boston Consulting Group as learning-curves and by other researchers in the U.S. (3-3) The basic idea of these prior developments was that the productivity of manufacturers in smaller, protected economies is influenced more by the length, frequency and total cumulative output of the production run for a particular product model, along with the techniques of production used to make it in a plant of a given size, than by changes in the plant's size or scale. Thus, even a relatively large plant that was diversified in its products and production activities would be high-cost in spite of its scale. However, recognition is also given to the traditional concept of plant-specific diseconomies of scale in that, given a level of diversity, the smaller the plant then the larger is the cost premium.

The concept of product-specific diseconomies of scale was combined by

Grubel and Lloyd with the then emerging idea of differentiated products from the literature on micro-economics, in which basically similar goods become non-substitutable in the minds of consumers because of their different characteristics which could be created by advertising and other forms of product differentiation. (3-4)

It is the two concepts of product differentiation and the capability to achieve cost reductions through increased specialization within a plant that form the basic two postulates of the IIT model. They were used to modify and extend the standard trade models based on comparative advantage (Ricardian model) and factor endowment proportions (Heckscher-Olin-Samuelson, or HOS model). The result was a paradigm that is useful in explaining the development of the IIT trade flows that have become such a dominant part of international trade over the past two decades or so.

The need for this new paradigm became apparent during the 1960's because of the changes taking place in the trade environment. New constructs were needed to explain such trade phenomena as the export of Volvos from Sweden to Germany and the return flow of Volkswagens from Germany to Sweden. The Ricardian and HOS models were not particularly appropriate for doing so because they do not adequately explain the two-way flow between countries in basically similar, but differentiated, goods produced in the same industry. Instead, they explain one-way flows of dissimilar goods from different industries in different countries. The work of Leontieff, which showed the U.S. exported relatively labour-intensive goods when the HOS model predicted it should export capital-intensive goods, also cast some doubt on the efficacy of the HOS model.

The Ricardian model, based on the concept of relative productivity differences between countries, did, however, stand up reasonably well to empirical testing. The tests showed a significant correlation between the productivity advantages of a country and the share of export markets held by its products. (3-5) But, it did not explain why the countries exported some of all goods, including those in which they appeared to have labour productivity disadvantages, since the model only allows for one country exporting the goods in which it has productivity advantages and importing other goods for which another country has the advantages. It is possible some of the unexplained trade was of the IIT variety. The Ricardian model, based on productivity differences, has some applicability. But it clearly needs some additional concepts to adequately explain more fully the two-way flow of similar goods actually observed in the world.

A major reason for the limited applicability of the HOS model is its restrictive assumptions. For instance, the HOS model assumes that capital is immobile between countries. Yet, one of the significant developments since WW II has been the large international flow of direct foreign investment of which Canada has been a major recipient as evidenced by manufacturing assets here being over fifty percent controlled from abroad. Attached to these flows are significant and continuous transfers of management expertise and technological information on an intra-firm basis. This casts some doubt on a key assumption of the HOS model that trade is due to major differences in relative factor endowment ratios between countries. In fact, there have been major levelings of such differences due in part to capital flows and in part due to government policies. Indeed, as Table 2-3 shows, at least for the industrial nations, significant differences in factor endowment ratios do not

exist and the access each has to the other's factor stocks through direct foreign investment reduces even further the meaningfulness of this idea. At the same time, trade continues to grow between these countries.

There are also other restricting assumptions that affect the ability of the standard HOS model to adequately explain more recent developments in trade flows. There are two in particular that will be stressed here. They are the assumption of uniform productivity and the assumption of product homogeneity. The assumption of uniform productivity means that unit costs cannot vary between countries because of differential inefficiencies in production. The production of any given good is assumed to be the same across all countries. It is ensured by assuming that in each country there are: identical production functions; identical and homogenous inputs of labour and capital; and constant returns to increased scale of output. Uniform goods are ensured by the assumption of product homogeneity no matter what firm or country produces them. It is in terms of these two key concepts that the IIT model differs most from the HOS model.

The assumption of uniform productivity in the HOS model is particularly troublesome when trying to adapt it to handle analyses of the Canadian trade situation. As has already been noted, Canada has had a persistent productivity gap with the U.S., and more recently with other countries such as Japan. The European nations have also had a similar problem because of their formerly protected trade environments which led to the development of small firms with high levels of diversity. Given a situation in which there is not uniform productivity, the introduction of trade liberalization and increased competition would lead firms that wish to maintain their ROI's, to

specialize and increase their scale through exports. It is this connection between the need for improved productivity and changes in trade data over the last decade or two that is the important point. The HOS model is not designed primarily to allow for such non-uniform productivity between countries for similar products.

The assumption of product homogeneity also is troublesome in a world where, outside of basic industrial goods, a large proportion of products are highly differentiated because of quality and style differences. Also, there often is a connection between specialization and differentiation. A move toward increased specialization leads firms to select products in which they have firm-specific advantages. In order to be successful in export markets, firms may have to develop a product that is differentiated from those of their competitors so that they can acquire a reasonable share of the market. The product differentiation could be based on any of several potential sources of internal strengths in a firm (or that can be acquired by it) in such areas as the design or quality of the product, innovative management, or some special skill in production. In this view, the concept of comparative advantage and different relative factor endowment ratios has some meaning in determining which producers and which products will survive. But, it is a distinction at the level of the firm rather than at the level of the country as a whole although national endowment ratios would influence the ability of firms to acquire or develop firm-level comparative advantages. (3-6)

Manufacturers with advantages because of country-level endowments, or because of advantages developed and acquired at the level of the firm, could also have first-mover advantages because of them. The combination in some

degree of first-mover, endowed and acquired advantages would give them market power. (3-7) A firm could engage in specialization and be at the appropriate scale so that it would be competitive in international markets. But, without some differentiation arising from an advantage, its products would be homogenous with those of competitors and would have to compete for market share on the basis of price alone. While such markets may be easier to enter, it is usually difficult to make a profit in them because of the need to maintain productivity and costs at international levels while being subject to the discipline of price. But, the price discipline is less severe for firms with differentiated products.

There are some implications of this IIT model, which combines the ideas of plant specialization and product differentiation, for industrial policy. One is that some firms in an industry may be successful in adapting to the changing trade environment while others will not because they lack any firm-specific advantage. This is unlike the HOS and Ricardian trade models which predict that in an internationally competitive industry all firms should thrive while those in non-competitive industries would all have to leave it. The concept of differentiation, in particular, puts a different emphasis on industrial strategies since it makes it more difficult to predict which firms will succeed and which will fail. Only the test of competition and survival can sort out this problem. In this context, government policy should emphasize creating a stable cost environment that will aid the firms in becoming specialized and competitive along with policies to ensure an adequate supply of the appropriate factors that will give them country or firm-level advantages (such as management expertise and skilled workers) rather than trying to pick the firms ahead of time that might be winners.

The concept of differentiation can also explain IIT even without the use of the concepts of firms increasing their scale and specialization, although the model would be more limited in its applicability. For instance, the firms in an industry could be specialized, large-scale producers with world-efficient unit costs. The basic trade balance for the industry would be determined by such firms and their ability to capitalize upon some comparative advantage arising from a relatively abundant factor of production in the country as a whole which is a major input into their products. In the case of Canada, products that use capital or materials and resources intensively could give their manufacturers such a cost advantage and allow them to export. Other industries producing products that do not use relatively low-cost Canadian inputs to any extent would be subject to competition from imports. The result in this case, even with specialized firms, would be inter-industry trade.

But, even with uniform productivity and products, it would still be possible for IIT to exist. Firms could develop and acquire areas of comparative advantage that would allow them to produce differentiated products based upon those advantages. Each firm would specialize in serving a particular market niche and achieve the plant and product-specific economies of scale associated with its product. Two-way trade would then take place between countries in the various differentiated products manufactured within the same industry (i.e. IIT) with firms in different countries specializing in the products in which they have successfully been able to differentiate themselves.

A Dissenting View on IIT:

There is not unanimity on the issue of the existence of IIT as a phenomena that requires adaptation of the HOS model to explain it. The basic criticism is that the data on trade are incorrectly recorded, which results in the anomaly of IIT. One way this could arise is if the allocation of imports and exports are to the same industry when they should be allocated to different ones. Consequently, what is actually inter-industry trade appears as IIT in the trade data. This could happen if industries are not disaggregated finely enough and different types of goods are captured in the data and classed to one industry rather than to the appropriate several different ones (the problem of categorical aggregation). (3-8)

An error in the classification of trade data could also develop if the definition of an industry is incorrect so that goods produced by different factor endowment ratios are classified to one industry. For instance, an industry that is internationally competitive because its products use a factor intensively that is in relatively abundant supply could be combined with one in which the products do not use the factor intensively, but use another that is in relatively short supply. The products of the first industry would be internationally competitive and exported. The latter industry would be import-oriented because its products would not be internationally competitive. The combination of the trade activity of the two industries would result in the appearance of IIT, when in fact the trade is inter-industry (the problem of overlapped trade). (3-9)

In terms of the Grubel and Lloyd index, which measures the ratio of IIT to total trade for an industry, both the errors of categorical aggregation

and overlapped trade have the same impact on the ratio and are empirically indistinguishable even though they are conceptually different. The critics of IIT hold that it is these errors which influence the Grubel and Lloyd index of IIT. Therefore, according to the critics, IIT is not a new phenomena that requires a new trade theory to explain it, but only an anomaly in the data and index that would be corrected if the data were correctly recorded.

Finger is a leading critic of the IIT paradigm and represents a considerable body of opinion which exists in the U.S. on this issue. In particular, in the Report of the President on U.S. Competitiveness which is referenced in the last footnote, Finger dismisses IIT as a statistical aberration of no consequence to U.S. trade policy. He was a major contributor to the President's report. His point is that the definition used to classify imports to industries is based on the SITC concordance which results in imports being allocated to industries that would have produced the products had they been manufactured domestically. The SITC industries are defined on the basis of the complementarity of the characteristics of the products in their final use, which is a demand-oriented definition. For instance, production and imports of both plastic and china cups would be allocated to the cup industry.

However, for purposes of economic analysis, industries are defined on the basis of the the SIC concordance which defines industries on the basis of the comparability, or homogeneity, of the factors used in production as well as on the basis of similarity of the proportions in which the factors are combined. By this definition, plastic cups would be allocated to the plastic

extrusion industry and china cups would be allocated to the pottery industry. The SIC definition is used for Census of Manufactures purposes rather than trade purposes.

If it is assumed that because of the relative factor endowment ratios in a nation, plastic cups are imported and china cups produced domestically and exported, then by the SIC definition there would be no two-way trade that should be recorded for either industry. However, the trade data collected using the SITC definition of the industries would actually record two-way trade since both imports and exports would be allocated to the cup industry.

The net result of the argument presented by Finger is that it is not possible to have intra-industry trade and this would be evident if the trade data were allocated to industries as defined by the economic criterion. It would not be possible, according to Finger, because factor endowment ratios must vary between nations. Therefore, there must be a difference in unit costs between countries for a given product. Thus, by definition, a nation must either export or import but cannot do both for the products produced in any given industry when the economic definition of an industry is used.

In order to determine the validity of this position, Finger tested to establish whether factor proportions varied more within an industry than between industries, defined on the SITC basis. If the test were to show that imports and exports were allocated to industries with widely different factor proportions then it would be possible for an industry to have exports allocated to it of a product that intensively used a relatively abundant factor while at the same time also having imports allocated to it of a

product that did not use intensively this abundant factor. Consequently, the variation in factor proportions would tend to be within industries rather than between them.

The test showed that approximately forty percent of the total variation in factor input ratios was within industry groups, at the 3-digit level of disaggregation. This assessment was based on the use of two input ratios: physical capital intensity (defined as non-wage value-added per employee); and human capital intensity. The 3-digit level of disaggregation is the one normally used in tests for IIT. Finer disaggregation reduces the possibility of there being categorical aggregation, but increases the possibility of defining IIT out of existence. The measurement of IIT depends upon the product groups being broad enough to capture trade in similar but differentiated products but not so narrow that only one product or variation in it exists for the industry. The 3-digit level is usually assumed to adequately balance these two conflicting objectives. On the basis of his test, Finger stated that Grubel and Lloyd were incorrect in concluding (using Grubel and Lloyd's own words) that after a "careful study of the SITC classification... the 3-digit SITC statistics separate commodities into groups most closely corresponding to the concept of an 'industry' conventionally used in economic analysis". Consequently, Finger dismissed the validity of the IIT paradigm as being just a statistical aberration.

It is important that the background of those who hold this position be understood since it helps to clarify why they hold to their viewpoint. The need for an IIT paradigm is considerably less in the U.S., than in Canada or the European nations, because U.S. manufacturers have not historically been

as small or diversified as manufacturers in these other nations because of their access to a large domestic market. Also, IIT is partly a function of the level of direct foreign investment (DFI) in a country, as will be discussed later and in the next chapter. The U.S. historically has had very small amounts of DFI relative to domestic investment in manufacturing assets. Hence, the need is less pressing for U.S. researchers to have a model which explains the IIT that arises when firms with the characteristics of being small, diverse and foreign-owned are subject to freer trade and increased competition. Under these conditions, IIT would be a much smaller part of total U.S. trade, and there would be relatively more of the type arising from differences in factor endowment ratios and product differentiation (although the slow-down in productivity improvement in recent years for the U.S., when it is reversed, could lead to a more significant level of IIT). As a result, IIT would also be less important for the U.S. from either a theoretical or policy standpoint. Consequently, researchers in the U.S. could afford to ignore this development in trade theory, with less loss of explanatory power, than can researchers in other countries such as Canada.

It is also worth noting that Finger's criticism deals with the problems of measuring IIT and not with the implications of it for policy. IIT is a theory of resource reallocation at the level of the firm and if it is theoretically possible then its implications for resource reallocation still stand. It suggests how small, diversified firms would be expected to react when they are subject to increased price competition and how this reaction would influence the trade data. The question of how important it is quantitatively is another issue. What is important is that the firms are able to shift resources from the manufacture of minor product lines to the

manufacture of a major product line in which they have chosen to specialize even if they are produced by different proportions of factor inputs.

Those who hold to Finger's viewpoint would insist, if the minor and major product lines are produced by different factor proportions, that such a shift of resources is inter-industry even if it is within a firm. But, this does not seem to be a practical approach to the issue in terms of the policy implications of IIT for employee relocation or retraining. The resource shift may notionally be of the inter-industry type, but in practice it would still be intra-firm. In terms of the prior example, if increased specialization led a firm to produce only china rather than both china and plastic cups, it would make no difference to the employees as long as the production of china cups increased enough to offset the loss of employment in plastic cups and the employees were retrained in pottery from plastics production for reemployment in the firm.

In this present study the problem of overlapped trade was partially resolved by collecting the trade data at the level of the firm before it was aggregated up to the level of an industry. The problem of categorical aggregation was partially resolved by using a 4-digit level of disaggregation of industries, as opposed to the usual 3-digit level used in other studies. This reduces the possibility of collecting in one industry the trade of dissimilar goods, yet still allows for the capture of similar but differentiated products at the industry level. Also, the import data which were allocated to industries on the basis of the SITC concordance, were converted to the SIC concordance by use of an algorithm so that the industries more closely conformed to the economic definition of an industry.

It is possible to use a corrected formula for the Grubel and Lloyd index that would have helped to overcome the aggregation and overlap problems, but it would have made the analysis more difficult to carry-out within the time frame and budget available. Future studies of the data bank should consider using such an adjusted index.

The critics of the IIT paradigm are themselves open to criticism. Their position is rather narrow since the HOS model is not inclusive enough to explain all trade flows. For instance, it does not explain why china cups made in different countries with the same factor proportions are traded on a two-way basis internationally. Limoge china produced in France is shipped to the U.K., while Wedgewood produced in the U.K. is shipped to France. The HOS model is supply oriented and overlooks that trade flows are influenced by demand-side considerations as well as just those related to the supply-side and factor proportions. Customer tastes are important in determining the success of products and they lead to product differentiation by manufacturers just to meet these various tastes. Hence, differentiation of products (as was also noted in the auto example used earlier), can lead to two-way trade flows in the products of an industry even though the factor proportions used in production are almost identical for the various models.

Even from just the supply side, the HOS proponents' arguments are not inclusive enough since they do not allow for the impact of increased scale and specialization on trade flows. As an example, prior to the development of the EEC, SKF had plants in many of the countries that eventually entered into this common market arrangement. (3-10) The plants in each country produced every variety and size of ball bearing at a high cost for sale

mainly into just the domestic market of the country in which each plant was located. After free trade was established between the countries in the common market arrangement, the plants in each country were specialized (partly in response to increased competition from the Japanese) to produce a much smaller range of bearing types that were sold into the much larger total common market. This allowed the plants to capture volume and product-specific economies of scale. The plants imported the bearings not produced locally while exporting their major product lines. All the different types of bearings were produced by essentially the same factor inputs and much the same factor proportions. This resulted in similar but differentiated bearings being produced and traded on a two-way basis in the same industry (even by Finger's definition of an industry) because of increased specialization.

In summary, the IIT paradigm is a useful addition to the analytical tool kit of economists interested in empirically oriented research. It allows them to address policy issues based on analyses that can account for what is actually transpiring in the trade data. It is appropriate for small economies (with consequently small and diverse manufacturers) that were formerly closed but have entered a new era of being opened-up to freer trade and increased price competition. It adds to, rather than replaces the traditional models based on national comparative advantages and national differences in relative factor endowment ratios so that it is more adept at explaining increases in trade among nations even when they have similar endowment ratios. The traditional HOS and Ricardian models are oversimplifications of reality and in themselves do not provide a broad enough understanding of trade developments since the Second World War. The

basic assumptions in the IIT model of product-specific economies of scale and product differentiation are the counterpart additions to trade theory and the development of commercial and industrial policy since WW II that the concepts of oligopoly and market power were to the theory of perfect competition which also has been updated (mainly since WW II) and made micro-economics a more meaningful tool of analysis in the areas of industrial organization and anti-combines policy.

Antecedent Studies on Canadian IIT:

It has already been noted that Grubel and Lloyd provided the first major synthesis of themes that resulted in the IIT theory. Their work was published in 1975. While the Grubel and Lloyd work was a major contribution to the literature, there was a somewhat earlier but more limited study by Lermer that was published in 1973 assessing IIT in just the Canadian trade data. (3-11) It covered the years 1961 to 1971 for just twenty commodity groups. The study was partly in response to an observation by another researcher that lower tariffs appeared to stimulate product rationalization and export activity by Canadian firms. (3-12) At that time rationalization was defined as a reduction in the number of products produced by a firm of which some would then be imported for resale and the balance exported on an increased scale (i.e. IIT). Lermer's study was also partly in response to an earlier study which showed that Canadian manufacturers were high cost because of their small scale and diversity. (3-13) In other words, it was an early identification of the relationship between increased scale, specialization and IIT and is the logical starting point for an analysis of Canadian IIT.

Lermer tested for the affect of increased scale and specialization on

the trade data by regressing exports and GNP on imports. The model was based on the assumptions that if imports and exports went up simultaneously (and significantly), after allowing for the influence of growth in GNP on the increase in imports, then this was evidence for a two-way flow of similar goods, or IIT. If imports and exports were negatively related (after allowing for the influence of change in GNP) then this would be evidence in support of inter-industry trade.

Lerner preselected four commodity groups within the automobile sector as a control group for the analysis. They were selected because it was known the Auto Pact, during the latter half of the 1960's, had led to a significant increase in the scale and specialization of the automobile producers in Canada and a subsequent increase in IIT. As expected, these results were confirmed in the regressions for these industry groups. Other commodity groups were also preselected (e.g. live animals and meats) with the foreknowledge that they were not subject to the forces of specialization and increased IIT. Indeed, trade was expected to be inter-industry in nature for the food and other groups selected, based on different comparative advantages between countries and the existence of trade barriers.

Of the twenty commodity groups analyzed, eleven showed a tendency for IIT (i.e. the four automobile groups, textiles, chemicals, machinery, farm machinery and miscellaneous products). The other nine groups did not show such a tendency (i.e. live animals, meat, paper and board, plastics, primary iron and steel, steel plate, general purpose machinery, communications equipment, and miscellaneous equipment).

Lermer's study was updated for this present study to see whether its conclusions were still valid. (3-14) The update was based on data provided by the then Department of Industry, Trade and Commerce for the same twenty commodity groups used by Lermer. However, the period covered was for 1963-1981 which covered both the time period in Lermer's study and the subsequent decade. This was done to ensure comparability in the data between the two decades being compared.

For the period 1972-1981, three of the four commodity groups in the auto sector showed a lessening in the movement toward IIT. This might be accounted for by diminishing returns to scale and specialization in these groups after the initial period of rationalization in the late 1960's and early 1970's. It could also reflect import penetration over the 1970's as the North American auto industry suffered a deterioration in its comparative advantage. The Japanese auto producers benefited from their large productivity improvements (relative to wage gains) and a shift in the nation's factor endowment ratios, both of which improved their competitiveness relative to North American producers. Six of the seven non-auto groups identified by Lermer as moving toward increased IIT also showed, subsequent to 1971, increased import penetration and a diminishing pace of movement toward IIT.

Of the nine groups Lermer identified as not being involved in IIT, two of them (i.e. live animals, and primary iron and steel) stabilized their import penetration after 1971. This might have been due to improved unit costs or increased trade barriers. Another six commodity groups moved toward increased IIT (the exceptions being live animals, meat, and paper and board)

and three of them did so very strongly (i.e. general purpose machinery, communications equipment, and miscellaneous equipment and tools). These results indicate that all of the six engaged in increased specialization while the three with the largest movement toward specialization should now be recategorized into the IIT group.

The data were combined for the complete two-decade period of 1963 to 1981. Four of the original nine commodity groups that, by Lermer's criteria were in the non-IIT (or inter-industry) category, could still be so allocated (i.e. live animals, meat, paper and board, and steel plate). The balance of the groups indicate both increasing inter and intra-industry trade since the correlations between imports and GNP as well as between imports and exports were both positive and significant (i.e. plastics, primary iron and steel, general machinery, communications equipment, and miscellaneous equipment and tools).

In the cases of the eleven commodity groups for which Lermer's data indicated the firms were engaging in specialization and IIT, only one could now be unequivocally allocated to that category (i.e. farm machinery) while three appear to have slowed their specialization and were being subjected to increased import penetration (i.e. textiles, material handling equipment, and mining machinery). The balance of the product groups appear to have been subjected to increased import penetration while at the same time having increased IIT (i.e. chemicals, road vehicles, auto parts, auto engines, and miscellaneous products).

The tests on the Lermer commodity groups for the decade following 1971

show the effects since then that were already discussed earlier which have influenced trade performance generally. That is, the influences of freer trade and increased competition from new, offshore producers and the consequent decline in Canada's share of world markets. The import propensities increased in a number of cases. For some industries, the export propensities also increased which is suggestive of greater specialization and IIT. In others, only the import propensities increased which resulted in them being no longer classified as having IIT to any great extent. This suggests that increased scale, specialization and IIT are the results of a dynamic process. The pace of the rationalization changes over time and different products are affected in different time periods. There appears to be decreasing returns at some point to increased rationalization. Technical change and the speed of its adoption can influence the trade performance of an industry. So also can differential changes between nations in relative unit costs because of changes in inflation, productivity and factor endowment ratios. In addition, changes in the barriers to trade also change and influence trade performance. And all of them seem to have had some influence on the results of the analysis.

Another study of Canadian trade data for the period 1965 to 1979 showed changes in the import and export propensities that were consistent with the increase in IIT for much of the same time period used for Lermer's study. (3-15) The propensities were calculated at both the 2-digit level of industry disaggregation and for the manufacturing sector as a whole. The results at the 2-digit level will be discussed later. But, for the manufacturing sector as a whole, the export propensity increased from 16.6% in 1965 to 31.4% in 1982 while the import propensity went from 20.0% to 32.6%

in 1979 (but declined to 29.8 by 1982 due to the influence of the severe recession in 1981-1982). Similar changes were also recorded for many of the 2-digit industries. These results are similar to those reported in a related study, covering the period 1965 to 1977, in which the value of manufactured exports grew by 14.4% while imports grew by 14.7% per annum. (3-16) At the same time gross output in the manufacturing sector grew by 10.1% per annum. As has already been discussed, this is a world-wide trend and reflects the increase in two-way trade of similar goods as firms increase their specialization and export more.

International Comparisons of Canadian IIT:

The topic of IIT has received more attention in Europe than in Canada, although several of the studies include research on Canadian data. As already noted, one of the original studies was by Grubel and Lloyd. Their work spawned much interest in Europe and has been followed-up more fully there with additional research. For instance, the European Institute for Advanced Studies in Management has sponsored three annual seminars on this subject, and the major papers from the first one held in 1981 are now published in a book. In addition, a book of readings on IIT has been published in Germany. Many articles have also appeared in European journals, relative to the U.S., and Canada. (3-17) The reasons for the lack of books and articles appearing in the U.S. have already been discussed above. The relative lack of them in Canada appears to be related partly to the dominance of Canadian thinking on trade issues by U.S. authors for whom IIT is not a pressing topic and also partly because Canada has been slower in adapting to the changing trade environment than the European countries. Consequently, interest in it here has been slower in developing.

The Grubel and Lloyd study was carried-out on SITC data at the 3-digit level for ten industrial nations, including Canada. The analysis was done on the data for the three years 1959, 1964 and 1967. They used an index to measure the content of IIT in total trade that ranges between zero and one. Their index, or some variation on it to allow for disequilibrium in the trade data or for the problems of overlapped trade and categorical aggregation, has since been widely used.

The Grubel and Lloyd index is calculated as follows.

$$\frac{[(X + M) - IX - MI]}{(X + M)}$$

where: (X + M) is the sum of exports and imports for an industry (i.e. total trade); and IX - MI is the net trade balance for an industry in absolute terms.

The net trade balance is assumed to represent the balance of trade that is inter-industry. It would reflect either a net import or export orientation as determined by relative international unit costs (i.e. trade explainable by the HOS model). If an industry were completely specialized in either imports or exports, there would not be any IIT in its total trade so that the value of the index would be zero. If the industry has both imports and exports that are equal, then total trade would be all accounted for as IIT and the value of the index would be one. One of the difficulties with this index (which will be discussed more fully in the next chapter) is that it does not take into account the importance of IIT relative to an industry's total activity. An industry with only nominal, but approximately equal, values for imports and exports would have a high IIT index even though the trade is only a small part of the industry's total production.

Grubel and Lloyd estimated that Canadian IIT increased from twenty-nine percent of total trade in 1959 to forty-eight percent by 1967. In 1959, the level of IIT for Canada was well below the international average of thirty-eight percent. This could be interpreted as being due to the continuing protection of manufacturers here relative to those in Europe who were entering into more competitive common market arrangements sooner and had to adapt to the increased competition with resulting increases in IIT. Canada stood eighth out of the ten countries in terms of its level of IIT. The other two countries with lower levels were the still highly protected economies of Australia and Japan. Canada was less involved in IIT than the European countries and the U.S.

Grubel and Lloyd's study showed that by 1967 the mean level of IIT for the ten countries was forty-eight percent, Canada was the same as the average and had moved to sixth spot. Its level of IIT was closer to the levels of IIT for the U.S. (forty-nine percent), Germany (forty-six percent), and Italy (forty-two percent). Canada still lagged behind the U.K. (sixty-nine percent), France (sixty-five percent) and Belgium/Luxembourg (sixty-three percent). In addition, Grubel and Lloyd concluded that IIT was not the result of overlapped trade or categorical aggregation in the data since the SITC definition of industries conformed very closely to the SIC definition. A similar conclusion was also reached by the author's of a recent study on U.K. trade data in which indices of IIT, both unadjusted and adjusted for categorical aggregation, were used and a comparison made between the results of the two calculations. These authors concluded that while there is "some variation in third-digit indices (that) is accounted for by categorical aggregation, it is far from being a complete explanation of the pattern of

intra-industry trade". (3-18).

A more recent study of IIT used OECD data covering the years 1965 to 1976 for eighteen commodity groups within the machinery and transport equipment sectors. (3-19) Seven countries, including Canada, were included in the study. The IIT index in this study was adjusted to eliminate from the net trade balances the amount considered to be disequilibrium values. An iterative process was used to adjust for this and the results showed that Grubel and Lloyd's index is a conservative measure of IIT because any disequilibrium value overstates the net trade balance and it is attributed to inter-industry trade by the index. It should also be noted that the eighteen industries selected for study in this analysis would, by their nature, have relatively high levels of IIT and would therefore overstate its importance if generalized to all industries.

This study, by Bergstrand, also showed IIT to be a significant portion of the total trade activity for Canada, and that it had grown substantially over the time period of his analysis which extended a decade beyond the data in the Grubel and Lloyd study. Bergstrand also concluded, as did Grubel and Lloyd, that overlapped trade and categorical aggregation were not the reasons for the IIT. He also concluded that IIT increased between countries as manufacturers specialized to exploit economies of scale and that if specialization is carried-out as a result of trade liberalization, then inter-industry trade declines in relative importance. This is attributed to the reasons already outlined before connecting freer trade, increased competition and the need to reduce costs. Costs are reduced by increasing scale (through increased exports) and specialization (through contracting-out

which increases imports), the combination of which leads to increased IIT.

Aquino also analyzed trade balances (after adjustment for disequilibrium) using the Grubel and Lloyd index. (3-20) Aquino also showed the Grubel and Lloyd index to be conservatively biased. His analysis covered twenty-six countries for just 1972 using OECD and UN trade data. Aquino found the Grubel and Lloyd index, unadjusted for trade balance disequilibrium, to be sixty-six percent while the adjusted index was slightly over seventy-three percent. Canada's ranking in Aquino's list was similar to Grubel and Lloyd's for 1967, with Canada ranking fifth out of ten countries, well ahead of the U.S., Japan and Australia (approximately fifty-seven percent, fifty-four percent and fifty-nine percent respectively). Canada was close to Italy, West Germany and Belgium (seventy-two percent, seventy-six percent and seventy percent respectively) but lagged France, the U.K. and the Netherlands (eighty-seven percent, eighty-two percent and seventy-nine percent respectively).

Aquino developed a measure of the elasticity of exports with respect to imports. It was extremely high for Canada at 1.15 in comparison to the other nine industrial nations. That is, exports increase relatively more than imports as imports increase. Only the Netherlands was higher at 1.43. The U.K. and the U.S. were very low at 0.02 with the rest of the countries ranging between .13 and .34. This would indicate that the adjustment process to freer trade for Canada would be easier than for most other nations, especially the U.S., and would result in export growth being greater than import growth. Also, because Canada has higher unit costs than the U.S., Canada would stand to gain the most from any movement to freer trade. U.S.

manufacturers would benefit little from increased scale and specialization, unlike Canadian manufacturers who would gain as they achieved access to the larger U.S. and world markets. Unit costs would fall, incomes and employment would increase and the balance of payments on manufactured goods would improve.

The high elasticity noted for Canada in 1972 could reflect, to some extent, that Canada was later in adjusting to the changing trade environment relative to Europe and the U.S. Consequently, it started from a lower level of specialization and moved more quickly toward it in the early 1970's than the other nations. And, as will be discussed later as well as in the next chapter, the relatively high level of DFI here would also influence the elasticity. Subsidiaries have extensive import and export trade with foreign affiliates and can more easily carry-out programmes to specialize than can Canadian-controlled firms because they are part of a larger organization with international affiliations. The enhanced ability of subsidiaries to wait-out changes in the trade environment and subsequently develop plans to adapt was noted in two recent studies of the Canadian manufacturing sector. (3-21) Thus, countries with high levels of DFI would also have responsive export and import patterns as the trade environment changed relative to countries with a higher level of domestically-owned manufacturers.

Other Evidence for IIT in Canadian Manufactured Goods:

There is additional evidence, at a more aggregate level, of IIT in Canadian manufactured goods. It has already been noted that there has been a significant increase in both the import and export propensities over the last fifteen years or so for the manufacturing sector as a whole which is

suggestive of an increased two-way flow of goods between Canada and the rest-of-the-world. There has also been increased trade domestically in finished and unfinished goods as measured by the ratio of purchased material to value-added. These ratios have increased over the 1970's as the movement toward trade liberalization became cumulative and strengthened in impact. This section will investigate these influences at the 2-digit level of industry aggregation.

International IIT:

A disaggregation of the manufacturing sector into twenty industry groups provides evidence for increased IIT generally across many industries (Table 3-1). It should be noted that at the 2-digit level, the following Tables suffer from both the problems of categorical aggregation and overlapped trade. Therefore, the conclusions drawn from their analysis must be taken with some caution until the more detailed analysis in the next chapter provides supportive or contradictory evidence.

There is only one industry group for each ratio that has not had a simultaneous increase in both ratios. This is not to suggest that there has not been significant inter-industry trade as well. There has been, and the shift in trade performance between industries is continuing in response to comparative unit cost differences as will be discussed below. But, at the same time, there also appears to have been a significant growth in IIT in response to the increased trade liberalization and specialization by manufacturers since 1960. Furthermore, comparative unit cost differences cannot explain the observed simultaneous increase in both the ratios for these industry groups as readily as can the IIT paradigm.

TABLE 3-1

Measures of Trade Performance
Manufacturing Sector
1965 and 1979

Industry	Import Propensity		Export Propensity	
	1979	<u>1979</u> 1965	1979	<u>1979</u> 1965
Food & Beverage	10.2	1.6	12.3	1.3
Tobacco	1.7	1.4	0.7	3.5
Rubber & Plastics	23.2	1.6	11.1	2.5
Leather	33.9	2.5	8.0	1.9
Textiles	28.9	1.2	7.1	1.9
Knitting Mills	30.8	3.4	1.6	0.6
Clothing	12.7	2.7	5.2	3.1
Wood	13.5	1.7	56.5	1.4
Furniture & Fixtures	13.3	2.6	9.2	5.4
Paper & Allied Indust.	9.7	1.6	57.2	1.2
Printing & Publishing	15.5	1.3	3.1	3.1
Primary Metals	34.9	1.4	44.5	1.1
Metal Fabricating	15.0	1.3	7.5	3.4
Machinery	75.2	1.2	53.2	1.9
Transportation Equip.	72.3	2.4	67.9	4.5
Electrical	40.2	2.0	20.5	2.6
Non-Metallic Minerals	18.5	1.2	12.5	2.3
Petroleum & Coal	3.2	0.3	10.7	13.4
Chemicals	35.0	1.4	28.9	2.0
Miscellaneous	54.6	1.3	21.7	1.4

Sources: Industry, Trade and Commerce, 1978, op. cit.;
Astwood, op. cit., Table 4.

At the twenty-industry level there has been considerable change in the share of the domestic market between 1965 and 1979 held by domestic manufacturers. A rough categorization of these industries is shown in Tables 3-2 and 3-3. Table 3-2 lists the industries that appear to be dominated by inter-industry trade flows while Table 3-3 lists those with predominantly IIT trade flows. The method of allocating the industries to Table 3-2 was the magnitude of the difference between the import and export propensities and whether the sign of the difference was positive or negative. A large negative difference would classify an industry as being import dependent. A

large positive difference would classify it as being export oriented.

TABLE 3-2

Trade Propensities For Industries
With Predominantly Inter-Industry Trade
Manufacturing Sector
1965-1979

Industry	(1) Change in Import Pro- pensity, 1965-1979	(2) Change in Export Pro- pensity, 1965-1979	(2) - (1) Difference in Changes to Propen- sities
<u>1) Import Dependent:</u>			
Rubber & Plastics	8.8	6.6	(2.2)
Leather	20.5	3.9	(16.6)
Knitting Mills	21.6	(0.9)	(22.5)
Clothing	8.0	2.5	(5.5)
Primary Metals	9.7	2.7	(7.0)
Electrical	19.6	12.6	(7.0)
Miscellaneous	11.0	5.7	(5.3)
Unweighted Average	14.2	4.7	(9.5)
<u>2) Export Dependent:</u>			
Wood	5.3	14.9	9.6
Pulp & Paper	3.6	7.4	3.8
Non-Metallic Minerals	3.5	7.0	3.5
Petroleum & Coal	(7.9)	9.9	17.8
Unweighted Average	1.1	9.8	8.7

Source: Table 3-1.

The first group of industries in Table 3-2 has become more dependent upon imports as the source of supply for domestic markets. The second group has become more export oriented. Both groups of industries tend to represent those that are moving toward greater inter-industry trade with the rest of the world, perhaps based on a comparative cost advantage or disadvantage of the firms in these industries. Industries such as knitting mills and clothing operate at a cost disadvantage because of the relatively large

supply of low-wage, but productive labour elsewhere. This resulted in the import penetration ratio increasing more than the export orientation ratio. Industries such as pulp and paper benefit from Canada's relative abundance of the primary materials and resources that are used intensively in producing the products of these industries which gives the manufacturers a comparative cost advantage in world markets. The result has been that the export orientation ratio has increased more than the import penetration ratio for these industries. At the same time, all these industries, but one, had an increase in both their import and export orientation ratios which suggests they had some IIT as well as inter-industry trade (i.e. the electrical industry group).

The one industry in which there was not a simultaneous increase in both the ratios is the knitting mills industry. Its export orientation ratio had a small decline. The manufacturers in this industry do not appear to be improving their export competitiveness, perhaps because they are not specializing and have high wage costs relative to the developing countries. If so, these factors would mean the firms might eventually have to leave the industry.

The decline in the import penetration ratio for the petroleum and coal industries reflects, in part, government regulation as much as it does market forces. The government has imposed programmes of import substitution and conservation in order to reduce imports of petroleum. At the same time there has been a significant increase in the export of coal to Japan.

Table 3-3 presents one set of industry groups which show a relatively

large simultaneous increase in both the ratios (strong IIT) and another set with a weaker, but still a simultaneous increase, in both the ratios (weak IIT). Both sets of industries appear to have relatively more IIT than inter-industry trade. The industries were classed to either a strong or weak IIT category on the basis of the magnitude of the increase in both the import and export propensities.

TABLE 3-3

Trade Propensities for Industries
With Predominantly Intra-Industry Trade
Manufacturing Sector
1965-1979

Industry	(1) Change in Import Pro- pensity, 1965-1979	(2) Change in Export Pro- pensity, 1965-1979	(2) - (1) Difference in Changes to Propen- sities
<u>1) Strong IIT:</u>			
Furniture & Fixtures	8.2	7.5	(1.3)
Machinery	11.3	24.8	13.5
Transport Equipment	42.3	52.7	10.4
Metal Fabricating	3.4	5.3	1.9
Chemicals	10.4	14.3	3.9
	-----	-----	-----
Unweighted Average	15.1	20.9	5.8
	-----	-----	-----
<u>2) Weak IIT:</u>			
Food & Beverages	3.9	2.6	(1.3)
Tobacco	0.5	0.5	0
Textiles	4.2	3.4	(0.8)
Printing & Publishing	2.7	2.1	(0.7)
	-----	-----	-----
Unweighted Average	2.8	2.1	(0.7)
	-----	-----	-----

Source: Table 2-4.

The discussion related to Tables 3-2 and 3-3 will be drawn on again later, after domestic IIT has been discussed, at which time some conclusions will be drawn from these combined sources of information.

Domestic IIT:

An increase in specialization by manufacturers through increased contracting-out of minor product lines and components to more efficient suppliers at home and abroad would increase the value of purchased items relative to the value of costs added in production within plants (i.e. value-added). This would cause an increase in their ratio of purchased material to value-added. The improvements in productivity as a result of increased scale and specialization would also increase the ratio since value-added would be reduced relative to purchased material, especially if a significant part of any increase in profit from the productivity improvements is passed on to customers as lower prices in order to retain their business and a share of the market generally against increased competition.

A good indication of the total value of intra-industry trade can be obtained from the cost of purchased materials which is collected as part of the Census of Manufactures (as also is the data on value-added). The total cost of purchased materials records the value of finished goods that are purchased for resale as part of a firm's wholesale activities as well as the value of material and components purchased for use as inputs into the manufacturing process. The cost would include purchases from domestic and foreign suppliers that are both within the industry of the purchaser and in other industries. This is a comprehensive measure of total trade and, in the case of the Census data, it is separable into the trade in goods purchased just for resale and the trade in semi-finished materials and finished components used as inputs into the manufacturing system.

One of the disadvantages of this comprehensive measure is that it

includes the cost of imported items as well as domestic purchases. As a result, it reflects increases in both international and domestic intra-industry trade. There is no readily available way to exclude the value of the imported goods from the statistic so that it would record just domestic intra-industry trade, although the domestic portion should generally dominate the statistic. Therefore, the cost of purchased material is used here as a proxy for the value of domestic intra-industry trade and changes in it even though this is not strictly correct.

The Input-Output Tables also provide information on the cost of purchased materials (as well as value-added). These Tables are useful because they separate out the type of materials purchased into: primary materials produced by the resources sector and used in the manufacturing sector; and components produced by firms in the manufacturing sector and used as inputs into the production systems of other firms in this sector. This split makes it possible to evaluate the extent of any bias in the cost of purchased materials arising from the large increases in the prices of resources (especially energy) over the past decade or so.

Census Data Measures:

The ratio of purchased material to value-added was calculated from the Census data and is presented here as a time series. An increase in the ratio over time would be consistent with firms increasing their degree of specialization as they sought to improve unit costs and become more competitive. Initially, the ratio should have been low in the early 1960's, since firms were more vertically and horizontally diversified then because of the tariff and other barriers to trade. Since the early 1960's, the ratio

should have increased because of the greater specialization and increased contracting-out to more efficient suppliers at home and abroad that has taken place as a result of increasingly freer trade and competition. It should have increased more quickly over the 1970's as the movement to freer trade became stronger and its effects became cumulative.

Table 3-4 shows the ratio for the Canadian manufacturing sector separately for production activity and for total activity. Total activity includes purchases of goods for resale (i.e. wholesale activity) as well as goods purchased for manufacturing activities. The Table also shows the total activity ratio for the U.S.

The ratio, which is an aggregate for all the firms and industries in the manufacturing sector, could change over time due to influences other than just increased specialization. For instance, it would vary with the business cycle because profits and purchased materials would be expected to decline more quickly than value-added in the downturn of the cycle and to rise more quickly in the upturn. Also, it would change over time if the weight of the shipments of some industries in the total shipments of the manufacturing sector changed and their production requirements for value-added differed from the average. Some industries, by their nature, require relatively more value-added to complete a product than do others (i.e. transportation equipment vs. clothing). It would also vary with any technical changes which altered the proportion of value-added needed in production by an industry over time.

TABLE 3-4

Ratio of Purchased Material to Value-Added
Manufacturing Sector
Selected Years, 1950-1979

Year	Ratio for Production Activity	Ratio for Total Activity	
	Canada	Canada	U.S.
1960	1.20	1.13	1.26 (1961)
1965	1.25	1.18	1.18
1970	1.28	1.20	1.12
1975	1.42	1.32	1.35
1979	1.49	1.40	1.34 (1977)

Sources: Statistics Canada, Manufacturing Industries of Canada; and U.S. Dept. of Commerce, Census of Manufactures.

The movement in the ratio is broadly consistent with what would be expected due to the business cycle and increases in specialization since 1960 by manufacturers. It shows some change that is coincident with the business cycle and it has steadily increased since 1960 with the rate of increase quickening after 1970, presumably because the effects of trade liberalization and increased international competition became strongly cumulative by then which would act as a spur to increased specialization activity.

The ratio for the U.S. was initially higher than for Canada. This would be expected since U.S. manufacturers were substantially more specialized than Canadian manufacturers in the early 1960's. The ratio for the U.S. dropped significantly, however, between 1960 and 1965 and into 1970. No apparent explanation is available for this although the U.S. did have the largest decline in its share of world trade over this time period of any of the industrialized nations (including Canada) when it fell from 20.1 percent to 14.9 percent. (3-22) This may have led U.S. manufacturers to contract-in

more of their production requirements for components in order to increase plant loads as export sales fell off or else to not move toward increased contracting-out to foreign suppliers as quickly as they should have and as quickly as did Canadian firms during this time period. However, this is conjectural and it is unknown to what extent the deteriorating export performance influenced the ratio except to note the changes in the two statistics are consistent with one another. In spite of this, the long-term trend for the U.S. ratio has been to increase as it also has been for Canada.

Table 3-5 presents the ratio of purchased material to value-added for the manufacturing sector, disaggregated to the twenty-industry level for selected years from 1970 to 1979. This is the same industry break-down as was used in Tables 3-2 and 3-3 so that comparisons can be made for these industries of their performance on both international and domestic intra-industry trade. Some inferences can then be made about the specialization activity of firms in these industries based on this total picture of their trade performance.

TABLE 3-5

Ratio of Purchased Material to Value-Added
Production Activity
Manufacturing Sector
Selected Years, 1950-1979

Industry	-----Ratio-----			Change 1960-1979
	1960	1970	1979	
Food & Beverage	1.83	1.92	2.29	(.09)
Tobacco Products	1.84	1.67	1.33	(.55)
Rubber & Plastic	0.90	0.90	1.12	.36
Leather	1.03	0.98	1.24	(.15)
Textiles	1.17	1.25	1.29	(.02)
Knitting Mills	1.12	1.31	1.12	.21
Clothing	1.09	1.09	1.03	(.04)
Wood Products	1.32	1.44	1.24	.14
Furniture/Fixt.	0.93	0.89	0.94	.06
Paper & Allied	0.95	1.10	0.99	.14
Print./Publish.	0.47	0.50	0.58	.09
Primary Metal	1.53	1.15	1.33	.52
Metal Fabric.	0.88	0.95	1.16	.28
Machinery	0.91	1.02	1.14	.23
Transport Equip.	1.26	1.96	2.03	.81
Electrical	0.87	1.06	0.96	.13
Non-Metal. Min.	0.62	0.66	0.76	.22
Petrol. & Coal	3.12	4.07	7.50	3.44
Chemicals	0.91	0.84	1.12	.15
Miscellaneous	0.79	0.70	1.49	.81

Source: Statistics Canada, Manufacturing Industries of Canada.

The four industries in Table 3-3 that show weak increases in IIT also show a decline in the ratio of purchased material to value-added (except for printing and publishing). There were also seven industries in Table 3-2 that were categorized as being subject to an erosion in their share of the domestic market without compensating growth in their export orientation. Two of these industries had a decline in the ratio of purchased material to value-added. The decrease in the ratio is consistent with firms increasing their degree of diversification in an attempt to maintain plant loads in the face of declining market share. This is a counter-productive response since it would tend to increase costs at a time when they need to be reduced. This

would also explain their weak performance on international intra-industry trade and a movement toward inter-industry trade since the higher costs from diversification would result in increased imports and reduced exports for these industries and the firms in them.

For the remaining five industries in Table 3-2 that were suffering from the loss of domestic market share to foreign-produced goods, there was an increase in the ratio (which was very large for the rubber and plastics, primary metals, and miscellaneous industries). This suggests that the firms in these industries may have captured productivity improvements by specializing and contracting-out their less efficient production activities. But, the productivity improvements apparently were insufficient to overcome some other problems in their cost structures that would allow them to become competitive with foreign producers. These cost problems may reflect a comparative cost disadvantage in Canada for some primary input (such as high wages, market power and large price increases by the suppliers of raw materials and resources, and poor management) or else incomplete specialization.

Four industries in Table 3-2 were categorized as having a comparative advantage which made them export oriented. These industries also had an increase in the ratio of purchased material to value-added. So also did the other five industries in Table 3-3 that, while not having a distinct comparative advantage, were categorized as having extensive international intra-industry trade.

It appears the natural comparative advantages held by firms in the

export-oriented industries have been buttressed by achieving productivity increases through increased specialization. Both of these influences would lead to low comparative costs and prices which would assist them in maintaining their export orientation and succeeding internationally so that they will be "winners" in the longer-run. The firms in the industries listed in Table 3-3 with no resource-based advantage apparently have been able to maintain their market share at least partly through increased specialization which would improve productivity, lower unit costs and maintain their market share against foreign goods.

The influence of the Auto Pact on all the ratios (import penetration, export orientation and purchased material to value-added) for the transportation equipment industry is most noticeable. It had the second largest increase in the ratio of purchased material to value-added of all the industries (with the petroleum and coal industry having the largest increase). During the period 1960 to 1970, the transportation equipment industry undertook significant increases in specialization in Canada which would cause the ratios to rise. The quick increase in them indicates the speed with which specialization was carried out and the low level initially of specialization. This was a highly protected industry with small-scale plants and considerable diversity within them for both final products and components which made them inefficient by world standards. These subsidiaries are now highly specialized, larger in size and extensively involved with intra-industry on a North American basis. The significant increase in the ratios since 1960 confirms that these statistics do pick-up the influence of changes in scale and specialization on domestic and international intra-industry trade. Further, the increases in the ratios

demonstrate the beneficial effect that subsidiaries can have on Canadian income and employment, as well as IIT. They have access to international markets and products through their foreign affiliates which enhances their ability to adapt in a changing trade environment, provided the domestic and head office management groups correctly interpret the changes and rationalize their Canadian subsidiaries appropriately to cope with it.

Input-Output Data Measures:

Additional evidence for an increase in domestic intra-industry trade as a result of specialization was sought through the data provided by the Input-Output Tables. This data are also useful for sorting-out primary materials produced in the resources sector from intermediate goods produced in the manufacturing sector. Two Tables, 3-6 and 3-7, provide evidence on these topics.

Table 3-6 shows the unit cost structure of the manufacturing sector as a whole by various types of inputs. In 1961, the costs of energy to the manufacturing sector, as represented by the cost of mineral fuels, represented 3 percent of total unit cost. By 1978, it represented 8 percent. Most of this increase would be due to price rather than volume changes since it did not start until after 1975. This was after the major increases in the world price of petroleum in 1974 and the later introduction of the national programme to raise domestic petroleum prices in Canada closer to the international price level.

TABLE 3-6

Composition of Relative Unit Cost
Manufacturing Sector
Selected Years, 1961-1978

Cost Categories	1961	1970	1978
Primary Material:			
Mineral Fuels	3%	3%	8%
Agriculture	7	5	5
Other	7	6	5
Sub-Total	17%	14%	18%
Components:			
Intermediate Goods	30	33	34
Total Purchased Material	47%	47%	52%
Value-Added:			
Labour Income	24	25	22
Return to Capital	12	10	11
Services & Misc.	17	18	15
Total	100%	100%	100%
Ratio of Intermediate Goods to Value-Added*	.57	.62	.69

Source: Statistics Canada, The Input-Output Structure of the Canadian Economy, Various Years.

* Value-Added is the sum of labour income, return to capital and services & misc.

The proportion of unit cost being spent on energy increased over the 1970's. However, the proportion spent on other primary material inputs declined by an almost equal amount. Consequently, in total, the impact of energy price increases on the value of purchased primary inputs was offset so that the ratio of purchased material to value-added was not significantly affected by changes in the total value of primary inputs including energy. It should also be noted that the proportion of total unit cost represented by energy costs, even after they doubled over the 1970's, was still a relatively small amount at 8 percent. Therefore, even with the sizeable increase in

energy prices, the impact on total unit costs of manufactured goods was relatively small.

The value of intermediate goods (i.e. items produced by firms in the manufacturing sector for use by other firms in this sector) is a truer measure of intra-industry trade in finished and semi-finished items than is total purchased material because it excludes the purchases of primary materials from the resources sector. The proportion of total unit cost represented by intermediate goods increased by 13 percent between 1961 and 1978. At the same time, value-added declined by 10 percent from its 1961 level, whether value-added is defined as just labour income or also includes the returns to capital, services and the miscellaneous category of costs.

The combined effect of the increase in the proportion of unit cost represented by purchased materials with the decline in value-added, was an overall increase in the ratio of purchased material to value-added of about 25 percent between the early 1960's and the late 1970's. This increase, based on the Input-Output data presented in Table 3-6, is similar to that for the Census data as shown in Table 3-4, in which there is an increase in the ratio of 24 percent between 1960 and 1979.

In summary, the studies on Canadian IIT, when compared and viewed on a serial basis, show that there has been a belated but increasing movement toward increased IIT in the Canadian trade data in addition to the basic inter-industry trade. This is consistent with Canada originally maintaining its protective barriers to trade as other nations moved toward freer trade in terms of having tariff-free access to larger common markets. Subsequently,

with freer trade and increased competition domestically, manufacturers here in the 1970's started to increase their scale and specialization which increased the level of IIT in the trade data. The high levels of DFI in Canada would also help to explain the high elasticity of exports to imports and increased IIT since the 1960's. Most of the researchers of IIT conclude that it is not a phenomena related to categorical aggregation or overlapped trade, but a genuine force at work in the trade data. The next chapter will provide a cross-section analysis of this phenomena for Canada using 1979 trade data.

IIT and Intra-Firm Trade:

It has already been noted that there is a close association between DFI and trade levels. This issue has been explored in several studies and is reviewed here because it impacts on the results of the trade analysis in the next chapter. In a review of a study by the U.S. Tariff Commission on the exports of MNEs from the U.S., Lall pointed out that in 1970, MNEs accounted for about seventy percent of total exports. (3-23) Almost one-half of these exports (or about one-third of total U.S. exports) went to majority-owned foreign subsidiaries. One of the implications of this is that subsidiaries in countries such as Canada would be importing about one-third of their goods on an intra-firm, or tied, basis and two-thirds from independent suppliers. Lall also drew on a study by Bradshaw using 1965 data which showed one-third of intra-firm exports went to Canada. (3-24) This reflects the high proportion of U.S. DFI that went to Canada prior to the time period covered in Bradshaw's study.

There also is a significant reverse flow of exports by the subsidiaries

to U.S. affiliates. (3-25) The imports of finished and unfinished goods by U.S. firms from foreign affiliates (defined as having five percent or more control by the U.S. firm) in OECD countries on a related-party transaction basis, accounted for more than sixty percent of all imports of manufactured goods by the U.S. in 1977. However, the identity of the U.S. firms receiving the exports by Canadian firms was significantly different than for the firms in the other OECD countries. The Canadian subsidiaries shipped about eighty percent of their exports to affiliates that were U.S. owned. But, the subsidiaries in the EEC countries shipped about seventy percent to non-U.S. owned affiliates, while the Japanese shipped almost one-hundred percent to non-U.S. owned affiliates. That is, the high level of U.S. DFI in Canada along with the low level of Canadian DFI in the U.S. meant that the majority of exports by Canadian firms were by subsidiaries to affiliates of U.S. parents, while in the case of the other countries, they were by resident-owned firms to their own U.S. subsidiaries.

A study by the Economic Council of Canada, using more recent data, indicates there has been an increase in the intra-firm trade between Canadian subsidiaries and their foreign affiliates. (3-26) The Council estimates that almost ninety percent of imports from the U.S. are by subsidiaries of U.S. enterprises. However, all of these imports would not be on an intra-firm basis. A portion would be from third-party suppliers and they may or may not be suppliers to U.S. affiliates. But, based on a special survey by the Council of selected Canadian industries, it was estimated that intra-firm trade rose from about two-thirds of imports in 1965 to almost four-fifths in 1979 which implies about seventy percent of total Canadian imports are on an intra-firm basis by subsidiaries. This ratio appears to be

high in light of the information from Lall's work that was noted above in which it was estimated that, on average for all countries including Canada, intra-firm trade on imports from the U.S. would be about thirty percent of total imports. It is possible that the propensity is higher for Canadian subsidiaries than the average for all subsidiaries of U.S. MNEs. The study by the Economic Council also estimated that exports by the subsidiaries to U.S. affiliates rose from about two-thirds of total Canadian exports in 1965 to about four-fifths throughout the 1970's. (3-27) There was considerable variation in intra-firm trade from industry to industry and the total value of it was strongly influenced by the large value of imports and exports on an intra-firm basis since 1965 arising from the Auto Pact which was IIT in nature.

The disaggregation of the data by type of good is also of interest. Over one-half of intra-firm exports by U.S. firms to foreign affiliates, according to Lall's interpretation of Bradshaw's results, were finished goods meant for resale without further processing. About one-third were materials and components meant for further processing by the foreign subsidiaries. Less than ten percent represented capital equipment and miscellaneous types of transactions. A later study than Bradshaw's found similar percentages by type of good. (3-28) Further, it was found that in the case of exports by Canadian subsidiaries to U.S. affiliates, that less than fifteen percent represented finished goods for resale with most of the balance of eighty-five percent representing material and components meant for further processing. (3-29)

Comparisons to the ratios used in the next chapter are made easier if

the imports and exports are stated in terms of the total shipments of the subsidiaries. It has been estimated by Lall that in 1970, as an average for all manufacturing, intra-firm exports from the U.S. to foreign affiliates represented about ten percent of the affiliates' domestic shipments. (3-30) Combining this result with those in the preceeding paragraph, leads to the conclusion that imports by Canadian subsidiaries' of finished goods for resale from U.S. affiliates represent about six percent of their shipments. Imports of materials and components would represent about four percent of domestic shipments. Again, Lall found that there was considerable variation in the ratio from industry to industry. For instance, in the machinery and equipment industries the subsidiaries purchased more than fifteen percent of their shipments from U.S. affiliates while the proportion in the beverage industry was less than one percent.

The data for this study were used to calculate the import propensities of the subsidiaries in Canada in as close a manner as it was possible to those shown by Lall. The results showed that the Canadian subsidiaries have an average ratio of imports from all sources to domestic shipments of about thirty percent, excluding the auto sector data (this is about double the ratio for the domestically-controlled firms in the manufacturing sector). If Lall's estimate is correct that intra-firm trade represents about one-third of total imports by subsidiaries, then the imports by the subsidiaries in this study from affiliates would be ten percent of their shipments, which is also consistent with Lall's estimates. These results suggest the estimates by the Economic Council are somewhat high. However, some of the difference could be due to an increase over the 1970's in imports by subsidiaries in the auto sector from foreign affiliates. It could also be due in part to the

Council including purchases from third parties that are tied in some manner to purchases by affiliates from the same suppliers. The Canadian subsidiaries could be required to purchase from specified independent suppliers for such reasons as the need to fill volume-related purchase commitments by the foreign affiliates with these suppliers.

In summary, there is evidence that DFI in Canada results in a significant two-way flow of finished and unfinished goods which is, in part, IIT in nature. A significant part of this trade is intra-firm with U.S. affiliates (i.e. from about one-third according to Lall to over three-quarters according to the Economic Council). This, of course, should be expected given the network of affiliates and the potential it provides for the subsidiaries to act as wholesalers as well as giving them access to low-cost components produced by affiliates. The exports by the subsidiaries to U.S. affiliates are mainly of unfinished goods meant for further processing in the U.S. while over one-half of imports by the subsidiaries are finished goods purchased for resale in a wholesale capacity. This latter point is important for the analysis in the next chapter.

The Transfer Price Issue:

In a study done for the IMF, Goldsborough found that price elasticities were significantly lower for intra-firm trade than for conventional trade between third parties. (3-31) This suggests that the intra-firm trade between subsidiaries and foreign affiliates has a high propensity to be tied by fiat rather than determined by market forces so that it is less responsive to being switched to lower-cost sources as exchange rates and prices change. There is a greater propensity to switch purchases to more competitive sources

of supply at home and abroad if the transactions are between independent purchasers and suppliers. More research is needed on the two issues of: whether transfer prices between subsidiaries and their affiliates are competitive; and whether purchasing agents in the Canadian subsidiaries are free to engage in global searches for the most competitive sources of supply or are tied by fiat to corporate purchasing decisions.

It is not meant to infer that intra-firm trade is non-competitive per se. It is possible that affiliates are the most competitive sources of supply because of benefits from bulk-buying practices when purchasing is centralized in a corporation. Also, the affiliates may be more specialized and generally more efficient in producing some finished goods and components than third parties (especially compared to smaller Canadian suppliers). Further, external markets are used as checks on internal transfer prices, the income tax and customs departments monitor the transfer prices, and search and transaction costs would likely be lower on intra-firm purchases. Also, in some instances, the affiliates may be the only source of supply of some of the corporations' finished goods and specialized components.

The internal dynamics of the MNE also help to ensure that transfer prices are kept in tandem with market prices. The managers of the Canadian subsidiaries are judged, in part, on the profitability of their enterprises. This creates an incentive to purchase from the the most competitive source of supply and to countervail against any corporate decision to force the subsidiaries to do otherwise. Further, price is only one dimension of the purchasing decision. Other important dimensions are: the ability to quickly supply items on time; security of supply; and quality. It may be that

third-party suppliers are not able to meet these criteria in many cases as well as can the affiliates.

In a recent study, Owen presents some evidence that subsidiaries purchase finished goods from U.S. industries that have above normal profits and their purchases of intermediate goods are sourced from U.S. industries that are not highly concentrated. (3-32) This evidence is admittedly weak, but it suggests that the subsidiaries do purchase from competitive sources of supply, if high profits are indicative of efficient costs and prices.

The intent is not to present an apology for the subsidiaries' high levels of intra-firm purchases or their relative lack of responsiveness to price changes. Rather the intent is to present arguments in defence of these practices that are based on efficient use of resources and to offset a prevalent attitude in Canada that the purchasing practices of the subsidiaries are detrimental to employment and income per se. It would seem to be more rational to assume that there are good grounds, based on a desire to maximize profits and create efficient use of resources, for such behaviour.

Alternatively, it may be that the Canadian-owned manufacturers are not searching wide enough for competitive suppliers and consequently rely too much on high-cost domestic sources of supply. In the longer run this would affect exports, domestic market share, and Canadian employment and incomes. The almost exclusive use of domestic suppliers could also be a form of tied-purchasing behaviour if Canadian-controlled producers are buying from high-cost domestic suppliers for want of more adequate search procedures.

However, no matter which side of the question one takes, it is apparent that further research is needed on the purchasing practices and behaviour of Canadian manufacturers whether they are domestically or foreign controlled.

Summary of Chapter Three:

This chapter attempted to show that the concept of IIT is a useful addition to the tools of analysis of interest to those interested in the empirical aspects of international trade. It extends and enriches the understanding and analysis of trade flows provided by traditional concepts in a world where both product differentiation and productivity differences exist between firms producing similar goods. It is particularly appropriate for countries such as Canada that have serious productivity and cost problems relative to producers in other parts of the world and that are moving from being small, protected economies to more open ones in a world of increasing competition.

All the major studies show IIT to be a significant proportion of the total international trade flows for Canada. It also appears to influence some industries more so at different times than others, but almost all industries appear to have had some degree of it over the past twenty years. This is reflected in the simultaneous increase in both the import and export propensities for many industries at the 2-digit level of disaggregation. It is also reflected in the pervasive increase in the ratio of purchased material to value-added. The major exceptions were for those industries suffering from severe cost problems which would inhibit their ability to engage in two-way trade. A good example of the relationship between increased scale and specialization and the level of IIT is provided by the

data for the auto sector in the late 1960's and into the 1970's. This suggests that a movement toward freer trade by Canada, particularly with the U.S., would result in most of the gains accruing to Canadians, since our major trading partners have already realized their gains (to a greater or lesser extent) through earlier increases in competition, scale and specialization.

IIT is related to some extent to the level of DFI in an industry because of the increased opportunity that is provided by the network of affiliations associated with MNEs that gives subsidiaries access to international export markets plus the opportunity to import low-cost finished and unfinished goods. These affiliations also allow the subsidiaries to engage in significant levels of intra-firm trade, which may have some transfer price problems associated with it. It also allows them to carry on extensive wholesale operations relative to their Canadian-controlled counterparts. The level of intra-firm transactions has a significant impact on the total import and export of manufactured goods for Canada. It also contributes to the high elasticity of exports with respect to imports for Canada which is beneficial to the nation as it moves toward freer trade. While imports may rise, so also do exports so that the overall self-sufficiency ratio (i.e. shipments to domestic consumption) has remained remarkably stable for Canada in spite of the large increase in total trade activity. (3-33)

In general, while Canada may have been slower in moving toward freer trade and increased competition than the other industrial nations, there is now evidence it is doing so with consequent increases in the level of IIT. The next chapter will assess the extent of IIT, at a more detailed level than

has been done so far, on a cross-section basis for 1979 along with some related analyses of exports and other variables related to increased scale and specialization on a time-series basis.

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CHAPTER FOUR

ANALYSIS OF DATA BANK

Introduction:

This chapter presents the analysis of the data bank assembled especially for this study. The data are from the Census of Manufactures as well as the international trade statistics, mainly for 1979. The emphasis here will be on the trade information, especially as it relates to IIT and the adjustment by Canadian manufacturers to increased competition during the 1970's.

This study provides a major break in several respects with the prior studies on Canadian trade data and IIT. First, the data were collected at the level of the plant and firm before being aggregated up to the level of an industry, rather than being collected initially at the industry level only as has been past practice. Second, the trade data have been linked directly to the data on production activities for plants from Statistique Canada's MAPID data bank which allows for a much richer analysis. Third, and perhaps most importantly, the data on imports and exports have been matched at the level of the firm so that they are related to the micro unit responsible for these activities. This helps to ensure imports and exports are related through the use of a common unit and nomenclature as well as allowing for the calculation of net trade balances at the level of the firm. Fourth, data on imports, exports, shipments and other manufacturing variables can also be aggregated up to the level of the consolidated enterprise. Fifth, the unconsolidated enterprises were identified and categorized by the type of involvement they had with the international sector depending upon whether the firms were:

importers only; exporters only; both importers and exporters; or neither importers nor exporters. This is the first time such a categorization has been made.

The matching of trade data at the level of the enterprise was done because, as has already been discussed, IIT is viewed here as resulting from the responses by firms to increased competition. Therefore, it seemed appropriate to initially assemble the data on that economic unit. This is in distinction to prior studies that used the industry as the economic unit on which to assemble data. One of the problems associated with these other studies, as a result of this, is that imports and exports are allocated to industries using different nomenclatures. Consequently, the relationship between imports and exports of similar products is not as tightly matched as might be desired. In this study, there is at least the commonality of the same economic unit to link the data before it is aggregated up to the level of an industry. It is believed this has resulted in a more accurate source of information for the analysis than has so far been available, as well as being theoretically defensible.

Description of the Data Sources and Data Problems:

The Census of Manufactures was the source of information on exports. This information is collected at the level of the establishment. The source of information for imports was a special study on 1979 trade data by Statistics Canada using the documents prepared at the port of entry. This information is collected at the level of the enterprise. Each establishment is assigned a BRID code number which identifies it and also connects it to the enterprise to which it belongs. The BRID identifier allowed the export

data at the level of the establishment to be related to the import data at the level of the enterprise.

It was also possible to gather other data from the Census of Manufactures such as shipments, purchased materials and value-added for each establishment and enterprise. These additional data allowed the calculation of special variables such as Herfindahl indices of product diversity that measure the value of primary products shipped as a ratio of total shipments. In the case of the consolidated enterprises, other special variables were calculated such as the ratio of imports, exports and shipments of an enterprise's primary product group to its total value of imports, exports and shipments, respectively. Also, a net trade balance (exports minus imports) was calculated for each consolidated enterprise.

In the case of establishments, shipments and exports were allocated to the commodity categories reported on the Census form which are based on definitions in the Industrial Classification Code (ICC). The commodity groups were then converted to the appropriate industry codes using the Standard Industrial Classification (SIC) concordance. The data were then aggregated into 159 industry groups, representing the 4-digit SIC industries. It should be noted that for consolidated enterprises, each one was allocated to the industry associated with its major product lines, even though some of the data were not related to that industry. However, no other way of treating them was feasible. Detailed statements of the different definitions of economic units and how they are treated by government statisticians are available elsewhere for the interested reader. (4-1)

The data were partitioned for each industry into several cells. There are two sectors of control (Canadian and foreign) and in the case of unconsolidated enterprises there are two size classes (less than \$10 Million in shipments and shipments equal to or greater than \$10 Million). The consolidated enterprises were allocated to three size classes (less than \$10 Million in sales; sales equal to or greater than \$10 Million but less than \$50 Million; and sales equal to or greater than \$50 Million). Sales were defined as shipments plus imports. Most of the data are for 1979, although data were also available on some items such as exports, shipments, purchased materials and value-added (total activity) for 1974. The data from the 1979 Census of Manufactures included both short and long form establishments.

The data for 1979 on shipments, exports and imports for the unconsolidated enterprises were further partitioned into four groups, depending upon the type of involvement the enterprise had with the international sector. Since within a size class the enterprises could be in either the Canadian or foreign sectors of control, eight identifiers were needed for each of the two size classes. The eight groups were given identifying numbers and the classification scheme is presented below to aid the reader later in relating this number to the type of trade activity of the enterprises. Also, throughout the balance of the chapter, imports and exports will be identified with their traditional acronyms of M and X, respectively.

Type of Trade	Foreign Sector	Canadian Sector
M only	1	5
X only	2	6
Both X & M	3	7
No X or M	4	8

Export values by commodity group were determined from the response on the 1974 and 1979 Census forms to the question asking for the first destination of an establishment's shipments. The ratio of total exports to total shipments was calculated from this information and it was used to prorate the total shipments for an establishment between domestic and export destinations for each commodity group. It should be noted that this average export propensity does not provide the actual exports for a commodity group, but only an estimate. This estimate should be close to the actual value but the extent of any bias is unknown.

There are some difficulties that arise from the way Statistics Canada collects export data on the Census form. An establishment could report the first destination as an export point even though the goods had been sent to a head office for transshipment. Both the establishment and the head office would then report export sales and create a double-count. Also, wholesalers in Canada could export manufactured goods produced here, but these exports would escape measurement on the Census. No feasible means of correcting for these difficulties were available although they would be offsetting to some extent. But the amount of any bias they create in the data bank is unknown. An adjustment was made for exports reported by head offices on short forms. These exports were, in the main, allocated back to the establishments from which the shipments originated. This adjustment covered about eighty percent of such exports (which were mainly by the automobile industries) and it corrected the major problem in the export data. In total, the export values used in this analysis are close to those reported elsewhere by Statistics Canada for the trade data on manufactured goods.

The values for imports came from different sources than the Census reports which were used for the information on shipments and exports. Also, the import data were only available for 1979 rather than the two years of 1974 and 1979 for which export data were available. The source documents that were used to determine the value of imports were invoices and Customs forms. The invoices are prepared by the firm shipping the goods. The Customs forms are normally prepared by customs brokers on behalf of their Canadian clients. The complete set of documents are reviewed by Customs staff at the port of entry. The Customs personnel allocate a 5-digit Import Commodity Classification code (MCC) to the documents and a PD number. The PD number is used by Revenue Canada (Taxation) to identify firms remitting payroll deductions and taxes. These transactions are largely automated for the major ports of entry.

Revenue Canada audits every import transaction over \$10,000. associated with goods entering through a major port, including its declared fair market value. Statistics Canada also audits the source documents for the consistency and accuracy of the codes. All import values are stated FOB with no freight costs included in the fair market value. This is consistent with the valuation of shipments and exports on the Census form.

An algorithm is used in Ottawa to convert the MCC code on the entry documents to a Producer's Standard Industrial Classification code (PSIC), disaggregated to the 4-digit level. The PSIC code is based on the concept of identifying the industry that would have produced the goods had they been made in Canada rather than imported. The algorithm restates the PSIC code so that it is conformable to the SIC code used by Statistics Canada for analysis

of the Census of Manufactures data on shipments and exports by commodity class.

The PD number is used later in Ottawa to cross-reference the identity of an importer with its BRID code number. The BRID code was developed by the Business Finance Division of Statistics Canada to trace the ownership of individual enterprises through to the larger consolidated enterprise, of which they form a part, for purposes of publishing the CALURA information. The link between the PD and BRID codes provides the connection between Revenue Canada and Statistics Canada identifiers. The BRID code was useful in this study for linking exports, which are on an establishment basis, with its enterprise so they could be compared with imports which also are on an enterprise basis. It was also useful for aggregating the trade and Census data up to the level of the consolidated enterprise.

The use of the four categories of establishments, depending upon the type of involvement they had with international trade, did introduce some complexities into the data and its analysis. In particular, imports could not be as readily related, as could exports, to shipments of similar goods by domestic producers in order to calculate import propensities. The values for shipments and exports come from the same Census document, by establishment, so they are easily matched to each other and the establishment and commodity group to which they belong. But, in the case of imports by groups 1 and 5 enterprises ("M only"), they cannot always be related to the shipments of an enterprise if the imports are components that have been allocated to an industry unrelated to the output of the establishment, which is often the case. This also applies to a lesser extent to imports of minor product lines

imported for resale if these products are only distantly related to the shipments of the major product lines of an enterprise. In the first case, there would be no shipments of the imported products by the establishments and in the latter case there would be negligible or no shipments. Note that these influences affect only the "M only" group of enterprises within any given industry. But, the result is to bias the import propensities upward for this group because of the lack of shipments, even though the enterprises would have significant levels of shipments in other industries to which their main products belong.

This bias in the import propensities could theoretically be overcome by summarizing the shipments used in the denominator of the propensities over all the enterprise groups within an industry. This would relate them to at least the shipments of similar products even though these shipments would not be primarily of the enterprises doing the importing. This was done when appropriate, but such a procedure introduces other difficulties because the shipments of groups 4 and 8 enterprises ("No X or M") are included in the denominator of the propensities in such a case. As will be noted later, this group tends to be mainly small, Canadian-controlled enterprises serving just local, regional and national markets in Canada. There is virtually no counterpart to this group in the foreign sector of control. The result is that the import propensities for the "M only" group of enterprises would be biased downward for the Canadian sector of control (or upward for the foreign sector).

To partly compensate for this bias, two variations were used for calculating the import propensities. One included the shipments for

enterprise groups 1 and 5, 2 and 6, and 3 and 7 ("M only", "X only" and "X and M") for which there is greater comparability in the types of enterprises between the sectors of control. This is referred to in the balance of this chapter as the narrow market definition for a propensity. The other variation included the market for all four groups of enterprises, including the "No X or M" group, and is referred to as the wide market definition. The true propensity in an industry for groups 1 and 5 enterprises ("M only") probably lies somewhere in between these two variations. In fact, as will be shown later, there is very little difference in the results of the tests for significant differences between the sectors of control no matter which definition is used.

The problems noted above associated with calculating the appropriate import propensities for "M only" enterprises does not arise in the case of the consolidated enterprises. In this case, the imports of an enterprise are consolidated across all enterprise groups and industries associated with the overall entity. The total for imports is then related to the total shipments of the entity. The consolidated enterprise is allocated to the industry in which the major portion of its shipments belong. This does create another problem since the consolidated enterprise could be allocated to an industry that is not appropriate for some of its imports of minor product lines and components. But, the imports are associated with the shipments of each enterprise doing the importing which is one of the items of interest to this study.

The allocation to industries different than the main industry of the enterprise, of imported components and minor product lines distantly related

to the major product lines of an enterprise, does result in an inflated count of the number of unconsolidated enterprises in the manufacturing sector as a whole, as well as in individual industries and enterprise groups. This is because of the duplicate count arising from the same enterprise importing products across several different industries. For instance, an enterprise could be a television producer and the shipments of its major product lines would be associated with the television industry. The enterprise would correctly be included in the count of producers belonging to that industry. However, if it also imports transistors and picture tubes, then it would also be counted in this study as also being in these different industries. Thus, the count of enterprises actually producing in the manufacturing sector would be overstated by the entries in the transistor and picture tube industries as would also be the count in these individual industries and enterprise groups within them. This is not a problem, however, when dealing with the consolidated enterprises since they are counted only once and for the industry to which the major products of the enterprise belong. This issue will arise later when the count of enterprises is presented, but it is not a significant problem for the analysis.

Aside from these mainly minor problems arising from disaggregating the enterprises into trade-related groups, there are advantages to having the disaggregated information. Enterprise groups 3 and 7 ("Both X and M") would tend to be those enterprises engaging in two-way trade in similar products. That is, they are the ones more clearly associated with IIT arising from specialization in products produced and are the ones of major interest to this study. Enterprise groups 2 and 6 ("X only") would tend to be those enterprises associated with one-way trade normally identified with the HOS

model. Enterprise groups 4 and 8 ("No X or M") would tend to be those enterprises associated with being just tariff factories and suppliers to only domestic markets. This group of enterprises is the most vulnerable to increased competition. Enterprise groups 1 and 5 ("M only") would tend to be those enterprises specializing in production activities and engaging in international sourcing as they contract-out their production activities. That is, the identification of different types of enterprises within an industry based on their international trade activities provides an insight into the activities of the firms in that industry that has not been possible until now and is of interest for identifying which industries are responding to the changing trade environment through increased scale and specialization along with the characteristics of these firms in terms of their size and type of ownership.

Comparisons of Data to Other Published Sources:

The Census data used in this analysis, which was abstracted from the MAPID data bank managed by Statistics Canada (i.e. exports, shipments, value-added and other information from the Census), were cross-checked with publications issued by Statistics Canada to ensure they were consistent in total. No major exceptions were found. However, in the case of imports (which were developed from non-MAPID sources) a significant difference was found and it has major implications for public policy toward MNEs. The total value of imports used for this analysis was about one-quarter higher than the value of imports reported by Statistics Canada in a publication that compared imports and import propensities between the sectors of control. (4-2) Subsequent investigation determined that the difference arose because of the wholesale activity by manufacturers which is associated particularly with

subsidiaries. Statistics Canada did not include in their analysis the imports of manufactured goods brought in by non-manufacturers such as wholesalers who do so in order to resell the items without further processing. An example would be The Bay importing furniture or clothes. The Bay is in the wholesale and retail sectors trading these goods but not in the manufacturing sector producing them. However, such imports were initially included in the data base used for this study and coded to the appropriate manufacturing industry at the time they entered Canada.

The focus of this study is on the trade activities of producers in the manufacturing sector only. The inclusion of these imports related to the activities of other sectors would distort the analysis. Consequently, they were removed from the data by using the following procedure: if imports plus shipments, minus imports, were equal to zero for an enterprise (where shipments could be in any of the 159 SIC industries) then the imports, and the sales of the imports, for the enterprise were deleted from the data bank. The adjustment to sales was necessary because sales are defined as shipments plus imports. Therefore, by definition, sales of manufactured goods would include items imported for resale even though they are sales of another sector. Therefore, they were removed in order to arrive at the sales of just the manufacturing sector. The adjustment was made only to the imports and sales of the group 1 and 5 enterprises ("M only") because the other groups have only manufacturers in them. This adjustment is similar to the one implicitly made by Statistics Canada in its study of import propensities by sector of control.

This adjustment likely introduced a bias into the import data which

would affect the comparisons of the import propensities between the sectors of control. The bias would arise because subsidiaries would tend to be more actively involved in the importing of goods as wholesalers than would Canadian-controlled manufacturers because of their access to foreign affiliates. The Canadian-controlled manufacturers do not have similar access and would tend to rely more upon the wholesalers in other sectors to perform this task. This would overstate imports and import propensities for the subsidiaries relative to the Canadian sector of control. The implications of this will be commented on more fully in the course of the analysis. But, the significance of the adjustment in relation to total imports of manufactured goods, by sector of control, is shown now in Table 4-1 along with comparisons to the total values used in the Statistics Canada study of import propensities.

TABLE 4-1

Imports by Groups of Enterprises
Manufactured Goods (\$ Billions)
1979

Enterprise Group	Imports: This Study Before Adjustment		Imports: This Study After Adjustment		Imports: Statcan Study	
	Foreign Sector	Canadian Sector	Foreign Sector	Canadian Sector	Foreign Sector	Canadian Sector
Group 1 & 5	\$13.5	\$14.9	\$ 8.4	\$ 3.7	N.A.	N.A.
Group 3 & 7	20.5	2.8	20.5	2.8	N.A.	N.A.
Total	<u>\$34.0</u>	<u>\$17.7</u>	<u>\$28.9</u>	<u>\$ 6.5</u>	<u>\$29.7</u>	<u>\$7.6</u>
Sales	<u>\$108.4</u>	<u>\$94.8</u>	<u>\$102.6</u>	<u>\$83.2</u>	<u>\$96.5</u>	<u>\$81.1</u>

Sources: See text.

It should be noted that the Statistics Canada study used CALURA files as

the source for its data, except for imports which came from the same data source as was used for this study. CALURA data, in turn, are compiled from the financial statements of firms required to report under the Act. Therefore, because shipments are not available from financial statements, the denominator of the Statistics Canada import propensities used sales even though the traditional import propensity calculation uses shipments, plus imports, minus exports (i.e. domestic market disappearance). However, the limitations of the CALURA data proscribed such a calculation. The MAPID data base compiled from Census information was used in this present study which contains data on shipments, imports and exports but not sales. The closest measure to sales that could be calculated from the MAPID data was shipments plus imports. This was used as the counterpart to the sales values used for the Statistics Canada study and is reasonably close, in total, to those values as is apparent from Table 4-1 if the post-adjustment values are compared to the values from the Statistics Canada study.

Table 4-1 shows, based on a comparison of the pre and post-adjustment values, that wholesalers with no manufacturing activities accounted for a significant portion of the value of imports of manufactured goods in 1979. Further, as expected, the bulk of this activity was by Canadian-controlled firms who accounted for about two-thirds of it. One of the conclusions in the Statistics Canada study was that, on average for the manufacturing sector as a whole, the import propensity for the foreign sector of control was over double that for the Canadian sector. However, given the difference in wholesale activities between the two sectors of control and the biased manner in which it was adjusted for, it is doubtful if the magnitude of the difference is generally that large, especially if allowance is made for the

significant imports and shipments by the automobile sector which is mainly in the foreign sector of control. Removing these industries would reduce imports and shipments in the foreign sector by about \$14 Billion and \$28 Billion respectively and considerably reduce the difference in the overall average propensity between the sectors of control (before adjustment for imports by non-manufacturing wholesalers). The problem is that, given the present methods for determining imports and shipments, it is extremely difficult to adjust accurately for the difference in the level of wholesale activity between the sectors of control. Either goods imported by wholesalers only are removed from the data as was done here (and which biases the results), or no adjustment is possible. In this latter case it is unclear whether or not the same level of wholesale activity is being compared between the sectors of control.

Paired T-test were carried-out across the sectors of control on the import propensities (before the adjustment for wholesalers only) at the 4-digit level of industries. A propensity was calculated for each sector of control in an industry (and each group of enterprises within a sector) using as the test statistic imports divided by total sales for an industry. This is the wide market definition. The tests were for significant differences in the propensities between the sectors of control using a two-tailed test. Only industries with observations in both sectors of control were used for the T-tests which reduces the number of usable observations to less than the potential full set of 159 industries. The tests were undertaken in order to determine if the conclusion of Statistics Canada was valid that there is a difference in the import propensities. The results are presented in Table 4-2.

TABLE 4-2

T-tests on Cross Section of Import Propensities
Between Sectors of Control
By Groups of Enterprises and in Total
Manufacturing Sector
1979

Enterprise Group	No. of Industries	Unweighted Averages of Propensities		Level of Significance
		Foreign Sector	Canadian Sector	
Groups 1 & 5	147	23.7%	24.3%	.77
Groups 3 & 7	120	6.1	2.5	.00
	-----	-----	-----	-----
Total	147	29.0%	26.4%	.20
	-----	-----	-----	-----

Sources: See text.

These tests show that, contrary to the Statistics Canada conclusion, there is no significant difference in import propensities between the sectors of control, either overall or for the groups 1 and 5 enterprises ("M only"), if the wholesale activities of non-manufacturers are not adjusted for. There is a significant difference, however, for the groups 3 and 7 enterprises ("Both X and M"), with the foreign sector of control having the higher propensity. But the propensity in this latter case is much lower than reported by Statistics Canada. Further, the difference between the sectors for this group of enterprises is mainly due to the fact that the subsidiaries are far more extensively involved in two-way trade of their products (presumably with their foreign affiliates) so that their higher import propensities are offset by higher export propensities as will be noted later in this study. This is an important result since, after allowing for any offsetting exports, it is not supportive of the nationalist position (which found sustenance in the Statistics Canada study) that subsidiaries import significantly more than do Canadian-controlled firms and as a result are

harmful to domestic income and employment. The differences between the sectors which was observed by Statistics Canada arises largely because of the wholesale activities of the subsidiaries that has no major counterpart in Canadian-controlled manufacturers. It also arises because the Statistics Canada study focused exclusively on imports and did not allow for the possibility of higher exports by firms with higher imports. This result will be drawn on later in the study when more detailed comparisons are made of import behaviour by sector of control.

Note, however, that the above conclusions are based on comparing averages for the manufacturing sector as a whole and on T-tests between the individual averages for each industry. These averages do not give weight to the relative importance of the imports by individual industries. This means that dominant industries, such as autos and parts, do not unduly influence the overall and industry averages. But, conversely, it also means that industries of lesser relative importance have a proportionately larger influence on the averages and their comparisons. It is also worth noting here that even though in the balance of this study the wholesaler-adjusted values are used for imports, in order to just assess trade in manufactured goods by producers only, it is done with the foreknowledge that there is a bias in the data as a result of this adjustment. However, the bias, since it is now explicit, can be more readily allowed for when interpreting the results of analyses on the data. This is in distinction to the results of the Statistics Canada study in which the conclusions were largely a result of an undiscovered bias in the data. In addition, T-tests similar to those performed above in which the import propensity was calculated by taking imports as a ratio of total sales were also undertaken using the traditional

calculation of an import propensity (i.e. imports as a ratio of shipments plus imports, minus exports, or what is termed domestic market disappearance). The results of these latter tests were very similar to the tests discussed above and are not reported on here because they would add no new information to the analysis.

Overview of the Statistics:

This section of the chapter explores the basic outline of the data bank before the detailed analyses are undertaken. Some preliminary conclusions will be drawn from this overview which will be more formally tested later. This initial look at the data does so by reviewing averages on the major variables for the manufacturing sector as a whole.

In the next few Tables, the data relating to the larger enterprises in the foreign sector of control that are in the "Both X and M" group of enterprises are presented in two ways. One shows the values for a cell, including the automobile and auto parts industries, and is described with the notation "incl." to reflect the fact these industries are included in the relevant variable. The other manner of presentation excludes the values for these industries and is labeled "excl." to reflect this fact. The reason for showing the two results is that the auto and auto parts industries are significant in terms of shipments, exports and imports and range from one-third to one-half of the total values reported for these important variables. In addition, these industries are mostly foreign controlled and there is no significant counterpart to them in the Canadian sector of control. Consequently, it would be misleading to present information on variables that include these industries when comparisons are being made

between the sectors of control.

Table 4-3 presents information on the number of unconsolidated enterprises in the data bank, by size class and sector of control.

TABLE 4-3

Number of Unconsolidated Enterprises
By Sector and Size
Manufacturing Sector
1979

Enterprise Group	<u>Sector of Control</u>				Total
	<u>Foreign</u>		<u>Canadian</u>		
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	
1 and 5	26093	381	17141	205	43820
2 and 6	335	95	2137	194	2761
3 and 7 "incl."	798	718	1114	443	3073
3 and 7 "excl."	798	660	1114	443	3015
4 and 8	553	59	25074	207	25893
Total "incl."	27779	1253	45466	1049	75547
Total "excl."	27779	1195	45466	1049	75489

Source: See text.

Three major points need to be made about the information in Table 4-3. First, the number of unconsolidated enterprises that ship over \$10 Million (the size categories are based on dollars of shipments in this Table) is relatively small. Further, by international standards, even shipments of \$10 Million (and multiples of this amount) do not represent a very large manufacturing operation. This reinforces the point made in an earlier chapter that the manufacturing sector is dominated by a relatively large number of small plants by international standards, although a significant proportion of them do have some type of involvement with international trade (i. e. all but groups 4 and 8). Also, the enterprises in the Canadian sector

of control are clustered in group 6 ("X only"), relative to those in the foreign sector of control. This group is associated with one-way trade of the inter-industry type that conforms to the HOS model of trade. But, the enterprises in the foreign sector of control are clustered more in group 3 ("Both X and M") which is associated with two-way trade conforming to the IIT model of trade.

Second, there is a relatively large number of Canadian-controlled enterprises in group 8 ("No X or M"). These enterprises have no involvement with international trade, except perhaps as minor importers of unfinished goods and finished goods distantly related to their major product lines. There is no significant counterpart group in the foreign sector of control. This is surprising since one of the expected results, based on the earlier discussion of why subsidiaries are in Canada, was that they would be mainly tariff factories serving just the Canadian market. In fact, by far the larger proportion of them are exporters, presumably because of their access to export markets through foreign affiliates. It is the smaller firms in the Canadian sector of control that are insular and not trading in international markets. Also, because they are small, it is likely they are the ones that are high cost and most vulnerable to increased competition unless they have some natural advantage, such as high freight costs associated with competitors reaching the regional and local markets that many of them serve almost exclusively. In fact, Table 1-1 shows that these firms are, relative to their larger counterparts, low-productivity and high-cost producers who are responsible to a large extent for Canada, on average for the whole manufacturing sector, having a cost disadvantage relative to the U.S., Japan and other industrial nations.

The third point, which has already been discussed above, is that there is a relatively large number of enterprises in groups 1 and 5 ("M only") because of duplicate counting of those enterprises that import components and minor product lines distantly related to their major product lines. The duplicate count should be relatively higher for the subsidiaries because they have access to foreign affiliates which increases their propensity to import such components and minor product lines. In fact, the smaller subsidiaries are heavily represented in this group. Apparently, they rely very much on their affiliates for products and components. This would be accounted for by the subsidiaries being able to so acquire them at a lower cost than if they were produced internally in Canada by small run sizes or acquired from domestic suppliers with similar problems of small scale production. The affiliates and other foreign suppliers would be lower cost because of their larger scale of production and greater specialization.

Some degree of understanding of the impact of the duplicate count on the number of enterprises can be obtained by comparing the results in Table 4-3 with those in Table 4-4. Table 4-4 shows the count for the consolidated enterprises. When imports are consolidated across the enterprises and folded into the total corporate entity, they become associated with only the one industry to which the total firm has been allocated. This eliminates the extra count in distantly related industries that influenced the results shown in Table 4-3. There are three size classes for the consolidated enterprises and they are based on sales levels, rather than on shipments as is the case for Table 4-3.

TABLE 4-4

Number of Consolidated Enterprises
By Sector and Size
Manufacturing Sector
1979

	<u>Sector of Control</u>						Total
	<u>Foreign</u>			<u>Canadian</u>			
	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	
1.	842	400	285	26036	633	157	28403
2.	842	400	261	26036	633	157	28379

1.="Incl."

2.="Excl."

Source: See text.

The count of small subsidiaries falls from 27779 in Table 4-3 to 842 in Table 4-4 as a result of eliminating the duplicate count. This decrease is far larger in both relative and absolute terms for the subsidiaries than for the Canadian-controlled firms. This reflects the much more extensive involvement of the subsidiaries in the use of foreign suppliers, both third-party and affiliated, for the sourcing of components and minor product lines. The much smaller decrease in the duplicate count for the small Canadian-controlled firms also reflects the insular view of their management which has adopted the role of not only just serving the domestic market with local production but also of not involving themselves with suppliers outside of Canada, perhaps partly because they are of attempting to produce internally a complete range of products and components rather than specializing through contracting-out and using foreign suppliers. In such a case, they would be high-cost producers because of their small scale and diversity as well as because of their lack of use of the most efficient suppliers. This would be detrimental to their longer-run competitiveness and success.

Table 4-4 also shows that the subsidiaries tend to be concentrated relatively more in the large size class as compared to the Canadian-controlled firms that are more in the intermediate size class. This is so even after adjusting for the greater relative representation of the Canadian-controlled firms in the small size class. It is also worth noting that the large enterprises across both sectors of control would likely be the ones that are the most competitive at home and internationally. But, they represent less than one-fifth of the total number of enterprises, although they represent a larger proportion of manufactured output as will be shown below.

Tables 4-5, 4-6, 4-7 and 4-8 present information on the major variables used in this study of sales, exports, imports and shipments respectively, by sector of control and size class. In the balance of the Tables in this chapter, the size classes for unconsolidated enterprises are based on dollars of shipments while those for consolidated enterprises are based on dollars of sales.

TABLE 4-5

Sales of Unconsolidated Enterprises
(in \$Millions)
By Sector and Size
Manufacturing Sector
1979

Enterprise Group	Sector of Control				Total
	Foreign		Canadian		
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	
1 and 5	\$ 6546	\$12301	\$ 6454	\$ 6128	\$ 31429
2 and 6	728	3785	3762	8418	16693
3 and 7 "incl."	2663	74095	3046	36894	116698
3 and 7 "excl."	2663	46339	3046	36894	88942
4 and 8	851	2402	14520	4420	22193
Total "incl."	\$10788	\$92583	\$27782	\$55860	\$187013
Total "excl."	10788	64827	27782	55860	159257

Source: See text.

TABLE 4-6

Exports of Unconsolidated Enterprises
(in \$Millions)
By Sector and Size
Manufacturing Sector
1979

Enterprise Group	Sector of Control				Total
	Foreign		Canadian		
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	
2 and 6	\$252	\$ 1860	\$1179	\$ 2316	\$ 5607
3 and 7 "incl."	488	18819	728	10549	30584
3 and 7 "excl."	488	9746	728	10549	21511
Total "incl."	\$740	\$20679	\$1907	\$12865	\$36191
Total "excl."	740	11606	1907	12865	27118

Source: See text.

TABLE 4-7

Imports of Unconsolidated Enterprises
(in \$Millions)
By Sector and Size
Manufacturing Sector
1979

Enterprise Group	<u>Sector of Control</u>				Total
	<u>Foreign</u>		<u>Canadian</u>		
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	
1 and 5	\$4334	\$ 4183	\$2263	\$1428	\$12208
3 and 7 "incl."	540	19919	322	2436	23217
3 and 7 "excl."	540	6586	322	2436	9884
Total "incl."	\$4874	\$24102	\$2585	\$3864	\$35425
Total "excl."	4874	10769	2585	3864	22092

Source: See text.

TABLE 4-8

Shipments of Unconsolidated Enterprises
(in \$Millions)
By Sector and Size
Manufacturing Sector
1979

Enterprise Group	<u>Sector of Control</u>				Total
	<u>Foreign</u>		<u>Canadian</u>		
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	
1 and 5	\$2212	\$ 8118	\$ 4191	\$ 4700	\$ 19221
2 and 6	728	3785	3762	8418	16713
3 and 7 "incl."	2122	54175	2724	34458	93479
3 and 7 "excl."	2122	39753	2724	34458	79057
4 and 8	851	2402	14520	4420	22193
Total "incl."	\$5913	\$68480	\$25197	\$51996	\$151606
Total "excl."	5913	54058	25197	51996	137184

Source: See text.

Tables 4-5 and 4-8 are very similar because they both have shipments as their base data and it dominates. The major point to be taken from these

Tables is that over one-half of sales and shipments are by the larger unconsolidated enterprises in groups 3 and 7 (i.e. those enterprises engaged in two-way trade). Moreover, the subsidiaries account for over twice as much as do the Canadian-controlled firms if the auto industries are included. To some extent this is because there are relatively more subsidiaries in the larger size class that tend to have higher shipments and sales per enterprise than for enterprises in the Canadian sector. But, clearly, the major reason for the dominance of the subsidiaries is the enterprises in the auto industries which are mainly in the foreign sector of control.

However, the subsidiaries account for a relatively smaller proportion of the sales and shipments by enterprise groups 1 and 5 ("M only"), given the proportion of them that are in this group relative to the Canadian sector of control. The Canadian-controlled enterprises represent a relatively large proportion of sales and shipments in groups 2 and 6 ("X only") as well as groups 4 and 8 ("No X or M"), which is consistent with the relatively large number of them in this group as was noted in Tables 4-3 and 4-4.

Table 4-6 shows that it is mainly the larger firms in both sectors of control that account for the bulk of exports, while at the same time being involved in two-way trade (i.e. groups 3 and 7). While the subsidiaries dominate exports in total, this is not the case after the auto industries are removed from the data. In terms of those enterprises just exporting only (groups 2 and 6), it is the Canadian-controlled firms that account for over one-half of it, although the total amount involved in this group is relatively small compared to total exports. The smaller subsidiaries are virtually not involved in export activity.

Imports, as shown by Table 4-7, are dominated by the subsidiaries across all the groups of enterprises, even after allowing for the influence on the data of the automotive industries. The enterprises in groups 1 and 5 that import only, have very sizable imports which account for over one-half of the total if the auto industries are excluded from the import data. The subsidiaries are particularly involved with these imports which would be mainly of components and minor product lines removed from their major product lines. The reasons for this have already been discussed when the information in Tables 4-3 and 4-4 was presented and which showed a relatively large number of unconsolidated and consolidated subsidiaries in group 1. But, the subsidiaries also import very extensively finished goods related to their major product lines relative to the Canadian-controlled enterprises.

In summary of the overall data on trade activity, it is the larger firms that are involved in it and especially the subsidiaries. This appears to reflect the subsidiaries' ability to trade on an intra-firm basis with foreign affiliates in order to acquire components, minor product lines and major product lines at a low cost which is an avenue to lower costs that is not available to domestically-controlled firms. It also appears to reflect a greater involvement generally with independent foreign suppliers who also would likely be lower cost than internal production or purchases from domestic suppliers, and this is an avenue to lower costs open to Canadian-controlled firms that appears to have been relatively underutilized.

The next few Tables utilize the information presented so far by calculating on a per-enterprise basis (for both unconsolidated and consolidated enterprises) the average values for imports, exports and

shipments by size, sector of control and trade group. This may help the reader to put the data into an overall and relative perspective before starting the analysis at the detailed level of the industries. Tables 4-9 (unconsolidated enterprises) and 4-10 (consolidated enterprises) present this information for shipments expressed in terms of the average for the enterprises in each cell.

TABLE 4-9

Average Shipments Per Unconsolidated Enterprise (In \$000)
By Sector and Size
Manufacturing Sector
1979

Enterprise Group	<u>Sector of Control</u>			
	<u>Foreign</u>		<u>Canadian</u>	
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.
1 and 5	\$ 85	\$21307	\$ 245	\$22927
2 and 6	2173	39842	1760	43391
3 and 7 "incl."	2659	75452	2445	77783
3 and 7 "excl."	2659	60230	2445	77783
4 and 8	1539	40712	579	21353
Total "incl."	\$ 213	\$54653	\$ 554	\$49567
Total "excl."	213	45230	554	49567

Source: See text.

TABLE 4-10

Average Shipments Per Consolidated Enterprise (In \$000)
 And Total Shipments (In \$Millions)
 By Sector and Size
 Manufacturing Sector
 1979

	<u>Sector of Control</u>					
	<u>Foreign</u>			<u>Canadian</u>		
	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.
<u>Average</u>						
1.	\$2659	\$17100	\$229200	\$818	\$19200	\$278800
2.	2659	17100	190919	818	19200	278800
<u>Total</u>						
1.	\$2239	\$6857	\$65310	\$21298	\$12144	\$43767
2.	2239	6857	49830	21298	12144	43767

1.="Incl."

2.="Excl."

Source: See text.

The information in Table 4-9 on average shipments for enterprises in groups 1 and 5 ("M only) should be interpreted with some caution because of the affect that the duplicate count has on the average for the small size class. This is apparent particularly for the subsidiaries when their average shipments, in total across all the small enterprise groups, shown in Table 4-9 (\$213 thousands) is compared with the counterpart average shipments in Table 4-10 (\$2659 thousands). The average value of shipments for a small, consolidated subsidiary is about thirteen times that for a small, unconsolidated subsidiary. However, in the Canadian sector of control the ratio is almost one-to-one (\$554 thousands versus \$818 thousands). The duplicate count of the unconsolidated subsidiaries, because they are active importers of components and minor product lines, reduces their average shipments. This comparison to the average for the Canadian-controlled

enterprises gives some indication of the difference in the order of magnitude by which subsidiaries are involved with the international sourcing of components and minor product lines relative to their Canadian-controlled counterparts.

The comparison of average shipments in Table 4-10 between the sectors of control indicates that the smaller foreign-controlled firms in Canada have more plants per consolidated enterprise than do Canadian-controlled firms. In such a case the smaller subsidiaries would benefit from firm-level economies of scale moreso than their Canadian-controlled counterparts. This, in conjunction with the access the subsidiaries have to their large foreign parents and affiliates would give them a considerable management advantage over the small Canadian-controlled plants which might explain part of the productivity difference between the sectors for the smaller plants that was noted in chapter one. The small enterprises in the Canadian sector of control appear to be mainly one-plant operations which would put them at a considerable disadvantage in gaining access to the type of management expertise, technology and products that are normally associated with larger, firm-level operations. Further, almost one-third of shipments by Canadian-controlled enterprises are by these small firms, compared to less than five percent for the subsidiaries, which means that a significant portion of output by the Canadian sector would be produced under this disadvantage.

Table 4-10 also shows a difference in size between the sectors of control for the largest consolidated enterprises, with the larger ones being in the Canadian sector. However, because the foreign sector has relatively

more consolidated enterprises in the largest size class, almost ninety percent of that sector's shipments are produced by the large enterprises as compared to sixty percent for the Canadian-controlled enterprises.

Table 4-9 allows a comparison of the average shipments of unconsolidated enterprises by trade group. The small, unconsolidated enterprises in the foreign sector tend to be smaller than their Canadian-controlled counterparts for groups 1 and 5, but this comparison is distorted by the much larger duplicate count of firms in the foreign sector as has already been discussed. There is no appreciable difference between the sectors for the small and large enterprises in groups 2 and 6 ("X only") and groups 3 and 7 ("Both X and M). Nor is there any significant difference between the sectors for the large enterprises in groups 1 and 5 ("M only"). Both the small and large subsidiaries that are just serving domestic markets do, however, appear to be larger than their Canadian-controlled counterparts (groups 4 and 8). Again, the larger size of the subsidiaries in this group would tend to give them a cost advantage which could be critical since these groups of enterprises are the most vulnerable to increased competition from imports because of their past insulation from competition which leads to inefficiencies.

Tables 4-11 and 4-12 present information on exports and imports for the consolidated enterprises. The statistics shown are for: total exports and imports; average exports and imports per enterprise; and the ratio of exports and imports to shipments.

TABLE 4-11

Average Exports (In \$000), Total Exports (In \$ Millions)
 And Exports as a % of Shipments for Consolidated Enterprises
 By Sector and Size
 Manufacturing Sector
 1979

Sector of Control

	<u>Foreign</u>			<u>Canadian</u>		
	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.
<u>Average</u>						
1.	\$310	\$2980	\$70050	\$50	\$3050	\$72060
2.	310	2980	37510	50	3050	72060
<u>Total</u>						
1.	\$262	\$1191	\$19966	\$1371	\$2088	\$11314
2.	262	1191	9790	1371	2088	11314
<u>Percent</u>						
1.	12%	17%	31%	6%	17%	26%
2.	12	17	20	6	17	26

1.="Incl."

2.="Excl."

Source: See text.

TABLE 4-12

Average Imports (In \$000), Total Imports (In \$ Millions)
And Imports as a % of Shipments for Consolidated Enterprises
By Sector and Size
Manufacturing Sector
1979

	<u>Sector of Control</u>					
	<u>Foreign</u>			<u>Canadian</u>		
	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.
<u>Average</u>						
1.	\$710	\$6010	\$91160	\$26	\$1850	\$29350
2.	710	6010	41965	26	1850	29350
<u>Total</u>						
1.	\$598	\$2407	\$25982	\$678	\$1176	\$4607
2.	598	2407	10953	678	1176	4607
<u>Percent</u>						
1.	26%	35%	40%	3%	10%	11%
2.	26	35	22	3	10	11

1.="Incl."

2.="Excl."

Source: See text.

There is no appreciable difference in average exports between the sectors of control in Table 4-11 except for the small enterprises where the subsidiaries have a propensity to export that is about double that for the Canadian-controlled enterprises. However, the subsidiaries do account for the largest proportion of total exports because of the larger number of them in the large size class. But, if the auto industries are excluded then the export propensity is higher for the Canadian sector of control. Also, the large enterprises in both sectors of control account for over three-quarters of total exports and their exports are about one-quarter of their shipments which is significantly higher than for the small and intermediate size firms. The export success of the large enterprises indicates they are cost competitive internationally. This is in contrast to the small firms in the

Canadian sector of control that have the weakest performance on export activity with an export propensity about one-quarter that of the large firms and they are outperformed by even the small subsidiaries who have a propensity double that of their Canadian-controlled counterparts. This indicates that the small Canadian-controlled firms are the ones having the greatest difficulty in being internationally competitive. The difference in the export propensity between the sectors of control for the small firms suggests that part of the problem of a lack of international competitiveness with the Canadian-controlled firms may be their lack of access to marketing channels which is not as great a problem for the subsidiaries because of their international affiliations.

Table 4-12 shows that the subsidiaries import more in total and per consolidated enterprise than the firms in the Canadian sector of control. Also, in contra-distinction to the Canadian-controlled firms, the subsidiaries import more than they export on a per-enterprise basis and in total across all the size classes. Almost three-quarters of imports are by the large enterprises in both sectors of control even after removing imports by the subsidiaries in the auto industries. The consolidated enterprises in the foreign sector of control, by far, import more than their Canadian-controlled counterparts on a per-enterprise basis and in total. Consequently, all the import propensities of the subsidiaries are higher than for their counterparts in the Canadian sector of control. This reflects, in part, the access the subsidiaries have to the unfinished and finished products of their foreign affiliates as well as their greater use of independent foreign suppliers. Presumably, the extensive use by the subsidiaries of imported items in place of domestically produced ones (either

sourced from third-party suppliers or from internal production in Canada) is because it is efficient to do so. However, it is worth noting here, because this point will be picked-up later in this chapter, that as the subsidiaries become larger their relative dependence on foreign sources of supply declines whereas it increases for the Canadian-controlled firms (excluding the auto industries). This is evidenced by the declining import propensity between the small and the large subsidiaries and the increasing propensity between the small and large firms in the Canadian sector of control. It should also be noted that these propensities are for consolidated enterprises for which the import propensity is derived by relating imports to the shipments of the enterprises rather than to the shipments of the firms in the industry to which the imported goods belong.

Table 4-13 shows the net trade balances, of exports minus imports, of the consolidated enterprises. The balances reflect the effects discussed above. The net trade balances in the Table are calculated as a percentage of sales for the enterprises in an industry and expressed as an unweighted average for the 159 industries.

TABLE 4-13

Unweighted Average of Net Trade Balances As a % of Sales Consolidated Enterprises by 159 Industries By Sector and Size Manufacturing Sector 1979					
<u>Sector of Control</u>					
<u>Foreign</u>			<u>Canadian</u>		
<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.
(10%)	(18%)	(9%)	3%	7%	15%

Source: See text.

The net trade balances for the subsidiaries are all negative (i.e. imports exceed exports), while those for the domestically-controlled firms are all positive. This is because of the higher import propensities of the subsidiaries. However, as has already been pointed out in chapter 3, the relatively lower import propensities by the Canadian-controlled enterprises may not necessarily be desirable. They could be the result of inefficient purchasing practices if the Canadian-controlled firms are inward-looking and consequently only utilize domestic suppliers or their own internal production as sources for components and products. The domestically produced items may be higher cost than foreign produced ones. If this is the case then it would be harmful to the longer-run competitiveness of the Canadian-controlled firms. The low export propensity for the small enterprises in the Canadian sector of control suggests that to some extent this may be the case.

Tables 4-14 and 4-15 present information on exports and imports for the unconsolidated enterprises. Exports and imports are shown as averages for the enterprises in each of the cells which are determined by partitioning the data into trade groups, firm sizes and sectors of control. The export and import propensities are shown as a percentage of the shipments for each cell. These propensities are not directly comparable to those in Tables 4-11 and 4-12 where they were calculated using total exports or imports and total shipments within a size class and sector of control. In Tables 4-14 and 4-15 the shipments are only for the enterprises within each trade group. The exception to this are the import propensities for enterprise groups 1 and 5 ("M only") in which the narrow market definition of shipments was used in order to create greater comparability between the sectors of control. That is, the shipments were summed across all the groups of enterprises within a

sector of control and size group, excluding the shipments of enterprise groups 4 and 8 ("No X or M"). The propensities are also not directly comparable between Tables 4-11, 4-12 and Tables 4-14, 4-15 because the former Tables are for consolidated enterprises and the latter Tables are for unconsolidated enterprises. The imports and exports of the consolidated enterprises are related to the shipments of the firms actually doing the importing and exporting, whereas the imports and exports of the unconsolidated enterprises are related to the shipments of the industries to which the goods belong. The difference between the two concepts is greatest for imports, especially those by enterprises in groups 1 and 5, where the imports are often allocated to industries not associated with the major product lines of the importers, as has already been discussed earlier in this chapter.

TABLE 4-14

Average Exports (In \$000) Per Unconsolidated Enterprise
And Exports as a % of Shipments
By Trade Group, Sector and Size
Manufacturing Sector
1979

Enterprise Group	<u>Sector of Control</u>			
	<u>Foreign</u>		<u>Canadian</u>	
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.
<u>Average</u>				
2 and 6	\$750	\$19578	\$600	\$11938
3 and 7 "incl."	611	26210	653	23813
3 and 7 "excl."	611	14766	653	23813
<u>Percent</u>				
2 and 6	35%	49%	31%	28%
3 and 7 "incl."	23	35	27	31
3 and 7 "excl."	23	25	27	31

Source: See text.

TABLE 4-15

Average Imports (In \$000) Per Unconsolidated Enterprise
And Imports as a % of Shipments
By Trade Group, Sector and Size
Manufacturing Sector
1979

Enterprise Group	<u>Sector of Control</u>			
	<u>Foreign</u>		<u>Canadian</u>	
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.
<u>Average</u>				
1 and 5	\$166	\$10979	\$132	\$ 6966
3 and 7 "incl."	677	27742	289	5499
3 and 7 "excl."	677	9970	289	5499
<u>Percent</u>				
1 and 5	86%	6%	21%	3%
3 and 7 "incl."	25	37	12	7
3 and 7 "excl."	25	17	12	7

Source: See text.

Several new points of information are provided by Table 4-14 in addition to those arising from Table 4-11 for the smaller enterprises. First, the difference in average exports per enterprise between the sectors of control is considerably narrower. Second, the export propensity for the small Canadian-controlled enterprises that are in group 2 ("X only") is higher and declines for the large enterprises. However, it increases from the small to the large subsidiaries. Third, the increase in the propensity from the small to the large subsidiaries in group 3 ("Both X and M") is largely a result of the influence of the large, export-oriented subsidiaries in the auto industries. These differences were masked in the data presented in Table 4-11 because of the dominance of groups 3 and 7 on total exports.

It is not immediately apparent why the export performance of the specialized exporters in the Canadian sector of control declines as they became larger while the performance of the subsidiaries improves. It may be a result of a lower ability to gain access to foreign markets, relative to

the subsidiaries who can utilize foreign affiliates. But, this does not appear to be the case for the Canadian-controlled enterprises in groups 3 and 7. The substantial increase in the export propensity of the subsidiaries in group 3 when the automotive industries are added to the data suggests that sectoral free trade agreements in industries with high levels of DFI in which the subsidiaries can specialize and thereby improve their competitiveness would result in improved export performance in those sectors.

Even though for groups 1 and 5 in Table 4-15 the enterprises and shipments in groups 4 and 8 have been left out of the calculation of average imports and the import propensity in order to improve the comparability between the sectors of control, two anomalies still exist that distort the inter-sector comparisons for groups 1 and 5 ("M only"). One is the greater propensity of the subsidiaries to import components and minor product lines distantly related to their major product lines which increases the duplicate count of them in group 1 relative to the Canadian-controlled enterprises in group 5. The other is the bias (extent unknown) in the proportion of the imports by groups 1 and 5 brought in to Canada by large enterprises. The imports in these groups would not have the shipments of the large enterprises associated with them if they are components and minor product lines because they would be in another industry to which the major product lines belong. Consequently, the importer and the value of the imports would be allocated to the small size class. The result would be an overstatement of the count of enterprises and imports in the small size class for groups 1 and 5 and an understatement in the large size class. This bias would be greater for the foreign sector of control since the subsidiaries are large importers of minor product lines and components relative to their counterparts in the Canadian

sector of control. This anomaly explains a large part of the high import propensity by the small subsidiaries in group 1.

In order to partially overcome the effects of these biases between the sectors of control, the imports in groups 1 and 5 were summed across the two size classes within each sector of control and taken as a ratio of the non-auto shipments in groups 1 and 5, 2 and 6, and 3 and 7 (i.e. excluding the "No X or M" group). The resulting import propensities are 15% for the subsidiaries and 6% for the Canadian-controlled enterprises. It is stressed again, however, that a lower propensity does not necessarily imply efficient purchasing practices if the reason for them is inadequate search procedures for potential low-cost suppliers, including foreign ones.

It is clear, however, that no matter how the data are adjusted to remove non-comparabilities between the sectors, the subsidiaries have high import propensities and high imports per enterprise relative to the firms in the Canadian sector of control. This is so even if the subsidiaries in the auto industries are removed from the comparisons, although doing so does considerably reduce the difference in the import propensity and the average imports per enterprise between the sectors for groups 3 and 7. The import propensities and their relationship to export propensities will be considered more fully at a more detailed level later in this chapter.

Table 4-16 provides information on some measures of the degree of specialization by consolidated enterprises in each of the sectors of control, by size of the enterprises. The measures are: the ratio of the primary products shipped to total shipments; the ratio of primary products exported

to total exports; and the ratio of imports of primary products to total products imported. The values shown in Table 4-16 are the unweighted averages for the 159 industry groups of the enterprises in each of the industries.

TABLE 4-16

Unweighted Averages of Shipments, Exports and Imports of Major Product Lines
As a % of Total Shipments, Exports and Imports
Consolidated Enterprises by 159 Industries
By Sector and Size
Manufacturing Sector
1979

	<u>Sector of Control</u>					
	<u>Foreign</u>			<u>Canadian</u>		
	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.
<u>Shipments:</u>						
Incl.	90%	82%	68%	94%	85%	59%
Excl.	90	82	65	94	85	59
<u>Exports:</u>						
Incl.	94	88	75	94	90	58
Excl.	94	88	69	94	90	58
<u>Imports:</u>						
Incl.	40	47	37	52	35	21
Excl.	40	47	37	52	35	21

Source: See text.

It would appear that the small subsidiaries are somewhat less specialized in the products they ship than are the Canadian-controlled enterprises. However, in this size class the consolidated enterprises in the foreign sector have more plants per firm than does the Canadian sector, as has already been noted above. Consequently, the subsidiaries could be shipping a wider variety of products but their plants could be more specialized than those of their domestically-controlled counterparts. In the case of the large subsidiaries, they are more specialized across all three variables than are the firms in the Canadian sector of control, even after removing the influence of the auto industries.

The small subsidiaries are also less specialized in imports. This reflects their higher propensity to import components and minor product lines distantly related to their major product lines, as has already been discussed. However, the subsidiaries increase their specialization in imports as they become larger and for the large ones are more specialized than their Canadian-controlled counterparts. At the same time, the Canadian-controlled enterprises decrease their specialization in imports as they become larger. It would appear the large Canadian-controlled enterprises contract-out to foreign suppliers more of their requirements for components and minor product lines as they become larger and have a more extensive degree of use of foreign suppliers than the large subsidiaries or the small enterprises in the Canadian sector of control. This is consistent with them using more efficient search procedures for suppliers as they become larger. This is an important point that will be used later in the analysis.

There is a significant increase in the diversity of products and exports shipped by the enterprises in the Canadian sector of control as they become larger, until for the large firms they are more diverse than the small firms and even the large subsidiaries. This suggests they may have significant product-specific diseconomies of scale because of their extra diversity unless they have specialized their plants. But if they have specialized their plants they may have diseconomies of scale. It is known that, relative to the subsidiaries, Canadian-controlled firms stress product development in their R&D rather than the development of cost-reducing technologies. (4- 3) In the longer-run this would tend to make them diverse in their output and exports as well as higher cost than more specialized producers because of the product-specific diseconomies of scale associated with diversity.

Table 4-17 provides information on import and export propensities, but just for the major product lines of the consolidated enterprises. They can be compared to the propensities shown in Tables 4-11 and 4-12.

TABLE 4-17

Unweighted Averages of Exports and Imports of Major Product Lines
As a % of Total Shipments
Consolidated Enterprises by 159 Industries
By Sector and Size
Manufacturing Sector
1979

	<u>Sector of Control</u>					
	<u>Foreign</u>			<u>Canadian</u>		
	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.	<\$10 Mil.	\$10-\$50 Mil.	>\$50 Mil.
<u>Exports:</u>						
Incl.	11%	15%	23%	6%	15%	15%
Excl.	11	15	14	6	15	15
<u>Imports:</u>						
Incl.	11	16	15	2	3	2
Excl.	11	16	8	2	3	2

Source: See text.

The gap between the export propensities in Table 4-11 for exports of all products and the propensities in Table 4-17 for just major products is greatest for the large enterprises in both sectors of control. This is further evidence to that presented in relation to Table 4-16 in which the firms appeared to become more diverse in their exports as they became larger, rather than becoming more specialized. This is especially so for the large Canadian-controlled enterprises since the gap is largest for them and indicates that the Canadian-controlled enterprises become more diversified in their exports than the subsidiaries as they become larger. It also appears, based on the lack of a gap between the propensities in the two Tables for the small firms in both sectors of control, that they are highly specialized in their exports and do not export minor product lines. But, for the large

firms the gap grows to six percent of shipments for the subsidiaries and eleven percent for the Canadian-controlled firms, after adjusting for the influence of the auto industries on the statistics.

The adjustment for the exports of the auto industries has a large impact on the export propensity for the large subsidiaries shown in Table 4-17. The propensity to export major product lines falls from 23% of total exports to 14% after the adjustment. This suggests that the proportion of exports by the subsidiaries in the auto industries of their major product lines is higher than the average. That is, they are more specialized in their exports of major product lines, rather than exporting minor product lines to any extent as do the other subsidiaries. Other than this, the large subsidiaries are no different in terms of their degree of specialization in major product lines exported than are the large firms in the Canadian sector of control after allowing for the influence of the auto industries. However, the small subsidiaries have a propensity to export major product lines that is almost twice as great as for their counterparts in the Canadian sector of control. This suggests the small subsidiaries benefit from their access to foreign affiliates by being able to sell into international markets through them. This allows the subsidiaries to more readily export their major product lines than can the Canadian-controlled enterprises, especially if they have a world product mandate (WPM) in them.

The gap between the import propensities in Table 4-12 for imports of all products and the propensities in Table 4-17 for just major product lines increases significantly as the Canadian-controlled enterprises become larger. The gap remain constant for the subsidiaries as they become larger, after

adjusting for the influence of the auto industries. This indicates the subsidiaries start at and stay at a high level of imports of components and minor product lines from foreign suppliers, but the Canadian-controlled enterprises increase their imports of these items. This interpretation is also consistent with the one for Table 4-16 which was discussed above. That is, the Canadian-controlled firms increase the efficiency of their purchasing practices as they become larger and source internationally rather than just domestically as appears to be the case for the small Canadian-controlled firms (i.e. based on their low import propensity).

The influence of the auto industries on the import propensity for the large subsidiaries is to significantly increase the gap between the propensities in Tables 4-12 and 4-17. And the increase in the propensity between the "incl." and "excl." values is greater for total imports than for imports of just major product lines. That is, the diversity of minor products and components purchased from foreign suppliers increases significantly. This seems to be due to the auto producers importing auto parts and components extensively from efficient U.S suppliers. It appears then, that the subsidiaries in the auto industries are highly diversified in their imports of components and minor product lines but highly specialized in the export of their major product lines (as was noted above in the results for Table 4-16). This would give them the best of both worlds. That is, they enjoy the cost advantages of sourcing from the most efficient suppliers internationally as well as the cost advantages that come from being specialized in their output and exports while achieving the benefits of large scale through the export of their major product lines.

Table 4-17 shows that the enterprises in the Canadian sector of control import a significantly lower proportion of their major product lines than do the counterpart subsidiaries. Again, this reflects the enhanced ability of the subsidiaries to draw on the finished goods of affiliates purchased for resale in Canada. The gap between the Tables for the import propensities of the small firms in the Canadian sector of control is very small (one percent) which suggests these firms source very little of their components and minor product line requirements abroad. The low value of the propensity in Table 4-17 also suggests they do not import very much in the way of major product lines either and this applies to all size classes. These results are in contrast to the small subsidiaries who have a large gap in the propensities between the Tables (fifteen percent) apparently because they utilize foreign suppliers extensively for components and minor product lines. The higher level of the propensity in Table 4-17 also suggests they import major product lines more extensively than their Canadian-controlled counterparts, although the relative level of this activity decreases as the subsidiaries become larger (excluding the auto industries). This decrease could reflect the greater use of domestic suppliers and internal production to displace imports of finished goods as they become larger.

Summary of Overview of Trade Data:

The major findings in the overall data are presented here before proceeding into the more detailed analysis. One of the major points that emerged in the discussion above was that the bulk of exports and imports by Canadian manufacturers is by a relatively small number of large enterprises that both import and export their products simultaneously. Their large size likely accounts, to some extent, for their success in international markets.

But, by international standards, many of even the large firms are small scale producers. In addition, there is a relatively large number of manufacturers that are inward-looking and serve just domestic markets and do not engage in international sourcing of purchased inputs. Their small size may have something to do with their lack of export sales since they would be producing under a cost penalty because of their small scale of production.

The subsidiaries are major importers of finished and unfinished goods, with a significant proportion of them likely being on an intra-firm basis with foreign affiliates. They also have an extensive wholesale activity in finished goods that has no counterpart for the firms in the Canadian sector of control. It is also likely that by being able to source internationally the subsidiaries are acquiring inputs at a lower cost than if they were produced in Canada either by themselves or by domestic suppliers. The small Canadian-controlled enterprises source very little from foreign suppliers in comparison to the subsidiaries. This could be undesirable if it prevents these small firms from getting their components and products at the lowest possible cost. The enterprises in the auto industries provide an example of how firms that are attempting to be internationally cost-competitive will influence Canadian trade data. They create an extensive two-way flow of finished and unfinished goods that increases both the import and export propensities. These producers, who are large scale and specialized, import extensively a diverse array of components and minor product lines while at the same time specializing in the major product lines which they export.

Firms that just supply the domestic market as import competitors are mainly Canadian-controlled rather than being tariff-factory subsidiaries.

Also, the subsidiaries in this group tend to be larger than their Canadian-controlled counterparts. The Canadian-controlled enterprises that do engage in international trade tend to be somewhat larger than the subsidiaries, but more diversified in the products they produce and export. The small subsidiaries also tend to part of multi-plant firms whereas the Canadian-controlled firms tend to be one-plant enterprises. This would give the subsidiaries the benefits of firm-level economies of scale. In addition, they benefit from having access to the management expertise of their parents along with the products and technology of their affiliates. The combination of these factors helps to explain why they are more productive and lower-cost (as was noted in chapter one) than their counterparts in the Canadian sector of control. The small subsidiaries also outperform the small Canadian-controlled firms in terms of exports, probably because of the easier access they have to foreign markets through their foreign affiliates along with lower costs for components and minor product lines acquired from their foreign affiliates.

Analysis of Industry-Level Statistics:

Most of the remaining analysis is based on T-tests of various statistics calculated for the data on the 159 industries in the bank. The tests use statistics that have been partitioned, depending upon the test of interest, by: size of enterprise; sector of control; enterprise group; and type of trade predominating in an industry (i.e. IIT or HOS type). The observations on a statistic are paired, by industry, across the partitions used in a test. The T-tests provide a more rigorous basis than was used above for determining if there are significant differences between the means of the partitions being compared. The purpose of pairing the observations by industry was to

ensure that any difference in the means could be attributed to the influence of the different partitions rather than to the influence of using observations from different industries in the partitions being compared. The means presented in the following Tables for the various partitions of a statistic are unweighted averages for the industries used in each test. The results of the T-tests shown in the Tables include its significance, expressed as the probability that the means are the same. That is, for a significance level of .05, there is one chance in twenty the means are not different. It is up to the reader to assess what level of risk is acceptable to him that the means are not significantly different.

The number of industry observations used in a T-test depends upon several factors. For instance, if the test is on a statistic calculated just for the large enterprises, then several industries that have no such enterprises would have null observations. Since the tests reported on here do not use null observations, any counterpart observations in the other partition would not be used because of the lack of a counterpart observation in the null cell. This results in fewer than the full 159 potential observations being used in many of the tests. One of the consequences of this is that the proportion of exports, imports and other variables are less than their total values in some cases. For instance, for the larger enterprises in groups 3 and 7 ("Both X and M"), total sales were \$74095 Millions and \$18819 Millions, respectively. The respective values for total exports were \$19919 Millions and \$36849 Millions. In the case of imports they were \$10549 and \$2436 Millions. But, if only the pairable, non-zero value observations are used then the number of industry observations falls from 159 to 80 and the values fall, respectively for the foreign and Canadian

sectors of control, to: \$55039 and \$11224 for shipments; \$14181 and \$34894 for exports; and \$10279 and \$2372 for imports. In this case it is the Canadian sector of control (group 7) that is the major limiting factor because of its less extensive involvement in international trade which reduces the number of industries with non-zero observations. A good example of this is the auto industry which has a null observation for the Canadian sector of control, yet this industry represents a significant amount of the manufacturing sector's shipments, exports and imports.

One test was on the comparison of the size of enterprises between the sectors of control in order to establish if the differences noted above for them in Table 4-9 are, in fact, significant. The results of this test are presented in Table 4-18.

TABLE 4-18

Results of T-tests on Average Shipments per Unconsolidated Enterprise
For 159 Industries
Between Sectors of Control
By Trade Group and Size of Enterprise
Manufacturing Sector
1979

Trade Group of Enterprises

Description	M Only		X Only		Both X and M		No X or M	
	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.	<\$10 Mil.	>\$10 Mil.
Number of Industries	146	64	100	30	102	80	134	23
Average for Industries (\$000)								
-Foreign	\$113	\$30236	\$2160	\$36697	\$2602	\$65368	\$1649	\$34446
-Canadian	312	24458	1784	45498	2430	64664	735	16459
Significance of T-test	.00	.42	.06	.27	.40	.96	.00	.01
% of Sales in Sample								
-Foreign	99%	76%	99%	72%	96%	74%	N/A	N/A
-Canadian	99	91	87	46	95	95	N/A	N/A

Source: See text

The results of Table 4-18 are generally consistent with those commented on when discussing Table 4-9. There are, however, some differences. In the case of the larger enterprises in groups 2 and 6 ("X only"), there was a difference in average shipments with the subsidiaries having the lower average. But, given the variability from industry-to-industry in the size of enterprises, this difference between the sectors is not significant. Also, the apparently large difference in firm size for the large enterprises in groups 3 and 7 ("Both X and M") that is shown in Table 4-9 (with the subsidiaries having the smaller size) is not supported by the tests presented in Table 4-18. Apparently, the difference shown in Table 4-9 is a result of

a few large industries dominating the overall average since the T-tests on comparable industries show virtually no difference in the average firm size between the sectors of control for this group of enterprises. The results shown in Table 4-18 do support the results noted for Table 4-9 that the subsidiaries are significantly larger than their Canadian-controlled counterparts for those enterprises in groups 4 and 8 ("No X or M").

Table 4-19 presents the results of the tests for significant differences between the sectors of control on the statistics of: major product line shipments to total shipments; major product line exports to total exports; and major product line imports to total imports. Consolidated enterprises were the units for which these ratios were calculated and the results are useful for comparing with those in Table 4-16.

TABLE 4-19

T-tests Results on Major Product Lines to Total Shipments, Exports and Imports
Between Sectors of Control
Using Data Collected on a Consolidated Enterprise Basis
For 159 Industries by Size of Enterprise
Manufacturing Sector
1979

Description	Size of Consolidated Enterprises (Sales \$)					
	<\$10 Mil.		\$10-50 Mil.		>\$50 Mil.	
	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.
<u>Number of Industries:</u>	134		77		40	
<u>Shipments:</u>						
Unweighted Average	90%	93%	81%	83%	65%	68%
Significance of T-test	.01		.41		.56	
<u>Exports:</u>						
Unweighted Average	51%	80%	64%	68%	61%	65%
Significance of T-test	.00		.41		.42	
<u>Imports:</u>						
Unweighted Average	26%	41%	31%	30%	30%	21%
Significance of T-test	.00		.65		.07	

Source: See text.

The results presented in Table 4-19 are similar to those already discussed in relation to Table 4-16. The small enterprises in the Canadian sector of control are significantly more specialized in all three activities. The small subsidiaries have a much larger proportion of their imports in the form of minor product lines and components than do the Canadian-controlled enterprises. And, for the large enterprises in the Canadian sector of control, the import propensity decreases, which reflects an increasing level of diversification by these enterprises as they increase their imports of minor product lines and components. This could be accomplished by increased contracting-out of products and production activities as well as by switching from domestic to foreign suppliers as they become larger, more specialized

and aware of the need for increased cost-competitiveness. In the case of exports, the small subsidiaries export a much more diverse array of products than do their Canadian-controlled counterparts. However, there is no significant difference between the sectors for all three activities in the case of the intermediate size firms. Nor is there any significant difference between the sectors for the large firms in their shipments and exports. In summary, the chief differences between the sectors of control for their major activities are mainly for the small firms (which account for a small part of the total activity) and in the import activity of firms of all sizes. This latter point is the important one and will be drawn upon later in this chapter.

Table 4-20 compares trade balances between the sectors of control (using the statistic of exports minus imports as a proportion of the sales for the consolidated enterprises). The trade balances were calculated for the 159 industries in the data bank, by sector of control. This test provides a more rigorous test of the results discussed for Table 4-13. Note that the imports and exports are collected by consolidated enterprise and allocated to the industry to which its major output belongs. This may not necessarily be the industry to which all of the imports and exports belong.

TABLE 4-20

Results of T-tests On Net Trade Balances
Between Sectors of Control
Using Trade Data Collected on a Consolidated Enterprise Basis
For 159 Industries by Size of Enterprise
Manufacturing Sector
1979

Description	Size of Consolidated Enterprises (Sales \$)							
	Fgn.		Cdn.		Fgn.		Cdn.	
<u>Number of Industries:</u>	134		77		40			
<u>Ratios:</u>								
Unweighted Average	(10.5%)	2.0%	(10.3%)	(1.0%)	(3.9%)	3.6%		
Significance of T-test	.00		.00		.02			

Source: See text.

The results presented in Table 4-20 clearly are supportive of the conclusions reached earlier based on Table 4-13. There is a significant difference between the sectors of control for all size classes, with the foreign sector consistently having negative trade balances. This result, as has already been discussed in relation to Tables 4-7, 4-12, 4-13, 4-15, and 4-17 is primarily because of the greater propensity of the subsidiaries to import minor product lines and components from foreign suppliers.

Data on exports were available for both 1974 and 1979 so that, unlike the situation with respect to imports for which only 1979 data are available, it was possible to test for differences in the ratio of exports to shipments over this time period. The 1974 data on exports were not partitioned into size classes or enterprise groups for the exporting establishments. Therefore, in order to be consistent, the 1979 data were aggregated across the size and enterprise group cells to arrive at the total ratio, by sector of control, for an industry. Note that in this case the ratio is based on

the wide-market definition, which includes the shipments of all the enterprise groups including groups 4 and 8 ["No X or M"]. Note also the data used here are from the MAPIID bank which are based on the establishment as the reporting unit.

Each of the 159 industries in each year were allocated to a category representing the type of international trade that dominated in an industry. The definition and significance of the two trade categories are discussed more fully in the next section of this chapter. But, for purposes of this discussion, it is only necessary to note that one category represents those industries in which IIT predominates (i.e. the two-way flow of similar goods) and the other represents those industries in which non-IIT (i.e. HOS trade) dominates the international trade flows. A variant of the Grubel and Lloyd index was used to determine which category an industry belonged. The results of the T-tests for significant differences in the ratio of exports to shipments, between the sectors of control in both 1974 and 1979 (inter-sector tests) as well as between the years 1974 and 1979 for each sector (intra-sector tests), are presented in Table 4-21. These results are disaggregated for each test by the industries in the IIT and non-IIT categories with the sum of the industries across these two groups accounting for the total 159 industries.

TABLE 4-21

Results of T-tests on Ratio of Exports to Shipments
Based on Establishment-Level Data
Between Sectors of Control and Years 1974 and 1979
By Trade Category
For 159 Industries
Manufacturing Sector

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	Fgn.79	Fgn.74	Fgn.79	Fgn.74	Cdn.79	Cdn.74	Cdn.79	Cdn.74	Fgn.79	Cdn.79	Fgn.79	Cdn.79	Fgn.74	Cdn.74	Fgn.74	Cdn.74
Number of Industries	79	79	80	80	44	44	115	115	44	44	115	115	70	70	89	89
Unweighted Averages	17.4%	12.8%	10.9%	13.2%	16.3%	11.6%	10.8%	8.5%	16.0%	16.3%	13.5%	10.8%	13.7%	9.7%	12.5%	9.1%
Significance of T-test	.00		.20		.01		.00		.89		.04		.05		.03	
R ² of Correlation	.81		.50		.42		.75		.38		.59		.18		.47	
Slope of Correlation	1.03		.64		.72		.96		.91		.88		.69		.89	

Note: IIT= all industries with a MINDF, MINDC or MINDT index >.1
nonIIT= all industries with a MINDF, MINDC or MINDT index <.1

Source: See text.

For the inter-sector tests on the IIT industries, both sectors of control show an increase in the ratio between 1974 and 1979, although there is a different mix of industries in the tests for the two years. Therefore, it is not clear whether the increases are due to increases in the export propensities or to changes in the industry mix. In 1974 the foreign sector shows an average ratio of 13.7% vs. 9.7% for the Canadian sector of control. In 1979 the comparable values are 16.0% and 16.3%. In 1974 the difference in the ratio between the sectors was statistically significant (at the .05 level). But by 1979 there was no difference between the sectors, presumably because of a larger increase in the ratio by the Canadian sector between 1974 and 1979. The R² of the correlation of the ratio between the sectors of

control is higher in 1979 than in 1974 as is also the slope of the correlation. That is, the variation in the export propensities between the sectors of control diminished between 1974 and 1979 and the correspondence between the sectors of control had increased for the values of the propensities in many industries. Both of these results are consistent with the Canadian sector of control having a larger increase in its export propensities than the foreign sector for those industries in which the subsidiaries initially had higher ratios. If this is the case, then the improvement in the export performance of the Canadian sector of control would be in those industries in which the subsidiaries had previously been the more successful exporters relative to their Canadian-controlled counterparts.

All of the above results from Table 4-18, for those industries in which IIT is a significant part of total trade, are consistent with the enterprises in the Canadian sector of control adapting to freer trade as a result of increased import competition, so that by the end of the decade they had caught-up to the export performance of the subsidiaries. This result is important and while it is only one indication of a faster response over the 1970's by Canadian-controlled firms to the changing trade environment, it is consistent with similar conclusions that will be noted later in this chapter.

Both sectors show an increase between 1974 and 1979 in the ratio of exports to shipments for the intra-sector comparisons of the ratio. The ratio for the subsidiaries went from 12.3% to 17.4% while that for the Canadian-controlled establishments went from 11.6% to 16.3%. In the inter-sector comparisons discussed in a prior paragraph, the same IIT industries were used in the comparison of the ratio between the two sectors

of control for a given year. In the intra-sector comparisons being discussed here, the IIT industries are the same between the two years being compared within a sector of control, but there is a different mix and number of industries than for the inter-sector comparisons. Consequently, the intra-sector comparisons show a significant increase in the export propensity for both sectors of control between 1974 and 1979 and they are both statistically significant increases. This is in distinction to the inter-sector comparisons in which only the Canadian sector had a significant increase in the ratio.

This noticeable improvement in the export propensities of the subsidiaries could be accounted for by the greater number of industries included in the intra-sector test as compared to the inter-sector one. The major reason for the increase in the number of industries is that there is no constraint on the number of eligible IIT industries in the intra-sector test as there is in the inter-sector test. In the inter-sector test there is a requirement that the industries be matched to counterparts in the Canadian sector of control. The Canadian sector is not as actively involved in IIT because its enterprises lack the same degree of international affiliations, compared to the subsidiaries. Consequently, the index used to select IIT industries for the inter-sector tests identified fewer IIT industries than would otherwise have been the case. Some of the industries in the foreign sector that would have qualified as belonging to the IIT category were forced into the non-IIT category because of the constraint imposed by the fewer industries in the Canadian sector that belonged to the IIT category. The different mix of industries partly explains why the export performance of the non-IIT industries increased in the foreign sector of control between 1974

and 1979 for the inter-sector tests but decreased for the intra-sector tests.

The variability in the export propensities for the industries between 1974 and 1979 is less (i.e. the R^2 is greater) and the correlation between the propensities for 1974 and 1979 is larger (i.e. the slope of the correlation is 1.0) for the foreign sector than for the Canadian sector of control on the intra-sector T-test of the IIT industries. The opposite is the case on the T-tests for the non-IIT industries, although the significance of this is weaker than for the tests on the IIT industries. These results for the IIT industries are consistent with the interpretation of similar results for the inter-sector tests discussed previously where it was suggested this was due to the greater variability in the data created by the larger increase in the export propensities by firms in the Canadian sector of control between 1974 and 1979.

It is important to note that the improvement in the export performance for the non-IIT industries in the Canadian sector of control (i.e. those specialized along the lines of the HOS model) did not improve as much as for the IIT industries and might even have declined between 1974 and 1979 for the subsidiaries. The IIT industries are characterized by imports as well as exports of similar goods as opposed to the non-IIT industries which tend to have relatively more of one than the other. This is an important point since it suggests that the route to increased exports is more through increased IIT, presumably because of increased import competition and improved competitiveness achieved through increased contracting-out to foreign suppliers, than through just increased scale achieved by export increases alone without the impetus of the same degree of import competition and

increased specialization. The overall decline in the export performance of subsidiaries in the non-IIT group of industries indicates they were not maintaining their competitiveness, perhaps because they were not adapting to the changing trade environment in Canada as quickly as might be desired by specializing their products and production operations in order to maintain their competitiveness in domestic and export markets.

The IIT Indices:

This section describes the various indices, based on the Grubel and Lloyd index, that are used in the balance of this chapter to allocate industries to either the IIT category or the non-IIT category. It will be recalled that the Grubel and Lloyd index is a measure of the proportion of total trade in an industry that is represented by IIT. Several variations of it were developed to meet the requirement of determining the extent of IIT in the different situations which varied from T-test to T-test. The major variations in the index related to whether the trade data being analyzed were: for a particular group of enterprises in an industry; for a particular sector of control in an industry; or for the industry as a whole.

One variation of the Grubel and Lloyd index has a micro orientation. It was calculated for each enterprise in an industry and weighted by its shipments. The weighted index was then averaged over all the enterprises in the industry to arrive at the value for the industry as a whole. This index, calculated at the level of the firm, is in distinction to the usual method used to calculate the Grubel and Lloyd index in which total imports and exports are used for the industry, rather than the imports and exports at the more disaggregated level of individual firms in the industry. Because of

this distinction the index is called the micro index. One of the variations on this index was calculated separately for the two sectors of control in an industry, using only the enterprises in groups 3 and 7 ("Both X and M"). It was also calculated at a higher level of enterprise aggregation that included all four enterprise groups within each sector of control of an industry. The index was also calculated for an even higher level of aggregation that included all the enterprises in an industry in both sectors of control. The acronyms for these various indices are, respectively, MIND3, MIND7, MINDF, MINDC, and MINDT. The derivation of the acronyms is from the term micro index with the suffix representing the level of aggregation of the enterprise groups included in it (i.e. for group 3 enterprises, group 7 enterprises, foreign sector enterprises, Canadian sector enterprises, and the total number of enterprises in an industry).

Another variation on the index has a more aggregated, or macro, orientation. It is more consistent with the traditional calculation used for the Grubel and Lloyd index since it is based on the total values for imports and exports in an industry, rather than on the imports and exports of the individual enterprises. The acronyms used for it are GIND3, GIND7, GINDF, GINDC, and GINDT. As is apparent, the acronym is based on the words gross (or macro) index with suffixes representing the level of aggregation of the enterprise groups in an industry as already outlined for the micro index.

In summary, several indices were used to allocate industries to the IIT or non-IIT categories, which are related to the level of the enterprise aggregation used to calculate them. The levels of aggregation associated with each index are: total imports and exports for an industry (MINDT or

GINDT); imports and exports for a particular sector of control in an industry (MINDF, MINDC, GINDF or GINDC); and the imports and exports of particular groups of enterprises within an industry such as groups 3 and 7 (MIND3, GIND3, MIND7 or GIND7).

The situation calling for the use of a particular index depended upon the T-test being undertaken. If the test was between, say, an import and export propensity for the same sector of control then the index for just that sector would be used (i.e. MINDF or GINDF). Further, if the test was on the same propensities but for just a group of enterprises within each industry, such as those that both import and export, then the appropriate indices would be MIND3 or GIND3. Counterpart indices would be used if the tests were on the propensities for the Canadian sector of control (i.e. MINDC, GINDC, MIND7 or GIND7). If the tests were performed on propensities in which the comparison was between sectors of control, then MINDT and GINDT indices were used for categorizing the industries to their respective trade categories.

As would be expected, the use of indices based on different levels of enterprise aggregation sometimes resulted in the same industries being put into different categories of trade. An example for one of the industries in the study will be presented here to explain this point. The industry was partitioned into two sectors of control and the three groups of enterprises that were involved with international trade (groups 1 and 5; 2 and 6; and 3 and 7). The trade performance of the enterprises measured by the indices was different in each of the cells created by the partitioning.

The subsidiaries in group 3 (Both X and M") had a value for GIND3 of .81

and for MIND3 of .59. Clearly, they were in the IIT category with imports of \$20 Million and exports of \$29 Million. The subsidiaries in enterprise group 1 ("M only") were major importers of components and minor product lines and this industry was not the industry to which their major product lines belonged. These subsidiaries imported \$138 Million and had no exports of products belonging to this industry. The aggregation of the group 1 and the group 3 enterprises resulted in a value of .32 for the GINDF index and .21 for the MINDF index, both of which were substantially lower than for GIND3 and MIND3 indices. On the basis of the GINDF and MINDF indices, the foreign sector of control would now barely qualify as an IIT industry.

The Canadian-controlled enterprises in group 7 were mainly specialized exporters that had only a low value of imports. The GIND7 index had a value of .14 and the MIND7 index had a value of .05, indicating the significant export orientation of the firms and which would classify them to the inter-industry, or non-IIT category of trade. The enterprises in group 5 were active as importers with imports worth \$74 Million. These enterprises, like their counterpart subsidiaries, were importing components and minor product lines distant from the industry to which their major product lines belonged. Further, the enterprises in group 6 that are exporters only, shipped exports worth \$25 Million. The aggregation of the imports and exports across groups 5, 6 and 7 increased the value of the GINDC index to .69, which would classify the industry to the IIT category. However, the MINDC index remained low at .03. The enterprises in group 5, with their low value of shipments (that are used to weight the index) relative to imports in this, their non-major-product-line industry, did not dominate the index. Consequently, the low value for the MINDC index reflected the specialized,

export orientation of the industry's international trade and was the more reliable indicator of the type of trade taking place. This index correctly allocated the industry to the non-IIT category which reflected the strong export orientation of the enterprises in this sector of control.

When the trade data are aggregated across all groups of enterprises and both sectors of control in this industry, the GINDT index has a value of .88, which would classify the industry unequivocally to the IIT category. In fact, the industry as a whole is very export oriented with inter-industry trade dominating. The high GINDT arises because the export orientation by the enterprises in the Canadian sector of control is combined with the import orientation of the enterprises in the foreign sector of control to give the appearance of IIT. However, the MINDT index remains at a low value of .07, which is a truer indication of the type of trade in the industry which is inter-industry in nature. Again, the micro index is the better measure because it uses weighted shipments which are very low for the enterprises importing items removed from the industries of their major product lines.

The micro indices were the more frequently used ones in this study for two reasons. One is that they reflect the viewpoint underlying this study that IIT is a result of actions at the level of firms as they individually adjust to increased competition. This view is consistent with the use of the micro indices since they are calculated from micro level data. In addition, as has already been discussed above, the micro indices provide a truer measure of the predominant type of trade when large imports of components and minor product lines are brought in by one group of enterprises while another group is export oriented.

The disaggregated indices (GIND3, MIND3, GIND7 and MIND7) were used whenever tests were performed on statistics for enterprises in groups 3 and 7 ("Both X and M") within a sector of control. GINDF, MINDF, GINDC and MINDC were used on tests at the overall level within a sector of control, with the preferred indices being MINDF and MINDC. And GINDT and MINDT were used on tests between sectors of control, with MINDT being the preferred index. However, there were situations in which the macro index was more appropriate and the justification for using it will be outlined in the text when it is used. It is also worth noting that the tests, whether the MIND or GIND series was used, produced very similar results.

The preference for either a micro or macro index is not an issue that has been identified as yet in the literature. However, it is an important issue for countries such as Canada that have high levels of foreign direct investment because the subsidiaries often have a different orientation on international trade than domestically-controlled enterprises. The aggregation of trade data across the sectors of control can obscure this difference and lead to an interpretation of the trade data that is inconsistent with the actual facts, as has already been noted in the case study for one industry that was presented above.

This aggregation of trade performance is a major problem for the Grubel and Lloyd index which traditionally is calculated at the macro level for an industry and does not allow for the different trade performances by different sectors of control or groups of enterprises within an industry. Canadian trade data are dominated by subsidiaries that import extensively and Canadian-controlled firms that are often specialized in exports. The

combination of their behaviour gives the appearance of two-way trade flows in similar goods by firms in the industry, when in fact the two trade flows are distinctly different and undertaken by different sets of firms. This, in part, no doubt explains some of the relatively high Grubel and Lloyd indices for IIT that have been recorded for Canada by other researchers as noted in chapter three. It may be that in the case of Canada, the conceptual problems related to the measurement of IIT are not so much those of categorical aggregation and overlapped trade as they are the problem of aggregating over sectors of control that have different performances on international trade. This issue of the actual extent of IIT in Canadian trade data will be explored more fully in the T-tests which follow later.

Critical Values for the Indices:

A critical value was developed for each index to establish the values at which the industries are correctly allocated to their IIT and non-IIT categories. Two different procedures were used to establish the appropriate critical values. One evaluated the frequency of the values and then determined the median one. The other procedure used a sensitivity analysis in which different values of the index were used to allocate the industries and the resulting categorizations were inspected to establish the value that most appropriately allocated them.

A critical value of .30 for the gross index and .10 for the micro index separated between one-third and one-half of the industries (depending upon the particular index used) into the inter-industry trade category with the balance being in the IIT category. Hence, this test which is based on the use of frequency distributions, suggested these were the most appropriate

critical values to use.

The results of the sensitivity tests are presented in Tables 4-22 and 4-23. Four statistics were tested for their sensitivity to different values for the indices. They were: exports by enterprise groups 3 and 7 as a ratio of their shipments (EXSH3 and EXSH7 for the foreign and Canadian sectors of control, respectively); and imports as a ratio of the domestic market for enterprise groups 3 and 7 (IMSH3 and IMSH7 for the foreign and Canadian sectors of control, respectively). Table 4-22 shows the statistics for the various values of GINDT and Table 4-23 shows them for various values of MINDT.

TABLE 4-22

Results of Sensitivity Tests On Export and Import Propensities
For Various Values of GINDT
159 Industries Using Unconsolidated Enterprises
Manufacturing Sector
1979

Description	0	<u>GINDT Value</u>			
		.25	.30	.35	.40
Number of Industries:	120	72	63	57	52
Propensities:					
EXSH3	20.9%	24.0%	25.1%	23.8%	25.0%
EXSH7	21.6	23.3	25.2	23.5	24.2
IMSH3	16.6	17.8	17.9	16.8	17.6
IMSH7	12.4	10.0	8.7	8.0	8.4

Source: See text.

Removing the non-IIT industries from the total pool of 159 industries should cause the weight of the IIT industries to increase and, in turn, to cause the import and export propensities to increase because of the propensity for IIT enterprises to have high levels of both imports and

exports. A continued removal of industries would result in an increasing number of IIT industries to be extracted from the pool. This would result in the propensities stabilizing and perhaps even declining. Table 4-22 shows rising propensities up to a value of .30 for the gross index, after which they start to decline. This is the same critical value that was established above using the frequency method.

In the case of the micro index, MINDT, the criterion outlined above provides a less clear cut rationale for selecting a particular critical value because all the propensities, except EXSH7, increase across all the succeeding higher values for MINDT (Table 4-23). However, a slight variation in the criterion suggests an acceptable critical value. That is, the difference between the export and import propensities should continue to narrow as industries with predominantly inter-industry trade are removed from the pool. This is because IIT is associated with more balanced propensities while inter-industry trade is associated with unbalanced ones. The narrowing of the propensities, as shown in Table 4-23, stops at a value of .10 for the MINDT index. This critical value is also associated with the approximate value at which EXSH7 reaches its maximum value and is also the value established by using the frequency method.

TABLE 4-23

Results of Sensitivity Tests On Export and Import Propensities
 For Various Values of MINDT
 159 Industries Using Unconsolidated Enterprises
 Manufacturing Sector
 1979

Description	<u>MINDT Value</u>				
	0	.05	.10	.15	.20
Number of Industries:	120	87	63	44	35
Propensities:					
EXSH3	20.9%	21.4%	19.7%	24.6%	27.1%
EXSH7	21.6	22.2	21.7	14.8	16.3
IMSH3	16.6	18.6	21.7	24.6	27.1
IMSH7	12.4	11.5	13.7	14.8	16.3

Source: See text.

On the basis of the above results, the critical value of .30 was selected for the gross indices to allocate industries to either the non-IIT category (i.e. those with an index value $<.30$), or the IIT category (i.e. those with an index value of $>.30$). A value of .10 was selected as the critical value for the micro indices (i.e. $<.10$ for non-IIT industries and $>.10$ for IIT industries).

Tests on the Import and Export Propensities:

T-tests on the import and export propensities used various combinations of partitions in the data to address the different questions of interest to this study. One set of questions is whether the propensities differ between: size classes; sectors of control; and trade groups. Another set of questions is whether the export propensities within a sector of control increase commensurate with the import propensities across the industries, for the different trade groups and size classes. These questions will now be addressed.

The export and import propensities, by industry, for trade groups 3 and 7 ("Both X and M") within each industry, will receive particular emphasis. The enterprises in these trade groups are more likely to be involved in IIT because of their extensive involvement in the two-way trade of similar goods. Also, particularly for the large firms, they account for a significant part of the total trade in manufactured exports and imports. For these reasons, the export and import propensities of the large firms in this trade group are of particular interest to the study. These propensities were further partitioned by sector of control for each industry and are identified by the acronyms EXSH3 and IMSH3 for the foreign sector, and EXSH7 and IMSH7 for the Canadian sector of control. The acronyms stand for export and import shares of the domestic production and consumption, respectively, in an industry. The numerical suffixes stand for the particular enterprise trade groups. These propensities were also partitioned into two size classes using the shipment values of the enterprises to do so (i.e. less or greater than \$10 Million).

Import and export propensities by industry were calculated as well for the other trade groups using the same partitions of sector of control and size classes as for trade groups 3 and 7. The propensities for trade groups 2 and 6 ("X only") are identified by the acronyms EXSH2 for the foreign sector of control and EXSH6 for the Canadian sector of control. Similarly, the acronyms for the propensities of trade groups 1 and 5 ("M only") are IMSH1 for the foreign sector of control and IMSH5 for the Canadian sector of control.

In addition to the propensities by trade groups within an industry,

total propensities for each industry were also calculated. These statistics are based on the total imports and exports for an industry, as determined by summing them over all the trade groups within a particular partition of sector of control and size class. The acronyms used to identify them are EXSH23 and IMSH13 for the foreign sector of control and EXSH67 and IMSH57 for the Canadian sector of control.

It is worth noting again, even though the issue was discussed more fully earlier, that any of the import propensities noted above that use data for trade groups 1 and 5 can have two different values. This is because their denominators can take either of two values for the size of the domestic market, depending upon whether the narrow or wide market definition is used. The narrow market definition excludes the shipments of enterprise groups 4 and 8 ("No X or M") in the denominators of the propensities, whereas the wide market definition includes them. This means there are two variations for the import propensities that could be used in any particular T-test. It should also be noted that the export propensities are invariant in their calculation and include in their denominators just the shipments of the enterprises in the trade group being analyzed.

a) T-tests on Import Propensities. The results of the T-tests on the import propensities are discussed first. They are presented in Tables 4-24 and 4-25 for the small and large enterprises, respectively. The industries have been allocated to either an IIT or non-IIT category, using the critical value of .10 for the MINDT index to do so. The propensities used in these tests are based on the narrow market definition, which excludes shipments by enterprises in trade groups 4 and 8 from the denominators of the

propensities.

TABLE 4-24

Results of T-tests on Import Propensities
Between Sectors of Control
For Unconsolidated Enterprises With Shipments (<\$10 Million)
By Trade Groups and Categories
Manufacturing Sector
1979

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	IMSH3	IMSH7	IMSH3	IMSH7	IMSH1	IMSH5	IMSH1	IMSH5	IMSH13	IMSH57	IMSH13	IMSH57
Number of Industries	61	61	41	41	77	77	69	69	77	77	69	69
% of Imports In Trade Group In T-test	89%	85%	7%	14%	81%	76%	19%	23%	82%	77%	18%	22%
Unweighted Averages	26.0%	15.8%	17.4%	17.8%	51.8%	33.1%	42.2%	17.2%	57.1%	36.1%	44.4%	18.0%
Significance of T-test	.00		.94		.00		.00		.00		.00	
R ² of Correlation	.15		.00		.27		.21		.34		.21	
Slope of Correlation	.46		.06		.45		.67		.50		.68	

Note: IIT= MINDT >.10
nonIIT= MINDT <.10

Source: See text.

For the smaller firms, Table 4-24 shows an unweighted average import propensity of 26.0% for the subsidiaries that are involved in the two-way trade of major product lines and that are in industries extensively involved in IIT (IMSH3). The counterpart propensity for the non-IIT industries is 17.4%. The two T-tests on the imports of enterprises in trade group 3 include 96% of their imports, of which 89% is associated with the IIT industries. The subsidiaries in IIT industries also have a significantly

higher unweighted average import propensity than their counterparts in the Canadian sector of control (IMSH7). In the case of the Canadian-controlled enterprises in trade group 7, the T-tests include 99% of their imports, with 85% being associated with IIT industries.

These results for the IIT industries are consistent with those already noted before when the overview of the trade data was presented. In that discussion it was noted that the subsidiaries would be expected to have higher import propensities for manufactured goods than Canadian-controlled firms for because they have access to the products of their foreign affiliates and as a result have more opportunity to act as wholesalers of items purchased just for resale. In the case of the non-IIT industries, where there is no significant difference in the import propensities between the sectors of control for goods traded on a two-way basis (IMSH3 and IMSH7), it appears the subsidiaries do not have an extensive wholesale function and behave more like their counterparts in the Canadian sector. However, the enterprises in trade groups 3 and 7 that are in non-IIT industries account for only a small proportion of the total imports of major product lines by enterprises in these trade groups.

The small subsidiaries in trade group 1 ("M only"), whether in IIT or non-IIT industries, have significantly higher import propensities than their Canadian-controlled counterparts (IMSH1 and IMSH5). The T-tests on these trade groups included virtually all of the imports by the small enterprises. The types of goods imported by firms in these trade groups tend to be components and minor product lines removed from the major product lines of the importing enterprises. The difference in propensities reflects a much

greater tendency for the subsidiaries to use foreign sources of supply, perhaps because they can be acquired at a lower cost than if they were produced in Canada by the subsidiaries or purchased from domestic suppliers. The tendency by the subsidiaries to use foreign suppliers also influences the total import propensities (IMSH13 vs IMSH57), because the value of components and minor product lines they import is large relative to both major-product-line goods and total imports. Consequently, the difference between the sectors of control, in total, remains significant and the subsidiaries have the higher propensities.

The major difference between the sectors of control for these smaller firms appears, then, to be the extensive wholesale role of the subsidiaries who trade products internationally on a two-way basis. The counterpart activity by the Canadian sector of control is in another sector, so that the comparisons between the sectors of control is biased by understating those for the Canadian-controlled firms. In addition, the subsidiaries do import relatively more minor products and components than the firms in the Canadian sector of control, presumably because they engage in more contracting-out of small-run products and components to foreign suppliers including their affiliates. These activities are consistent with the subsidiaries being specialized in the products and production activities they undertake in Canada, at least until they become larger enterprises as will be discussed in relation to the next Table.

Table 4-25 presents the same information as Table 4-24, except it is for the larger enterprises. Since these larger firms are responsible for the major part of Canadian imports of manufactured goods, the results presented

in Table 4-25 and the relationships underlying the data are considerably more important than the ones presented above relating to Table 4-24 for the smaller enterprises.

TABLE 4-25

Results of T-tests on Import Propensities
Between Sectors of Control
For Unconsolidated Enterprises With Shipments >\$10 Million
By Trade Groups and Categories
Manufacturing Sector
1979

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	IMSH3	IMSH7	IMSH3	IMSH7	IMSH1	IMSH5	IMSH1	IMSH5	IMSH13	IMSH57	IMSH13	IMSH57
Number of Industries	57	57	23	23	42	42	22	22	64	64	36	36
% of Imports In Trade Group In T-test	78%	88%	1%	9%	65%	79%	5%	14%	74%	86%	2%	13%
Unweighted Averages	21.7%	13.5%	8.4%	3.5%	9.3%	10.7%	12.5%	13.8%	26.4%	17.1%	12.7%	11.2%
Significance of T-test	.00		.29		.68		.63		.00		.54	
R ² of Correlation	.36		.02		.01		.87		.21		.68	
Slope of Correlation	.79		-.82		.04		.69		.53		.79	

Note: IIT= MINDT >.10
nonIIT= MINDT <.10

Source: See text.

Some of the results for the larger enterprises are similar to those for the smaller ones. For instance, the subsidiaries in industries that are categorized as being extensively involved in IIT, have a higher unweighted import propensity for major-product-line goods at 21.7%, than the Canadian sector of control at 13.5% (IMSH3 vs IMSH7).

However, the import propensities are different in some important ways for these larger enterprises than for the smaller ones. For instance, the imports of components and minor product lines (IMSH1 and IMSH5) by the subsidiaries in both IIT and non-IIT industries are similar to those for firms in the Canadian sector of control, as a ratio of their shipments. This suggests the larger subsidiaries rely relatively more on domestic suppliers and internal production as they become larger. At the same time, the domestically-controlled firms may be engaging in more contracting-out to foreign suppliers, as has been noted earlier. Another difference in the import propensities between the small and larger enterprises is that the larger ones in both sectors of control that are importing only (IMSH1 and IMSH5) and are in the non-IIT industries, have somewhat higher propensities than those in the IIT industries.

The lower proportion of imports accounted for by the subsidiaries in the T-tests presented in Table 4-25, compared to the proportion for Table 4-24, is because the auto industry was excluded due to the lack of a Canadian sector of control with which to compare it.

Table 4-26 shows the results of the T-tests already discussed in relation to Tables 4-25 and 4-26, but using the wide rather than the narrow market definition in the denominators of the propensities. Only the results for IMSH1 and IMSH5 are presented. This is because, first, IMSH3 and IMSH7 are not affected by this change in market definition and, second, the results for the total import propensities (IMSH13 and IMSH57) are so dominated by IMSH1 and IMSH5 that the results are almost identical for both sets of variables.

TABLE 4-26

Results of T-tests On Import Propensities
 (Based on Wide Market Definition)
 Between Sectors of Control
 For Unconsolidated Enterprises that Import Only
 By Size Classes and Trade Categories
 Manufacturing Sector
 1979

Description	<\$10 Million in Shipments				>\$10 Million in Shipments			
	IIT		non-IIT		IIT		non-IIT	
	IMSH1	IMSH5	IMSH1	IMSH5	IMSH1	IMSH5	IMSH1	IMSH5
Number of Industries	77	77	69	69	42	42	22	22
Unweighted Averages	47.1%	23.7%	31.9%	9.4%	9.2%	10.2%	12.4%	13.5%
Significance Of T-test	.00		.00		.74		.67	
R ² of Correlation	.25		.29		.01		.87	
Slope of Correlation	.49		.98		.05		.69	

Note: IIT= MINDT >.10
 non-IIT= MINDT <.10

Source: See text.

It does not appear to make much difference in the T-tests whether the narrow or wide market definition is used to calculate the import propensities. The major difference is that the propensities based on the wide definition are marginally lower, as would be expected because of the larger value for the market that is included in the denominators of the propensities. Table 4-26 does, however, reinforce the result already discussed that the import propensities of the subsidiaries decline as they become larger for both the IIT and non-IIT industries and become similar to those for the larger enterprises in the Canadian sector of control. This is

attributed partly to a relative increase in foreign sourcing by Canadian-controlled firms and partly to import substitution behaviour by the subsidiaries as they increase their use of Canadian suppliers along with more internal domestic production of components and minor product lines. Some of the difference in the import propensities between the small and large firms for those enterprises that import only (IMSH1 and IMSH5) is accounted for by the way the data were collected. That is, imports by the larger enterprises were often allocated to the small size category because of the lack of shipments associated with the import of minor product lines and components removed from the major product lines of these firms. It is also of interest that the larger enterprises that are in IIT industries tend to import different products in each sector of control (i.e. $R^2 = .01$) while the two sectors import similar products in the non-IIT industries.

b) T-tests on Export Propensities. The results of the T-tests on the export propensities are presented next. Table 4-27 presents the results for the smaller enterprises (i.e. less than \$10 Million in shipments). The industries were again categorized as being either IIT or non-IIT in nature, using MINDT with a critical value of .10 for doing so. Table 4-28 presents the same information as for Table 4-27, but for the larger enterprises (i.e. with shipments greater than \$10 Million).

TABLE 4-27

Results of T-tests on Export Propensities
Between Sectors of Control
For Unconsolidated Enterprises With Shipments <\$10 Million
By Trade Groups and Categories
Manufacturing Sector
1979

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	EXSH3	EXSH7	EXSH3	EXSH7	EXSH2	EXSH6	EXSH2	EXSH6	EXSH23	EXSH67	EXSH23	EXSH67
Number of Industries	61	61	41	41	53	53	47	47	69	69	65	65
% of Exports In Trade Group In T-test	78%	75%	17%	20%	44%	26%	56%	66%	54%	47%	32%	51%
Unweighted Averages	28.0%	21.9%	19.3%	21.8%	38.1%	21.5%	22.7%	23.3%	22.4%	32.8%	20.8%	21.5%
Significance of T-test	.51		.54		.02		.86		.37		.84	
R ² of Correlation	.88		.83		.12		.25		.81		.11	
Slope of Correlation	.83		.17		.58		.57		-.02		.38	

Note: IIT= MINDT >.10
nonIIT= MINDT <.10

Source: See text.

The percentage of exports accounted for within a trade group by the T-tests is large, at 95% of the exports by both the subsidiaries and the Canadian-controlled firms engaged in two-way trade (EXSH3 and EXSH7) and at 100% and 92% for firms in the foreign and Canadian sectors of control, respectively, engaged in one-way export trade as specialized exporters (EXSH2 and EXSH6). The percentage of total exports by firms engaged in two-way trade that is accounted for by the IIT industries is high at 78% and 75% respectively for the foreign and Canadian sectors of control (EXSH3 and EXSH7). However, in the case of the specialized exporters (EXSH2 and EXSH6),

the percentage of exports accounted for the by the non-IIT industries is larger than for the IIT industries at 56% and 66% respectively for each sector of control. These results would be expected, given the tendency for firms involved in two-way trade to be associated with IIT industries and firms involved in one-way trade of exports to be associated with the non-IIT industries. These results provide some confirmation that the IIT indices do allocate the industries reasonably well to their correct category of trade orientation.

There is no significant difference between the sectors of control for the export propensities of the enterprises engaged in two-way trade, whether they belong to IIT or non-IIT industries (EXSH3 and EXSH7). In fact, the only significant difference in the export propensities between the sectors of control is for the specialized exporters in the IIT industries (EXSH2 and EXSH6) and the foreign sector of control has the higher export propensity. The low values, across all the partitions, for the R^2 of the correlation between the export propensities in each sector of control along with the low values of the slopes of the correlations (except between EXSH2 and EXSH6) both suggest that the two sectors export substantially different products. In the case of the specialized exporters, who conform more to the HOS model of trade, there is greater similarity between the sectors of control in the products exported than for the exporters engaged in two-way trade. This would be expected, since one-way trade in exports should be based on international comparative cost advantages which are country and industry specific. However, exports of products that are traded on a two-way basis would tend to be associated with advantages that are based partly on product differentiation and they tend to be firm and sector specific.

The total export propensities (EXSH23 and EXSH67) reflect the above influences and are not significantly different between either the sectors or the industry categories. However, the unweighted average export propensity for the Canadian sector of control of the IIT industries does appear to be somewhat higher than for the foreign sector (32.8% vs 22.4%), although the statistical tests do not show the difference as being significant.

TABLE 4-28

Results of T-tests on Export Propensities
Between Sectors of Control
For Unconsolidated Enterprises With Shipments >\$10 Million
By Trade Groups and Categories
Manufacturing Sector
1979

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	EXSH3	EXSH7	EXSH3	EXSH7	EXSH2	EXSH6	EXSH2	EXSH6	EXSH23	EXSH67	EXSH23	EXSH67
Number of Industries	57	57	23	23	9	9	21	21	60	60	35	35
% of Exports In Trade Group In T-test	48%	42%	17%	55%	3%	2%	73%	64%	75%	39%	22%	59%
Unweighted Averages	21.9%	21.0%	24.9%	25.0%	27.3%	12.9%	31.5%	28.7%	22.1%	21.8%	23.6%	24.8%
Significance of T-test	.74		.78		.26		.59		.90		.71	
R ² of Correlation	.33		.64		.03		.50		.3		.55	
Slope of Correlation	.61		.77		.00		.83		.65		.77	

Note: IIT= MINDT >.10
nonIIT= MINDT <.10

Source: See text.

Table 4-28 presents the results of the tests on the export propensities for the larger enterprises. These are the important results in terms of the

percentage of total exports that these firms account for. The percentage of exports accounted for by the subsidiaries engaged in two-way trade, summed across both the IIT and non-IIT categories, is less than for the firms in the Canadian sector of control (i.e. 65% and 97%, respectively). This is because the requirement of having to pair industries across the sectors necessitated removing the foreign-controlled auto industry from the T-test. This industry accounts for a large percentage of exports by the foreign sector.

One of the major points that can be drawn from the information in Table 4-28 is that there is no significant difference in the export propensities of the larger firms between the sectors of control across any of the partitions of the data. However, the non-IIT industries do tend to generally have higher export propensities than the IIT industries within each trade group, and this is especially so for the specialized exporters in the Canadian sector of control (EXSH2 and EXSH6). Note also that for the specialized exporters there are very few industries that are associated with IIT trade. These results are consistent (i.e. the firms in the non-IIT industries should be specialized exporters, more involved with inter-industry trade on a one-way basis, which would also account for their higher export propensities because of their international comparative advantages). Also, exports by the Canadian sector of control tend to be associated more with the non-IIT industries while exports by the subsidiaries are associated more with IIT industries. This result was also noted for the smaller firms in Table 4-27 and reflects the tendency for subsidiaries to be more involved in two-way, intra-firm trade with affiliates.

It is interesting to note that, in contrast to the smaller firms, there

is a greater correspondence between the sectors of control in the products exported. This is apparent from the higher R^2 's and the higher values for the slopes of the correlations, especially for the non-IIT industries. The relatively lower correspondence, for the IIT industries, could be accounted for by the greater horizontal diversity of the subsidiaries engaged in two-way trade because of their greater involvement in wholesale activities.

The total export propensities reflect all the above influences (EXSH23 and EXSH67). The exports of the subsidiaries are primarily in IIT industries, while those of the Canadian-controlled firms are primarily in non-IIT industries. However, there are no significant differences in the export performances of the two sectors of control. These results reflect the influence of the different nature of the firms in the two sectors. The subsidiaries are actively involved in two-way trade with affiliates because of their wholesale activities and tend to be associated with IIT industries, while the domestically-controlled firms tend to be specialist exporters and are involved more with non-IIT industries that have one-way flows of goods. Once this difference is adjusted for, the propensities tend to be the same in each sector of control.

Comparisons of Import and Export Propensities:

The next sets of T-tests compare the import and export propensities for significant differences in them within a sector of control for the various partitions by trade group and size of enterprise. If the import and export propensities within a sector of control are approximately the same and change simultaneously in the same direction across the industries, then this would be indicative that the trade flows are IIT in nature. If the import and

export propensities are significantly different and do not increase together across the industries, then this would be indicative that the trade flows are inter-industry in nature. Tables 4-29 and 4-30 present the results of the T-tests, for the small and larger enterprises respectively, that were undertaken to probe for these relationships.

The critical values of the IIT indices that were used to allocate the industries to either the IIT or non-IIT categories utilized both the GIND and MIND series and the Tables note where each was used. For trade groups 3 and 7 ("Both X and M" enterprises), the MIND indices using the critical value of .10 were not severe enough for determining the IIT industries since too many of them were allocated to the IIT category. Rather than increase the critical value, the GIND indices were used instead. It has been noted previously that both the MIND and GIND indices are reliable measures of IIT when tests are performed within a sector of control, by enterprise group (as is the case here), and can be interchanged. Therefore, the GIND indices series was used for comparisons of the import and export propensities within a sector of control for trade groups 3 and 7 (IMSH3 and EXSH3 for the foreign sector and IMSH7 and EXSH7 for the Canadian sector of control. However, as has been the case in the tests so far, the MIND indices series were used when the comparisons were between the total import and export propensities (IMSH13 and EXSH23 for the foreign sector of control and IMSH57 and EXSH67 for the Canadian sector of control).

The results of the tests for significant differences between the import and export propensities that are presented in Tables 4-29 and 4-30 use the narrow market definition in determining the import propensities. In the case

of the larger enterprises, it is not material whether the narrow or wide market definition is used. This is because the shipments by enterprises in trade groups 4 and 8 ("No X or M") for both sectors of control are relatively small since most of the larger enterprises are engaged in some form of international trade activity. Also, the shipments by trade groups 4 and 8 tend to be a constant proportion of total shipments across the industries. Consequently, not using the shipments of firms in groups 4 and 8 does not significantly bias the import propensities between the sectors of control. The relatively small value of shipments by the larger enterprises in trade groups 4 and 8, in relation to their total shipments, results in the import propensities based on the wide market definition being only marginally lower than those based on the narrow market definition.

However, in the case of the small enterprises, it could make a significant difference which market definition is used. As has already been noted when the overview of the trade data was discussed, the enterprises in trade groups 4 and 8 that are in the Canadian sector of control represent a significant proportion of total shipments and this proportion is greater than in the foreign sector of control. This would tend to bias any comparisons of import propensities between the sectors of control. But, it should not influence the tests being discussed here because they are all within a sector of control. Further, by performing the tests on the propensities that are based on just the narrow market definition, the difference between the sectors of control is minimized since the major cause of the bias is removed (i.e. trade groups 4 and 8).

In fact, in these tests it is not material whether the narrow or wide

definition is used for calculating the import propensities, even as it was not for the tests presented in Table 4-26. The tests were performed using both definitions and the results were basically the same mainly because the variation between the two definitions is insignificant in relation to the variation in them between industries. The major reason for choosing the narrow rather than the wide definition for the tests presented in Tables 4-29 and 4-30 is that the import propensities based on the narrow market definition conform more closely than those based on the wide definition to the export propensities with which they are being compared. The export propensities include in their denominators just the shipments of the enterprises in the trade groups for which the propensities are calculated, which means only the shipments are included of those trade groups that export. Thus, the shipments of trade groups 4 and 8 are excluded from all the calculations of export propensities. For these reasons, only the results for the import propensities based on the narrow market definition are presented in Tables 4-29 and 4-30.

It is recognized, however, that there is not complete comparability in the calculation of the import and export propensities. While the shipments of trade groups 4 and 8 are excluded from the denominator of the import propensities, some of the enterprises in these groups could be importing minor product lines and components that are not related to their main products and because of the way the data were collected their shipments would not be associated with these imports. This could only be adjusted for by including the shipments of all the enterprises in groups 4 and 8 in the denominators of the import propensities. Thus, to correct one bias in which shipments are understated, another is created which overstates shipments. It

has been assumed that the shipments of enterprises in trade groups 4 and 8 that do not import and/or export are significantly larger than the shipments of those enterprises in these trade groups that do import minor product lines and components. Therefore, the lesser bias in the comparability of the calculations of the import and export propensities is introduced by excluding the shipments of trade groups 4 and 8 from the calculation of the import propensities.

TABLE 4-29

Results of T-tests Comparing Import and Export Propensities
 Within a Sector of Control
 For Unconsolidated Enterprises With Shipments <\$10 Million
 By Trade Groups and Industry Categories
 Manufacturing Sector
 1979

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	IMSH3	EXSH3	IMSH3	EXSH3	IMSH7	EXSH7	IMSH7	EXSH7	IMSH13	EXSH23	IMSH13	EXSH23	IMSH57	EXSH67	IMSH57	EXSH67
Number of Industries	72	72	43	43	67	67	54	54	78	78	52	52	52	52	92	92
% of Variable In Trade Group In T-test	E81%	E84%	E19%	E16%	E78%	E76%	E20%	E21%	84%	71%	15%	28%	63%	37%	37%	56%
Unweighted Averages	21.8%	21.8%	25.5%	19.7%	16.8%	19.8%	14.8%	22.2%	53.3%	23.1%	48.7%	28.5%	35.4%	36.5%	22.4%	19.4%
Significance of T-test	.98		.29		.81		.86		.88		.88		.93		.38	
R ² of Correlation	.51		.85		.43		.88		.83		.83		.39		.88	
Slope of Correlation	.72		.28		.55		.83		.21		.28		.16		.83	

Note: IIT= GIND3 and GIND7 >.38; MINDF and MINDC >.18
 non-IIT= GIND3 and GIND7 <.38; MINDF and MINDC <.18
 Where: GIND3 applies to IMSH3/EXSH3; GIND7 applies to IMSH7/EXSH7; MINDF applies to IMSH13/EXSH23;
 and MINDC applies to IMSH57/EXSH67.

E= estimate.

Source: See text.

The results presented in Table 4-29 for the small enterprises do not show a significant difference between the import and export propensities for the subsidiaries involved in the two-way trade of their major products (IMSH3/EXSH3). This applies to both the IIT and non-IIT industry categories. The non-IIT industries do, however, appear to have a larger difference between the import and export propensities than the IIT industries, with the net balance being in favour of imports. This suggests the subsidiaries in

the non-IIT industries are oriented more toward being involved in inter-industry trade with specialization in imports. However, the percentage of the total imports and exports of major product lines associated with the non-IIT industries is relatively small compared to the IIT industries. In the case of the Canadian-controlled firms there is a significant difference between the import and export propensities for both the IIT and non-IIT industries, with the export propensities being higher than the import propensities (IMSH7/EXSH7). Consequently, in contrast to the subsidiaries, the Canadian-controlled enterprises in the non-IIT industries tend to be more involved in inter-industry trade as specialized exporters. These results are similar to those already discussed separately above for the import and export propensities and reflect the larger wholesale role of the subsidiaries.

There is a significant difference between the total import and the total export propensities for the foreign sector of control. This applies to both the IIT and non-IIT industries (IMSH13/EXSH23). The total import propensities are about double the total export propensities (EXSH23) and also about double the import propensities for just major product lines (IMSH3). That is, the imports of components and minor product lines are about equal to the imports of major product lines resold on a wholesale basis. It was noted in a prior chapter in which the literature review was discussed that, on an overall basis, about one-third of the subsidiaries' total imports are unfinished goods and two-thirds are finished goods. This implies that the value of total imports of components and minor product lines (IMSH1) is made up of about two-thirds components (i.e. unfinished goods) and one-third minor product lines (i.e. finished goods). The total import propensities for the subsidiaries may be biased upward somewhat, compared to those for the

Canadian-controlled enterprises, because components and minor product lines imported by the larger firms whose major products are in another industry would be allocated to the small size class as has already been discussed.

In the case of the Canadian-controlled enterprises, there also is a large increase in the total import propensities as a result of including components and minor product lines in addition to major products in them. Consequently, there is no significant difference between the total import and the total export propensities in either the IIT or the non-IIT categories (IMSH57/EXSH67) as there was in the case of enterprise group 7 ("Both X and M") alone. The proportion of exports accounted for by the non-IIT industries is also considerably higher than for the subsidiaries. That is, in contrast to the subsidiaries, the Canadian-controlled enterprises have a much stronger orientation toward one-way trade of an inter-industry type and in the case of the IIT industries toward greater export specialization. This is likely due to the more extensive use of affiliates and foreign suppliers generally for finished and unfinished goods by the subsidiaries, and their greater involvement in two-way trade with affiliates.

The R^2 of the correlation between the import and export propensities within the IIT industries for trade groups 3 and 7 ("Both X and M") is higher than for the non-IIT industries. The slopes of the correlations are also higher in the IIT than in the non-IIT industries. These conditions exist in both sectors of control, but are stronger for the foreign sector. This suggests there is a tendency for export propensities to rise with increases in import propensities across the industries for major products traded on a two-way basis. For trade groups 3 and 7, both the association of higher

export with higher import propensities across the industries and the similarity between the average values for the propensities are consistent with the IIT paradigm. These relationships for the IIT industries are not significant for the non-IIT industries in either sector for any of the trade groups. This indicates the non-IIT industries tend to be either import or export oriented in conformity with the HOS paradigm of inter-industry trade. These relationships also do not exist for the total propensities which include imports of components and minor products imported by firms whose major products are associated with other industries. The lower significance of these relationships when components and minor products are included in the total import propensities suggests these types of goods may be related to inter rather than intra industry trade. This point will be discussed more fully in the next section.

In summary of Table 4-29, the smaller subsidiaries are more involved in balanced two-way trade of their major product lines than are their counterparts in the Canadian sector of control. This reflects their greater access to the products and markets of affiliates, largely on a wholesale basis. However, in terms of total trade, the foreign sector is more import-oriented than the Canadian sector because of both the large wholesale activity of the subsidiaries and their greater propensity to use foreign suppliers. The net result is that total trade is unbalanced in favour of imports for the smaller enterprises in the foreign sector of control compared to the Canadian sector. This would likely be the case even if the Canadian sector were adjusted by including the imports of manufactured goods by firms in the wholesale sector to make this sector's wholesale activities comparable to those of the foreign sector. But, for those firms involved in two-way

trade, the export and import propensities do tend to be similar and rise together across the industries. This applies to both sectors of control.

Table 4-30 shows the same information as Table 4-29, except it is for the larger enterprises. These firms account for the bulk of international trade in both imports and exports.

TABLE 4-38

Results of T-tests Comparing Import and Export Propensities
 Within a Sector of Control
 For Unconsolidated Enterprises With Shipments >\$10 Million
 By Trade Groups and Industry Categories
 Manufacturing Sector
 1979

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	IMSH3	EXSH3	IMSH3	EXSH3	IMSH7	EXSH7	IMSH7	EXSH7	IMSH13	EXSH23	IMSH13	EXSH23	IMSH57	EXSH67	IMSH57	EXSH67
Number of Industries	67	67	34	34	51	51	43	43	88	88	24	24	51	51	47	47
% of Variable In Trade Group																
In T-test	E88%	E77%	E 3%	E14%	E47%	E28%	E16%	E 8%	98%	79%	2%	19%	81%	32%	17%	41%
Unweighted Averages	21.0%	20.0%	7.6%	22.0%	13.1%	16.8%	6.3%	27.1%	22.0%	20.3%	11.4%	19.4%	17.0%	21.7%	7.6%	21.5%
Significance of T-test	.43		.01		.01		.00		.36		.26		.07		.00	
R ² of Correlation	.76		.01		.71		.01		.49		.00		.33		.00	
Slope of Correlation	.98		-.09		.84		-.04		.76		-.06		.63		-.03	

Note: IIT= GIND3 and GIND7 >.38; MINDF and MINDC >.18
 non-IIT= GIND3 and GIND7 <.38; MINDF and MINDC <.18
 Where: GIND3 applies to IMSH3/EXSH3; GIND7 applies to IMSH7/EXSH7; MINDF applies to IMSH13/EXSH23;
 and MINDC applies to IMSH57/EXSH67.

E= estimate.

Source: See text.

One of the major differences between the small and larger enterprises is that the larger ones have a considerably lower propensity to import components and minor product lines relative to their total activities. This applies to both sectors of control.

Like the small subsidiaries, there is no significant difference between the import and export propensities for firms engaged in two-way trade of

their major product lines (IMSH3/EXSH3) that are in IIT industries. But, the R^2 of the correlation (i.e. .76) between the import and export propensities IMSH3 and EXSH3 as well as the slope of the correlation (i.e. .90) for the IIT industries is considerably higher than for the smaller subsidiaries in the same trade group and industry category. The IIT industries account for over three-quarters of the imports and exports of major product lines which is considerably larger than for the non-IIT industries. In general, the larger subsidiaries show a strong orientation to two-way trade in their major product lines which is IIT in nature.

However, there is a difference between the import and export propensities for the subsidiaries in non-IIT industries and the difference is attributable to the much lower propensity of these firms to import. Indeed, their import propensities are similar to those for their counterparts in the Canadian sector of control. As a result, the larger enterprises in trade group 3 that are in non-IIT industries are export oriented, unlike their small counterparts, but like their Canadian-controlled counterparts. Further, the enterprises engaged in two-way trade of their major products that are in non-IIT industries have no significant degree of correlation between the propensities and there is a negative slope for the correlation which suggests that high export propensities are associated with low import propensities (and vice versa). These results are consistent with these industries being dominated by inter-industry trade as opposed to the intra-industry type associated with the IIT industries.

The enterprises in the Canadian sector of control that are engaged in the two-way trade of their major product lines (IMSH7/EXSH7) do have a

significant difference between their import and export propensities, with the import propensities being lower. This applies to both the IIT and non-IIT industries. In the case of enterprises in the IIT industries, this significant difference between the propensities does not exist for their counterparts in the foreign sector of control because of the higher propensity of the subsidiaries to import major products from affiliates. But, like the foreign sector of control, the IIT industries in the Canadian sector have a high correlation between the propensities (i.e. .71) and increased import propensities are associated with increased export propensities which results in a relatively steep slope for the correlation (i.e. .84). For the non-IIT industries, the R^2 of the correlation is very low at .01 and the slope is negative. Thus, like their counterparts in the foreign sector of control, these industries display characteristics consistent with inter-industry trade that is specialized in exports. The non-IIT industries also account for a larger proportion of the trade in major products than in the foreign sector. While the foreign sector is more actively involved in the two-way exchange of similar major products, both sectors have a significant level of it.

The patterns noted above for the larger enterprises exist as well for their total trade propensities (IMSH13/EXSH23; IMSH57/EXSH67). In the case of the non-IIT industries, both sectors of control are export oriented with Canadian sector accounting for a larger proportion of its total trade in this category. The foreign sector of control displays a greater propensity toward IIT trade. The subsidiaries do have higher import propensities than their Canadian-controlled counterparts, but for the larger enterprises this appears to be accounted for more by their larger wholesale role than by their

significantly greater use of foreign-produced components and minor products. The narrower gap in the import propensities between the sectors of control for the larger enterprises, compared to the small ones, has already been commented on above. It appears to be related to greater contracting-out to foreign suppliers by the Canadian-controlled enterprises along with import replacement by internally-manufactured domestic production and the greater use of domestic suppliers by the subsidiaries as they become larger.

Extent of IIT:

Table 4-30 shows that 67 industries in the foreign sector of control and 51 in the Canadian sector are in the IIT category for enterprises in trade groups 3 and 7 which represent those firms engaged in the two-way trade of their major product lines (IMSH3/EXSH3; IMSH7/EXSH7). These industries were reviewed in detail to assess the extent of IIT in them. The review disclosed that a significant number of the industries allocated to the IIT category based on the Grubel and Lloyd index, while having relatively high levels of IIT, were not involved in it in a major way. These results arise because of the manner in which the Grubel and Lloyd index is calculated. It is a relative measure which expresses the level of two-way trade as a percentage of total trade. But, it does not take into account the level of two-way trade relative to the total production activity in an industry. Consequently, while the relative measure can be high, the importance of two-way trade to the total activity in an industry can be low. For instance, if exports are equal to imports then the IIT index would be at its maximum level of 1. However, if the imports and exports are only one percent of shipments, then the amount of two-way trade is insignificant. One way to overcome this problem is to use not only the Grubel and Lloyd index, but also

the import and export propensities, in evaluating the significance of IIT in an industry. These propensities allow for both the level of imports and exports (the numerators), as well as the level of shipments in an industry (the denominators).

This approach was adopted to sort the industries allocated to the IIT category as noted in Table 4-30 into two groups. One group was those industries in which the level of IIT is significant in relation to shipments while the other group was those industries in which IIT was not significant in relation to shipments. The groups were determined on the basis of whether the import or export propensity for an industry was less than .10. If so, then the industry was allocated to the group in which IIT was not significant in relation to the total activity in an industry. Otherwise, the industry was allocated to the group in which IIT was significant in relation to total activity. The industries allocated to this latter group, from the original IIT industries noted in Table 4-30, are listed in Table 4-31 for the larger enterprises only.

TABLE 4-31

Industries With Significant IIT in Major Product Lines
 Based on IIT Index > Critical Value
 and Import and Export Propensities > .10
 For Unconsolidated Enterprises With Shipments > \$10 Million
 By Sector of Control
 Manufacturing Sector
 1979

Industry	Foreign Sector		Canadian Sector	
	Import Propen.	Export Propen.	Import Propen.	Export Propen.
Sugar Products	42%	15%	--	--
Rubber Products	20	21	15%	24%
Man-Made Fibre Mills	14	11	41	14
Fur Products	--	--	12	46
Plywood Mills	--	--	11	40
Office Furniture	10	26	--	--
Publishing	--	--	14	12
Iron & Steel Mills	33	32	--	--
Steel Pipe Mills	26	43	--	--
Aluminum Mills	14	13	21	26
Wire Products	14	27	--	--
Hardware	18	28	--	--
Misc. Metal Fabric.	22	24	--	--
Agricul. Implements	90	78	41	51
Misc. Mach. & Equip.	51	40	43	35
Refrigeration Equip.	26	26	47	46
Office & Store Mchy.	87	82	23	53
Aircraft	62	80	88	79
Autos	62	69	--	--
Auto Parts	86	65	13	63
Railroad Equip.	33	39	21	53
Television	73	64	35	20
Communic. Equip.	60	60	23	27
Misc. Electrical	16	17	--	--
Batteries	16	19	11	12
Glass	19	15	--	--
Abrasives	23	57	--	--
Refractories	43	59	--	--
Plastics and Resins	23	22	--	--
Ind'l. Chem.-Inorgan.	14	25	--	--
Ind'l. Chem.-Organic	29	19	--	--
Misc. Chemicals	28	12	16	13
Instruments	41	26	69	64
Sport. Goods	40	13	--	--
Toys	31	14	--	--

Unweighted Averages	36%	36%	26%	38%
Number of Industries	32	32	18	18

Source: see text.

It has already been noted that the firms in the foreign sector of control are extensively involved in the two-way trade of their major products and have higher propensities (especially for imports) than do their counterparts in the Canadian sector of control. However, even for the subsidiaries, significant levels of IIT relative to the total activity in an industry is associated with a relatively few number of industries. Table 4-31 lists 32 such industries for the foreign sector of control and only 18 in the Canadian sector, out of a potential of 159 industries.

A perusal of the industries listed in Table 4-31 shows that they tend to be concentrated in particular types of goods. That is, the products tend to be industrial goods used as intermediate products and capital inputs (steel, aluminum, wire, office furniture, machinery and equipment, transportation equipment, electrical products, non-metallic mineral products, chemicals and plastics).

What is clear from Table 4-31 is that IIT is not significant for many industries in comparison to shipments, nor is it widespread across the manufacturing sector. This result is not supportive of the impression conveyed by the studies discussed earlier in the literature review section in which the Grubel and Lloyd index was used without allowance for the absolute level of two-way trade for an industry. Further, the Canadian sector of control is not as highly involved in IIT as is the foreign sector of control. One implication of the results presented in Table 4-31 is that there is still considerable room for product specialization in Canadian manufacturing industries along with considerable room for increased contracting-out to foreign suppliers.

The generally higher import propensities for the foreign sector of control reflect the greater involvement of the subsidiaries as wholesalers on behalf of their foreign affiliates, relative to the Canadian-controlled manufacturers who likely rely more on independent importers in the wholesale sector to perform this function.

Table 4-31 presents those industries in which IIT is significant in relation to shipments, but only for the major products of firms engaged in two-way trade. In addition, firms import minor product lines and components which, if added to the trade in major products, could increase the level of IIT to a more significant level for many industries. Table 4-32 presents the results after such imports are added to the two-way trade in major products.

A caveat should be noted before the information in Table 4-32 is discussed. That is, it is a matter of interpretation as to whether the imports of minor product lines and components represent IIT or inter-industry trade. The definition of IIT developed earlier was based on the concept that it is a result of a firm both importing and exporting products similar to those it manufactures as part of its major product line. Clearly, the imports of minor products and components in trade groups 1 and 5 ("M only") are not similar to the major products of the importers, since they have been allocated to industries only distantly related to the major industries to which the firms belong in many cases, as has already been discussed. It could be argued, however, that it is not material whether the trade in similar products is by the same firm, or by separate firms in an industry with one group of firms importing and another group exporting, as long as there is two-way trade in similar goods for the industry. Nevertheless, this

latter type of two-way trade is suggestive of specialization in exports by some firms with import competition being provided by others, which is similar to an inter-industry pattern of trade.

No particular view on this issue is taken here, except to present the results for the combined imports so that the reader can draw his own conclusions. However, the position could be taken that if the specialization by some firms in an industry in exports (perhaps because of specialization in major products differentiated from imported goods) and the imports by other firms (because of production specialization and increased contracting-out of components and minor product lines to foreign suppliers) are both a response to increased international competition then it is the type of response associated with IIT rather inter-industry trade. The view that minor products and components represent IIT is further supported by the increased two-way trade flow with which they are often associated with in an industry, rather than just an increase in the one-way trade flow which is associated with inter-industry trade.

The information presented in Table 4-32 was developed in the following manner in order to determine the extent to which, for the IIT industries, not only major product lines are imported, but also minor products and components. The imports of enterprises in trade groups 1 and 5 ("M only") were combined with those for trade groups 3 and 7 ("Both X and M") to arrive at the total import propensity for each sector of control in an industry (IMSH13 and IMSH57). The MINDF index and the MINDC index, set at a critical value of .10, were used to determine the IIT industries for each sector of control, respectively. Any industries in the IIT category were then reviewed

and those with an import or export propensity of less than .10 were removed from the IIT category. The import propensities IMSH13 and IMSH57 have shipments in their denominators for just trade groups 1 and 3 (foreign sector) and 5 and 7 (Canadian sector). The results presented in Table 4-32 are for the larger enterprises only, as was the case for Table 4-31. Table 4-32 summarizes the results, rather than listing the industries individually as was done in Table 4-31. The important point is how the import propensities change and the number of industries extensively involved in IIT increases when total imports (IMSH13 and IMSH57) are used to determine IIT rather than just the imports of major products (IMSH3 and IMSH7).

TABLE 4-32

Industries With Significant IIT - Comparison Between Major Products and Total Imports
Based on IIT Index > Critical Value
and Import and Export Propensities > .10
For Unconsolidated Enterprises With Shipments > \$10 Million
By Sector of Control
Manufacturing Sector
1979

Description	Foreign Sector		Canadian Sector	
	Major Products	Total Imports	Major Products	Total Imports
Unweighted Averages	34%	58%	33%	41%
Number of Industries	26	54	13	39

Source: see text.

There is a more than doubling for the foreign sector and a tripling for the Canadian sector of control in the number of industries that can be classified as being extensively involved in IIT (e.g. based on its relationship to total activity in an industry) when IIT is calculated by including minor product lines and components in imports. The volume of trade

that can be classified as IIT in nature is also considerably increased. The unweighted average of the import propensities also increases, with the increase being considerably greater for the subsidiaries because of their greater propensity to contract-out minor products and components to foreign suppliers (including affiliates) as compared to their Canadian-controlled counterparts. The industries added to the list of those presented in Table 4-31 include food (meat and feed), textiles (rugs), wood (plywood and doors), metal processors (boilers, heating equipment, metal coatings and metal stampings), electrical goods (small and major appliances, and lighting fixtures) and non-metallic minerals (clay). These products comprise both minor product lines (electrical appliances and textiles) and components (metal stampings).

Summary of T-tests on Import and Export Propensities:

The enterprises in the foreign sector of control have higher import propensities for both components and final products than do their Canadian-controlled counterparts. This reflects the greater access the subsidiaries have to affiliates along with, perhaps, a greater awareness for efficient purchasing practices that utilize foreign suppliers for small-run products and components. The subsidiaries also tend to be more involved in IIT than do the Canadian-controlled firms, with the Canadian-controlled firms being more involved in international trade as exporters only. One half of the imports by the subsidiaries are in the form of minor products and components, rather than being imports of major product lines that are traded on a two-way trade basis. Generally speaking, IIT that is significant in relation to the total activities of manufacturers is not widespread and is lower for the firms in the Canadian sector of control. This suggests there

is still considerable room for increased scale and specialization by Canadian manufacturers in both sectors of control.

One import difference between the small and larger enterprises is the convergence in the import behaviour between the sectors of control. The difference in the import propensities between the sectors of control is much narrower for the larger enterprises. Presumably, this reflects greater import replacement behaviour by the subsidiaries as they become larger, along with increased use of foreign suppliers by the Canadian-controlled firms. The latter behaviour appears to be the dominant type since the import propensities of the larger subsidiaries are not materially lower than for the smaller ones, but they are significantly higher for the larger Canadian-controlled firms than for the small ones.

In terms of just the export propensities, generally there is not a significant difference between the sectors of control, especially for 1979 after a significant increase in the export propensities between 1974 and 1979 for the firms in the Canadian sector of control. This allowed them to catch-up to the export performance of the subsidiaries.

A significant value of the total trade, especially by the subsidiaries, is in the form of two-way trade in major products. There is a strong relationship between increased imports and increased exports for the industries involved in this type of trade with the relationship being stronger for the subsidiaries, presumably because of their international affiliations. These results suggest that the movement to freer trade will result in offsetting increases of imports and exports so that there need be

no undue apprehension about freer trade or the ability of subsidiaries to adapt to it.

Scale and Specialization:

So far in the analysis, the emphasis has been on international trade flows. But the hypothesis developed earlier in which the relationships between increased competition and trade flows were outlined also included a discussion of the impact of increased competition on plant scale and the degree of product and production specialization. In this section, an analysis is made of the extent to which there have been changes in plant scale and product specialization between 1974 and 1979. In the following section the focus will be on changes in production specialization over the same time period.

A proxy measure of change in plant scale was developed from the information in the data bank. It is the ratio of the value of shipments in an industry for 1979 to the value in 1974, in constant 1974 dollars. It was necessary to adjust the data for the entry and exit of firms in an industry over the time period involved, otherwise the statistic would have been influenced by factors other than just the growth in shipments by existing producers and affected the usefulness of the statistic as a proxy for growth in plant scale. The adjustment was accomplished by using only the shipments of establishments common to both the opening and closing years of 1974 and 1979 that reported on the Long-Form Census form. There were approximately 11,000 establishments in this group. They were partitioned by two sectors of control (foreign and Canadian) and by the two trade categories (IIT and non-IIT). In order to test for the sensitivity of the analysis to the index

used to allocate industries to either the IIT or non-IIT categories, it was carried out twice. One analysis used the GIND index with a critical value of .30 to allocate the industries and the other used the MIND index with a critical value of .10 to allocate them. T-tests were carried-out on the statistic to determine if there were significant differences in it between the sectors of control, by industry category. The results of the analysis are presented in Table 4-33.

TABLE 4-33

Results of T-tests On Growth in Shipments
Between Sectors of Control for 159 Industries
Based on Long-Form Establishments Common to 1974 and 1979
Manufacturing Sector

Description	Based on GIND Index				Based on MIND Index			
	IIT		non-IIT		IIT		non-IIT	
	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.
Number of Industries	78	78	81	81	70	70	89	89
Unweighted Averages	1.23	1.26	1.07	1.30	1.18	1.28	1.12	1.28
Significance Of T-test	.44		.00		.11		.02	
R ² of Correlation	.08		.00		.02		.00	
Slope of Correlation	.27		-.05		.13		-.01	

Note: IIT= Index > critical value
non-IIT= Index < critical value

Source: See text.

The results of the T-tests are similar for both the GIND and the MIND index. Shipments grew, on average, by about 25% between 1974 and 1979 for the IIT industries and there were no significant differences in this growth

between the sectors of control. However, for the non-IIT industries, the growth in shipments was significantly different between the sectors of control, with the Canadian sector having a rate of growth more than double that for the foreign sector and which was about equal to that for the IIT industries. The implication of this is that the subsidiaries who are not engaging in increased specialization and two-way trade in response to the changing trade environment but, instead, are continuing as tariff factories with extensive imports to serve just the Canadian market, have not increased their scale to the same extent as either the Canadian-controlled firms that are specialized exporters or the firms in both sectors of control that are engaging in two-way trade. Another study has noted a positive relationship between increased scale and the degree of specialization of firms. (4-3) This, along with the results noted here, would suggest that the subsidiaries who are not achieving increases in scale may not be doing so because they are not specializing. Their lack of specialization would reduce their ability to lower unit costs which in turn would make them less competitive and unable to increase their scale through exports. As a consequence, they would not engage in two-way trade but would tend to be importers on a one-way trade basis. This would explain why the subsidiaries with the lowest growth in shipments are in the non-IIT category since they would be high-cost tariff factories with extensive import activities.

The issue of changes in specialization was also addressed. It was not as easy to develop a statistic that would serve as a proxy for specialization as it was to develop one for changes in scale. This is partly because of the wide variety of measures that exist for specialization. But, more importantly, it is also because none of the measures of specialization can

accurately capture the extent of specialization because of data limitations. The degree of specialization is dependent on the number of variations of a product that are needed to meet customer tastes. But, most measures of product diversity can only measure the number of products or commodities produced by a plant or firm, rather than the number of variations on the products. For instance, a firm could be in the shoe business and the Census would be able to count the number of Industrial Commodity Classifications (ICC) which the firm was manufacturing. However, within the commodity group of women's shoes, the firm could produce a number of different styles that were dependent upon colour, heels, strappings, materials used and other factors. No measure of diversity at this level is available from the Census data. But, given these limitations on the measures of specialization, an attempt was made to assess the degree of product specialization by sector of control and category of trade.

Several measures of product specialization were developed for the years 1974 and 1979, by sector of control. One measure is the primary product specialization ratio (PPSR), which is the ratio of the value of primary products to the value of total products produced by an establishment. This ratio, by establishment, was weighted by the shipments for each establishment in an industry and then averaged over the number of establishments to arrive at an industry-level measure of diversity. Another measure of specialization is the average number of ICC products produced at the 5-digit level of product disaggregation (ANSD). This measure was calculated for each establishment and weighted by its shipments and then averaged over all the establishments in an industry to arrive at the industry-level index. A third measure is the percentage of output accounted for by the leading 5-digit ICC

products (APCQ). This statistic was also calculated by establishment, weighted by its shipments and averaged over all the establishments in an industry to arrive at the industry-level measure. The final measure of diversity is a Herfindahl index (HERF). It is a measure of diversity at the 5-digit ICC level of disaggregation. The index was weighted for each establishment to arrive at the industry-level measure. The HERF index can vary between zero and one, with the higher values associated with higher levels of product specialization. Table 4-34 presents the unweighted averages of the ratios, by sector of control, for both 1974 and 1979.

TABLE 4-34

Unweighted Averages of Various Measures of Specialization
By Sector of Control for 159 Industries
Based on Establishment-Level Data
1974 and 1979

Description	Unweighted Averages			
	1979		1974	
	Fgn.	Cdn.	Fgn.	Cdn.
Primary Products Specialization (PPSR)	.82	.85	.81	.85
Avg. No. of 5-digit ICC Products (AN5D)	4.1	4.1	4.7	4.2
Avg. % of Output by 5-digit ICC (APCQ)	.69	.74	.67	.73
5-digit ICC Herfindahl Index (HERF)	.61	.66	.59	.65

Source: see text.

The results presented in Table 4-34, for all measures of specialization, show that the establishments in the Canadian sector of control were more specialized in the products they produced than were the subsidiaries for both

1974 and 1979. Also, there was an increase in the degree of product specialization between 1974 and 1979 for both sectors of control. (Note that AN5D decreases as specialization increases).

In order to formally test for differences in the degree of specialization between the sectors of control, T-tests were carried-out on the 1979 statistics within each of the two trade categories of IIT and non-IIT industries. The GINDT index with a critical value of .10 was used to allocate the industries between the two trade categories. The results are presented in Table 4-35.

TABLE 4-35

Results of T-tests on Various Measures of Specialization
Between Sectors of Control for 159 Industries by Industry Categories
Based on Establishment-Level Data
Manufacturing Sector
1979

Description	IIT INDUSTRIES								non-IIT INDUSTRIES							
	PPSR		ANSD		APCQ		HERF		PPSR		ANSD		APCQ		HERF	
	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.	Fgn.	Cdn.
Number of Industries	78	78	78	78	78	78	78	78	81	81	81	81	81	81	81	81
Unweighted Averages	.86	.86	4.6	4.5	.70	.72	.61	.63	.77	.84	3.6	3.6	.69	.75	.62	.68
Significance of T-test	.92		.74		.52		.35		.87		.96		.83		.84	
R ² of Correlation	.02		.24		.04		.06		.13		.35		.09		.13	
Slope of Correlation	.17		.45		.21		.27		.58		.71		.51		.52	

Note: IIT= GINDT > .10
non-IIT= GINDT < .10

Source: See text.

All of the significant differences in specialization between the sectors of control are in the non-IIT industries, and the Canadian sector of control is equal to or more specialized than the subsidiaries for all the statistics associated with these industries. The subsidiaries are just as specialized as their Canadian-controlled counterparts in the IIT industries. This indicates the subsidiaries engaging in two-way trade have responded to increased competition, perhaps by specializing in products mandated to them by their parents for world distribution. But, in non-IIT industries, some of the subsidiaries appear to be continuing as diversified tariff-factory manufacturers with high levels of imports and serving just the domestic market while their Canadian-controlled counterparts (as well as some of their

counterparts in the foreign sector) are specialized as exporters. This tariff-factory role for some subsidiaries would reduce the degree of specialization by the foreign sector. The higher degree of specialization of the Canadian-controlled firms in the non-IIT industries is associated with their tendency to be exporters only. This tendency was noted earlier when the export propensities were discussed and it was noted the Canadian-controlled firms are more extensively involved with inter-industry trade as exporters only. It now appears these specialized exporters are also more specialized in the products they export than are the firms in the foreign sector and than the firms in both sectors in the IIT industries.

Therefore, it appears the subsidiaries in the non-IIT industries are lagging in their response to freer trade by not specializing horizontally and increasing their scale as much as their counterparts in the IIT industries in both sectors of control and as much as their counterparts in the Canadian sector of control within the non-IIT industries. Instead, they appear to be continuing in their traditional role as tariff factories that are high-cost and rely extensively upon imports from affiliates. This issue will be analyzed further in the next section when vertical specialization is analyzed. But, from a policy standpoint, it is the subsidiaries in the non-IIT industries that appear to be the least adaptive to the changing environment. Further research on this group of firms is needed to establish why they are responding in this manner.

Domestic IIT and Production Specialization:

The analysis so far has focused primarily on the issue of international intra-industry trade. However, the freer trade and increased competition

that have led to international IIT through increased specialization and contracting-out to foreign suppliers should also have led to increased contracting-out to efficient domestic suppliers as manufacturers attempted to lower unit costs. The result would be an increase in domestic intra-industry trade. In addition, the prior section assessed the changes in horizontal, or product, specialization. But, the issue of changes in vertical specialization due to increased contracting-out has yet to be addressed. Both increased domestic IIT and changes in vertical specialization will be analyzed in this section since both can be done through the use of the same statistic of purchased material to value-added. Further, some additional insight into horizontal specialization can be gained by decomposing this statistic into that portion of it attributable to the wholesale activities of manufacturers and that portion attributable to their manufacturing activities. The wholesale activities are germane to the issue of horizontal specialization.

It has already been discussed in Chapter 3 why the ratio of purchased material to value-added has been selected to evaluate the extent of domestic IIT. Basically, as increased specialization and contracting-out of products and components to suppliers take place, purchased materials for an industry would increase while value-added would decline. Thus, the ratio should increase with increases in competition, specialization and contracting-out. The statistic does include imported as well as domestically-purchased materials so that it is a measure of total rather than just domestic IIT. However, the domestic purchases should dominate it. The ratio was disaggregated to measure separately wholesale activity (i.e. total purchased material and value-added, less manufacturing purchased material and

value-added) and manufacturing activity. The value of materials included in the wholesale measure would be finished goods purchased for resale of both minor and major product lines while the value of materials included in the manufacturing measure would be components meant for further processing. It would be expected the ratio measuring wholesale activity would increase over time with increased horizontal specialization and contracting-out to suppliers and that it would be higher for the subsidiaries than for the Canadian-controlled firms because of their more extensive wholesale activities, as has already been discussed. Similarly, the ratio measuring manufacturing activity should also increase over time with increased vertical specialization and contracting-out to suppliers.

The ratio, disaggregated by wholesale and manufacturing activities, was calculated for the 159 industries in the data bank for the two years of 1974 and 1979, by sector of control. These statistics were tested for significant differences between the two years of 1974 and 1979, by industry category (i.e. IIT and non-IIT industries) within a sector of control. They were also tested for significant differences between the sectors of control, by industry category, for each year. The acronyms for the statistic of Fgn.9 and Fgn.4 are for the foreign sector of control in the years 1979 and 1974, respectively. The acronyms Cdn.9 and Cdn.4 are for the Canadian sector of control in each of these years, respectively. Table 4-36 presents the results of the T-tests for the wholesale activities of the firms and Table 4-37 presents the results for their manufacturing activities. The MIND index series was used to allocate the industries to either the IIT or non-IIT categories using a critical value of .10. For inter-sector comparisons of the statistics MINDT was used and for intra-sector comparisons MINDF and MINDC

were used for the foreign and Canadian sectors of control, respectively.

TABLE 4-36

Results of T-tests on Ratio of Purchased Material to Value-Added
Wholesale Activity
Between Sectors of Control and Years 1974 and 1979
For 159 Industries
By Industry Categories
Manufacturing Sector

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	Fgn.9	Fgn.4	Fgn.9	Fgn.4	Cdn.9	Cdn.4	Cdn.9	Cdn.4	Fgn.9	Cdn.9	Fgn.9	Cdn.9	Fgn.4	Cdn.4	Fgn.4	Cdn.4
Number of Industries	79	79	80	80	44	44	115	115	70	70	89	89	70	70	89	89
Unweighted Averages	23%	9%	10%	11%	7%	9%	13%	14%	24%	9%	11%	13%	7%	12%	13%	14%
Significance of T-test	.14		.53		.60		.63		.08		.51		.63		.65	
R ² of Correlation	.81		.28		.15		.46		.00		.11		.00		.10	
Slope of Correlation	.06		.87		-1.86		.69		-.02		.48		-.02		.28	

Note: IIT= MINDF, MINDC and MINDT >.10
non-IIT= MINDF, MINDC and MINDT <.10
Where: MINDF and MINDC apply to the appropriate intra-sector comparisons of the statistic and MINDT applies to the inter-sector comparisons.

Source: See text.

The information presented in Table 4-36 indicates that there was a large (but not statistically significant) increase in the wholesale activities of the subsidiaries between 1974 and 1979 that are in the IIT industries. This is in contrast to the wholesale activities of the subsidiaries in the non-IIT industries and the Canadian-controlled firms in both the IIT and non-IIT industries. The increase in wholesale activities by the subsidiaries in the IIT industries is consistent with them specializing horizontally over the 1970's (perhaps by WPM strategies) in response to increased competition but

continuing to offer a full product line to their domestic customers by importing products from affiliates. A similar pattern would not exist for the Canadian-controlled firms because they lack affiliates from whom to purchase dropped product lines. In addition, unlike the subsidiaries, the wholesale role is performed by specialist firms in the wholesale sector rather than by Canadian-controlled manufacturers.

The increase in the wholesale activities of the subsidiaries between 1974 and 1979 results in a significant difference in this activity between the sectors of control in 1979 (at a level of significance of .08). In 1974, the two sectors had similar ratios, but by 1979 the ratio for the foreign sector was almost three times that for the Canadian sector of control. This is also consistent with the evidence presented above in which it was shown that the Canadian-controlled firms are more specialized than the subsidiaries and that the subsidiaries import a substantially greater amount of finished goods. However, the comparison is incomplete in the sense that Statistics Canada has not provided data that consistently treat the wholesale activities between the sectors of control.

The subsidiaries in industries that are categorized as being IIT in nature have a wholesale activity that is about twice as great as that for subsidiaries in the non-IIT industries. This may be due, in part, to a greater degree of specialization as exporters by the subsidiaries in the non-IIT industries (perhaps because they are specialized plants in a North-American context that just supply a product to a U.S.-based marketing organization) with a consequently lower need to fill-out their product lines for Canadian markets with products imported from affiliates. There is no

appreciable difference in the statistic between IIT and non-IIT industries for the Canadian-controlled firms nor between them and the subsidiaries in non-IIT industries. One of the policy implications of these results is that the Canadian-controlled firms (and especially the small ones) who wish to offer a wide variety of products to international markets, yet achieve the cost benefits of being specialized producers, should form consortia of producers to act as trading houses as the Japanese have done to market their products internationally.

Table 4-37 presents the results of the T-test on the statistic measuring manufacturing activities. This statistic is interpreted as a measure of both domestic IIT and the degree of vertical specialization by manufacturers.

TABLE 4-37

Results of T-tests on Ratio of Purchased Material to Value-Added
Manufacturing Activity
Between Sectors of Control and Years 1974 and 1979
For 159 Industries
By Industry Categories
Manufacturing Sector

Description	IIT		non-IIT		IIT		non-IIT		IIT		non-IIT		IIT		non-IIT	
	Fgn.9	Fgn.4	Fgn.9	Fgn.4	Cdn.9	Cdn.4	Cdn.9	Cdn.4	Fgn.9	Cdn.9	Fgn.9	Cdn.9	Fgn.4	Cdn.4	Fgn.4	Cdn.4
Number of Industries	79	79	80	80	44	44	115	115	70	70	89	89	70	70	89	89
Unweighted Averages	155%	175%	124%	134%	174%	163%	131%	124%	161%	173%	123%	128%	189%	156%	123%	118%
Significance of T-test	.57		.29		.35		.03		.39		.81		.32		.53	
R ² of Correlation	.18		.71		.76		.87		.57		.23		.45		.24	
Slope of Correlation	.28		.76		1.81		.95		.80		.99		1.72		.97	

Note: IIT= MINDF, MINDC and MINDT >.10

non-IIT= MINDF, MINDC and MINDT <.10

Where: MINDF and MINDC apply to the appropriate intra-sector comparisons of the statistic and MINDT applies to the inter-sector comparisons.

Source: See text.

With the exception of the comparison in the statistic between 1974 and 1979 for the Canadian sector of control in the non-IIT industries, none of the tests are significant. This reflects the large inter-industry variation in the statistic relative to the difference in it between the means being compared. Yet, the pattern of the change in the statistic is completely different in each of the sectors of control which leads to the belief that the two sectors did perform differently between 1974 and 1979 in terms of their make-or-buy decision. Therefore, it is of interest to explore these relationships even though definite assertions cannot be made.

The unweighted average of the statistic declined for the foreign sector of control between 1974 and 1979 in both the IIT and non-IIT industries. This is in contrast to the Canadian sector of control for which the statistic increased in the same time period and the increase was significant for the non-IIT industries. The subsidiaries appear to have moved toward greater contracting-in (i.e. greater diversification in production activities through increased vertical integration) across both industry categories which led to a reduction in domestic IIT. At the same time, the Canadian-controlled firms appear to have increased their contracting-out and degree of production specialization which led to an increase in domestic IIT. Such behaviour by the Canadian-controlled firms is consistent with their greater increase in product specialization over this time period and their greater tendency to be specialist exporters, both of which have been noted previously.

The increase in the vertical integration of the subsidiaries is also consistent with another study which showed for a small sample of firms that the subsidiaries were somewhat slower than their Canadian-controlled counterparts in responding to the changing trade environment with increased specialization. (4-4) In that study some of the subsidiaries were more resistant to changing their role from tariff-factories to specialized exporters for various reasons and as a result had declining market shares. The short-run responses, at least, in such cases was to continue in their established patterns of tariff-factory behaviour, by attempting to displace imports and increase their diversity by contracting-in production activities in order to maintain plant utilization levels. It should also be noted, however, that ultimately some subsidiaries in the study based on the small sample of firms did eventually adopt specialization strategies so that in the

longer-run their perverse behaviour would not be a problem.

In light of this later response by the subsidiaries as noted by the study mentioned above and the statistically weak results shown in Table 4-37, it may be wise to put a minimum of emphasis on the interpretation of the movement in the statistics between 1974 and 1979 for the sectors of control and conclude only that the Canadian-controlled firms were at a lower level of specialization in 1974 than the subsidiaries, and that by 1979 the Canadian-controlled firms had caught-up to the subsidiaries and no significant difference now exists between the sectors of control in terms of their degree of vertical specialization.

In the case of the non-IIT industries the pattern of reversal in the statistic between the sectors of control is not evident, as it is for the IIT industries, nor is there an appreciable change in the statistic between 1974 and 1979 for either sector of control. Further, the non-IIT industries have a lower level for the statistic which suggests they are more vertically integrated than firms in the IIT industries. This may reflect to some extent the mixing of both import and export-oriented industries in the non-IIT industry category with the import oriented ones pulling the average down. They would do so because the producers in import-oriented industries would tend to be high-cost and vertically integrated.

Summary of Chapter Four:

For historical reasons, the structure of the manufacturing sector in Canada is dominated by a large number of small enterprises. However, in terms of production, exports and imports the manufacturing sector is

dominated by a relatively small number of large firms of which a significant proportion are foreign-controlled. The small subsidiaries are extensively involved with importing minor and major product lines as well as components. The imports of minor and major products by the subsidiaries are mainly on a wholesale basis on behalf of their affiliates and it allows the subsidiaries to offer a wider variety of products to their customers without incurring the costs of small scale and diversity which would be associated with their production in Canada if they were sold only into the domestic market. The Canadian-controlled manufacturers tend to leave the wholesale function to importers in the wholesale sector.

It is the large subsidiaries that are actively involved in IIT, partly because of their wholesale activities, and a large part of it is intra-firm trade. IIT is strongly associated with MNEs and it is fostered by the easy access the subsidiaries have to the products and markets of their foreign affiliates. The Canadian-controlled enterprises, in comparison to the subsidiaries, tend to be relatively more involved in inter-industry trade. That is, they are more oriented to being just exporters and have a much lower propensity to import components and finished products.

The subsidiaries do have higher import propensities than their Canadian-controlled counterparts. But, this is mainly because of the more extensive wholesale activities of the subsidiaries. If the wholesale role performed by Canadian-controlled firms that are in the wholesale sector were integrated back into the manufacturing sector then it is doubtful there would be a significant difference between the sectors of control in their import performance on finished goods. This would be especially so for the larger

enterprises for whom the difference in import performance is much narrower than for the small enterprises because the larger subsidiaries tend to displace their imports of finished goods with domestic production as they become larger.

The subsidiaries, after allowing for the difference in wholesale activity between the sectors of control, also have higher import propensities for components because of their more extensive use of foreign suppliers. This propensity narrows between the sectors for the larger firms as Canadian-controlled enterprises use foreign suppliers more extensively as they become larger.

The extent of IIT in major products is not as great as prior studies that use a relative measure of it would indicate. However, when the imports of minor product lines and components are included in the definition of IIT, then it becomes more pervasive. But, there appears to still be considerable room for increased specialization, scale and IIT.

The export propensities of the small Canadian-controlled enterprises are about one-half those of their counterpart subsidiaries. They also tend to use efficient foreign suppliers much less than the counterpart subsidiaries and than the larger enterprises in both sectors of control. The lower export propensities may reflect the difficulty that small firms have in accessing the export market without the aid of a large, mature marketing organization such as that available to most subsidiaries. The low import propensities may reflect inefficient purchasing procedures that limit the search for competitive components to just domestic suppliers and also a lack of access

to foreign suppliers. The development and use of trading houses, for both exports and imports, by the small enterprises in the Canadian sector of control would help to overcome some of these difficulties.

The sources of supply for components imported by the subsidiaries (as well as minor and major product lines) are mainly affiliates or the same suppliers as those used by the affiliates. This extensive tied trade, whether intra or inter firm, raises the question of the appropriateness of the transfer prices used to price the goods. This is not meant to imply the transfer prices of imported goods, per se, are incorrect or that the practice of intra-firm sourcing is undesirable. A case can also be made at the other extreme that the small, Canadian-controlled firms who do not search globally for efficient suppliers are also involved in tied trade, but with domestic suppliers. Further, this behaviour could be just as undesirable in terms of reduced competitiveness, income and employment in Canada as would any tied trade between subsidiaries and their foreign suppliers. Indeed, it may be that the higher propensity of the small subsidiaries as well as the large enterprises in both sectors of control, to use foreign suppliers is an indication that there are cost and availability problems associated with using many Canadian suppliers. No doubt the transfer price issue is important, but it is a general problem related to more than just the purchases by subsidiaries from affiliates. It applies to all firms, whether Canadian or foreign controlled. What is required is an increased awareness by all firms that efficient prices will prevail only if adequate global search procedures are employed to find efficient suppliers.

While some industries do have high import propensities, those identified

as being involved in IIT tend to also have high export propensities. In particular, there is a tendency for import propensities to rise as the subsidiaries and Canadian-controlled firms increase their degree of specialization and engage in increased contracting-out to more efficient foreign suppliers. But, at the same time, there also is a tendency for the firms to increase their export propensities perhaps because of the increased international cost competitiveness which accompanies increased specialization. The net result is increased two-way trade of the IIT type with increases in imports being offset by increases in exports.

A major policy problem exists in relation to those firms that are continuing in their tariff-factory role and have not adjusted to the changing environment by increasing their degree of specialization. In this case, imports increase on a one-way basis without the benefit of increased scale and exports. There appears to be a relatively larger group of subsidiaries than Canadian-controlled firms that are acting in this fashion, whether one looks at the non-IIT industries in which they tend to be, or at the ratio of purchased material to value-added. This may just be a temporary problem while the subsidiaries sort-out their new role in relation to the changing trade environment and also with their parents and affiliates. But, it is of concern that in some cases it may be longer-term in nature. Unlike the case of firms that increase exports as they specialize and increase imports, it is not possible to be as sanguine with respect to subsidiaries that mainly increase their imports from affiliates to remain competitive rather than increasing their specialization and scale through exports as trade protection declines. In such cases, the subsidiaries will eventually become wholesale importers for the products of their affiliates. Obviously, it is the

specialized subsidiary engaged in IIT that is viable in the longer-run and that should be encouraged.

The most desirable form of adaptation by the subsidiaries would be if they were to develop a long-run comparative advantage that would allow them to become specialized on a full-mission basis with a world product mandate. This requires the subsidiary to have an aggressive management that can build on some firm or country-specific advantage. The subsidiaries would then no longer produce products identical to those of their affiliates. This would increase their propensity to source from domestic suppliers, some of whom may have to be developed by the subsidiaries. This is would be especially so as the movement toward "just-in-time" production and delivery systems increases and the need to have local suppliers increases.

The Canadian-controlled enterprises appear to now be at least as specialized, if not moreso, than the subsidiaries in their production activities as well as in the products they produce. This will help to make them more competitive with the subsidiaries and their other competitors at home and abroad. However, the subsidiaries do have the advantage of being able to offer a wider variety of products because of their ability to wholesale the different products of affiliates. Therefore, it is important that Canada have an efficient wholesale sector that can bring together the different products of several Canadian-controlled producers and offer the final customer the same product variety as the subsidiaries and other competitors are able to do.

The subsidiaries do not appear to have increased their degree of

production specialization to the same extent as the Canadian-controlled firms over the 1970's and may even have become more diverse. This may reflect a propensity to continue as tariff factories even when such a role is no longer appropriate because of internal rigidities in the MNE to adopt new strategies. This would not help to make them competitive with imports or in export markets. The subsidiaries account for a significant share of Canadian employment and exports so that any cost inefficiency arising from their inability to become more specialized raises some concern. So also does the general lack of increased production specialization between 1974 and 1979 by firms in the non-IIT that are in both sectors of control. This could affect their future competitiveness. Research on the reasons for this apparent lack of response to increased competition needs to be undertaken. At the same time it is necessary to recognize that some industries and firms may have to contract in accordance with the HOS model of comparative disadvantage.

The relatively greater response by the firms in the IIT industries that are Canadian-controlled, compared to the subsidiaries, in terms of increased scale and levels of product and production specialization, may explain their greater improvement in export performance between 1974 and 1979 relative to the foreign sector of control. Such responses would improve their unit costs and make them more competitive internationally. On the other hand, the relatively weaker response by the subsidiaries, even though they started from higher levels of IIT, production specialization and export performance, is of concern and needs further investigation.

REFERENCES

4-1. The reader is referred to the relevant publications by Statistics Canada for further details on the methods used for collecting and reporting the data used in this study. The concepts and definitions relating to establishments, enterprises and other reporting units are contained in Catalogues 31-528 and 31-203. The ICC and SIC classification procedures are outlined in Catalogues 12-501 and 12-541. The definition and determination of sector of control, BRID code and inter-corporate structures are contained in Catalogue 61-517. The determination of destination of shipments for export purposes is discussed in Catalogues 31-522 (1974) and 31-530 (1979). Other Catalogues may also be relevant in describing the data and its sources.

4-2. Statistics Canada, Canadian Imports by Domestic and Foreign Controlled Enterprises, (Ottawa: Minister of Supply and Services, 1981).

4-3. Baldwin, J.R. and Gorecki, P.K., Trade, Tariffs, Product Diversity and Length of Run in Canadian Manufacturing Industries: 1970-1979, (Ottawa: Economic Council of Canada, Discussion Paper No. 247, 1983); and by the same authors, The Relationship Between Plant Scale and Product Diversity in Canadian Manufacturing Industries, (Ottawa: Economic Council of Canada, Discussion Paper No. 237, 1983).

4-4. Daly, D.J. and MacCharles, D.C., Canadian Manufactured Exports: Constraints and Opportunities, op. cit.

CHAPTER FIVE

CONCLUSIONS

Introduction:

Past policies of management and government were based on the model of a small market economy served by domestic producers that needed protection in order to survive. These policies, in combination with the small market sizes in Canada, fostered a large number of small-scale firms and larger firms with diversity in products and production activities. Consequently, manufacturers here had lower productivity and higher costs than producers elsewhere, particularly those in the U.S. and more recently in Japan. The movement toward freer trade and the increased competition that has accompanied it over the past twenty-five years or so now dictates that a different approach to policy be followed if Canadian manufacturers are to be internationally cost competitive and able to maintain income and employment levels in the manufacturing sector.

As part of this process of adaptation, management must become more outward-looking and achieve cost reductions through increased specialization and scale by increasing their use of foreign suppliers and increasing their exports. These adaptations to the more competitive environment create IIT. It is the extent to which this adaptive process has been carried-out in Canada, measured in part by the extent of IIT, that forms the basis of this report and the conclusions which follow. The success of the private sector in adapting assumes, of course, that governments have in place policies that create a stable cost environment.

MNEs, Intra-Firm Trade and IIT:

The evidence from this study, and also from the literature survey, shows that IIT and direct foreign investment (DFI) are strongly associated through intra-firm trade flows. MNEs can specialize plants internationally and utilize their marketing organizations in each country as wholesalers to distribute the products of their plants on an international basis. They can also establish plants as specialist suppliers of components to affiliated plants. This specialization of products and production activities across nations allows them to overcome the problems of small-scale production and diversity of activities that would otherwise exist if the plants were producing all products and components for just the domestic market of the nation in which they resided.

Such specialization is particularly important in the case of Canada because, unlike most other industrial nations, producers here do not have access to a large common or domestic market that would allow them to be large-scale, specialized producers that are efficient. But, in order to benefit from the increased efficiency and competitiveness that results from the international specialization by MNEs, it is necessary to accept that much of Canada's international trade will be in the form of intra-firm transactions as the MNEs trade products and components among their affiliates on a two-way basis. Also, because specialization creates two-way flows of products and components between affiliates, there will be a strong relationship between the number of MNEs that are adapting to increased competition and the level of IIT in the foreign sector of control.

The benefits to small countries such as Canada of having DFI and its

associated two-way trade are significant in an era of increasingly freer trade. The MNEs can give their subsidiaries access to world markets so they can more readily specialize and increase their scale and exports. The domestic plants also gain access to efficiently produced components and minor product lines that would otherwise have to be produced at a higher cost by either local suppliers or internally by the subsidiaries themselves. Indeed, it is likely that the high levels of DFI in Canada are a major explanation for the high elasticity of increased exports to increases in imports. The high level of DFI also helps Canada by making the transition to freer trade easier. The foreign-controlled plants can import components and minor product lines from affiliates. At the same time, they can more readily export a major product line, in which they have been given the right to specialize on behalf of the whole corporation, back to the affiliates (assuming the subsidiaries are in a hospitable cost environment and can show they are competitive with other suppliers and plants). The net impact of having high levels of DFI is a greater potential for adapting to freer trade (compared to that provided by smaller domestically-owned firms), and an increase in two-way trade with a greater tendency for exports to increase as imports increase. All this helps to stabilize incomes and employment as competition increases.

It is important to point out, however, that the achievement of these benefits from DFI in an era of increasing competition assumes the subsidiaries do adapt to the changing environment by moving from their role as primarily small, tariff factories toward becoming large, specialized manufacturers that are internationally cost-competitive and capable of exporting. In reality, it may be that this does not happen because of

various rigidities encountered by the subsidiaries in reallocating resources. The local management may not be aware of the need to develop a new role for the subsidiary as the trade environment changes. Local management may also not be aggressive in pursuing the adoption of this new role with corporate-level management. The corporate-level management also may not be enlightened about the need for a new role for the subsidiary. And other factors may also intervene to prevent the foreign-controlled firms from adapting as quickly as might be desired, such as regulation or the creation of barriers to international investment and trade flows.

The above discussion is not meant to single out just subsidiaries when discussing the need for adaptation and resource reallocation by firms. It is meant only to stress the importance of them to Canadian trade and competitiveness and how, if they are adaptive, the subsidiaries can ease the adjustment costs of moving to freer trade. Canadian-controlled firms must also be adaptive and they too have problems in doing so. The success with which Canada develops a competitive manufacturing sector depends upon the management decisions made by firms in both sectors of control.

The interconnections between DFI, intra-firm and international two-way trade are apparent in the data for this and other studies on Canadian trade data. For instance, some studies have noted the extensive intra-firm (or tied) trade in international trade flows. These studies have estimated that from seventy to eighty percent of Canada's international trade is on an intra-firm basis, although these estimates seem high in the light of the evidence from this study which is discussed below. But, certainly a large proportion of Canada's international trade is on an intra-firm basis. These

other studies also indicate that the subsidiaries in Canada ship about eighty percent of their exports to affiliates, and over eighty percent of these exports represent materials and components meant for further processing by the receiving affiliates.

In terms also of imports, the subsidiaries rely extensively on intra-firm sources of supply. It has been estimated by others that imports from affiliates represent about ten percent of the subsidiaries' shipments with about two-thirds of the imports being major and minor product lines (i.e. finished goods) and the balance being components and capital equipment used in manufacturing. In addition, these estimates indicate that the subsidiaries import components from third-party suppliers worth as much as the imports of components from affiliates. These latter imports are not directly intra-firm trade, but a portion of it arises because of the relationships the foreign suppliers have with the foreign affiliates of the subsidiaries in Canada. Consequently, some of this trade could be classified as semi-tied.

The data from this study are basically consistent with the above information from prior studies, although there are some differences. The major point to be made here is that, by any standard, Canada has a substantial proportion of its international trade being transacted by MNEs on an intra-firm basis with much of it being in the form of two-way IIT.

For instance, Table 4-6 shows that exports by the subsidiaries are over sixty percent of total exports of Canadian manufactured products, although not all of this is intra-firm trade. The improved export performance of the

Canadian-controlled firms over the late 1970's noted in this study (Table 4-21) may have reduced the percentage of total exports represented by the subsidiaries, which would account for their lower proportion of total exports than was reported, as noted above, by the earlier studies.

In the case of imports, Tables 4-7 and 4-8 show that the subsidiaries import from affiliates and third parties, an amount valued at about twenty-five percent of their shipments (excluding the auto industries). This is about double the ratio reported in the prior studies and no apparent explanation exists for this except to note there has been an increase in IIT, and hence in imports, since these prior studies were completed. Tables 4-12 and 4-17, along with Tables 4-16 and 4-19, when taken together, indicate that the imports by subsidiaries of components and minor product lines represent about fifteen percent of their shipments, while the imports of major product lines represent about ten percent of their shipments (excluding the auto industries). The estimates from the prior studies, that are noted above, indicate that components imported from affiliates and third parties should be about ten percent of shipments. Subtracting this from total imports of components plus minor product lines leaves the imports of minor product lines at about five percent of the shipments of the subsidiaries. The imports of components would then be at about ten percent of shipments by the subsidiaries and about equal to the imports of major product lines at ten percent. It appears that about one-half of the imports of components are from affiliates and the other half from third-party suppliers.

If the above percentages are recombined, then the imports of finished goods by the subsidiaries (minor plus major product lines) would be about

fifteen percent of their shipments, representing items imported mainly on a wholesale basis from affiliates for resale without further processing. Therefore, the wholesale activities of the subsidiaries represent over one-half of their imports and this accounts for a large part of the difference between the sectors of control in their import propensities. Canadian-controlled firms also import goods for resale, but this activity is undertaken mainly by firms in the wholesale sector which artificially biases upward for the subsidiaries any comparisons of import propensities between the sectors of control in just the manufacturing sector.

The Transfer Price Issue:

The extensive trade on an intra-firm basis in both imports and exports does raise the issue of whether or not the transfer prices of the transactions are equivalent to the prices that would be set by efficient, free markets and, if not, the extent of any resource misallocation that results from the use of incorrect transfer prices. The prices used for intra-firm, international trade may not reflect market prices because the trade is tied and this allows for prices to be set by fiat decisions that are based on tax avoidance and other income redistribution criteria. This is a problem as well for purchases from third-party foreign suppliers who sell to subsidiaries in Canada because of their supply relationships with foreign affiliates (semi-tied trade). The estimates derived from this study are that approximately one-half of imports are on a tied basis and a considerable portion of the balance of imports are on a semi-tied basis. The extent of exports to affiliates is unknown. But, clearly there is a potential for a significant part of the pricing of Canada's international trade in manufactured goods to be set by non-market factors that might not be in the

best interests of the subsidiaries or the nation as a whole.

One of the known factors that makes the transfer price issue sensitive is that intra-firm, international trade is less price elastic than inter-firm trade. That is, exchange rate changes do not reallocate purchases between domestic and foreign suppliers as much if the trade is intra-firm than if it is inter-firm. The stability of the tied purchases with affiliates as relative prices change suggests that more than just prices are involved in the decision by subsidiaries to source from related parties. No doubt more than just price is involved in a purchase decision. For instance, continuity and stability of supply, quality of the goods, and the proprietary nature of some items all are involved and would mitigate against changing sources of supply even if relative prices change. But, there are also several audit features in the system that prevent transfer prices being too far removed from efficient ones. For instance, the declared values are audited at the port of entry, Revenue Canada audits them for income tax purposes and the subsidiaries themselves are profit maximizers who would resist paying prices that are not realistic. However, the issue is one that needs further investigation because of its significance, its political sensitivity and the the strident manner of some in putting forward their viewpoint on the issue.

Any investigation of transfer prices, however, should not be limited to just those involved with tied international trade. It should also review the "tied" trade behaviour of firms buying from domestic suppliers even when the structure of relative prices is such that more foreign sourcing should probably be taking place. This is the case primarily for the small Canadian-controlled firms. Such behaviour is just as serious in terms of its

implications for resource misallocation domestically as similar behaviour by the subsidiaries with respect to their tied purchases from affiliates. The almost exclusive use of high-cost domestic suppliers by the smaller Canadian-controlled firms, when cheaper sources of supply are available from foreign manufacturers, would make the purchasers less competitive and reduce Canadian incomes, output and employment. It is the purchasing practices as well as the transfer prices used by firms in both sectors of control that should be evaluated, not just the transfer prices used by the subsidiaries.

The extent of intra-firm trade in the total trade of manufactured goods also challenges the appropriateness of the models used for commercial and industrial policy which assume that Canada's trade is conducted on the basis that it has a small, open economy with perfect competition and free markets. More recognition should be given to the elements of imperfect competition and its implications for policy. One variation that is a movement in this direction is the IIT model, which is built on the idea of selling into market niches because of the market power of firms arising from product differentiation and comparative advantages internally created by the firms.

Caveats on IIT:

This study has emphasized that IIT is a function of firms responding to increased competition by increasing their degree of specialization and scale through exports. It has also shown IIT to be extensive based on the traditional Grubel and Lloyd index as the basis for measuring it. However, evidence was found that to some extent the index overstates the extent of IIT when it is measured at the level of the industry. Further disaggregation of the data to the level of sectors of control within an industry indicates that

in some industries what appears to be IIT is a result of combining two different types of inter-industry trade. The foreign sector is prone to be import-oriented, especially in its wholesale activities, while the Canadian sector of control is prone to be specialized in exports of related goods. The aggregation of these two different activities across the sectors of control gives the appearance at the level of the industry of two-way trade in similar goods by firms in the industry when in fact the firms are specialized by type of trade. The use of the MIND indices in this study reduced this problem to some extent in the analysis of the data. But, other studies have not done so and consequently they may have biased upward their estimates of the extent of IIT in Canadian trade data.

The evidence presented earlier in this study also suggests that IIT in major products is not as widespread as other studies have indicated for Canada. It is even less widespread in the Canadian sector of control than in the foreign sector (Table 4-31). However, the extent of IIT is increased if imports of components and minor product lines are taken into account (Table 4-32). Nevertheless, there is still considerable room for increases in scale by the smaller Canadian manufacturers and increases in specialization by the larger ones. These adaptations, achieved by increased contracting-out and exports, would lead to further increases in IIT. Many firms across a wide range of industries have still to adjust to freer trade in this manner so that further increases in IIT are to be expected. That is, import propensities will continue to increase, as will export propensities, but this should not be grounds for concern. It is part of an adaptation process that must be entered into and attempts to prevent import penetration of Canadian markets will only retard the movement of the manufacturing sector to a more

competitive position that will create longer-term employment and incomes.

Overview of Trade Data:

Tables 4-7 and 4-12 provide an overview of the import data. The larger enterprises account for over two-thirds of imports. Also, excluding the auto industries, components and minor product lines account for about one-half of total imports by manufacturers, with the subsidiaries being responsible for almost seventy percent even though they account for only about forty-five percent of non-auto shipments (Table 4-8). The other half of imports are major product lines, with the subsidiaries again accounting for about seventy percent of them.

Table 4-6 provides an overview of exports. The subsidiaries account for a proportion more in line with their share of shipments. Only twenty percent are by enterprises that export only, with the balance of eighty percent by enterprises that both import and export their major product lines (i.e. that engage in two-way IIT). Both the small and larger enterprises in the Canadian-sector of control are engaged in trade as exporters only, but the small subsidiaries are virtually absent from this type of trade. The larger enterprises account for over eighty percent of manufactured exports and these exports represent about twenty-five percent of the shipments by these enterprises (Tables 4-6 and 4-11). It is interesting that in comparison to the export ratios of the subsidiaries, the larger Canadian-controlled enterprises do not appear to be hampered in their sales into export markets, but the small ones are, based on their much lower comparative ratio of exports to shipments.

Tables 4-3 and 4-4 show that over eighty percent of manufacturers are small and Canadian-controlled (excluding the double-count created by trade groups 1 and 5 that import only). They account for only about ten percent of manufactured shipments. They also have very little involvement with international trade. These are the firms most likely to be high-cost and vulnerable to import competition. Some of them enjoy natural protection in the form of freight-cost advantages and local-purchase preferences and will continue to exist because of this protection. But most of them could benefit from increased scale through export sales to make them competitive. However, most of them are incapable of making the transition from suppliers to local and regional markets and growing into larger, cost-competitive, export-oriented firms. Many of them are bound to exit from their industries over time for lack of competitiveness, although most will likely be replaced by new entrants.

It is these smaller firms, however, that in total have created most of the growth in employment over the last decade. Further, it is these firms that offer the largest opportunity for increased exports, income and employment. It is difficult to see how policy can be used to identify the winners ahead of time in order to promote their growth. For this reason perhaps all that can be done is to ensure there is a favourable cost environment that will allow the winners to grow and succeed along with an information and management education programme that would reinforce the point that the longer-term success of these smaller firms depends upon them becoming specialized exporters.

In the case of the larger enterprises, there is one group that is not

extensively involved in international trade, although their number is small. They are the firms in trade groups 4 and 8 that neither export nor import. The subsidiaries in this group are about twice as large as the Canadian-controlled firms which, along with the access they have to the knowledge and expertise of their parents and affiliates, may give them a cost advantage over their Canadian-controlled counterparts in terms of economies of scale at the plant and firm level. The Canadian-controlled firms could overcome this cost disadvantage by increasing their scale through specialization and exporting. Further, the firms in both sectors of control associated with these trade groups could do so in order to overcome any product-specific cost disadvantage they might have with respect to competition from imports.

Tables 4-29 and 4-30 show that on a cross-section basis for the trade in major products of the IIT industries, there is a relatively high R^2 and slope of correlation between the import and export propensities. That is, as import propensities increase across these industries, so also do the export propensities. These results are supportive of the hypothesis that firms engaged in IIT do tend to move resources into the production of exportables and rely on imports to replace the production of products and components that have been displaced as the firms specialize. This resource reallocation is largely within the firms and the industries. However, this is not the case for the non-IIT industries. In these industries, the firms tend to be specialized in either imports or exports on an inter-industry basis and any increase in exports would have to be accomplished by drawing resources from outside the industry while resources released from any increase in imports (relative to market size) would release resources to other industries. But,

since a high proportion of Canada's international trade in manufactured products is associated with the IIT industries and firms, especially the subsidiaries, the transition to freer trade for Canada has probably been easier than it would have been had the resource reallocation involved with the adjustment been mainly inter-industry in nature.

This is not meant to suggest that the transition to increased specialization and scale through increased contracting-out and exports will be easy. The automobile industry is a case in point. The movement toward increased productivity in the last few years as a result of increased competition has forced the producers to reallocate resources internally into specialized production facilities and to engage in greater contracting-out to efficient suppliers. Some auto workers that were laid-off will never be reemployed in the industry and they may have to be retrained and seek opportunities in other industries. But, many of the workers have been continuously employed in the industry as it went through the adjustment period and others have been reemployed as the firms became more competitive. It would have been much more difficult had all these workers been required to seek employment in other industries that were internationally competitive if the auto industry were abandoned in line with the principles of the HOS model of inter-industry trade.

One of the policy implications of this is that the subsidiaries should be encouraged to seek world product mandates and plant specialization agreements with their parents based on some source of comparative advantage in the domestic firms, rather than having them abandoned on the grounds they are no longer competitive. This is particularly appropriate in the case of

the small subsidiaries that are continuing in their traditional role as unspecialized, tariff factories even when the trade environment has changed and this role is no longer justified. Also, the small Canadian-controlled firms should also be encouraged to engage in more contracting-out to efficient suppliers at home and abroad and to export more.

It is clear then, based on the data from earlier studies and this one, that it is the larger enterprises in both sectors of control that account for the major portion of the international trade in manufactured products (excluding imports of manufactured goods by non-manufacturers in the wholesale sector). These larger enterprises, while representing only five percent of the total number of manufacturing firms (Table 4-4), account for over fifty percent of the shipments of manufactured products. They are extensively involved in the international trade of their major product lines on a two-way-flow basis consistent with IIT. This suggests that both sectors of control are responding in a major way to the changing trade environment through increased scale, specialization and export activity. However, there are a significant number of firms, particularly in the Canadian sector of control and the smaller ones in both sectors, that are not involved in trade at all. It is these firms that are most vulnerable to increased competition. In terms of the distribution of the types of trade, the subsidiaries are relatively more involved than the Canadian-controlled firms in one-way trade as importers of components and minor product lines from affiliates and third-party suppliers, while the Canadian-controlled firms are relatively more involved than the subsidiaries in one-way trade as exporters. But, the bulk of international trade is by the larger firms in both sectors of control and it is largely of the IIT type.

Scale and Specialization (Horizontal and Vertical):

Small enterprises, even if they are specialized, suffer from the cost penalty of lack of scale. Large-scale firms can also have significant unit cost disadvantages if they achieve their larger size by increasing their diversity through broadening the number of products and product variations they manufacture as well as the number of components they produce internally, rather than purchasing these items from suppliers. However, they do benefit to a greater or lesser extent depending upon their size, from scale economies at the level of the plant and firm. But, the product-specific diseconomies of scale associated with diversity can be substantial. In an era of increasing competition, it is also possible that firms would be led to increase their diversity. Their market shares could decline, which would cause their plant utilization levels to decrease. This would create an incentive for the firms to fill-up their capacity by taking on the production of additional products and components. The evidence from this and other studies indicates all these factors were at work in the 1970's.

For instance, there is evidence from this study and others that the subsidiaries, while initially more specialized in the early 1970's, are no longer so compared to their Canadian-controlled counterparts. (5-1) Traditionally, the subsidiaries imported minor product lines and components along with some major lines from affiliates for which there was a small domestic demand and manufactured in Canada the major products that had a larger market demand. Consequently, they were diverse in their wholesale activities (along with having high import propensities for components) but more specialized in production than their Canadian-controlled competitors. The subsidiaries had a competitive advantage by being able to offer a wide

product line to meet the needs of their customers without incurring the same level of product-specific cost disadvantages as their Canadian-controlled competitors who had to produce these items internally or else acquire them from Canadian suppliers at high cost because of the small scale at which they could be produced in Canada.

However, the data from this study indicates that the subsidiaries have increased their level of diversity over the late 1970's (Table 4-37), perhaps because they continued as tariff factories when this was no longer appropriate, lost market share to competitors and attempted to offset the consequent decline in plant utilization by contracting-in the manufacture of products and components. They are no longer more specialized in production (and may now even be more diversified) than their Canadian-controlled counterparts and also continue with high levels of imports as wholesalers of finished goods and consumers of components. It is to be expected the subsidiaries would increase their imports of finished goods from affiliates as long as they continue as inefficient tariff factories since this would be one way of remaining competitive.

Other evidence from this study is also consistent with the conditions outlined above. Firms in the Canadian sector of control that are specialized as exporters (i.e. in non-IIT industries) and those in both sectors engaging in two-way trade (i.e. in IIT industries) increased their scale more than the subsidiaries engaged in one-way trade (Table 4-33). In other words, the subsidiaries in the non-IIT industries, and in some cases in the IIT industries, that are continuing as import-oriented tariff factories have not had the growth that the firms in the IIT industries or of the

Canadian-controlled firms in the non-IIT industries that are specialized as exporters only.

There is also evidence the Canadian-controlled firms are more specialized in the products they manufacture (Table 4-34), especially for the firms in the non-IIT industries where they tend to be specialized as exporters only (Table 4-35). Tables 4-16 and 4-19 also show, at least for the small firms, that the Canadian-controlled enterprises are more specialized than the subsidiaries.

Generally, the evidence is that the small firms are more horizontally specialized than the larger ones and this applies to both sectors of control (Tables 4-16 and 4-19). Further, the Canadian-controlled firms increase their horizontal diversity more than their counterpart subsidiaries as they become larger. The net result is that there is no difference in the level of horizontal specialization in production between the sectors of control for the larger enterprises. The diversity in exports reflects these patterns of horizontal diversity in manufacturing between the sectors control and size classes (Tables 4-12, 4-17 and 4-19). That is, the small Canadian-controlled enterprises are more specialized than the subsidiaries in what they export, the large enterprises in both sectors of control are more diverse than the small ones and there is no difference in export diversity between the sectors of control for the larger enterprises. In other words, the small firms probably suffer from scale diseconomies but not product-specific diseconomies. However, the larger firms probably suffer from product-specific diseconomies, but not scale economies to the same extent as the small firms.

There is some evidence, although at a lower level of statistical significance, that the subsidiaries in the IIT industries increased their level of wholesale activities between 1974 and 1979 (Table 4-36). This is consistent with their greater involvement in IIT and as wholesalers for their affiliates. It is also consistent with them not adapting as quickly to the changing trade environment as the Canadian-controlled firms and having to increase their imports of products from affiliates in order to remain competitive. While they are significantly more diversified in their wholesale activities than their Canadian-controlled counterparts, it is difficult to make a comparison of this with the Canadian sector of control because much of the wholesale activity on imported goods by Canadian-controlled firms is undertaken in the wholesale sector. In this study these wholesale activities were not integrated with the import data for manufacturers. It is also possible the Canadian-controlled firms increased their wholesale activities over the 1970's as they became more involved with IIT.

In summary, it appears the subsidiaries are no longer more specialized than the Canadian-controlled firms in their manufacturing activities, either horizontally or vertically. In fact, the subsidiaries may even have increased their degree of vertical diversity which in the longer-run would increase their costs and make them even less competitive. This type of response is perverse and would be harmful to Canadian incomes and employment. However, this could be a temporary situation until the subsidiaries adjust their role in Canada and move from being just tariff factories to more specialized and competitive manufacturers. Further research needs to be done on this issue to establish in which industries, and why, the subsidiaries

are engaging in this behaviour and whether or not it is short or longer-term behaviour. The subsidiaries also seem to be increasing their wholesale activities but it is difficult to make a definitive statement on this until Statistics Canada provides comparable data on imports by wholesalers that is properly integrated with the manufacturing sector.

The overall impression gained from the data is that, relatively speaking, the firms in the Canadian sector of control are responding more appropriately than the subsidiaries to the changing trade environment by increasing their degree of specialization and scale. This has resulted in a higher growth rate in exports over the 1970's for them than for their counterparts in the foreign sector of control. But, given the lack of widespread IIT, the large number of small manufacturers and the relatively high degree of diversity by the larger firms in both sectors of control, there is still considerable room for increased scale, specialization and IIT.

Import and Export Propensities:

The subsidiaries have large wholesale activities, even though they are primarily manufacturers, because of their access to the efficiently manufactured products of affiliates. They also contract-out the production of components to both affiliates and third-party suppliers in other countries because of the relatively greater access they have to these efficient sources of supply. The import propensities should be even greater for the small subsidiaries because their scale of production in Canada prevents them from being efficient producers of as many finished goods and components as the larger subsidiaries. Consequently, they would have a higher propensity to use efficient foreign suppliers. Also, compared to the small

Canadian-controlled firms, their association with larger affiliates and parents in other countries raises their awareness and ability to take advantage of low-cost suppliers outside of Canada.

The greater involvement of the subsidiaries in wholesale as well as contracting-out activities would result in them having import propensities for major products, as well as components plus minor products, that would be greater than for the Canadian-controlled manufacturers. However, the larger Canadian-controlled firms should, because of their larger size, be as aware and able as the subsidiaries to take advantage of efficient suppliers and more than the small Canadian-controlled firms. Consequently, the larger Canadian-controlled firms should have higher import propensities for components than the small firms in the Canadian sector of control and ones that are not substantially different from those for the subsidiaries.

It would be expected that a significant number of subsidiaries, especially in the small size class, would be in trade group 1 ("M only"). This is because, for many of them, their original mission was to be a small tariff factory that manufactured just a narrow range of the major product line for sale into the small domestic market. Consequently, they would have high import propensities for components and minor product lines since their small size would not allow them to be as efficient as their foreign affiliates or third-party foreign suppliers who would have larger rates of output and total cumulative volumes. Similarly, domestic suppliers would also be high cost for the same reasons. Consequently, their high costs of production on major products would prevent them from being exporters and their dependency on foreign sources for low cost components and minor

products would make them importers only on an extensive basis. Tables 4-3, 4-4 and 4-7 provide support for these conclusions.

These hypotheses are generally supported by the evidence from this study as can be established by reference to Tables 4-12, 4-17, 4-16 and 4-19. The value of imported components plus minor product lines, as a ratio of shipments, that are shown in the Tables does not vary across the size classes in the foreign sector of control. However, the value of major product lines imported as a ratio of shipments does and it declines as the subsidiaries become larger. This indicates that the subsidiaries internally produce relatively more of their major product lines as they become larger. There is an incentive as the subsidiaries become larger to fill-up their plants with products that displace their imports of finished goods for resale. However, this could add to their unit costs since it creates product diversity in the plants. But, they do not undertake to acquire domestically or produce internally relatively more of their minor product lines and components. Instead, they continue to use foreign sources of supply for them. It may be that Canadian suppliers are too high cost, due in part to their small size and diversity, so that it is not beneficial to switch purchases for components from foreign to domestic sources of supply.

The change in import propensities by the subsidiaries as they become larger does not apply to their Canadian-controlled counterparts. The Canadian-controlled firms have a small (and insignificant) import propensity for major products and it does not vary as they become larger. But, their import propensity for components and minor product lines does increase from virtually nothing for the small enterprises to about nine percent of

shipments for the larger ones, which is only about one-quarter less than for the larger subsidiaries. This suggests the Canadian-controlled firms purchase relatively more components from foreign suppliers as they become larger, mainly at the expense of domestic suppliers. Clearly, there is a significant difference in the purchasing practices between the smaller and larger Canadian-controlled enterprises. It appears the larger Canadian-controlled firms engage in more efficient search procedures for efficient suppliers on an international basis than do the small ones. It also implies that Canadian suppliers are not as competitive as foreign ones because the larger firms, who would be expected to be more efficient and internationally oriented in their search procedures, displace domestic purchases with foreign ones once they start to make inter-country price comparisons. However, they continue to manufacture their major product lines in Canada.

What emerges then, from the import data, is that the Canadian-controlled firms, especially the smaller ones, do not engage in adequate search procedures for low-cost sources of supply internationally as much as might be desired. This could harm their competitiveness if they are tied to high-cost domestic suppliers or internal sources of supply. On the other hand, given the changing trade environment which makes tariff factories less relevant, it appears the subsidiaries, especially the smaller ones, could undertake to source more of their requirements for components and products domestically.

The subsidiaries have significantly higher import propensities for major product lines than their Canadian-controlled counterparts in the IIT industries, but not for the non-IIT industries (Tables 4-24 and 4-25). This

reflects their wholesale activities on behalf of affiliates that has no counterpart in the Canadian-controlled manufacturers, as well as their more extensive involvement in two-way trade with affiliates. The small subsidiaries have significantly higher import propensities for minor product lines and components in both the IIT and non-IIT industries. But, there are no significant differences for the larger enterprises between the sectors of control on the use of foreign suppliers for components and minor product lines. Indeed, the propensity of the larger Canadian-controlled firms for components appears to be somewhat higher than for the larger subsidiaries. The net result is that for total imports, the difference between the sectors of control in their import propensities is due almost entirely to the larger wholesale activities of the subsidiaries.

If the trade data were adjusted to bring the imports by Canadian wholesalers back into the manufacturing sector there probably would be no difference between the sectors for their total import propensities. Further, in the case of the smaller enterprises, part of the difference between the sectors of control in their import propensities for components could be explained by the allocation methods used in collecting the data by which some imports of the larger subsidiaries were allocated to the small size class. This would also account for the marginally lower import propensities of the larger subsidiaries in comparison to the propensities of the Canadian-controlled firms. It is reasonable to conclude, therefore, that for the larger enterprises that are responsible for the major portion of imports, there is no difference between the sectors of control in the import propensities for components and minor product lines. This is a result, apparently, of the larger Canadian-controlled enterprises being aware of more

efficient sources of supply internationally and substantially increasing their use of foreign suppliers as they become larger.

The export propensities of the Canadian-controlled enterprises in IIT industries, as well as those in non-IIT industries who are specialized in one-way trade as exporters, increased significantly between 1974 and 1979 (Table 4-21). The export propensities also increased significantly for the subsidiaries in the IIT industries, but declined for those in non-IIT industries. However, in the IIT industries, the Canadian-controlled firms started from a lower level of export performance in 1974, increased, it more strongly than the subsidiaries and by 1979 had caught-up to them. This is consistent with the Canadian-controlled enterprises adapting to the changing trade environment more quickly than the subsidiaries, as has been discussed above in relation to changes in scale and specialization between the sectors of control over the same time period. It also confirms at a more general level the findings of a recent study based on a small sample of firms. (5-2)

The information provided by Tables 4-27 and 4-28 confirms that, with one exception, the export propensities in 1979 were not significantly different between the sectors of control no matter how the data are partitioned between trade groups (i.e. "X only" or "Both X and M"), trade categories (i.e. IIT or non-IIT) or size classes. The one exception is for the small enterprises in the IIT industries that are associated with trade groups 2 and 7 (i.e. "X only"). In this case the subsidiaries have the higher propensity. The export propensities for the small subsidiaries are double those for the Canadian-controlled firms (Table 4-11) in the same size class. But this exception represents a very small proportion of total exports and probably

reflects the advantage the subsidiaries have of being able to utilize the marketing organizations of their affiliates to access export markets and also a comparative advantage by the subsidiaries (perhaps related to the intensive use of a resource) that makes them efficient suppliers to affiliates.

Since the export propensities do not differ between the sectors of control for the larger enterprises, this suggests that the larger Canadian-controlled enterprises do not have any greater difficulty accessing foreign markets than do the subsidiaries. The policy implication of this is that size is important in achieving success in export markets and that the small firms would benefit from combining into consortia to market their products internationally.

Tables 4-29 and 4-30 provide information on comparisons within each sector of control of the import and export propensities. The subsidiaries in IIT industries do not have significantly different import and export propensities for their major product lines. However, they are different within the Canadian sector of control with the import propensities of these firms being significantly lower than their export propensities and than the export propensities for the subsidiaries. This reflects the larger wholesale activities of the subsidiaries. The larger enterprises in both sectors of control that are in non-IIT industries tend to be export-oriented with significantly lower import propensities than the enterprises in the IIT industries. The small subsidiaries in the non-IIT industries are import-oriented which is probably due to them being mainly tariff factories.

Future Areas of Research:

There are two recommendations related to data collection. One is that Statistics Canada should maintain on an ongoing basis the matching of imports with exports as was done for this study. The other is that the data should consistently treat the wholesale activities between the sectors of control. It is clear that for 1979 the import and export propensities did not differ significantly between the sectors of control for the bulk of Canadian international trade in manufactured goods, once the data are consistently treated. Yet, Statistics Canada, because it did not relate imports to exports and properly treat the difference in wholesale activities, has published information that leads to the impression that the subsidiaries have significantly higher import propensities without compensatingly higher export propensities. This important point cannot be made without examining imports and exports together and on a consistent basis of calculation.

There are some areas where additional research is needed to clarify the meaning and interpretations of the data that were presented here. The issue of transfer pricing and efficient purchasing practices generally in both sectors of control is one area. The lower export propensities of the smaller firms in the Canadian sector of control is another area that needs research in terms of how marketing practices and organizations affect the ability of these firms to export. A major area where further research is needed relates to the generally slower response noted here and in other studies of the subsidiaries to the changing trade environment. They had smaller increases in their export propensities, in their degree of contracting-out, and in their scale and specialization. This may only be a temporary problem arising from short-term rigidities in the MNEs such as their greater financial

staying power which gives them time to delay responding, the inability of local management to identify the need for change, and rigidities within the MNEs that retard their ability to change quickly. But, their slower response is a matter of concern and warrants further investigation.

It should be recognized that in 1974, the subsidiaries were well ahead of their Canadian-controlled counterparts in terms of export propensities, degree of contracting-out, scale, specialization, and IIT. But, the Canadian-controlled firms caught-up to the subsidiaries on these activities over the late 1970's. Also, there is some indication that the larger subsidiaries engaged in a perverse type of behaviour by contracting-in the production of components and products. This is consistent with them being tariff-factories rather than with them being competitive manufacturers and adapting by increasing their degree of specialization and scale.

The small enterprises in the Canadian sector of control suffer from the disadvantages of small scale and many of them are not involved in any way with international trade either as importers of efficiently-produced components or as exporters of products. They have higher unit costs than counterpart subsidiaries of the same size which suggests their disadvantages are related to firm-level diseconomies in the area of management expertise as well as plant and product-specific diseconomies that affect productivity and the absorption of fixed costs. They tend to be inefficient, as a result, and inward-looking. Yet, these small firms account for a significant share of output by the Canadian sector of control and the growth in employment may lie largely with them in the future. Policies directed at informing and educating management could be helpful in improving their competitiveness and

growth as exporters. For instance, they could combine their resources within an industry to develop centralized research facilities. Also, they could become more involved in management training programmes, foreign sourcing and international trading houses.

It is important to emphasize that about three-quarters of exports are by the larger consolidated enterprises and the exports represent one-quarter of their output. Their export propensities are two to four times those of the small enterprises. Scale and specialization are important to productivity and export performance. The smaller enterprises need to become more outward-looking and all enterprises need to consider expanding their specialization and scale through exports and increased contracting-out. The net result will be improved cost and productivity performance. There will also be increased IIT which will cause imports to increase. But, at the same time exports will increase to the overall benefit of Canadian incomes and employment in the manufacturing sector.

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