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THE EXTENT AND DETERMINANTS OF INTRA-INDUSTRY INTERNATIONAL TRADE IN CANADA: AN EMPIRICAL INVESTIGATION

by

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ABSTRACT

The purpose of this thesis is to measure the extent of "Intra-Industry International Trade" (IIT), in Canada's foreign trade, to present an economic analysis of the forces which influence foreign trade patterns, and to test empirically various country-specific and industry-specific hypotheses concerning the determinants of intra-industry trade.

The measurement has been performed from a number of perspectives. First, the intensity of intra-industry trade has been computed across countries for each Standard International Trade Classification (SITC) category at different levels of aggregation for the years 1962, 1971, and 1980. Second, various measures have been applied across countries for selected years. Third, the strength of intra-industry trade has been identified across industries at different points in time. Finally, trends in Canada's intra-industry trade have been examined, both across countries and across industries, for the years 1962-80.

Four alternative measures have been employed. They are: (a) the Grubel and Lloyd (G-L) unadjusted index; (b) the G-L adjusted index; (c) the G-L measure of the level of aggregation; and (d) the Aquino index. These IIT measures have been used as dependent variables in regression analysis in order to test various country-specific and industry-specific hypotheses.

The main hypotheses are that intra-industry trade intensity increases with a decreasing development stage differential, market size differential, tariff barriers, distance, cultural

and language differentials between trading partners; and an increasing level of development, average market size, product differentiation, economies of scale, productivity, human capital intensity and level of aggregation.

The results reveal that across countries the extent of intra-industry trade in Canada is remarkably high in trade with developed countries, in particular with the U.S.A., the EEC, and the OECD countries. Across industries, values of IIT indices above 70 percent at the 1-digit and over 50 percent at the 3-digit levels are obtained in SITC 5 through 8 (Manufactured Products). In addition, strikingly high magnitudes are observed even in the SITC 0-4 divisions. Temporal analysis indicates that a substantial growth in IIT has taken place over the years 1962-80, both across countries and across industries, but cyclical variations are also noticeable. Furthermore, for many countries IIT intensity has tended to decline through time. Finally, the strength of IIT is preserved at each level of disaggregation, suggesting that IIT is in fact, a real phenomenon and not a mere "statistical artifact."

The statistical and econometric analyses generated strong evidence in support of major hypotheses in an application to Canada. Product differentiation, economies of scale, the level of developtment, average market size, market size differentials, and the distance between trading partners are found to be statistically significant determinants of IIT.

DEDICATION

DEDICATED TO THE MEMORIES OF

MY FATHER, THE LATE S.A. SUBHAN

MY UNCLE, THE LATE S. IMAMUL HAI

AND

MY MOTHER, S.H.N. BANO

AND

MOST HUMBLY TO PROFESSOR HERBERT G. GRUBEL

FATHER AND UNCLE, MAY YOUR SOULS REST IN PEACE.

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I wish to extend my deep gratitude to Professor Herbert G. Grubel, my thesis senior supervisor. The thesis could not have been completed without the invaluable advice, acute criticisms, and extreme encouragement provided by him during all stages of this research.

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Countless others have also contributed, not least the following: the staff members of the External Trade Division, the Input Output Division of Statistics Canada, Dr. Satish Kumar, Jawaharlal Nehru University; Dr. I.Z. Bhatty, National Council of Applied Economic Research, New Delhi; Shri Sisir Kumar, former M.P. (Indian Parliament); Dr. S. Chandra Sekhar, Andhra University; I owe a great debt to my colleague, Dr. M. Hyuha, University of Dar Es Salaam, who helped me during all stages of development of the thesis. In addition to this I would like to express my gratitude to Dr. Don Drinkwater and Mrs. Nellie Tabbada, without whose expertise I could not have performed the necessary computations (which involved over two hundred thousand records on magnetic tapes). I also extend my thanks to the staff of I.M.C., in particular to Mr. Fred Kyba. My sincere thanks are due to Professor Peter Lane of University of Waikato, New Zealand, who read an earlier draft of my thesis. His valuable advice and editorial comments greatly assisted me. Most of the analytical work on this thesis was carried out during the period that I was a lecturer at the University of Dar Es Salaam, Tanzania. My thanks are due to the Faculty and Staff, Department of Economics, University of Dar Es Salaam.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 The Phenomenon of Intra-Industry International Trade (IIT)

International trade and production statistics show that in the post World War II period, world trade has grown faster than the real output of the world economy, especially among the developed countries. World trade statistics also reveal that trade has been biased towards manufactured goods relative to other commodities. These statistics of foreign trade flows indicate that many commodity groups appear both in the imports and exports of a country, within the same industry. This phenomenon of simultaneous export and import by a country of products in the same industry has been defined as "Intra-Industry International Trade," "Two-Way Trade," or "Trade Overlap." The emergence of intra-industry trade has attracted increasing interest from economists, in the form of both theoretical and empirical work.

The interest in the phenomenon of intra-industry trade has arisen primarily because a large and growing part of international trade cannot be explained by traditional theory. This is so because the pattern of international specialization is usually explained in terms of differences in production patterns between trade partners. These traditional theories predict that given certain underlying assumptions, a country will not simultaneously export and import products in the same industry because "Nations trade with each other for fundamentally the same reasons that individuals or regions engage in exchange of goods and services to obtain the benefits of specialization" (H.E. Kreinin, 1979, p. 214). This statement reveals the essence of why nations trade. Essentially, the "benefits of specialization" resulting from trade arises from two sources. First, the Ricardian theory suggests that countries have inherent technological differences. All countries gain from trade if each country specializes in products in which it has a relative cost advantage and exports the excess products of those industries. Secondly, differences in factor endowments, popularly known as the Factor Proportions Theory or the Heckscher-Ohlin-Samuelson Model (H-O-S), focus attention on relative factor endowments as the basis for comparative advantage and as the main determinants of trade patterns. The theory, then, predicts that all countries gain from trade if each country specializes in the production of those products that use intensively its relatively abundant productive resources, and exports the excess products of those industries. Both theories predict the emergence of inter-industry trade.

An interesting aspect concerning intra-industry trade (IIT) is that the intensity of IIT is more pronounced among developed countries, which have similar demand patterns, homothetic tastes, technologies and relative endowments of productive factors. They also seem to share similar cultural, language, and other socio-institutional attributes.

The universal validity of the traditional theory has been questioned, both on theoretical and on empirical grounds. On the theoretical side, the traditional supply oriented factor proportions theory seems to be inadequate in its assumptions of perfect competition, constant returns to scale, and homogeneous products. Empirical evidence, on the other hand, shows that trade has developed more rapidly among those countries which tend to have similar factor endowments, similar levels of development, and the same demand and preference conditions. Evidence also does not confirm that input-ratios vary widely among similar products but, rather, shows that factor intensities tend to be similar within industry categories. As Richard E. Caves noted:

> Since World War II tariff barriers have been reduced substantially, and international trade (specially in manufactures) has grown more rapidly than national production in the industrial countries. The European Community and lesser preferential arrangements have taken bold steps toward easing the economic barriers of national frontiers. The pervasive expansion of intra-industry trade shows that much of the enlargement of international commerce takes the form of increasingly fine division of labor within industries, rather than the sectoral specialization assumed in classical discussions of comparative advantage (Richard Caves, 1980, p. 113).

The empirical phenomenon of intra-industry trade has thus been used as the basis for new developments in international trade theory.

From a historical perspective, the notion of intra-industry trade is not new. It dates back to Hilgerdt (1935), Frankel (1943), and Hirschman (1945). Its systematic development, however, started with the studies of Verdoorn (1960), Linder (1961), Linneman (1966), Michaely (1962, 1964), Balassa (1961, 1971, 1979), Grubel (1967), Gray (1973, 1979), Grubel and Lloyd (1975), and Willmore (1979). These studies were stimulated by attempts to establish such forms of economic co-operation as the European Economic Community (EEC), the European Free Trade Association (EFTA), The Latin American Free Trade Association (LAFTA), and the Central American Common Market (CACM). More recent developments include the empirical studies of Pagoulatos and Sorensen (1975), Aquino (1978), Caves (1981), Loertscher and Wolter (1980), Bergstrand (1982), Toh (1982), McCharles (1983), Havrylyshyn and Civan (1983), and the theoretical underpinnings of Krugman (1981), Helpman (1981), Lancaster (1980), Brander (1981), Falvey (1982), Ethier (1982), and Helpman and Krugman (1984).

These studies provided a theoretical rationale for trade in the absence of differences in factor endowments, along with empirical tests of significance. One explanation for the emergence of IIT is that the products simultaneously exported and imported within an industry are close but not perfect substitutes. These products are differentiated, although they may be produced by essentially the same technique, within the same industrial process.

Research on IIT has been concerned with three basic issues. First, whether the existence of intra-industry trade is a real phenomenon of the modern world trade patterns or merely a "statistical artifact" due to "categorical aggregation" in the compilation of international trade statistics. There has been considerable debate on this issue with inconclusive results. Balassa (1967, 1971, 1979), Lancaster (1960, 1980), Hesse (1974), Grubel and Lloyd (1975), Aquino (1978), and Loertscher and Wolter (1980) argue that intra-industry trade is a stable characteristic of an industry, and, therefore, is a real phenomenon on both theoretical and empirical grounds. On the other hand, critics like Finger (1975b), Lipsey (1976), and Pomfret (1978) argue that intra-industry trade is mainly a statistical illusion. Doubt arises as a result of data compilation. It is maintained that the trade data are arbitrarily grouped in industry products that are produced using different input mixes and are not close substitutes.[1] These economists assert that intra-industry trade would disappear if narrower group definitions were used. While this seems to be a partially satisfactory explanation for the apparent contradiction of the one market one price principle, it probably constitutes a retreat from, rather than an indication of, the Heckscher-Ohlin hypothesis. If one is willing to accept increasingly narrow commodity definitions, it soon becomes almost impossible to relate comparative cost advantage theory to

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[1] This aspect is discussed in detail in Chapter Four.

any data currently available, and empirical testing becomes impossible without time consuming and prohibitively expensive collection of data. Furthermore, reducing the observed phenomenon of intra-industry trade would not remove the doubt which the initially observed intra-industry trade has placed on the factor proportions theory, unless one could also prove that factor proportions vary more within commodity groups than between groups. In order to clarify this doubt various attempts have been made to estimate the intensity of IIT at fine levels of disaggregation. Most of the empirical evidence and tests support the assertion that IIT is a stable characteristic of an industry and not a mere statistical illusion. The issue has been addressed in this thesis as well, and an attempt has been made to supplement empirical evidence in the context of Canada's foreign trade pattern. Different measures of IIT have been computed and analyzed. The empirical results are documented in Chapter Four. These results indicate the importance of intra-industry trade in Canada's total foreign trade.

The second issue arose with respect to the determinants of intra-industry international trade and comparative cost advantage. The unique determinant of comparative cost advantage within the conventional Heckscher-Ohlin-Samuelson (H-O-S) theorem is the price (cost) in production, given that this theory considers trade flows of homogeneous products. However, in the real world, large trade flows consist of differentiated products which are close, but not perfect, substitutes. Hence, price and cost differences are no longer unique determinants. The causes of international trade flows are: (a) the prevalence of increasing returns to scale in production; (b) trade liberalization efforts made under the auspices of the General Agreements on Trade and Tariffs (GATT) and through various bilateral trade negotiations, along with the formation of Customs Unions and Free Trade Zones; (c) product differentiation; and (d) the level of development and the extension of the size of the market through international trade, which offer more varieties of any given commodity than the domestic market in the absence of trade. As Linder observed:

> The almost unlimited scope for product differentiation ... real or advertised ... could, in combination with the seemingly unrestricted buyer idiosyncrasies, make possible flourishing trade in what is virtually the same commodity. Ships bringing European beer to Milwaukee take American beer to Europe (Linder, 1961, p. 102).

In this context, various theories regarding the determinants of intra-industry trade are discussed in Chapter Two.

A third issue is concerned with the empirical tests of various hypotheses derived from the theories of intra-industry trade. These hypotheses establish the relationship between intra-industry trade and various economic factors relating country attributes and industry characteristics. For instance, it is posited that intra-industry trade is an increasing function of a country's per capita income. From the industry point of view, it is argued that the higher the product differentiation coupled with increasing returns to scale, the greater will be the magnitude of intra-industry trade. Notable studies on this issue are those by Gregory and Tearl (1973), Pagoulatos and Sorensen (1975), Finger and De Rosa (1975), Loertschter and Wolter (1980), Lundberg (1982), Toh (1982), and Bergstrand (1982). Various testable hypotheses have been drawn from the emerging theoretical discussion in Chapter Five. The methodology involving the measurement of IIT has been analyzed in Chapter Three. Different values of IIT indices have been computed and examined in Chapter Four. These estimated values of IIT indices have been used as dependent variables in relation to the determinants of IIT. The empirical tests of these hypotheses are presented and examined in Chapter Six. These results indicate the importance of intra-industry trade in Canada's total foreign trade, both across countries and across industries.

In this study, all three basic issues are examined and an effort has been made to provide further evidence on the extent and the determinants of the intra-industry trade specialization in Canada.

1.2 Purpose of the Study

The main purpose of this study is to measure the quantitative importance of intra-industry trade in Canada's total trade and to utilize these measures as an input for an empirical test of the determinants of intra-industry trade as developed by Lancaster, Gray, Caves, Grubel and Lloyd, Pagoulatos and Sorensen, and Loertscher and Wolter. Available evidence suggests that no attempt has previously been made to test these hypotheses in the Canadian context.

More precisely, this study has three objectives:

1. To measure the magnitude of intra-industy trade employing different indices suggested in the literature. This involves defining an appropriate measure of intra-industry trade, as well as gathering data and computing its values. Estimation has been done as follows:

   A. Across Countries

      1) Total Analysis: this considers intra-industry trade between Canada and the rest of the World.

      2) The Country Analysis: In this analysis, intra-industry trade is estimated for Canada in relation to each trade partner separately, for example, with the United States, Japan, EEC, etc. at each level of disaggregation.

      3) The Temporal Analysis: In this analysis, various indices of IIT have been measured through time for each SITC industry group with each specified partner country. Time series data have been employed for the period 1962-1980.

   B. Across Industries

      1) The Total Analysis: For this analysis, the estimation has been performed for all industrial groups summing across 29 countries.

      2) The Industry Analysis: For this analysis,

each product group is estimated separately.

3) <u>The Level of Aggregation</u>: In this analysis, IIT indices have been measured at various levels of disaggregation, ranging from 1-digit to 5-digit, in order to investigate the sensitivity of IIT with respect to the level of aggregation.

4) <u>Through Time</u>: In this analysis, each SITC group has been estimated for the selected years: 1962, 1966, 1971, 1976, and 1980. Time series analysis has also been performed using data for the period 1962-1980.

2. To analyze the determinants of intra-industry trade. The main objective here is to examine the effects on IIT of various economic forces. This analysis indicates to what extent country attributes and commodity characteristics determine the significance and magnitude of intra-industry trade, among countries and across industries. Factors that affect intra-industry trade are combined into the following groups:

   A. The level of economic development;

   B. The measure of market size;

   C. Variables related to product differentiation;

   D. Economies of scale variables; and

   E. Trade liberalization: nominal and effective tariffs.

3. To test hypotheses: Various country and industry-specific hypotheses have been tested in this study.

1.3 Testable Hypotheses

Country-Specific Hypotheses are:

1.3.1 Intra-industry international trade between countries is an increasing function of their market sizes.

1.3.2 Intra-industry international trade between countries is a decreasing function of the difference in their market sizes.

1.3.3 Intra-industry international trade between countries is an increasing function of their average level of development.

1.3.4 Intra-industry international trade is a decreasing function of the difference in their level of development stage. In other words, the more similar factor endowments, per capita incomes and similar demand patterns between countries, the higher would be the magnitude of intra-industry trade.

1.3.5 Intra-industry trade between countries is an increasing function of trade liberalization or a decreasing function of trade barriers and transport costs.

1.3.6 Intra-industry trade between countries is enhanced if the trading partners share the same culture and language.

Industry-Specific Hypotheses are as follows:

1.3.7 Intra-industry trade is an increasing function of the potential for product differentiation and economies of scale.

1.3.8 Intra-industry trade is an increasing function of the degree of aggregation.

1.3.9 Intra-industry trade is a decreasing function of transaction costs.

1.3.10 Intra-industry trade is a decreasing function of factor intensity.

1.3.11 Intra-industry trade is an increasing function of human capital intensity and productivity.

The above propositions are testable hypotheses, If intra-industry trade is, indeed, a real phenomenon and is influenced by the above factors, it should be possible to demonstrate this with empirical evidence, in order to determine how well these factors explain a country's foreign trade pattern.

1.4 Methodology

Other than qualitative analysis, statistical and econometric techniques are used to analyze the data. The econometric analysis involves multiple regression analysis aimed at supplementing the statistical analysis.

1.5 Data Used and Their Sources

At the outset, it appeared extremely difficult to undertake this kind of research because of the lack of suitable data in the required format. The commodity trade statistics, published by the United Nations and OECD, contain data which meet only some of these needs. These data are compiled and published according to the United Nations' "Standard International Trade Classification" (SITC). In these publications, the lowest level at which data are available for many countries is the 3-digit group level. At this level, all SITC commodity groups which enter into international trade flows are compiled into 182 commodity categories plus one additional category, entitled "Commodities and Transactions Not Classified According to Kind." Data need to be compiled at an adequate level of disaggregation to derive indices which would be comparable between countries and which would satisfactorily measure the concepts being tested by the hypotheses. Since no attempt has been made before to test the significance of IIT at different levels of disaggregation and for both industry and country analysis in the Canadian context, this study focuses on these aspects of Canada's trade pattern. However, data as noted above are simply not available in the desired form. Hence, much time and resources have been spent in search of data. The data used in this study are mostly from magnetic tapes provided by the Department of Industry, Trade and Commerce, Government of Canada, and the External Trade Division and the Input-Output Division of Statistics Canada. The numerical values of the foreign trade flows between Canada and its trade partners included in the sample are measured in thousands of U.S. dollars (current). The 1962 to 1978 data are based on the SITC Revision I basis. The 1979 and 1980 data packages are based on the SITC REV II.[2]

After having received the magnetic tapes, various programs were used for data processing, and for the estimation of intra-industry trade indices.

The product differentiation variable has been calculated on the basis of value and quantity data given by the External Trade Division, for the years 1971, 1976, 1980, and 1981.

The statistics for Gross National Product (GNP) and Gross Domestic Product (GDP) are in billions of dollars, at current prices. These have been obtained from various issues of the "International Financial Statistics," of the International Monetary Fund (IMF). These figures are reported by country in domestic currencies. They were converted to U.S. dollars employing existing exchange rates documented in the same publication. In some cases data have been taken from the United Nations Statistical Year Book and the "World Tables" (1980, 1983) published by the World Bank.

The scale economies variable and the data on sales-advertisement ratios were taken from Caves et al (1977, 1980). Value added, emmployment wages, and capital stock data were

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[2] The SITC Classification has been revised twice, REV. I (1960) and REV. II (1975).

obtained from Statistics Canada. These data were sometimes pooled in accordance with the SIC and SITC Classifications at the 3-digit levels. A concordance between SITC and SIC was made for this purpose.

Tariff variables have been compiled from data provided by the External Trade Division on a 3-digit SITC-SIC basis, and Wilkinson and Norries' (1975) estimated nominal and effective tariffs were also used.

CHAPTER TWO

DETERMINANTS OF INTRA-INDUSTRY TRADE: THEORETICAL FOUNDATIONS

There has been considerable debate on the economic analysis of the phenomenon of intra-industry trade. An interesting aspect concerning the explanation of intra-industry trade is that empirical studies have preceded theoretical considerations. It has often been pointed out in the literature that empirical work in this field has far outpaced theoretical development. As Tharakan (1983), put it:

> Although there was some amount of "patch work theorising" in this, together with the contribution of Gray (1973), ... and recent theoretical contributions of Lancaster (1980), Krugman (1981), and Brander (1981), the intra-industry trade has, by and large, remained an empirical phenomenon in search of a theory (Tharakan, 1983, pp. 2-3).

However, it has also been recognized that the economic analysis of intra-industry trade has come a long way since Verdoorn's (1960) seminal study. Remarkable extensions of the factor proportions theory have taken place since then. Kojima's (1964) study of the pattern of international trade among developed countries seems to have further stimulated the development of a "new philosophy" on the frontiers of trade. As he observed:

> A significant finding ... which presents opportunities for further inquiry is the rapid growth of horizontal trade of manufactured goods among highly developed, homogeneous and industrial countries. We need to uncover the forces underlying this conspicuous trend and define any new philosophy that may have evolved which is contrary to the traditional comparative costs theory (Kojima, 1964, pp. 16-36).

The significance of the above findings consisted of the fact that within the framework of the Heckscher-Ohlin theorem, there was no room for such simultaneous exports and imports by countries of products which are very close substitutes in consumption or in terms of factor input requirements in production. Economists, as usual, have different opinions. Scholars such as Balassa (1967, 1971, 1979), Gray (1973), Hesse (1974), Grubel and Lloyd (1975), Aquino (1978), Falvey (1981), Krugman (1981), Brander (1981), Krugman and Helpman (1984), and others, believe that no new theory is required to explain the phenomenon of intra-industry trade. Krugman pointed out:

> ... the case for an extended theory is stronger than the negative reason that factor proportions theory doesn't work, so that something else is needed. There is also a positive reason: a model which combines scale economies and factor proportions makes some substantive predictions which seem to be borne out in practice (Krugman, 1979, p. 14).

Corden (1979) has his own suggestions of redistributing the weight given to the existing theories with a down grading of the factor-proportions theorem. As Cordon observed:

> The recognition of the phenomenon of intra-industry trade has not given rise to any new theories of trade and has not required any new theories ... The empirical importance of intra-industry trade only affects the weight which is given to existing theories (Cordon, 1979, p. 10).

Finger (1975b) argues that "Trade Overlap" is consistent with factor proportions theory so long as factor input requirements vary more within product groups than between them. These divergent questions and views are examined in this chapter with the help of the existing trade theories.

Because of the substantial task that confronts a survey of the literature, the main strategy adopted in this chapter will be as follows. First, we shall summarize briefly those theories which have enjoyed some credibility as explanations of the determinants of intra-industry trade, but which are not central to the main theme of this research. Second, we shall review, in greater detail, those theories and empirical evidence which are crucial to the central themes.

The benefits of this approach are: (a) to acquaint readers with some idea of the type of problems the research examines, and (b) to familiarize them with those issues it ignores. This is so because some of the theories are closely interrelated and as such require more detailed explanations while others are quite straightforward and, therefore, need no further analysis. For example, the demand similarity model is based on a single conceptual argument, the demand determined goods characteristics.

Among various approaches available in the literature on international trade theories, the following will be reviewed in this Chapter: the Factor Proportions Theory or the Heckscher-Ohlin-Samuelson Models; the Model of Human Capital; the Demand Similarity Model or the Burenstan-Linder Approach; the Technological Gap Model; the Product Life Cycle Models; the Product Differentiation Models; theories of Scale Economies; and the theories of Tariffs and Exchange Rates.

2.1 The Factor Proportions Theory

The main developers of this theory are: Heckscher (1919, 1949), Ohlin (1933), and Samuelson (1948, 1949, 1953).[1] The theory is, therefore, popularly known as the Hechscher-Ohlin-Samuelson (H-O-S) theorem.

This H-O-S approach considers the capital labor ratio (factor intensity) as the essential industry characteristic and relative abundance of factor endowments as the country attributes which determine the direction and patterns of international trade. In other words, the H-O-S theory regards international differences in factor endowments as the basis for comparative advantage and as the main determinant of trade flows between countries. The theory posits that countries tend to export those products in which they enjoy comparative advantage resulting from abundance of certain factor endowments relative to their trade partners. The theory suggests that a country which is rich in capital endowment will export capital-intensive goods and those countries which possess abundant labor will export labor-intensive products. Michaely has given an excellent summary of the theory:

> Relative commodity prices are determined by the operation of a few elements within a general equilibrium system. These are simultaneous operations, but some of the inter-dependencies may be ignored, for simplicity. In each economy, four basic sets of conditions are given: tastes; ownership of production factors; physical endowment of factors; and the production functions.

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[1] Samuelson's studies have refined and enriched the traditional theory. In its original form, the theory is associated with the names of Heckscher and Ohlin.

> Income distribution in the economy is determined by the conditions of ownership of productive resources and by prices of these resources. Together with the prevailing tastes of individuals in the economy, income distribution determines the demand conditions for commodities. Demand for commodities implies demand for productive services; this demand combines with the physical endowment of factors of production to determine the relative prices of factors (namely, of productive services). Of the two variables, OHLIN and HECKSCHER believed that in international comparisons attention should be paid particularly to the latter: differences among countries in the availability of productive services weigh probably more heavily, in creating differences in factor prices, than differences in demand conditions for commodities. Finally, commodity prices are determined by factor prices and by the amount of each factor required for the production of each commodity; the latter is itself a function of factor prices, as well as of the production function for each commodity. The production function is the same for any given commodity all over the world ... provided, of course, that productive factors are defined in minute detail, so that the same term stands for exactly the same factor anywhere, and that all the factors are included in the function (Michaely, 1964, p. 530-531).

It is clear that, as opposed to the classical theory which stresses importance of international differences in production functions as an explanation of comparative advantage, the Hechscher-Ohlin formulation explicitly postulates the international identity of production functions (Bhagwati, 1974, p. 34). Thus, as a national attribute, the unique determinant of comparative cost advantage is international differences in factor endowments, and the non-reversible factor intensity is the essential characteristic of an industry.

The underlying assumptions of this model are:

1. Two countries, two commodities, two factors of production; products and inputs being indistinguishable by country of origin;

2. Pure competition in both product and factor markets;
3. Non-reversible and different factor intensities of the two commodities at all prices;
4. Identical production functions for each commodity between countries;
5. Linear homogeneous production functions (i.e., constant returns to scale and diminishing returns along the isoquants) in the production of each commodity;
6. Absence of production externalities (i.e., the output of each commodity depends only on inputs of factors which enter into the production process of that commodity alone), factor indifferences between uses, and identical factor quality between countries;
7. Perfectly inelastic factor supplies in each country, factors being completely mobile within countries but completely immobile between countries; and,
8. No trade barriers to impede trade flows between countries.

Under the above assumptions, the prediction of the Heckscher-Ohlin theorem is that a country exports (imports) that product which is relatively more intensive in the factor which is relatively more (less) abundant in that country.

There is a link to the discussion of the intra-industry trade phenomenon within the framework of the H-O-S theorem. Economists have divergent opinions on the issue as to whether, in the real world, the H-O-S model is incapable of explaining a large and growing part of international trade or if this phenomenon is consistent with the H-O-S theorem. Economists, like Lipsey (1976), Finger (1975), and Pomfret (1979), believe that the phenomenon of intra-industry trade, in addition to being at variance with the factor proportions theory of trade, is apparently contrary to the one market, one price principle. On the other hand, Balassa (1963, 1976, 1979), Grubel (1967), Grubel and Lloyd (1975), Gray (1973, 1979), Falvey (1981), and Krugman (1981), among others, claim that the observed phenomenon of intra-industry trade is not at variance with the traditional factor proportions explanation of trade patterns and specialization. They argue that it is simply necessary to relax some of the underlying assumptions of this theory. Once the assumptions are modified, intra-industry trade phenomenon could be explained within the H-O-S model. These divergent views can be summarized.

The assumption of linear homogeneous production function of degree one implies that with unchanged relative factor prices, an equal proportional increase (decrease) in two inputs will keep the input proportions the same and will tend to increase (decrease) output by the same proportion. If the products are homogeneous and prices in the two countries are identical, commodities will not be exported and imported simultaneously by the same country within the same industry. As such, intra-industry trade cannot emerge within this theory.

Nevertheless, if the assumptions of homogeneous products and constant returns to scale are relaxed, then the existence of intra-industry trade can be explained within the H-O-S theorem.

As Grubel states: "The solution to the inconsistency between the real world and the basic H-O-S model is to drop the assumption of constant returns to scale" (Grubel, 1981, p. 76).

The theories explaining the role of economies of scale are multi-faceted. It suffices here to examine one aspect of this issue. Grubel (1981), among others, attributes the economies of scale not to the optimal plant size, but mainly to the longer production run. It is asserted that, in the modern real world, economies of scale can arise if the industry reduces varieties and concentrates on the production of a few or even only one variety by each trade partner. In order that a country both export and import goods produced with identical capital/ labor ratios, there must be a difference in unit costs between the two varieties. For example, instead of six and four cylinder cars both being produced in the Canadian plants, six cylinder cars are manufactured exclusively by a Canadian firm for sale to the entire North-American market, while four cylinder cars are produced in the United States for the whole trade area. This would tend to yield substantial gains since benefits would accrue from a fall in costs per unit of output in both countries. In this situation, because of complete specialization, the Canadian production function for six cylinder cars can be described as more efficient than the U.S., and the U.S. production function with respect to four cylinder cars can be considered more efficient than the Canadian. Thus, Canada will export six cylinder cars and import four cylinder cars and *vice versa*. Intra-industry trade exists, albeit factor input mixes are the same. Hence, intra-industry trade can be explained within the H-O-S model. This can be further illustrated with the help of Figure 2.1.

Figure 2.1 exhibits a production frontier under the assumption of increasing returns to scale in the production of each model of automobiles. It is hypothesized that the average cost per unit of output falls as output increases (at least over a certain range of the supply curve). In the above case, if a Canadian firm produces at point M, the firm is producing both varieties of the automobiles X (six cylinder cars) and Y (four cylinder cars) and maximizing profits by satisfying domestic consumers' needs. However, there is no incentive for trade to open, because there exists a one to one correspondence between the two price ratios. On the other hand, at point N when the Canadian firm moves towards a complete specialization in the production of one of the two varieties, i.e., produces only six cylinder cars, X is relatively cheaper than Y, because of economies of scale, and the Canadian firm becomes more competitive trading at world price WW. The economy reaches a higher indifference curve at point N. Hence, the gains from trade and specialization are realized as in the case of the H-O-S model (Grubel, 1981, pp. 76-78).

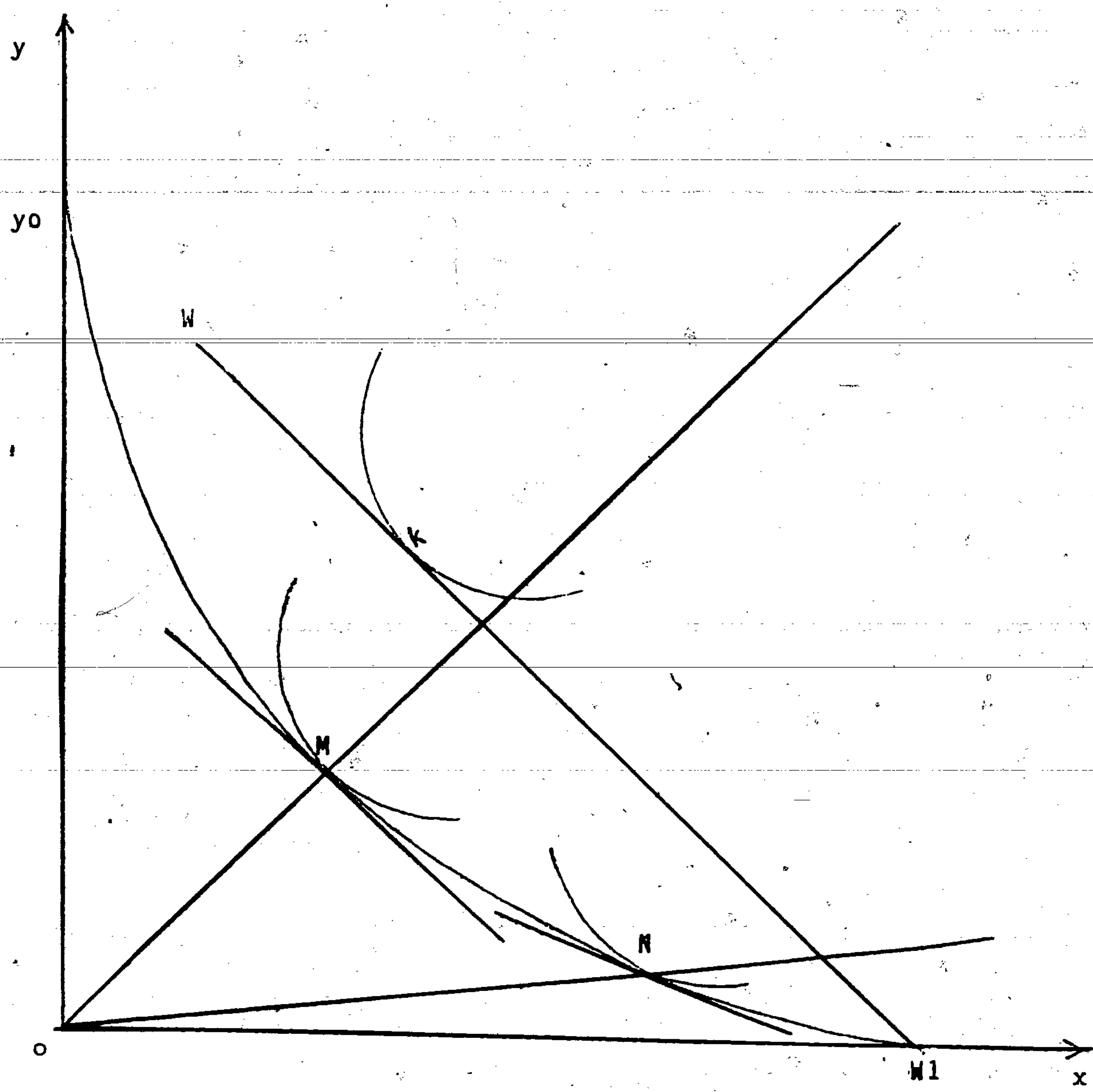

Figure 2.1 -- Increasing Returns to Scale*

* H.G. Grubel (1981), International Economics, p. 77.

2.2 The Theory of Human Capital

Bhagwati (1965), Keesing (1965), and others developed the human capital theory following Leontief (1933, 1956). The theory asserts that differences in the intensity of human capital for the same category of products is the crucial determinant of modern international trade flows among countries. It is argued that a country endowed with skilled labor, compensates for its comparative cost disadvantage by producing high quality differentiated products. Leontief (1933) had shown that a pair of countries with identical factor endowments, implying identical transformation curves, may start trading a part of their produce in order to reach higher indifference contours. It seems that the existence of intra-industry trade was conceived within this framework as far back as the early 1930s.

2.3 The Demand Similarity Models

The demand similiarity theories regard demand conditions as the major determinant of trade. Similar demand patterns and market structures are considered as the essential country attributes and the similarity between imports, exports, and production processes for the domestic market as the basic commodity characteristics. The theory asserts that trade will be more intense between countries with similar attributes.

The demand similarity theory is propounded by S. Burenstan Linder (1961). He postulates different explanations for the pattern of trade in primary products and for the pattern of trade in manufactured goods. He accepts the factor proportions explanation of the pattern of trade in primary products but not in the case of trade in manufactured goods. Linder's hypothesis suggests that while the composition of trade in primary products may be properly explained by the factor proportions theory, the pattern of trade in manufactured goods is mainly determined by the demand characteristics of each trading partner country. He argues that the structure of the relative prices of manufactured commodities in each country is determined by the "representative demand," which in turn is determined by the quality of products which are demanded by the majority of its population. Furthermore, the representative demand is an increasing function of income per capita of the trading partners. Especially at each income level, there is a representative demand for a specific range of goods. The presumption is that the higher the demand, the larger will be the share of domestic market and the larger the production the lower will be the per unit cost (due to scale effects). The domestic producers will be more competitive compared to the countries where those products are outside the range of the representative demand. They will thus be able to extend the market by exporting these products. Linder observes:

> Among all non-primary products, a country has a range of potential exports. This range of exportable products is determined by internal demand. It is a necessary, but not a sufficient, condition that a product be consumed (or invested) in the home country for this product to be a potential export product. This is our basic proposition (Linder, 1961, p. 87).

From his basic proposition, two more propositions follow: (a) production conditions are not independent of demand conditions. Rather production will be more efficient if demand is substantial; and (b) domestic production conditions will be influenced by home demand to a larger extent than by foreign demand. The basic reason for this is unfamiliarity of domestic producers with foreign markets as compared to domestic markets. However, as a successful firm grows over time, the domestic market becomes insufficient for further expansion and, therefore, the trade horizon of the firm is gradually lifted. Consequently, the share of exports increases along the market expansion path (Linder, 1961, p. 88).

An implication of this assertion of the domestic market as a "providing market," is that a good cannot be exported unless domestic demand for it has achieved a certain minimum size needed for the establishment of an "efficient industry." Trade in manufactured goods is considered as an extension of the domestic market to serve consumers in foreign markets who have similar demands and preferences.

Another important feature of Linder's thesis is that, in contrast to the H-O-S model, his theory asserts that differences in demand structure reduce the amount of trade flows between countries. In essence, his theory asserts that the propensity for countries to import from each other will be greater, the closer the characteristics of their internal demand and the more similar their income levels. This proposition, along with his analysis of the basis of trade, are illustrated with the help of his diagrammatic summary of the principles for trade in manufactures (Linder, 1961, p. 100).

In Figure 2.2, per capita income is measured on the horizontal axis and is indicated by the variable "Y". On the vertical axis the degree of quality is measured and represented by "q." It is hypothesized that the more complex, refined, and sophisticated the products demanded, the higher the per capita income, and the higher will be the degree of quality characterizing the demand structure as a whole. Line OP is intended to represent this relationship (Linder, 1961, pp. 99-100).

Depending upon income distribution within countries, a country's demand structure covers a whole range of "sophistication" rather than a point. Thus, Figure 2.2 shows the demand structure of country 1 covering the range a-e, with c as the "average." The demand structure of the more advanced country, country 2, covers the range b-g, around the average f. Because these ranges represent all the products for which there is demand in each country and because a country cannot produce a product cheaply enough or export it unless the product is demanded at home, the ranges a-e and b-g represent the potential import products and the potential export products of countries 1 and 2, respectively.

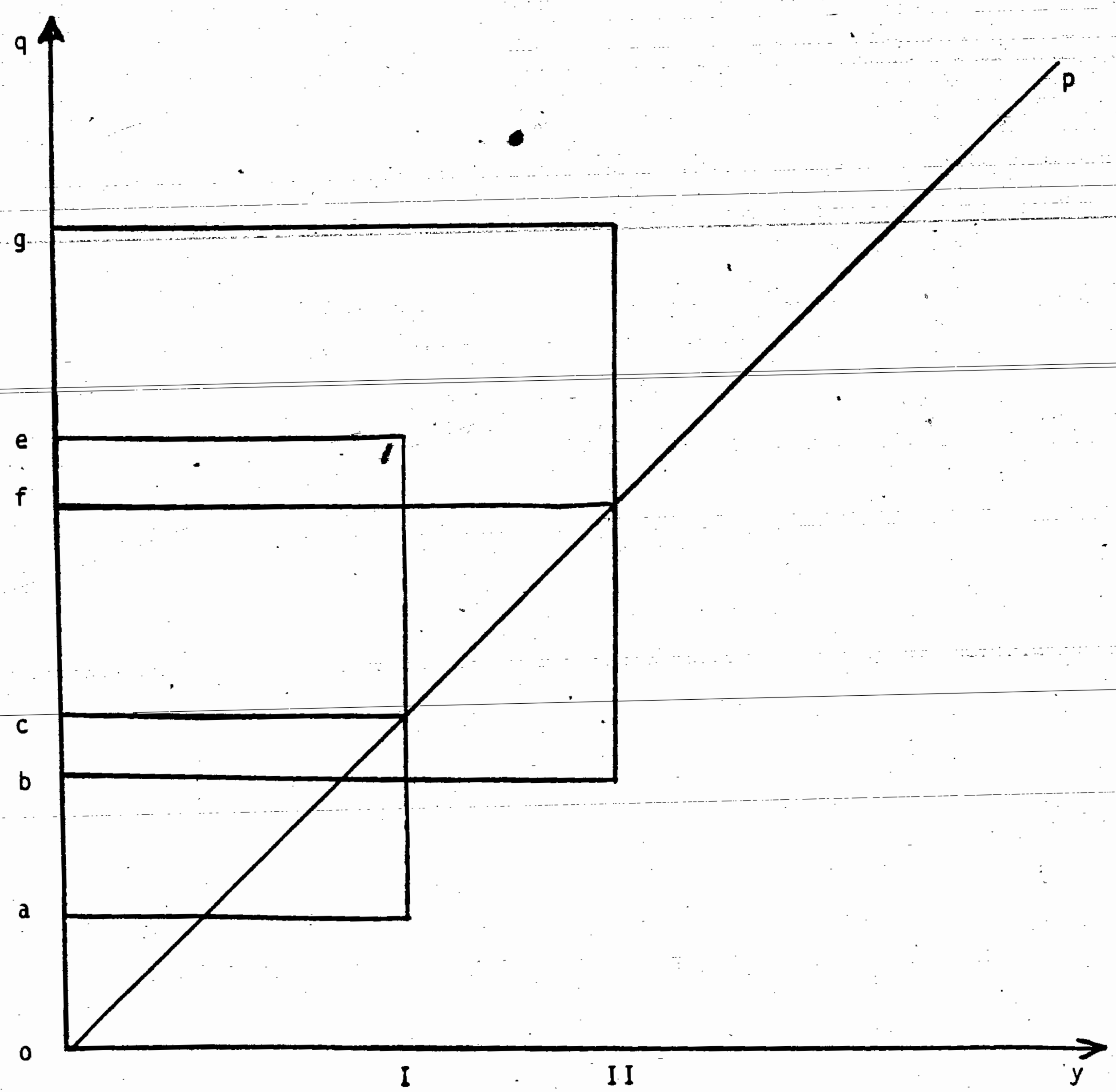

Figure 2.2 -- Graphical Representation of Potential Trade*

* S.B. Linder, (1961) An Essay On Trade and Transformation p. 100

The common range b-e represents those products which are potentially tradeable between the two countries. Thus, the demand conditions determine the range of potentially tradeable goods; and within that range some products may be exported and imported by the same country -- generating intra-industry trade.

This theory has appeal in that the underlying hypothesis attempts to explain the relationship between; (a) income per capita and bilateral trade intensity, and (b) the commodity composition of trade in manufactures. There is a link between Linder's (1961) hypothesis and the phenomenon of intra-industry trade. Linder's theory, unlike the Heckscher- Ohlin theorem, predicts that international trade propensities will be more intense between countries with similar per capita incomes, and similar factor endowments coupled with similar tastes and preferences. Emerging research on the determinants of intra-industry trade has focused attention on the level of development of trading partners as measured in terms of their per capita incomes. In a cross country comparison, per capita income has been identified as one of the important factors influencing intra-industry trade patterns. Gray (1973), Falvey (1981), Krugman (1981), and Helpman (1984) have provided further explanations on this issue.

However, research in this area, though of general interest to us, is not free from shortcomings. There are two major difficulties in integrating this explanation into the discussion of intra-industry trade: first, it is difficult to isolate this factor for empirical testing; and second, Linder's theory is only one component of the demand-determined goods theory. A single variable (income per capita) cannot by itself explain the structure and pattern of trade flows. Tariffs, subsidies, transport costs, differential exchange rates, social policy, history, special climate, tastes, and topographic conditions of a country may be as important as income per capita and related quality of goods.

2.4 The Product Life Cycle Model

Raymond Vernon's article (1966) has initiated discussion on the Product Life Cycle Theory. The theory postulates exporting and investing abroad as separate stages in the dynamic process by which a country acquires comparative advantages due to product innovation. The essential features of his model are as follows.

First, differentiation of commodities is the crucial industry characteristic. The theory asserts that early sophistication and development in manufactured goods leads to differentiated products, whereas lack of suitable sophistication promotes export of standardized goods. Second, knowledge capital (acquired technological know-how, labor skills, etc.) is regarded as the main determinant of comparative cost advantage and international trade patterns. Third, institutional factors, such as government regulations with respect to patents and copyrights along with natural protection, such as "learning by doing" in the production processes, are also considered to be an important determinant of commodity characteristics in a fast-growing country. Fourth, the income elasticity of demand for different products by different income groups is considered as an essential element determining the nature of products and their substitutes. Fifth, the theory asserts that the possession of proprietory technical (or marketing) knowledge confers a world-wide monopoly on a firm (and, hence, on the country where the firm is located). Sixth, it is a dynamic theory of comparative advantage in the sense that it incorporates time inputs within the theoretical framework. Lastly, product differentiation and economies of scale are deemed to have an effect on the speed and the structure of the cycle in the production process.

Given the above attributes of the model, the central theme of Vernon's study can be explained in terms of various stages. In the early stage, production and export advantages lie with sophisticated firms in advanced countries (for example, United States producers dominated the world market for radios built with vacuum tubes). As the product cycle unfolds over time, countries with technical expertise begin making and exporting the item, because the protection derived from patent rights and the development of substitutes are gradually eroded. (For instance, Japanese radios competed with those of the United States in the U.S. market because the Japanese exploited a comparative advantage in labor cost, which is crucial to the process of assembling the radios.) Gradually, the advanced country develops a new differentiated product (e.g., the U.S. industry started producing transistors). After a few years, larger production runs and proven production technology brings industry within the technical grasp of more nations (for example, Japanese producers again took advantage of low labor costs in making the wire connections between transistors, and became more competitive throughout the world). The product cycle may be repeated until the partner countries' comparative cost advantages settle down (Grubel, 1981, pp. 81-83).

Hufbauer (1970) has presented an excellent summary of the development process as expounded by Vernon:

> Successive stages on standardization ... characterize the product cycle. Initially a new good is made in small lots, each firm with its own variety. Manufacturing processes are highly experimental; many different techniques are given a try. But as markets grow, changes take place, national and international specializations are agreed upon. Simultaneously, the number of processing technologies decreases as inferior methods are weeded out. The surviving techniques grow more familiar and marketing channels become better established. The expansion of output transforms the item from "sideline" to "mainline" status (Hufbauer, 1970, p. 189).

The relevance of this theory in the context of intra-industry trade is that within this dynamic theory a monopoly situation is presented. The products are differentiated and produced under the operation of economies of scale resulting from the longer length of production runs. These elements are crucial for the emergence of intra-industry trade. Intra-industry trade emerges within the product life cycle model as the development of new goods and processes takes place over time. The empirical evidence, for example the observed simultaneous exports of United States' transistor radios and imports of vacuum tube radios (from Japan), supports the theory. Furthermore, intra-industry trade is more pronounced among developed countries, such as the United States and European countries, particularly in the chemical and pharmaceutical industries. In these industries expenditure on research and development is very high. Hence, the developed drugs and medicines are simultaneously exported and imported among these countries (Grubel, 1981, p. 83).

2.5 The Technological Gap Model

The proponents of technological gap models, such as Kravis (1956), Posner (1961), Hufbauer (1966), Keesing (1965), Gruber, Mehta and Vernon (1967), and others, consider sequential national innovation and entry to production as the essential industry characteristics; and the development of new technology at different points in time, as the determinant of export performance. It is stressed that technological innovation is an essential determinant of modern trade flows. They argue that early manufacture of new goods (due to technological development) confers an export advantage to that country. This theory is very much associated with Linder's demand oriented and Vernon's product life cycle theories.

On the demand side, it is argued that a new product will be developed in a country only if the demand for that product exists in that country. This is true because entrepreneurs respond to profit opportunities of which they are aware and only domestic producers will know enough about domestic markets to develop new products for sale. The critical stages of development of a new product require close contact between the producer and the output and factor markets in order to develop viable domestic and foreign markets.

On the supply side, it is maintained that with the development of new technological innovations, new products are produced at lower cost and sold in the domestic market. Since the firms become more competitive, they try to extend the horizon of the market by penetrating the world market. The countries where new products are first introduced have comparative advantages resulting from innovation and new technology. These countries enjoy monopoly power due to the fact that the technological know-how is not imitated by the trade partners because of the lag in the speed of adjustment.

H.V. Posner (1961) has made an attempt to elaborate on the imitation gap model in a very interesting manner. He breaks the lag into three components. First, there is the foreign reaction lag, the time taken by the first firm to produce new products. Second, there is the domestic reaction lag, the time required for the other producers to follow and establish themselves in the domestic market. Third, there is the demand lag, the time domestic consumers take to develop a taste for the new product. If the local producers adopt the new goods quickly and the demand response is not slow, the initiation lag is shortened. One interesting hypothesis that derives from this analysis is that a high rate of dynamism as measured by the ratio of investment to GNP could be considered as one of the important determinants of intra-industry trade flows. This is so because the higher this ratio is in a country, the faster will be the rate of technological advance, which in turn leads to further growth of manufacturing. It is well known that intra-industry trade is most intense in the manufacturing sector. Grubel and Lloyd (1975) pointed out that technological gap trade can become intra-industry trade where research and development produce a rapid turn-over of products due to legal protection such as patents and copyrights, thereby enabling firms to serve specialized requirements in different parts of the world. This assertion is supported by empirical evidence. For example, the British economy has been lacking innovations and has been experiencing balance of payments deficits because of the consequent loss of competitive advantage. In contrast, Japan's rate of dynamism has been faster than that of most developed countries, and consequently has become more competitive in the world market. The empirical evidence also shows that the share of intra-industry trade increases in a country's total trade as the trade gap narrows. Thus, the availability of technical know-how, rather than the cost of factors of production, determines the characteristics of products and the direction of trade (Posner, 1961; Hufbauer, 1966).

2.6 The Market Structure Conduct Approach

The market structure approach relates to intra-industry trade and market structure in the industrial countries. It is argued that intra-industry trade in manufactures is not just a transient result of trade liberalization as was perceived earlier. There is no obvious relationship between the amounts of intra-industry trade in manufactures and the proportional liberalization of trade. The phenomenon of trade instead depend heavily on the structures of international product markets and the behavior of firms. These in turn may rest heavily on: (a) long run and structural forces and (b) the performance of markets. This approach explains the effects of rationalization of industry into more efficient production units which generate increased efficiency without incurring the cost of transferring factors of production to different locations and lines of work.

In the market structure approach, therefore, the role of multinational corporations has been considered as the basis for international trade flows. Foreign trade statistics show that a large proportion of international trade in manufactured commodities is dominated by oligopolistic international firms characterized by large size, a high degree of product differentiation, large R&D outlays and advertising networks and economies of scale (Vernon, 1971; Caves, 1981; Caves and Sherazi, 1977). For example, it was found that about 62 percent of all United States' manufacturing exports were generated by such international firms in 1970 (Committee on Finance, 1973). Likewise, Jacquemin and Jong (1977) found such empirical evidence for Europe; and Larry Willmore (1979) for CACM and LAFTA.

It is stressed that under such a market structure, barriers to entry are erected which provide incentives for established firms to practise discriminatory and limit pricing policies. This entry deterrent has been considered as revenue generating investment (Caves and Porter, 1977). The theoretical rationale provided to support this assertion is that in the monopolistically competitive market (at the global level, which encompasses national oligopolists), each national oligopolist faces two demand curves, domestic and foreign demand. If foreign demand is more elastic than domestic demand then price discrimination practised by two different firms selling products in the same industry located in two different countries would generate intra-industry trade. (By charging a higher price in the domestic market and a lower price in the foreign market.)

On the other hand, within the context of oligopoly behavior, growth maximization (as opposed to profit maximization) is considered as one of the prime goals of multinational firms which prefer the extension of market shares in foreign countries to domestic expansion. The donor country's firm may choose to invest in the host country in order to protect its already established export market from increasingly aggressive host country competition. As a result of market inter-penetration and segmentation by oligopolistic firms seeking market shares on a world-wide basis through exports and counter exports, intra-industry trade is generated. In fact, within this process, variations in intra-industry trade intensities across industries can be explained by different structural characteristics of industries. The important elements are: (i) the motives of the firm; (ii) the goal of growth maximization as opposed to profit maximization; (iii) the role of the leading firm; (iv) the band-wagon effect; (v) the conditions of entry; (vi) the technological characteristics of the industry; (vii) the number and size distribution of firms in the industry; (viii) the degree and character of product differentiation; and (ix) the nature of consumer choice and preferences.

Krugman (1981) has attempted to provide a theoretical rationale for the existence of intra-industry trade. He has essentially addressed the question as to how a supplier can successfully capture both domestic and foreign markets in the absence of significant Heckscher-Ohlin comparative advantages. He defines an industry as a configuration of a large number of firms. Assuming all firms are producing somewhat differentiated products and operating on the downward-sloping parts of their average cost curves, he argues that intra-industry trade can develop within an industry because firms in different trading partners produce different varieties. He stresses that the existence of fixed costs in production prevents countries from producing a whole range of product lines. In essence, Krugman's model suggests that economies of scale are the basic determinants of intra-industry trade.

Brander (1981) shows that under certain conditions, two-way trade is generated even in completely identical products, caused by strategic interactions among firms.

Falvey's (1981) analysis generates intra-industry trade within the Heckscher-Ohlin framework, without requiring increasing returns to scale. The only modification made is the introduction of "quality" or product "differentiation" in his model.

Krugman and Helpman (1981, 1984) provide an explanation of intra-industry trade with the help of a generalization of the Heckscher-Ohlin theory. They admit: (a) factors such as the existence of monopolistic competition in the presence of multinational firms in some sectors; (b) scale economies and consumers' preferences in Lancaster's sense; and (c) differences in factor endowments among countries which are related to differences in income per capita. Two main results are derived. First, the nature of trade depends on how similar countries are in their factor endowments. As trading partners become more similar, trade between them will increasingly become intra-industry in character. Second, it is shown that without requiring homotheticity in the production of differentiated products, the intersectoral pattern of trade can be predicted from factor endowments, but not from pre-trade commodity prices or factor-rewards. Third, the welfare effects of the opening of trade depend on its type and relative country size. If intra-industry trade emerges and is sufficiently dominant, then the gains from trade will be much more pronounced, because the advantages of extending the market will outweigh the distributional effects, and the owners of scarce as well as abundant factors will be at a higher indifference contour. Fourth, the theory also confirmed the observed differential in the rates of growth of GNP and the volume of trade.[2] Lastly, they also observed that the relationship between intra-industry trade and relative factor endownments becomes unclear in the presence of multinational corporations (MNCs). If the MNCs help in substituting for imports, they lead to a reduction in trade volumes. If, however, they trade with their subsidiaries located in different countries, then they increase international trade of an intra-industry character.

2.7 Theories of Tariff Barriers

Traditional trade theories suggest that removal of trade barriers will cause a country to shift resources from import competing to export industries where the country has comparative advantage. The prediction of the theory, therefore, is an increase in inter-industry trade specialization.

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[2] It has been observed that in the post World War II period, the volume of trade of the industrial countries grew at an average rate which was almost double the average growth rate of their GNP.

Interestingly enough, the phenomenon of intra-industry trade was observed in empirical studies of the pattern of intra-industry trade after the formation of the Benelux (Belgium, Netherlands, and Luxembourg) Customs Union (Verdroon, 1960), and the European Economic Community (Balassa, 1967, 1971), (Grubel, 1967), (Grubel and Lloyd, 1975), the Central American Common Market (CACM), and the Latin American Free Trade Area (LAFTA) (Willmore, 1978). All have shown a significant growth in the phenomenon of intra-industry trade resulting from trade liberalization.

In the context of the discussion on the cost of protection, studies by Wonnacott and Wonnacott (1967, 1980), De Melo (1978), Dixon (1980), and others, demonstrate that trade liberalization tends to extend the market horizon between trade partners. Given foreign demand conditions, domestic producers enhance their market shares. This leads to large scale production and economies of scale and thereby generates IIT.

Furthermore, it is stressed that, due to removal of tariffs, rationalization/specialization takes place within industries and within plants. This rationalization can be either vertical or horizontal. In vertical specialization in the manufacturing sector, parts, components and accessories are produced in different plants and then assembled in other plants at different locations. For example, instead of Canadian plants producing the entire range of intermediate products, they would either produce one of the components for assembly elsewhere or assemble the components produced elsewhere.

In the case of horizontal specialization, narrower ranges of products occur in machinery, equipment, and intermediate products. It was stressed that trade liberalization would yield substantial gains from trade, since benefits would accrue because of a fall in costs per unit of output. Economies of scale arising from production gains depend on resource transfer between industries and this transfer, in turn, is higher if commodities are close substitutes. For example, the elasticity of product transformation will be higher for a pair of products like four cylinder cars and six cylinder cars than for broadly defined pairs like manufacturing and "primary industry." Balassa suggested that:

> Intra-industry specialization involves ... greater product specialization through reduction in the number of product varieties and models manufactured in particular plants (horizontal specialization) ... accompanied by vertical specialization in the manufacturing of parts, components and accessories (Balassa, 1974, p. 123).

It has also been argued that intra-industry trade can emerge in functionally very similar goods which are differentiated by style, design, attractive packaging, brand names, and advertizing. In this case, IIT emerges because of an increase in the number of differentiated products (particularly consumer goods) rather than from a reduction in the variety produced in the individual plants. Grubel (1967, 1970) emphasized that differentiated products involve start up costs and economies of scale associated with each new line. Patents, copyrights and secrecy prevent rival firms from imitation.

Stykolt and Eastman (1960, p. 342) argued that the existence of differentiated products under tariff protection leads to a "market structure ... in which several firms of sub-optimal scale resort to non-price competition to sell differentiated products which are close substitutes." Similarly, English (1964) observed that each Canadian industry tends to be a "miniature replica" of its counterpart in the United States, with the same number of production lines resulting in excess costs associated with frequent change-overs and shorter production runs. If the Canadian provinces were united through a free trade zone or a customs union rather than a political confederation, the trade statistics would indicate substantial intra-industry (intra-provincial) trade as a result of the efficient operation of the "miniature replica" effect.

2.8 Product Differentiation Models

There has been a general consensus among international trade theoreticians that product differentiation plays an important role in the determination of trade patterns. In fact, any discussion on intra-industry trade patterns appears to be impossible without reference to product differentiation (Davies, 1975, p. 2).

The body of literature on the role of product differentiation as the basis of intra-industry trade is multi-faceted, which calls for detailed analysis. We shall examine not only the theoretical explanation of product differentiation, but also the applications of product differentiation as a variable used in an empirical test.

2.8.1 <u>The Concept of Product Differentiation</u>

The initiation of the concept of product differentiation is attributed to Chamberlin's (1948) classic work on monopolistic competition. Within the Chamberlinian framework, product differentiation is considered to be a deliberate process whereby manufacturers of closely competitive goods attempt to obtain some release from the market discipline of selling a homogeneous product. Their products are differentiated by design, style, and performance. This leads to an imperfect market in which each manufacturer faces a downward sloping demand schedule. In this way, each firm enjoys some freedom of action with respect to marketing, advertizing, and pricing decisions.

Lancaster (1970) has defined this concept more precisely in terms of consumer demand characteristics analysis. <u>Obiter dictum</u>, Lancaster's seminal studies (1966, 1970, 1980) have become the basis for the explanation of intra-industry trade arising from product differentiation. Several attempts have been made since then to provide a theoretical rationale for intra-industry trade.

Traditional consumer demand theory deals with the goods rather than with their characteristics based on the assumption that quantities can be infinitesimally small. Lancaster's model, on the other hand, identifies the purchaser's demand for characteristics as an essential property of the market. The underlying assumption of this model is that the characteristics are not available as a continuous range of alternatives but are combined in different proportions. To be more precise, commodities can be regarded as differentiated varieties of the same common characteristics if these are combined different combinations. For example, motor vehicles form a product group which shares common attributes, such as facilitating transport (short distance, long distance, for a small or large family). However, individual models vary in the way these qualities are combined. The theory stresses that consumers derive utility from these different characteristics of the goods available rather than the goods themselves (i.e., they buy goods for the combinations of characteristics they possess).

Furthermore, the theory also indicates that consumers have high elasticities of substitution among goods within a given commodity group (e.g., sweaters made of wool and synthetics). In this way, product differentiation in the Chamberlinian sense appears to be a deliberate attempt by firms to destandardize their product for sales promotion and erect entry barriers by creation of brand names, patent and copyright laws.

From a historical perspective, it is worth noting that the concept of product differentiation in the Chamberlinian sense was first incorporated into the theory of international trade in manufactures by H.G. Johnson (1967), developed by Lancaster

(1971, 1980), and refined by Gray (1973), Barkar (1977), Magee (1977), among others.

Peter Gray (1973) attempted to provide theoretical underpinnings for analyzing the occurrence of two-way international trade in differentiated products. Using a model of two countries, assuming tastes, prices of competing goods, and income distribution as given; and constant returns to scale, he specifically addressed the question of type C goods. Type A goods compete in similar differentiated markets both at home and abroad, while Type B goods reflect national tastes and tradition which provide the differentiation and design with intrinsic utility in foreign markets. Type C goods are not traded at "arms length." International integration and internal economies accruing to multinationals may explain the increase in two-way trade in Type C goods. In his "theoretical underpinnings," differentiated products (Type C goods) are both produced and consumed in each trade partner country. Firms exploit the economies of scale at least over some range of the supply curve. The differentiation of goods, with the scale effect, necessarily imparts a negative slope to the demand curve for the individual commodity, in addition to the negative slope of the demand curve of the group of similar commodities. The determinants of the position and the shape of the demand curve are: (a) the level and distribution of income; (b) the tastes and preferences of the foreign buyers; (c) the prices of the foreign competing differentiated products; (d) tariff and non-tariff barriers;

and, (e) the selling efforts made by the firm in foreign markets, which he calls "landed costs." Given these conditions, a firm exports its products if a positive price exists which yields the manufacturer an economic rent over time. This economic rent, dubbed as positive "reciprocal export price ranges" (EPRs) among trading partners, is the basis of intra-industry trade or two-way trade (in his terminology). It is stressed that as each group of products has its own demand curve, cost or selling price variation does not debar some sales being made by each producer within the group. And for two-way trade to take place, "export price ranges," must exist for competing goods in both countries. This, in turn, would require that the price corresponding to minimum sales should be equal to or higher than the long run marginal costs of production. Thus, the essence of Gray's argument was that the existence of "export price ranges," is a necessary condition to export and import each other's product simultaneously.

From the above proposition, Gray derived some theoretical determinants of intra-industry trade. These are as follows: (a) the higher the degree of product differentiation of the product group, the steeper would be the demand curve in both trade partners. This would generate higher economic rent (EPRs) due to the higher price corresponding to the minimum sales required. This would lead to higher intra-industry trade. (b) The smaller the differences in per capita incomes and relative factor prices, the higher would be the share of two-way trade. It is also suggested that the gain from uniting developing nations at similar low levels of per capita incomes would come from the ability of such countries to achieve economies of scale in production by planning the integration and rationalization of industries. (c) The lower the trade barriers and transport costs, the more similar would be the long-run marginal costs of the trading partners, the higher would be the EPRs and hence the higher the intensity of intra-industry trade.

In spite of the refinements, Gray's model has limited predictive power. For instance, Davies (1977) has observed that Gray's model is based on the assumption of constant returns to scale. This means his theoretical model does not provide an explanation as to why either one or both of the trade partners cannot produce both varieties of the differentiated products. Gray (1977) defended his case by arguing that increasing returns to scale over some range of the supply curve is not inconsistent with his model. He has stressed that barriers to entry of a new product-line are a more important candidate in explaining the development of two-way trade than economies of scale.

Hufbauer (1970) has explained the concept of product differentiation in the context of the neo-technology theory of international trade. He identifies the "differentiation of commodities" as the essential process by which a product is transformed during the product cycle (Hufbauer, 1970, p. 179). In his view, sophistication of the manufacturing sector is the essential determinant of a country's ability to export differentiated commodities. A lack of technological sophistication limits a nation's ability to export standardized goods (Hufbauer, 1970, p. 217). Standardization implies a trade partner's specification governing marketing, advertizing, and production management procedures. The process of standardization facilitates marketing and the transmission of information about the knowledge input. Trade in newly developed commodities takes place only when the second stage of the product cycle is attained. The hypothesis here is that product differentiation decreases as standardization increases. As he states: "product cycle emphasises the transition from product differentiation to product standardization" (Hufbauer, 1970, p. 190). The concept of differentiation, in Hufbauer's sense, therefore, is actually non-standardization or newness, albeit goods produced with new technology lend themselves to Chamberlinian differentiation and to monopolistically competitive market structures. However, it does not stress the on-going process of trade in differentiated products identified as a characteristic of IIT in monopolistically competitive products. In spite of some weaknesses, Hufbauer's measure for product differentiation (which he constructed for empirical testing) has been widely accepted and used.

Hufbauer's (1970) paper aims to develop empirical measures to test hypotheses in relation to a wide range of trade patterns in common manufactured goods. The analysis indicates that exports are typically less distorted by domestic policies than imports. However, exports suffer from at least three difficulties as a guide to comparative advantage: (1) tariffs and quotas severely limit certain international markets, for example, cotton textiles, whose characteristics are understated in the exports of nations with a textile advantage; (2) a nation's own import restrictions affect its export composition by drawing resources directly and indirectly from the export industries; and (3) geographical and psychological distance adversely affects trade. He attempted to examine interrelationships among commodity characteristics against the background of rank correlations among commodities, ordered according to different characteristics by Spearman's correlation coefficient, taking both physical and human capital indices.

He concluded that many different characteristics express themselves in export patterns. No one theory fully explains trade in manufactures. The five strong intercorrelations indicated are:

(a) the expected coincidence between wages and human skills;
(b) the correspondence between human and physical capital;
(c) the overlap between the consumer/producer goods dichotomy, and the light/heavy industry dichotomy;
(d) the match between standardized and skilled goods; and,
(e) the correspondence between scale economies and skill intensive goods.

To some extent, the "different" characteristics reflect different aspects of the sophistication that accompanies economic development.

In his article, Magee (1977) analyzed the concept of product differentiation in two different senses. First, he employed the Hufbauer product differentiation measure in order to investigate the intensity of product differentiation in new and old industries. His findings revealed that "older industries" had less product differentiation and more standardized products (Magee, 1977, p. 324). Second, the concept is used in a Chamberlinian sense in order to analyze the effects of horizontal integration of industries. Magee stressed that since product differentiation introduces barriers to entry and thereby leads to market concentration, it could induce multinational corporations to integrate industries horizontally in different countries.

It is quite obvious that the concept of product differentiation in the Chamberlinian sense, is an on-going process which follows for continuous existence of international trade in general and intra-industry trade in particular (in each product) which are very sensitive to prices and exchange rates. It is believed that international trade in these products will lead to a stable trade pattern through time. By contrast, differentiation which emerges within the product cycle model would generate intra-industry trade in an erratic manner. In this case, trade in differentiated products may not lead to a stable trade pattern through time. Instead, frequent changes in trade patterns may emerge with the evolution of standardization. Doubts have been expressed about the sensitivity of such products to price and exchange rate changes. These commodity characteristics would have different implications for exchange rate policy.

The central hypothesis derived from the analysis of the concept of product differentiation is as follows:

> Intra-industry trade is an increasing function of the degree of product differentiation within an industry.

In order to test this hypothesis empirically, the index computed by Hufbauer (1970) has been employed in this study. In Appendix A-1 the construction of the index is presented, and the empirical estimates are reported in Appendix Table A2.1. These estimates are used as one of the independent variables to test the hypothesis concerning the relationship between intra-industry trade and product differentiation. The results of empirical testing will be reported in Chapter Six.

Summary

The above review of the literature in the context of the intra-industry trade phenomenon discloses the following: first, economists have divergent opinions on the issue of explanations of the phenomenon of intra-industry trade. Scholars such as Grubel (1967, 1971), Gray (1973), Grubel and Lloyd (1975), Gray (1973), Gray and Hesse (1979), Falvey (1981), Krugman (1981), and Krugman and Helpman (1984), among others, argue that intra-industry trade can be explained within the modified framework of the Heckscher-Ohlin model.

Finger (1975), Lipsey (1976), and Promfret (1979), on the other hand, argue that intra-industry trade is at variance with the factor proportions theory. They maintain that "Trade Overlap," is consistent with the factor proportions theory, so long as factor input requirements vary more within product groups than between them. The debate goes on with inconclusive results.

Second, theories of human capital, technological gap and life cycle can also explain the emergence of intra-industry trade flows. As Grubel and Lloyd pointed out (1975, pp. 109-111), technological gap-life cycle trade can become intra-industry trade where research and development produce a rapid turnover of products (most of which dominate previously marketed substitutes) which are protected by patents and copy-rights and serve specialized world wide requirements, as in the case of the pharmaceutical industry. Likewise, intra-industry trade can be explained by the product life cycle process, even in products with identical factor input requirements, and in the absence of economies of scale. Innovations in these industries are protected by patents and copyrights. Differences in the intensity of human capital for the same category of commodities produced in two different countries coupled with non-homothetic tastes and income distribution, may also generate intra-industry trade. Third, Linder's (1961) hypotheses seem to be quite persuasive as an explanation of the intra-industry trade phenomenon. The essence of Linder's argument seems to be that factor endowments, economies of scale, innovation, and the process of product development, can generate export potential in certain products, a large domestic market is a necessary condition for its development. Once the domestic market is well coordinated and well developed on the basis of domestic demand, the horizon of markets can be extended through international trade between countries which share similar demand patterns and similar levels of income. In such cases, foreign trade propensities will be higher, leading to higher intra-industry trade flows.

Fourth, the market structure approach focuses on the interactions of multinationals, the behavior of the firms, and the interaction of product differentiation with economies of scale as important determinants of intra-industry trade. High incomes give rise to demand for high quality differentiated products. If each country produces only a sub-set of products within each industry in order to meet domestic and foreign demand, intra-industry trade would be generated under such interactions of the industries' operations under economies of scale. Furthermore, if multinational activities do not become substitutes for trade, then their world-wide operations would tend to generate intra-industry trade.

Fifth, the theories of tariff protection predict that the volume of intra-industry trade varies inversely with the level of trade restrictions. Empirical evidence showed that trade liberalization and economic integration among countries have given rise to an intra-industry trade pattern. This, in turn, led to welfare related policy implications in the context of the cost of protection.

Sixth, the concept of product differentiation has been a formidable task to define and more so to translate into the general body of trade literature, particularly the Chamberlinian type concepts. Tharakan (1983), following Johnson (1967), visualizes the difficulties associated in translating the Chamberlinian-type concepts of monopolistic competition into the general equilibrium framework of international trade theory. As he observed:

> ... the introduction of product differentiation, economies of scale and other elements of non-perfect competition in explaining a substantial part of the world trade flows raises normative problems which a patch work theory cannot satisfactorily solve (Tharakan, 1983, p. 20).

Finally, it has been recognized that empirical studies have outweighed theoretical development in the context of intra-industry trade. Intra-industry trade has, by and large, remained an empirical phenomenon in search of a theory. Cordon suggests:

> It is desirable that there be developed a rigorous general equilibrium model with economies of scale, possibly embodying some dynamic elements and allowing for more than two products and yet (ideally) remaining as simple as the popular geometric expositions of the H-O-S model (Corden, 1979, p. 10).

The question is open as to whether we really need a new theory or the existing theories have provided sufficient explanations of the emergence and determinants of intra-industry trade flows among nations.

CHAPTER THREE

MEASURING INTRA-INDUSTRY TRADE: THE PROCEDURE

The object of this chapter is to provide an analysis of the alternative measures of intra-industry trade. The chapter is divided into two sections. Section one attempts to make a choice among alternative measures and examines their statistical attributes. Section two presents an overview of the extent and trends of intra-industry trade. Notable studies are: Balassa (1963, 1967, 1979), Gray (1973), Hesse (1974), Grubel and Lloyd (1975), Aquino (1978), Pelzman (1978), Willmore (1979), Bergstrand (1982), Toh (1982), Lundberg (1982), and Schumacher (1983).

Several alternative measures have been developed in the literature to estimate the magnitude of intra-industry trade. A few of them are estimated in this study. The criteria for making a choice among various indices are basically: first, those indices which share some common statistical attributes and which have been generally discussed were chosen; and second, other indices have been retained for the purpose of illustrating the conceptual distinctions underlying an aspect of measurement methodology important since the early phase of the development of intra-industry trade phenomenon. These indices have been widely used in various empirical studies, with some modifications and refinements where necessary. The main purpose of discussing these indices is not to show the superiority of one over another, but to trace the development of each index over time and to investigate how far one index is able to capture the strength of intra-industry trade.

A related issue is to determine to what extent the empirical performance of the various indices differs under different situations, e.g.:

(a) when trade is balanced; and

(b) when trade is imbalanced.

3.1 The Choice of an Index of IIT

In order to determine the magnitude of intra-industry trade in Canada's total foreign trade, a choice has to be made among alternative measures available in the existing literature. Then these estimates are utilized to present an empirical test of the analytical arguments about the major hypotheses.

3.1.1 The Balassa Index (1966)

Balassa made an attempt to investigate whether the formation of the European Economic Community (EEC) led to inter-industry or intra-industry trade specialization, using the following formula:

$$S_b = \frac{1}{n} \sum_{i=1}^{n} \frac{|X_i - M_i|}{(X_i + M_i)} \qquad (3.1)$$

Where S_b is the value of intra-industry trade, X_i and M_i refer to the exports and imports respectively of commodity i (or industry i) and n is the sample size. The Balassa index calculates intra-industry trade as unweighted averages of the ratio of absolute differences of exports and imports to the sum of exports and imports. The statistical property of this index is such that the value of S_b varies between zero and unity. The importance of intra-industry trade increases as the measure decreases. If inter-industry specialization predominates, then the resulting "representative ratio" would tend to approach unity, since a country would either export or import a commodity. By contrast, in the case of intra-industry trade specialization, the ratios would tend towards 0 because exports and imports would approach equality within each category.

The Balassa index, however, suffers from two drawbacks. First, it assigns equal weight to all industries, irrespective of their share in total trade flows, and second, it does not provide any correction for trade imbalance. It has also been argued that the Balassa index is a measure of inter-industry rather than intra-industry trade. The discussion of these undesirable properties of the aggregate Balassa measure is provided by Grubel and Lloyd (1975).

3.1.2 The Grubel and Lloyd Indices (1975)

Grubel and Lloyd (1975) have defined intra-industry trade as the value of exports of an industry which is exactly matched by the imports of the same industry. Its value is determined by:

$$G_i = (X_i + M_i) - |X_i - M_i| \quad (3.2)$$

Where G_i is the value of intra-industry trade, X_i and M_i are the values of the exports and imports of industry i, both being valued at a common currency, for a given period. Inter-industry trade is defined as:

$$S_i = |X_i - M_i|. \quad (3.3)$$

If total trade is divided into two parts, intra-industry trade (G_i) and inter-industry trade (S_i), it is clear from (3.2) that intra-industry trade is the value of total trade ($X_i + M_i$) remaining after the subtraction of net exports or imports of the industry, i.e., inter-industry or net trade $|X_i - M_i|$. For example, if Canada exports $300 million of children's bicycles and imports bicyles for $500 million, then for each dollar of the $300 million of exports there is a matching dollar of imports. Of the total ($X_i + M_i$) or $800 million of trade in commodity i (i.e., bicycles), three-fourths or $600 million is intra-industry trade, and $200 million is inter-industry trade.

In order to facilitate a comparison of the values of intra-industry trade as a proportion of the economy's total trade, intra-industry trade is expressed as a percentage by making use of the following index:

$$B_i = \frac{[(X_i + M_i) - |X_i - M_i|]}{(X_i + M_i)} \times 100 \qquad (3.4)$$

Where X_i and M_i are as defined above, and B_i is the value of intra-industry trade as a percentage of total trade.

The statistical properties of this index are such that the computed percentages vary in the interval from zero, when either X_i or M_i is zero so that there is no intra-industry trade, and 100, when the value of exports of an industry exactly matches that of imports of the same industry, so that there is no inter-industry or net trade. The higher the B_i, the higher the level of intra-industry trade specialization.

When the measures of intra-industry trade are calculated across industries (or product groups by SITC classification) at a given level of aggregation, or across countries for a chosen SITC group, it is useful to have a summary measure. First, to examine the distribution of these measures at a chosen level of aggregation among the same or all individual industries; second, to examine the extent of intra-industry trade for a particular set of traded goods at different levels of aggregation; third, to investigate the intensity of the emerging pattern of trade between the home country and her trade partners; and fourth, to examine if the index of IIT is high or low with a partner country experiencing balance of payment's disequilibrium. Therefore, a summary measure has been devised by Grubel and Lloyd by taking a weighted average of the values of Bi, with weights given by each industry's share in a country's total trade:

$$IITB = \bar{B}_i = \sum_{i=1}^{n} B_i (X_i + M_i) / \sum_{i=1}^{n} (X_i + M_i) \times 100$$

$$= \frac{\sum_{i=1}^{n} (X_i + M_i) - \sum_{i=1}^{n} |X_i - M_i|}{\sum_{i=1}^{n} (X_i + M_i)} \times 100 \qquad (3.5)$$

Where $\bar{B}_i$ is the weighted average value of intra-industry trade across industries, $i = 1 \ldots n$, where n is the number of industries in the sample at a chosen level of aggregation.[1]

Grubel and Lloyd pointed out that: "B_i measures average intra-industry trade directly as a percentage of the export plus import trade. It is also equal to the sum of the intra-industry trade for the industries as a percentage of the total export plus import trade of the n industries" (Grubel and Lloyd, 1975, p. 22).

3.1.3 The G-L Measure For Levels of Aggregation (1975)

Grubel and Lloyd further visualized that within industry i the trade flows may consist of several subcategories j, that is

$X_i = \sum_j X_{ij}$ and $M_i = \sum_j M_{ij}$

In order to make comparisons of the intra-industry trade indices at different levels of aggregation, Grubel and Lloyd devised the following index:

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[1] The level of aggregation of i used by Grubel and Lloyd varied in their studies, although in most cases, 3-digit SITCs were used.

$$IIT_S = B_i = \frac{\sum_j (X_{ij} + M_{ij}) - \left|\sum_j^n X_{ij} - \sum_j^n M_{ij}\right|}{\sum_j (X_{ij} + M_{ij})} \times 100 \qquad (3.6)$$

The following result of this aggregation is stressed:

$$R_i = \sum_j (X_{ij} + M_{ij}) - \left|\sum_j X_{ij} - \sum_j M_{ij}\right|$$

$$\geq \sum_j (X_{ij} + M_{ij}) - \sum_j \left|X_{ij} - M_{ij}\right| \qquad (3.7)$$

"and since the denominator of B_i is unaffected by aggregation the measure of intra-industry trade at a more aggregative level is greater than, or at least no less than, the measured intra-industry trade with a finer commodity breakdown" (Grubel and Lloyd, 1975, p. 23).[2]

In the formulae given above, the subcategories j refer to a refined product classification within industry i. Grubel and Lloyd point out that the above measures can also apply to trade in products of different industry classifications with different trade partner countries or group of countries. Furthermore, it is suggested that the intensity of intra-industry trade may also be computed by employing the mean measure $\bar{B}_i$ (i.e., equation 3.5) in relation to each specific trade partner country for an industry i, at a chosen level of aggregation. Also, an average value can be estimated by summing trade flows across countries.

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[2] This measure has been employed in order to examine the sensitivity of IIT to different levels of aggregation. The results are presented in Chapter Four.

However, the mean measure B_i suffers from certain shortcomings.

3.1.4 Bias from Trade Imbalance

It was realized that, "The mean is a biased downward measure of intra-industry trade if the country's total commodity trade is imbalanced or if the mean is an average of some subset of all industries for which exports are not equal to imports" (Grubel and Lloyd, 1975, p. 22). The rationale is simple. As long as overall exports and imports do not exactly match each other, intra-industry trade can never be 100 percent. As Grubel and Lloyd observed:

> With an imbalance between exports and imports the mean must be less than 100 no matter what the pattern of exports and imports, because exports cannot match imports in every industry. This is an undesirable feature of a measure of average intra-industry trade which is due to the fact that it captures both the trade imbalance and the strength of intra-industry trade (Grubel and Lloyd, 1975, p. 22).

In order to avoid any bias introduced by imbalanced trade, the mean must be adjusted by removing this trade imbalance. Consequently, Grubel and Lloyd proposed that while considering all commodity trade, adjustment must be made for the aggregate trade imbalance by expressing intra-industry trade as a proportion of the total commodity export plus import trade less the trade imbalance. The Grubel and Lloyd proposed adjusted measure is:

$$IITC = \bar{C}_i = \frac{\sum^n (X_i + M_i) - \sum^n |X_i - M_i|}{\sum^n (X_i + M_i) - |\sum^n X_i - \sum^n M_i|} \times 100 \qquad (3.8)$$

From equation (3.8) it is clear that:

$$\bar{C}_i = \bar{B}_i \cdot \frac{\sum_{i=1}^{n} (X_i + M_i)}{\sum_{i=1}^{n} (X_i + M_i) - |\sum_{i=1}^{n} X_i - \sum_{i=1}^{n} M_i|} \times 100 \qquad (3.9)$$

$$= \bar{B}_i \cdot 1/1-K \qquad (3.10)$$

Where "K" is the country's overall trade imbalance as a proportion of its total trade. This adjustment factor can also be defined as:

$$K = \frac{|\Sigma X_i - \Sigma M_i|}{\Sigma_i (X_i + M_i)}$$

It is stressed that "... the adjustment factor and the adjusted measure increase as the trade imbalance increases as a proportion of total export plus import trade" (Grubel and Lloyd, 1975, p. 23).

The measure $\bar{C}_i$ as stated by Grubel and Lloyd, expresses intra-industry trade as a proportion of total commodity export plus import trade less the trade imbalance (Grubel and Lloyd, 1975, p. 22).

The $\bar{C}_i$ share the same statistical attributes as $\bar{B}_i$. But $\bar{C}_i \geq \bar{B}_i$ in all cases, because the numerators are the same, but the denominator of $\bar{C}_i$ is never larger than that of $\bar{B}_i$.

The development of these indices and trade imbalance continued with further refinements made by Aquino (1978) and others.

3.1.5 The Aquino Index (1978)

Antonio Aquino (1978) has cast doubt upon the reliability of Grubel and Lloyd's indices, especially in a situation when a country's overall trade is substantially imbalanced. According to Aquino, although Grubel and Lloyd provided an adjusted summary measure (as presented by $\bar{C}_i$ in equation 3.8) they neglected to correct the elementary index B_i (in equation 3.4). He argues that if $\bar{B}_i$ in equation (3.5) is a downward biased summary measure of intra-industry trade where total trade is imbalanced, it is precisely because B_i in equation (3.4) is in such cases, a downward biased measure of intra-industry trade in each commodity, because bias does not arise only in the process of obtaining $\bar{B}_i$ as a mean of its value. As he put it:

> If j's total trade is imbalanced Bj is a downward biased summary measure of intra-industry trade just because Bij is a downward biased measure of intra-industry trade in each commodity. This because one cannot possibly maintain that the overall imbalance has not an imbalancing effect on the single commodities' trade flows and then recognize that the imbalancing effect appears at a highest level of industry aggregation (Aquino, 1978, p. 280).[3]

Aquino stressed that it is a logical fallacy to maintain

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[3] Aquino used j to index countries.

simultaneously that the overall trade balance would skew the intra-industry trade index calculated at the highest level of aggregation, but not when the computation is performed pertaining to single commodities. He therefore suggested that the bias should be corrected at an elementary level (i.e., a "correction" should be made at the commodity i level) before calculating B_i itself.

He proposed a new "adjusted measure." Assuming that the imbalancing effect of the total trade surplus or deficit is equiproportional in all industries, he first generated a "theoretical value" of exports and imports by addressing the question as to what the values of exports and imports of each commodity would have been if total exports had been equal to total imports. These values can be obtained with the help of the following formulae:

$$X^e_{ij} = X_{ij} \frac{1}{2} \frac{\sum_{i=1}^{n} (X_{ij} + M_{ij})}{\sum_{i=1}^{n} X_{ij}} \quad (3.11)$$

$$M^e_{ij} = M_{ij} \frac{1}{2} \frac{\sum_{i=1}^{n} (X_{ij} + M_{ij})}{\sum_{i=1}^{n} M_{ij}} \quad (3.12)$$

Where X^e_{ij} and M^e_{ij} stand for the "theoretical values" i.e., what the value of exports and imports would have been respectively if total exports had been equal to total imports. By substituting these "theoretical values" he obtains a new adjusted unbiased summary measure of the proportion of intra-industry trade as:

$$IITQ = \bar{Q}_j = \frac{\sum_{i=1}^{n} (X_{ij} + M_{ij}) - \sum_{i=1}^{n} |X^e_{ij} - M^e_{ij}|}{\sum_{i=1}^{n} (X_{ij} + M_{ij})} \times 100 \quad (3.13)$$

Where $\bar{Q}_j$ is the value of intra-industry trade.

Aquino's main contribution here lies in highlighting the possible bias in the intra-industry trade indices at the industry level. Though his adjusted measure can be viewed as a useful statistical tool, it suffers from certain limitations. Greenaway and Milner (1981) have criticized Aquino's "corrected measure" on two counts: first, its assumption that a specific recorded trade imbalance is consistent with disequilibrium; and, second that equilibrating forces would be equiproportionally distributed across all industries. These critics suggested that in the case of cross-section analyses of the determinants of intra-industry trade, better approaches would be: (i) a judicious selection of the sample years so as to avoid periods of over-all disequilibrium; and (ii) averaging of the intra-industry trade indices over a carefully-selected time period. Aquino (1981), defending his position, maintained that his "equiproportionality rule" is acceptable in the absence of any reliable alternative criterion. He also stressed that in the case of countries like Japan, the rational choice of a normal year of trade flows equilibrium seemed to be almost impossible. The debate is still open. It is noted in this study as well, that Aquino's measure suffers from a basic flaw.*

3.2.1 Glejser's New Measure (1979)

Glejser, Goosens and Vanden Eede (1979) have proposed a conceptually new approach to estimate the magnitude and variations of intra-industry trade. They have cast doubts about the validity of the Balassa-Grubel-Lloyd-Aquino set of intra-industry indices on the following grounds. First, they pointed out that the above measures do not make any distinction between supply side (export) specialization and demand side (import) specialization. Second, these measures are sensitive to trade imbalances. Third, they maintain that the "Aquino Correction" itself is of little use, as it can yield misleading results in certain cases. Finally, it has been noted that the existing measures fail to provide explicitly for verifying whether the intertemporal changes recorded in the coefficients are statistically significant. The new proposed coefficients are:

$$E = \frac{1}{n} \sum_{i=1}^{n} \log(X_i/X) / (X_{gi}/X_g) = \frac{1}{n} \sum_{i=1}^{n} E_i \qquad (3.14)$$

$$U = \frac{1}{n} \sum_{i=1}^{n} \log(M_i/M) / (M_{gi}/M_g) = \frac{1}{n} \sum_{i=1}^{n} U_i \qquad (3.15)$$

Where X_i is exports of a given country of a product or industry i to a group of countries. M_i is the imports of product i by the country concerned from the same group of countries. X is the

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* This aspect will be discussed in Chapter Four with empirical evidence.

total exports of the home country to the group of countries. M is the total imports of the country from the group of countries. X_{gi} is the total intra-area export, within the group of product i. M_{gi} is the total intra-area import within the group of product i. X_g is the total intra-group exports. M_g is total intra-industry imports. The variance of E and U can be obtained as:

$$\frac{1}{n}\sum_{i=1}^{n}(E_i-\bar{E})^2 = S_E^2 \qquad (3.16)$$

and

$$\frac{1}{n}\sum_{i=1}^{n}(U_i-\bar{U})^2 = S_U^2 \qquad (3.17)$$

The magnitude of intra-industry trade will tend to be higher the smaller these variances are. If the observed variance of E or U has declined over time, this would suggest that intra-industry trade specialization has increased over that period. Glejser et al. (1979) claim that their measures have the advantage of providing the possibility for testing whether the changes noticed are significant or not. There has been criticism of the statistical properties of Glejser's measure. Fase (1983) criticized Glejser's measure on the basis of his simulation results, particularly those relating to the hypothesis of the normal distribution of E_i and U_i and the F distribution of the ratio of their estimated variances.

3.2.2 The Loertscher and Wolter Index (1980)

Loertscher and Wolter's (1980) coefficient of intra-industry trade is very innovative. Their indicator is:

$$IIT_{ijk} = \left| \ln \frac{X_{ijk}}{M_{ijk}} \right| \qquad (3.18)$$

Where M_{ijk} and X_{ijk} represent country j's imports and exports of commodity i in trade with country k and ln denotes the natural logarithm. Following Aquino, they employed a second indicator in order to adjust their coefficients in case of overall trade imbalances. This indicator reads:

$$Q_{ijk} = \frac{(ajk \cdot X_{ijk} + bjk \cdot M_{ijk}) - |ajk \cdot X_{ijk} - bjk \cdot M_{ijk}|}{(ajk \cdot X_{ijk} + bjk \cdot M_{ijk})} \qquad (3.19)$$

where

$$ajk = \sum_{i}^{n}(X_{ijk} + M_{ijk}) \; / \; 2 \sum_{i}^{n} X_{ijk} \qquad (3.20)$$

$$bjk = \sum_{i}^{n}(X_{ijk} + M_{ijk}) \; / \; 2 \sum_{i}^{n} M_{ijk} \qquad (3.21)$$

The value of IIT_{ijk} range between 0 (exclusive intra-industry trade) and ∞ (no intra-industry trade). Grubel and Lloyd, however, have rejected indices that are not symmetrical, i.e., range from 0 to ∞, because in this estimation, the distribution is very awkward to analyze and weight.

In this study, Grubel and Lloyd's and Aquino's (i.e., $\bar{B}_i$, $\bar{C}_i$, $\bar{Q}_j$) indices have been used to determine the magnitude of intra-industry trade in Canada's total trade.[5] These measures, then, are to be utilized for testing the analytical arguments about the major hypotheses. An investigation of the empirical performance of these different indices for intra-industry trade across industries and among countries is conducted. The basic criterion for choosing these indices is the universal popularity of the G-L indices and the recent development of Aquino's index which has acquired some credibility within a short period. Glejser's index is yet to be verified in future research. Most of the research done so far has employed the G-L indices.

The concept of intra-industry trade is not new. The idea can be traced back to Frankel (1943). As he noted:

> We frequently meet the phenomenon that countries with a relatively high proportion of international trade per head of population export and import what are apparently the same commodities (1943, p. 195).

The growing exchange of manufactured products within the same categories has been recognized for quite some time. What is new is the realization of the extent, the explanation of the determinants of this trade, and the awareness of its policy implications.

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[5] In this study, these indices have been denoted as IITB, IITC, and IITQ respectively.

3.3 The Extent of and Trends in Intra-industry Trade: An Overview

Many studies have been conducted by economists, government agencies and autonomous research institutions on the measurement of the extent of intra-industry trade. It is profitable to review some of them with a view to acquainting ourselves with the tools and techniques employed by previous studies, and their findings, so that the results of the present study may be compared with experiences in Canada and elsewhere.

Notable studies are those of Verdoorn (1960), Michaely (1962a, 1962b, 1964), Kojima (1964), Balassa (1963, 1966, 1979), Gray (1973), Grubel and Lloyd (1975), Hesse (1974), Aquino (1978), Finger and De Rosa (1979), McLease (1979), Willmore (1979), Caves (1981), Helleiner (1979), Roosens (1980), Gulck (1981), and Schumacher (1983).

Verdoorn (1960) computed the magnitude of inter and intra-industry trade using the bilateral trade ratios[6] of the Benelux Union (BLEU), for a sample of 121 SITC commodity groups at the 3-digit level. His findings revealed that the number of the extreme values had declined while their median had grown over time since the formation of the Union. Drawing upon his

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[6] The ratio used was:

$$U_i = \frac{X_i}{M_i}$$

where X_i and M_i were Dutch exports to and imports from, Belgium/Luxembourg. This is considered to be an index of similarity of trade flows.

empirical results, Verdoorn inferred the following: (i) economic integration among the Benelux members has generated specialization within the same category of trade; (ii) a high degree of product differentiation had taken place leading to higher share of intra-industry rather than inter-industry trade.[7] Although Verdoorn's seminal study did not attract immediate attention, it, later on, seemed to open "new territory," on the frontiers of trade research.

Michaely (1962a) estimated an index of dissimilarity of exports and imports in SITC commodity groups, for 36 countries.[8] His findings showed that the commodity composition of trade flows of developed countries tended toward considerable similarity, while the opposite tendency was observed for the less developed countries. His results, however, suffered from severe limitations due to an aggregation problem.

Balassa (1963) observed that a substantial volume of increased trade in manufactured products had occurred within the same commodity groups among the European Economic Community (EEC).

Kojima (1964) computed the degree of intra-industry and inter-industry trade by employing a ratio measure of trade flows.[9] Kojima found, first, that trade in manufactures among

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[7] This was reflected in the presence of high variance of the price differentials for the Union's bilateral export price.

[8] Michaely's measure is very close to the G-L adjusted measure.

[9] Kojima's measure is very close to that of Grubel and Lloyd.

the industrial developed countries of West Europe and North America was significant and had grown over time among these countries. Second, his empirical findings showed that simultaneous exports and imports of goods within the same category were relatively high in all the industrial countries. Third, trade within the category of capital intensive heavy and chemical goods had expanded considerably more rapidly than total world trade. On the basis of these findings, Kojima suggested that the growth of trade in similar products called for a policy of international coordination and economic cooperation among countries.

Balassa (1966) estimated the intensity of intra-industry trade for 91 industries among the European Economic Community (EEC) by using equation (3.1) for the years 1958 and 1963. He found that the index was in the range of 0.4 to 0.6 in 1958 and 0.3 to 0.5 in 1963. From this evidence, he inferred that the decline of these "representative ratios," experienced by every EEC country during the period of study, indicated increased intra-industry trade specialization resulting from trade liberalization among EEC countries.

Gray (1973), employing the Balassa index using EEC trade flows data, confirmed that the order of magnitude of intra-industry trade was substantial and, as noted above, had been growing over time.

Grubel and Lloyd (1975) estimated intra-industry trade by employing their indices for:

1. 163 products at the SITC 3-digit level for 10 countries; Canada, U.S.A., Japan, Belgium-Luxembourg, Netherlands, Germany, France, Italy, U.K., and Australia for the years 1957, 1964, and 1967.
2. Australian trade at all levels of disaggregation ranging from 1 to 7-digits for the same period.
3. South-east Asian countries, such as Ceylon, India, Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand, and also for Yugoslavia, at the 2-digit SITC level.

On the basis of their empirical findings, they inferred the following. First, that intra-industry trade was very "significant" within manufacturing industries. Taking the mean across the 10 countries for the year 1967, they found a mean of 70 percent or more for Food Preparation (SITC 099), Stone and Gravel (SITC 273), Organic Chemicals (SITC 512), Inorganic Chemicals (SITC 513), Leather (SITC 611), and Miscellaneous Non-ferrous Base Metals (SITC 689). The ranking of countries by the intensity of estimated intra-industry trade showed the U.K. in the lead with 69 percent, followed by other EEC members. The U.S.A. came up with 49 percent and Australia was on the bottom of the ladder with only 17 percent. Second, even at a very fine level of disaggregation, the extent of intra-industry trade was quite substantial. The magnitude of IIT declines as one goes from highly aggregated levels to a more finely disaggregated level, but IIT does not disappear. Third, the level of intra-industry trade has been growing over time. Fourth, intra-industry trade specialization has developed among less developed countries (LDCs) as well to a certain degree.

Hesse (1974) computed intra-industry trade indices in manufactures between industrial countries for the years 1953-70. His main findings can be summarized as follows. First, the intensity of intra-industry trade between industrialized countries was significant within 3-digit SITC groups. For example, 15 out of 52 manufactured products in his sample showed 70 percent or more, while 42 products showed 50 percent or larger coefficients for the year 1970. Second, intra-industry trade specialization has tended to increase relatively strongly over time between industrialized countries. For example, the estimated IIT values for 52 manufactured products were higher in 1970 than in 1961, while 45 were higher in 1961 than in 1953. Third, it was observed that the intensity of intra-industry trade decreases as a result of further sub-division of the SITC classification, but it remains "remarkably high" even at a refined level of disaggregation. Hesse's findings are thus in conformity with the earlier studies discussed above.

Aquino (1978) by employing $\overline{B}_i$, $\overline{C}_i$, and $\overline{Q}_j$ indices estimated the extent of OECD's intra-industry trade for 25 industrial sectors for the year 1972. All these coefficients indicated very high magnitudes of intra-industry trade. His empirical findings revealed that in 1972 the magnitude of intra-industry trade ranged from 22.9 percent in the case of India to 87.4 percent for France. For other leading countries this value was above 70 percent. For example, the United Kingdom led the group with 81.9 percent, followed by the Netherlands with 78.7, Sweden with 76.3, Belgium with 70.1, Austria with 75.0, Canada with 73.5, Italy with 72.3, and Denmark with 70.3 percent.

Finger and De Rosa (1979) computed "trade overlap"[10] of 14 major developed countries for 1961 through 1976. They reported average values of two 3-year periods: (1) 1961-63 and (2) 1974-76. Their main findings were: (i) 61 out of 144 SITC 3-digit products showed more than 50 percent trade overlap; (ii) the number increased during 1974-76 to 117 products, and (iii) the coefficients in manufactured products increased from 50 to 85 percent over time. These results are very much in conformity with those of others.

McAleese (1979) computed intra-industry trade for the Irish economy employing the G-L index. His results showed that intra-industry trade had increased rapidly in the Irish economy since 1964. The magnitude of the G-L index rose from 0.363 in 1964 to 0.415 in 1971 and further to 0.559 in 1977. A lower rate of increase was recorded in the "adjusted" G-L index during the above period. The intensity of IIT was most pronounced in manufactured goods (SITC 5-8).

Research has been conducted to analyze the experience of developing countries with intra-industry trade in manufactured goods, and also to examine the prospect for such trade among developing, as well as between developed and developing

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[10] Finger prefers the term "trade overlap."

countries. Notable studies are those of Balassa (1979), Willmore (1979), Helleiner (1979), Roosens (1980), Gulck (1981), and Schumacher (1983).

Willmore (1979) in his paper estimated the degree of intra-industry trade for Central American Common Market (CACM) countries. He came to the conclusion that intra-industry trade had developed between CACM and LAFTA countries, since the formation of their economic integration. He also noted that the achievement of scale economies and a greater division of labor in import-competing sectors is one of the hopes of proponents of customs unions among small economies.

Bela Balassa (1979) reviewed the experience of developing countries with intra-industry trade in manufactured goods and examined the prospects for such trade among developing, as well as between developed and developing countries. He pointed out that, apart from the increased exchange of consumer goods by reasons of natural product differentiation, intra-industry trade may entail horizontal and vertical specialization, leading to cost reductions, economies of scale, and economic integration in countries at similar levels of development. If external tariffs are set at low levels in the region and there is provision for tariff reductions, it is suggested that greater efficiency would result. It is stressed that efficiency objectives would also be served if developing countries engaged in vertical specialization in products oriented towards their own markets. This may take the form of importation of capital intensive and technology intensive parts and accessories, combining them with labor-intensive inputs produced domestically. Thus, over time, intra-industry trade could emerge and grow among developing countries and between developing and developed countries.

Helleiner's (1979) study also showed that a large share of U.S.A. imports from developing countries is intra-firm, and this share of the developing countries has been climbing up rapidly.

Roosens (1980) calculated the intensity of intra-industry trade of the OECD countries with the less developed world, by using the Grubel and Lloyd (equation 3.5) and Aquino measures (equation 3.13) at the 3-digit SITC level. The computation was performed for the years 1968-75. His empirical findings showed that an intra-industry trade pattern has developed between the developed and developing world over the years. Empirical evidence showed that in 1975, the U.S.A. was on the top of the ladder with 33.3 percent of IIT with the LDCs, followed by Australia (28.7), the Netherlands (27.4), Canada (25.8), and Japan (25.6). Low values were found for Yugoslavia (11.0), Turkey (12.4), and Iceland (0.4).

Schumacher (1983) attempted to quantify the extent of intra-industry trade between the Federal Republic of Germany and developing countries at different levels of disaggreagtion. His empirical findings showed that, (a) intra-industry trade in manufactures between Germany and developing countries has increased significantly. However, he noted that a considerable proportion of that trade overlap can be explained by applying the familiar hypothesis directed toward the explanation of inter-industry specialization between countries having different factor endowments. (b) In applying the definition of intra-industry trade by Grubel and Lloyd, intra-industry trade between Germany and developing countries accounted for significantly less than one-third of the total trade for the year 1980 in 36 industries. On the basis of the above results, he concluded: "Hence, only a very small fraction of trade in manufactures with developing countries has to be explained by product differentiation, economies of scale effects and other factors which are important to explain trade flows among industrialised countries" (Schumacher, 1983, p. 108).

These findings provide further insight on the explanation of the intra-industry trade phenomenon. The emergence of IIT between the trading partners with factor proportions differences certainly needs further investigation. Although Helliener and Grubel and Lloyd have provided the explanation of such patterns, further research seems to be necessary.

It has also been felt by scholars, such as Pelzman, that the process of intra-industry trade is not limited only to market economies of West Europe. Pelzman (1978) attempted to answer the interesting question raised by Grubel and Lloyd (1975), as to what extent intra-industry trade prevails in a centrally planned economy "where ideology should diminish the influence of ... product differentiation" (Grubel and Lloyd, 1975, p. 49). He estimated the extent of intra-industry trade within SOVIET-COMECON by employing Grubel and Lloyd's indices, for the period 1958 to 1973. His results showed that on a global level the share of intra-industry trade specialization for the Soviet Union with the rest of the world was below 40 percent. Soviet intra-industry trade with COMECON's members represented even a smaller percentage of total trade turnover. But the estimated coefficients for industrial groups at the 3-digit level showed a high magnitude of intra-industry trade, particularly in the Machinery and Equipment and Chemical Sectors. He noted that not only was a high percentage of intra-industry found in these sectors but, more importantly, there existed a tendency toward a positive growth in intra-industry trade specialization. These results were in conformity with the basic specialization assumptions in a customs union.

Summary

Intra-industry trade has been defined as international trade in differentiated products which are close substitutes in consumption and production or both. As far as measurement is concerned, "intra-industry trade" is defined as the simultaneous export and import of products belonging to the same "industry."

The above analysis of various alternative measures of intra-industry trade suggests that the Grubel and Lloyd (1975) measures have some advantage over other indices. This is so because their application helps to address the following pertinent questions. First, what is the interpretation of a trade imbalance with regard to the measurement of intra-industry trade? Second, what is an appropriate level of aggregation at which an "industry" should be defined, and intra-industry trade quantified? Third, is an additional measure for the levels of aggregation provided?

On the basis of the above empirical findings, some general propositions are derived. First, intra-industry trade is a real phenomenon rather than just a statistical artifact. Second, intra-industry trade is most prevalent in manufactured products and has been most prevalent among developed countries. Third, intra-industry trade has been growing over-time. Fourth, intra-industry trade has accompanied economic integration and trade liberalization among countries. Fifth, intra-industry trade has also developed among developing countries in manufactured products, and also between developing and the developed world. Finally, the process of intra-industry trade is not limited to market economies only, but there exists intra-industry trade within SOVIET-COMECON countries as well.

CHAPTER FOUR

MEASURING CANADA's INTRA-INDUSTRY INTERNATIONAL TRADE (IIT) FLOWS: THE RESULTS

This chapter is a report of the empirical estimations of intra-industry trade indices. Among the various measures developed in the preceding chapter, three indices have been applied to calculate Canada's share of IIT in its total foreign trade over the span of nineteen years (1962-80). The three used indices in this study are: the Grubel and Lloyd unadjusted measure, (equation 3.5); Grubel and Lloyd's adjusted index, (equation 3.9); and the Aquino adjusted index, (equation 3.13). A fourth index (equation 3.6) has also been computed in order to investigate the sensitivity of IIT at different levels of aggregation. Estimation has been performed in several ways, each presented in this chapter in a separate section. Section 4.1 provides a brief discussion on the controversial issue of aggregation along with the system of United Nations Standard Industrial Classification (SITC), and then outlines the main empirical findings at different levels of disaggregation. Section 4.2 is an analysis of measured IIT with Canada's specified trade partner counties and with some country groups. Section 4.3 is an investigation of IIT by industry. Section 4.4 analyzes the variation of IIT by country and by industry through time. Section 4.5 presents a brief analysis of special trade relations with the U.S.A. and presents the measured IIT with the

U.S.A. at the 2-digit and 3-digit levels.

4.1 Intra-Industry Trade: The Effects of Different Levels of Data Aggregation

In this section, the analysis of different levels of aggregation and its effects on estimated intra-industry trade is discussed. The method of calculation and data employed for empirical estimates have been discussed in the preceding chapters and will not be reiterated here. Magnetic tapes containing the required data sets were obtained from the Department of Industry Trade and Commerce, Government of Canada, and the External Trade Division of Statistics Canada. Various programs were constructed in order to process and reclassify the data, and compute measures for bilateral and total trade flows, at different levels of aggregation. These measures were estimated from data in current U.S.A. dollars.

Before presenting the main findings, it is necessary to explain the United Nations System of data compilation, followed by its member nations. At the United Nations International Data Bank System, all the data relating to international trade flows have been compiled according to the United Nations "Standard International Trade Classification" (SITC). This system was introduced after Hirschman's pioneering attempt (1947) to measure IIT for different groups of commodities. Because of lack of uniform and consistent data, he could not perform the desired estimates at refined levels of disaggregation. Since then, most countries have adopted the United Nations SITC system of defining the industry group, along with their domestic standard classification (SIC) in order: (i) to make international comparisons, and (ii) to promote research at highly disaggregated levels. The SITC scheme has been revised twice. The data employed in this study are based on Revision I up until 1978. While 1979 and 1980 data are based on Revision II.[1]

The SITC system allows successive subdivision of industrial groupings by using a 5-digit classification number. The 1-digit (0-9) section consists of ten groups into which all products are divided. The 2-digit level divides each group into ten further groups. Each subgroup is then divided into finer groups at the 3,4 and 5-digit levels. An example of this system can be helpful to clarify the concept of aggregation. A sample of the SITC system is, therefore, presented here, as follows:

SITC Codes	Description of the Industry
6	Manufactured Goods classified by materials.
67	Iron and Steel.
674	Universal Plates and Sheets of Iron or Steel.
6742	Medium Plates and Sheets, 3mm to 4.75mm in thickness of Iron or Steel (other than tinned Plates and Sheets).
67421	Medium Plates and Sheets of other than high carbon or alloy steel.

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[1] Revision I occured in 1960 and Revision II in 1975.

This SITC scheme has facilitated research on international trade flows at a very fine level of disaggregation. In what follows, attempts have been made to examine the strength of IIT at 1-digit to 7-digit levels of aggregation. Drawing on empirical evidence, a general hypothesis has been established. It is posited that the higher the level of aggregation, the greater will be the magnitude of IIT for a given set of trade data (ceteris paribus).

The problem of the degree to which goods can be grouped together within a single industry is important to the concept of intra-industry trade. The following is an attempt to set limits to an industry so that the concept of an industry becomes operational. In this study, an industry is defined as a single SITC product group irrespective of the level of aggregation. For example, SITC 6, Manufactured Goods classified chiefly by material, is an industry at 1-digit level. SITC 67421 is an industry at 5-digit level. Following Grubel and Lloyd (1975) the greatest emphasis has been placed on the most interesting and widely used 3-digit level. As Grubel and Lloyd observed:

> A careful study of the SITC classification and the results of calculations already presented has convinced us that the 3-digit SITC statistics separate commodities into groups most closely corresponding to the concept of "an industry" used conventionally in economic analysis. (One exception is the iron and steel industry, for which the 2-digit level (67) appears to be more appropriate.) (Grubel and Lloyd, 1975, p. 52).

It is, therefore, generally accepted that most goods within any particular 3-digit SITC system contain similar factor proportions. However, a great deal of heterogeneity within

3-digit SITC groups is found. This problem arises as a result of the criteria by which internationally traded goods are grouped in the same statistical class. The basic criteria are substitutability of commodities in either production or consumption or both, and similarity of input requirements in production. However, it has been observed that within the U.N. SITC scheme many goods which are not identical in terms of their input requirements, technological intensity or end uses are included in the same statistical group. For example, SITC 7142 is very heterogeneous from the point of view of technology intensity even at the finest level of disaggregation, in the sense that it includes the simplest calculating machines together with the most sophisticated calculating and accounting systems. Likewise SITC 7242 contains portable radios along with highly sophisticated receivers. These commodities have different production functions but are recorded in the same SITC classification. The crux of the matter lies in the degree to which compiled trade data include commodities with different input-mixes within a single group.

Finger (1975b) appears to be apprehensive about the occurrence of this phenomenon. He writes that the "literature (on IIT) is valueless because all observed IIT can be explained by categorical aggregation" (Finger, 1975b, p. 7). In a similar vein, Lipsey (1976) has his own doubts: "Many of the 3-digit groups contain products that are diverse by any standard: produced by nonoverlapping groups of companies using completely different production techniques, and sold in entirely different markets." After having expressed his apprehensions in this respect, he then concludes that, "... from these results and from my own impressions as to the heterogeneity of 3-digit groups, that much, although not all, of intra-industry trade is a statistical phenomenon" (Lipsey, 1976). Any observed IIT attributable to categorical aggregation is, therefore, considered to be spurious as it owes its existence to shortcomings in the body of data.

On the other hand, Gray (1973, 1979), Grubel and Lloyd (1975), Hesse (1974), Aquino (1978), and Caves (1981), believe that observed IIT is a real phenomenon and is also a stable characteristics of industries. The existence of IIT is, therefore, not a statistica statistical illusion or product of categorical aggregation. They agree that some part of IIT is caused by the level of statistical compilation of data (as mentioned above), but that these are exceptional cases. They argue that a large amount of IIT is due to other factors, such as economies of scale, product differentiation, joint production process, trade liberalization, geographical proximity, market structure, and the operations of multinational firms.

In order to clarify the doubts expressed in the body of literature of IIT, Grubel and Lloyd (1975) classified the industries in which IIT has taken place into three groups. Group 1, consists of industries in which goods are close substitutes in use but have dissimilar input requirements, such as furniture made of wood or steel and yarn made of nylon or wool. The observed phenomenon of IIT in this group can be explained within the framework of the H-O-S model as input requirements are different. Group 2 consists of those commodities which are poor substitutes in use, for example, tar and gasoline or iron bars and iron sheets, but which have a similar input mix. Within this group, IIT takes place because of a joint technological production process. For instance, petroleum products of different volatility, kerosene and gasoline. In this case, one country a supply of one of its joint products in excess of its demand, and, therefore, exchanges it for others. Group 3 comprises products which are close but not perfect substitutes in their basic functions for consumers, but they are differentiated by style, quality, minor variations in the combination of performance characteristics, or just the brand names, such as automobiles -- Volkswagen and Renault. They all contain similar input mixes. Apparently this group appears to be at variance with the H-O-S model's prediction. IIT in this group has been very high. Trade within this group is consistent with the hypothesis that IIT has developed between those countries which share similar factor endowments and, therefore, similar production functions. Grubel and Lloyd (1975) further argued that the existence of IIT in this group is also consistent with the H-O-S model and is not at variance with the traditional theory. If increasing returns to scale in the production function (from the supply side) and product differentiation (on the demand side) are incorporated in the H-O-S model (instead of constant returns to scale and homogeneous products),[2] IIT is explained.

Since the question of aggregation is basic to the theory of intra-industry trade, economists have attempted to resolve the controversy on empirical grounds. Various studies have investigated the sensitivity of IIT at different levels of disaggregation. A few of them are briefly reviewed here.

Grubel and Lloyd (1975) attempted to measure the magnitude of IIT at various levels of disaggregation, ranging from 1 to 7-digit for Australian foreign trade in relation to trade with ten OECD industrialized countries. Their findings indicated that the intensity of IIT was the highest at 1-digit and lowest at the 7-digit level. The average of IIT to Australian total trade with all 10 partner countries was 6.2 percent at the 7-digit and 42.9 percent at the 1-digit levels. Grubel and Lloyd pointed out that, "This tabulation shows clearly that high levels of intra-industry trade persist at all levels of aggregation" (1975, p. 51). Although Grubel and Lloyd admit that (especially in their example of Referigerators (pp. 66-67)), even at the 5-digit SITC level there is a possibility that observed two-way trade is not intra-industry trade. But Grubel and Lloyd maintained that:

> Both the measures of intra-industry trade at different levels of aggregation and the case studies ... have shown that intra-industry trade in Australia cannot be explained away by disaggregation. (Grubel and Lloyd, 1975, p. 67).

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[2] This issue is discussed in the preceding chapter.

They also observed that, "A study of the descriptions of 5-digit industries reveals that they leave much room for the inclusion of similar products differentiated in apparently minor ways" (p. 58). On the basis of these results, Grubel and Lloyd (1975) concluded:

> This result implies that industries preserve their relative strength of intra-industry trade through these levels of aggregation, and studies of differences among industries would be insensitive to the level of aggregation chosen (Grubel and Lloyd, 1975, p. 51).

Peter Gray (1979) estimated West Germany's IIT (for 1973 trade data) in relation to 5 different partner country groups. Employing the Balassa index, he computed IIT for the 1 to 4 digit levels for SITC 0 through 8. For SITC 6 through 8, estimation was performed for all levels of disaggregation ranging from 1 to 5-digit. His main findings also confirm the general hypothesis that the importance of IIT declines with the level of disaggregation. He observed that, "the magnitude of intra-industry trade decreases with a more refined level of disaggregation but never vanishes, and in all cases remains considerable" (Gray, 1979, pp. 87-110). However, his results also showed that in many cases IIT was more intense at higher levels of disaggregation.[3]

Clark's study (1975) concentrated on 1 and 2-digit levels for New Zealand's foreign trade with a few partner countries. His main findings were consistent with the other empirical results.

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[3] This will be discussed subsequently.

Some empirical researchers have also tried to disentangle the issue of aggregation from the real causes of IIT by empirical tests of theories of IIT. It was posited that if the tests indicate sensitivity to theoretical determinants, then IIT is a real phenomenon and not just a statistical artifact. Such empirical studies were conducted by Pagoulatos and Sorensen's (1975) tests of Gray's theory of two-way trade[4] (or intra-industry trade). They stated that, "If two-way trade is indeed a real phenomenon and is influenced by the factors suggested by Gray it should be possible to demonstrate this with empirical evidence" (Pagoulatos and Sorensen, 1975, pp. 456-457). Using a multiple regression analysis for 102 U.S.A. 3-digit SITC industries with an IIT index as the dependent variable and with independent variables such as transport costs, product differentiation, trade restrictions, and the level of development, estimation was performed. The effects of different levels of aggregation were captured by a variable representing the number of 4-digit sub-groups in each of the 3-digit classes. Most of the coefficients were found significant with the appropriate sign and a reasonable R^2. These authors conclude:

> This suggests that two-way trade is not only the result of data aggregation, but that other factors, such as product differentiation, tariff differentials, income similarity, the height of tariff barriers and transportation costs, significantly contribute to the explanation of the simultaneous export and import of the same commodity. Furthermore ... two-way trade is a real phenomenon, rather than just an aggregation problem (Pagoulatos and Sorensen, 1975, p. 464).

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[4] Gray prefers to use the term "two-way trade."

Virtually all these empirical studies support the theoretical hypothesis that intra-industry trade is an increasing function of the level of aggregation. The higher the level of aggregation, the greater will be the strength of IIT within a given product group and across all commodity groups. The magnitudeof IIT declines as one moves from a highly aggregated level to a fine level of disaggregation, but the strength of IIT is preserved even at the finest level of disaggregation. As Grubel and Lloyd observed:

> Measured intra-industry trade rises rapidly as the degree of aggregation increases, reaching 20 percent at the most widely used 3-digit levels, and 43 percent at the 1-digit levels (Grubel and Lloyd, 1975, p. 49).

In line with the above studies, an attempt is made in this study to investigate the sensitivity of IIT in Canada's foreign trade to degree of disaggregation.

The computation of IIT values has been performed for all industries at the 1 to 5-digit levels for trade with 29 countries.

Tables 4.1 through A4.1.2,[5] provide summary statistics. The main empirical findings are: (a) that in most cases the value of the IIT indices tends to decrease as the number of digits increases for almost all the trading partners in the sample and in all the commodity groups. Examples do occur of values of the indices increasing as the number of digits increases.

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[5] Tables A4.1.1 and A4.1.2 are in the Appendix.

TABLE 4.1

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY AT DIFFERENT LEVELS OF AGGREGATION, 1980 (%)

SITC	LEVELS OF AGGREGATION	U.S.A	JAPAN	U.K.	BEL—LUX	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	IRELAND	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND
0	1 - digit	76.74	12.69	32.43	10.45	46.32	37.99	23.36	69.20	96.82	14.63	28.94	98.70	43.14	10.46	69.97
	2 - digit	53.34	23.91	26.62	25.62	39.95	29.18	17.03	32.72	39.80	90.20	25.57	19.93	34.36	18.46	22.58
	3 - digit	45.19	23.59	23.52	15.54	20.11	17.62	13.05	24.70	26.17	5.21	17.82	11.56	26.29	10.77	14.87
	4 - digit	38.92	12.69	20.37	12.02	17.77	15.45	10.68	20.03	19.57	6.81	14.89	6.47	23.09	9.07	11.89
	5 - digit	25.66	16.59	13.51	10.84	14.60	12.91	8.15	15.60	16.57	6.75	13.86	6.30	13.82	7.64	12.07
1	1 - digit	35.21	44.49	78.38	13.59	1.16	31.88	8.09	76.25	42.84	81.89	2.90	15.97	9.05	81.86	54.53
	2 - digit	38.21	31.85	29.41	14.94	12.42	12.75	3.37	58.02	24.81	27.57	1.91	21.17	14.80	30.88	39.12
	3 - digit	35.21	23.49	22.36	17.86	22.44	7.92	2.03	31.76	11.75	13.87	1.71	19.49	11.30	12.90	34.38
	4 - digit	35.67	18.11	15.03	16.09	13.25	10.88	1.27	25.83	8.68	10.44	7.36	19.91	8.73	9.03	28.30
	5 - digit	33.24	14.82	10.86	8.94	10.17	3.25	0.88	20.61	5.81	9.28	1.06	10.13	8.01	9.03	16.29
2	1 - digit	57.77	24.79	6.29	4.69	4.49	5.11	1.05	9.06	76.60	39.72	0.44	47.30	9.12	11.54	4.37
	2 - digit	53.36	18.22	14.17	21.54	21.63	20.57	12.28	20.91	22.14	23.43	0.21	20.72	12.67	15.20	19.77
	3 - digit	42.74	13.41	15.37	14.62	19.20	14.22	12.76	19.21	16.35	12.17	0.20	16.88	13.60	9.28	11.31
	4 - digit	31.16	9.83	11.30	13.19	16.70	9.73	8.91	16.42	12.72	8.35	0.11	10.09	12.05	7.56	9.44
	5 - digit	21.82	6.72	9.10	8.13	12.26	7.64	5.81	11.75	11.78	7.63	0.10	8.98	9.56	5.92	7.09

TABLE 4.1
(cont'd)

SITC	LEVELS OF AGGREGATION	U.S.A	JAPAN	U.K.	BEL-LUX	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	IRELAND	Austria	FINLAND	NORWAY	SWEDEN	SWITZERLAND
3	1 - digit	45.90	3.01	8.90	6.46	2.68	42.07	0.00	23.57	0.25	0.00	10.34	36.73	0.86	0.02	1.53
	2 - digit	25.31	3.02	4.01	6.72	1.50	22.59	0.00	11.33	8.48	0.00	10.06	15.38	10.64	0.02	1.52
	3 - digit	25.06	0.18	13.96	12.49	1.41	17.59	0.00	8.28	16.77	0.00	8.34	0.00	10.49	0.01	1.08
	4 - digit	22.08	0.02	11.18	10.41	0.95	13.83	4.96	10.22	12.58	0.00	6.68	7.67	8.99	0.01	0.72
	5 - digit	11.95	0.02	9.13	10.41	0.95	11.70	0.00	4.40	12.58	0.00	6.68	7.69	8.99	0.01	0.72
4	1 - digit	33.07	3.11	91.12		4.36	11.78	0.00	5.37	0.00	0.00	0.00	0.00	77.65	16.32	1.20
	2 - digit	32.66	4.05	24.04	0.00	1.55	26.96	0.00	5.58	0.00	0.00	0.00	0.00	35.30	4.17	0.53
	3 - digit	31.37	3.48	14.24	0.00	0.85	28.94	0.00	6.22	0.00	0.00	0.00	0.00	28.58	2.50	0.32
	4 - digit	25.14	3.09	9.35	0.00	0.75	22.74	0.49	4.42	0.00	0.00	0.00	0.00	15.79	2.08	0.27
	5 - digit	16.01	2.09	7.41	0.00	0.57	24.37	0.00	5.65	0.00	0.00	0.00	0.00	12.63	2.08	0.27
5	1 - digit	80.06	60.52	78.10	75.08	58.08	49.70	85.03	38.31	60.97	7.83	80.73	55.22	99.47	47.64	23.22
	2 - digit	38.98	38.55	44.90	69.71	39.72	38.40	41.90	45.70	30.66	26.04	28.53	48.45	52.38	53.35	28.21
	3 - digit	32.18	31.93	39.18	39.90	32.51	32.22	28.30	42.86	18.58	18.66	18.93	28.19	29.52	34.12	22.45
	4 - digit	19.20	15.50	20.65	20.87	20.07	17.07	16.33	24.59	12.68	12.95	18.23	17.10	18.81	23.65	11.61
	5 - digit	7.43	11.09	10.64	14.00	11.56	5.33	12.39	15.17	11.76	11.20	14.50	17.10	18.05	18.33	7.68
6	1 - digit	78.85	66.16	72.06	70.74	72.13	91.91	88.51	22.71	72.79	83.67	35.79	34.64	29.69	54.49	83.90
	2 - digit	58.47	30.43	35.62	39.93	35.88	38.18	34.37	30.01	60.90	31.96	28.77	49.22	44.67	43.45	47.33
	3 - digit	45.12	18.98	33.97	28.23	29.92	28.18	21.81	29.50	41.33	19.64	17.54	33.83	24.33	26.34	34.55
	4 - digit	27.22	13.75	21.38	18.93	18.95	18.21	13.00	21.48	25.44	13.86	12.17	23.99	15.88	16.15	20.80
	5 - digit	15.39	8.70	11.09	12.23	11.39	10.00	7.49	13.45	17.64	0.76	0.87	18.22	13.39	10.32	13.08

TABLE 4.1
(cont'd)

SITC	LEVELS OF AGGREGATION	U.S.A.	JAPAN	U.K.	BEL—LUX	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	IRELAND	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND
7	1 - digit	72.24	7.36	53.27	94.16	57.04	23.18	54.00	70.15	63.65	22.17	64.08	42.24	85.24	40.42	44.58
	2 - digit	60.25	12.91	55.59	55.08	45.72	36.35	41.73	50.27	53.14	26.33	52.41	37.31	65.26	40.17	38.56
	3 - digit	48.08	14.70	39.04	34.15	32.45	23.62	30.41	33.57	26.64	24.95	26.29	43.09	33.12	33.81	19.48
	4 - digit	30.03	11.01	25.20	22.01	21.67	15.31	21.22	21.49	17.37	17.78	19.13	18.30	23.05	17.57	13.30
	5 - digit	14.93	6.09	12.86	14.29	13.82	9.15	10.43	14.52	12.16	12.66	13.18	12.73	17.32	9.03	8.13
8	1 - digit	45.17	13.31	51.23	81.04	38.76	87.25	16.44	94.40	24.14	63.86	43.53	89.05	66.71	64.06	94.31
	2 - digit	57.87	23.57	64.23	38.14	40.34	57.42	23.75	58.69	37.99	47.33	36.97	45.03	43.25	47.69	47.92
	3 - digit	42.76	18.18	47.20	35.60	31.13	40.45	17.93	40.55	28.62	37.60	36.29	10.99	35.16	32.05	40.29
	4 - digit	23.51	10.17	23.97	20.79	17.65	22.31	7.34	21.54	16.01	20.08	18.10	18.58	20.45	18.07	20.91
	5 - digit	10.98	5.62	10.99	12.80	8.48	10.12	5.38	12.39	9.56	12.45	11.11	10.71	14.69	9.47	11.22
9	1 - digit	83.03	22.79	81.45	95.63	9.98	35.36	14.58	88.59	30.62	5.18	64.77	18.49	57.07	2.27	69.53
	2 - digit	61.79	24.01	18.29	26.35	13.54	18.04	4.50	32.38	21.36	3.26	12.09	32.72	39.00	2.10	27.45
	3 - digit	57.36	21.22	13.07	19.99	14.53	16.70	3.38	27.44	20.04	2.88	6.74	28.44	35.39	2.04	23.21
	4 - digit	50.90	19.31	10.67	17.20	13.82	14.11	5.21	24.02	20.04	2.88	6.07	28.31	35.39	1.74	22.14
	5 - digit	41.36	19.31	8.67	15.97	11.69	11.46	2.03	20.82	20.04	2.88	6.07	28.31	35.39	1.50	20.56

TABLE 4.1
(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	South Korea	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILLIPPINES
0	1 - digit	81.02	86.07	16.70	11.53	5.25	99.58	96.60	95.86	51.37	0.00	19.35	3.47	37.54	80.57
	2 - digit	15.98	14.59	23.72	25.46	2.01	37.96	23.94	39.46	21.78	0.00	9.86	12.82	14.95	12.55
	3 - digit	12.59	8.27	19.03	21.72	5.80	27.87	19.04	29.59	23.42	0.00	6.88	8.09	7.51	10.00
	4 - digit	10.88	6.91	14.58	16.22	3.53	21.79	17.99	28.41	20.10	0.00	8.05	4.78	4.87	6.65
	5 - digit	11.07	7.37	13.34	13.62	3.25	16.63	13.08	19.20	16.41	0.00	4.13	3.82	4.00	6.02
1	1 - digit	0.43	0.21	72.49	53.70	0.00	18.39	0.00	7.52	36.11	0.00	0.00	54.54	0.00	21.42
	2 - digit	0.29	1.42	29.83	19.37	0.00	31.83	0.00	18.09	14.50	0.00	0.00	0.69	0.00	19.60
	3 - digit	0.22	1.66	15.25	10.01	0.00	35.92	0.00	9.04	10.99	0.00	0.00	0.63	0.00	17.33
	4 - digit	0.89	2.05	16.84	6.75	0.00	21.86	0.00	6.03	18.40	0.00	0.00	0.40	0.00	17.20
	5 - digit	0.13	0.92	8.98	6.08	0.00	20.54	0.00	6.03	13.07	0.00	0.00	0.37	0.00	13.07
2	1 - digit	9.74	14.58	94.41	94.60	56.56	88.23	1.69	25.02	0.55	0.00	0.00	86.16	4.45	43.49
	2 - digit	13.03	22.99	26.79	17.16	19.75	25.71	8.05	7.33	8.72	0.00	0.00	25.39	6.09	21.32
	3 - digit	13.09	12.18	17.90	10.77	15.83	14.87	5.14	7.17	8.39	0.00	0.00	10.17	3.34	10.28
	4 - digit	13.55	8.03	15.14	7.88	12.26	12.20	5.61	3.79	6.73	0.00	0.00	6.30	3.15	8.77
	5 - digit	12.66	7.26	13.17	8.02	11.61	10.13	5.25	3.54	6.34	0.00	0.00	5.46	2.12	8.36

TABLE 4.1
(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILLIPPINES
3	1 - digit	0.00	0.00	5.59	0.00	0.00	9.95	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.23
	2 - digit	0.00	0.00	4.38	0.00	0.00	7.36	0.00	0.00	0.00	0.00	0.07	0.03	0.00	0.23
	3 - digit	0.00	0.00	12.74	0.00	0.00	9.66	0.00	0.00	0.00	0.00	1.50	0.01	0.00	0.11
	4 - digit	0.00	0.00	8.92	0.00	0.00	8.28	0.00	0.00	0.00	0.00	1.12	0.01	0.00	0.08
	5 - digit	0.00	0.00	8.92	0.00	0.00	8.28	0.00	0.00	0.00	0.00	1.04	0.01	0.00	0.08
4	1 - digit	91.97	68.73	4.44	12.26	0.00	3.59	0.00	37.15	0.00	0.00	0.00	0.00	0.52	0.00
	2 - digit	25.98	50.36	1.48	4.09	0.00	2.47	0.00	23.48	0.00	0.00	0.00	39.32	0.36	0.00
	3 - digit	15.59	37.81	0.82	2.45	0.00	1.80	0.00	13.03	0.00	0.00	0.00	21.96	0.21	0.00
	4 - digit	12.99	32.31	0.63	1.75	0.00	1.97	0.00	9.18	0.00	0.00	0.00	14.64	0.18	0.00
	5 - digit	12.99	20.72	0.55	1.75	0.00	1.40	0.00	7.24	0.00	0.00	0.00	13.51	0.18	0.00
5	1 - digit	98.32	41.21	19.34	46.06	4.35	37.31	5.57	2.03	18.18	0.00	0.00	43.58	10.21	14.32
	2 - digit	30.59	43.94	32.36	12.06	4.15	34.12	26.56	8.63	44.31	0.00	0.00	19.12	16.64	9.26
	3 - digit	16.94	32.99	23.89	7.81	1.42	26.03	22.99	4.29	25.63	0.00	0.00	17.24	13.72	4.39
	4 - digit	10.32	19.32	18.77	8.61	1.16	15.50	16.63	3.71	16.94	0.00	0.00	13.96	10.87	3.55
	5 - digit	10.32	16.48	16.63	8.24	1.16	14.90	15.90	3.71	16.08	0.00	0.00	12.05	10.18	4.87

TABLE 4.1
(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILLIPPINES
6	1 - digit	85.82	86.98	15.51	9.97	2.32	98.07	61.39	77.70	53.25	0.00	0.13	30.30	81.05	37.10
	2 - digit	14.74	16.69	18.48	18.71	18.43	26.21	21.71	18.16	40.54	0.00	6.01	17.53	18.40	16.71
	3 - digit	5.91	12.61	22.11	12.78	5.55	18.16	15.02	11.67	23.71	0.00	1.63	13.35	12.51	7.71
	4 - digit	4.40	9.14	16.03	9.25	3.59	15.48	13.45	8.67	17.20	0.00	1.10	9.09	10.65	4.53
	5 - digit	2.75	6.71	12.96	7.82	3.52	10.95	8.64	0.00	12.91	0.00	0.91	6.66	7.49	0.00
7	1 - digit	96.29	37.17	7.23	1.54	0.12	41.91	34.84	49.56	2.92	0.00	0.05	4.72	1.53	0.09
	2 - digit	56.50	33.54	9.64	1.04	0.09	52.46	27.57	29.05	24.40	0.00	0.00	5.05	1.41	0.08
	3 - digit	26.79	28.53	16.60	5.00	0.04	34.90	12.70	17.01	25.20	0.00	0.00	8.79	7.19	0.03
	4 - digit	14.46	16.48	15.57	1.90	0.03	24.01	8.08	10.04	15.73	0.00	0.00	8.14	5.95	0.01
	5 - digit	12.34	9.96	16.06	1.55	0.03	18.30	7.43	0.00	14.18	0.00	0.00	5.57	4.59	0.01
8	1 - digit	8.72	6.05	56.31	44.40	31.63	4.00	0.91	16.13	6.01	0.00	2.07	9.03	70.97	54.40
	2 - digit	1.52	16.68	35.75	24.11	10.66	6.34	13.17	10.94	31.34	0.00	2.20	34.07	34.59	14.69
	3 - digit	1.76	10.77	34.56	22.29	8.54	6.74	11.57	10.87	24.42	0.00	1.79	34.98	21.15	8.34
	4 - digit	1.76	7.80	20.87	14.71	7.49	5.66	5.94	8.32	19.19	0.00	3.33	23.85	11.50	5.77
	5 - digit	0.99	3.71	13.70	10.98	8.84	3.48	4.22	0.00	12.01	0.00	2.72	-16.58	0.03	3.73
9	1 - digit	0.00	22.64	69.67	44.68	55.28	1.53	0.00	29.62	50.54	0.00	39.65	98.37	96.05	80.00
	2 - digit	0.00	30.75	34.49	11.65	32.38	1.05	0.00	27.65	47.53	0.00	0.00	65.16	48.07	20.00
	3 - digit	0.00	26.95	29.49	6.96	27.80	0.96	0.00	27.66	42.77	0.00	0.00	58.52	41.21	11.43
	4 - digit	0.00	22.73	25.71	6.96	27.80	0.96	0.00	27.26	42.77	0.00	0.00	58.52	41.21	11.43
	5 - digit	0.00	20.21	25.71	6.96	27.80	0.96	0.00	0.00	42.77	0.00	0.00	58.52	41.21	11.43

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

For instance, SITC 1 and 8 with the United States and France; SITC 2 Switzerland and Sweden, Norway, the Netherlands, and the U.K.; SITC 7 with Japan, and W. Germany; SITC 8, with Japan, U.K., Italy, and Denmark. In these cases, 2 and 3-digit estimates are greater than the 1-digit values. This phenomenon apparently seems to be inconsistent with the general hypothesis. Possible explanations for this are given below. First, these measures are not the global averages across all commodities or each trade partner, rather the estimates are for each SITC industry group with respect to each specific trade partner. In many countries there are differences between import commodity classification and export commodity classification at different levels of aggregation.[6] These inconsistencies in data reporting by individual countries may bias measured IIT at a particular level of aggregation. Second, this may arise from trade imbalance in a particular commodity group, especially because of imbalance in the trade in finished goods and in parts. Some countries are net importers of finished goods, but net exporters of intermediate goods (such as Australia). Third, drawing on Peter Gray's (1979) assertions, one can argue that the weighted index will be smaller at higher levels of aggregation. This, however, depends on the number of industries in each commodity group for each particular partner country. Grubel and Lloyd (1975) argued that, although the mean values increase with

[6] Grubel and Lloyd (1975) mentioned such a problem in the case of Australian classification.

aggregation, the number of individual industries with very high levels of IIT decreases with aggregation. For instance, there are 54 industries at the 2-digit level, more than 150 at the 3-digit level, and so on. This needs further investigation.

(b) High levels of intra-industry trade exist at all levels of aggregation in all commodity groups, particularly in trade relations with developed countries, such as the United States, Netherlands, Denmark, Finland, Norway, Switzerland and France. These countries have a similar level of development (measured in terms of per capita income). This result supports the hypothesis that high IIT is more pronounced between developed countries.

(c) The values of the indices for manufactured goods are consistently higher than those for primary products -- particularly so at the higher levels of aggregation. For example, in 1980, Canada's IIT in SITC 5, 6, and 7, for most of the countries is above 70 percent at the 1-digit level. In most cases, observed IIT exceeds 50 percent at the 3-digit level. This lends further support to the hypothesis that measured IIT is high and more pronouced within manufacturing sectors. This may be because the product differentiation and economies of scale are more observable in these industrial sectors. This is also supported by the fact that income elasticities for these products are high.

(d) These results also indicate that the observed phenomenon of IIT in Canada is not limited to trade with developed countries, but exists even between developed and less developed countries. This is particularly true for those countries which are specialized in manufactured and semi-manufactured goods. IIT also exists with a few countries which are specialized in the exports of primary products and which, surprisingly enough, have a high level of protection in their manufacturing industries. The findings are consistent with those of Grubel and Lloyd (1975) and Gray (1979). Large variations are found within individual commodity groups and with different partner nations. In SITC, 5 values of over 90 and less than 3 are found at the 1-digit level. These values are strikingly high with developed trading partners such as the U.S.A. (80.06), Japan (60.52), U.K. (78.10), Belgium-Luxembourg (78.08), Italy (85.03), Denmark (60.97), Austria (80.73), Norway (99.47), and Portugal (98.97). At the 3-digit level, values range from 42.86 (Netherlands), to 1.42 (Turkey). High magnitudes are found at the 4-digits in relation to different trading partners. At the 5-digit level, values of 18.33 and 1.16 percent are found for different countries. Higher values are, generally found for the developed countries as compared to the less developed trading partners. For instance, the share of Canada's intra-industry trade with the United States is 80.06 at 1-digit, 38.98 at 2-digit, 32.18 at 3-digit, 19.20 at 4-digit, and 7.93 at 5-digit levels. SITC 6 and 7 show a similar tendency.

(e) The striking (and perhaps interesting) aspect of Canada's IIT phenomenon is that high values are found in the SITC 0-4 Divisions, a finding which at first glance may appear surprising.[7] Earlier studies found high magnitudes in SITC 5-8 among EEC and OECD countries. The Canadian data also show that IIT values in these categories are substantial. High values are found in these SITC groups even at the 5-digit level.

(f) Furthermore, a closer glance at these findings also suggests that intra-industry trade does not emerge simply from aggregation. Some exaggeration of the importance of intra-industry trade obviously exists at high levels of aggregation, yet IIT retains its status as a real phenomenon of significance at low levels of aggregation. This is supported not only by the magnitudes of the G-L index, which are low at relatively high levels of disaggregation, but also by the fact that in a number of cases the value of IIT increases with further disaggregation.

From an efficiency point of view these results have also been summarized with the help of Figures 4.1.1.(a-j) and 4.1.2 (a-j). These Figures exhibit the sensitivity of Canada's intra-industry trade with the United States at different levels of aggregation. The direction holds for other trading partners (except in some exceptional cases).

These Figures lend additional support to the following facts. First, that intra-industry trade is pervasive in almost all the SITC commodity groups, especially with the United States. Second, intra-industry trade is a decreasing function of the level of disaggregation. Figure 4.1.2 shows that IIT tends to decline as one moves from the 1 to 5-digit levels.

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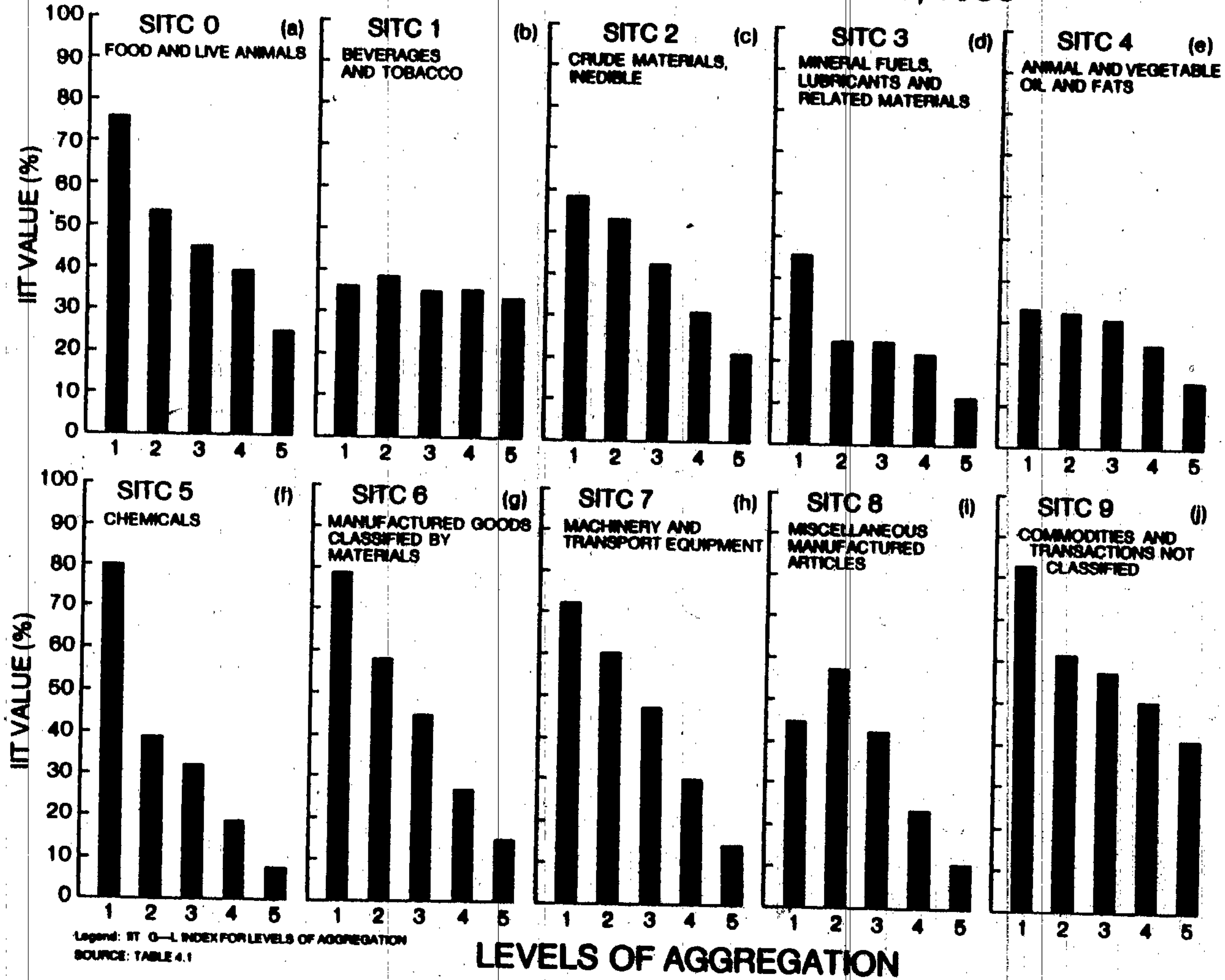
[7] As discussed in the preceding chapter.

FIG. 4.1.1

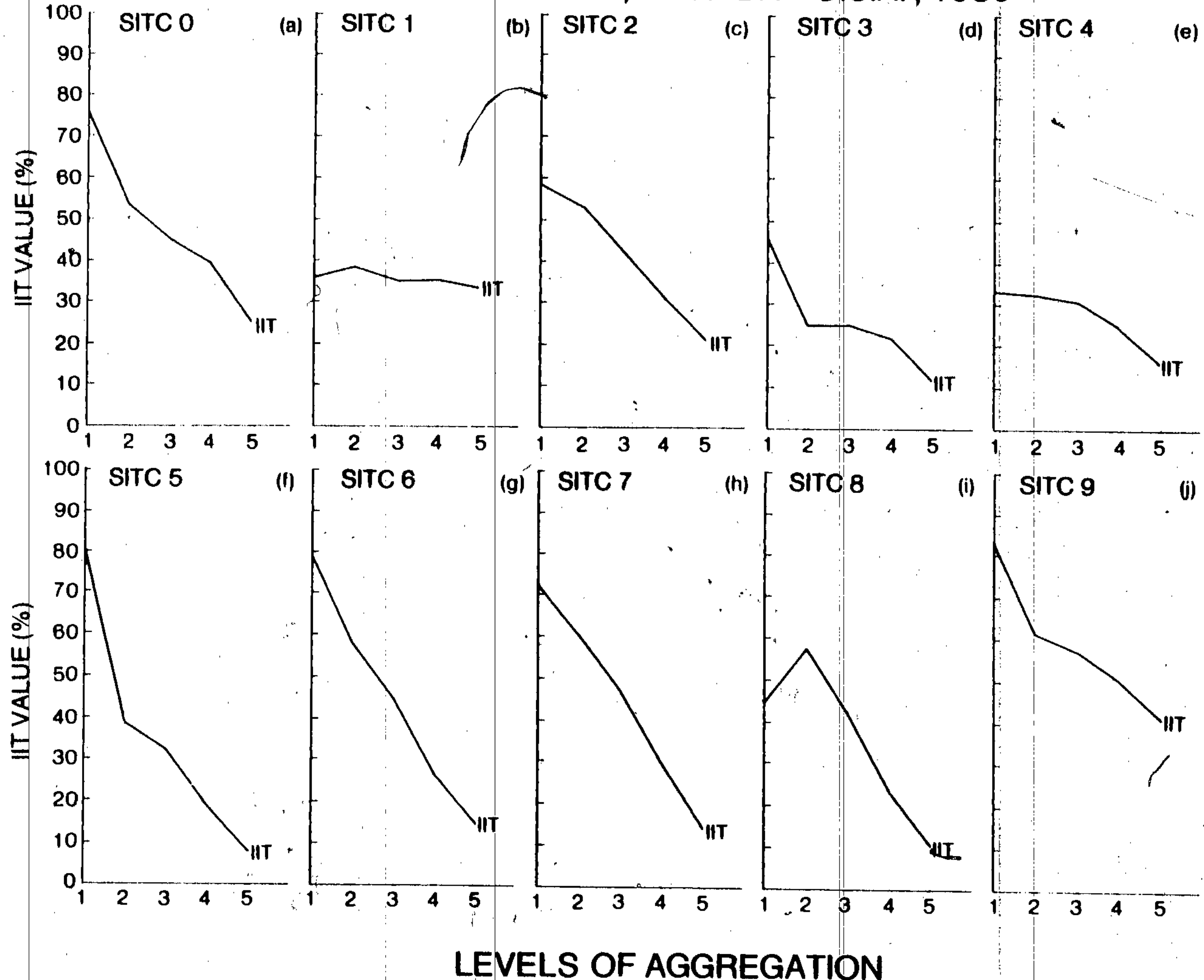
INTRA—INDUSTRY TRADE AT DIFFERENT LEVELS OF AGGREGATION IN SITC 0 THROUGH 9, CANADA—U.S.A., 1980



Legend: IIT G—L INDEX FOR LEVELS OF AGGREGATION
SOURCE: TABLE 4.1

FIG. 4.1.2

INTRA—INDUSTRY TRADE AT DIFFERENT LEVELS OF AGGREGATION IN SITC 0 THROUGH 9, CANADA—U.S.A., 1980



However, it also indicates that even at the highest level of disaggregation, IIT does not vanish. Interestingly SITC 1 seems to be insulated from the repercussions of aggregation. A negligible variation is found in this category. Third, in a few cases IIT tends to increase with the level of disaggregation. Fourth, the intensity of IIT is higher in SITC 5 through 8. Finally, these results seem to support the widely accepted belief that the 3-digit level of aggregation may constitute a workable concept of industry for the purpose of the measurement of intra-industry trade.

These findings, thus, lend support to the hypothesis that enough intra-industry trade exists in Canada to warrant its due consideration. Its existence cannot be explained away in terms of statistical illusion. Intra-industry trade is apparently a real phenomenon potentially influenced by various economic and other forces, rather than a mere statistical artifact.

4.2 <u>Canada's Intra-Industry Trade by Country</u>

In this section, the extent of intra-industry trade of Canada with respect to specified trade partner countries is presented. The Grubel and Lloyd unadjusted (IITB), Grubel and Lloyd adjusted (IITC), and Aquino adjusted (IITQ) indices have been employed. These indices have been estimated for all SITC classes across countries.

Tables 4.2 and Appendix Tables A4.2.1 through A4.2.4 exhibit Canada's share of intra-industry trade with each trade

TABLE 4.2

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY SITC 0 THROUGH 9, SUMMARY VALUES (1980)

SITC	DESCRIPTION	IIT(%)	U.S.A.	JAPAN	BEL-LUX	FRANCE	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	GERMANY W.	DENMARK	NORWAY	SWEDEN
0	FOOD & LIVE ANIMALS	(a)	50.16	9.38	6.66	21.72	9.42	30.35	14.64	15.95	5.78	34.66	17.42	35.50	27.54	8.77
		(b)	65.36	73.95	63.72	46.89	54.27	43.86	45.15	55.11	39.56	35.12	45.85	36.67	63.84	71.46
		(c)	55.41	40.21	43.56	39.24	38.68	41.59	40.99	36.86	32.90	35.07	40.37	36.44	43.08	46.17
1	BEVERAGE AND TOBACCO	(a)	24.57	43.39	9.84	1.00	3.02	41.85	23.17	2.15	20.90	6.50	10.68	9.17	8.37	20.74
		(b)	69.79	97.53	72.37	86.35	37.37	54.88	29.56	74.10	25.52	40.73	33.51	58.18	92.45	33.33
		(c)	57.39	75.21	62.59	58.37	37.28	46.43	29.21	74.10	25.32	26.36	33.39	40.78	40.71	33.33
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS	(a)	38.28	3.65	2.70	3.21	1.18	5.62	4.48	0.31	20.91	22.76	3.89	37.01	5.72	19.09
		(b)	66.27	76.11	57.54	71.43	63.88	57.02	71.32	70.22	52.64	48.10	76.29	48.26	62.69	47.48
		(c)	50.40	48.23	36.77	34.57	35.68	39.30	43.92	44.41	36.31	33.63	49.31	42.38	33.75	39.91
3	MINERAL FUELS LUBRICANTS AND RELATED MATERIALS	(a)	36.63	0.01	5.26	2.05	0.00	18.36	6.55	10.34	0.00	12.24	20.62	0.22	0.39	14.28
		(b)	79.80	71.77	81.52	76.47	00.00	77.89	73.70	100.00	0.00	33.33	49.00	97.77	45.58	33.33
		(c)	60.39	50.17	59.45	76.47	50.00	77.89	55.79	92.72	50.00	25.00	38.01	91.13	33.35	27.29
4	ANIMAL AND VEGETABLE OILS AND FATS	(a)	23.11	2.32	-	1.71	0.00	2.40	26.32	0.00	0.00	31.11	4.23	0.00	32.95	0.00
		(b)	69.90	74.70	-	39.29	0.00	44.75	28.88	0.00	0.00	56.34	35.95	0.00	42.40	0.00
		(c)	52.48	56.89	-	32.03	50.00	33.24	28.35	50.00	50.00	42.24	29.39	50.00	42.41	50.00

<u>TABLE 4.2</u>
<u>(cont'd)</u>

SITC	DESCRIPTION		U.S.A	JAPAN	BEL—LUX	FRANCE	ITALY	NETHERLANDS	U.K	AUSTRIA	IRELAND	FINLAND	GERMANY W.	DENMARK	NORWAY	SWEDEN
5	CHEMICALS	(a)	50.87	33.12	54.98	29.15	50.33	21.93	43.50	29.34	5.90	20.70	36.67	27.42	47.64	54.61
		(b)	63.53	54.74	73.22	50.20	59.18	57.25	55.69	36.34	75.31	59.76	73.78	44.98	47.89	84.34
		(c)	52.01	50.15	67.63	40.40	52.51	43.84	48.27	34.95	37.72	40.05	56.96	39.55	47.87	71.74
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	49.43	28.58	30.25	35.53	33.30	14.81	36.07	23.65	41.00	26.00	40.20	38.32	17.31	27.97
		(b)	62.68	43.19	42.77	49.26	37.62	65.20	49.51	66.05	49.00	61.56	43.74	52.64	58.31	46.58
		(c)	57.61	38.23	36.45	45.44	36.24	44.44	42.67	50.44	43.82	49.44	42.09	47.05	44.93	41.17
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	67.40	6.69	54.08	40.19	35.22	37.96	45.75	38.63	17.37	-	20.22	41.99	56.75	26.42
		(b)	93.29	90.89	57.43	70.46	65.22	54.11	85.88	60.29	78.35	-	87.25	65.96	66.57	98.93
		(c)	78.11	55.20	53.88	58.36	51.21	46.83	64.24	48.16	54.99	-	61.69	54.38	58.07	80.07
8	MISCELLANEOUS MANUFACTURED ARTICLES.	(a)	43.89	11.55	38.73	33.61	13.19	52.24	45.91	42.09	44.55	73.11	56.26	20.17	52.60	40.84
		(b)	97.16	86.83	47.79	86.71	80.24	55.33	89.61	96.70	69.75	86.98	64.48	83.53	78.85	69.86
		(c)	75.23	50.54	41.88	66.75	47.25	50.97	68.47	66.26	51.34	69.68	58.71	54.50	62.48	54.15
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	75.26	9.39	35.40	9.82	5.47	43.30	28.11	19.44	4.79	10.25	12.07	29.83	57.07	0.08
		(b)	86.47	41.23	37.01	98.39	37.55	48.87	34.51	30.01	92.30	98.71	34.14	97.40	100.00	42.85
		(c)	70.26	37.01	34.78	56.50	35.86	47.40	33.87	29.99	92.30	95.24	33.59	97.40	95.50	28.14

TABLE 4.2
(cont'd)

SITC	DESCRIPTION		PHILLIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG—KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA
0	FOOD & LIVE ANIMALS	(a)	22.38	24.45	36.00	31.16	8.12	6.18	4.28	60.89	31.52	57.75	11.39	0.00	7.91	15.50	13.84
		(b)	27.77	34.94	44.00	36.20	48.63	53.59	81.23	61.15	32.60	60.23	40.40	0.00	40.87	27.51	36.86
		(c)	27.65	31.68	41.00	35.47	38.02	41.13	51.75	60.77	32.27	59.88	33.17	50.00	31.09	27.20	30.56
1	BEVERAGE AND TOBACCO.	(a)	8.92	40.82	0.34	0.16	24.33	15.38	0.00	15.59	0.00	3.76	11.85	0.00	0.00	0.25	0.00
		(b)	41.66	75.11	80.00	77.41	33.56	28.64	0.00	84.74	0.00	50.00	81.73	0.00	0.00	75.00	0.00
		(c)	27.00	59.71	74.38	70.56	33.35	26.89	50.00	35.50	50.00	28.20	75.59	50.00	0.00	33.34	50.00
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS.	(a)	18.51	4.11	5.17	13.14	28.62	33.11	33.71	36.36	0.82	9.15	1.72	0.00	0.00	29.29	1.75
		(b)	42.56	94.13	53.16	90.07	30.31	34.99	59.59	41.20	48.33	36.57	39.77	0.00	0.00	31.10	39.43
		(c)	34.41	62.58	31.96	49.10	30.03	34.33	38.68	38.91	30.20	27.70	27.88	50.00	50.00	27.84	34.87
3	MINERAL FUELS LUBRICANTS AND RELATED MATERIALS.	(a)	0.11	1.44	0.00	0.00	5.59	0.00	0.00	9.95	0.00	0.00	0.00	0.00	0.10	0.01	0.00
		(b)	50.00	93.87	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	34.31	50.00	0.00
		(c)	50.00	93.88	50.00	50.00	48.95	50.00	0.00	61.26	50.00	50.00	50.00	50.00	34.25	50.00	50.00
4	ANIMAL AND VEGETABLE OILS AND FATS	(a)	0.00	0.40	22.99	68.70	1.11	3.06	0.00	2.80	0.00	22.45	0.00	0.00	0.00	43.72	0.32
		(b)	0.00	33.33	25.00	99.96	25.00	25.00	0.00	77.92	0.00	60.43	0.00	0.00	0.00	46.53	62.44
		(c)	50.00	25.00	25.00	69.29	25.00	25.00	0.00	73.12	50.00	60.33	50.00	0.00	50.00	43.32	50.00

TABLE 4.2
(cont'd)

SITC	DESCRIPTION		PHILLIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA
5	CHEMICALS	(a)	7.32	19.78	39.13	28.79	14.03	13.84	2.16	22.88	3.54	1.16	36.43	0.00	0.00	2.77	3.87
		(b)	51.10	85.17	39.80	69.86	72.51	30.06	50.00	66.67	63.49	57.32	47.94	0.00	0.00	60.37	37.92
		(c)	45.02	68.24	39.79	57.02	44.77	27.95	31.73	50.83	34.44	31.21	42.37	50.00	50.00	33.36	27.34
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	34.28	48.37	23.98	36.06	13.62	25.03	3.06	34.75	22.58	22.81	41.27	0.00	9.32	25.04	17.01
		(b)	36.38	57.65	33.16	60.65	80.26	65.84	67.31	41.99	46.02	48.28	42.40	0.00	55.77	33.89	30.70
		(c)	35.79	50.61	31.05	46.11	44.99	47.77	34.49	38.80	40.05	41.30	40.93	50.00	33.42	32.40	30.28
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	24.19	27.87	24.48	44.51	9.80	12.12	15.74	29.84	40.08	36.69	41.65	0.00	1.39	45.61	20.89
		(b)	91.80	62.52	60.19	45.24	88.66	73.53	86.39	74.81	43.01	58.84	81.48	0.00	92.72	67.71	59.52
		(c)	60.98	52.13	45.05	44.95	68.66	50.72	77.28	53.11	40.78	52.30	64.32	50.00	40.13	50.67	42.81
8	MISCELLENEOUS MANUFACTURED ARTICLES.	(a)	3.44	40.90	12.85	14.46	23.13	40.88	19.97	4.88	2.47	25.87	38.36	0.00	0.57	8.71	5.59
		(b)	74.11	43.37	51.52	58.18	85.[illegible]0	49.65	33.93	76.36	76.94	35.30	65.09	0.00	58.00	38.66	54.42
		(c)	35.46	41.91	37.03	42.83	66.[illegible]4	48.14	29.47	48.36	36.52	33.24	49.31	50.00	34.21	27.17	29.35
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	65.83	69.52	1.01	27.20	13.61	38.61	3.33	19.15	13.90	14.34	13.44	13.69	98.52	37.97	1.44
		(b)	100.00	99.99	100.00	33.49	[illegible].08	41.69	43.47	100.00	48.64	52.92	57.53	100.00	100.00	99.69	100.00
		(c)	99.99	70.16	92.57	33.[illegible]	[illegible]5.41	40.54	33.73	73.50	36.43	36.33	35.88	99.99	99.75	99.69	74.06

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

partner for different commodity groups. The first 2 columns show the SITC code and the commodity description respectively. Subsequent columns indicate the partner countries. In each column of a partner country, there are 3 rows for every SITC class. In each case, the first row of figures is the unadjusted G-L index measure, the figures in the second row are the adjusted G-L index and the figures in the third row are the Aquino adjusted index. These values are the summary measures at the 1-digit level for the selected years, 1962, 1966, 1971, 1976, and 1980. The calculations have been performed from 1962 up until 1980 (using annual time series data) for each SITC group and sub-groups and for each partner country in the sample size. However, results for all years have not been reported, in order to be to keep the analysis within manageable range.

The selection of years presented is based on several considerations. First, during the period 1961-64 manufactured products were a rapidly growing segment of Canadian exports and the 1971-74 period was one of substantial and sustained real growth in manufacturing. From 1961 until 1966, the average annual rate of growth in manufacturing output was 8.4 percent. Second, in 1962 the depreciation of the Canadian dollar provided a stimulus to the foreign sector. In particular it enhanced exports of finished products. Third, the Auto-Pact between Canada and the United States was signed in 1965. Since then rationalization of the Canadian automotive industry and its integration with the United States subsidiaries has taken place.

This has affected the IIT trade pattern. Fourth, world-wide tariff reductions took place during this period under GATT negotiations. These tariff reductions were generally based on the principle of reciprocity between developed countries and as such were biased toward manufactured products (Hufbauer and Chilas, 1974). However, it is worth mentioning that Canada actually increased its effective protection in 25 out of 82 manufacturing industries between 1961-66. But between 1966 and 1970, average effective tariffs on manufacturing were reduced from 20.1 percent to 16.9 percent on an unweighted basis (Wilkinson, 1980). Furthermore, the year 1962 has been selected as an initial year for two reasons: first, the most important factor is the availability of data in the required format; second, most of the empirical research on this issue has been carried out since the 1960s, so for comparability purpose this year appeared appropriate. The year 1980 is the latest year one could get access to the data in the required format. The countries in the sample consist of both developed or industrialized and less-developed or semi-industrialized partners. Those countries classified as industrialized or developed for purposes of this study are those called industrialized in the WORLD ECONOMIC SURVEY published by the United Nations Department of Economic and Social Affairs and the International Monetary Fund (IMF). The countries in the sample are: United States, United Kingdom, France, Italy, West Germany, Belgium-Luxembourg, Netherlands, Austria, Australia, Denmark, Finland, Norway, Sweden, Switzerland, Portugal, Spain, New Zealand, Turkey, Ireland, Kuwait, Venezuela, Brazil, Hong Kong, Singapore, South Korea, Israel, India, and the Philippines. The primary criterion for selecting these trading partners for this study were: (i) their dominance of world trade and their export and import value of total trade with Canada, especially trade in manfactures; (ii) the availability of data at detailed levels of disaggregation for the span of 19 years; and, (iii) these are the countries which have reported foreign trade statistics in a consistent and systematic framework (at the U.N. Data Bank System of the Department of Industry Trade and Commerce) according to the SITC code for all these years.

The sample size consists mostly of developed countries for the reason that Canada's trade has been largest with these countries. However, some less developed countries (LDCs) have also been included in the sample. These LDCs are very vulnerable in terms of their participation in regional trading arrangements, the proportion of manufactures in total trade, their principal trade partners along with other foreign trade attributes. The main objective for the selection of these countries is to test various hypotheses relating to IIT theories in the context of country attributes and commodity characteristics, and to see if Grubel and Lloyd's observation of Australia's IIT with semi-industrialized partners is also in conformity with the Canadian case. As Grubel and Lloyd put it:

> Australian industries indicate that the phenomenon of intra-industry trade is not restricted to trade among

highly industrialised countries but exists even in the trade of nations which are more specialised in the production and export of agriculture and mining products and which have high levels of protection for their manufacturing industries (Grubel and Lloyd, 1975, p. 49).

A close investigation of the above tables reveals the following facts: first, the difference in the measured IIT between countries is pronounced for different commodity groups. Second, the highest level of IIT is between Canada and the United States, the lowest level is between Canada and Kuwait. Canada and the United States are both industrialized countries with various similar attributes and special trade agreements.[8] Kuwait on the other hand, is a less developed country with virtually no industrial base and a weak manufacturing sector coupled with a primitive agricultural sector. It does, however, have large oil reserves.

Canada's IIT with the United States is very pronounced and high magnitudes exist in virtually all product groups. In the case of Kuwait, most product groups have 0 values of IIT except for group 9, Miscellaneous Commodities.

The variation in the IIT magnitudes is different for different commodity groups over time. The values range from 0 (with Kuwait), 5.78 (with Ireland), to 50.16 (with the U.S.A.) for SITC 0 in 1980 G-L unadjusted measure). For the same SITC class, the IITC (G-L adjusted measure) shows values of 39.56 for Ireland, 0 with Kuwait and 65.36 with the U.S.A. The Aquino index tends to be higher than the G-L unadjusted, but lower than

[8] Canada and the States special trade relationship will be discussed in a subsequent section.

the adjusted measures. For the same SITC class, the IITB varies between 0 (with Kuwait), 2.52 (with Turkey), and 51.28 (with the U.S.A. in 1976. The range follows a same pattern in the years 1962, 1966, and 1971. Results for the United States show consistently high intensity of IIT for the selected years.

For SITC 1, which indicates trade in Beverages and Tobacco, the IITB values range from 0 (with Kuwait again), less than unity (with Portugal) to 43.39 (with Japan) in 1980. The same pattern is reflected in earlier preceding years for the lowest values. However, different developed countries take the position of having the highest magnitude: Norway (68.98) in 1976, Switzerland (77.14) in 1971 and (66.98) in 1966, and Austria (68.99) in 1962. This pattern clearly indicates trade diversification through time in this category.

When Crude Materials in SITC 2, are estimated, IIT values range from 0 (Kuwait, Venezuela) to 38.28 (with the U.S.A.) in 1980. The highest values in earlier years are for Hong Kong (41.3) and (46.77) in 1976 and 1971, respectively.

For SITC 3, measured IIT with many less developed countries is 0, reflecting no intra-industry trade in this category. The highest value is for the United States in 1980 (36.63), the U.K. in 1976 (61.14), Australia in 1971 (29.70). In 1962 and 1966 virtually no IIT existed in this category with many countries (with U.S.A. as an exception). The corresponding IITC values show over 70 percent in many cases. IITQ coefficients are lower than those for IITC, but much higher than those of IITB. Low values are found in SITC 4 in almost all the years with a few exceptions (such as Spain, Brazil, Finland and Norway).

The most important and interesting cases are SITC 5 through 8, which have been estimated for various countries and for country groups in previous studies.

The measured IIT in SITC 5 demonstrates high magnitude with many developed countries. The range varies between 0 (Kuwait) and 50.87 percent with the United States in 1980. Adjusted measures show values above 60 and 70 percent in many cases in 1980. High magnitude exists in trade relations with the U.K., Sweden, Belgium-Luxumbourg and Italy among others. This confirms earlier empirical results with respect to trade patterns in this category.

The measures for SITC 6, Manufactured Goods, systematically demonstrate moderately high values with the United States along with other developed countries. The IITB values range from 3.06 to 50 percent. Values above 60 are found for IITC and IITO in the context of industrialized countries. These results are consistent with Grubel and Lloyds' findings about Australia's foreign trade with 10 industrialised countries. Their findings showed 50 percent unweighted mean values for the 10 countries across industries.

The results also reveal that IIT can occur in trade between developed and less developed countries, particularly with those countries where rapid industrialization is taking place concomitant with their development strategy. For example, the results exhibit a substantial magnitude with many semi-industrialized countries such as Portugal, Spain, Hong Kong, New Zealand, Brazil and India.

Machinery and Transport Equipment (SITC 7) shows high magnitudes for all the indices in each year. IIT values of over 90 percent are obtained in a number of cases. Various plausible explanations in the Canadian context can be presented. First, Canada's trade within this group (consumer versus non-consumer products) is very similar to the composition of Canada's trade for all manufactures. Second, even though SITC 7 is only one of several industry groups in the manufacturing sector. It represents a proportionately large share of trade in both manufactured products and aggregate trade. For example, in 1979, trade in this category for all OECD countries accounted for 45 percent of all OECD trade in manufactured products and 33 percent of all OECD aggregate trade. In Grubel and Lloyd's study (1975, p. 37), the IIT index averaged over all manufactures was 57 percent. For SITC 7, the average measured IIT was 59 percent. Measured IIT for SITC 6 and 8, were 66, 49, and 52 percent respectively. In this study, SITC 7 stands out as the most extreme group. This is also in conformity with the recent empirical findings obtained by J.H. Bergstrand (1982) for SITC 7 for the United States in her trade relations with a few selected OECD countries. It appears that this group satisfies both the demand characteristic of differentiation of products and economies of scale characteristic from the supply side.

The calculated IIT indices for Miscellaneous Manufactured Items, SITC 8 and SITC 9, are also significant. The SITC 9 group is, however, not a representative class. Many commodities, not specified elsewhere, are lumped together in that group. Therefore, a very high magnitude in that category should not necessarily be taken as indicative of high IIT.

Industries percentages over 70 percent, at the 3-digit level, are SITCs 011, 013, 025, 044, 048, 073, 212, 282, 291, 613, 621, 663, 725, and 941. Industries with above 90 percent are: 025, 212, 282, 613, 941. Low and zero values are found in a few industries such as SITCs 042 (Rice), 043 (Barley), 045 (Cereals), 071 (Coffee), 072 (Cocoa), 271 (Crude fertilizers), 351 (Electric energy), 411 (Animal oils & fats), 531 (Synthetics), 532 (Dyeing and tanning), 675 (Hoops and Strips of Iron or Steel), and 961 (Coins, other than gold not being legal tender).[9]

Examination of IITC and IITQ show that 34 out of 133 industries have values above 90 percent, 22 industries show above 70 percent, and a large number are over 50 percent. From these investigations one feels that the IITB measure is the most reliable and convincing measure of IIT among these alternatives despite its shortcomings (as discussed before). It is so because IITC is dramatically overstated. For instance, in the category SITC 043 (Barley) IITB is 1.77 while the magnitude of IITC is

[9] The Table containing the results at the 3-digit level, by country and by industry, is not included due to space constraints.

100.00 and IITQ is 99.99. Given the raw data, IITB seems to be the representive index.

It is also worth noting that in some 3-digit industries which do not fall into the category of manufactures, such as SITC 0 through 4, above 70 percent or greater IIT values are observed (G-L unadjusted measure), for example, in Meat (SITC 011 012), Maize (044) and Cereal Preparations (048). Ninety percent or greater values are found in Iron and Steel Scrap (SITC 282)[10] and 63 percent or greater in Sand, Stone and Gravel.

The analysis of the SITC classes and the existence of IIT therein reveals a very interesting phenomenon. The results show that IIT is not only limited to the SITC 5 through SITC 9 group as has been found in many earlier empirical studies. Rather IIT also exists in SITC classes of 0 through 4. A large variability is observed over time. The most interesting phenomenon observed is the result (with the U.S.A.) in SITC 0. The magnitude of IIT in this commodity group exceeds that in manufactures. For example, in 1966 IIT in SITC 0, was 56.47 percent. Estimated IIT for SITC 6 was 45.24 percent, and, in 1971, the above values were 59.61 (for SITC 0) and 48.45 (for SITC 6) respectively. However, from 1976 onwards the magnitude in manufactured goods has exceeded that in SITC 0. These results manifest the structural changes in export and import sectors of the Canadian economy. These findings, in particular for SITC 5, 6, and 7 have

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[10] This is consistent with Grubel and Lloyd's findings.

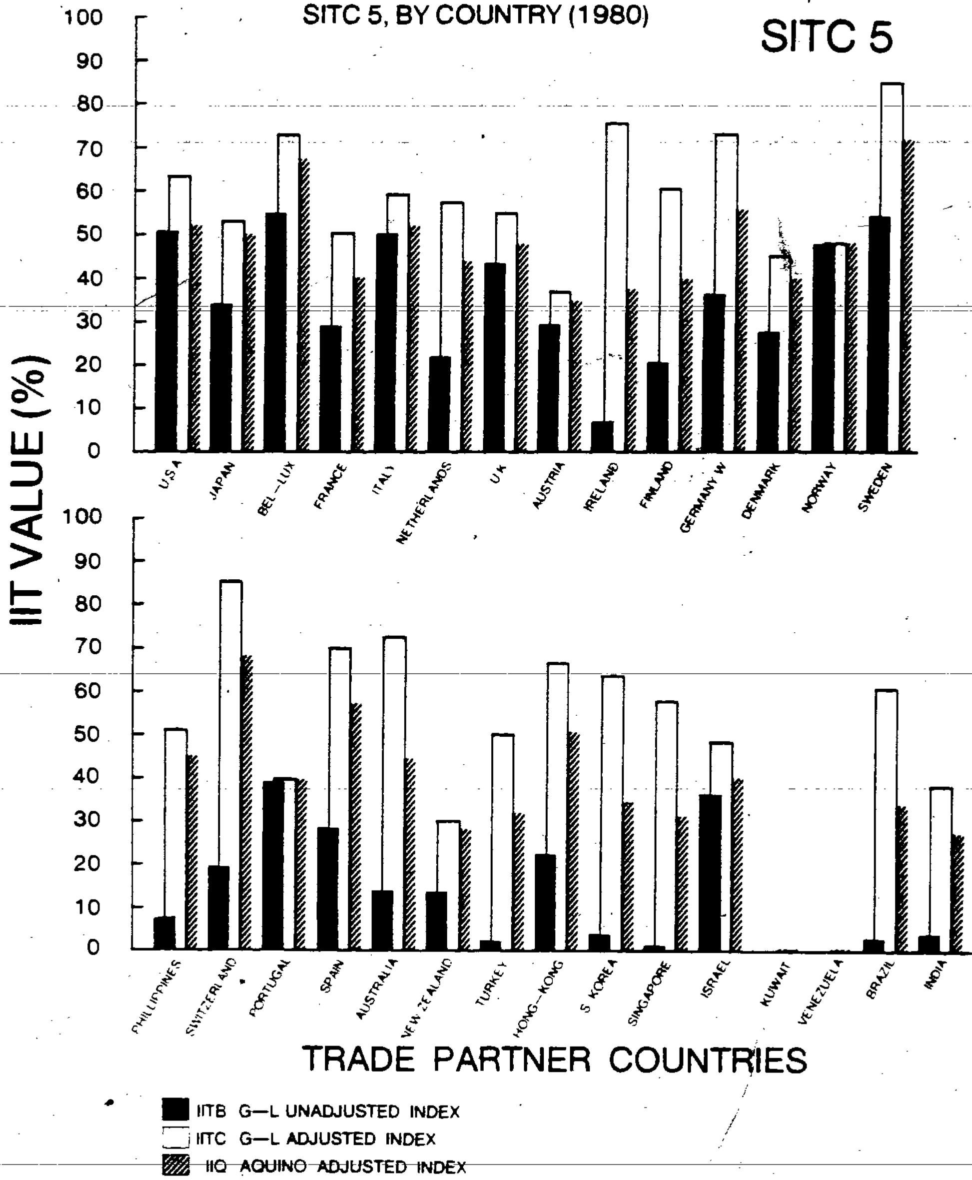
been summarized in Figures 4.2.1 through 4.2.3. These figures reveal large variations in the observed values of different indices in different SITC categories.

Tables 4.2 through A4.2-4 also indicate that, in virtually all economic sectors, the intensity of IIT varies significantly from one period to another (with a few exceptions) in bilateral trade relations with different countries.

Furthermore, the results reveal that the differences in IIT values between countries are pronounced. The difference between indusrialized countries and semi-industrialized countries is again distinct. The prevalence of high magnitudes across countries suggests that among industrialized countries in manufactured goods is rapidly becoming more intra-industry (and, therefore, less inter-industry) in character. Emerging intra-industry trade patterns with the developing countries also suggests that there exists trade potential between Canada and her less developed trading partners. Canada's market can be extended in these areas. This, in turn, begs the question as to what policy implication one could perceive for a more integrated world, especially in the context of: (a) free trade between the United States and Canada; (b) the North-South dialogue, and (c) the issue of establishing a New International Economic Order.

FIG. 4.2.1

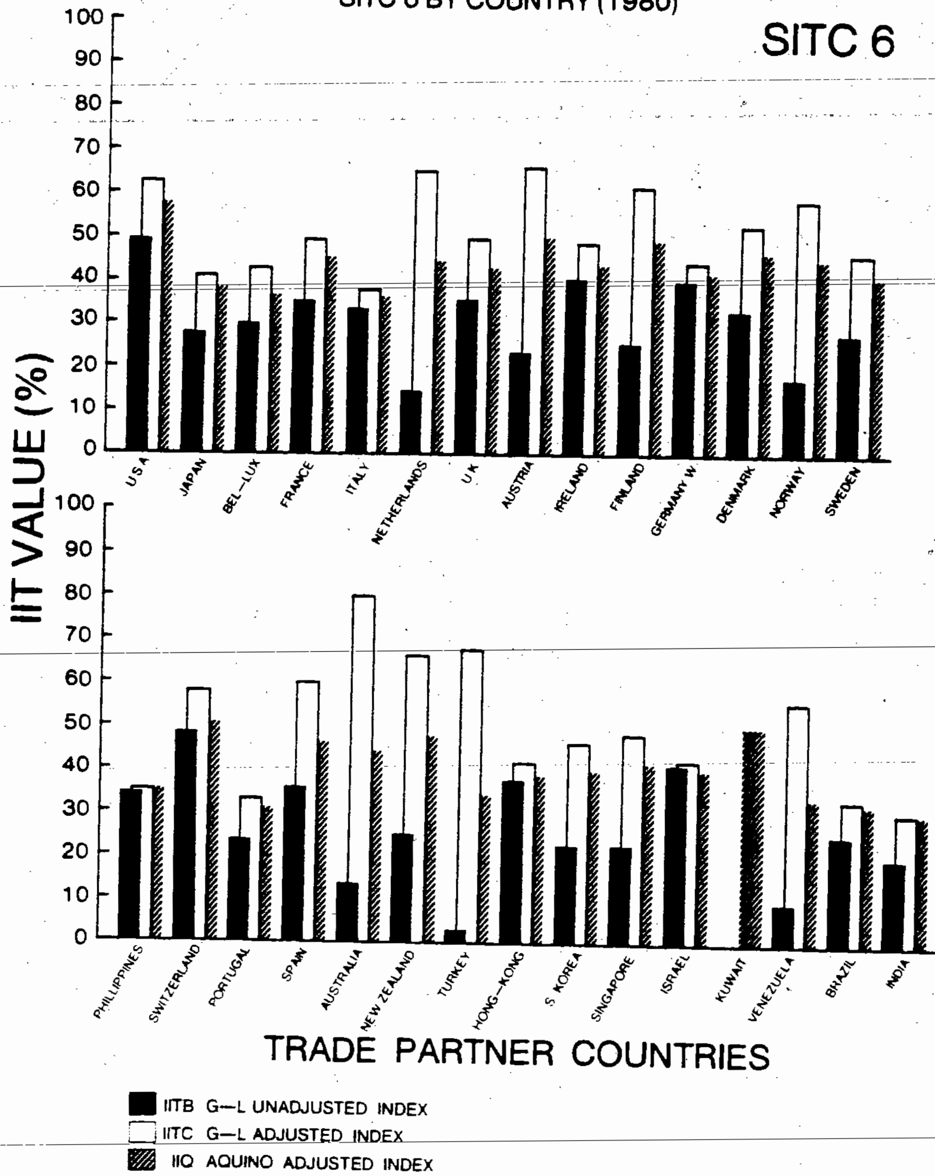
CANADA'S INTRA—INDUSTRY TRADE IN CHEMICALS, SITC 5, BY COUNTRY (1980)



SOURCE TABLE 4.2.1

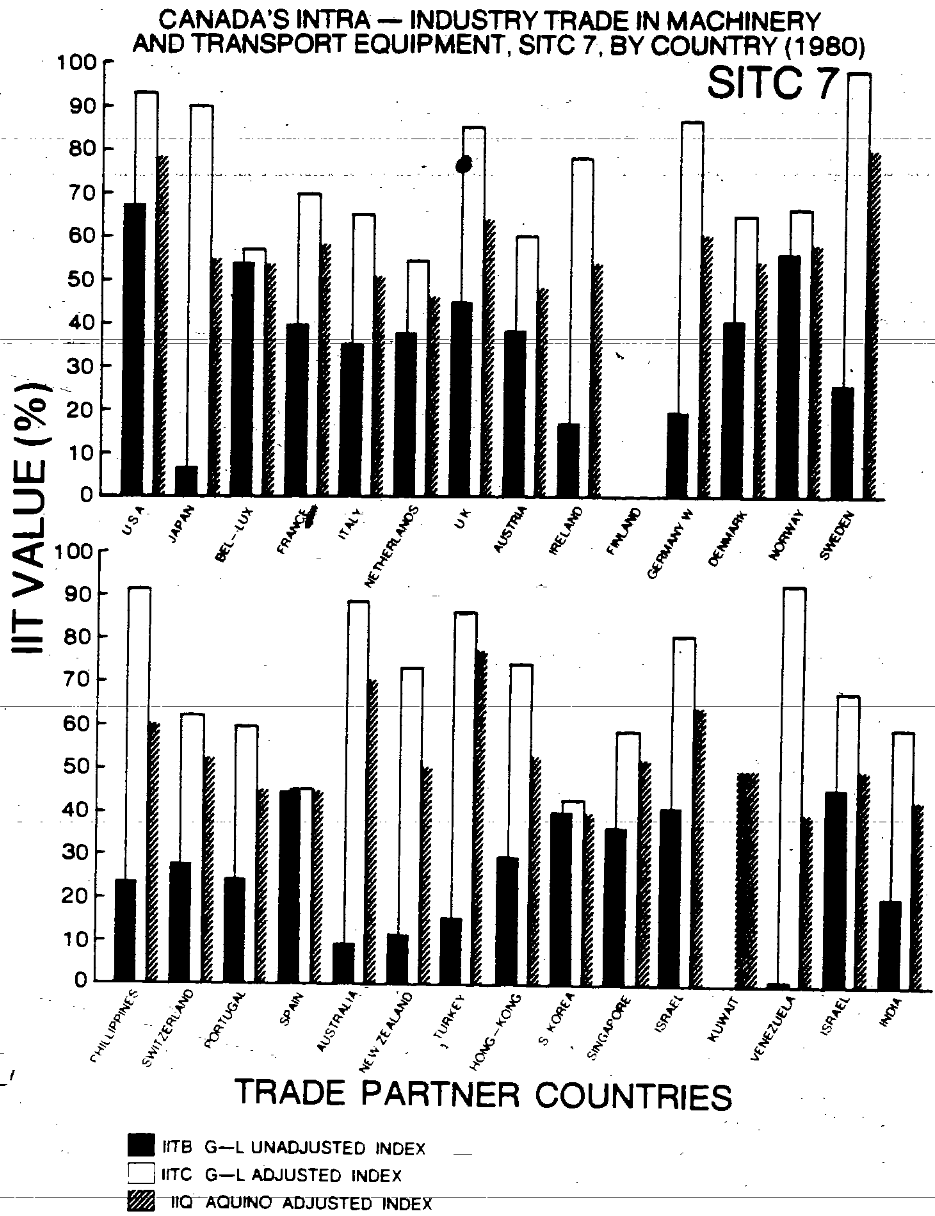
FIG. 4.2.2

CANADA'S INTRA — INDUSTRY TRADE IN MANUFACTURED GOODS, SITC 6 BY COUNTRY (1980)



SOURCE: TABLE 4.2.1

FIG. 4.2.3



SOURCE TABLE 4.2.1

4.2.2 <u>Empirical Performance of Different Indices of Intra-Industry Trade</u>

In this section an assessment of the magnitude of the different indices, IITB, IITC, IITQ and their performance as the measure of IIT is presented. The values in Tables 4.2.1 through 4.2.2 show that IITB (G-L unadjusted measure) values are substantially lower than those for IITC and IITQ. The size of the differences found to be fairly high for most of the countries. In a number of cases, it is noticeable that IITB values are negligible, almost in the neighbourhood of zero, while IITC estimates 100 percent intra-industry trade. These results are in conformity with the inference drawn by Grubel and Lloyd with respect to the performance of their adjusted measure of IIT. As they stated:

> ... the adjustment factor and the adjusted measure increase as the trade imbalance increases as a proportion of total export and total import trade (Grubel and Lloyd, 1975, p. 23).

Furthermore, for the country analysis, they observed that:

> When the measures relate to the trade with individual countries this adjustment makes a substantial difference if the bilateral trade imbalances are large relative to the combined total export and import trade (Grubel and Lloyd, 1975, p. 23).

The range between these two values in some cases is very high. For example, in the case of Japan the unadjusted value in SITC is 6.69 for the year 1980, whreas the adjusted measure is 90.89 percent. In the case of SITC 8 the unadjusted index is 11.55 while the adjusted index is 86.83 percent. The Aquino adjusted index is in almost all commodity groups greater than 60 percent. The results, once again, are consistent with the earlier results of many empirical studies, and also with those of Aquino (1978).

From these empirical results, one interesting aspect of Aquino's measure is revealed. It is noticeable that for any SITC commodity group, when either exports or imports are zero, Aquino's index involves a term which is of the indeterminate form, zero divided by zero. Our computer program calls this result zero which yields a value for IITQ of 50 percent. For example, for SITC 0 and SITC 5 and 6 (with Kuwait) in 1980, both G-L indices are 0 indicating that Canada's trade with Kuwait in these commodity groups has been of entirely inter-industry trade. Yet Aquino's index shows that 50 percent of Canadian trade is IIT in these SITC classes in trade relations with Kuwait. This is certainly a flaw in Aquino's index measure, which needs to be amended. Aquino's claim that Qj (as he denotes his measure) is superior to other indices of IIT is questionable.

4.3 Canada's Intra-Industry Trade by Industry

In this section, estimated values of intra-industry trade by industry are presented.[11] The calculations were performed for the entire population of SITC commodity groups at all levels of

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[11] These values have been obtained by summing across 27 countries, i.e., excludes U.S.A. and Japan.

aggregation, ranging from 1 to 5-digits, for 19 years (1962-80). However, due to space and time constraints, estimated IIT coefficients are given here only for selected years.

Tables 4.3 and 4.3.1 present the estimated 3-digit and 2-digit summary values, respectively. These tables indicate that a wide variation exists in the intensity of intra-industry trade among industries. The differences in values are quite pronounced. These estimates range from high values of 88.23 percent for Inorganic Chemicals (SITC 513) in 1962 and 62.27 percent for Cleansing and Polishing Soaps (SITC 554) in 1980, to very low values for Non-alcoholic Beverages (SITC III), Jute (SITC 264), Fertilizers (SITC 271).

Within SITC 5, Chemicals, wide variation in the distribution of intra-industry trade values is noticeable. For example, organic and inorganic chemical groups 512, 513, and 514 demonstrate high values, while several chemical groups, such as 521, 531, and 523, show relatively low values. The obvious explanation is that a large proportion of Canada's trade in this category is with the United States and Japan. When these two important trade partners are excluded from the estimates, one expects measured IIT summing across other countries for these groups to be low.

TABLE 4.3

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY INDUSTRY: 3-DIGIT SITC (1962-1980)

SITC	DESCRIPTION	1962 IITB	1962 IITC	1962 IITQ	1966 IITB	1966 IITC	1966 IITQ	1971 IITB	1971 IITC	1971 IITQ	1976 IITB	1976 IITC	1976 IITQ	1980 IITB	1980 IITC	1980 IITQ
001	Live animals	22.10	28.71	28.45	6.01	63.30	13.79	23.85	31.32	19.71	21.99	28.46	18.17	20.27	93.38	29.18
011	Meat, fresh, chilled & Frozen	0.26	6.78	0.16	24.13	41.41	17.02	1.57	4.99	1.45	2.32	6.41	4.76	1.75	3.09	2.56
012	Meat, dried, salted or smoked	0.00	0.20	50.00	0.00	0.00	50.00	1.73	6.89	6.90	7.33	8.55	8.44	17.79	78.26	16.54
013	Meat in airtight containers n.e.s. and meat prrparations	13.71	29.77	12.76	0.00	0.00	0.00	8.40	92.39	39.19	3.26	38.13	24.71	11.73	82.07	69.26
022	Milk and Cream	2.79	46.41	2.90	6.57	4.25	0.94	1.69	16.14	1.70	0.48	2.88	1.57	1.41	2.19	1.40
023	Butter	0.00	0.00	80.00	[illegible].45	53.84	6.08	6.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
024	Cheese and Curd	1.50	1.73	1.72	3.30	4.10	4.06	4.23	4.52	4.18	4.68	74.76	6.04	4.22	24.78	2.66
025	Eggs	0.00	0.00	0.00	28.29	46.75	20.28	10.59	20.45	8.14	10.92	26.46	7.26	1.97	23.67	1.21
031	Fish, fresh & simply preserved	22.22	51.70	30.35	14.91	67.90	30.85	23.68	74.93	37.16	19.94	56.98	26.64			
032	Fish in airtight containers n.e. S & Fish preparations	5.58	23.86	12.66	8.60	36.82	25.27	13.86	53.71	21.61	10.88	33.81	23.26			
041	Wheat-incl. spelt & Meslin Unmilled	0.00	0.00	50.20	0.00	0.00	50.00	0.00	0.00	0.50	0.00	0.00	50.00			
034														6.07	81.90	14.79
042	Rice	0.00	0.00	0.00	0.00	50.00	50.00	6.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
043	Barley Unmilled	0.00	0.00	50.00	-	-	-	0.00	0.00	50.00	0.00	0.00	50.00			
044	Maize, Corn-unmilled	0.00	0.00	50.00	-	-	-	-	-	-	-	-	-	-	-	-
045	Cereals, Unmilled, Excl. Wheat, rice, barley & Maize.	0.00	0.00	0.00	0.01	100.00	53.32	6.15	100.00	22.46	0.00	0.00	50.00	0.06	25.00	25.00

TABLE 4.3 (cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITC	1962 IITQ	1966 IITB	1966 IITC	1966 IITQ	1971 IITB	1971 IITC	1971 IITQ	1976 IITB	1976 IITC	1976 IITQ	1980 IITB	1980 IITC	1980 IITQ
074	Tea and mate	0.36	95.00	11.52	0.25	100.00	8.91	0.01	100.00	49.90	0.01	100.00	46.71	0.06	100.00	47.11
075	Spices	8.01	96.55	4.55	20.74	98.97	15.47	14.70	69.90	14.91	9.77	60.07	10.39	10.08	41.71	15.07
081	Feeding-stuff for animals - excl. unmilled cereals	0.14	94.11	47.30	0.71	68.27	53.34	5.43	66.57	31.25	5.03	61.45	26.12	2.01	96.06	41.95
091	Margarine and shortenings	0.00	0.00	50.00	-	-	-	0.00	0.00	50.00	0.00	0.00	0.00	4.16	6.89	2.98
098														38.82	72.43	53.52
099	Food preparations n.e.s.	55.40	64.90	49.98	43.42	64.19	47.36	35.92	38.50	34.55	29.75	89.66	40.66			
111	Non-alcoholic beverages, n.e.s.	0.00	0.00	50.00	0.28	100.00	7.17	0.00	0.00	50.00	0.73	6.05	3.70	1.63	49.61	3.22
112	Alcoholic beverages	11.13	55.94	32.16	9.19	73.14	40.75	7.70	84.14	53.63	4.83	77.65	51.63	3.94	75.15	53.65
121	Tobacco unmanufactured	0.00	0.50	0.51	0.06	57.89	3.17	1.89	75.80	2.48	0.67	25.97	3.87	1.81	24.71	12.40
122	Tobacco manufactures	11.66	94.50	30.97	25.13	30.41	21.48	39.02	78.39	29.43	2.82	20.49	17.59	8.30	38.92	18.05
211	Hides and skins - excl. for skins - undressed	11.09	54.03	12.73	9.88	88.19	10.06	1.53	12.08	3.99	4.38	73.33	7.11	1.70	86.40	10.43
212	Fur skins, undressed	56.99	57.43	57.42	-	-	-	36.86	45.05	43.11	34.90	44.58	39.38	17.24	38.32	27.06
221	Oil, Seeds, oil nuts and oil Kernel.	0.45	3.40	3.40	34.05	41.20	40.48	0.16	33.90	33.90	2.86	10.27	8.88			
222														9.05	100.00	37.23
231	Crude rubber-incl. synthetic and reclaimed	1.85	100.00	40.20	6.77	100.00	35.60	20.20	26.59	24.39	14.17	18.02	14.97			
241	Fuel wood and charcoal	0.00	50.00	0.00	0.00	50.00	6.00	0.00	0.00	50.00	0.00	0.00	0.00			
242	Wood in the rough or roughly squared	-	-	-	0.10	72.72	13.28	0.02	100.00	51.14	0.00	0.00	0.00			
243	Wood, shaped or simply worked	-	-	-	0.19	26.93	20.83	0.25	10.47	2.26	0.14	3.68	2.16			
244	Cork, raw and waste	-	-	-	-	-	-	0.00	0.00	50.20	0.00	0.00	50.00	0.00	0.00	0.00
251	pulp and waste paper	0.02	100.00	53.96	0.07	4.53	4.54	6.37	100.00	1.87	0.22	70.37	11.45	0.04	92.00	47.02
261	Silk	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.02	50.00
262	Wood and other animal hair.	4.88	98.23	69.81	3.21	83.44	5.72	2.95	65.93	41.02	17.01	87.48	65.99	-	-	-
263	Cotton	2.22	2.83	1.83	17.48	22.05	15.68	27.86	53.30	27.53	-	-	-	13.68	15.34	15.35
264	Jute	0.00	00.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00	50.00	0.00	50.00	0.00	0.00	50.00
265	Vegetavle fibres except cotton and jute	0.12	100.00	0.36	4.14	100.00	5.46	0.19	100.00	0.10	1.94	84.61	1.79	1.58	100.00	8.18

TABLE 4.3
(cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITC	1962 IITQ	1966 IITB	1966 IITQ	1966 IITQ	1971 IITB	1971 IITQ	1971 IITQ	1976 IITB	1976 IITQ	1976 IITQ	1980 IITB	1980 IITQ	1980 IITQ
266	Synthetic and regenerated artificial fibres	9.25	14.65	14.35	36.15	41.75	40.89	18.42	23.63	19.11	23.52	44.47	32.07	15.65	44.86	12.96
267	Waste materials from textile fabrics-incl. rags	16.80	23.88	18.50	13.06	13.16	13.13	13.12	14.64	12.40	13.27	13.87	6.00	-0.00	0.00	50.20
271	Fertilisers, crude	0.00	0.00	0.00	-	-	-	-	-	-	0.00	50.00	0.00	0.00	0.00	50.20
273	Stone, Sand and gravel	0.03	100.00	8.06	1.70	35.29	1.20	6.95	80.00	52.04	0.97	17.07	1.85	1.30	37.83	3.93
274	Sulphur and unroasted iron pyrites	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	45.00
275	Natural abrasives incl. industrial diamonds	-	-	-	8.68	35.36	33.79	47.05	68.66	60.82	10.88	46.07	34.99			
276	Other crude minerals	31.16	81.42	59.47	6.32	100.00	41.17	7.17	100.00	28.15	5.24	100.00	26.10			
281	Iron ore and concentrates	1.17	15.67	29.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
282	Iron and Steel srap	0.00	0.00	0.00	0.15	0.95	0.95	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
283	Ores and concentrates non-ferrous base metals	0.34	20.45	3.85	3.34	57.82	30.78	1.50	8.74	2.38	7.62	24.48	12.40			
284	Non-ferrous metal scrap	1.54	7.77	0.95	2.88	100.00	27.42	9.93	22.85	6.35	10.38	21.05	7.32			
285	Silver and platinum ores	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00			
286	Ores and Concentrates of Uranium and thorium	0.00	0.00	50.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	50.00			
291	Crude animal materials n.e.s.	39.32	48.66	49.24	31.99	41.22	32.42	40.05	41.52	40.12	23.96	26.21	24.27			
292	Crude vegetable materials, n.e.s.	37.41	47.03	35.37	29.46	35.30	32.40	35.46	43.32	39.92	52.55	66.65	48.77			
321	Coal, Coke and briquettes	0.00	0.00	50.00	0.00	0.00	50.00	3.45	3.74	3.72	0.00	0.00	50.00			
331	Petroleum, crude and partly refined	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00
332	Petroleum products	4.15	46.44	9.57	1.93	83.50	11.39	2.82	57.02	12.54	19.69	22.49	17.53			
341	Gas, natural and manufactured	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	5.55	11.11	3.70	2.48	[illegible]	20.10
351	Electric energy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Mineral fuels, lubricants and related materials	0.32	64.44	0.94	0.47	82.80	9.90	1.96	53.34	1.30	1.75	15.33	0.97			
411	Animal oils and fats	14.46	70.56	53.62	0.00	0.00	50.00	3.49	89.20	49.24	3.13	95.33	26.57			
421	Fixed vegetable oils, soft	46.97	73.89	70.90	16.75	21.37	0.00	0.00	0.00	0.00	0.56	0.91	0.91			
422	Other fixed vegetable oils	32.55	98.73	59.69	18.10	67.40	10.46	29.84	33.76	32.83	3.80	5.82	5.53			
425														4.76	44.66	6.12
431	Animal/Vegetable oils and fats, processed and waxes	15.57	28.10	9.84	9.15	9.29	9.02	28.54	33.33	25.61	6.47	95.65	79.30	4.13	93.05	61.34

TABLE 4.3
(cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITC	1962 IITQ	1966 IITB	1966 IITC	1966 IITQ	1971 IITB	1971 IITC	1971 IITQ	1976 IITB	1976 IITC	1976 IITQ	1980 IITB	1980 IITC	1980 IITQ
														1.39	35.07	2.86
512	Organic chemicals	36.47	61.45	53.63	49.48	49.72	49.47	48.12	64.06	43.75	50.78	87.79	58.77	36.67	95.17	51.90
513	Inorganic chemicals, elements, oxides, halogen salts	88.23	89.69	89.69	40.57	70.25	59.81	13.08	51.59	42.55	18.96	51.74	37.90	29.37	73.77	42.14
514	Other inorganic chemicals	44.66	49.72	49.57	59.44	70.15	54.49	42.31	43.57	43.21	48.26	58.65	57.57	12.69	29.40	85.60
515	Radioactive and associated materials	22.27	100.00	45.77	19.53	100.00	43.05	4.50	28.01	6.38	8.78	18.81	15.64	0.00	0.00	50.00
521	Crude chemicals from coal, Petroleum and gas	23.33	49.37	45.83	0.00	0.00	50.00	25.68	89.49	17.86	0.00	0.00	50.00	0.0		
522														26.14	67.05	49.31
523														34.83	47.89	45.79
531	Synthetic organic dyestuffs, natural indigo and lakes	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00			
532	Dyeing and tanning extracts, synthetic tanning materials	0.00	0.00	50.00				0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
533	Pigments, paints, Varnishes and related materials	29.42	88.69	78.37	60.01	83.03	80.03	18.24	44.31	35.59	73.12	87.88	[illegible]	30.52	74.70	56.14
541	Medical and pharmaceutical products	31.27	46.49	36.32	36.76	61.82	51.59	41.64	60.61	44.58	31.74	72.12	55.42	36.70	71.84	49.53
551	Essential oils perfume and flavour materials	5.77	100.00	45.62	30.91	92.68	37.89	15.02	46.52	34.52	9.04	31.84	12.67	14.80	41.33	28.89
553	Perfumery, cosmetics, dentifrices etc.				11.87	26.51	23.06	20.49	65.90	48.96	5.67	58.30	[illegible]	9.85	66.50	33.38
554	Soaps, cleansing and polishing operations	2.56	16.49	15.55	33.16	68.77	55.14	5.66	54.38	36.15	11.65	47.40	37.54	62.27	62.80	62.14
561	Fertilisers manufactured				0.37	1.79	0.21	4.19	83.94	10.45	0.86	64.55	4.27	-	-	-
571	Explosive and pyrotecnic products	-	-	-	1.82	7.69	2.51	24.07	47.41	25.32	20.95	53.80	40.66	-	-	-
581	Plastic materials, regenerated cellulose and resins	0.13	0.22	0.23	27.88	30.54	27.14	28.90	37.08	34.63	26.66	34.10	31.46			
598														35.85	39.52	35.70
599	Chemical materials and products n.e.s.	18.44	77.83	66.84	48.24	67.27	53.27	35.60	74.57	60.72	27.38	59.88	35.89			
611	Leather	58.63	90.42	82.10	28.26	84.34	78.42	16.56	88.90	85.23	14.47	74.11	62.46	32.43	65.79	61.48
612	Manufacture of leather or artificial or reconstituted leather	61.00	87.90	69.49	41.27	91.06	53.19	5.23	98.27	55.42	5.45	89.88	73.79	5.09	89.77	43.17

TABLE 4.3
(cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITO	1962 IITQ	1966 IITB	1966 IITB	1966 IITQ	1971 IITB	1971 IITO	1971 IITQ	1976 IITB	1976 IITQ	1976 IITB	1980 IITB	1980 IITO	1980 IITQ
613	Fur skins, tanned or dressed including dyed	41.48	44.60	42.11	36.46	72.37	50.86	23.56	56.44	28.33	29.73	41.38	33.93	31.84	48.17	32.52
621	Materials of rubber	9.16	10.13	8.67	15.86	57.19	[illegible]							24.62	45.84	44.17
629	Articles of rubber, n.e.s.	8.00	40.61	32.65	12.99	48.56	30.29	34.39	74.80	61.45	13.10	49.53	27.38			
631	Veneers, plywood Boards and other wood, worked, n.e.s.	10.88	37.99	15.89	8.94	57.83	30.02	6.60	28.61	24.23	7.83	12.01	11.77			
632	Wood manufactures, n.e.s.	26.37	63.87	47.25	23.84	46.62	34.93	22.50	33.08	26.41	19.59	21.15	18.54			
633	Cork manufactures	0.00	0.00	50.00	-	-	-	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	0.00
641	Paper and paperboard	2.74	57.17	45.70	2.49	74.42	53.77	2.35	70.73	58.18	5.73	86.36	67.99	6.35	79.99	58.17
642	Articles of paper, pulp, paper-board	49.42	71.19	69.91	5.78	50.00	8.07	29.50	65.75	51.32	43.08	57.52	55.93	55.01	61.38	50.92
651	Textile yarn and thread,	8.64	39.95	35.36	19.09	79.94	44.35	33.23	87.63	36.28				41.47	60.13	50.45
652	Cotton fabrics, woven excl. narrow or special fabrics	34.93	71.17	24.52	24.29	49.52	18.15	16.94	17.75	15.70	21.60	61.18	25.78	15.68	55.04	24.55
653	Tex fabrics woven excl. narrow, special, not cotton	9.74	63.76	55.08	13.26	92.60	55.86	14.95	89.04	58.82	33.51	83.42	42.42			
654	Tulle, lace, embroidery, ribbons, trimmings	16.65	85.80	22.11	17.57	27.06	26.04	10.12	73.35	46.66	60.00	60.69	35.73	34.28	75.69	36.73
655	Special textile fabrics and related products	7.27	41.73	30.14	0.00	0.00	50.00	46.72	69.37	49.71	23.94	58.85	45.27	14.16	39.04	25.36
656	Made-up articles, wholly or Chiefly of textile materials	13.26	62.06	52.75	24.96	72.13	46.88	38.25	72.25	41.37	10.87	26.65	22.33	3.34	41.58	31.13
657	Floor-Coverings, tapestries	3.15	71.06	51.31	10.00	[illegible]	24.19	38.81	81.84	72.47	34.31	42.16	38.36	23.07	54.45	41.92
658														17.91	54.51	30.98
661	Lime, cement and fabricated building materials excl. glass/clay materials	1.80	100.00	29.75	1.88	15.90	14.65	35.30	54.82	38.27	14.32	27.09	21.14	26.35	41.15	33.13
662	Clay and refractory construction materials	16.54	34.13	24.49	15.56	61.57	27.46	22.74	69.14	45.40	5.27	73.96	40.57	9.74	31.02	23.77
663	Mineral manufactures, n.e.s.	18.87	25.16	23.98	24.78	63.29	55.60	20.40	50.52	35.06	13.26	53.56	28.29	40.34	53.61	47.76

TABLE 4.3 (cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITG	1962 IITQ	1966 IITB	1966 IITG	1966 IITQ	1971 IITB	1971 IITG	1971 IITQ	1976 IITB	1976 IITG	1976 IITQ	1980 IITB	1980 IITG	1980 IITQ
664	Glass	0.70	68.75	46.29	0.00	0.00	50.00	0.35	100.00	10.89	0.00	0.00	50.00	0.00	0.00	50.00
665	Glass ware	0.59	78.57	54.73	15.89	70.15	64.42	12.84	56.47	46.92	42.62	60.39	36.00	49.44	80.05	60.17
666	Pottery	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
667	Pearls and precious and semi precious stones	18.84	100.00	59.46	18.35	99.25	79.74	32.38	99.78	66.56	29.98	87.54	81.21	41.53	98.58	89.78
671	Pig iron, spiegeleisen, sponge iron etc.	14.01	32.96	32.30	14.67	23.63	20.50	9.59	42.45	36.93	11.08	13.89	12.36	2.75	5.40	3.88
672	Ingots and other primary forms of iron or steel	4.25	70.60	60.79	0.00	0.00	0.00	17.15	27.45	22.34	12.96	41.44	32.19	26.68	42.53	20.30
673	Iron and Steel bars, rods, angles, shapes, sections	17.82	57.01	30.76	13.81	74.90	45.22	29.00	50.33	57.92	49.06	75.09	60.06	34.55	50.22	49.50
674	Universal, plates and sheet of iron or steel	41.96	79.67	34.34	30.50	36.05	30.78	39.62	53.26	35.86	47.90	52.69	44.68	18.61	23.18	22.41
675	Hoop and strip of iron or steel	-	-	-	-	-	-	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
676	Rails and railways' track construction materials for iron or steel.	0.00	0.00	50.00	0.00	0.00	50.00	30.09	58.44	41.66	0.56	15.00	15.00	0.07	0.07	0.07
677	Iron and steelwire, excluding wire rod	0.00	0.00	0.00	3.29	96.01	53.76	1.06	88.88	43.46	6.23	91.94	43.18	5.96	71.93	37.92
678	Tubes, pipes and fitting of iron or steel	1.84	23.50	17.26	9.71	52.34	31.97	0.50	26.70	23.55	15.50	32.01	16.85	13.09	79.84	53.04
679	Iron steel castings, forgings, unworked n.e.s.	27.20	29.21	25.50	15.01	15.21	14.35	14.45	33.08	23.14	21.22	83.56	47.79	25.23	86.58	44.07
681	Silver and platinum group metals	2.85	68.65	66.86	6.83	76.62	76.21	10.96	14.66	14.57	77.74	92.60	92.80	15.91	17.71	18.74
682	Copper	3.10	100.00	69.78	5.99	100.00	75.09	6.45	99.79	72.79	6.29	99.44	62.85	4.15	91.84	40.99
683	Nickel	1.00	1.01	1.25	4.03	6.52	6.42	5.18	0.61	7.22	1.88	1.95	1.86	9.60	16.75	10.17
684	Aluminium	12.42	99.45	56.40	8.92	65.79	82.03	9.90	86.75	57.66	19.66	58.70	21.80	7.36	42.78	13.27
685	Lead	0.35	66.66	55.73	1.44	100.00	64.15	0.34	100.00	61.76	0.81	100.00	59.44	0.08	56.60	12.37
686	Zinc	2.16	100.00	32.36	0.38	100.00	49.64	1.08	100.00	23.54	6.21	19.80	6.47	0.64	99.70	9.18
687	Tin	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
688	Uranium and thorium and their alloys	-	-	-	-	-	-	-	-	-	-	-	-			

TABLE 4.3
(cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITC	1962 IITQ	1966 IITB	1966 IITC	1966 IITQ	1971 IITB	1971 IITC	1971 IITQ	1976 IITB	1976 IITC	1976 IITQ	1980 IITB	1980 IITC	1980 IITQ
689	Miscellaneous non-ferrous base metals	17.36	80.40	54.75	11.68	16.82	16.75	23.59	50.03	20.06	24.51	26.42	22.92	14.63	100.00	98.12
691	Finished structural parts and structures n.e.s.	41.12	62.56	62.22	24.53	26.51	26.24	57.69	79.19	65.34	35.32	50.62	45.71	21.46	95.67	57.13
692	Metal containers for storage and transport	-	-	-	32.52	79.55	52.72	8.99	81.17	59.35	15.60	29.17	18.83	59.27	67.77	66.26
693	Wire products - excl. electric and fencing grills	46.79	91.21	66.84	6.97	15.25	14.01	6.88	54.33	27.71	2.97	35.03	16.72	51.50	56.95	47.72
694	Nails, screws, nuts, bolts, bolts, rivets & similar articles	12.36	51.75	40.63	20.99	43.99	41.11	20.79	56.77	42.09	10.78	37.02	35.22	12.26	38.01	26.29
695	Tools for use in the hand or machines	24.31	50.58	59.21	21.63	65.53	52.47	31.20	51.55	40.81	26.46	66.40	46.55	30.35	[illegible].34	44.47
696	Cutlery	51.36	69.28	66.97	21.48	43.98	40.41	7.73	27.41	15.44	8.31	40.78	15.82	15.32	60.81	13.83
697	House hold equipment of base metals	33.45	69.45	57.39	43.72	[illegible]	45.86	15.75	57.50	26.13	[illegible]	45.55	26.65	24.55	54.60	30.67
698/699	Manufactures of Metal	11.37	74.22	64.14	23.48	62.42	58.34	32.54	48.81	46.68	35.69	67.82	58.71	55.44	75.28	71.08

TABLE 4.3
(cont'd)

SITC	DESCRIPTION	1962 IITB	1962 IITC	1962 IITQ	1966 IITB	1966 IITC	1966 IITQ	1971 IITB	1971 IITC	1971 IITQ	1976 IITB	1976 IITC	1976 IITQ	1980 IITB	1980 IITC	1980 IITQ
711	Power generating machinery	31.96	36.60	34.39	18.85	26.11	25.69	22.41	30.43	27.80	34.68	51.32	47.52	8.35	46.51	7.65
712	Agricultural machinery & implements	17.13	58.17	48.39	14.88	38.49	30.08	14.15	66.43	38.40	23.02	48.12	41.48	2.25	28.98	28.77
714	Office machines	46.17	61.81	46.94	52.79	79.85	64.26	53.10	79.09	69.42	57.06	62.50	58.31	33.38	49.05	29.12
715	Metal-working machinery	18.37	73.81	63.92	6.04	77.61	64.64	15.06	57.17	52.61	17.17	58.80	43.94			
717	Textile and leather machinery	33.42	67.99	58.14	37.54	82.01	58.07	22.18	76.33	63.91	19.45	69.54	51.16			
718	Machines for special industries	19.51	33.52	29.75	16.92	43.57	37.31	17.13	30.13	26.10	22.42	35.53	33.76			
719	Machinery and appliances non-electrical parts.	26.04	54.70	47.56	30.74	67.60	55.25	36.60	65.78	56.95	[illegible]	63.76	49.08			
722	Electrical power machinery and switchgear	13.53	22.67	21.29	14.40	30.39	29.76	15.51	43.64	39.68	9.81	27.05	23.50	1.75	8.52	8.11
723	Equipment of distributing electricity	4.66	6.13	6.00	5.96	7.84	7.85	12.95	37.49	9.99	15.53	16.68	14.68	47.67	52.02	51.15
724	Telecommunication apparatus	30.69	62.67	43.59	24.44	46.50	41.98	34.00	43.80	40.85	35.44	42.42	40.24	19.18	67.79	52.86
725	Domestic electrical equipment	43.13	72.23	69.66	59.97	60.86	59.35	37.88	74.12	44.74	16.01	27.95	17.16	10.32	26.41	20.10
726	Electrical apparatus for medical purposes, radiological apparatus	13.47	34.68	34.68	10.02	30.63	26.83	26.23	56.77	43.30	18.41	44.94	35.94	12.52	67.35	49.14
727														12.58	50.45	37.50
729	Other electrical machinery and apparatus	34.52	54.11	50.59	55.99	78.15	55.05	66.22	75.53	70.11	65.57	68.77	63.73			
731	Railway Vehicles	0.47	1.50	0.28	1.83	2.06	1.85	0.10	[illegible]	[illegible]	0.84	1.82	0.89			
732	Road Motor Vehicles	2.26	6.59	5.93	8.04	10.30	9.95	11.03	16.03	15.48	9.76	10.37	9.40			
733	Road Vehicles, other than motor vehicles	0.22	2.03	2.03	1.89	69.81	18.65	0.98	52.80	39.76	3.30	83.03	60.73			
734	Air-crafts	16.64	24.72	12.90	20.56	23.39	18.89	16.27	100.00	67.67	47.24	75.90	43.68			
735	Ships and boats	16.70	44.68	36.99	0.75	5.78	5.06	5.54	15.77	5.52	16.16	49.12	39.04			
812	Sanitary, plumbing, heating and lighting fixtures	55.24	62.08	50.90	43.24	51.51	40.18	45.26	63.93	39.72	12.16	53.85	30.96	39.06	61.97	43.42
821	Furniture	5.28	87.37	39.30	12.72	80.62	29.94	11.81	80.24	21.29	7.61	60.07	24.85	33.91	64.39	29.46
831	Travel good, hand bags and similar articles	-0.88	100.00	55.67	50.19	89.08	42.01	8.93	93.73	17.02	8.32	81.97	8.09	3.29	75.36	8.36
841	Clothing except fur clothing	19.25	82.77	51.54	16.23	85.81	51.31	7.66	99.12	47.17	5.55	84.74	23.28			
842	Fur clothing and articles of artificial fur	11.07	60.00	38.35	3.66	100.00	35.63	3.92	81.10	20.63	4.95	74.74	55.66	10.20	23.87	10.82
851	Footwear	15.81	95.80	47.20	5.34	97.51	41.85	2.38	85.05	29.80	2.09	87.29	23.56	7.29	76.47	14.18
861	Scientific, medical capital, /cont. instruments	55.38	57.33	56.32	14.67	81.25	66.47	28.72	62.98	55.63	40.43	83.50	62.53			

TABLE 4.3
(cont'd)

SITC	DESCRIPTION	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
862	Photographic and Cinematographic supplies	6.85	34.73	34.74	12.41	53.75	40.15	3.81	69.81	27.75	1.77	70.86	41.85			
	Developed Cinematographic film	16.45	79.34	36.23	11.26	100.00	45.57	12.80	55.77	45.85	6.79	100.00	70.71			
864	Watches and clocks	5.91	66.16	41.37	4.94	55.18	35.46	5.77	92.34	87.72	10.35	92.43	61.14			
891	Musical instruments, sound recorders and parts.	0.28	88.23	49.34	6.48	90.62	52.76	1.04	47.54	41.57	3.27	58.38	41.95			
892	Printed matters	10.78	84.84	72.10	-	-	-	13.00	87.41	69.30	21.07	92.94	82.00	29.06	93.71	87.88
893	Articles of artificial plastic materials, n.e.s.	9.11	80.97	35.34	14.61	85.40	68.92	10.09	64.19	46.26	11.16	75.73	45.08	11.33	82.74	59.51
894	Perambulators, toys, games and sporting goods	24.18	70.12	56.61	29.43	84.67	64.27	23.46	78.15	52.31	21.45	73.97	52.25	32.75	57.98	41.80
895	Office and stationery supplies, n.e.s.	29.71	53.38	42.10	22.52	69.79	49.39	6.87	62.19	58.66	9.64	93.23	55.86	3.43	45.24	39.82
896	Works of arts, correctors' pieces and antiques	-	-	-	18.48	99.62	81.93	43.43	88.33	74.75	27.60	45.33	31.30	31.97	34.58	32.82
897	Manufactured articles n.e.s.															
898		28.39	96.78	74.12	-	-	-	27.88	68.46	32.14	17.76	78.57	28.78	33.01	57.85	35.58
911	Postal packages not classified according to kind															
931	Special transactions to be be added not classified according to kind	18.53	39.81	27.99	11.37	99.03	71.16	8.14	99.52	31.03	23.21	82.93	62.42	11.17	69.68	39.77
941	Animals, n.e.s. incl. Zoo animals, dogs and cats.	15.95	16.66	16.29	13.21	35.86	26.19	7.54	14.36	13.26	23.33	75.58	72.47	45.19	54.79	41.98
951	Fire arms of war and ammunition thereof	15.14	22.71	22.[illegible]	31.13	37.69	30.45	19.27	35.97	23.70	16.41	87.63	35.55	6.37	43.19	21.12
961	Coin-other than gold, not being legal tender	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

IITB - G-L Unadjusted index.

IITC - G-L Adjusted index

IITQ - Antonio adjusted G-L index.

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

TABLE 4.3.1

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY INDUSTRY:

2-DIGIT SITC (1962-1980)

SITC	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
00	Live animals	22.10	28.71	28.46	6.01	63.30	13.79	23.55	31.32	19.71	21.99	28.46	18.17	20.27	93.38	29.18
01	Meat and Meat preparations	3.83	9.45	3.75	23.77	43.79	17.15	3.81	13.25	5.02	5.00	14.82	7.73	4.19	7.78	5.27
02	Dairy Products & Eggs	7.75	14.63	6.91	18.73	21.46	17.34	9.16	11.94	9.04	19.71	34.21	26.39	28.24	49.17	26.47
03	Fish & Fish preparations	11.55	38.46	23.89	14.69	64.82	33.77	24.57	84.94	38.46	19.50	57.25	34.92	12.83	78.94	33.18
04	Cereals & cereal preparations	2.49	99.72	62.32	2.84	96.60	52.27	4.93	99.68	61.12	4.28	98.65	51.22	4.52	92.34	51.95
05	Fruit and Vegetables	15.15	18.16	15.11	13.42	15.16	13.70	18.93	32.06	19.99	27.57	29.51	26.85	26.48	32.34	27.58
06	Sugar, Sugar preparations and honey	11.27	99.11	20.23	29.45	95.62	36.71	9.70	90.57	20.55	3.93	70.64	18.73	4.94	59.44	16.45
07	Coffee, tea, cocoa, spices and manufactures thereof	5.86	77.05	25.09	8.93	99.78	26.86	1.55	100.00	31.44	3.49	99.28	39.85	1.94	96.30	37.29
08	Feeding stuff for animals (not including unmilled cereals)	0.14	94.11	47.30	0.71	68.27	53.34	5.43	66.57	31.25	5.03	61.45	26.12	2.01	96.06	41.95
09	Miscellaneous food Preparations	52.08	65.78	45.34	44.64	66.36	48.29	36.40	39.13	34.94	29.98	88.77	40.43	37.16	72.68	54.17
11	Beverages	10.89	56.03	31.99	9.01	73.16	40.66	7.51	84.11	53.36	4.77	75.29	50.83	3.93	76.06	52.31
12	Tobacco and tobacco manufactures	6.16	62.02	26.50	4.45	37.94	24.08	6.10	42.99	24.35	8.04	35.80	14.50	18.58	66.64	22.18
21	Hides, skins and furskins, undressed	45.52	62.25	48.43	27.46	47.94	40.12	31.29	49.64	38.87	28.26	53.32	35.87	14.72	41.11	22.72
22	Oil-seeds, oil nuts and oil kernels	0.45	3.40	3.40	0.20	36.95	36.24	0.16	33.90	33.90	2.86	10.27	8.88	5.64	100.00	34.70

TABLE 4.3.1

(cont'd)

SITC	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
23	Crude rubber (including synthetics and reclaimed)	1.85	100.00	40.20	6.77	100.00	35.69	20.20	26.59	24.39	14.17	18.02	14.97	13.47	14.30	13.68
24	Wood, lumber and cork	0.31	40.72	25.47	0.18	28.44	22.54	0.27	11.85	2.56	0.17	3.86	2.06	1.18	22.64	9.56
25	Pulp and Waste paper	0.02	100.00	53.96	0.07	4.53	4.54	0.37	100.00	1.87	0.22	70.37	11.45	0.04	92.00	47.02
26	Textile fibres (not manufactured into yarn thread or fabrics) and their Waste	11.24	69.89	37.05	19.36	86.11	56.42	24.51	65.60	33.28	30.91	47.31	37.20	42.70	48.51	42.82
27	Crude fertilizers and Crude minerals (excluding Coal, Petroleum and Precious Stones)	15.02	100.00	39.69	10.80	97.19	49.09	7.97	100.00	33.53	6.33	94.51	36.25	6.67	95.60	42.89
28	Metalliferous ores and Metal Scrap	1.17	33.87	29.31	2.31	40.22	22.62	2.48	17.21	11.36	6.68	29.51	20.29	4.43	16.32	12.26
29	Crude animal and Vegetable materials, n.e.s.	41.72	52.03	43.41	32.57	34.08	32.41	42.70	46.03	43.85	44.86	52.70	41.94	35.30	36.25	35.27
32	Coal, Coke and briquettes	0.00	0.00	50.00	0.00	0.00	50.00	3.45	3.74	3.72	8.61	98.97	27.02	0.07	32.94	11.28
33	Petroleum and Petroleum Products	0.32	64.44	0.72	0.47	83.50	5.98	0.39	57.02	4.27	1.39	22.49	0.81	2.18	5.90	1.93
34	Gas, natural and manufactured	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	5.55	11.11	3.70	0.00	0.00	0.00
35	Electric Energy	-	-	-	-	-	-	-	-	-	-	-	-			
41	Animal oils and fats	14.46	70.56	53.62	6.95	84.18	82.95	3.49	89.20	49.24	3.13	95.33	26.57	2.48	88.90	20.10
42	Fixed Vegetable oil and fats	63.80	66.14	66.14	17.53	26.62	13.07	8.85	22.04	19.87	2.05	2.33	2.04	7.16	16.95	7.09
43	Animal and Vegetable oils and fats, Processed and Waxes of Animal or Vegetable origin	14.57	28.10	9.84	9.15	9.29	9.02	28.54	33.33	25.61	6.47	95.65	79.30	4.13	93.05	61.34

TABLE 4.3.1

(cont'd)

SITC	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
51	Chemical Elements and Compounds	64.78	79.74	68.84	55.48	64.36	61.23	40.99	49.54	44.51	60.50	63.91	60.22	29.16	34.02	30.96
52	Mineral Tar and Crude Chemicals from Coal, Petroleum and natural gas	23.33	49.37	45.83	0.00	0.00	50.00	25.68	89.49	27.86	0.00	0.00	50.00	21.41	91.69	43.94
53	Dying, tanning and colouring materials	9.52	89.68	52.05	22.06	86.16	41.98	3.82	50.93	37.34	6.46	73.53	47.55	7.22	80.22	42.50
54	Pharmaceutical Products	31.27	46.49	36.32	36.76	61.82	51.59	41.64	60.61	44.58	31.74	72.42	55.42	36.70	71.84	49.53
55	Essential oil and Perfume materials; toilet, Polishing and Cleansing Preparations	11.68	55.20	59.79	22.85	53.41	36.86	18.10	73.60	67.96	9.76	61.26	48.63	34.87	79.81	53.32
56	Fertilizers, manufactured	0.13	0.22	0.23	0.37	1.79	0.21	4.19	83.94	10.45	0.86	64.55	4.27	1.24	35.84	6.02
57	Explosives and Pyrotechnic products	0.91	18.51	5.18	1.82	7.69	2.51	24.07	47.41	25.32	20.95	53.80	40.66	0.00	0.00	50.00
58	Plastic materials, regenerated cellulose and artificial resins	47.84	65.01	45.50	27.88	30.54	27.14	29.90	37.08	34.63	26.66	34.10	31.46	45.59	59.93	41.67
59	Chemical materials and Products, n.e.s.	18.44	77.83	66.84	48.24	67.27	53.79	35.60	74.57	60.72	27.38	54.88	35.89	42.25	65.12	45.07
61	Leather, leather manufactures, n.e.s. dressed furskins	58.42	85.63	84.27	32.54	86.78	80.51	18.99	88.27	72.51	17.46	72.83	59.19	39.35	65.99	55.25
62	Rubber manufactures, n.e.s.	12.74	36.48	25.87	15.86	57.19	31.81	11.85	63.81	45.42	5.71	56.76	28.71	13.98	61.55	43.83

TABLE 4.3.1

(cont'd)

SITC	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
63	Wood and Cork manufactures (excl. furniture)	24.10	41.68	30.80	9.26	54.94	37.35	14.04	39.14	32.15	11.86	15.73	14.40	10.02	29.21	24.99
64	Paper, paperboard and manufactures thereof	4.73	63.04	54.86	4.87	81.53	64.31	5.93	80.05	65.81	9.19	87.11	66.69	9.19	82.77	60.17
65	Textile garn, fabrics, made-up articles and related Products	15.33	75.11	58.39	21.37	74.56	57.61	32.39	89.52	61.49	27.88	69.77	47.60	40.99	67.42	47.60
66	Non-metallic mineral manufactures, n.e.s.	6.51	69.44	49.33	8.83	87.84	64.46	15.52	86.41	63.78	20.46	79.19	59.64	24.79	78.07	60.35
67	Iron and Steel	44.00	52.71	50.62	31.69	62.37	48.85	38.40	51.08	49.36	46.60	56.03	50.58	30.05	38.55	32.99
68	Non-ferrous metals	21.22	87.90	66.29	18.80	74.86	55.98	10.82	45.04	37.61	17.35	40.69	35.53	12.68	81.57	59.92
69	Manufactures of metal n.e.s.	22.98	73.13	68.41	36.14	66.99	59.05	30.71	61.08	55.48	29.08	66.28	57.92	55.57	76.88	70.31
71	Machinery, other than electric	37.93	59.19	51.73	29.80	61.85	50.60	31.42	57.51	50.09	41.27	68.79	53.56	39.02	50.22	42.96
72	Electric machinery, apparatus & appliances	22.98	73.13	68.41	46.44	56.29	54.34	52.73	67.08	66.25	40.37	55.95	52.98	30.56	59.35	53.46
73	Transport equipment	32.37	54.45	47.70	13.07	17.47	16.37	21.94	26.63	26.01	24.11	26.97	24.67	17.26	78.40	66.42
81	Sanitary, plumbing heating and lighting fixtures and fittings	53.24	62.08	50.90	43.24	51.51	40.18	45.26	63.93	39.72	20.16	53.85	30.96	39.06	61.97	43.42
82	Furniture	5.28	87.37	39.30	12.72	80.62	29.94	11.81	80.24	21.29	7.61	60.07	24.85	23.91	64.39	29.46
83	Travel goods, handbags and similar articles	0.08	100.00	55.67	50.19	89.08	42.01	8.93	93.73	17.02	8.32	81.97	8.09	3.29	75.36	8.36

TABLE 4.3.1

(cont'd)

SITC	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
84	Clothing	22.09	84.78	54.04	32.90	79.04	47.04	17.29	54.93	31.15	13.28	67.38	26.05	19.60	42.79	23.05
85	Footwear	15.81	95.80	47.20	5.34	97.51	41.85	2.58	89.05	29.80	2.09	87.29	23.56	7.29	76.47	14.18
86	Professional, Scientific and controlling instruments; photographic and optical goods, watches and clocks	47.06	71.72	49.32	14.90	89.07	63.83	16.94	66.43	54.92	27.47	85.67	72.68	-	-	-
89	Miscellaneous manufactured articles, n.e.s.	13.20	81.15	68.72	20.24	86.05	60.59	20.51	88.74	63.57	37.49	89.76	53.41	46.33	88.05	61.54

Key
IITB = G-L Unadjusted index
IITC = G-L adjusted index
IITQ = Antonio's adjusted index

Source: Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

Industrial groups falling under SITC 6, Manufacturing, indicate high values of IIT (as expected) particularly in SITC 611 Leather, 612 Manufactures of Leather, 613 Fur Skins, 642 Articles of Paper, Pulp Board, 674 Universal Plates and Sheets of Iron or Steel, 693 Wire Products, 696 Cutlery, and 664 Glass. The IITC and IITQ indices show values above 70 percent for all the above industries. Some industries such as 629, 641, 664, and 671 have low values.

It appears that IIT values are low for goods which are at a low level processing stage (raw materials, etc.), and high for goods of higher level of processing. This suggests that an increase in the level of processng of the product is followed by an increase in IIT. This in turn is explained by the prevalence of product differentiation within such groups. In this category the commodity classes which have low values are SITCs 023, 025, 041, 052, 071, and 072. Large variability is found in those sectors which are partly composed of seasonal goods. Seasonal changes in products and cyclical variation in demand patterns cause IIT to emerge in these categories. Explanations for these attributes are: first, that they are all broadly defined categories containing a variety of products, consisting mainly of consumer rather than producer goods. Second, the broad category "Food and Live Animals" consists mostly of finished goods. Lastly, those commodities having low IIT values are generally materials requiring further processing rather than consumer goods. Although eggs and butter are consumer goods, they are not the type of goods which can easily be differentiated by brand names or places of origin and consequently would be expected to have low values.

Industries which fall within the category "Inedible Crude Materials" also have a wide distribution of measured IIT. As the tables show, those commodities with low values tend to be intermediate goods at a low stage of finishing such as Cotton (253), Jute (264), Vegetable Fibres (263), and Metal Ores and Concentrates (281, 283, 284, 286). The commodity groups in this category with relatively high measured IIT tend to be of two different kinds. First come the more aggregated groups, such as 266 (Synthetic and Regenerated Artificial Fibres), SITC 276 (other Crude Materials) and 291 (Crude Animal Materials, n.e.s.). The relatively high IIT in this group can be attributable to the compilation of different goods into a single commodity group. There are three industries which have relatively high measured IIT which are more difficult to explain. These are 275 (Natural Abrasives). A few included in abrasives are, industrial diamonds, and pumice.

Tables 4.3 and 4.3.1 provide some evidence in support of the contention that product differentiation by style, quality, and specific performance characteristics is an important factor affecting the value of IIT. For example, with minor exceptions, the high level industries are dominated primarily by consumer goods industries in which product differentiation of the type mentioned above can be achieved. Thus, industries which have low measured IIT are characteristically those producing goods in which differentiation is difficult if not impossible.

These results run counter to the belief based on traditional trade theories that if a country exports relatively much of a certain commodity, it will import relatively little of it. The theory was challenged by Linder (1961) on theoretical grounds and by Hufbauer's (1970) empirical test. These studies suggest that relatively high values of exports are often associated with relatively high values of imports. This is also true for Canada. These results are also consistent with those of Aquino. He also estimated the elasticities of the share of each industry's exports within the context of total exports of manufactured products in a country, with respect to the industry's share in the country's total imports of manufactures. His results indicated that the values of the elasticities were positive, particularly for Canada, France, Netherlands, Portugal, Switzerland, India, Singapore, Korea, and Hong Kong. Office machines, radio broadcast receivers, passenger motor cars, and parts of motor vehicles gave similar results for the analysis by industry. The exceptions were Japan among countries and miscellaneous manufactures within industries.

From the above empirical evidence, it is unlikely that these results are just the outcome of the heterogeneity of product classes. It rather suggests that intra-industry trade is a stable industry characteristic.

4.4 Canada's Intra-Industry Trade Through Time

This section examines the intensity of IIT over time (1962-80). The estimates have been performed in three different ways. First, the values of the IIT indices have been obtained by summing across industries with respect to the world as a whole, and then with respect to each specific partner country. Second, summary values of IIT indices have been calculated for each industry at the 1-digit level. This has been performed across all countries. Third, the magnitude of IIT has been estimated with respect to a few countries and groups of countries, such as the EEC, Japan, and LDCs.

4.4.1 Canada's IIT by Country: Through Time

This sub-section examines the general trends in the IIT indices over time. Analysis over time permits investigation of the strength of IIT while holding constant the level of industry aggregation. This analysis, therefore, is insulated from the problems of "categorical aggregation" of different industries.

Table 4.4.1 shows the distribution of, and variation in, the intensity of intra-industry trade in all industrial groups with the rest of the world and with selected trade partners over time for the years (1962-80). The results suggest wide-spread growth in the magnitude of IIT over time with the world at large and in bilateral trade. Some cyclical fluctuations are noticeable.

TABLE 4.4.1

CANADA'S INTRA-INDUSTRY TRADE BY COUNTRY: THROUGH TIME (1962-1980)

COUNTRY	IIT	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
WORLD	B	56.87*	57.02	54.05	56.66	59.24	62.97	65.10	67.81	65.12	67.19	67.33	66.47	67.31	68.58	68.29	67.61	68.95	67.05	64.51
	C	57.26**	58.86	54.53	58.11	59.74	63.97	66.25	68.55	69.43	69.30	67.82	66.74	68.99	72.80	70.60	68.90	69.59	67.56	66.87
	Q	57.04**	57.78	53.89	56.27	59.13	62.86	65.20	67.65	66.67	67.96	67.51	66.50	66.99	69.43	68.21	67.58	68.94	67.01	65.12
U.S.A.	B	50.33	51.96	49.62	51.10	56.59	61.52	65.75	68.17	66.85	67.53	67.28	66.81	63.01	61.94	65.04	66.55	69.03	66.40	64.73
	C	54.00	55.38	57.41	58.15	62.55	66.39	67.22	69.79	68.10	68.67	67.46	67.79	64.45	66.48	67.43	68.18	69.51	69.13	65.40
	Q	52.20	53.71	[illegible]	53.23	58.84	65.58	65.77	67.74	67.27	67.90	67.34	66.89	63.04	64.06	65.20	66.67	69.05	66.60	64.62
BEL-LUX	B	34.12	29.70	26.88	24.24	26.56	29.10	25.05	30.31	25.21	26.10	28.26	28.97	28.57	29.57	26.78	30.62	37.51	31.64	28.20
	C	41.23	38.41	33.89	31.64	36.50	35.50	38.98	42.40	55.77	49.74	42.76	50.66	41.52	50.74	61.37	58.80	57.76	53.36	60.35
	Q	38.08	36.01	31.62	29.33	32.75	32.91	32.13	35.62	38.81	34.71	34.17	37.09	33.17	35.65	37.31	39.89	42.14	37.71	40.77
DENMARK	B	45.86	50.26	43.04	37.79	39.68	43.80	39.97	35.76	43.24	47.02	36.01	40.06	32.62	32.19	32.88	39.83	40.55	41.88	43.65
	C	70.01	71.22	69.19	58.42	62.32	57.72	51.72	56.05	52.29	59.85	63.39	69.70	74.40	64.70	58.47	55.10	52.43	52.65	54.71
	Q	57.72	62.09	53.71	46.36	49.41	50.34	47.17	46.16	47.67	53.64	50.52	55.08	54.45	53.09	49.64	48.16	46.44	45.94	48.58
FRANCE	B	39.58	39.18	39.68	39.78	38.90	34.70	36.08	38.61	42.50	35.61	34.41	37.35	40.07	37.58	45.25	38.33	36.92	36.91	37.12
	C	40.64	42.78	41.32	42.06	44.29	45.05	44.68	42.80	43.44	43.33	46.20	48.38	46.39	47.01	48.48	47.82	46.26	42.27	41.65
	Q	39.99	40.83	40.21	40.63	42.46	41.83	41.67	41.03	42.19	40.95	42.91	44.89	44.17	43.93	46.55	44.43	43.27	39.95	38.91
GERMANY W.	B	40.75	43.75	40.17	38.52	35.27	32.63	32.90	33.76	35.37	34.22	31.95	33.40	32.88	34.17	37.96	35.07	32.30	40.13	37.90
	C	46.39	48.54	43.23	41.03	42.04	40.22	37.65	38.38	36.05	40.38	42.25	40.14	40.48	40.23	41.56	39.87	42.93	43.88	40.15
	Q	42.38	45.66	41.66	39.65	40.00	38.19	36.60	36.79	35.73	38.20	40.70	38.55	38.33	38.95	39.93	37.74	40.28	41.35	38.97
AUSTRIA	B	35.39	33.27	30.91	29.09	28.65	20.13	13.07	14.86	14.81	15.29	14.65	17.96	24.95	24.52	25.22	28.09	27.96	30.94	41.57
	C	36.83	38.34	37.75	34.78	35.12	36.84	39.20	38.83	44.50	46.24	44.61	54.19	51.23	50.07	48.65	60.92	64.39	51.32	50.48
	Q	36.53	37.70	33.78	30.94	31.26	33.71	34.38	35.11	37.69	38.39	38.88	46.66	46.19	45.83	44.76	50.77	53.01	45.19	46.25
FINLAND	B	23.62	24.12	39.84	39.50	29.97	41.61	42.28	46.99	25.46	46.26	38.28	42.26	41.26	52.84	41.64	45.29	49.71	49.86	39.50
	C	44.21	47.61	47.77	55.52	45.77	52.57	57.02	64.76	57.27	53.78	56.39	49.70	58.78	66.59	65.08	67.43	62.06	55.75	48.83
	Q	36.15	37.49	42.82	46.46	38.11	47.23	49.81	60.96	43.64	50.39	50.59	46.13	52.15	58.92	55.96	58.22	54.90	50.85	43.67
NORWAY	B	18.12	21.32	26.64	26.10	24.64	23.44	21.43	23.18	18.25	17.32	23.30	22.92	21.25	28.50	29.37	96.76	29.31	25.51	32.04
	C	48.31	44.28	45.22	44.82	51.39	41.33	42.34	38.10	41.20	38.40	34.23	37.44	33.07	34.97	30.77	38.51	47.80	47.46	48.18
	Q	33.44	34.18	36.10	34.47	35.43	33.05	33.14	32.53	31.34	30.54	29.92	31.50	29.22	32.29	30.35	30.17	39.96	36.70	38.05
PORTUGAL	B	24.19	43.52	34.20	28.69	24.93	32.20	31.03	29.51	33.58	34.80	35.76	32.00	37.06	31.21	34.19	37.47	33.53	37.25	32.86
	C	39.63	49.38	47.33	47.94	48.58	51.44	46.92	44.61	39.24	43.22	42.48	39.25	41.02	42.33	38.51	41.40	41.54	40.68	45.39
	Q	37.94	46.60	37.22	40.34	39.18	41.50	39.42	39.69	35.13	37.68	37.65	33.12	37.73	34.25	35.10	39.46	34.82	39.55	41.85
SWEDEN	B	49.01	43.67	47.05	40.39	31.51	29.94	29.46	37.09	36.91	33.04	29.53	31.70	30.25	30.84	31.35	33.47	30.26	34.31	40.92
	C	57.05	56.11	57.14	59.93	48.34	56.09	52.11	57.86	59.25	58.53	62.01	62.57	49.58	60.28	57.56	59.99	60.79	57.02	53.56
	Q	53.22	49.17	51.67	51.80	43.86	51.42	47.39	53.03	55.19	53.71	52.70	54.63	44.51	53.59	49.90	52.78	53.47	49.19	49.13
SWITZERLAND	B	38.39	40.77	39.37	38.94	35.84	30.87	33.49	30.84	35.15	31.15	31.84	35.91	38.99	31.71	36.27	35.92	34.13	42.81	51.91
	C	41.10	43.99	47.47	49.63	46.66	54.76	50.08	51.08	52.58	51.39	52.44	50.18	47.95	54.67	54.20	57.31	58.85	57.09	63.70
	Q	40.18	42.80	41.81	45.41	42.69	46.71	45.07	43.95	45.55	43.73	46.07	44.43	43.59	47.65	47.54	51.35	51.54	50.09	57.72
SPAIN	B	30.04	28.77	26.95	22.24	20.33	25.95	27.93	25.94	25.91	29.97	34.07	34.01	33.71	40.40	36.09	35.58	41.21	32.72	39.82
	C	42.84	49.41	34.55	36.71	37.00	40.39	35.73	36.53	35.88	38.01	34.34	34.04	38.46	41.41	38.02	36.70	44.28	37.08	43.34
	Q	40.09	41.14	32.43	32.19	31.67	34.62	32.06	33.91	33.71	35.92	34.22	34.03	35.98	40.87	37.02	36.08	41.01	34.62	41.17

TABLE 4.4.1
(cont'd)

COUNTRY	LIT	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
AUSTRALIA	B	22.30	24.60	22.19	20.50	28.14	24.56	25.36	29.18	32.52	32.60	36.01	34.23	34.01	30.79	36.95	38.85	33.21	34.55	32.49
	C	37.40	34.78	37.25	40.90	41.72	42.60	43.87	39.85	38.21	39.89	39.92	35.75	34.60	37.27	38.11	41.79	35.83	36.50	36.27
	Q	35.36	33.52	34.63	36.61	38.22	38.20	39.54	37.46	35.26	36.31	37.51	35.02	34.33	35.64	37.96	39.81	34.96	35.48	35.70
NEW ZELAND	B	20.73	20.25	20.44	19.39	18.13	18.41	25.35	28.97	30.58	28.90	29.56	29.77	30.67	33.04	32.74	38.42	31.06	29.85	31.73
	C	33.83	32.49	33.21	34.35	34.90	34.46	35.41	29.16	31.89	29.64	29.60	34.64	31.99	34.95	36.65	38.46	37.50	39.74	38.74
	Q	29.21	28.73	28.12	27.59	27.58	27.27	30.13	29.10	29.91	29.42	29.52	34.22	31.59	32.87	34.77	38.44	34.42	33.16	33.89
IRELAND	B	33.72	36.12	29.45	30.67	32.74	37.16	45.77	43.37	43.66	46.95	46.40	41.77	46.82	45.17	43.24	41.59	34.11	34.70	36.18
	C	57.18	54.18	50.64	50.95	52.08	49.69	48.37	47.91	44.96	50.53	51.10	54.88	52.36	62.00	46.67	49.29	51.02	46.35	36.73
	Q	50.02	50.13	45.75	45.09	45.03	46.30	47.30	45.88	44.67	46.55	46.77	46.75	49.38	48.68	44.91	43.12	41.52	39.67	36.54
ITALY	B	38.75	41.49	42.54	35.40	31.68	31.86	33.09	34.90	33.85	31.51	33.05	31.86	30.09	31.09	28.30	30.83	31.52	31.21	29.73
	C	47.53	50.17	47.21	37.17	35.56	35.24	34.66	36.79	37.38	35.16	34.73	34.12	35.41	33.66	33.79	33.11	34.34	32.56	37.57
	Q	42.85	46.05	42.75	36.20	33.63	33.70	33.91	34.98	35.62	33.55	32.54	32.93	32.59	32.31	30.96	32.02	32.43	31.92	32.99
NETHERLANDS	B	38.54	33.03	30.34	33.34	31.48	27.58	30.76	34.39	29.69	28.12	31.89	34.75	32.36	29.90	33.37	33.15	34.62	23.86	21.94
	C	59.70	59.87	49.56	52.06	51.52	49.48	55.05	55.75	63.49	53.67	56.85	56.08	52.49	57.84	55.86	59.06	58.10	58.51	65.26
	Q	47.84	47.39	41.81	41.35	42.62	40.07	42.24	45.32	45.81	38.84	44.44	44.82	41.64	44.27	43.40	45.13	45.93	41.07	48.94
U.K.	B	37.45	34.41	32.26	32.96	34.38	34.09	35.21	38.08	33.63	38.37	39.88	39.71	38.45	40.11	37.97	40.49	43.67	42.01	40.20
	C	49.30	50.40	46.12	46.10	45.79	45.21	47.19	44.54	49.04	48.43	46.27	49.29	49.41	47.54	47.66	48.15	47.29	47.43	49.81
	Q	45.55	45.64	41.12	41.32	41.50	40.91	42.04	41.73	42.34	43.61	43.11	44.33	43.98	34.57	42.85	44.19	45.39	44.51	44.46
BRAZIL	B	28.74	27.19	22.32	22.02	28.41	31.42	27.20	27.44	27.78	31.76	34.92	42.11	25.03	51.75	37.80	49.15	39.62	41.22	28.97
	C	30.66	30.26	30.31	32.68	37.82	33.01	31.29	31.23	40.49	45.20	41.85	47.08	53.18	55.88	55.92	54.92	51.93	45.67	45.64
	Q	30.01	30.13	29.78	31.84	35.99	32.39	30.27	29.80	33.84	38.06	38.78	44.30	44.28	53.32	49.00	51.95	47.86	43.58	41.62
VENEZUELA	B	8.08	8.37	8.54	9.86	11.55	10.08	9.82	9.33	10.92	10.24	11.51	7.23	5.88	9.07	9.43	12.31	15.05	16.39	12.35
	C	25.38	26.02	26.02	24.70	24.43	24.81	24.73	24.60	24.84	24.36	24.74	24.95	24.86	24.92	25.30	24.78	23.63	25.98	25.86
	Q	25.10	25.22	20.65	20.90	21.08	20.85	21.06	21.09	20.92	20.58	20.78	20.59	20.42	20.30	20.42	20.26	20.43	35.25	25.10
ISRAEL	B	36.59	34.71	33.97	36.55	30.16	36.58	38.18	36.10	40.98	38.88	35.20	35.06	32.26	26.88	36.42	43.22	39.99	35.36	40.54
	C	40.29	41.81	41.30	37.01	39.26	42.29	43.55	39.26	41.49	43.76	42.92	44.47	48.19	43.16	44.75	46.91	54.57	49.27	56.42
	Q	38.33	38.71	37.50	36.53	34.56	39.75	40.95	37.65	40.80	40.74	39.07	38.91	42.72	35.96	40.30	44.33	46.99	40.21	47.06
KUWAIT	B	4.71	17.98	3.34	10.05	17.03	19.38	16.95	9.16	-5.58	0.65	21.58	13.87	2.87	5.20	21.82	15.73	0.07	19.03	[illegible]
	C	25.04	25.00	25.20	24.75	24.21	20.03	20.06	22.44	22.21	25.00	22.10	22.59	23.58	24.55	24.02	20.09	33.33	24.39	24.03
	Q	25.00	25.00	20.01	20.14	20.13	20.04	20.03	20.04	20.00	23.19	20.09	20.01	20.01	20.01	20.07	20.07	28.16	24.36	24.03
TURKEY	B	23.20	19.56	26.12	12.95	16.33	15.10	9.89	12.66	4.12	4.37	17.65	11.61	5.86	5.78	6.57	5.86	11.74	12.60	40.49
	C	28.65	27.93	28.55	26.40	43.71	32.47	44.69	39.16	30.18	41.78	46.59	39.80	50.08	36.69	38.13	23.32	25.37	25.68	36.86
	Q	28.59	26.66	28.02	24.24	28.01	25.53	25.84	26.50	23.57	29.72	44.50	27.41	40.22	32.83	34.27	22.58	24.02	23.88	48.69
HONG KONG	B	34.96	37.27	33.43	44.09	47.38	22.26	20.43	10.65	20.45	20.40	17.84	20.97	22.98	20.95	18.95	18.48	21.58	23.66	24.17
	C	40.11	41.00	39.88	33.89	33.92	47.57	50.79	54.40	53.36	56.44	58.35	55.69	54.11	57.26	61.23	53.77	54.03	55.70	56.36
	Q	37.83	39.10	33.05			32.56	32.44	33.90	34.05	36.22	35.29	35.61	36.14	36.50	38.85	34.66	37.03	36.83	40.21
INDIA	B	33.63	37.57	33.14	39.30	23.24	22.03	21.86	25.53	22.88	25.00	23.00	17.41	29.69	10.80	27.50	23.29	17.79	22.64	16.42
	C	41.14	38.13	45.23	46.64	42.61	47.11	42.23	42.52	48.18	49.18	37.22	41.13	43.01	41.24	41.95	37.05	38.03	36.76	37.20
	Q	39.80	38.11	36.90	41.08	35.74	36.75	35.11	36.07	42.58	38.15	30.36	33.97	37.40	35.74	41.28	32.95	31.34	30.01	32.78
SOUTH KOREA	B	6.61	7.48	23.72	24.95	7.02	21.88	25.80	24.17	25.28	24.87	24.78	26.90	24.48	24.89	20.47	18.97	23.73	29.72	29.78
	C	55.24	41.96	36.02	33.32	31.23	26.89	26.27	24.93	26.31	26.62	30.10	33.51	33.82	39.62	39.21	33.11	33.81	35.26	30.88
	Q	40.56	32.78	32.46	29.44	26.85	25.62	25.50	24.77	25.94	26.19	26.43	29.24	31.08	30.20	31.88	29.69	29.95	33.01	30.50
PHILLIPPINES	B	6.76	8.76	8.69	40.72	14.43	10.48	7.43	9.89	9.96	13.02	25.49	39.09	22.42	23.72	29.00	26.35	30.26	31.40	34.43
	C	47.14	51.23	42.26	33.23	45.59	45.64	46.05	39.64	39.47	45.37	42.09	48.03	45.71	40.68	37.52	37.46	35.77	31.71	35.18
	Q	34.41	35.76	34.77	24.85	34.46	30.76	29.02	28.18	29.21	38.42	37.03	45.75	38.46	36.83	35.07	35.62	34.00	31.65	33.76

TABLE 4.4.1
(cont'd)

COUNTRY	IIT	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
SINGAPORE	B						16.08	13.28	14.34	23.45	26.78	26.57	32.85	34.14	42.37	29.54	28.56	34.53	30.61	32.66
	C						38.17	38.17	38.49	32.54	38.29	49.29	55.52	45.29	48.01	49.30	48.80	45.52	39.37	35.93
	Q						35.82	33.87	33.17	31.07	34.59	38.04	44.10	39.99	44.37	44.10	44.49	41.74	33.99	34.24
JAPAN	B	25.19	21.27	23.55	24.96	23.26	24.85	25.03	28.79	26.94	29.35	27.09	28.84	23.89	22.64	23.29	24.66	27.20	22.49	25.35
	C	34.25	34.93	31.22	27.81	27.81	33.59	31.73	30.94	30.35	30.80	30.37	29.82	28.88	29.54	28.33	27.93	30.77	30.86	31.35
	Q	32.09	31.16	28.51	27.10	27.26	29.87	29.08	29.99	29.06	28.70	28.13	27.89	27.37	27.50	27.13	27.23	29.62	28.42	29.56
EEC	B	41.86	40.50	37.66	38.35	39.41	39.17	39.00	41.32	37.62	40.32	43.43	42.49	41.26	41.61	40.33	41.93	45.06	42.51	39.52
	C	52.87	55.01	48.86	47.89	47.13	45.94	46.62	44.94	49.66	46.25	45.30	46.64	46.22	45.30	47.17	46.08	45.06	47.16	52.07
	Q	47.70	47.85	43.83	42.84	43.54	42.80	42.97	43.22	43.08	43.24	44.26	44.27	42.99	45.16	43.25	43.53	45.07	43.69	45.43

SOURCE: Magnetic tapes from the Dept. of Industry, Trade and Commerce, Government of Canada.

* IIT_B = unadjusted G-L index.

** IIT_C = adjusted G-L index.

*** IIT_Q = adjusted Antonio index.

The highest degree of IIT for Canada's trade is with the United States, Sweden, West Germany, and the EEC as a group.[12] The lowest magnitude is with Kuwait and Venezuela. This suggests that the higher values of IIT for Canada's bilateral trade are with the industrialized countries and the lowest values are with the less developed countries (with Japan as an exception).

The table also indicates that the share of Canada's IIT in its total trade with the world and with individual partner countries has been growing over time. For example, in 1962, the magnitude of IIT with the world was 56.87 percent (unadjusted G-L index), which increased to 68.58 percent in 1975 (20.5 percent growth) and further grew to nearly 69 percent in 1976 and 1978 and fell to 67.05 and 64.51 in 1979 and 1980 respectively (13.42 percent negative growth). These two years are exceptional in showing a negative growth. One explanation for this unexpected result may be the wide-spread recession in the industrial world.

The magnitude with the United States was 50.33 in 1962, which grew to 68.17 percent in 1969 (35.45 percent growth) reached the highest level of 69.03 in 1978 (37.15 percent growth) with a slight fall in 1979 and 1980. Adjusted measures are much higher than unadjusted in all cases. This trade pattern is followed for other countries, although wide variations are

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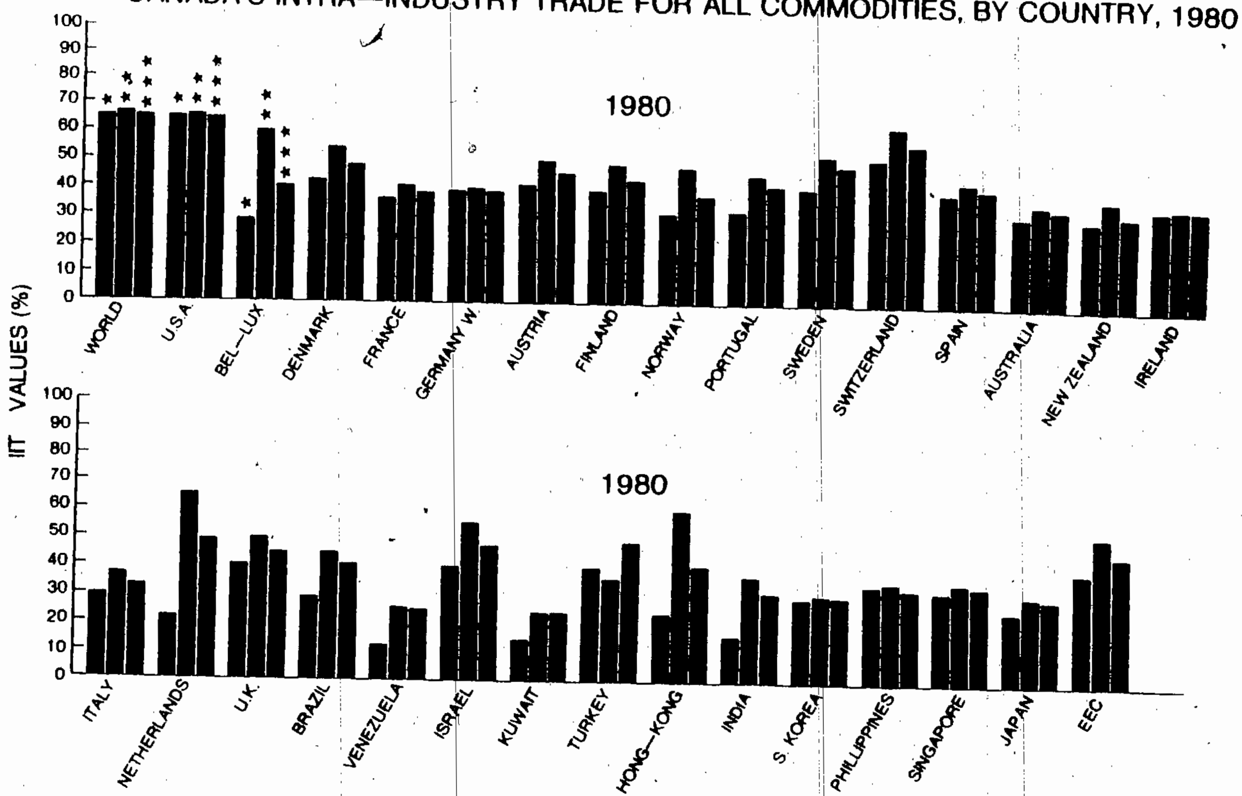
[12] Data for the EEC includes 9 countries: France, West Germany, Italy, Belgium-Luxembourg, Netherlands, Denmark, Ireland, United Kingdom, and Finland from the year 1973. Earlier periods include only the original six members.

noticeable in certain cases, such as Austria, Finland, Ireland, Netherlands, and Turkey. It is also noticeable that in the cases of India, Hong Kong, and Ireland, IIT values reveal wide variations over time and also indicate that the intensity of IIT has declined over time for these countries. For example, in 1962, IIT with India was 33.63 percent falling to 16.42 in 1980 (about 51 percent negative growth). Similarly, with Hong Kong the IIT magnitude was 34.96 in 1962, declining to 18.48 in 1979 (47 percent negative growth) with slight growth in 1980.

Furthermore, the table indicates that regardless of cyclical variations over the years, Canada's share of intra-industry trade has been in the range of 55 to 70 percent from 1962 to 1980 (with two exceptional years 1975 and 1976, when values over 70 percent are obtained). In 1962, out of 29 countries, 15 demonstrated intra-industry trade values above 30 percent, 7 over 40 percent, and 4 above 50 percent. In 1970, many countries show percentages over 60. From 1970 to 1980 cyclical variations are observable. These results are summarized in Figures 4.4.1 through 4.4.8. Table 4.4.1 and Figures 4.4.1 and 4.4.2 show the distribution of and variation in the intensity of Canada's intra-industry trade in relation to: (a) the rest of the world; (b) with the EEC countries as a group; and (c) with her 29 trading partners in two years, 1962 and 1980. Figures 4.4.3 through 4.4.8 show the growth in Canada's intra-industry trade through time with the world at large and with a few selected countries.

FIG. 4.4.1

CANADA'S INTRA—INDUSTRY TRADE FOR ALL COMMODITIES, BY COUNTRY, 1980



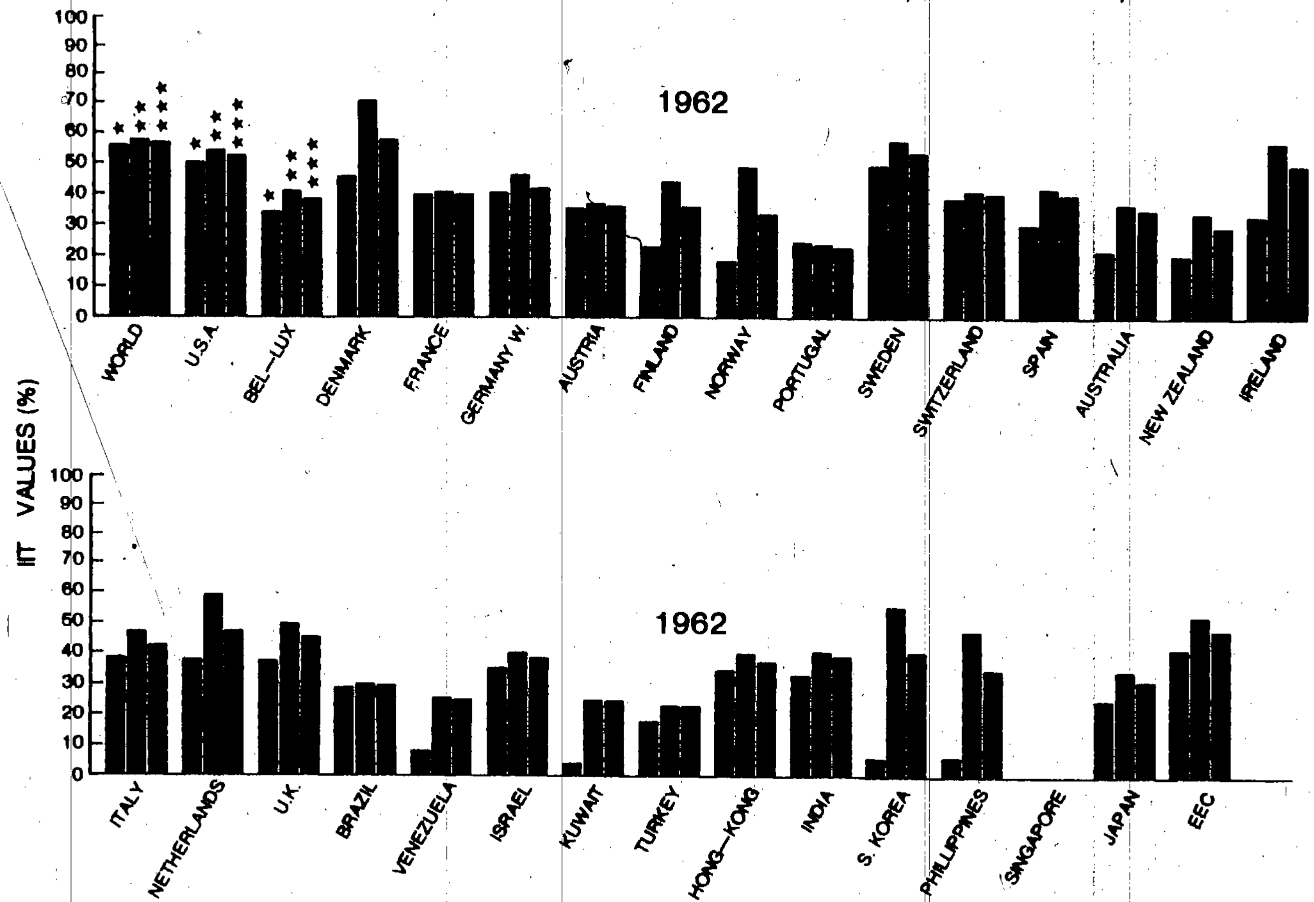
TRADE PARTNER COUNTRIES

Legend ★ IITB G—L UNADJUSTED INDEX
★★ IITC G—L ADJUSTED INDEX
★★★ IITQ AQUINO ADJUSTED INDEX

SOURCE : Magnetic tapes from the Dept. of Industry, Trade and Commerce, Government of Canada.
TABLE 4.4.1

FIG. 4.4.2

CANADA'S INTRA—INDUSTRY TRADE FOR ALL COMMODITIES, BY COUNTRY, 1962



TRADE PARTNER COUNTRIES

Legend ★ IITB G—L UNADJUSTED INDEX
★★ IITC G—L ADJUSTED INDEX
★★★ IITQ AQUINO ADJUSTED INDEX

SOURCE: Magnetic tapes from the Dept. of Industry, Trade and Commerce, Government of Canada.

TABLE 4.4.1

FIG. 4.4.3
INTRA-INDUSTRY TRADE THROUGH TIME
1962 -1980
CANADA - WORLD

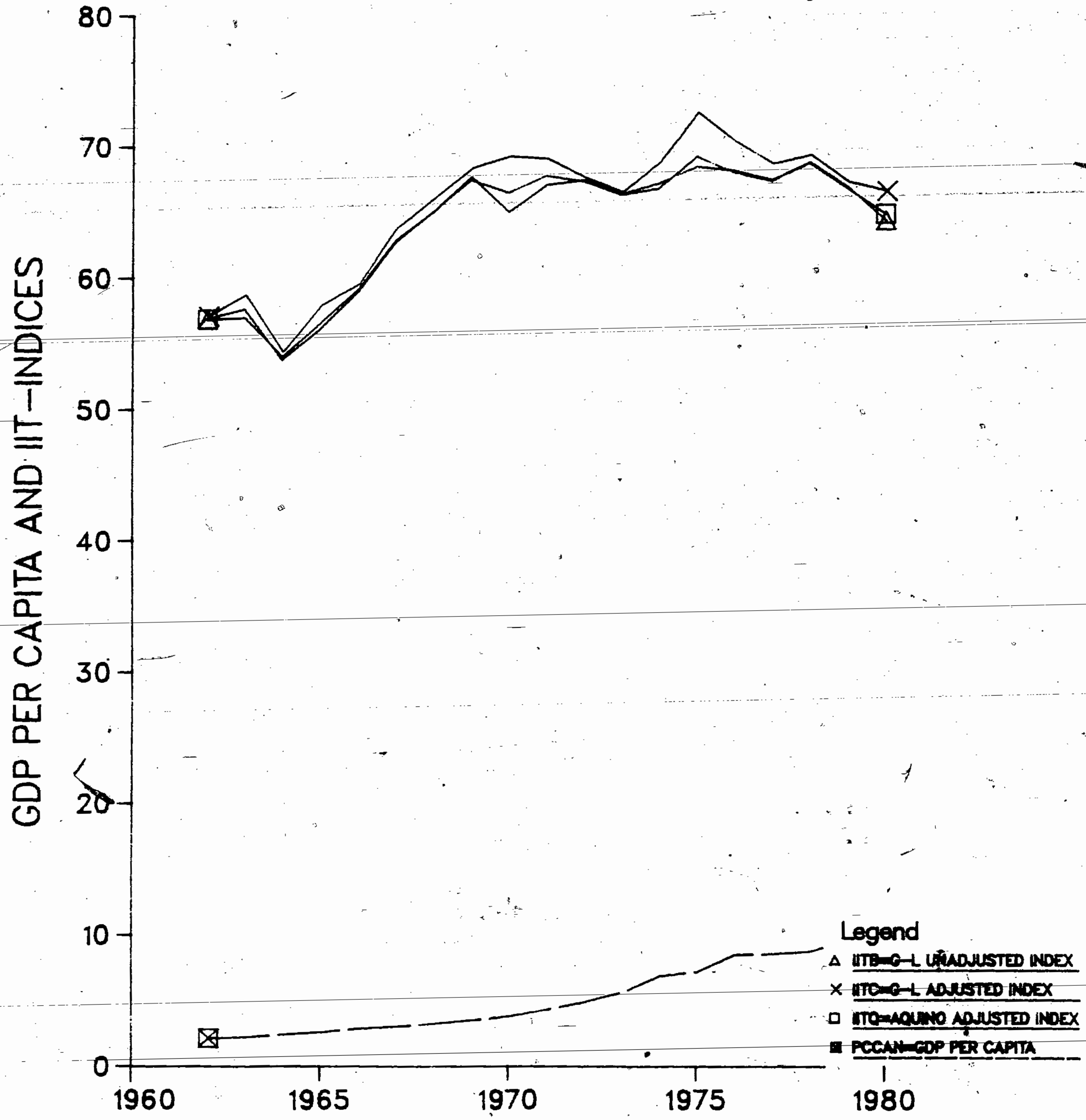


FIG.4.4.4.
INTRA-INDUSTRY TRADE THROUGH TIME
1962-1980
CANADA-USA

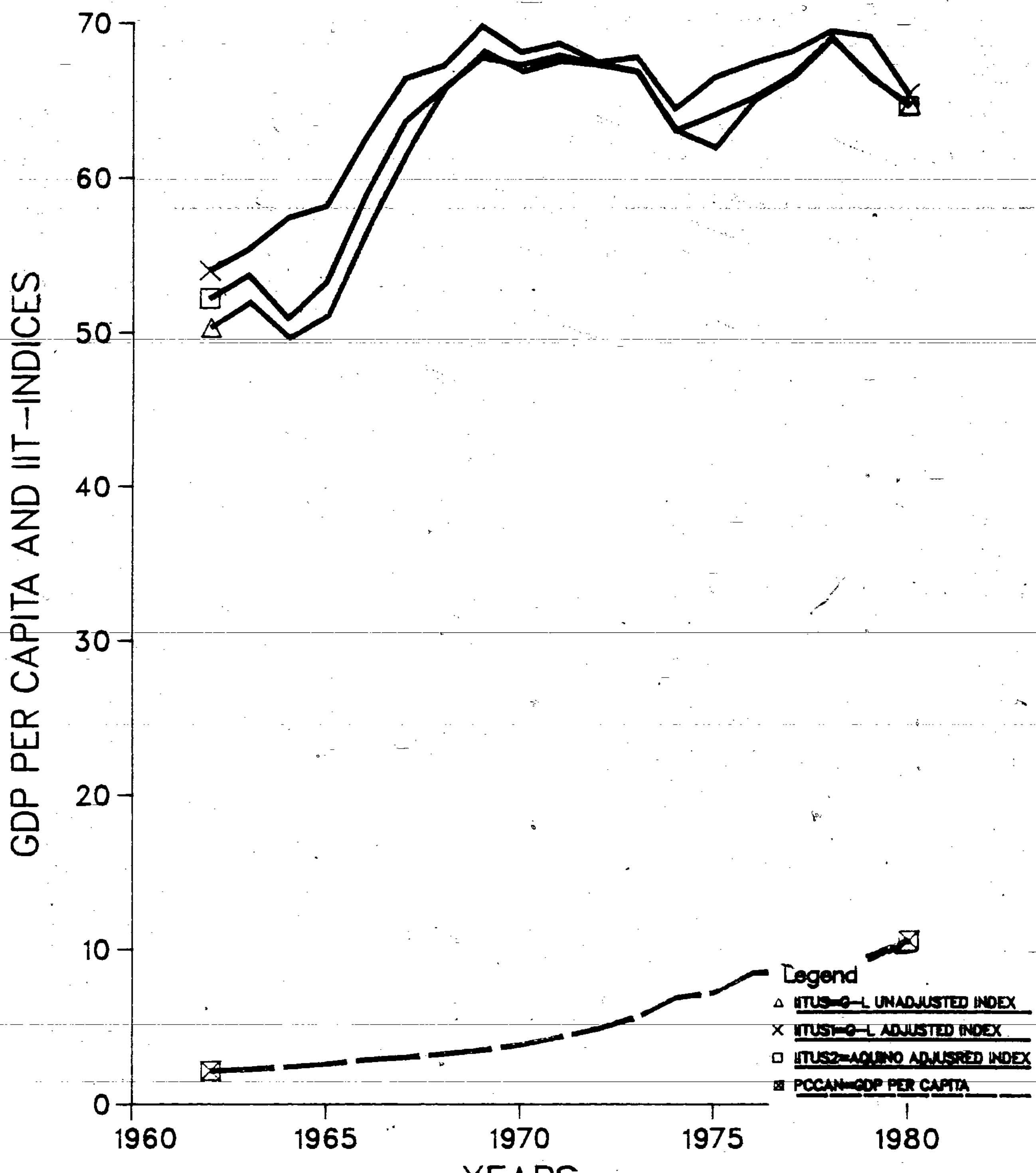


FIG.4.4.5.
INTRA-INDUSTRY TRADE THROUGH TIME
1962-1980
CANADA-EEC

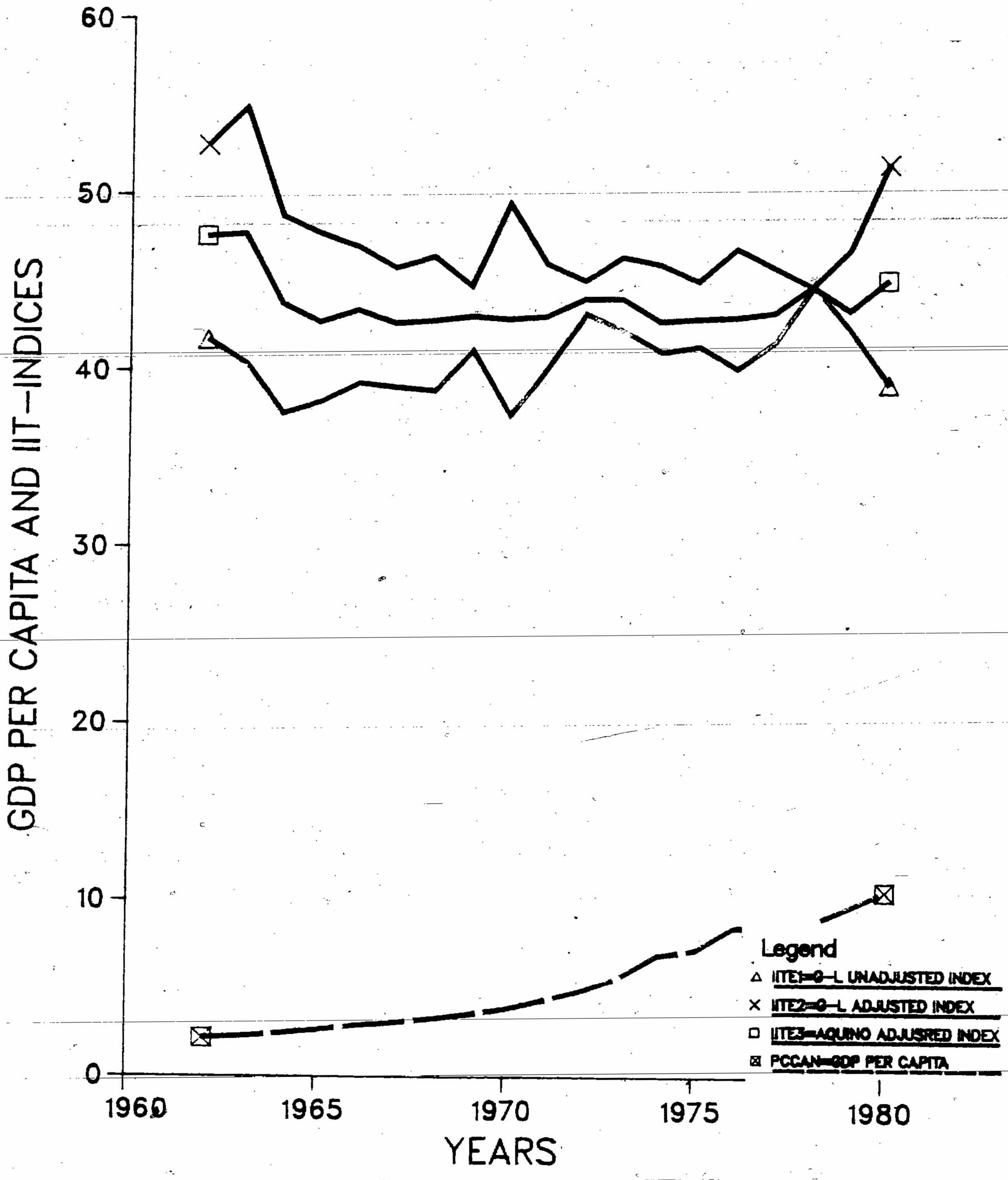


FIG.4.4.6.
INTRA–INDUSTRY TRADE THROUGH TIME
1962–1980
CANADA–JAPAN

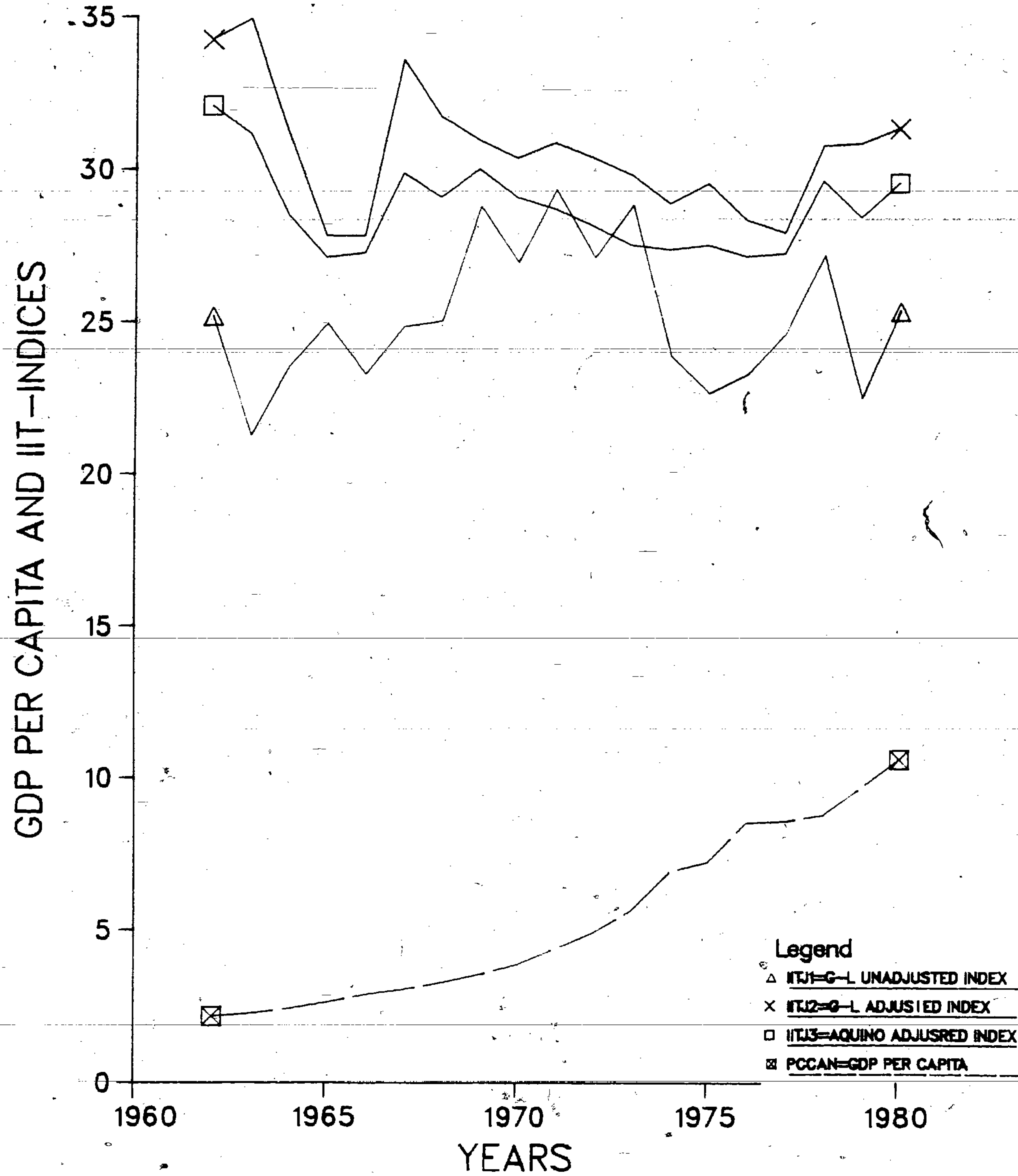


FIG.4.4.7.
INTRA-INDUSTRY TRADE THROUGH TIME
1962-1980
CANADA-NEW-ZEALAND

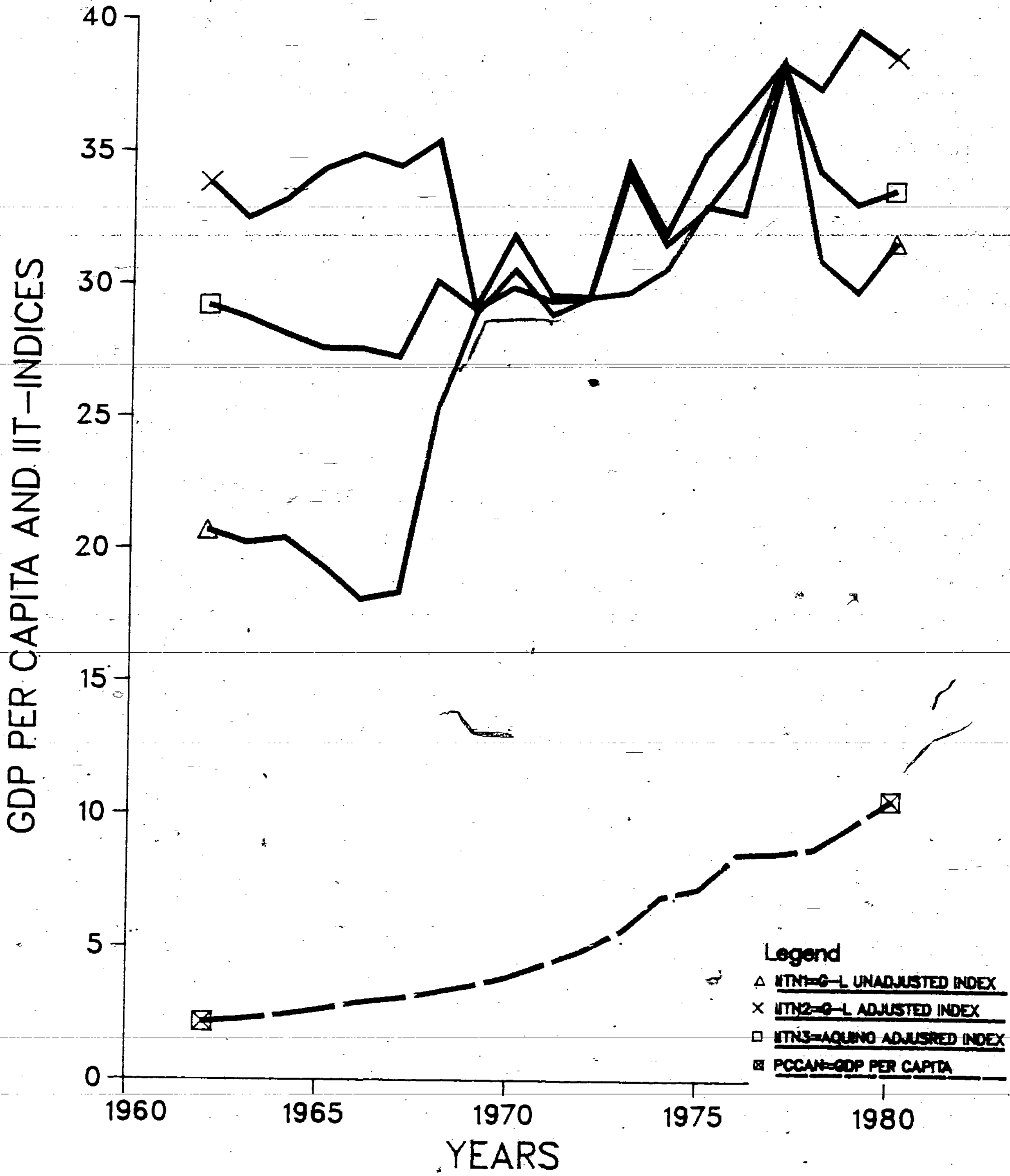
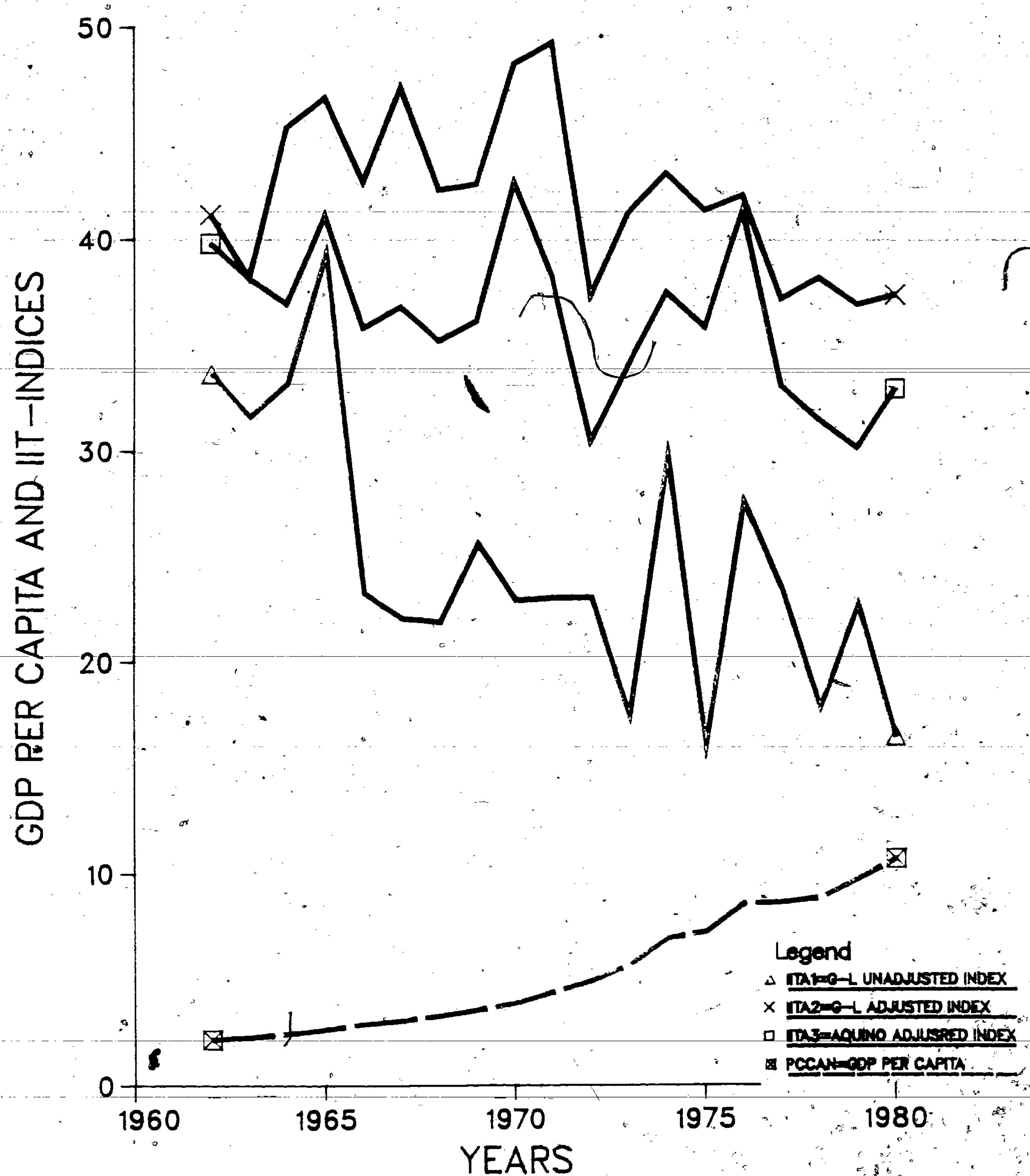


FIG.4.4.8.
INTRA-INDUSTRY TRADE THROUGH TIME
1962-1980
CANADA-INDIA



These figures lend support to the theses developed by Gray, Linder, and Barkar that intra-industry trade increases with the level of development of the trading partners. However, it is noticeable that the level of development, as measured by per capita income, is not the only determinant of this trade pattern. There are other forces which affect the rate of growth of intra-industry trade.

A close investigation of these tables and figures reveals the following facts. First, that Canada's intra-industry trade with the rest of the world was in the neighborhood of 60 percent in 1962 and tended to reach the neighborhood of 70 percent in 1980, for all the alternative indices used. Some variations are observable in the alternative measures employed. Second, in bilateral trade relations with the United States, values of slightly over 50 percent were found in 1962 which increased to over 64 percent in 1980 (20 percent growth). Third, Sweden, Denmark, the Neitherlands, Ireland, and the EEC countries show over 50 percent in 1962. The strength of intra-industry trade has tended to decline in a few cases. Intra-industry trade with the Netherlands, Sweden, and the EEC countries has tended to be more or less stable over these two years. Fourth, large growth has occurred in relation to Switzerland, Portugal, Finland, South Korea, Israel, and a few other countries. Fifth, variations in the three measures are profound in certain cases, especially in 1962; such as those of Belgium-Luxembourg, the Netherlands, Hong-Kong, India, and Norway.

These results are consistent with earlier findings, such as those of Balassa, Grubel and Lloyd, and others. However, the results do not support the assertion that intra-industry trade grows with the progress of time. Our results seem to suggest that Canada's growth in intra-industry trade depends upon the interactions of various factors, prevailing in both domestic, as well as in trading partner's economies. A plausible explanation is that Canada is a small open economy. Its degree of openness is very high, therefore, it is much more vulnerable to various domestic and external shocks. Intra-industry trade cannot grow simply because time goes by. Canada's trade patterns are shaped by various economic and other forces. In certain years, if those forces are not favorable, the intensity of intra-industry trade is adversely affected. Much depends on the existing domestic socio-economic, political, and institutional frameworks, vis-a-vis the rest of the world and in relation to a specific trading partner. In certain years many countries were running balance of payments deficits, while Japan and Germany had surpluses. There have been policy shifts in many nations. The world has witnessed the breakdown of the Bretton Woods international monetary system in the 1970s, followed by a worldwide recession and supply shocks phenomena. A small open economy like Canada may not be able to insulate herself from such domestic and external shocks. Thus, our results are consistent with the hypothesis that these forces exert their impacts on the rate of growth of intra-industry trade over time.

These results also suggest that intra-industry trade is a long run phenomenon and not a mere transient response of trade liberalization policy.

4.4.2 Intra-Industry Trade By Industry: Through Time

This section is an assessment of the performance of each industrial group over time. Table 4.4.2[13] shows that the magnitude of IIT in different industrial groups has been a long run phenomenon in each industry. Some oscillations in some years for some industries are noticeable. For example, in the initial year (1962) the G-L unadjusted measured IIT in Crude Materials (SITC 2) is 45.56 percent falling to 39 percent and remaining stable for a few years. The adjusted G-L index has IIT values above 80 percent in this category throughout the given years while Aquino's adjusted measure ranges from nearly 80 to 95 percent.

The highest growth has occurred in SITC 7, where the value has increased from 48.90 percent in 1962 to over 61 percent in 1968, 1969, and 1971. Thereafter, it has fallen somewhat. In 1980, the observed value was almost 47 percent (unadjusted G-L index). The adjusted G-L index ranges from over 90 percent to 100 percent. Aquino's adjusted index ranges from nearly 80 to virtually 100 percent over the years (1962-80).

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[13] In this table, values in row one represent the G-L unadjusted measure, the second row the G-L adjusted index, and the third row the Aquino adjusted index.

TABLE 4.4.2

CANADA'S INTRA-INDUSTRY TRADE BY INDUSTRY: THROUGH TIME (1962-1980)

SITC	DESCRIPTION	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
0	Food and Live Animals	* 34.10	33.95	33.26	33.00	37.62	38.19	38.98	37.02	39.72	40.71	37.35	41.30	39.30	37.91	38.83	38.37	39.89	39.38	40.39
		** 93.18	88.64	85.23	87.73	87.86	87.75	87.57	87.77	87.79	91.98	91.79	94.17	94.18	93.92	93.74	93.59	91.22	92.23	91.47
		*** 94.37	94.31	84.92	88.57	89.08	88.81	88.27	88.43	88.69	87.76	88.40	87.62	87.98	88.34	87.98	87.92	89.92	86.10	87.21
1	Beverage and Tobacco	33.00	31.79	33.27	35.86	39.63	40.37	38.47	40.65	41.42	42.07	43.68	47.11	52.06	51.51	50.62	53.72	55.61	47.97	62.67
		100.00	100.00	100.00	100.00	96.22	88.98	89.25	88.63	88.49	88.46	88.40	95.23	95.54	95.35	95.22	95.89	98.60	89.31	88.96
		99.99	99.99	99.99	99.99	96.21	88.97	89.25	88.62	88.48	88.46	88.39	88.00	88.39	88.20	88.07	87.74	87.92	80.42	81.32
2	Crude materials incdible except fuels.	45.56	43.71	41.44	39.87	39.16	39.26	39.65	38.53	39.30	39.74	38.74	39.21	41.95	40.89	39.40	39.19	42.99	38.94	40.13
		89.74	89.74	86.72	89.54	86.81	87.01	86.95	86.46	86.13	83.57	84.85	85.08	84.75	85.10	84.95	83.63	87.79	83.17	82.91
		94.86	94.86	86.55	89.45	87.85	87.71	88.00	87.95	87.92	83.97	83.93	83.90	84.10	84.47	84.20	83.68	85.94	79.89	79.54
3	Mineral fuels, lubricant and related Materials	39.23	48.22	46.47	53.56	54.56	55.28	60.47	54.99	50.07	50.39	52.88	52.81	51.69	56.79	54.77	51.41	49.44	42.37	44.68
		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.13	98.74	99.10	97.87	98.03	97.23	97.92	97.53	98.51	91.29	90.64
		99.99	99.99	93.83	99.09	98.96	99.09	99.16	99.00	99.12	98.27	97.98	97.86	98.01	97.12	96.96	97.06	97.91	86.99	86.47
4	Animal and Vegetable oils and Fats.	46.43	46.53	35.43	35.23	29.40	35.35	35.72	32.97	41.17	47.90	44.95	37.23	27.31	29.10	35.76	39.04	38.44	33.46	26.35
		100.00	100.00	93.92	100.00	100.00	97.98	99.16	99.51	99.63	99.61	99.29	98.96	98.94	98.36	97.84	97.91	98.59	98.08	97.61
		99.99	99.99	93.92	94.18	93.94	96.72	98.09	98.37	98.84	93.52	92.40	92.71	92.29	91.16	90.61	90.32	89.76	83.73	84.44

TABLE 4.4.2
(cont'd)

SITC	DESCRIPTION	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
5	Chemicals	36.21	39.97	43.01	37.91	40.64	39.14	39.77	39.52	36.18	37.65	35.38	36.01	33.75	31.84	29.48	32.71	33.10	32.00	32.09
		92.31	92.31	90.71	87.57	87.68	87.80	88.00	88.10	87.39	87.87	88.16	88.41	88.02	87.42	87.99	87.41	87.83	77.42	77.67
		96.14	96.14	85.55	86.42	85.86	86.68	86.66	84.98	84.71	84.81	85.09	85.03	84.22	83.91	83.90	83.79	83.82	73.63	73.47
6	Manufactured goods Classified by Materials.	35.37	36.32	30.33	35.70	36.07	35.27	32.28	37.96	39.61	38.17	37.81	39.[illegible]	39.26	39.73	29.48	39.03	40.18	39.38	39.91
		94.83	94.83	88.95	89.95	89.71	90.25	89.52	90.22	89.73	85.61	86.02	83.92	84.44	85.84	87.99	81.96	80.77	81.76	79.53
		97.40	94.40	74.04	80.85	80.05	79.98	80.63	80.35	79.45	77.09	77.42	76.82	76.75	77.14	83.90	75.65	75.39	72.44	71.82
7	Machinery and Transport Equipments.	48.90	49.85	41.18	49.30	51.66	58.56	61.73	61.29	60.68	61.61	57.43	55.44	58.16	56.51	57.26	58.29	56.09	47.92	46.80
		100.00	100.00	96.55	97.27	97.67	97.54	97.15	96.28	95.87	97.70	98.16	98.00	98.89	99.24	99.09	99.67	99.46	93.69	93.56
		99.99	99.99	78.47	87.39	88.16	88.80	88.55	88.46	87.84	88.78	88.48	88.17	88.02	88.57	90.10	89.85	83.24	80.09	79.66
8	Miscellaneous Manufactured Articles.	28.44	31.75	24.80	27.64	26.27	22.87	25.73	30.01	34.02	31.92	29.44	26.63	24.87	23.85	24.81	30.90	28.83	29.83	31.59
		100.00	100.00	98.08	96.16	94.38	93.84	94.01	93.79	94.76	95.81	96.30	95.47	96.07	94.22	96.02	98.67	95.97	95.83	95.74
		99.99	99.99	72.72	80.84	80.56	80.82	80.63	80.26	80.44	79.02	79.03	79.21	79.82	79.71	79.44	82.47	71.76	78.86	71.37
9	Commodities and Transactions n.e.s.	63.12	41.81	63.60	61.58	46.22	49.62	57.12	57.18	62.14	58.40	63.77	63.76	70.43	59.80	54.68	49.41	40.97	49.72	51.53
		100.00	71.43	100.00	100.00	100.00	100.00	100.00	100.00	100.00	92.86	95.70	96.18	98.46	100.00	100.00	100.00	77.78	81.82	79.03
		99.99	85.71	99.99	99.99	99.99	99.99	99.99	98.99	99.99	92.85	92.85	92.85	92.85	92.85	92.85	92.85	83.33	81.82	81.81

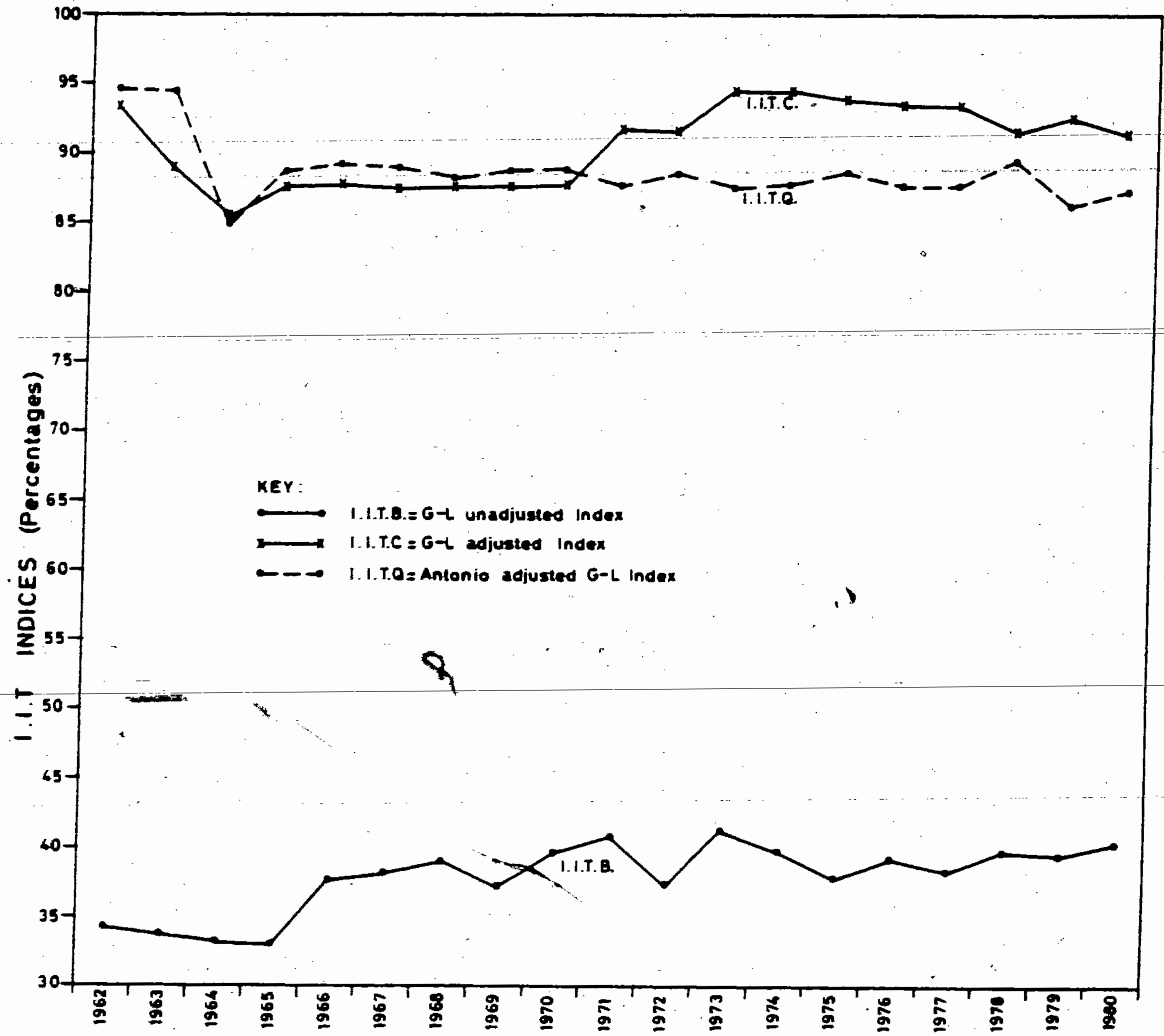
* = G-L Unadjusted Index   ** = G-L Adjusted index   *** Antonio adjusted index

In SITC 6, measured IIT has increased from 35.37 percent in 1962 to almost 40 percent in 1980 (unadjusted G-L index) while Aquino's adjusted measure indicates over 71 percent of total trade in this industry group as IIT. The exceptional year is 1964 when a sharp decline is observed in both SITC 6 and 7. For SITC 5 (Chemicals), the G-L unadjusted measure shows an increase from 36.21 in 1962 to 43 percent in 1964. Thereafter it has declined somewhat. It is noticeable that in Chemicals, if one looks at the G-L adjusted and Aquino adjusted measures, they are all above 80 percent since 1962 with 1979 and 1980 as exceptional years when the IIT fell slightly. As far as SITC 0 and SITC 1 are concerned, they demonstrate stable growth over time. Measured G-L unadjusted values range from 33 percent to 40 percent for SITC 0 and from 33 percent to 62 percent for SITC 1 over the period (1962-80), while G-L adjusted and Aquino adjusted measures are over 80 percent in both categories for all years. SITC 3 and 9 exhibit substantial increases over time but with wide oscillation in some years. These results again confirm that IIT has been a stable characteristic of an industry and also that the incidence has been growing over time. These results are summarized in Figures 4.5.1 through 4.5.10.

In order to examine the rate of growth of the share of IIT in Canada's foreign trade one has to look at the linkages between the performance of the economy and its effects on international trade.

FIG. 4.5.1

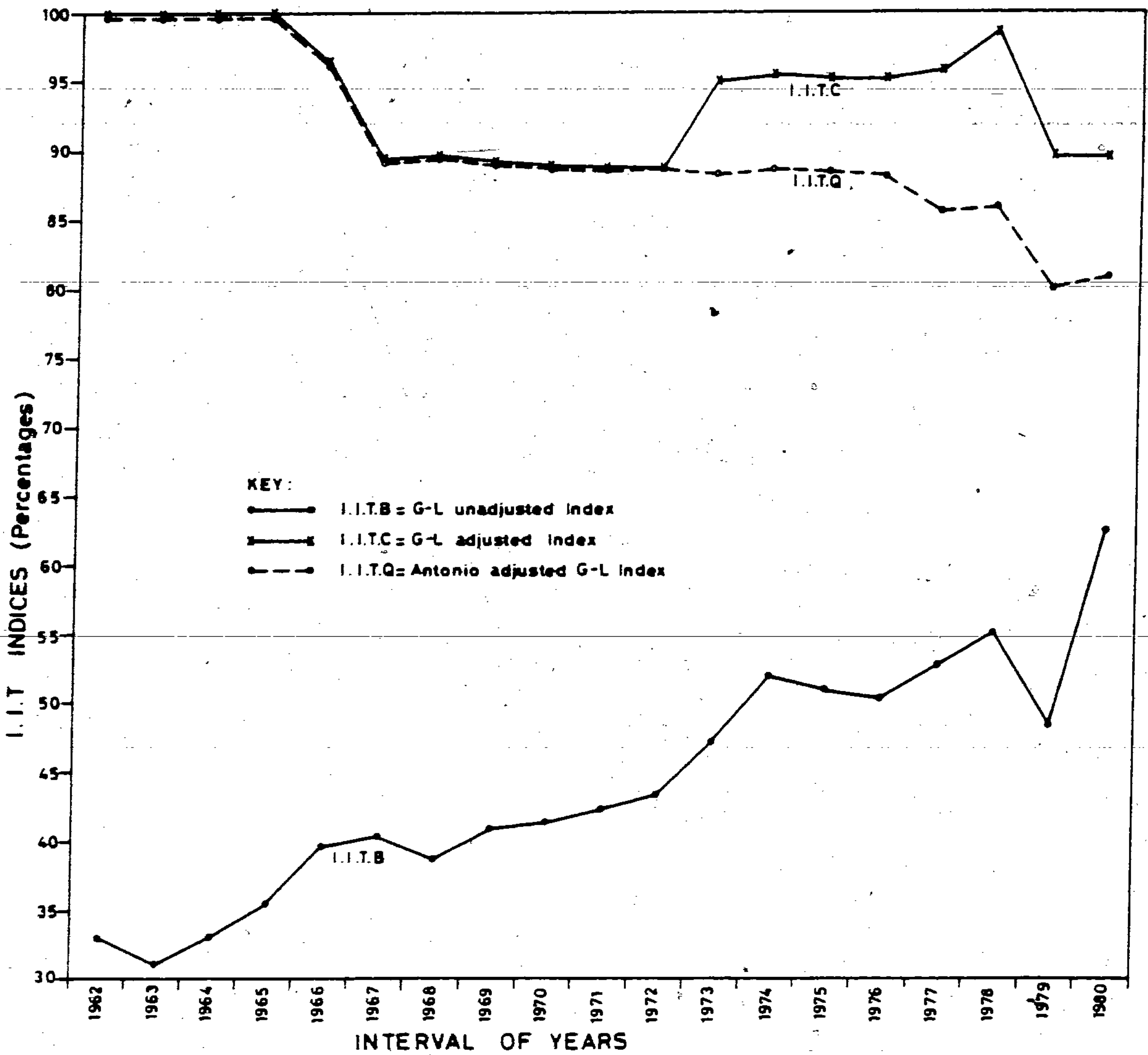
CANADA'S IIT IN FOOD AND LIVE ANIMALS ,SITC 0 THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.2

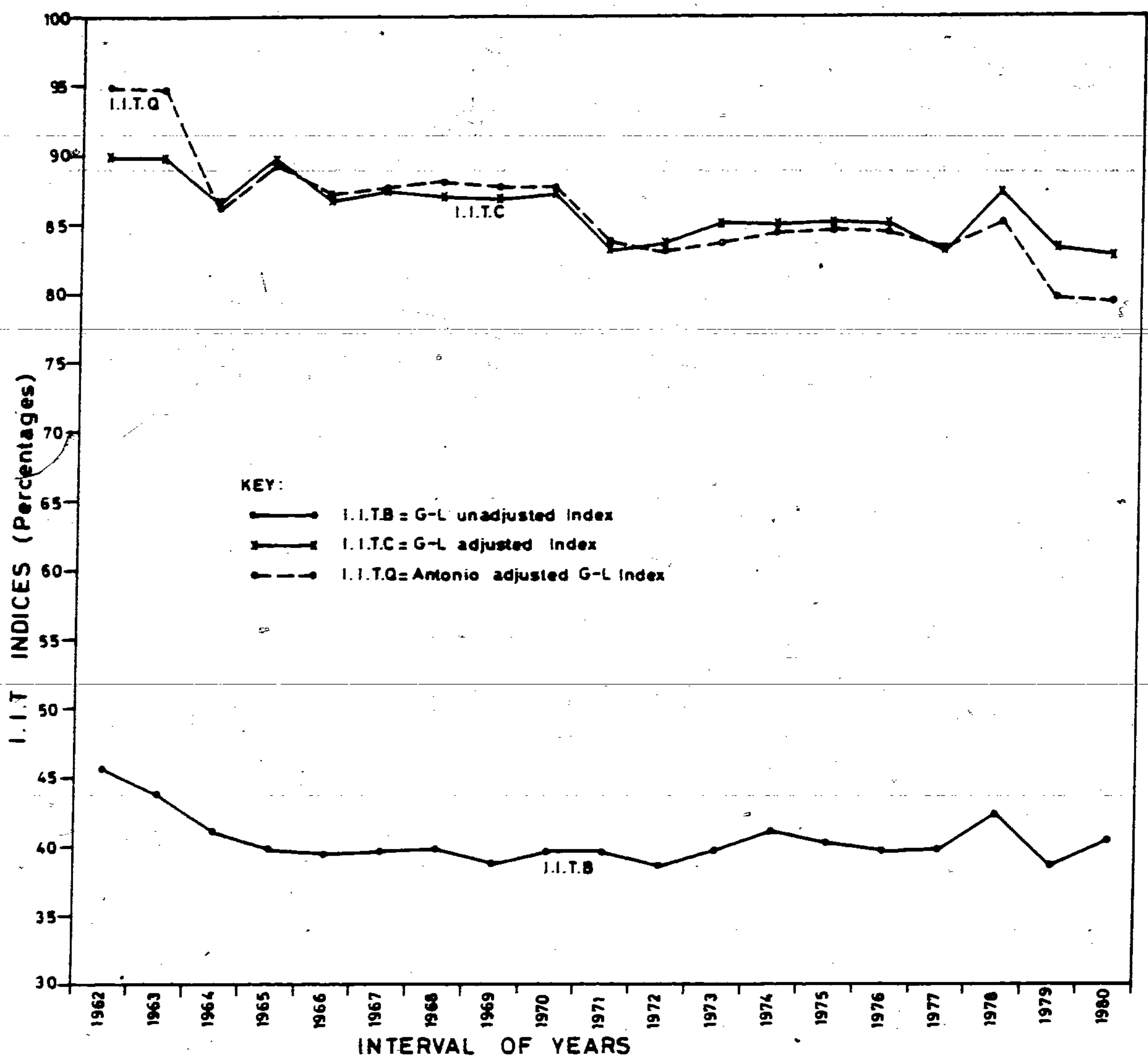
CANADA'S IIT IN BEVERAGE AND TOBACCO SITC 1 THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.3

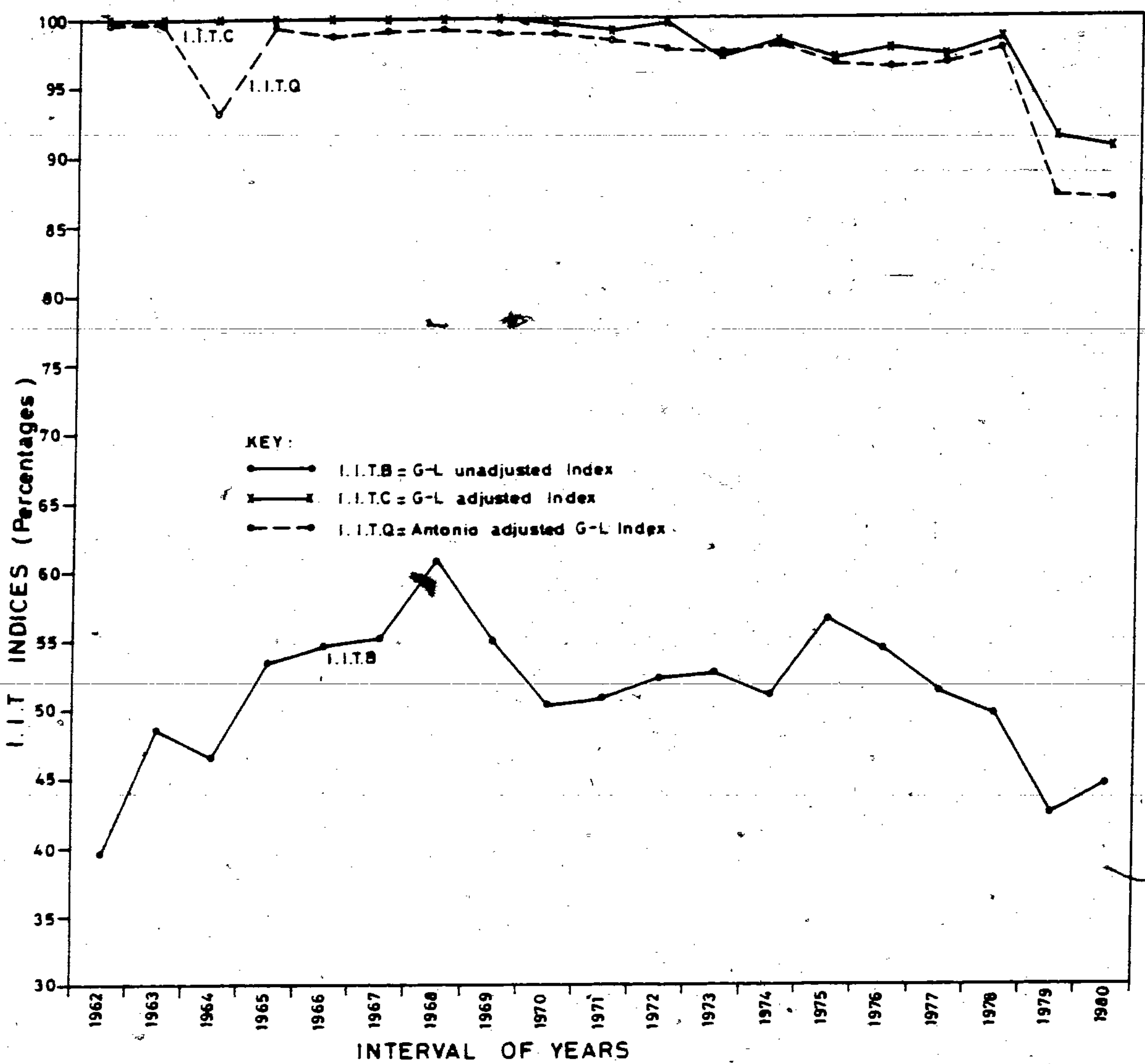
CANADA'S IIT IN CRUDE MATERIALS, SITC 2, THROUGH TIME (1962–1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.4

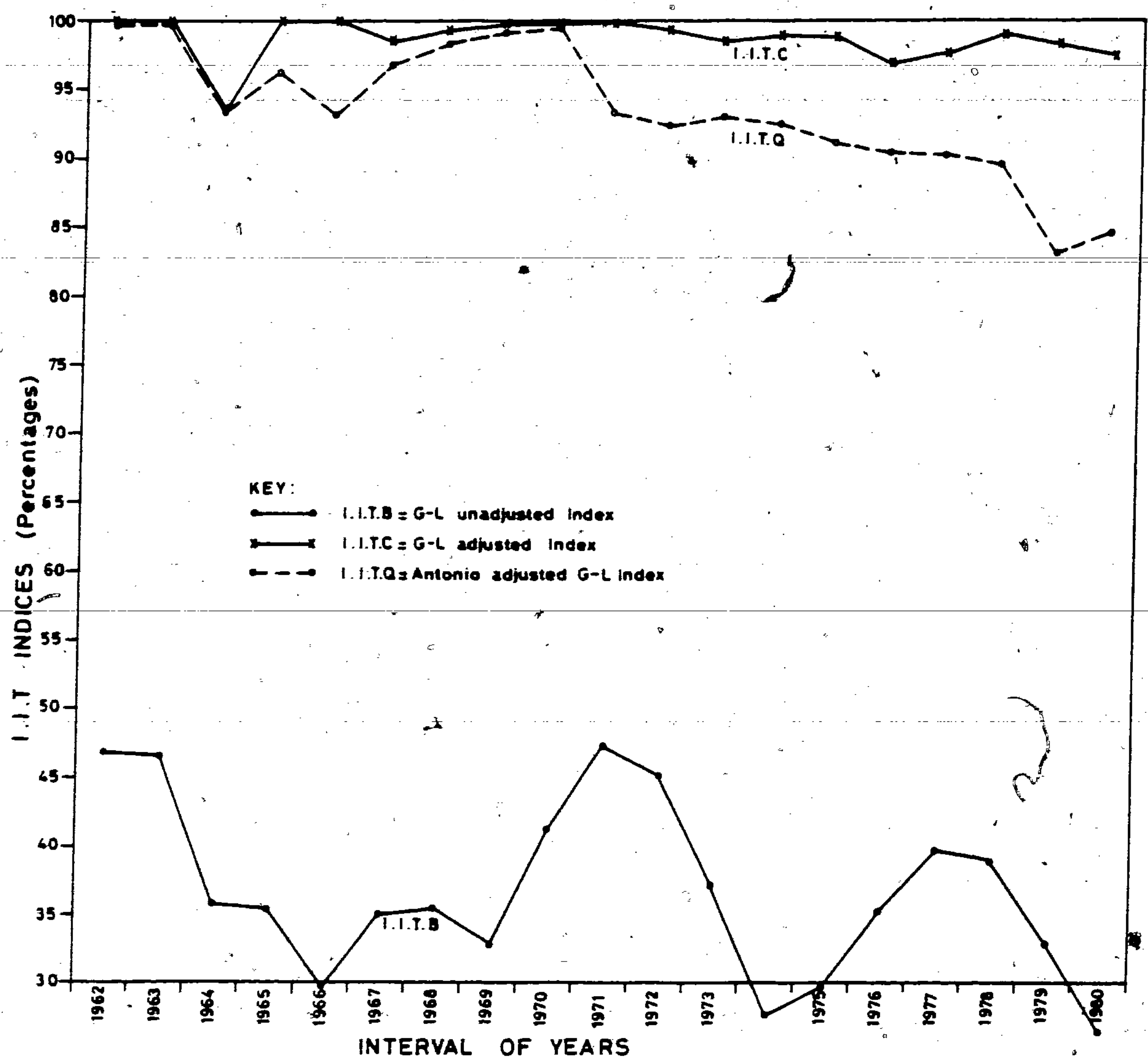
CANADA'S IIT IN MINERAL FUELS, SITC 3, THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.5

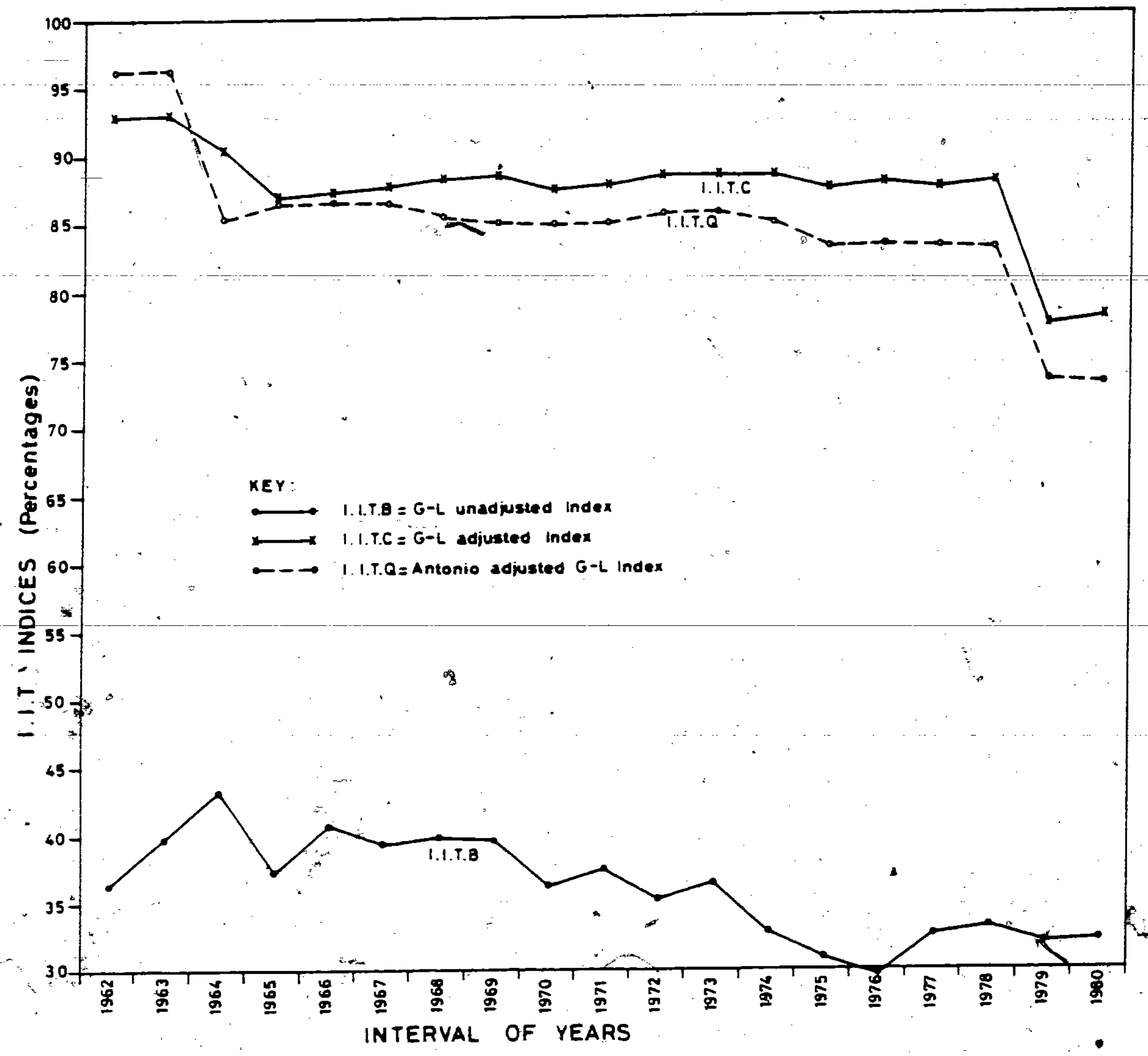
CANADA'S IIT IN ANIMAL & VEGETABLE OILS &FATS ,SITC 4, THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.6

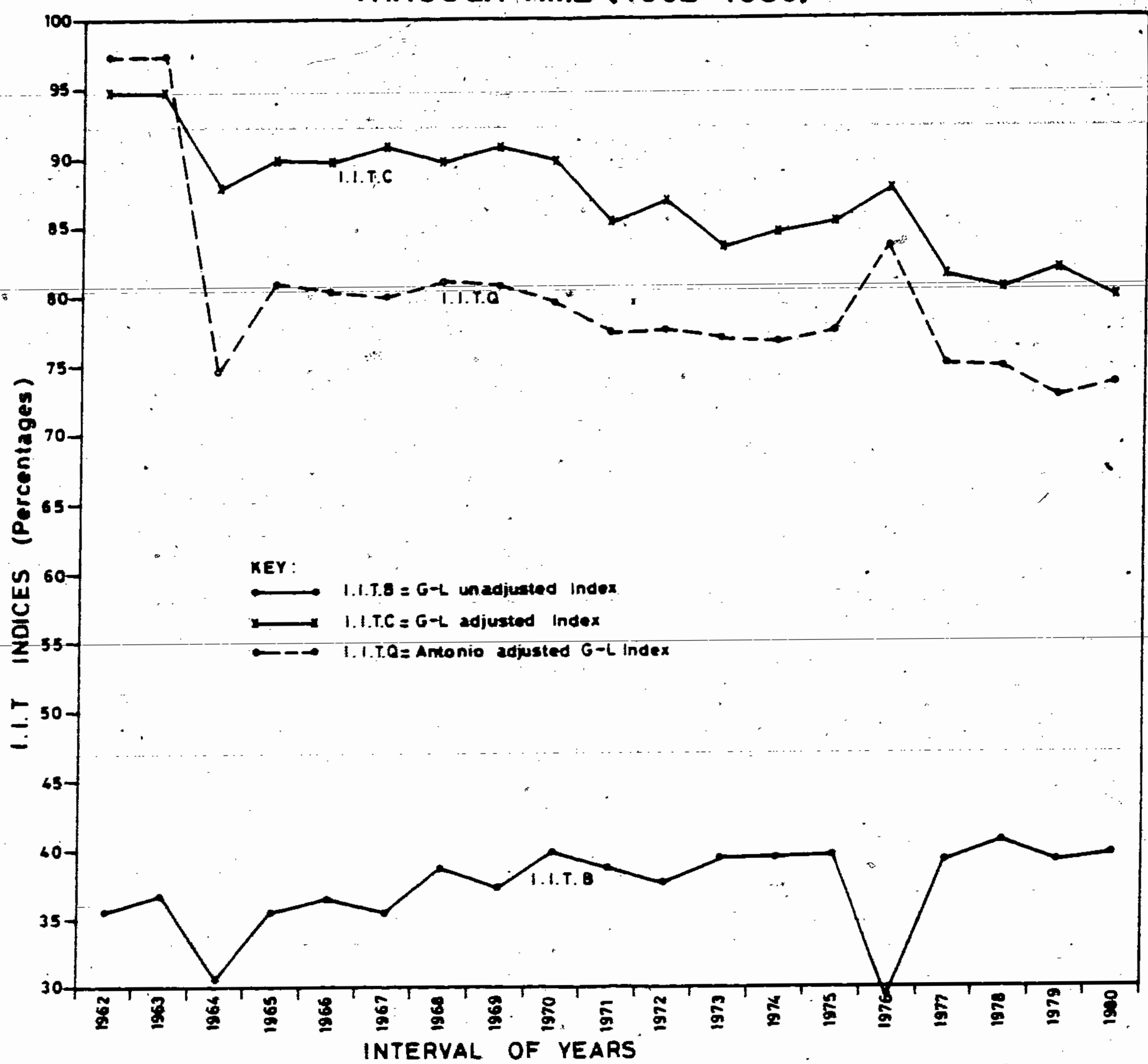
CANADA'S IIT IN CHEMICALS, SITC 5, THROUGH TIME (1962–1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.7

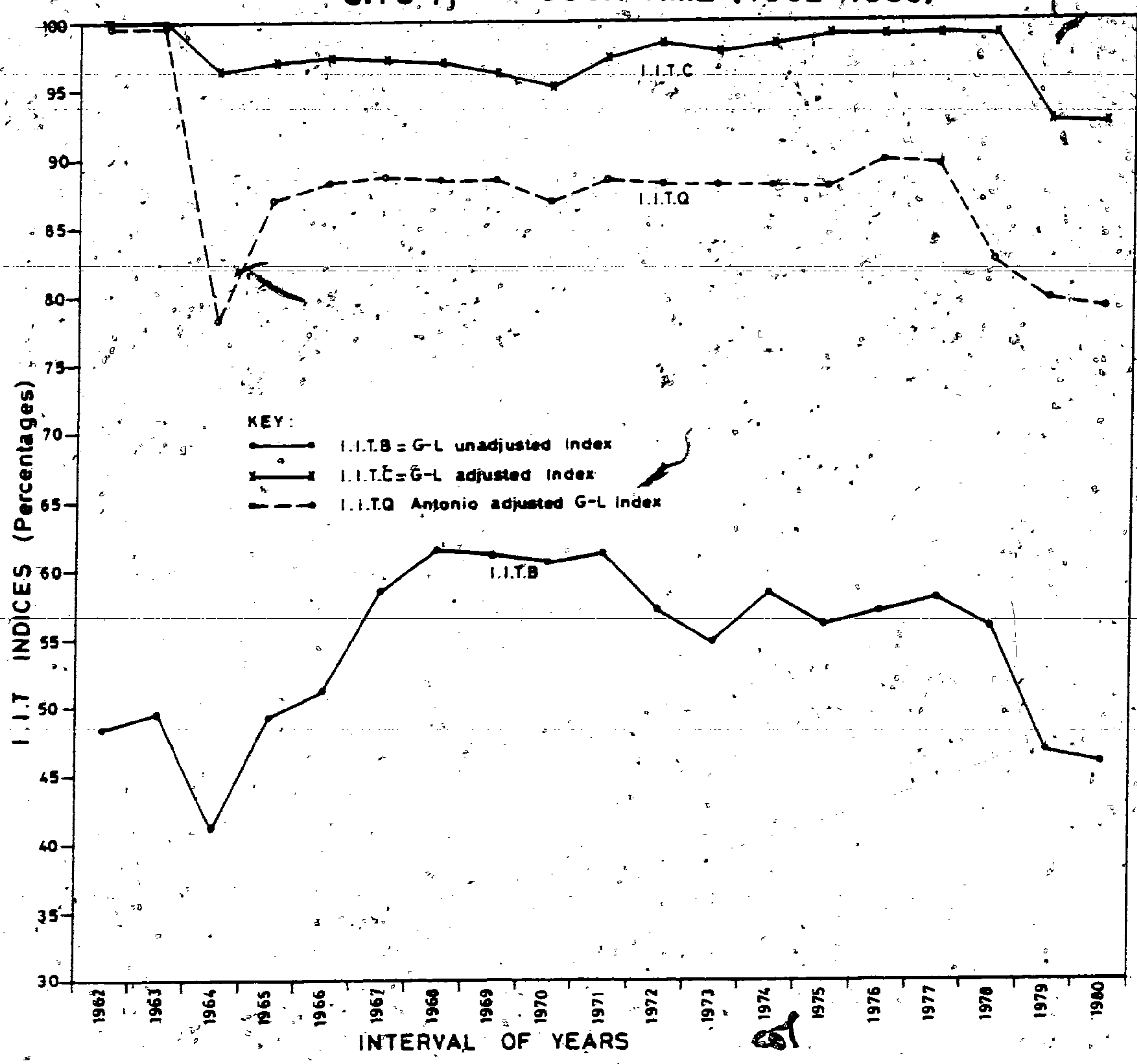
CANADA'S IIT IN MANUFACTURES, SITC 6, THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.8

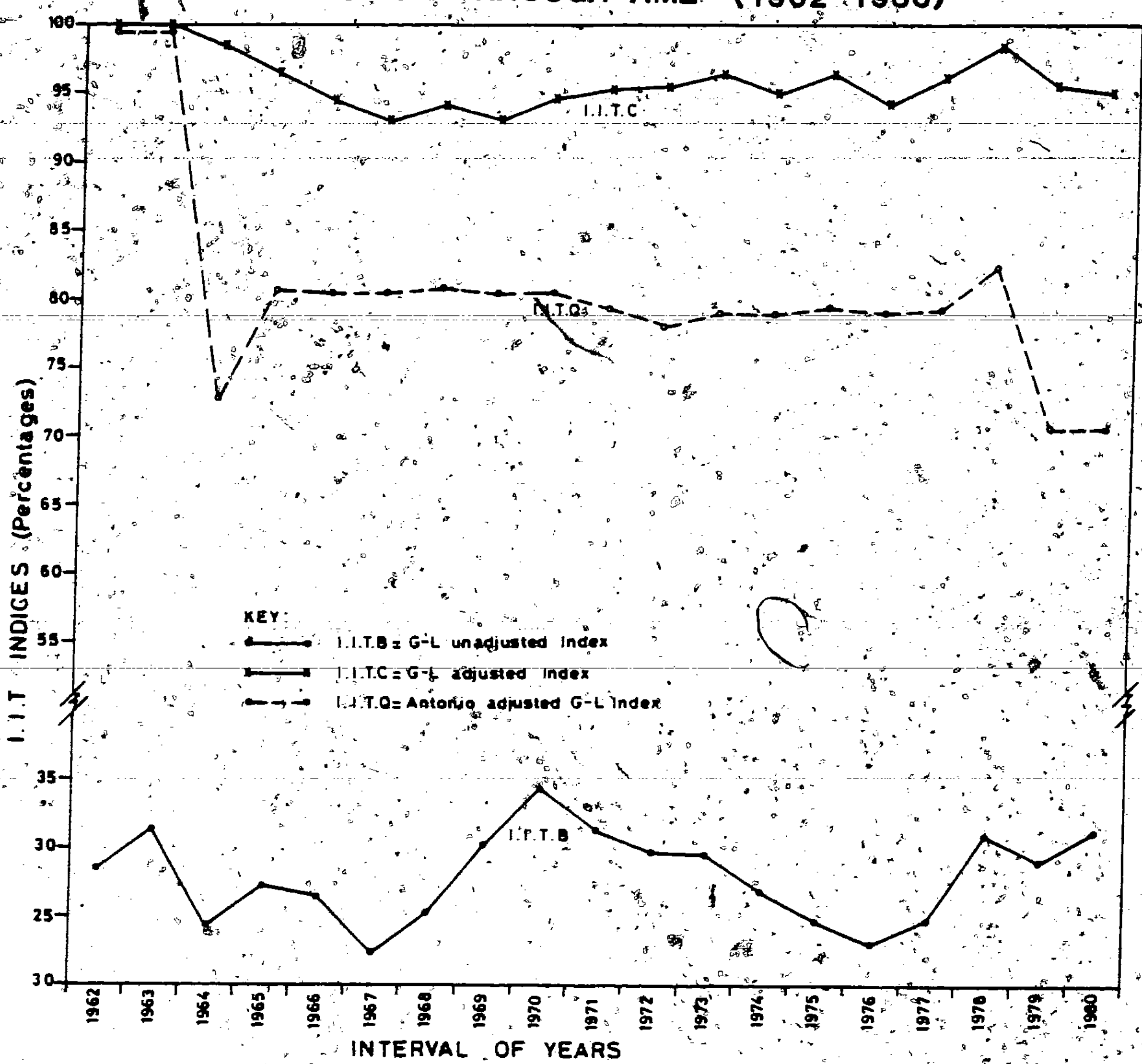
CANADA'S IIT IN MACHINERY & TRANSPORT EQUIPMENTS, SITC 7; THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.9

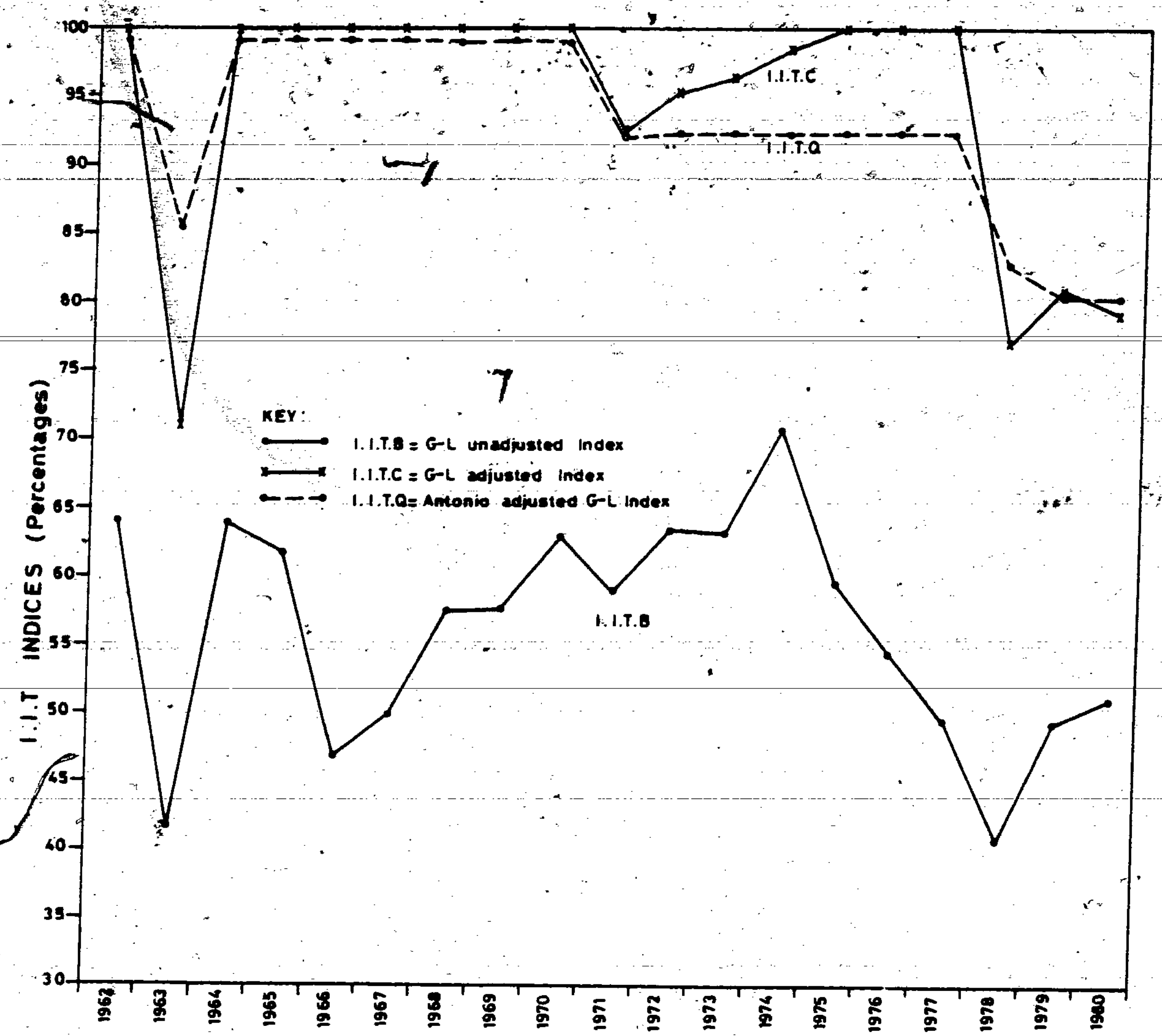
CANADA'S IIT IN MISCELLANEOUS MANUFACTURED ARTICLES, SITC 8 THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

FIG. 4.5.10

CANADA'S IIT IN COMMODITIES AND TRANSACTIONS n.s.e., SITC 9 THROUGH TIME (1962-1980)



SOURCE: TABLE 4.4.2

From empirical evidence it seems that the Canadian economy has expanded more rapidly in the post World War II period than any other developed economies. The average annual growth (over the past three decades) of 4.5 percent exceeded that of the United Stated (2.8 percent), West Germany (3.4 percent), France (3.9 percent), and the United Kingdom (2.1 percent).

The rate of growth of IIT is linked with the rate of growth of the manufacturing sector of the domestic economy vis a vis that of the trade partners. This is so because the development of the IIT phenomenon has emanated from the growth in the manufacturing sectors of many industrial nations. The manufacturing sector is the <u>sine qua non</u> of any industrial society. In fact, no nation can claim to be industrialized without an advanced, diversified, and flexible processing sector. A strong manufacturing base is needed for the advancement of scientific knowledge and for efficient resource exploitation. An overview of the Canadian manufacturing sector, therefore, seems to be essential at this point.

A rapid and sustained real growth was experienced from 1961 until 1974 in Canadian manufacturing. From 1961 to 1966, the average annual rate of growth was 8.4 percent. This rate fell over the ensuing five years to 4.2 percent but accelerated again to 7.9 percent from the end of 1970 until the beginning of 1974. Since then the growth rate has fluctuated (Economic Council of Canada, Ottawa, 1977). This explains why the magnitude of IIT has grown over this period (1961-66) with some variation in subsequent years in almost all the manufacturing industries. Employment in manufacturing increased by 41 percent over the same period. In terms of composition and employment, Food and Beverages stand out as having the highest number of employees (14 percent of the total employment in the manufacturing sector in 1961, and 12.4 percent in 1974); followed by Transport and Equipment (18.5 percent in 1961 and 9.6 percent in 1974). The highest capital per worker is in the Petroleum and Coal industry which had only 1.1 percent (in 1961) and 1 percent (in 1974) of total employment. Its net capital per worker was $184,943, followed by the chemical industries ($51,002 per worker), (Wilkinson 1980).

The sectors which expanded more rapidly than the average for all manufacturing were rubber products (including plastics) machinery, chemicals, electrical products, metal fabricating, transportation equipment, furniture and fixtures, and chemical products. In all these sectors, highly processed commodities are produced and they contain the highest technological intensity (with the exception of furniture and fixtures). Furthermore, the performance (in terms of productivity) in durable products has been better than that of non-durables (with productivity up to 94 percent of that in the United States). This is particularly true of transportation equipment, which accounts for nearly 40 percent of the value added of all the durables and of the steel industry, which accounts for about 20 percent of value added.

One of the important factors contributing to the growth of the manufacturing sector was the pegging of the Canadian dollar to the United States dollar at $0.925 U.S.

In addition, during the 1960s highly manufactured commodities (mainly durables) such as steel and transportation equipment were the fastest growing sectors of the Canadian economy. This can be partially attributed to the Auto Pact of 1965 between Canada and the United States. This agreement led to rationalization in Canadian industries and integration with the U.S.A. This led to improvements in the productivity and competitiveness of the manufacturing sector.

Apart from automotive products, other highly processed commodities, such as industrial machinery and equipment, communication installations and defense related equipment were also rapidly growing segments of Canadian exports. Export of these products rose from 10 percent of total trade in 1970 to over 15 percent by 1980. The Canadian-U.S. Defence Production Sharing Agreement, along with improved export credit facilities and trade promotion efforts, were the main contributing factors to this expansion.

During these years, world wide trade liberalization efforts were made within GATT negotiations, contributing towards high growth of IIT, because bilateral tariff reductions between developed countries were favorable to manufactured goods. This move helped promote intra-industry rather than inter-industry trade. It is worth considering, however, that Canada continued to maintain a fairly high tariff in a number of sectors. In certain cases, in fact, the Canadian government increased its effective tariff as reported by Wilkinson and Norrie (1979). Nevertheless, in some manufacturing industries ERP was reduced between 1966-70. ERP was raised in slaughtering, meat processing, dairy products, wool products, wool, yarn and cloth, some wool industries, paper boxes and bags, glass and glass products (Wilkinson, 1980). In addition, import quotas were maintained on some labor intensive products such as clothing. Initially these were in the form of "export restraints" negotiated with LDCs. Subsequently, import quotas have been imposed on a fairly wide range of clothing and textile products from LDCs. This explains why the intensity of IIT declined over time with some LDCs like India, Hong Kong, and Venezuela. In fact, it has been observed in some research (George, 1981) that the effect of the Canadian Generalized System of Preferences (GSP) to LDCs manufactured and semi-manufactured products has been negligible.

LDCs have tried to attract multinational corporations to help exploit their natural resources and support their development strategy. The developing world, with the help of Western multinational corporations coupled with financial aid (whatever amount they receive) has been more fully exploiting their mineral resources and their abundant labor force. They try to achieve their development strategy by producing labor intensive products in order to compete in the world market and take advantage of their lower wage rates.

In this context, a number of industries including textiles, knitting mills, clothing, furniture and fixtures, heating, air conditioning equipment, and major appliances, are all well known labor intensive industries. They use comparatively large amounts of unskilled labor relative to capital and material resources. Effective rates of protections in Canada in these industries averaged about 26 percent. On the other hand, within these labor intensive industries, various sub-industries and processes that depended on a particular technology or had a domestic market orientation, have developed without significant protection. Lary Hal (1968) identified a wide range of products in these sectors, such as printed materials, wood products, rubber goods, electrical apparatus and appliances, basic machinery of a wide variety of classes, some canned products and non-metallic mineral products. The existence of intra-industry trade in these industries once again suggests that factor proportions are not the only determinant of international trade flows.

The role of multinationals has been very important from another aspect. They shifted whole ranges of assembly lines to LDCs because many of the skills required in such processing are modest. Wilkinson points out that P.C. Kindelberger's prediction over two decades ago that automobiles would become the "textiles" of tomorrow is now being realized (Wilkinson, 1980, p. 69). This fact also explains why trade in manufactures with LDCs registers high IIT with Canada.

Foreign ownership is a crucial issue in the Canadian context. In 1974, foreign control was about 70 percent in electrical apparatus and machines, 85 percent in chemicals, 96 percent in automobiles, 99 percent in rubber, and 100 percent in tobacco products (Statistics Canada Daily Bulletin, December, 1977). Furthermore, if one looks at the Financial Post's[14] Big 200 Industrial Corporations in Canada, one finds that out of these 200 corporations, 68 were owned by foreign parent companies, 47 were less than 50 percent foreign ownership and another 20 had significant foreign control (Wilkinson, 1980).

There has been debate over the issue of the implication of foreign participation in Canadian manufacturing. Divergent opinion and empirical evidence exist on this issue. One school of thought claims that foreign firms have had positive effects on the Canadian economy in that they bring high technology, the results of high R & D from their parent country along with management expertise (Globerman, 1978). These managerial skills exploit opportunities, generate employment and provide ready made channels for exports. Foreign firms import larger proportions of their purchases from their original country and export their products simultaneously. This generates high levels of intra-industry trade. It has also been found that average value added per worker in foreign establishments in Canada was higher than that in the domestically owned establishments (Daly,

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[14] Those industries having more than 50 percent of sales of manufacturing or utilities fall under this 200 defined firms.

1979). This made the products more competitive.

On the other hand, opponents of foreign ownership argue that the costs of dominance of foreign ownership exceed the benefits. This cost of importation of managerial skills has been growing over time. Secondly, a substantial capital inflow has been for taking over existing firms and not for establishing new plants. Thirdly, in a number of foreign establishments value added per worker was not higher than the domestic firms and in some industries such things are not comparable, in that they are larger (due to scale economies they reap such benefits). Fourthly, foreign firms, like domestic ones, are geared to producing too many product lines to achieve advantages of economies of scale. They simply add fragmentation and inefficiency to the Canadian economy. Foreign firms do not exhibit better performance than domestic firms. In fact, they export more to their affiliates and less to others. In this context it is worth mentioning that the impact of multinationals on intra-industry trade appears to be ambiguous. It has generated a high magnitude of intra-industry trade in that they export more to and import more from their affiliates. If foreign investment becomes a substitute for trade, it will have a dampening effect on intra-industry trade. The final outcome seems, therefore, to be difficult to predict.

4.5 Canada's Intra-Industry Trade with Special Reference to the United States

Canada's trade relations with the United States is of major significance. About 70 percent of Canada's foreign trade is with the United States. The United States dominates as a market for Canadian exports and as a supplier of Canadian imports. For the United States, Canada is its most important trade partner in that with only one-tenth of the population of the group of 9 EEC countries combined and less than one-quarter that of Japan, Canada is the market for about 22 percent of the U.S. total exports and the supplier of 20 percent of its imports. In addition, Canada has been the prime location for direct investment by Americans and a major source of investment for the States.

From the Canadian standpoint, approximately 70 percent of Canada's exports is destined to the United States and above 70 percent of its imports come from the U.S. Canada's trade with the EEC accounts for only 10 percent of its total trade, 5 percent is with Japan and 15 percent with the rest of the world.

Canada's exports to the United States makes up about 15 percent of the GNP. The United States is the largest market for all the major industrial sectors of the Canadian economy (with the agriculture sector as an exception).

The IIT indices for Canada/U.S. are the most significant. Next to the U.S., the EEC and Japan are the major trade partners. Therefore, summary values are also documented for

Japan, the EEC, and also the LDCs. In view of the fact that intra-industry trade has emerged between Canada and a number of LDCs, the results are reported for them as well. These are documented in Appendix Tables A.4.6.1 through A.4.6.3.

Tables 4.5 and A 4.5.1 show that, out of 56 industries at the 2-digit level, 15 industries had measured IIT between 50 percent and 80 percent in 1962. In 1980, more than 25 industries show values ranging from 50 percent to 94.90 percent (SITC 85, Footwear), of intra-industry trade as measured by the unadjusted index. Adjusted indices are always much higher than the unadjusted measures. In 1962, about 10 out of 156 industries at the 3-digit level show above 70 percent IIT, 9 indicate above 91 percent, 14 above 60 percent, and 4 industries above 80 percent. 1980 follows the same pattern. By then, however, many more industries show percentages of 50 or more. The remaining years have similar patterns with some variations in some industries.

The high level of IIT between Canada and the United States can be attributed to many factors. First, a similar level of development and cultural and ethnic affinity exist between these two countries. A second factor is the geographical and market proximity of the two countries. Third, trade concessions, in particular the Auto Pact of 1965 and the Defence Sharing Agreements, have freed trade between these partners. There is a prospect of forming a free trade area between the United States and Canada, possibly including Japan and the EEC visualized by Wonnacott (1975).

TABLE 4.5

CANADA'S INTRA-INDUSTRY TRADE WITH THE U.S.A.

3-DIGIT SITC (1962-1980)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
001	Live Animals	15.39	100.00	99.99	25.35	100.00	99.99	76.01	100.00	99.99	92.98	100.00	99.99	59.12	93.07	90.50
011	Meat, Fresh, chilled or frozen	75.76	100.00	99.99	50.03	100.00	98.58	47.37	100.00	99.55	55.12	100.00	99.84	50.17	100.00	97.34
012	Meat, dried, salted or smoked	62.61	100.00	99.99	71.05	100.00	99.99	59.88	100.00	99.99	45.87	100.00	99.99	35.22	100.00	99.99
013	Meat, in airtight containers, n.e.s. and meat preparations	78.34	100.00	99.99	79.90	100.00	99.99	89.76	100.00	99.99	72.59	100.00	99.99	-	-	-
022	Milk and Cream	8.79	100.00	99.99	70.31	100.00	99.99	84.16	100.00	99.99	94.49	100.00	99.99	53.29	72.41	54.04
023	Butter	-	-	-	26.10	100.00	99.99	0.00	0.00	50.00	35.71	100.00	99.99	68.49	100.00	99.99
024	Cheese and Curd	43.74	100.00	99.99	64.86	100.00	99.99	91.77	100.00	99.99	91.87	100.00	99.99	64.73	100.00	99.99
025	Eggs	35.68	100.00	99.99	25.90	100.00	99.99	52.99	100.00	99.99	11.12	100.00	99.99	49.95	100.00	99.99
031	Fish, fresh & simply preserved	8.19	100.00	99.99	25.90	100.00	99.99	22.07	100.00	99.99	38.42	100.00	99.99	-	-	-
032	Fish, in airtight containers n.e.s. and fish preparations	93.15	100.00	99.99	77.90	86.00	82.19	66.55	71.62	69.52	64.24	70.47	67.65	52.98	100.00	99.99
041	Wheat including spelt and meslin, unmilled	0.28	100.00	99.99	0.00	50.00	50.00	0.17	100.00	99.99	10.01	100.00	99.99			
042	Rice	0.00	0.00	50.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	0.00

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
043	Barley, unmilled	0.00	0.00	50.00	0.00	00.00	50.00	0.00	0.00	50.00	0.04	100.00	58.43	23.03	100.00	99.99
044	Maize-(corn)-unmilled	1.52	100.00	99.99	3.27	100.00	99.99	13.64	100.00	99.99	5.20	100.00	99.99	3.98	100.00	99.99
045	Cereals, unmilled, excl. wheat, rice, barley and maize	7.75	100.00	99.99	38.49	100.00	99.99	14.69	100.00	99.99	38.94	100.00	99.99	95.32	94.94	93.91
046	Meal & flour of what or of meslin	1.39	100.00	99.99	0.00	0.00	50.00	7.69	100.00	100.00	78.23	100.00	99.99	17.64	100.00	99.99
047	Meal and flour of cereals, except wheat/meslin	4.65	100.00	99.99	30.66	100.00	99.99	37.79	100.00	50.00	38.26	100.00	50.00	45.23	50.00	50.00
048	Cereal preparations and preparations of flour fruits and vegetables	42.51	100.00	99.99	63.70	85.95	73.91	53.07	86.85	80.95	72.82	85.25	82.80	74.11	84.22	79.71
051	Fruit, fresh, and nuts-excl. oil nuts	16.54	100.00	99.99	22.81	100.00	74.26	20.38	100.00	81.95	12.28	100.00	76.14	-	-	-
052	Dried fruit (incl. artificially dehydrated)	1.67	100.00	1.67	1.19	100.00	50.00	1.55	100.00	50.00	3.19	100.00	49.99	-	-	-
053	Fruit, preserved & fruit preparations	6.77	100.00	99.99	24.27	100.00	80.44	21.35	68.53	68.53	10.16	62.85	62.85	-	-	-
054	Vegetables, roots and tubers fresh or dried	19.47	100.00	99.99	21.76	100.00	93.99	25.45	99.74	92.11	17.60	100.00	87.63	26.17	100.00	88.54
055	Vegetables, roots & tubers preserved or prepared n.e.s.	21.03	100.00	99.99	10.57	100.00	94.25	20.57	100.00	81.49	6.55	100.00	91.97	-	-	-
061	Sugar and Honey	48.97	100.00	99.99	60.66	100.00	99.99	63.14	100.00	99.99	97.15	100.00	99.99	70.33	100.00	99.99
062	Sugar confectionary, sugar preparations excl. chocolate confectionary	22.76	100.00	99.99	34.96	100.00	49.99	52.94	56.26	50.00	33.99	100.00	50.00	51.06	100.00	99.00

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
071	Coffee	6.15	100.00	99.99	0.43	100.00	99.99	32.62	100.00	99.99	26.66	100.00	99.99	2.36	100.00	55.33
072	Cocoa	2.71	100.00	99.99	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
073	Chocolate & other food preparations containing Cocoa, n.o.s.	70.85	100.00	99.99	38.88	100.00	99.99	38.18	100.00	99.99	82.83	100.00	99.99	60.30	100.00	99.99
074	Tea and mate	28.82	100.00	99.99	11.26	100.00	99.99	8.79	100.00	99.99	13.07	100.00	99.99	20.93	100.00	99.99
075	Spices	22.34	100.00	99.99	11.82	100.00	60.38	34.20	100.00	71.29	27.21	100.00	62.09	48.84	100.00	58.88
081	Feeding-stuff for animals excl. unmilled cereals	82.76	100.00	99.99	84.24	93.32	78.61	81.89	100.00	83.87	58.12	86.48	84.36	46.45	81.99	65.44
091	Margarine & Shortenings	0.56	100.00	99.99	0.39	100.00	99.99	5.00	100.00	99.99	0.39	100.00	99.99	2.03	100.00	71.24
099	Food preparations, n.e.s.	30.65	100.00	99.99	90.17	99.23	91.15	19.97	100.00	85.72	23.62	100.00	[illegible]	80.72		
111	Non-alcoholic beverages, n.e.s.	11.38	100.00	99.99	3.23	100.00	99.99	15.34	50.00	50.00	20.39	100.00	50.00	52.67	100.00	50.00
112	Alcoholic beverages	3.89	100.00	99.99	4.76	85.85	85.86	5.10	86.14	86.14	6.20	82.61	82.61	12.54	74.69	63.10
121	Tobacco, Unmanufactured	42.44	100.00	99.99	18.52	100.00	99.99	34.11	100.00	99.99	96.41	100.00	99.99	43.98	74.50	63.34
122	Tobacco manufactures	13.25	100.00	99.99	19.19	100.00	99.99	19.19	100.00	99.99	61.25	100.00	99.99	56.40	100.00	99.99
1 1	Beverages and Tobacco	14.49	100.00	99.99	13.82	100.00	99.99	11.87	100.00	99.99	13.44	100.00	99.99	36.09	100.00	99.99
211	Hides and skins-excl. fur skins - undressed	62.74	100.00	99.99	42.15	100.00	99.99	40.29	100.00	99.99	82.88	100.00	99.99	75.59	100.00	99.97
212	fur skins, undressed	64.19	100.00	99.99	59.72	100.00	99.99	92.30	100.00	99.99	56.50	100.00	99.99	49.10	92.27	80.85
221	Oil-seeds, oil nuts and oil kernels	9.57	100.00	99.99	13.29	100.00	99.99	17.69	100.00	99.99	36.37	100.00	99.99	-	-	-
231	Crude ruber - incl. Synthetic and reclaimed	58.37	100.00	99.99	88.14	100.00	99.99	99.46	100.00	99.99	92.85	100.00	99.99	-	-	-

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
241	Fuel wood and charcoal	45.90	100.00	99.99	65.66	100.00	99.99	56.82	100.00	99.99	40.35	100.00	99.99	-	-	-
242	Wood in the rough or roughly squared	68.41	100.00	99.99	79.25	100.00	99.99	68.23	68.23	91.41	58.57	100.00	57.20	-	-	-
243	Wood, shaped and simply worked	16.34	100.00	99.99	17.63	100.00	99.99	11.15	50.35	50.36	21.57	50.80	50.80	-	-	-
244	Cork, raw and waste	0.00	0.00	50.00				0.00	0.00	50.00	0.00	0.00	50.00	0.60	6.00	50.00
251	Pulp and waste paper	7.09	100.00	99.99	4.17	100.00	69.72	6.74	100.00	86.96	5.80	100.00	74.18	4.86	98.05	76.63
261	Silk	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	-	-	-
262	Wood & other animal hair	96.45	100.00	99.99	86.50	94.35	93.88	65.79	93.74	89.59	15.36	97.50	95.33	-	-	-
263	Cotton	1.61	100.00	99.99	1.49	100.00	99.99	0.43	100.00	99.99	1.23	100.00	99.99	0.40	100.00	99.00
264	Jute	3.72	100.00	99.99	34.72	100.00	99.99	67.94	100.00	99.99	43.26	100.00	99.99	61.05	100.00	99.99
265	Vegetable fibres, except cotton and Jute	1.05	100.00	99.99	19.19	100.00	99.99				33.99	100.00	99.99	6.72	96.87	60.49
266	Synthetic and regenerated artificial fibres	34.67	100.00	99.99	19.23	100.00	51.72	98.94	100.00	99.99	12.49	100.00	52.62	13.81	100.00	49.99
267	Waste materials from textile fibries incl.	11.29	100.00	99.99	10.12	100.00	99.99	15.84	100.00	99.99	16.67	100.00	99.99	0.00	0.00	50.00
271	Fertilisers, crude	7.00	100.00	99.99	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
273	Store, sand and gravel	97.20	100.00	99.99	61.64	91.53	63.87	61.04	76.24	64.11	60.64	66.91	65.63	64.34	66.68	62.76

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
274	Sulphur and unroasted iron pysites	85.00	100.00	99.99	46.61	100.00	99.99	12.18	100.00	99.99	11.16	100.00	99.99	1.92	100.00	99.99
275	Natural abrasives-incl. industrial diamonds	82.61	100.00	99.99	31.82	100.00	78.25	29.55	100.00	78.27	19.14	100.00	72.18	-	-	-
276	Other crude minerals	38.15	100.00	99.99	30.28	61.18	59.85	35.77	59.19	57.69	40.54	61.93	59.85	56.52	100.00	99.99
281	Iron ore & concentrates	46.87	100.00	99.99	29.66	100.00	99.99	12.03	100.00	99.99	22.33	100.00	99.99	-	-	-
282	Iron and steel scrap	65.70	100.00	99.99	54.32	100.00	99.99	53.29	100.00	99.99	84.33	100.00	99.99	75.59	97.46	93.47
283	Ores and concentrates of non-ferrous hase metals	53.96	100.00	99.99	47.27	63.96	63.97	57.36	61.04	61.05	43.25	83.61	83.61	-	-	-
284	Non-ferous metal scrap	23.18	100.00	99.99	16.27	95.30	88.81	66.25	86.88	79.61	64.55	93.54	81.99	-	-	-
285	Silver and platinum ores	0.00	0.00	99.99	0.00	0.00	50.00	8.17	100.00	56.45	0.05	100.00	67.52	-	-	-
286	Ores and concentrates of Uranium and Thorium	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.30	100.00	99.99
291	Crude animal materials n.e.s.	61.81	100.00	99.99	28.32	76.57	70.16	48.26	90.85	77.80	47.65	69.95	65.50	69.59	70.28	70.11
292	Crude vegetable materials,n.e.s.	67.63	100.00	99.99	82.82	99.02	72.77	63.09	91.73	65.19	38.95	95.00	61.19	43.87	100.00	66.45
321	Coal, Coke and Briquettes	9.99	100.00	99.99	16.56	100.00	99.99	20.47	100.00	99.99	10.82	100.00	99.99	-	-	-
331	Petroleum, Crude & Partly refined	0.80	100.00	99.99	0.00	0.00	50.00	0.00	0.00	50.00	0.74	100.00	99.99	-	-	-
332	Petroleum Products	37.64	100.00	99.99	27.96	100.00	76.42	68.18	74.82	62.72	64.54	66.54	62.98	-	-	-
341	Gas, natural & Manufactured	6.34	100.00	99.99	26.00	100.00	99.99	5.29	100.00	99.99	1.19	100.00	99.99	1.12	50.43	50.43
351	Electric Energy	34.36	100.00	99.99	77.29	100.00	99.99	36.01	100.00	99.99	10.75	100.00	99.99	0.60	100.00	99.99
411	Animal oils and fats	28.01	100.00	99.99	47.30	76.40	76.40	96.44	99.03	95.91	32.23	75.35	68.49	58.46	78.24	74.69

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
421	Fixed vegetable oil, soft	2.69	100.00	99.99	0.00	0.00	50.00	0.10	100.00	99.99	11.59	100.00	99.99			
422	Other fixed vegetable oils	9.87	100.00	99.99	6.42	100.00	99.99	9.07	100.00	99.99	5.50	100.00	99.99			
431	Animal/Vegetable oil and fats, processed and waxes	13.05	100.00	99.99	7.09	100.00	99.99	3.14	100.00	56.79	7.11	100.00	57.13	5.74	100.00	55.83
512	Organic Chemicals	67.03	100.00	99.99	41.55	89.87	73.01	28.46	90.63	50.20	33.07	80.97	50.38	59.57	73.07	50.28
513	In organic chemicals elements, oxides, halogen salts	71.84	100.00	99.99	51.82	58.79	57.61	44.10	62.71	62.71	47.84	65.04	65.04	7.32	100.00	52.87
514	Other inorganic chemicals	99.45	100.00	99.99	73.49	85.93	67.07	61.43	74.26	59.89	53.60	75.14	55.52	14.89	100.00	72.92
515	Radioactive and associated materials	4.94	100.00	99.99	68.04	100.00	99.99	74.29	100.00	99.99	12.58	100.00	99.99	28.86	100.00	56.21
521	Crude chemicals from coal, petroleum and gas	50.39	100.00	99.99	16.68	100.00	99.99	23.14	100.00	99.99	18.34	100.00	99.99	-	-	-
531	Synthetic organic dyestuffs, natural indigo and lakes	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
551	Essential oils, perfume and flavour materials	12.35	100.00	99.99	8.49	100.00	77.74	8.49	100.00	77.74	4.08	100.00	62.51	10.75	100.00	99.99
553	Perfumery, cosmetics, dertifrices, etc.	2.91	100.00	99.99	29.08	100.00	99.99	29.08	100.00	99.99	17.80	100.00	99.99	27.39	100.00	99.99
554	Soaps, cleansing and polishing preparations	9.78	100.00	99.99	4.11	100.00	99.99	4.11	100.00	99.99	7.75	100.00	99.99	25.40	100.00	99.99
561	Fertilisers manufactured	35.59	100.00	99.99	16.36	86.22	75.69	16.36	86.22	75.69	21.97	74.83	72.45	-	-	-

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
571	Explosives & pyrotechnic products	20.71	100.00	99.99	84.29	100.00	82.34	84.29	100.00	82.34	22.91	100.00	71.23	-	-	-
581	Plastic materials, regenerated cellulose and resins	6.21	100.00	99.99	16.97	100.00	73.72	16.97	100.00	73.72	19.33	100.00	75.73	-	-	-
599	Chemical materials and products, n.e.s.	16.39	100.00	99.99	32.36	87.42	82.61	32.36	87.42	82.61	18.88	91.71	86.97	-	-	-
611	Leather	86.56	100.00	99.99	44.42	100.00	61.50	44.42	100.00	61.50	25.08	100.00	67.98	76.45	100.00	79.34
612	Manufacture of leather or of artificial or	35.47	100.00	99.99	76.27	100.00	99.99	76.27	100.00	99.99	88.17	100.00	99.99	87.32	100.00	99.99
613	Fur skins, tanred or dressed, including dyed	61.68	100.00	99.99	32.70	100.00	99.99	32.70	100.00	99.99	39.60	100.00	99.99	44.00	100.00	99.99
621	Materials of rubber	20.49	100.00	99.99	32.00	100.00	76.07	32.00	100.00	76.07	54.53	100.00	81.94	77.70	93.81	82.78
629	Articles of rubber, n.e.s.	38.53	100.00	99.99	28.07	100.00	80.42	28.07	100.00	80.42	92.90	100.00	87.18	-	-	-
631	BVeneers, plywood boards and other wood, worked n.e.s.	33.61	100.00	99.99	72.38	72.86	72.70	72.38	72.86	72.70	60.52	100.00	64.56	-	-	-
632	Wood manufactures n.e.s.	63.06	100.00	99.99	22.58	91.75	61.84	29.58	91.75	61.84	34.34	92.03	67.61	-	-	-
633	Cork manufactures	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
641	Paper and paper board	12.85	100.00	99.99	12.95	69.29	66.42	17.44	74.26	68.35	30.29	72.57	67.04	19.38	60.06	52.94
642	Articles of paper, pulp, paper board	10.98	100.00	99.99	16.36	100.00	85.04	27.75	98.35	78.48	16.53	100.00	83.38	44.17	86.15	68.16
651	Textile yarn and thread	5.59	100.00	99.99	40.39	100.00	74.64	23.55	100.00	77.58	8.81	100.00	77.08	9.17	100.00	54.83

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
652	Cotton fabrics, woven excl. narrow or special fabrics	2.16	100.00	99.99	10.25	100.00	52.24	6.86	100.00	50.00	10.34	100.00	49.99	9.63	100.00	50.00
653	Text fabrics woven excl. narrow, special, not cotton	5.33	100.00	99.99	4.92	100.00	56.36	16.42	100.00	58.96	9.27	100.00	57.70	8.70	100.00	54.76
654	Tulle, lace, embroidery, ribbons, trimings	4.46	100.00	99.99	4.61	100.00	80.61	4.50	100.00	82.19	7.80	100.00	78.03	86.24	100.00	87.62
655	Special textile fabrics and related products	41.42	100.00	99.99	32.54	62.69	57.60	32.78	60.46	56.91	11.04	59.30	55.33	2.67	100.00	58.33
656	Made up articles, wholly or chiefly of textile materials	4.79	100.00	99.99	9.52	100.00	73.31	57.67	100.00	75.01	19.93	100.00	66.86	3.80	100.00	79.56
657	Floor coverings, tapestries etc.	3.02	100.00	99.99	78.72	100.00	99.99	34.59	100.00	93.01	14.45	100.00	98.12	21.21	100.00	67.05
661	Lime, cement and fabricated building materials-excl. glass/clay materials.	89.43	100.00	100.00	62.33	65.32	64.88	50.89	76.50	66.23	70.70	76.79	75.10	47.31	75.74	70.85
662	Clay & refrectory construction materials	35.85	100.00	99.99	31.55	97.53	91.85	36.24	95.49	89.68	29.13	97.87	96.40	21.17	100.00	93.65
663	Mineral manufactures, n.e.s.	30.43	100.00	99.99	31.77	100.00	70.10	34.15	97.83	71.20	48.37	98.30	77.93	76.44	83.26	72.88
664	Glass	6.57	100.00	99.99	2.21	100.00	74.30	2.26	100.00	64.90	0.00	0.00	50.00	0.00	0.00	50.00
665	Glass-ware	0.85	100.00	99.99	5.12	100.00	73.50	23.57	68.32	62.31	40.04	95.48	75.74	0.00	0.00	0.00
666	Pottery	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
667	Pearl and perecious and semi-precious stores	22.93	100.00	99.99	43.64	100.00	99.99	46.02	100.00	99.99	59.95	100.00	99.99	33.83	100.00	60.76

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
671	Pig iron, spiegeleisen, sponge iron etc. ingots and other primary forms of iron or steel	32.83	100.00	99.99	42.77	77.65	55.08	54.71	76.72	76.72	54.48	79.77	79.77	74.68	76.40	75.05
673	Iron and steel bars, rods, angles, shapes, sections	43.99	100.00	99.99	49.90	100.00	50.68	51.93	54.01	50.00	56.80	65.76	50.00	30.52	50.00	50.00
674	Universal plates and sheets of iron or steel	49.18	100.00	99.99	45.41	70.45	55.03	46.75	50.18	50.19	48.93	50.20	50.20	38.38	55.11	54.93
675	Hoop and strip of iron or steel	0.00	0.00	0.50	0.00	0.00	0.50	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
676	Rails and railway track construction materials of iron or steel	96.33	100.00	99.99	89.58	100.00	99.99	90.15	100.00	99.99	96.00	100.00	99.99	53.96	100.00	87.38
677	Iron and steel wire, excluding wire rod	14.47	100.00	99.99	32.70	100.00	50.00	55.92	63.43	50.00	49.69	49.99	50.00	29.10	50.00	50.00
678	Tubes, pipes and fittings of iron or steel	36.03	100.00	99.99	45.08	100.00	99.99	83.02	100.00	99.99	88.90	100.00	99.99	91.85	100.00	99.99
679	Iron steel castings, forgings, unworked, n.e.s.	67.96	100.00	99.99	96.52	100.00	99.99	93.84	100.00	99.99	31.57	100.00	99.99	65.01	85.19	82.39
681	Silver and Platinum group metals	54.61	100.00	99.99	84.37	100.00	99.99	10.08	50.00	50.00	14.66	50.00	50.00	36.42	50.00	50.00
682	Copper	17.27	100.00	99.99	27.26	93.39	88.33	58.84	86.83	80.52	37.91	79.90	68.74	36.12	80.83	70.66
683	Nickel.	5.64	100.00	99.99	34.38	100.00	99.99	8.25	52.45	52.46	11.90	52.52	52.52	17.02	60.71	60.72
684	Aluminium	18.52	100.00	99.99	46.79	60.51	57.45	43.86	54.61	53.75	49.40	54.66	54.35	47.62	56.76	55.22
685	Lead	0.29	100.00	99.99	5.46	100.00	99.99	16.53	94.16	94.16	8.76	93.76	93.76	18.25	50.00	50.00
686	Zinc	6.94	100.00	99.99	3.48	50.27	50.28	6.72	86.22	86.23	0.88	70.60	70.61	0.98	68.14	68.14
687	Tin	0.00	0.00	0.50	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	50.00
688	Uranium and thorium and their alloys	-	-	-	-	-	-	-	0.00	50.00	0.00	0.00	0.00	-	-	-

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTION	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
689	Miscellaneous non-ferrous base metals	70.99	100.00	99.99	91.80	100.00	94.26	80.39	91.03	71.98	74.43	98.36	79.58	43.48	74.24	60.01
691	Finished structural parts and structures, n.e.s.	78.50	100.00	99.99	91.91	100.00	99.99	99.94	100.00	99.99	84.35	100.00	99.99	48.77	100.00	99.99
692	Metal containers for storage and transport	21.25	100.00	99.99	17.38	100.00	60.45	28.39	100.00	49.99	40.46	100.00	50.00	41.53	100.00	50.00
693	Wire products-excl. electric and fencing grills.	70.73	100.00	99.99	50.03	100.00	70.45	64.60	65.15	64.06	68.43	74.67	63.16	29.65	71.36	63.00
694	Nails, screws, nuts, bolts rivers & similar articles of iron	32.57	100.00	99.99	26.56	100.00	49.99	41.44	100.00	50.00	51.43	100.00	50.00	52.57	100.00	50.00
695	Tools for use in the hand or in machines	1.74	100.00	99.99	12.09	59.77	59.77	32.59	100.00	89.75	28.83	100.00	79.23	31.77	100.00	75.15
696	Cutlery	2.47	100.00	99.99	40.89	98.51	64.03	8.16	81.94	58.78	6.01	74.12	51.64	16.20	100.00	62.07
697	Household equipment of base metals	1.52	100,00	99.99	15.96	100.00	86.41	15.72	100.00	74.34	8.38	100.00	77.39	8.08	100.00	50.00
698	manufactures of metal, n.e.s.	5.75	100.00	99.99	23.31	100.00	80.25	36.70	100.00	79.12	51.04	99.96	88.10	-	-	-
6	Manufactured goods classified by material	39.58	52.99	49.47	45.24	56.27	51.49	48.45	58.80	54.17	50.58	60.48	57.72	49.43	62.68	57.61
711	Power generating machinery, other than electric	51.18	100.00	99.99	74.39	100.00	87.09	90.72	94.85	89.72	82.69	100.00	89.16	70.58	84.47	60.60
712	Agricultural machinery and implements	55.03	100.00	99.99	66.41	100.00	91.74	73.23	100.00	89.64	63.20	100.00	92.08	71.10	100.00	99.99
714	Office - Machines	30.87	100.00	99.99	22.43	100.00	86.09	60.22	100.00	94.22	55.86	100.00	96.24	52,10	66.78	56.05
715	Metal-working machinery	25.46	100.00	99.99	18.48	100.00	88.87	32.03	100.00	88.25	34.71	100.00	89.76	9.47	100.00	66.13
717	Textile and leather machinery	30.00	100.00	99.99	12.65	100.00	53.38	27.72	100.00	55.74	29.26	100.00	57.11	-	-	-
718	Machines for special industries	27.87	100.00	99.99	34.12	100.00	91.85	36.01	100.00	92.84	25.17	100.00	90.90	9.47	100.00	66.13
719	Machinery & appliances -non electrical parts	16.23	100.00	99.99	29.00	98.67	83.67	38.27	94.57	86.17	40.58	93.23	84.13	-	-	-

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
722	Electric power machinery Switchgear	15.28	100.00	99.99	28.60	100.00	99.99	37.29	100.00	99.99	37.31	100.00	99.99	38.23	100.00	99.99
723	Equipment for distributing electricity	93.00	100.00	99.99	90.88	93.60	88.81	85.71	91.23	81.02	36.04	100.00	96.11	28.46	100.00	66.16
724	Telecommunications apparatus	76.79	100.00	99.99	81.96	100.00	92.47	91.36	97.79	94.09	71.00	100.00	92.93	24.09	100.00	53.00
725	Domestic electrical equipments	6.69	100.00	99.99	18.75	100.00	77.41	13.51	100.00	87.25	12.35	100.00	84.16	78.90	[illegible]3.18	80.25
726	Electrical apparatus for medical purposes, radiological apparatus	34.87	100.00	99.99	40.46	100.00	99.99	43.78	100.00	99.99	45.25	100.00	99.99	11.59	100.00	55.20
729	Other electrical machinery apparatus	16.44	100.00	99.99	46.09	68.73	62.19	45.99	100.00	80.76	37.17	100.00	76.05	-	-	-
731	Railway Vehicles	35.33	100.00	99.99	21.44	100.00	89.19	59.38	100.00	91.00	23.75	100.00	86.70	-	-	-
732	Road Motor Vehicles	5.25	100.00	99.99	50.46	100.00	59.41	73.11	87.19	62.95	72.76	100.00	63.56	-	-	-
733	Road Vehicles other than motor vehicles	57.47	100.00	99.99	33.52	100.00	99.05	20.09	100.00	99.42	12.82	100.00	97.30	-	-	-
734	Aircrafts	65.94	100.00	99.99	85.66	87.36	85.32	80.35	82.34	79.84	79.57	100.00	90.38	-	-	-
735	Ships and Boats	74.68	100.00	99.99	84.39	100.00	99.99	78.75	100.00	99.99	81.60	100.00	99.99	-	-	-
7	Machinery and transport Equipment	33.41	99.71	85.40	56.50	98.38	79.90	57.43	78.36	94.22	72.20	99.77	78.14	67.40	93.20	78.11
812	Sanitary, plumbing, heating and lighting fixtures	23.35	100.00	99.99	22.74	100.00	90.15	50.08	100.00	90.01	21.91	100.00	91.56	42.49	100.00	80.57
821	Furniture	18.04	100.00	99.99	21.82	50.11	50.11	45.11	50.23	50.19	33.36	50.08	50.08	63.59	86.80	50.42
831	Travel goods, hand bags and similar articles	4.35	100.00	99.99	97.87	100.00	99.99	61.54	100.00	99.99	37.15	100.00	99.99	46.25	100.00	88.07

TABLE 4.5

(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
841	Clothing except fur clothing	34.53	100.00	99.99	57.27	91.55	73.11	62.81	86.79	81.02	62.12	99.91	83.56	58.39	60.25	56.65
842	Fur clothing and articles of artificial fur	95.02	100.00	99.99	12.02	100.00	99.99	4.69	100.00	99.99	38.68	100.00	99.99	93.72	96.86	96.84
851	Footwear	70.52	100.00	99.99	85.09	100.00	96.77	43.90	99.92	86.90	82.76	98.61	98.35			
861	Scientific, medical, optical, meas contr. instruments	43.57	100.00	99.99	1.77	84.47	51.66	8.45	97.33	58.81	16.04	98.76	65.46			
862	Photographic and cinematographic supplies	23.21	100.00	99.99	28.22	94.43	79.01	52.32	87.20	67.33	61.17	97.14	72.32			
863	Developed cinematographic film	6.16	100.00	99.99	4.45	100.00	50.00	1.03	100.00	50.00	1.43	100.00	50.00			
864	Watches and clocks	12.97	100.00	99.99	8.26	100.00	50.00	7.43	63.49	50.00	10.07	61.07	49.99			
891	Musical instruments, Sound recorders and parts	18.62	100.00	99.99	15.05	100.00	62.86	12.16	100.00	70.09	7.24	100.00	73.13	25.97	99.63	60.78
892	Printed matters	12.38	100.00	99.99	9.76	100.00	60.90	17.20	100.00	59.48	23.41	98.19	59.96			
893	Articles of artificial plastic materials n.e.s.	3.71	100.00	99.99	11.00	100.00	99.99	21.74	100.00	99.99	15.40	100.00	99.99	17.60	100.00	81.16
894	Perambulators, toys, games, and sporting goods	61.92	100.00	99.99	35.37	72.43	61.04	65.28	73.52	69.51	38.82	96.25	75.17	50.70	96.36	74.63
895	Office and stationary supplies n.e.s.	11.04	100.00	99.99	6.59	100.00	49.99	6.11	100.00	50.00	6.17	100.00	50.00	6.96	100.00	50.00
896	Works of art, collectors pieces and antiques	71.01	100.00	99.99	56.09	100.00	50.00	65.10	93.25	50.00	52.03	54.24	50.00	33.72	100.00	50.00
897	Jewellery and gold-silversmith's wares	9.92	100.00	99.99	8.30	100.00	99.99	14.32	100.00	66.27	5.28	100.00	71.48	16.70	100.00	78.98
899	Manufactured articles, n.e.s.	4.90	100.00	99.99	20.70	55.00	54.61	9.95	100.00	54.32	15.54	100.00	53.45	41.85	100.00	50.83

TABLE 4.5
(cont'd)

SITC GROUP	DESCRIPTIONS	1962			1966			1971			1976			1980		
		IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ	IITB	IITC	IITQ
911	Postal packages not according to kind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
931	Special transactions not classified according to kind	20.82	100.00	99.99	15.14	100.00	99.99	36.21	100.00	99.99	48.34	100.00	99.99	50.31	100.00	99.99
941	Animals n.e.s. incl. 700 animals, dogs and cats	91.83	100.00	99.99	96.75	100.00	99.99	93.74	100.00	99.99	90.29	100.00	99.99	91.57	100.00	99.99
951	Firearms of war and ammunition therefor coin other than gold, hot being legal tender	90.88	100.00	99.99	33.49	100.00	99.99	41.87	50.00	50.00	23.30	100.00	50.00	31.04	100.00	50.00

IITB = G-L Unadjusted measure
IITC = G-L Adjusted index
IITQ = Antonio Adjusted Index

Source: Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

Canada and the United States, with their market proximity, have a substantial transport cost advantage over other competitors in each other's markets. Other advantages that may may be important for each country's industries are that producers find it easier to get "feed back" from the nearby market and are better informed about the changing pattern of consumption. They can ship additional products to the point of sale more quickly and are able to service the market more efficiently with a lower level of inventories. Furthermore, a manufacturer is not only concerned about the sale of his output, but about access to inputs. If industries are located near suppliers of inputs, producers are in a better position to obtain the required inputs in the event of unforeseen changes in the demand and supply pattern. Competition is another contributory factor, especially in those industries in which style is important or technology is rapidly changing. For example, in the Food and Beverages industry, the West Lake region is superior on all these counts to Ontario. It provides greater opportunities to markets, inputs and competition. On the other hand, the U.S. midwest is superior to Ontario in only one of these respects.

It is noticeable from Table 4.5 and 4.5.1 that trade in SITC 0 also grew over time between these two countries. A possible explanation, aside from the above factors, is the regional character of North America. Because of a wide variation of climate across regions, the U.S. can produce many varieties of fruits which have much shorter growing seasons in Canada. The seasonal fruit and vegetable trade creates quite special problems and has resulted in special regulatory provisions. Trade in meat and dairy products is also substantial, but has been subjected to many complications because of off-shore imports and by the existence of Canada's Marketing Boards.

Ores and concentrates constitute an important Canadian export in Crude Materials. Measured IIT in this category varies between 30 and 40 percent over the sample period.

One crucial category is fabricated materials. This category consists of three main items: forest products, non-ferrous metals, and chemicals. About 50 percent of Canada's exports of fabricated materials are in forest products, particularly lumber, wood pulp and newsprints to the U.S.

SITC 5, Chemicals, exhibits a high magnitude of IIT, particularly in organic and inorganic chemicals, fertilizers, crude chemicals from coal, petroleum and gas. The overall weighted averages of IIT were 43 percent in 1962 and 51 percent in 1980.

In the end-products category, automotive products constitute the most significant item, accounting for two-thirds of Canadian exports and almost one-half of U.S. end-products imports to Canada. Intra-industry trade in SITC 6 was high particularly SITC 611, Leather (86.56 percent), SITC 613, Fur and Skins (61.68 percent), SITC 632, Wood Manufactures (63.06 percent), SITC 655, Special Textile Fabrics (41.42 percent), SITC 661, Lime, Cement and Fabricated Materials (89.43 percent), Iron and Steel bars, SITC 673, (near 44 percent), SITC 676, Rails and Railway Track (96.33 percent), and SITC 681, Silver and Platinum group metals. It is noteworthy that in many cases IIT grew over time, while only in a few cases, such as SITC 689, 691, and 695, IIT tended to decline in magnitude, particularly in 1980. Aside from auto products, most of the commodities under this category are capital goods. Although the growth rate in this sector has been commendable, export performance has not attained the expected level. While the value of exports rose substantially from $2.71 in 1960 to $3.6 billion in 1967, the inflow of U.S. products rose from $1.6 billion in 1960 to $10.3 billion in 1977, increasing Canada's balance of payment's deficits by $6.7 billion in this category alone. These imbalancing effects are captured by intra-industry adjusted trade indices, (IITC and IITQ) which both demonstrate very high magnitudes over this period in these categories.

Summary

The results reveal that across countries the extent of intra-industry trade is remarkably high in trade with developed countries, in particular with the U.S.A., the EEC, and the OECD countries. Across industries, values of IIT indices above 70 percent at the 1-digit and over 50 percent at the 3-digit levels are obtained in SITC 5 through 8 (Manufactured Products). In addition, strikingly high magnitudes are observed even in the

SITC 0-4 divisions. Temporal analysis indicates that a substantial growth in IIT has taken place over the years 1962-80, both across countries and across industries, but cyclical variations are also noticeable. Furthermore, for many countries IIT intensity has tended to decline through time. Finally, the strength of IIT is preserved at each level of disaggregation, suggesting that IIT is in fact, a real phenomenon and not a mere "statistical artifact."

With respect to the performance of the alternative measures, the Grubel and Lloyd unadjusted index seems to be a representative index despite its shortcomings. The main shortcomming of other indices is that the G-L adjusted measure overstates the order of magnitude of IIT. Likewise Aquino's corrected measure yields high values. Judging from the performance of the measures considered, the arguments in favor of making adjustment to trade imbalances do not seem to be convincing.

These findings suggest that the growth in intra-industry trade depends upon the rate of growth of per capita income of the trading partners and the international environment at different points in time. The growth in intra-industry trade does not take place simply because of the progress of time.

CHAPTER FIVE

DETERMINANTS OF INTRA-INDUSTRY TRADE: REVIEW OF EMPIRICALLY TESTABLE HYPOTHESES AND EVIDENCE

During the last few years, several contributions in the trade literature have recorded attempts to test empirically the various theories of intra-industry trade, such as Pagoulatos and Sorensen (1975), Finger and De Rosa (1979), Loertscher and Wolter (1980), Caves (1981), Toh (1982), Lundberg (1982), Bergstrand (1982), and Havrylyshyn and Civan (1983).

The literature identifies two types of intra-industry trade. The first concerns the direction of bilateral trade and its intensity. These investigations measure the variations of intra-industry trade intensity across countries for a given industry. The second examines the national attributes of trading partners and variation in the magnitude of intra-industry trade across industries, depending on the commodity structure. These discussions have led to a set of empirically testable hypotheses. In this chapter hypotheses are discussed and independent variables are identified. A few studies which have used such independent variables are reviewed.

The following hypotheses have been derived from the emerging theoretical work in order to get an insight into the forces which shape the pattern of Canada's international trade.

5.1 Country Specific Hypotheses Concerning IIT

5.1.1 Hypothesis 1: Intra-industry trade among countries is an increasing function of their average level of development, as measured in terms of their per capita incomes, i.e., $(\delta IITjk/\delta ALDjk) > 0$.

The theoretical rationale is: first, that a high level of development reflects similarity of income between trade partners. Demand oriented trade theories suggest that similarity in per capita income should exert a positive influence on trade intensity. This is based on the premise that consumer demand at low income levels is standardized with regard to product characteristics. In other words, consumers with low incomes are not willing to pay for product differentiation. The cost reductions obtained by limiting the number of products to a few standardized types will, at low incomes, outweigh the utility lost by not being able to buy a product exactly suited to the demand of the individuals (Lancaster, 1966, 1980). High per capita income countries on the other hand, are characterized by a highly differentiated demand. When trade opens between similar countries consumers gain from the increase in varieties. As real income increases purchasers tend to buy more varieties of any given commodity (Barkar, 1974). Since international trade offers a greater number of differentiated products to consumers, the share of high income elasticity goods in total consumption increases with income. In turn, this highly differentiated demand allows for the exploitation of economies of scale in the production of a wide variety of individual commodities. To be more precise, higher income per capita results in a more diversified demand pattern and is considered as a precondition for product differentiation in monopolistic competition which underlies the theory of intra-industry trade. Second, highly developed countries have technological advantage, command a high capability to innovate, and are therefore more able to develop and produce highly differentiated goods at low costs. Third, highly developed countries enjoy sophisticated systems of information and communication linkages which enlarge the market for highly differentiated products (Loertscher and Wolter, 1980). If these propositions hold, then one would expect a high magnitude of IIT between countries having equality of factor endowments, similar per capita income, and similarity in demand and preference structures.

In order to test these hypotheses empirically, a variable is constructed by taking the average of per capita incomes for two partner countries (in this case Canada and one of her trade partners, such as the U.S., Japan, etc.) in a given year and in a numeraire currency. This variable is defined as the average level of development of home country j and her trade partner k (ALDjk).

Since the econometric analysis on the determinants of intra-industry trade is still in its infancy, caution must be exercised regarding the predicted signs of variables. The link between average level of development and IIT is not unambiguous. For instance, as discussed in the preceding paragraphs, highly developed trade partners have a large potential for IIT. That is, given the demand in the rest of the world, the more varieties of a commodity a country produces, the larger is the number of product varieties which are potential exports. But this is not the only side of the story. A country which produces a large number of varieties of a commodity might be expected to import only a small number to satisfy minority demands and therefore will have a lower share of intra-industry trade. This would likely be the case unless the demand for product variety grew with increasing per capita income.

This is so because increasing economic development has two possible effects. First, it can increase the number of product varieties for which demand exceeds the "threshold size" needed for establishment of an efficient domestic industry. This would reduce the number of product varieties imported and would, therefore, reduce IIT. Second, increasing per capita incomes might increase the demand for product varieties for which the income elasticities of demand are greater than unity. Only if both effects are present would IIT tend to increase with the level of development. If only exports or only imports of a commodity increase, total trade will rise relative to intra-industry trade and, therefore, IIT will decline. "Export potential" nevertheless grows with the level of development, and if increasing demand for product differentiation outweighs the increasing ability of domestic producers to supply the domestic market, then both exports and imports will increase simultaneously and IIT will tend to rise.

5.1.2 Hypothesis 2: Intra-industry trade is a decreasing function of the level of development differential between trading partners.

This follows from Linder's analysis. According to him, given the size of inter-industry trade, the scope for intra-industry trade in products differentiated by quality will be greater, the greater the overlap in the quality interval of demand and income distributions.

It is argued that the (ALDjk) measure could be biased if a low and a very high level of development are averaged. Therefore, a second variable has been constructed to account for the development differential. For empirical estimation the absolute difference of a year's per capita income in U.S. dollars between the two countries, j and k, is employed. The variable is defined as the measure of average level of development differential (ADSDjk).

A third variable is constructed to take into account the above effects by taking the ratio of the per capita income of the home country relative to her partner country. If this ratio approaches unity, then trade partner countries are similar in their development level. A reasonable hypothesis for this variable is that IIT will be greater, for a developed country such as Canada, the higher the per capita income of the trading partner considered. The variable is defined as average development similarity (ADS1).

5.1.3 Hypothesis 3: Intra-industry trade between countries is an increasing function of their average market sizes.

Large market size can be considered as an indicator of the improved accessibility to export markets. Wonnacott (1975) has argued that free trade between the United States and Canada would provide the Canadian producers with access to the large market of 223 million people, so that potential for intra-industry trade would be high. The supply induced effect is especially important in the context of economies of scale effects. Larson (1978) maintains that economies of scale are associated with any products which are produced in large volume. It is also stressed that in a large market the exports of multinationals will be more differentiated, further influencing the intensity of IIT (if multinationals do not become a substitute for trade). Following Loertscher and Wolter (1980), the variable (AMSjk) has been constructed by taking the average of the GDP of the home country and that of each trade partner.

5.1.4 Hypothesis 4: Intra-industry trade is a decreasing function of market size differences between trading partners.

Average market size is not necessarily a function of the mean of two different market sizes. If the markets of both economies are equally large, there would be higher scope for IIT than in cases where trade partner's are of very different sizes. It is, therefore, hypothesized that intra-industry trade is high if the difference in trade partners market sizes is small. In order to test this, a variable is constructed by using the absolute difference of GDP in U.S. dollars between the home and partner countries. This variable is denoted as (DMSjk).

A third variable is employed by taking the ratios of trade partner's GDPs (the reporting country's GDP being in the denominator) in order to account for the above effects. As the ratio approaches unity, it is expected to exert a positive effect on IIT. However, if the ratio diverges to a great extent, IIT would decline. A reasonable hypothesis for this variable is that IIT will be greater, for a developed country such as Canada, the larger the market size of the trading partner considered. This variable has been defined as average market size similarity (ADS2).

5.1.5 Hypothesis 5: Intra-industry trade between countries is a decreasing function of trade barriers and transport costs.

The similarity and extent of protection are factors which are also considered to influence the magnitude of intra-industry trade. More precisely, it is predicted that the lower and more similar are the trade barriers and the lower the transport costs and the less the distance between countries, the higher should be the level of intra-industry trade relative to total trade.

Verdoorn (1961), Balassa (1967), and Gray (1973) observed that in Western Europe intra-industry trade accompanied trade liberalization. Similarly, Willmore (1972, 1979) and Helleiner (1979) noted the development of intra-industry trade in the Central American Common Market (CACM) and among the Latin American Free Trade Area (LAFTA) countries. As a result, it has been suggested that conventional inter-industry trade theory, with its emphasis on the distribution of income among productive factors or among industries in the absence of factor mobility between industries, is inadequate for evaluating the consequences of trade liberalization. In Balassa's opinion, the impediments to trade liberalization are not as great as have generally been suggested because trade liberalization leads to higher intra-industry specialization. This in turn provides potential gains to producers from economies of scale and avoids income redistribution distortions between industries, because resource shifts take place within industries.

Hufbauer and Chilas (1974) have noted that the tariff reductions under the auspices of the General Agreements on Trade and Tariffs (GATT) negotiations have led to intra-industry trade between developed countries. They argued that tariffs have been reduced through phases on an industry by industry basis following the principle of reciprocity under the Most Favored Nations Clauses. Most of these industries had been chosen from the manufacturing sector, where the potential for intra-industry trade is greater.

Since the approach used herein uses cross sectional data, ideally one would like to employ data on trade barriers imposed by the home country vis-a-vis some weighted average of industry specific barriers imposed by the other countries. Such information, however, is non-existent. As a result, a transport cost variable (DISTjk) measured by the distance between the respective economic centres of countries j and k in miles is employed.

5.1.6 Hypothesis 6: Intra-industry trade between countries is an increasing function of their culture and languages.

It is posited that similar culture and languages between trading partners go hand in hand with similar preference patterns and habits and therefore further facilitate intra-industry trade. In fact, socio-political cultural and institutional framework of modern societies exert great influence in shaping international trade pattern. For instance "snob effects", "demonstration effects", and "band-wagon effects", are well known factors. Unfortunately for empirical tests, it is extremely difficult to get grip on these factors. To test this hypothesis two dummy variables are introduced: (i) a cultural group dummy, 1 if j and k belong to a common cultural group, 0 otherwise; and (ii) a language group dummy (LNGjk), 1 if j and k belong to a common language group, 0 otherwise.

5.2 Industry Specific Hypotheses Concerning IIT

A further, often ignored, aspect of trade is the nature of international markets themselves (Helleiner, 1978). Variations in intra-industry trade intensities across industries can be explained by different structural characteristics of industries and the attributes of international markets. Important elements of market structure are: (a) the level of aggregation; (b) the degree of product differentiation; (c) the nature and extent of economies of scale; (d) the technological characteristics of the industry; and (e) the penetration of foreign firms and the conditions of entry. Industry specific hypotheses are as follows:

5.2.1 Hypothesis 7: Intra-industry trade is a decreasing function of the level of disaggregation.

Intra-industry trade can arise from the level of aggregation of distinct commodities arising from conversion of United Nations Standard International Trade Classifications (SITC) into industry categories.

Greenaway and Milner (1983) employed a number of adjustment factors to United Kingdom's trade data as independent variables in their empirical test to make some allowance for the "categorical aggregation" phenomenon. Their measures suggested that categorical aggregation was indeed exerting an impact, but was not a significant factor. This impact results from the inappropriate inclusion of products in one category which have a relatively low degree of substitutability in consumption or production or both. For example, in the SITC system each industry category is comprised of a number of sub-classes of products which are similar, but nonetheless not perfectly homogeneous. Furniture made of wood and steel are classified in a common industry category (SITC, 821) even though input requirements are substantially different.

Empirical studies such as those by Grubel and Lloyd (1975), Pagoulatos and Sorensen (1975), Gray (1978), Loertscher and Wolter (1978), and Toh (1982), report that the magnitude of IIT declines as one uses finer and finer levels of disaggregation, but these coefficients do not disappear altogether, even at the finest level of disaggregation. There is no straightforward proxy measure which can be employed to capture the "categorical aggregation," effect. Caves (1981) suggested that misaggregation might be influenced by joint production. Trade among countries may be taking place in joint products from the same industry.

In order to provide further evidence on this issue, IIT indices in this study have been estimated at each level of aggregation ranging from 1-digit to 5-digit.[1] In order to further test this hypothesis a variable (LDAGi) measured as the number of 4 and 5-digit SITC groups in a given 3-digit SITC groups, will be employed as one of the independent variables.

5.2.2 Hypothesis 8: Intra-industry trade is an increasing function of the potential for product differentiation.

The theories explaining the concept of product differentiation were discussed in the preceding chapter and will not be repeated here. Despite extensive theoretical work on the subject of intra-industry trade, operational empirical measures of product differentiation are still comparatively few in number, and the problem of determining the effects of product differentiation on IIT remains.

To test hypothesis 8, put forward, different methods of measuring product differentiation have been suggested in the literature and employed in various empirical studies. The unit

[1] This aspect was discussed in greater detail in Chapter Four.

value of exports has been used as an indicator of quality differences, suggesting that the higher the unit value, the higher the quality of the product (Ohlsson, 1976). The ratio of the unit value of imports to the unit value of exports has also been employed (Davies, 1975) as a measure of product differentiation. However, product differentiation in general might fail to be reflected in a high dispersion of unit values.

Another method which has acquired widespread credibility and has been used in most empirical studies is Hufbauer's (1970) proxy measure. This index is the measure of the coefficient of variation of the unit values of exports destined to different countries. It is assumed that a high value of the product differentiation index denotes highly differentiated goods (Linder good) while standardized (H-O goods) are characterized by a low level of this index. In this study, Hufbauer's measure has been estimated and the estimates so obtained are utilized as an independent variable in order to test the hypothesis. The variable is denoted as (PDi).

Caves (1974) has used R and D and advertising expenditures to total sales as proxies for product differentiation. His model employed advertising/sales ratio variables in different equations in order to explain the inter-industry variation of market share held by multinationals in Canada. He found a stronger correlation between the advertisement/sales ratio and foreign investment in the convenience industry as compared to the non-convenience industry samples. It was hypothesized that differentiation is more pronounced in convenience products because international firms differentiate their products through intense advertising and non-price competition. Caves empirical findings supported this hypothesis. In this study, Caves' variables will be employed as independent variables. The hypothesis to be tested here is that greater advertising intensity is positively related to the intra-industry trade. The variable (SARi) is used.

5.2.3 Hypothesis 9: Intra-industry trade is an increasing function of economies of scale.

The existence of economies of scale is considered to be an essential condition in order for intra-industry trade to occur. Intra-industry trade primarily arises within manufacturing industries. In a typical non-manufacturing industry, such as wheat growing or copper mining, the products of any two firms are viewed by consumers as perfect substitutes and the firms use very similar production methods and combination of factor inputs. In this case, intra-industry trade can never arise from trade in homogeneous goods.

In the manufacturing sector, however, which generates the bulk of trade among industrialised countries, products are usually the result of hundreds of production processes. The large number of tasks, and intrinsic complexity of production imply that production is often characterized by "increasing returns to scale." In the context of intra-industry trade, economies of scale refers to the length of production runs rather than to the size of plant as such. It is argued that a profit maximizing firm will limit the number of product lines it operates if there exists a potential for economies of scale associated with each production line and, thereby, gains from trade.

Measurement of scale economies is a formidable task. Various measures, nevertheless, have been employed by researchers in order to determine the extent of the economies of scale, such as average size of plants (average value added or employment per plant), or the share of the total labor force employed in big plants. In this study, the value added measure has been employed as an independent variable for the empirical test. A variable (ESCi) has been constructed by taking the value added per employee in a given industry at the 3-digit SITC-SIC levels.

The length of production runs may not be truly reflected in these measures. It has been argued that the length of production runs should be reflected in the rate of output in a continuous production run. Continuous long production runs are characterized by a high degree of mechanization and low human capital utilization. The length of production runs (LPR) is approximated by the degree of mechanization relative to human capital by Toh (1982). The degree is roughly approximated by the level of expenditures on new machinery and equipment per worker. However, data for this are not available at appropriately dissaggregated SITC levels for our purposes.

5.2.4 Hypothesis 10: Intra-industry trade in an industry is a decreasing function of nominal and effective tariffs.

It is hypothesized that intra-industry trade should increase as a result of trade liberalization. The lower the tariff level the higher the IIT, $\delta IIT/\delta TNP < 0$.

It should be recalled that the phenomenon of IIT became of major concern when Verdoorn (1960), Balassa (1966), and others observed that creation of the Customs Union of the Benelux led to the emergence of intra-industry trade pattern. It is pointed out that economic integrations with hihger degree of trade creation effects would tend to enhance intra-industry trade patterns among countries. Falvey's (1981) theoretical model shows that countries which have less trade barriers tend to do more two-way trade with each other than those with high tariffs. Pagoulatos and Sorensen (1975) found support for the above hypothesis. Caves (1981) is sceptical. He argues that in a cross country case the hypothesis holds, but in terms of individual categories there does not seem to have an a priori ground to expect that there should be a negative correlation between IIT and protection. In this study tariff values (TNPi) for each industry and nominal (NTWi) and effective (ETWi) are used to test this hypothesis.

5.2.5 Hypothesis 11: Intra-industry trade is an increasing function of human capital intensity.

It is argued that industries characterized by the use of advanced technology and firm specific knowledge would result in technological gap trade. Since technical knowledge is 'embodied' in the labor force, these industries would tend to use a high proportion of skilled labor. Thus, there may exist a positive link between human capital intensity in an industry and intra-industry trade. A variable (WE) measured as the wage bill to employment ratio in an industry i, has been employed for this empirical test.

5.2.6 Hypothesis 12: Intra-industry trade is a decreasing function of factor intensity differences between countries.

Economic analysis of the determinants of intra-industry trade suggests that those industries which employ different production techniques and factor proportions in different countries will give rise to Heckscher-Ohlin inter-industry trade, and hence relatively less intra-industry trade. Capital labor ratios in industry i has been used as an independent variable in order to test this hypothesis.

The above propositions are testable hypotheses. If intra-industry trade is indeed a real phenomenon and is influenced by the factors mentioned above, it should be possible to demonstrate this with empirical evidence.

5.3 Summary of the Model

In summary, the following models are subjected to empirical estimation in Chapter Six in view of the above hypotheses:

$$\left.\begin{matrix} IITB_{jk} \\ IITC_{jk} \\ IITQ_{jk} \end{matrix}\right\} = f\,(\overset{+}{AMS_{jk}},\ \overset{-}{DMS_{jk}},\ \overset{+}{ALD_{jk}},\ \overset{-}{ADSD_{jk}},\ \overset{+}{ADS1_{jk}},\ \overset{+}{ADS2_{jk}},\ \overset{-}{DIST_{jk}},\ \overset{+}{CUL_{jk}},\ \overset{+}{LNG_{jk}}) \qquad (5.1)$$

$$\left.\begin{matrix} IITB_{i} \\ IITC_{i} \\ IITQ_{i} \end{matrix}\right\} = f\,(\overset{+}{PD_{i}},\ \overset{+}{SAR_{i}},\ \overset{+}{ESC_{i}},\ \overset{-}{LDAG_{i}},\ \overset{+}{WS_{i}},\ \overset{+}{WE_{i}},\ \overset{+}{KIN_{i}},\ \overset{-}{TNP_{i}},\ \overset{-}{ETW_{i}},\ \overset{-}{NTW_{i}}) \qquad (5.2)$$

where:

IITB = G-L unadjusted index

IITC = G-L adjusted index

IITQ = Aquino adjusted index

jk = country suffix (home and partner)

i = industry suffix

Expected signs for coefficients are shown above the variables.

TABLE 5.1

LIST OF VARIABLES

ALDjk	= average level of development of trading countries j and k measured as the average of their per capita incomes expressed in a common currency.
ADSDjk	= development stage differential measured as the absolute difference of per capita incomes between countries j and k expressed in a common currency.
ADS1jk	= the similarity of the level of development measured as the ratio of per capita income of country j to that of country k expressed in a common currency. (The partner country's per capita income being in the numerator.)
AMSjk	= average market size of the trade partners, measured as the average of their gross domestic products (GDPs) expressed in a common currency.
DMSjk	= market size differential between countries measured by taking the absolute differences of their GDPs.
ADS2jk	= average market size similarity measured as the GDP ratios of the two countries. (The partner country's GDP being in the numerator.)
DISTjk	= transport cost variable measured by the distance between the respective economic centers of countries j and k in miles.
LNGjk	= a language group dummy variable, 1 if j and k belong to a common language group, 0 otherwise.
CULjk	= a cultural group dummy variable, 1 if j and k belong to a common cultural group, 0 otherwise.
ESCi	= economies of scale variable, measured as the ratio of value added to total number of employees in an industry at the 3-digit SIC level.
LDAGi	= the degree of aggregation in SITC group i measured as the number of 4 and 5-digit groups in the 3-digit SITC group.

PDi = measure of product differentiation = (Un)/(Vn). In this expression, Un denotes the standard deviation of Canadian export unit values for shipments of n products to different countries. Vn represents the unweighted mean of unit values. The measure is the coefficient of variation in the unit values of Canadian exports destined to different countries.

TNPi = tariff values for each industry as percentages of total duties collected to total values of imports at the 3-digit level of SIC.

ETWi = effective rate of protection computed by Wilkinson and Norrie (1975) for 3-digit manufacturing industries.

TNWi = nominal tariff values (percentages) as computed by Wilkinson and Norrie (1975) for 3-digit manufacturing industries.

WSi = wage share in value added in industry i.

WEi = human capital intensity ratio in industry i, measured as wage bill to employment ratio.

KINi = factor intensity in industry i (K/L).

5.3 Determinants of Intra-industry Trade: Some Empirical Evidence

Various studies have been conducted in order to test hypotheses about the nature and strength of the determinants of intra-industry trade. Pagoulatos and Sorensen (1975), Finger and De Rosa (1979), Loertscher and Wolter (1980), Caves (1981), Lundberg (1982), Toh (1982), Bergstrand (1982), and Havrylyshyn and Civan (1983).

Emilio Pagoulatos and Robert Sorensen (1975) made a pioneering attempt to test the incidence of intra-industry trade. Employing the G-L index, first they computed the magnitude of intra-industry trade in United States total trade in manufactures for 102 industries (3-digit SITC) for the period 1963-67. These estimated coefficients were utilized as dependent variables to test the empirical significance of the factors affecting intra-industry trade suggested by Gray (1973). Their main findings were: (i) that intra-industry trade accounted for 47.9 percent of U.S. total trade in manufactures, (ii) that the intensity of intra-industry trade had grown over time (observed IIT was 47.9 percent in 1963, grew to 50 percent in 1965 and further increased to 54 percent in 1967) and (iii) out of 102 SITC industry groups at the 3-digit level of aggregation, two-thirds experienced a high level of IIT over the period 1963-67 (over one-half of the industries in the sample experienced 50 percent or more) and (iv) they were successful at identifying the influence of independent variables on the variations of intra-industry trade among industries.

Out of the eight independent variables used in their model specifications, four pertained to trade barriers. These were: height of tariff barriers, the height of non-tariff barriers, the United States EEC tariff differential and the non-tariff barrier differential. The remaining four variables were: (a) income similarity, (b) the mean distance, (c) the level of aggregation, and (d) a product differentiation dummy. It was postulated, theoretically, that the more similar and the lower the trade barriers between countries, the higher would be the magnitude of intra-industry trade. Out of the four trade barrier policy variables, only the coefficients on the height of non-tariff barriers and the non-tariff barrier differential were not statistically significant although they yielded expected signs. In order to test the theoretical hypothesis that IIT between trade partner countries is an increasing function of incomes per capita, a variable defined as the percentage of the total OECD to U.S. trade in manufactures in the total U.S. trade in manufactures was employed by these authors. The coefficient on this variable was statistically significant at the 1 percent level with the xpected positive sign. The mean distance variable also yielded a statistically significant coefficient, suggesting that intra-industry trade tends to be high in those commodities which have lower transportation costs. In order to empirically test the "statistical artifact" explanation of intra-industry trade, a variable defined as the number of 4-digit items in each of the 3-digit classifications in the sample was used in their model. The coefficient was statistically significant at the 5 percent level with a positive sign, suggesting that some of measured IIT is caused by statistical aggregation. Contrary to expectations, the performance of the product differentiation variable was weak. However, an alternative dummy variable used to test for the importance of the involvement of multinational companies yielded a stronger result, lending support to the hypothesis that the process of substitution of direct foreign investment for exports by multinational companies reduces the magnitude of intra-industry trade.

The Pagoulatos-Sorensen model was incomplete in that their study emphasized determinants related to industry characteristics, such as economies of scale, product differentiation, level of aggregation. They did not incorporate national attributes, such as per capita income, the level of development, development development differentials and geographical distance.

J.M. Finger and Dean A. De Rosa (1979) attempted to analyze the significance of intra-industry trade as a "product characteristic", integrating the concept of intra-industry trade into the theory of comparative advantage for facilitating the empirical testing of hypotheses.

Utilizing a cross section data base for 75 manufactured products at the 3-digit SITC level, they performed several experiments. First, they computed "trade overlap" indices across

14 major industrial countries. Second, they calculated the same indices for the bilateral trade of the United States with 13 major industrial countries. These two sets of indices then were used as endogenous variables in their regression analysis for four different time periods: 1963, 1967, 1972, and 1975. Since the main thrust of their study was to analyze the intra-industry trade phenomenon as a "product characteristic," most of their explantory variables measured those economic forces which are used in testing the traditional and neo-factor proportions theories, such as physical and human capital intensity, transport costs, first trade date, economies of scale, product differentiation and the combined exports and imports of the trading partners concerned.

Their main empirical results where that: (i) the scale economies and product cycle variables were not statistically significant, (ii) with the exception of the first trade date, none of the independent variables yielded consistent and statistically significant results; and (iii) in most of the regressions the R^2s are low. The F-statistic for their best equation is 1.315 with an R^2 of 0.027 (Finger and De Rosa, 1979, p. 221, Table 2).

In general, in contrast to other research, Finger and De Rosa's study fails to explain the variation of intra-industry trade across industries. From these results, the authors infer that intra-industry trade is an independent variable representing the degree of integration of the international markets concerned. Finger and De Rosa then proceeded to perform a second set of experiment utilising the data base for the entire population of 3-digit export and import values of the OECD member countries over the years 1961-76. The paper reported the results of empirical analysis of: (a) the relationship between intra-industry trade (trade overlap, in their terminology) and industry characteristics representative of the product cycle and neo-factor proportions theories; (b) the relationship between trade overlap and the United States protection; and (c) the influence of trade overlap and other economic forces on the pattern of United States exports. The second set of empirical results showed that the United States export performance in the manufacturing sector is statistically significant with respect to the global and bilateral measure of intra-industry trade, and intra-industry trade coefficients were found negatively correlated with protection of manufactures in the United States.

One of the limitations in their study is that they ignored country attributes such as per capita incomes, development stage differentials and market size differences. They may have obtained better results had the above missing determinants been incorporated in their specifications.

Rudolf Loertscher and Frank Wolter (1980) have provided further empirical evidence on determinants of intra-industry trade. In their study, an attempt was made to explain variations in intra-industry trade intensity among countries and across industries simultaneously. They introduced some new independent variables. They made a distinction between "country hypotheses" and "industry hypotheses." It was postulated that intra-industry trade among countries will be greater if the average of their development levels (as measured by per capita incomes) is high, if the development differential is small, the larger the average market size (measured in terms of GDP), if the differences in their market sizes is small, if trade barriers are low, if geographical, linguistic and cultural differences are small, and if the trading partners are integrated in a customs union and share a common border. The industry hypotheses posited that the intra-industry trade is an increasing function of product differentiation, level of aggregation, economies of scale, and a decreasing function of transaction costs.

Taking bilateral trade flows for OECD countries, they computed the magnitude of intra-industry trade by employing two alternative measures. One was a simple variation of a Grubel-Lloyd type measure and the other was equivalent to the Aquino adjusted measure. These estimated indices were used as dependent variables in their econometric analysis. For the empirical tests of the "country" and "industry" related hypotheses, the OLS technique was used. Their main findings revealed that: (i) intra-industry trade intensity was substantial, both among countries and across industries, and (ii) the results indicated that intra-industry trade intensity across countries was significantly and inversely correlated with development stage differentials, market size differentials and the distance between the trading partners. The coefficients were statistically significant and positive for the average market size and the customs union variables. However, the coefficient on the average level of development was not statistically significant and the sign was not stable over different estimations. Among the industry hypotheses the level of aggregation and the product group dummy yielded significant and positive coefficients. The economies of scale variable had a large t value but an unexpected negative sign. They admit that the variable used was not appropriate to capture the economies of scale arising from longer production runs. The product differentiation variable in this case also showed an ambiguous result. The total explanatory power of the regression equation was low. In spite of these limitations , this study was an improvement over the previous study by Pagoulatos and Sorensen (1975), in that it adopted a combined approach, i.e. stressed both industry characteristics and national attributes. In the present research, most of the independent variables have been drawn from Loertscher and Wolter (1980) with some others added in relation to both commodity characteristics and country attributes.

Richard E. Caves (1981) basic strategy was to explain the variation of intra-industry trade among the 3-digit SITC industrial sectors of 13 industrial countries. A market conduct approach was adopted in order to relate intra-industry trade and the market structure of the countries. It is pointed out that, although a lot of intra-industry trade in manufactures takes place, it is not just a transient result of trade liberalization. There is no obvious relation between the amounts of intra-industry trade in manufactures and the proportional liberalization of trade. The phenomenon of trade might instead depend heavily on the structures of international product markets and the behavior of firms. Also, it is consistent with the rationalization of industry into more efficient production units, and increasing the efficiency of production without incurring the cost of resource shifts to different locations and functions.

The Caves paper presents a test of influences that determine the intersectoral variance of the amount of intra-industry trade. The magnitude of intra-industry trade was computed for manufactured goods among the 13 countries, using the form of dependent variable suggested by Hesse (1974). These estimates were used as dependent variables for empirical tests of hypotheses. A large number of independent variables were successfully used in the model, which included two variables for the level of aggregation, one each for economies of scale and the importance of trade between affiliates, a variable for average distance shipped, average tariffs and the standard deviation of tariff rates, a proxy measure for the extent of investment activity and five variables for product differentiation, of which three principal components were used in various regressions. An additional variable representing the share of total inputs coming from non-agricultural primary sectors was also used. Both OLS techniques and logit analyses were experimented with to empirically test the determinants. Variables which were found statistically different from zero in the alternative regressions were: the aggregation variables, foreign investment activity, product differentiation, and the proportion of trade among affiliates. The important conclusions drawn from the results were: (1) intra-industry trade partly reflects the heterogeneity of the categories of trade we measure, altough only a small proportion of the variance of intra-industry trade can be explained by such measures; (2) statistical evidence on the influence of scale economies on intra-industry trade is weak; (3) the relationship between intra-industry trade and product differentiation was found to be very complex; (4) direct foreign investment was negatively related to intra-industry trade. However, it was statistically confirmed that the jointness involved in international trade among affiliated companies was an offsetting factor that has a positive effect on intra-industry trade. Finally weak statistical support was observed with respect to intra-industry trade and the variance of a country's tariff rates.

The normative implications of Caves' findings are: first, that research in industrial organization has shown that both imports and exports have a significant bearing on the performance of a national industry; second, that import competition in the long-run is clearly a source of improved allocative and technical efficiency. Exposure to export opportunities is clearly favorable to technical efficiency and probably to allocative efficiency, and finally, from the objective of securing good market performance Caves concluded that "there is much to applaud in intra-industry trade and little to deplore" (Caves, 1981, p. 221).

Kiertisak Toh's (1982) article attempts to refine and integrate the earlier analysis of the subject of intra-industry trade by using a market-structure-conduct approach developed in the field of industrial organization as a framework for the empirical testing of hypotheses. The advances made in the study have as background the studies of Verdoorn (Benelux Customs Union), Balassa (EEC), and Grubel and Lloyd, especially in manufacturing trade among industrialized countries. The first hypothesis of the market-structure-conduct approach is "the extent of intra-industry trade is likely to be greater in industries where price diversity is great." "Price diversity tends to be greater when products are highly differentiated or when there is a great amount of consumer's ignorance, or both." Second, "the extent of intra-industry trade is likely to be greater in industries in which trade is highly concentrated among similarly high per capita income countries." Third, "the extent of intra-industry trade is likely to be greater, the longer the production run is." "Production runs are longer when production processes are adaptable to mechanization and low human capital utilization." Fourth, "the extent of intra-industry trade is likely to be greater in industries in which internationally oligopolistic rivalry behavior is likely to be more intense." The rivalry behavior is likely to be more intense in industries in which barriers to foreign entry are low." Fifth, "the extent of intra-industry trade is likely to be greater in industries whose products are in the mature stage of the product life cycle, and which also have a high rate of product variety development."

Toh used nine independent variables in his model. Out of the nine, six variables measuring product differentiation, the degree of mechanization, the four firm concentration ratio, the market share of U.S. exports, the product life cycle and human capital were employed to test the above five hypotheses. The remaining three variables included distance, the tariff and non-tariff barriers variables account for trade barriers and transport costs. The experiments were performed for two years years -- 1970 and 1971. Both linear and non linear regressions analyses were used. The estimated coefficients on the independent variables were all significantly different from zero at conventional levels with the expected signs. The distance, tariff, and non-tariff barriers variables were statistically insignificant in the linear models. The non-linear models yielded better results.

The empirical findings suggest four implications. First, in order to explain the phenomenon of intra-industry trade emphasis must be given to the firm as the unit of analysis because it helps capture the nuances within the industry that give rise to intra-industry trade specialization. The role of international firms and their growth motives in particular should be incorporated in the explanation of trade patterns. Second, both inter-industry and intra-industry trade are compared. Differences in endowments bring about inter-industry specialization and one-way trade; and as endowments, technology, and incomes become more similar, intra-industry trade or two-way trade emerges. Third, to the extent that intra-industry trade is caused by product differentiation and product specific economies of scale, the country gains from long production runs via intra-industry specialization and benefits from wider choice and product variety. The excess capacity dilemma of Chamberlin may thus be solved. Fourth, the regression results consistently confirmed the oligopolistic market interpenetration hypothesis with implications for anti-trust and anti-merger policies. The greater the degree of oligopolistic market interpenetration, other things being equal, the higher the level of intra-industry trade and therefore anti-merger policy may separate domestic oligopolies and their foreign competitors.

Lars Lundberg's (1982) article tests some hypotheses derived from the emerging theoretical work on intra-industry trade using data for Swedish trade, with a cross-section analysis of the share of intra-industry trade in Swedish trade with different countries and in different product groups. The intra-industry trade share of a country's total trade with a group of countries will be affected by the size of the overall trade deficit or surplus. The greater the imbalance, the greater will be the share of net trade, and the smaller the share of intra-industry trade. This measure is based on the degree of similarity of a country's export and import structure. The first hypothesis examined is that the less the difference in factor endowments between the two countries, the higher the proportion of intra-industry trade. Second, the higher the average per capita incomes in the trading countries, the higher will be the share of intra-industry trade. Third, the smaller the difference in per capita income levels between the two trading countries, the higher the proportion of intra-industry trade is likely to be. The data show that the share of intra-industry trade is higher, (a) the smaller the difference in factor endowments and/or income per capita between Sweden and the trade partners, and (b) the smaller is the geographical and/or economic and cultural distance to the trading partners. Theoretically, intra-industry trade is expected to be high if, from the user's point of view, the individual products of different firms in an industry are highly differentiated. The study concludes, first, that if high costs of sales promotion indicate product differentiation, we should expect high intra-industry trade in industries with a high proportion of salesmen (SAR). This is not confirmed by the data. In fact, the coefficients for SAR is negative. Second, theory leads us to expect much trade in industries where there are economies of scale associated with length of runs, which is confirmed by the positive coefficient for concentration in big plants. Third, there is a link between the degree of standardization of the production process and the share of inter-industry trade. Finally, when knowledge is not a free good, innovations will merely lead to an increase in firm-specific knowledge, giving the firm a monopoly position, leading to two-way trade within the industry. Thus, the larger the stock of firm-specific knowledge, and the more rapid the turn-over of this stock, the greater will be the share of intra-industry trade.

Jeffrey H. Bergstrand's (1982) study examines the scope and growth of intra-industry trade across various industries producing machinery and transport equipment (SITC 7), one of the four manufacturing industry groups, and compares and contrasts causes of intra-industry trade. It considers that, among the causes, increasing returns to scale and product differentiation are expected to be prominent. Empirical investigation suggests that the degree of increasing returns to scale and product differentiation and the extent of government induced trade liberalization are important in explaining intra-industry trade. The hypotheses posited are, first, that the greater the extent of product diversity, implicit in the trade between two countries in an industry as measured by a higher degree of increasing returns, the greater the IIT. Second, the lower the degree of tariff and non-tariff protection, the greater is the degree of IIT. This is consistent with the explanation that trade liberalization increases intra-industry specialization in differentiated products. Third, as trade is increasingly dominated by product groups using widely different combinations of productive resources, the degree of IIT falls. That is, as trade is composed more of product classes with widely different production methods, the share of trade that is inter-industry in character increases. Fourth, neither border trade nor trade differences are as important in causing IIT as the other variables. The five conclusions of the study are as follows. First, IIT does not appear to be merely an arbitrary consequence of aggregation of products of essentially different industries. Second, IIT increases when pairs of countries specialize to exploit economies of scale in their bilateral trade. Third, greater product differentiation in trade between pairs of countries in an industry is consistent with a higher degree of IIT. Fourth, neither geographic adjacency of countries nor taste differences between countries were found to be prominent sources of IIT. Fifth, trade liberalization between pairs of countries tends to increase the share of trade that is intra-industry in character. This reflects a penchant for industrialized countries to favor trade liberalization in industries where product diversity and increasing returns are prominent, and where the costs of reallocating productive factors are correspondingly low.

Havrylyshyn and Civans' (1983) paper analyzed the determinants of a country's intra-industry trade pattern in a cross section of 62 countries. Their study included a large number of developing countries, unlike earlier studies which have primarily considered developed countries only. Their results show a strong confirmation of the hypothesis that intra-industry trade is an increasing function of the stage of development, contrary to Loertscher and Wolter (1980). They also found that formation of a customs union promotes intra-industry trade only if it exerts trade creating effects. From the above findings they concluded that development characteristics of the trading partners and trade liberalization are important determinants of intra-industry trade across countries.

All these studies lend support to the proposition that intra-industry trade is, in fact, a real phenomenon. Various economic and non-economic forces play an important role in shaping the international trade flows among countries.

Summary

Drawing on the literature various country-specific and industry-specific hypotheses have been derived for empirical test. The main hypotheses are that intra-industry trade intensity increases with a decreasing development stage differential, market size differential, tariff and non-tariff barriers, distance, cultural and language differentials between trading partners, and an increasing level of development, average market size, product differentiation, economies of scale, productivity, human capital intensity and level of aggregation.

Empirical work on intra-industry trade has made striking advancements in a short span of time. It has gone well beyond the measurement of two-way trade and the methodological problem of "categorical aggregation." Empirical studies have focused emphasis on the determinants of intra-industry trade. Hesse (1974), Pagoulatos and Sorensen (1975), Finger and De Rosa (1979), Toh (1982), Lundberg (1982), and Caves (1981) have explored the variations in intra-industry trade across industries in relation to industry characteristics. Loertscher and Wolter (1980) focused on variations of IIT both across countries and across industries. Havrylyshyn and Civan (1983) have further extended the analysis of the determinants of IIT. They focussed on the intensity of IIT across countries taking into account the trade flows between developed and developing countries. These findings reveal that various facets of market structures and country attributes jointly determine modern trade flows.

An intersting aspect of these findings is that some studies confirm the hypotheses that intra-industry trade intensity across industries increases with an increasing degree of product differentiation, increasing scale economies, greater involvement of multinationals, a greater degree of human capital intensity, decreasing trade restrictions and factor endowment differences.

Other studies contradict the predictions of the intra-industry trade theories. For instance, Caves (1981) is sceptical of the effects of trade restrictions. Scale economies do not come out statistically significant and, surprisingly, show up with negative signs.

Loertscher and Wolter (1980) found that the intensity of IIT across countries increases with a decreasing development stage differential, a decreasing market size differential, increasing average market size, and decreasing distance between trading partners. No support was found for the level of development hypothesis. The role of common language and cultural groups were not unambiguously classified. Trade effects of customs unions were found important. Nevertheless, all these studies on determinants of intra-industry trade lend support to the proposition that intra-industry trade is, in fact, a real phenomenon, influenced by various macro economic variables among other forces, and not a mere statistical artifact.

CHAPTER SIX

DETERMINANTS OF CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE: AN ECONOMETRIC ANALYSIS

Introduction

This chapter is directly linked to Chapters Two and Five above. In Chapter Two, a review of the theory and literature on the determinants of intra-industry trade was undertaken. In Chapter Five, hypotheses on determinants of IIT across countries and industries as well as related empirical evidence were presented and discussed. This chapter sets out to test empirically some of the hypotheses discussed in the preceding chapter. Econometric results are presented and discussed.

Following earlier notable studies, such as those of Hesse (1974), Pagoulatos and Sorensen (1975), Finger and De Rosa (1979), Caves (1980), Loertscher and Wolter (1980), Lundberg (1982), Toh (1982), Bergstrand (1982), and Havrylyshyn and Civan (1983), the econometric results below are presented and discussed in relation to:

(a) determinants of IIT across countries; 27 countries which are Canada's trading partners were sampled (cross section analysis);

(b) the determinants of IIT in bilateral trade relations between Canada and six of her major trading partners -- the U.S.A., Japan, U.K., W. Germany, France and India (time series analysis); and

(c) determinants of IIT across industries (cross section analysis).[1]

In section 6.1, the determinants of IIT as explained in (a)-(c) above are briefly explained; and in section 6.2, the methodology followed in the empirical investigation is outlined. Econometric results are then reported in section 6.3, 6.4, and 6.5. A comparison of results from this study with similar results from other studies, as well as a discussion of econometric problems encountered at the estimation stage (such as autocorrelation and multicollinearity) are also undertaken in the last three sections.

6.1 The Independent Variables

Various country-specific and industry-specific variables have been constructed and used as explanatory variables in the regression analyses. Since the variables were discussed earlier in Chapter Five, here they are listed and used with no further detailed explanation of their construction or meaning. Country-specific determinants are basically derived from such macroeconomic variables as GDP, per capita income, and population. They are as follows:

(A) Average Level of Development (ALDjk)

(B) Average Development Stage Differentials (ADSDjk)

(C) Measure of Income Similarity (ADSS1jk)

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[1] See Chapter Five above.

(D) Average Market Size (AMSjk)

(E) Average Market Size Differentials (DMSjk)

(F) Measure of Country Sizes (ADSS2jk)

(G) The Distance Variable (DISTjk)

(H) Language Group Dummy (LNGjk)

(I) Cultural Group Dummy (CULjk)

(J) Customs Union Dummy (CUSUjk)

The Industry-Specific Determinants used in this study are listed below:

(a) Product Differentiation (PDi)

(b) Economies of Scale (ESCi)

(c) Level of Disaggregation (LADGi)

(d) Tariff Protection (NTPi)

(e) Effective Tariffs (ETWi)

(f) Nominal Tariffs (NTWi)

(g) Factor Intensity (KINi)

(h) Sales/Advertisement Ratios (SARi)

(i) Wage/Employment Ratio (WEi)

(j) Share of Wage Costs in value added (WSi)

If all the statistical series were available and if our knowledge of economic processes were complete, we could immediately make a complete list of explanatory variables relevant for the purpose, and the only problem remaining would be to determine their relative significance in explaining the phenomenon of intra-industry trade. However, since the explanation of the determinants of intra-industry trade is still fairly new, and little *a priori* knowledge has been developed, much room for empirical experimentation remains.

In total, series for 25 independent variables were tried. Some of the variables were developed in this study while others have been suggested and used in previous studies. A number of statistical series are simply not available, although they could be developed at a very high cost.

6.2 Method of Analysis

As noted before, regression analysis is employed in this chapter. There are three different measures of IIT used as dependent variables in this study. They are;

IITB = The G-L unadjusted measure (equation (3.5)

IITC = The G-L adjusted measure (equation (3.9)

IITQ = The AQUINO-corrected measure (equation (3.13)

Each of the IIT variables was regressed on the explanatory variables listed above, and three dummy variables to be explained below. Multiple regression analysis was used. However, simple regressions were also run in cases where multicollinearity was so rampant that multiple regression analysis failed to produce any statistically significant coefficients despite high values of R^2.

Both cross sectional and time series data were used for country-specific analyses, but, due to lack of the relevant data, only cross sectional analysis was done for the industry-specific analyses. For the latter analyses, different sample sizes were experimentd with. For instance, a sample of 16 industries was employed in one case while in other cases sample sizes were 19 and 29 industries -- all at the 3-digit SITC-SIC levels.[2]

The three IIT indices were expressed in percentage form. The explanatory variables for the industry-specific analysis were also all expressed in percentages, except the level of aggregation (LDAGi) variable which is an integer (the number of industries in a 3-digit SITC group); and those in the country-specific analysis were expressed in various units. Both linear and non-linear (logarithmic) multiple regressions were run. Earlier studies have used both functional forms. Further, simple correlation matrices were also computed. Simple correlation coefficients are employed as a method of detecting the presence or absence of multicollinearity. Park-Glejser tests are also used.

6.3 <u>Determinants of Intra-Industry Trade Across Countries: An Econometric Analysis</u>

The model estimated is presented in equation 6.1 below:[3]

$$\left.\begin{array}{l} IITBjk \\ IITCjk \\ IITQjk \end{array}\right\} = \begin{array}{l} f(\overset{+}{ALDjk},\ \overset{-}{ADSDjk},\ \overset{+}{AMSjk},\ \overset{-}{DMSjk},\ \overset{+}{ADS1jk}, \\ \quad \overset{+}{ADS2jk},\ \overset{-}{DIST},\ \overset{+}{LNGjk},\ \overset{+}{CULjk}) \end{array} \qquad (6.1)$$

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[2] A concordance between SITC and SIC was constructed for this purpose.

[3] See Chapter Five for a detailed discussion of this model.

Tables 6.1 through 6.5 show econometric results based on linear and double logarithmic models using cross-sectional data for the years 1980 and 1962. In each of the cases the sample included 22 countries.[a]

Tables 6.1 and 6.2 show regression results based on linear models, while Tables 6.3 and 6.4 show results based on non-linear, double logarithmic regression results. Tables 6.5(a) through 6.5(d) show correlation matrices based on the cross country data.

6.3.1 Average Level of Development (ALDjk)

It is postulated that IIT between countries is an increasing function of the average of their levels of development as measured by per capita incomes (i.e., Hypothesis 1 in subsection (5.1.1) of Chapter Five).

The estimated coefficient on the average level of development (ALDjk) is positive as hypothesized whenever it is statistically significant at conventional levels (as Tables 6.1 through 6.4 show). It is statistically different from zero, at least at the 10 percent level of significance in most of the equations (e.g., equations 4, 5, 6, and 7 of Table 6.1). It is significant at 1 the percent level inequation 4 of Tables 6-1 and 6-3.

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[a] At first, a sample of 27 countries was employed but subsequently most of the LDC countries were dropped. It was observed that when developing countries were included in the sample only the development stage variable appeared significant.

TABLE 6.1

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS COUNTRIES (LINEAR MODEL) 1980

Dependent Variables	Pre-determined Variables									
	CONSTANT	+ AMS_{jk}	− DMS_{jk}	+ ALD_{jk}	− $ADSD_{jk}$	−+ $ADS1_{jk}$	+ $ADS2_{jk}$	− $DIST_{jk}$	−+ LNG_{jk}	+ CUL_{jk}	R^2
IIT_B											
1	18.03 (1.22)*	0.02 (1.78)	-0.01 (-1.31)	1.82 (1.76)	-1.20 (-1.36)			-0.01 (-0.97)			0.583
2	12.10 (0.74)	-0.02 (-0.80)	-0.05 (-1.34)	1.83 (1.85)	1.38 (1.49)			-0.04 (-0.52)	-2.92 (-0.62)	5.93 (1.02)	0.245
3	-125.57 (-0.29)	1.25 (0.37)	-0.02 (-1.79)			0.05 (1.78)	1.63 (0.38)	-0.02 (-1.24)	-1.82 (-0.38)	4.51 (0.73)	0.556
IIT_C											
4	0.001 (0.05)	0.02 (1.86)	-0.13 (-1.78)	4.75 (11.11)	1.38 (-2.36)			-0.03 (-0.66)			0.618
5	37.10 (2.80)	-0.006 (-0.34)	-0.02 (-1.55)	2.62 (2.81)	-0.20 (-0.26)			-0.11 (-2.15)	1.78 (0.51)	-3.36 (-0.64)	0.562
6	865.28 (2.74)	6.42 (2.59)	-0.04 (-0.48)	37.26 (2.76)		0.14 (4.04)	8.16 (2.59)	-0.02 (-2.57)	0.01 (0.02)	-1.49 (-0.37)	0.457
IIT_Q											
7	30.10 (2.64)	-0.03 (-0.34)	-0.01 (-1.02)	1.84 (2.33)	-0.87 (-1.28)			-0.001 (-1.71)			0.587
8	34.29 (2.66)	-0.02 (-0.19)	-0.019 (-1.27)	2.02 (2.22)	0.67 (0.89)			-0.04 (-1.69)	0.36 (0.11)	-4.63 (-0.90)	0.6[illegible]5
9	341.53 (0.87)	2.28 (2.74)	-0.01 (-0.77)			0.09 (2.02)	2.89 (1.74)	-0.001 (-1.83)	-0.51 (-0.15)	5.41 (1.07)	0.606

* t-values in parentheses.

TABLE 6.2

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS COUNTRIES (LINEAR MODEL) 1962

Dependent Variables	CONSTANT	Pre-determined Variables: AMS_{jk} (+)	DMS_{jk} (−)	ALD_{jk} (+)	$ADSD_{jk}$ (−)	$ADS1_{jk}$ (+)	$ADS2_{jk}$ (+)	$DIST_{jk}$ (−)	LNG_{jk} (+)	CUL_{jk} (+)	R^2
IIT_B											
1	20.67 (3.08)*	0.22 (1.65)	-0.09 (-1.20)	2.87 (2.73)	-1.07 (-1.88)			-0.01 (-2.44)			0.369
2	26.24 (2.11)	0.24 (1.77)	-0.22 (-1.31)	3.95 (0.85)	0.92 (1.46)			-0.001 (-1.39)	0.53 (0.08)	5.50 (0.80)	0.374
3	35.12 (3.26)			-0.48 (-0.10)		0.14 (1.74)	0.02 (1.52)	-0.002 (-2.34)	1.89 (0.36)	0.90 (0.14)	0.231
IIT_C											
4	35.37 (3.96)	-0.04 (-0.22)	-0.03 (-0.32)	5.10 (1.98)	0.64 (0.84)			-0.003 (-2.59)			0.146
5	39.68 (2.67(	0.02 (0.06)	-0.01 (-0.07)	1.42 (0.21)	0.54 (0.72)			-0.002 (-0.40)	0.69 (0.09)	12.47 (1.51)	0.454
6	43.26 (4.63)					1.12 (1.83)	0.01 (0.72)	-0.002 (-2.04)	0.84 (0.15)	8.54 (1.07)	0.468
IIT_Q											
7	31.43 (4.84)	0.03 (0.26)	0.002 (0.01)	3.62 (1.96)	0.80 (1.44)			-0.003 (-1.25)			0.154
8	39.58 (3.89)	0.11 (0.88)	-0.05 (-0.77)	-1.38 (-0.31)	0.56 (1.09)			-0.002 (-2.00)	4.78 (0.86)	8.95 (1.58)	0.442
9	42.88 (4.71)			-1.01 (-0.25)		0.05 (0.68)	1.33 (1.89)	-0.008 (-2.58)	4.48 (1.01)	6.17 (1.11)	0.442
10	41.76 (5.74)	0.01 (0.30)		3.91 (1.79)				-0.002 (-2.21)			0.271

* t-values in parentheses.

TABLE 6.3

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS COUNTRIES (NON-LINEAR MODEL) 1980

Dependent Variables	CONSTANT	+ $LAMS_{jk}$	- $LDMS_{jk}$	+ $LALD_{jk}$	- $LADSD_{jk}$	- $LDIST_{jk}$	+ $LDS1_{jk}$	+ $LDS2_{jk}$	+ $LLNG_{jk}$	+ $LCUL_{jk}$	R'
IIT_B											
1	4.98 (3.06)*	0.07 (1.58)	0.08 (0.95)	0.26 (1.93)	-0.05 (-0.91)	-0.25 (-1.70)					0.338
2	4.58 (2.64)	-0.08 (-0.58)	0.11 (1.03)	0.22 (0.62)	-0.06 (-0.81)	-0.21 (-1.25)			-0.10 (-0.27)	0.12 (0.56)	0.355
3	2.41 (2.16)	-0.13 (-0.26)	0.14 (0.76)			-0.13 (-1.28)	0.02 (0.19)	0.21 (1.17)	-0.002 (0.12)	0.12 (0.54)	0.308
IIT_C											
4	5.71 (7.07)	-0.12 (-1.89)	-0.10 (-2.12)	0.52 (3.85)	-0.01 (-0.36)	-0.22 (-2.84)					0.774
5	5.84 (6.30)	-0.11 (-1.50)	-0.11 (-1.94)	0.52 (2.98)	-0.01 (-0.55)	-0.24 (-2.62)			-0.23 (-0.33)	0.04 (0.35)	0.784
6	8.25 (6.54)	0.62 (2.17)	-0.01 (-0.05)			-0.27 (-3.10)	0.14 (2.28)	0.18 (1.86)	0.08 (0.40)	0.07 (1.64)	0.790
IIT_Q											
7	5.86 (5.71)	-0.11 (-1.33)	-0.07 (-1.08)	0.52 (1.47)	-0.01 (-0.22)	-0.21 (-2.13)					0.511
8	6.12 (5.33)	-0.11 (-1.19)	-0.09 (-1.25)	0.32 (1.67)	-0.01 (-0.21)	-0.24 (-2.09)			0.01 (0.07)	0.10 (0.79)	0.538
9	9.40 (7.60)	0.93 (3.32)	0.08 (1.86)			-0.26 (-2.95)	0.02 (2.27)	0.29 (3.12)	0.01 (0.18)	0.12 (2.15)	0.716

* t-values in parentheses.

TABLE 6.4

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS COUNTRIES (NON-LINEAR MODEL) 1962

Dependent Variables		Pre-determined Variables									
	CONSTANT	+ $LAMS_{jk}$	− $LOMS_{jk}$	+ $LALD_{jk}$	− $LADSD_{jk}$	+ $LADS1_{jk}$	+ $LADS2_{jk}$	− $LDIST_{jk}$	+ $LLNG_{jk}$	+ $LCUL_{jk}$	R^2
IIT_B											
1	6.07 (2.86)*	0.22 (1.62)	-0.14 (-1.65)	0.12 (1.33)	0.06 (0.70)			-0.38 (-1.81)	0.13 (0.72)	0.15 (0.64)	0.521
2	9.34 (4.43)	0.53 (1.49)	-0.06 (-0.81)			0.03 (0.48)	0.30 (2.16)	-0.61 (-3.25)	0.29 (2.02)	0.07 (0,35)	0.299
3	9.46 (4.69)	0.68 (2.45)					0.36 (3.14)	-0.60 (-3.34)	0.29 (2.24)	0.11 (0.63)	0.340
IIT_C											
4	6.54 (4.44)	-0.01 (-0.05)	-0.08 (-1.47)	0.19 (1.75)	0.03 (1.60)			-0.33 (-2.27)	0.05 (0.43)	0.24 (1.44)	0.241
5	7.03 (4.14)	-0.04 (-0.14)	-0.09 (-1.39)			0.05 (1.04)	0.10 (0.11)	-0.39 (-0.54)	0.09 (0.79)	0.19 (1.28)	0.149
6	7.19 (4.06)	-0.26 (-1.04)		0.69 (0.88)		0.06 (1.95)	0.10 (0.98)	-0.37 (-2.34)	0.10 (0.90)	0.26 (1.74)	0.244
IIT_Q											
7	6.09 (5.07)	0.05 (0.78)	-0.07 (-1.62)	0.04 (1.24)	0.05 (1.02)			-0.31 (-2.60)	0.12 (1.34)	0.19 (1.46)	0.687
8	7.33 (5.20)	-0.16 (-0.71)	-0.06 (-1.16)			0.02 (0.30)	0.09 (1.95)	-0.41 (-3.19)	0.19 (1.87)	0.14 (1.10)	0.682
9	5.65 (5.90)					0.03 (0.28)	0.02 (0.56)	-0.27 (-2.57)	0.07 (0.89)	0.19 (1.43)	0.568
10	5.62 (6.65)				0.07 (1.45)	0.04 (1.91)		-0.28 (-2.88)	0.05 (0.66)	0.20 (1.66)	0.552
11	5.80 (5.12)	0.02 (0.18)						-0.28 (-2.46)	0.08 (1.64)	0.19 (1.53)	0.552

* t-values in parentheses.

TABLE 6.5(a)

CORRELATION MATRIX (1980 DATA) Linear Models

	IIT1	IIT2	IIT3	AMSJ	DMSJ	ALDJ	ADSD	ADS1	ADS2	DIST	LING	CUL
IIT1	1.00	0.3413	0.6579	-0.2335	-0.2469	0.2824	0.1330	0.2817	-0.2342	-0.2997	0.0155	0.2184
IIT2	0.3413	1.00	0.8349	-0.3075	-0.4721	0.6286	-0.2595	0.6275	-0.3059	-0.4738	0.3933	0.4915
IIT3	0.6579	0.8349	1.00	-0.3637	-0.4679	0.3946	0.0786	0.3936	-0.3627	-0.4580	0.2159	0.2518
AMSJ	-0.2338	-0.3075	-0.3637	1.00	0.8235	0.2122	-0.3761	0.2104	0.9999	-0.0859	-0.3466	-0.1906
DMSJ	-0.2469	-0.4721	-0.4679	0.8235	1.00	0.0770	-0.2153	0.0757	0.8226	0.0436	-0.3351	-0.4245
ALDJ	0.2824	0.6286	0.3943	0.2122	0.0770	1.00	-0.6045	0.9999	0.2126	-0.2597	0.3526	0.4591
ADSD	0.1330	-0.2595	0.0786	-0.3761	-0.2153	-0.6045	1.00	-0.6025	-0.3768	0.0452	0.2222	-0.3898
ADS1	0.2818	0.6275	0.3936	0.2104	0.0757	0.9999	-0.6025	1.00	0.2109	-0.2585	0.3521	0.4593
ADS2	-0.2342	0.3059	0.3627	0.9999	0.8226	0.2126	-0.3768	0.2109	1.00	-0.0862	0.3458	-0.1899
DIST	-0.2997	-0.4738	-0.4580	-0.0859	0.0436	0.2597	0.0452	0.2585	-0.0862	1.00	0.1560	-0.2308
LNG	0.0155	0.3933	0.2159	-0.3466	-0.3351	0.3526	0.2222	0.3521	-0.2358	0.1560	1.00	0.4107
CUL	0.2184	0.4915	0.2518	-0.1906	-0.4245	0.4591	0.3898	0.4593	-0.1899	-0.2308	0.4107	1.00

TABLE 6.5(b)

CORRELATION MATRIX (1980) Non-Linear Models

	LIIT1	LIIT2	LIIT3	LAMSJ	LDMSJ	LALDJ	LADSD	LADS1	LADS2	LIST	LLNG	LCUL
LIIT1	1.00	0.2931	0.5837	-0.2042	-0.1068	0.1740	0.0298	0.0853	-0.1105	-0.2783	-0.0154	0.2184
LIIT2	0.2931	1.00	0.8390	-0.2429	-0.4547	0.5897	-0.2877	0.5062	-0.0233	-0.5440	0.3833	0.5359
LIIT3	0.5837	0.8390	1.00	-0.3075	-0.4214	0.3060	-0.0892	0.1516	-0.0850	-0.4968	0.2110	0.2881
LAMSJ	-0.2042	-0.2429	-0.3075	1.00	0.4929	0.2871	-0.1906	0.3110	0.9404	-0.0869	-0.3178	-0.0873
LDMSJ	-0.1068	-0.4547	-0.4214	0.4929	1.00	0.0710	-0.1255	0.0577	0.2515	0.0938	-0.2218	-0.3608
LALDJ	0.1740	0.5897	0.3060	0.2871	0.7100	1.00	-0.4515	0.9722	0.4190	-0.2341	0.3609	0.4816
LADSD	0.0298	-0.2877	-0.0892	-0.1906	-0.1255	-0.4515	1.00	-0.5045	-0.2551	0.1771	-0.1554	-0.2695
LADS1	0.0853	0.5062	0.1516	0.3110	0.0577	0.9722	-0.5045	1.00	0.4087	-0.1726	0.3704	0.5240
LADS2	-0.1105	-0.0233	-0.0850	0.9404	0.2515	0.4109	-0.2551	0.4087	1.00	-0.1377	-0.2148	0.0825
LIST	-0.2783	-0.5340	-0.4968	-0.0869	0.0938	-0.2341	0.1771	-0.1726	-0.1377	1.00	0.0761	-0.3434
LLNG	-0.0154	0.3833	0.2110	-0.3178	-0.2218	0.3609	-0.1554	0.3704	-0.2148	0.0761	1.00	0.4107
LCUL	0.2184	0.5395	0.2881	-0.0873	-0.3608	0.4816	0.2695	0.8240	0.0825	0.3434	0.4107	1.00

TABLE 6.5(c)

CORRELATION MATRIX (1962) (Linear)

	IIT1	IIT2	IIT3	AMSJ	DMSJ	ALDJ	ADSD	ADS1	ADS2	DIST	LING	CUL
IIT1	1.00	0.6399	0.8344	0.3457	-0.2269	0.3382	0.3996	0.4372	0.3190	-0.4652	0.0871	0.3259
IIT2	0.6399	1.00	0.9210	-0.0527	-0.1763	0.2600	0.2396	0.3503	-0.1098	-0.4696	0.0490	0.4790
IIT3	0.8344	0.9210	1.00	0.0721	-0.1549	0.3012	0.3637	0.3286	-0.0011	-0.4917	0.1584	0.4608
AMSJ	0.3457	-0.0527	0.0721	1.00	-0.0328	0.4525	-0.1077	0.1769	0.8835	-0.1222	-0.1038	-0.0888
DMSJ	-0.2269	0.1763	0.1549	0.0328	1.00	0.2277	-0.1416	0.1012	-0.1542	-0.0722	0.2134	0.1079
ALDJ	0.3382	0.2600	0.3012	0.4525	0.2274	1.00	0.0898	0.6096	0.0536	-0.0765	0.5080	0.3254
ADSD	0.3996	0.2396	0.3637	0.1077	0.1416	0.0895	1.00	0.2872	-0.0775	-0.0951	0.2901	0.0108
ADS1	0.4372	0.3503	0.3286	0.1769	0.1012	0.6096	0.2872	1.00	0.1278	0.0902	0.4575	0.4611
ADS2	0.3190	0.1098	0.0011	0.8835	0.1542	0.0536	-0.0775	0.1278	1.00	-0.0608	-0.2975	-0.1450
DIST	0.4652	0.4696	0.4917	0.1222	0.0722	-0.0765	-0.0951	0.0902	-0.0608	1.00	0.3933	-0.1606
LNG	0.0871	0.0490	0.1584	0.1038	0.2134	0.5080	0.2901	0.4575	-0.2975	0.3933	1.00	0.2500
CUL	0.3259	0.4790	0.4608	0.0888	0.1079	0.3254	0.0108	0.4611	-0.1450	-0.1606	0.2500	1.00

TABLE 6.5(d)

CORRELATION MATRIX -- CROSS SECTION (1962) (Non-Linear)

	LIIT1	LIIT2	LIIT3	LAMSJ	LDMSJ	LALDJ	LADSD	LADS1	LADS2	LIST	LLNG	LCUL
LIIT1	1.00	0.6252	0.8459	0.4986	0.0824	0.4346	0.1140	0.3399	0.5276	-0.5571	0.1726	0.3174
LIIT2	0.6252	1.00	0.9123	0.1621	-0.0408	0.3933	0.0801	0.3582	0.0992	-0.5606	0.1221	0.5553
LIIT3	0.8459	0.9123	1.00	0.3194	0.0716	0.4161	0.1677	0.3090	0.2632	-0.6181	0.2301	0.5049
LAMSJ	0.4986	0.1621	0.3194	1.00	0.5315	0.5097	-0.1437	0.3362	0.9218	-0.4409	0.1912	0.0035
LDMSJ	0.0824	-0.0408	0.0716	0.5315	1.00	0.3506	-0.1516	0.1936	0.2866	-0.3668	0.3786	0.0623
LADDJ	0.4346	0.3933	0.4161	0.5097	0.3506	1.00	-0.2533	0.6869	0.3850	-0.2339	0.5740	0.4139
LADSD	0.1140	0.0801	0.1677	-0.1437	-0.1516	0.2533	1.00	-0.2781	-0.0845	-0.0419	0.0015	0.2114
LADS1	0.3399	0.3582	0.3090	0.3362	0.1936	0.6869	-0.2791	1.00	0.2903	-0.5803	0.4198	0.3473
LADS2	0.5276	0.9920	0.2632	0.9218	0.2866	0.3850	-0.0845	0.2903	1.00	-0.2786	0.0247	-0.0678
LDIST	0.5576	-0.5606	0.6181	-0.4409	0.3668	0.2339	-0.0419	-0.0580	-0.2786	1.00	0.1201	-0.2639
LLNG	0.1726	0.1221	0.2301	0.1912	0.3786	0.5740	0.0015	0.4198	0.0247	0.1201	1.00	0.2619
LCUL	0.3174	0.5553	0.5049	0.0035	0.0623	0.4139	0.2114	0.3473	0.0678	-0.2634	0.2619	1.00

The coefficient ranges from 1.82 to 4.75 in the linear models where it is significant at conventional levels, whereas in the non-linear models, it is about 0.52.

These results are different than those obtained by Loertscher and Wolter (1980). In their linear models, the estimate is positive while in the double logarithmic regressions it is negative. But their estimates are statistically insignificant in both cases.

However, Pagoulatos and Sorensens' (1975) findings support the hypothesis. The coefficient for the income similarity variable[5] was found positive as expected and was significant at the 1 percent level, suggesting that similarity in income is indeed an important factor in influencing the intensity of intra-industry trade. These different results may be due to the use of different proxies for the average level of development variable in the two studies. Loertscher and Wolter (1980) employed average per capita incomes of the bilateral trade partners, whereas Pagoulatos and Sorensen used an industry's share of export and import relative to total export and import as the measure of income similarity. It is to be noted that per capita income is more closely associated with the demand side of the question whereas the share of an industry's export and import, particularly in manufacturing output, is closely associated with the supply side.

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[5] These authors termed the variable income similarity instead of level of development.

Havrylyshyn and Civan (1983) recently found a strong confirmation of the "stage of development" hypothesis. Their different results may have been affected by two facts: (a) they employed per capita income as a proxy measure for the level of development; (b) a large number of developing countries were included in their sample. Loertscher and Wolter sampled only OECD countries and their proxy measure (as discussed earlier) was an average of per capita incomes of two trading partners. Loertscher and Wolter (1980) noted that "No support is found for the 'average development stage', hypothesis" (p. 287). While Havrylyshyn and Civan observed, "we show in the paper that with developing countries included the stage of development is in fact a very important determinant of the level of IIT" (Havrylyshyn and Civan, 1983, p. 112).

In this study, a number of developing countries have been included in the sample of 27 trading partners.[6] Regression results are consistent with those of Havrylyshyn and Civan (as far as the development stage variable is concerned).

Thus, evidence in this study shows that the average development stage is one of the important country-specific determinants of IIT. A higher level of development enlarges the scope for the realization and expansion of trade in differentiated products between two trade partner countries. This

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[6] These results have not been reported in the Tables. It is noticeable that when developing countries are included in the sample only the development stage variable appears significant at the 5 percent level. The other variables seem to have no effect on the variation of IIT.

appears to hold irrespective of the alternative definition of IIT used.

6.3.2 Average Level of Development Differential (ADSDjk)

As noted under hypothesis 2 in subsection 5.1.2 of Chapter Five, ADSDjk is another proxy for average development stage. ADSDjk is the absolute difference between per capita incomes of two trade partners, j and k. Here, $\delta IIT/\delta ADSD < 0$ is expected. Tables 6.1 through 6.4 results show that in most of the equations, coefficient estimates on ADSDjk are statistically insignificant at conventional levels, and vary in sign across equations. However, in equations 4 and 1 of Tables 6.1 and 6.2, respectively, the coefficients are statistically different from zero at the 5 percent level with the right sign. The coefficient estimates vary from 0.20 to 1.38.

According to Tables 6.5(a) through 6.5(d), the variable ADSDjk does not seem to be highly collinear with other variables. Hence, it seems multicollinearity cannot be advanced as one of the major reasons for the poor performance of the variable.

The expected sign associated with this variable was negative. It is posited that in a cross-country comparison, a country's share of intra-industry trade is inversely related to the absolute difference in bilateral incomes per capita. Loertscher and Wolter (1980) present results to this effect. Their sample consisted of OECD countries, the period being the early 70s. Their estimate on ADSDjk was statistically significant at the 1 percent level (Loertscher and Wolter, 1980, p. 287, Table 1). Thus, it is possible that the same measure used in the current study may not have been a good proxy for the development stage differential in bilateral trade relations in the Canadian context.

6.3.3 Similarity of Development Stage (ADS1jk)

In order to resolve the above problem, we employed another measure -- Development Stage Similarity (ADS1jk). ADS1jk was defined as the ratio of the per capita incomes of the trading partners. This proxy for development stage has not been employed in any previous study; it is one of the new variables constructed in this study. A reasonable hypothesis for this variable is that IIT will be greater for a developed country such as Canada, the higher the per capita income of the trading partners considered. It is argued that the share of IIT will tend to be higher between countries with close factor proportions than with differences in factor endowments. The higher the capital-labor ratio the greater will be the per capita incomes since income per capita is an increasing function of the capital labor ratios. Countries with similar factor endowments will tend to produce similar groups of commodities with product differentiation. Intra-industry trade, therefore, will tend to be higher between these countries. Thus, $\delta IIT/\delta ADS1 > 0$.

Tables 6.1 through 6.4 show that this measure performs relatively better than ADSDjk in terms of the significance of the coefficient associated with it. The coefficient is significant at the 1 and 5 percent level in some equations (e.g., equations 6 of Tables 6.1 and 6.3). The coefficients in all these cases are positive.

The above evidence suggests that this is a better and more revealing measure of income similarity between countries. Hence, in further research this measure is worth employing as one of the country-specific determinants of IIT.

6.3.4 The Average Market Size Variable (AMSjk)

As stated in the hypothesis 2 in sub-section (5.1.2) of Chapter Five, intra-industry trade varies directly with average market size given any two trading partners. A large market size is considered an indicator of the growth in GDP or improved accessibility to export markets, for large markets imply high supply and demand responses, (see Wonnacott and Wonnacott, 1975; Loertscher and Wolter, 1980).

As Table 6.1 and 6.2 show, the sign associated with the coefficients on average market size (AMSjk) is in general positive as postulated. Out of 19 equations, it is only in a few cases that the sign turned out to be negative. In those cases where the coefficients are negative, the estimates are not statistically significant at the 10 percent level. The coefficient estimates for this variable are positive and significant at the 10 percent level in equations 1 and 6 of Table 6.1 and equations 1 and 2 of Table 6.2. The coefficient ranges from 0.01 to 6.42 in the cases where it is positive and statistically significant.

In the non-linear models, the estimates on this variable are statistically significant at least at the 10 percent level in most of the equations. In equation 9 of Table 6.3 and equation 3 of Table 6.4, the coefficients are statistically significant at the 5 percent level. As compared to results from the linear models, there are a number of cases in which the associated coefficients of this variable turn out to be negative, such as in equations 2, 4, 6, and 8 of Table 6.3 and equations 4 and 5 of Table 6.4.

Loertscher and Wolter (1980) found a positive relationship in both linear and non-linear models. Their estimates were significant at the 10 percent level.

The negative sign was unexpected. There is no obvious explanation for this sign change. One explanation could be that the (AMSjk) variable used here is not appropriate for capturing the effects of the true market size of the trade partners. Second, the non-linear models may be misspecifications of the relationship under consideration (whereby the estimates may be inaccurate).

However, the link between IIT and the average market size should not be overstated. On the demand side, diversity of individual consumption patterns probably varies considerably among countries of equal size. So the number of varieties of a product demanded in a country would be only weakly related to the size of a country. Havrylyshyn and Civan (1983) found that "Size of a country, whether measured by population or GNP, does not seem to have any influence on the level of a country's intra-industry trade" (p. 133). Besides, it is also argued that while a large economy may permit greater opportunities for scale economies to occur in individual industries, a large size also means less border trade. In this situation, the two may have counter-balancing effects.

As far as the issue of multicollinearity is concerned, simple correlation coefficients (Tables 6.5(a) through 6.5(d) are used as a simple rule of thumb to indicate its presence.[7] In the linear models, the variable AMSjk is highly collinear with DMSjk with a simple correlation coefficient of 0.9998 for 1980, and with ADS2jk with a simple correlation coefficient of 0.8835 for 1962. (See Tables 6.5(a) and 6.5(d).) This collinearity between AMSjk and ADS2jk did not affect our results in Table 6.7 because no regression included these variables as joint independent variables. In the non-linear models, as Table 6.5(b) and 6.5(d) show, AMSjk is again collinear with ADS2 with simple correlation coefficients of 0.9404 and 0.9218 for the years 1980 and 1962 respectively. One of the consequences of multicollinearity, apart from distortion of standard errors, is

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[7] There is no standard test for multicollinearity. Hence, all tests are, in a way, rules of thumb as Maddala (1977) points out.

the possible change in signs on coefficients. This may explain some of the changes in signs in the logarithmic models.

On the whole, our results show that this variable is an important determinant of IIT. These results also seem to agree with the general proposition that IIT is an increasing function of the average market size of the trade partners in bilateral trade relations. The regression analysis seems to lend some support to the view of the sceptic who argues that at least a certain proportion of IIT is merely cross-hauling, border trade. This variable may be capturing the effects of Canada's border trade with the United States. The relative market size effects on IIT need to be investigated further.

6.3.5 Market Size Differential (DMSjk)

It is postulated that IIT is high if the difference in trade partners' market sizes is small, and low if the difference in sizes is big (see L&W (1980). MSjk=|GDPj-GDPk| is the proxy used here for market size differentials.

There appears to exist a negative relationship between IIT and DMSjk as expected. Tables 6.1 and 6.2 show that whenever the estimated coefficient on DMSjk is statistically significant at the 10 percent level it is also negative.

The coefficient estimates range between 0.01 and 0.22. These results are consistent with those of Loerstcher and Wolter (1980, p. 287). Their estimated coefficient on this variable is -0.146 and was statistically significant at the 1 percent level of significance.

The results, therefore, show that the variable DMSjk is also one of the important determinants of IIT and that Canada's intra-industry international trade is inversely related to the market size differential with her trade partner countries. It suggests that if the inequality of the market sizes of the bilateral trade partners is reduced, the share of IIT will tend to increase. This is true irrespective of the functional forms of the models used, as Tables 6.1 through 6.4 show.

6.3.6 Similarity of Market Size (ADS2)

One more variable was constructed in order to capture the market size effects of the bilateral trading partners. This variable is ADS2jk. It is the ratio of GDPj to GDPk, where j and k have their usual notation; and is a proxy measure for market size similarity between trade partner countries. Thus, $\delta IITjk/\delta ADS2jk > 0$ by hypothesis. Note that, like ADS1, this is a "new" variable, it has been constructed and used for the first time in this study.

A reasonable hypothesis for this variable is that IIT will be greater for a developed country such as Canada, the higher the GDP of the trading partner considered.

Tables 6.1 through 6.4 show that the variable (ADS2jk) is an important determinant of IIT. The coefficient on ADS2jk is positive, as expected, and statistically different from zero at the 5 percent significance level (e.g., equation 6 of Tables 6.1

and Table 6.3 and equations 9, 3 of Tables 6.3 and 6.4 respectively). It is interesting to note that, in this case, the concept of IIT used does matter. The variable performs well with the G-L adjusted measure (IITC) as compared to the two alternative measures. The coefficient ranges from 0.22 to 5.20.

6.3.7 The Distance Variable (DISTjk)

The distance variable has been used as a proxy measure for transaction costs. It is hypothesized that the lower the transaction (transport) costs between trading centers the higher will be the degree of IIT (i.e., $\delta ITT/\delta DIST < 0$).

In all regressions where the distance variable is included, the estimated coefficient on this variable appears with a negative sign as hypothesized (Tables 6.1 through 6.4). It is statistically significant at conventional levels in most of the equations in the tables.

In the linear models the coefficient is about -0.002. It ranges between -0.21 and -0.61 in the double log models whenever it is significant at conventional levels. The results of this study are consistent with those of Loertscher and Wolter (1980). Their coefficient on this variable has a negative sign and is significant at the 1 percent level.

6.3.8 <u>The Dummy Variables (LNG, CUL)</u>

It is postulated that if the bilateral trade partners share a common culture, language, and a common border, the intensity of IIT between them would tend to be higher (i.e., $\delta IIT/\delta CUL > 0$, $\delta IIT/\delta LNG > 0$).

The coefficients on the variables for culture and language group are generally positive as posited when they are significant at conventional levels in non-linear regressions (see equations 2, 3, 4, 6, 8, 10, and 11 of Table 6.4).

In linear models (Tables 6.1 and 6.2), the estimates for the language dummy are insignificant, while for cultural group they are significant at the 10 percent level only in one instance (equation 8 of Table 6.2). These findings are generally in agreement with the study by Loertscher and Wolter (1980). They may be important determinants of IIT, but their direction of effect appears to be unclear. The results suggest that not much emphasis should be placed on them. Economic agents probably desire more varieties of a certain good regardless of cultural and ethnic characteristics. Snob and band-wagon effects are found in most societies irrespective of the above attributes. In any case, culture and language, among other socio-political and institutional factors, do exert their influences in shaping and determining trade relations among countries. However, they may not be crucial determinants as compared to other economic forces in determining the strength and direction of intra-industry international trade.

In comparison to earlier studies on the determinants of intra-industry trade, the most striking results of our regression results shown in Tables 6.1 through 6.4, are the high proportion of the variation explained. Loertscher and Wolter (1980, p. 288) obtained an R^2 value of .147 in a cross country analysis. Havrylyshyn and Civan's (1983) regressions yielded adjusted R^2 values of .7704 to .7806, (unadjusted R^2 of .7855 to .7960), which is extremely high for both cross section data and also considered fairly high for time-series analysis. Our results appear to be between these two extreme cases.

The R^2s in this study appear to be fairly reasonable. It shows in some equations that over 50 percent variation of IIT is explained.

6.4 <u>Country-Specific Determinants of IIT Over Time: 1962-80</u>

In this section the results based on time series data are reported. Country-specific determinants of IIT are discussed for a sample of six countries. Thus, bilateral trade relationships between Canada and each one of her trade partners are investigated for the period 1962-80.

Tables 6.6 and 6.8 present results where the dependent variable is either IITB, IITC or IITQ. The list of independent variables here is similar to that of the preceding sections. The countries in the sample are the U.S., Japan, U.K., France, and India. Time and other constraints dictated the choice of only 6 out of 29 of Canada's trade partners in the sample.

TABLE 6.6

COUNTRY SPECIFIC DETERMINANTS OF INTRA-INDUSTRY TRADE (1962-1980) Time Series Results

CANADA-U.S.A.

Dependent Variables	CONSTANT	AMS^{+}_{jk}	DMS^{-}_{jk}	ALD^{+}_{jk}	$ADSD^{-}_{jk}$	$ADS1^{+}_{jk}$	$ADS2^{+}_{jk}$	R'	D.W
		Pre-determined Variables							
IIT^{B}_{1}	235.65 (3.83)*	-0.04 (-0.37)	0.005 (-0.07)	0.44 (1.76)	20.83 (2.02)	139.65 (2.92)	4.16 (0.45)	0.673	1.2934
IIT^{C}_{2}	213.15 (4.89)	0.009 (0.12)		-0.37 (-0.90)	-18.57 (-2.54)	118.33 (3.48)	3.83 (0.58)	0.698	1.8628
IIT^{Q}_{3}	224.99 (4.25)	-0.03 (-0.31)		0.52 (1.84)	-18.79 (-2.12)	129.69 (3.15)	2.59 (0.33)	0.685	1.3418
CANADA-JAPAN									
IIT^{B}_{4}	6.48 (0.88)	0.87 (1.42)	0.14 (0.48)	81.79 (3.57)	37.30 (4.20)	228.21 (1.38)	68.25 (1.88)	0.595	2.5267
IIT^{C}_{5}	43.98 (6.32)	0.53 (0.90)	-0.47 (-1.49)	6.58 (0.22)		123.79 (-0.74)	21.86 (0.58)	0.479	1.5003
IIT^{Q}_{6}	20.56 (0.38)	2.39 (0.55)		116.58 (2.64)	62.94 (3.69)	456.27 (1.44)	117.83 (4.70)	0.769	2.2674
CANADA-UNITED KINGDOM									
IIT^{B}_{7}	20.11 (1.65)	-2.61 (-0.90)	1.01 (0.81)	0.30 (0.04)	8.14 (1.47)	54.57 (1.07)	-15.38 (-0.95)	0.571	1.4180
IIT^{C}_{8}	35.44 (2.74)	-2.65 (-0.86)		1.64 (0.19)		40.93 (1.76)	-9.93 (-0.58)	0.174	1.8871
IIT^{Q}_{9}	33.87 (2.49)	0.09 (0.03)		28.93 (3.06)	7.63 (-1.24)	0.17 (0.32)	2.45 (0.13)	0.169	1.4669

* t-values in parentheses.

TABLE 6.7

COUNTRY SPECIFIC DETERMINANTS OF INTRA-INDUSTRY TRADE (1962-1980) Time Series Results

CANADA-WEST GERMANY

Dependent Variables	CONSTANT	+ AMS_{jk}	- DMS_{jk}	+ ALD_{jk}	- $ADSD_{jk}$	+ $ADS1_{jk}$	+ $ADS2_{jk}$	R^2	D.W
IIT^B_1	30.28 (1.02)	1.17 (0.29)	-0.62 (-0.08)	-5.43 (-0.28)	1.64 (0.57)	122.36 (1.35)	43.19 (1.47)	0.282	1.8794
IIT^C_2	19.76 (0.81)	0.16 (-0.32)		6.33 (0.40)		-83.47 (-1.13)	36.35 (1.52)	0.326	1.1476
IIT^Q_3	29.43 (1.50)	-0.58 (-0.26)		4.12 (0.33)	1.11 (0.59)	63.11 (1.67)	27.92 (1.46)	0.323	0.9503
CANADA-INDIA									
IIT^B_4	28.96 (-2.06)	-0.58 (-0.85)	-1.57 (-1.92)	1079.52 (1.66)	590.15 (1.75)	97.35 (0.25)	78.53 (2.35)	0.820	2.5235
IIT^C_5	49.02 (3.25)	-0.47 (-0.64)		409.51 (0.57)		39.58 (1.10)	-19.29 (-0.65)	0.396	2.2399
IIT^Q_6	22.25 (1.58)	10.95 (1.39)		511.50 (1.78)	-249.70 (-0.74)	633.33 (1.65)	-30.94 (-1.12)	0.473	2.1560
CANADA-FRANCE									
IIT^B_7	18.89 (0.51)	0.41 (0.32)	-0.22 (-0.66)	-9.94 (-0.24)	-0.20 (-0.45)	1.44 (0.26)	11,07 (0.54)	0.112	1.9815
IIT^C_8	30.56 (1.98)	0.27 (0.52)		-6.65 (-0.39)		1.76 (0.76)	5.99 (1.70)	0.342	1.5030
IIT^Q_9	26.48 (2.59)	0.13 (0.36)		1.49 (1.97)	-0.18 (-1.48)	1.48 (0.97)	6.57 (1.16)	0.206	2.3088

* t-values in parentheses.

TABLE 6.8

COUNTRY SPECIFIC CORRELATION MATRIX
(Canada-U.S.A.)

	IIT1	IIT2	IIT3	AMSJ	DMSJ	ADS1	ADS2	ADS3	ADS4	CU	LG
IIT1	1.00	0.9661	0.9898	0.5838	0.5828	0.4419	0.4053	-0.3141	0.0667	0.00	0.00
IIT2	0.9661	1.00	0.9736	0.5211	0.5196	0.3939	0.3216	-0.3828	0.0872	0.00	0.00
IIT3	0.9898	0.9736	1.00	0.5333	0.5309	0.3885	0.3387	-0.3679	0.0609	0.00	0.00
AMSJ	0.5837	0.5211	0.5333	1.00	0.9992	0.7671	0.8483	0.0026	0.1413	0.00	0.00
DMSJ	0.5828	0.5169	0.5309	0.9992	1.00	0.7615	0.8639	0.0295	0.1203	0.00	0.00
ALDJ	0.4419	0.3939	0.3885	0.7671	0.7615	1.00	0.5382	-0.2198	0.2178	0.00	0.00
ADSD	0.4053	0.3216	0.3884	0.7670	0.7615	0.5382	1.00	0.5092	-0.2154	0.00	0.00
ADS1	-0.3141	-0.3828	-0.3679	0.0026	0.0295	-0.2198	0.5092	1.00	-0.5108	0.00	0.00
ADS2	0.0666	0.0871	0.0608	0.1413	0.1203	0.2178	-0.2154	-0.5108	1.00	0.00	0.00
CUL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
LNG	0.00	0.00	0:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

6.4.1 Average Market Size (AMSjk)

As noted before, by hypothesis, $\delta IITjk/\delta AMSjk > 0$. Tables 6.6 and 6.7 show the coefficient estimate on the average market size variable (AMSjk) varies in sign throughout the 18 equations estimated. The highest "t" statistic is 1.42 (equation 4, Table 6.6). It is associated with the only significant estimate on AMSjk. Otherwise, coefficient estimates on AMSjk are insignificant at conventional levels. It appears that when the coefficient is statistically different from zero at conventional levels of significance, the estimate is positive, implying that there exists a positive relationship between intra-industry trade and average market size of the trade partner countries. The variation in sign aspect is similar to the results based on cross sectional data discussed before. However, no strong support is found for this variable in time series results.

6.4.2 Market Size Differentials (DMSDjk)

Here, it is hypothesized that $\delta IIT/\delta DMSD < 0$. As far as DMSjk is concerned, its coefficient estimate appears to be negative, as expected, whenever the coefficient is significant at conventional levels (equations 5 of Table 6.6 and equation 4 of Table 6.7). Again, these results on DMSjk based on time series data, in general, are consistent with those based on cross sectional data (Tables 6.1 and 6.2), as far as the direction of IIT flows is concerned.

6.4.3 Average Level of Development (ALDjk)

IIT is expected to vary directly with ALD, i.e., $\delta IIT/\delta ALD > 0$. The coefficient of the average level of development variable (ALDjk), is positive whenever the coefficient is significant at least at the 10 percent level. Note that in the case of Canada-India bilateral trade, the coefficient estimate on ALDjk is negative with a large t value in one case (equation 4, Table 6.7). One plausible explanation is the different attributes of these two countries in terms of capital-labor ratios and per capita incomes, beside other socio-political, institutional, religious and cultural factors.

6.4.4 Average Development Stage Differential (ADSDjk)

Tables 6.6 to 6.7 show that the coefficient on this variable is positive whenever the estimate is significant at the 5 percent or 1 percent levels (for example, in equations 1, 3, and 4 in Table 6.6 and equation 4 and 9 of Table 6.7). It can be noted that in the time series data, the coefficient associated with ADSD in general is positive, although it was expected to be negative. Likewise the estimate on ADS1jk, another proxy measure for the development stage differential, is negative whenever it is statistically different from zero at least at the 10 percent level, except in the case of India (see Table 6.7 equation 6). Probably this measure here is capturing income dispersion between trading partners rather than the development stage differential effect.

As far as ADS2jk is concerned, the coefficient estimate is positive whenever it is statistically significant at conventional levels. For predictive purposes, this variable may be employed in future research as it seems to perform better.

6.5 Determinants of IIT Across Industries: Empirical Results

The basic model used to test industry-specific hypotheses, as described in Chapter Three, is:

$$\left.\begin{array}{l} IITBi \\ IITCi \\ IITQi \end{array}\right\} = f\,(\overset{+}{PDi},\ \overset{+}{ESCi},\ \overset{+}{LAGGi},\ \overset{-}{KINi},\ \overset{+}{SARi},\ \overset{-}{NTWi},\ \overset{-}{ETWi},\ \overset{-}{NTPi},\ \overset{+}{WEi},\ \overset{+}{WSi}) \qquad (6.2)$$

where

IITBi = the value of intra-industry trade for industry i (i=1, ..., 29) (as estimated by the unadjusted G-L index).

IITCi = the value of intra-industry trade for industry i as computed by the G-L adjusted index.

IITQi = the value of intra-industry trade for industry i (for the same sample size), as calculated by the Aquino-adjusted index.

The hypothesized industry-specific determinants of IIT are:

PDi = product differentiation in industry group i.

SARi = Sales-Advertising Ratios.

ESCi = Economies of Scale in industry i.

LAGGi = Level of Aggregation in a given SITC industrial group.

KINi = Capital intensity in industry i.

NTWi = Nominal tariff rates in industrial group i (Wilkinson and Norrie's estimates).

NTPi = Nominal Tariff protection in industry i.

ETWi = Effective tariff rate in industrial group i (Wilkinson's estimates).

WEi = Wage/Employment ratio in industry i, (total wage costs divided by the number of employees).

WSi = Share of wage costs in value added in industry i.[8]

Canadian industry specific IIT is hypothesized to vary directly with PD, ESC, SAR, WE, and WS and inversely with LDAG, NTW, NTW, and NTP. Its relationship to KIN is a priori indeterminate. (See hypotheses 5 through 9 in Section 5.2 of Chapter Five).

Tables 6.9 and 6.10 present the regression results.

6.5.1 Product Differentiation (PDi)

According to modern trade theory, intra-industry trade is an increasing function of product differentiation in an industrial group. The concept of product differentiation and its measurement (as discussed earlier), itself is a debatable issue. Since there is no precise and direct measure of product differentiation, two alternative proxy variables have been employed: PDi and SARi. First, the Hufbauer (1970) proxy measure (PDi) was calculated for each SITC group of Canadian corresponding SIC classes and then used as an explanatory

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[8] The construction of these variables is explained in Chapter Five.

TABLE 6.9(a)

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS INDUSTRIES (LINEAR MODELS) (1980)
CROSS SECTION -- INDUSTRY Case 1 (n=16)

Dependent Variables	CONSTANT	+ $P.D_1$	+ SAR_1	+ KIN_1	- $LDAG_1$	- TNP_1	- ETW_1	- NTW_1	+ ESC_1	R^2
IIT_B										
1	-80.39 (-0.63)*	0.18 (1.75)		0.24 (0.91)	-0.07 (-0.05)	-1,71 (-0.65)	-1.07 (-0.88)		4.60 (0.96)	0.436
2	46.53 (1.00)		-3.03 (-0.73)	0.09 (0.43)	-0.80 (-0.80)		0.34 (0.25)	-2.35 (-1.38)	1.15 (0.48)	0.428
3	9.65 (0.12)	0.089 (1.91)			-0.87 (-1.04)	-0.39 (-0.18)			1.25 (0.40)	0.260
IIT_C										
4	51.79 (0.70)	0.053 (0.64)		0.14 (0.90)	0.65 (0.92)	-0.78 (-0.51)	-1.11 (-1.56)		1.3 (0.40)	0.406
5	92.50 (3.91)		1.21 (0.57)	0.04 (0.42)	0.38 (0.75)		-1.48 (-2.12)	-1.39 (-1.61)	-0.80 (-0.66)	0.175
6	107.97 (2.13)	0.17 (0.01)			0.02 (0.04)	-0.12 (-0.09)			-1.15 (-0.57)	0.116
IIT_Q										
7	92.75 (1.06)	0.03 (0.30)		0.01 (0.05)	-0.51 (-0,61)	-0.54 (-0.30)	-0.21 (-0.25)		-0.43 (-0.13)	0.244
8	77.01 (6.24)		-4.77 (-4.32)	0.12 (2.31)	-0.57 (-2.16)		-1.48 (-4.07)	-1.45 (-3.24)	-0.22 (-0.34)	0.377
9	97.75 (1.96)	0.03 (1.55)			-0.60 (-1.12)	-0.64 (-0.48)			-0.68 (-0.34)	0.233

* t-values in parentheses.

TABLE 6.9(b)

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS INDUSTRIES CROSS SECTION (LINEAR MODELS) (1980) Case 2 (n=18)

Dependent Variables		Pre-determined Variables						
		+	+	-	-	-	-	
IIT_B	CONSTANT	PD	ESC	LDAG	KIN	SAR	NTW	R^2
1	-29.36 (-0.78)*	0.12 (1.72)	3.05 (1.57)	-0.41 (-0.53)	0.14 (0.92)		-0.49 (-0.54)	0.132
2	9.73 (0.28)		1.78 (0.89)	-0.73 (-0.84)	0.11 (0.63)	-1.04 (-0.82)	-0.15 (-0.14)	0.024
3	28.82 (1.83)	0.08 (1.70)		-0.84 (-1.22)			-0.09 (-0.11)	0.042
IIT_C								
5	105.61 (6.78)	0.11 (1.69)	1.62 (1.72)	-0.16 (-0.41)		2.10 (1.49)	0.69 (1.65)	0.241
6	106.79 (6.21)		1.15 (1.24)	0.02 (0.04)	0.06 (0.70)	2.49 (1.57)		0.149
IIT_Q								
7	68.96 (6.60)	-0.02 (-0.40)	0.59 (1.62)	-0.77 (-1.85)	0.02 (0.19)		-0.96 (-1.92)	0.321
8	0.35 (0.33)			-0.77 (-1.70)	-1.37 (-0.81)		-0.93 (-1.73)	0.381
9	62.95 (3.32)		0.39 (0.35)	-0.81 (-1.68)	0.03 (0.36)	-0.46 (-0.83)	-0.93 (-1.68)	0.204

* t-values in parentheses.

TABLE 6.9(c)

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS INDUSTRIES (NON-LINEAR MODELS) (1980) CROSS SECTION: INDUSTRY Case 2 (n=18)

Dependent Variables		Pre-determined Variables						
		+	+	-	-	-	+	
IIT_B	CONSTANT	LPD	LESC	LLDAG	LKIN	LNTW	LSAR	R^2
1	-5.18 (-1.70)*	0.839 (2.95)	0.933 (1.72)	-0.367 (-1.35)	0.441 (1.83)	0.528 (1.73)		0.029
2	0.52 (0.16)		0.33 (0.32)	-0.31 (-0.83)	0.31 (0.98)	0.53 (1.54)	-0.03 (-0.14)	0.259
3	-3.42 (-1.09)	0.74 (2.44)	0.93 (1.08)	-0.21 (-0.76)		0.48 (1.49)		0.108
IIT_C								
4	5.59 (9.32)	0.282 (-0.19)	-0.376 (-2.39)	-0.841 (-1.78)	-0.035 (-0.77)	0.124 (2.44)		0.039
5	5.33 (12.53)		-0.03 (-2.39)	-0.84 (-1.67)		0.12 (2.44)	0.04 (1.33)	0.536
6	5.33 (10.39)		0.38 (1.66)	-0.11 (-1.04)		0.12 (1.532)		0.325
IIT_Q								
7	4.01 (6.01)	-0.145 (-1.18)	0.055 (0.24)	-0.153 (-1.93)	0.015 (0.22)	0.14 (1.92)	-0.053 (1.78)	0.139
8	4.37 (11.80)	-0.04 (-0.51)		-0.13 (-2.02)		0.13 (1.91)		0.359
9	4.05 (6.53)		0.06 (0.27)	-0.15 (-2.02)		0.14 (1.98)	-0.05 (-1.24)	0.426
10	5.46 (11.30)	0.15 (2.31)		-0.12 (-2.01)		-0.11 (-1.74)		0.365

* t-values in parentheses.

TABLE 6.9(d)

DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS INDUSTRIES (LINEAR MODELS) (1980) CROSS SECTION: INDUSTRY Case 3 (n=29)

Dependent Variables	CONSTANT	+ PD_i	+ ESC_i	+ $LDAG_i$	+ KIN_i	- WS_i	- WE_i	- TNP_i	R^2
IIT_B									
1	9.22 (0.21)*	0.09 (1.78)	1.32 (0.52)	-0.53 (-0.96)	0.13 (0.58)	-0.05 (-0.09)	-0.01 (-0.12)	0.20 (0.37)	0.149
2	10.16 (0.23)	0.08 (1.72)	1.26 (6.87)	-0.58 (-1.13)		-0.08 (-0.16)		0.34 (0.83)	0.136
3	5.84 (0.15)	0.08 (1.49)	1.44 (1.77)	-0.59 (-1.14)			-0.003 (-0.05)	0.33 (0.76)	0.136
IIT_C									
4	142.08 (4.32)	-0.01 (-0.17)	-0.21 (-0.12)	-0.34 (-0.90)	0.09 (0.55)	-0.17 (-0.43)	-0.06 (-1.02)	-0.08 (-0.23)	0.098
5	132.35 (4.33)	-0.03 (-0.76)	-1.55 (-1.52)	-0.30 (-0.62)		-0.38 (-1.11)		0.13 (0.44)	0.024
6	133.37 (4.93)	0.01 (1.79)	-0.41 (-0.19)	0.06 (1.13)			-0.06 (-1.37)	-0.02 (-0.05)	0.076
IIT_Q									
7	121.06 (4.21)	0.09 (2.29)	-0.94 (-0.62)	-0.76 (-2.28)	-0.09 (-0.64)	-0.44 (-1.23)	0.005 (0.11)	0.34 (1.05)	0.315
8	120.65 (4.58)	0.08 (2.47)	-0.93 (-1.06)	-0.72 (-2.33)		-0.42 (-1.42)		0.24 (0.97)	0.209
9	103.64 (4.25)	0.06 (1.90)	0.26 (0.23)	-0.26 (-2.44)			-0.03 (-0.74)	0.17 (0.63)	0.258

* t-values in parentheses.

TABLE 6.9(e)

**DETERMINANTS OF INTRA-INDUSTRY TRADE ACROSS INDUSTRIES (NON-LINEAR MODELS) (1980)
CROSS SECTION: INDUSTRY Case 3 (n=29)**

Dependent Variables		Pre-determined Variables							
		+	+	-	+	+	-	-	
IIT_B	CONSTANT	LPD_i	$LESC_i$	$LLDAG_i$	$LKIN_i$	LWS_i	LWE_i	$LTNP_i$	R^2
1	14.85 (1.36)*	1.094 (3.46)	2.455 (1.91)	-0.499 (-1.84)	-0.121 (-0.19)	-3.385 (-0.21)	-3.46 (-1.62)	-0.035 (-0.12)	0.244
2	-1.98 (-0.59)	0.91 (3.08)	0.75 (1.84)	-0.49 (-1.87)	-0.12 (-0.30)	0.11 (0.39)			0.325
3	14.92 (1.46)	1.08 (3.82)	2.41 (2.11)	-0.49 (-1.99)		-3.39 (-1.77)		-0.03 (-0.09)	0.404
IIT_C									
4	6.23 (2.26)	-0.079 (-1.00)	-0.256 (-0.71)	-0.056 (-0.71)	0.024 (0.73)	-0.097 (-0.93)	-0.077 (-0.14)	-0.032 (-0.34)	0.014
5	5.87 (7.23)	-0.68 (-1.11)	-0.26 (-1.49)	-0.06 (-0.90)		-0.10 (-1.01)		0.03 (0.45)	0.221
6	5.53 (2.17)	0.17 (2.33)	-0.24 (-0.79)	-0.10 (-1.69)	0.01 (0.43)	-0.12 (-1.21)	0.11 (0.23)	-0.01 (-0.08)	0.439
IIT_Q									
7	6.09 (2.48)	0.145 (2.51)	-0.240 (-1.71)	-0.114 (-1.91)	-0.105 (-1.23)	-0.118 (-1.41)	0.114 (-0.26)	-0.020 (-1.11)	0.425
8	5.46 (11.30)	0.15 (2.31)		-0.11 (-2.01)		-0.10 (-1.12)		0.02 (0.34)	0.403

* t-values in parentheses.

TABLE 6.10(a)

CORRELATION MATRIX -- INDUSTRY 1 (1980 data base)

	IIT1	IIT2	IIT3	PD	SAR	KIN	LAGG	TNP	ETW	NTW	ESC
IIT1	1.00	-0.3300	0.3066	0.2953	-0.0115	0.0282	-0.4757	-0.2975	-0.2783	-0.4530	0.2641
IIT2	-0.333	1.00	0.1404	0.0992	0.2870	0.0836	0.1830	0.2120	-0.4119	-0.0044	-0.3390
IIT3	0.3066	0.1404	1.00	-0.1039	-0.4200	0.1135	-0.4389	-0.2644	-0.2331	0.2659	0.2647
PD	0.2953	0.0992	-0.1039	1.00	-0.0970	-0.3261	-0.0427	0.2022	-0.0933	-0.3373	-0.2577
SAR	-0.0115	0.2870	-0.4200	-0.0970	1.00	0.3165	-0.2022	0.0659	-0.3058	-0.2991	-0.1093
KIN	0.0282	0.0836	0.1135	-0.3261	0.3165	1.00	0.1240	0.1076	0.2600	0.1438	-0.2037
LAG	-0.4757	0.1830	-0.4389	-0.0427	0.2296	-0.1240	1.00	0.4251	0.2997	0.1482	-0.5107
TNP	-0.2975	0.2129	-0.2944	-0.2022	0.0659	0.1076	0.4251	1.00	0.1023	-0.0816	-0.6974
ETW	-0.2783	-0.4119	-0.2331	-0.0933	0.3058	0.2600	0.2997	0.1023	1.00	0.6729	0.0072
NTW	0.4530	-0.0044	0.2659	-0.3373	0.2991	0.1438	0.1482	0.0816	0.6729	1.00	0.1915
ESC	0.2641	-0.3390	0.2647	-0.2577	0.1093	0.2037	0.5107	0.6974	0.0072	0.1915	1.00

TABLE 6.10(b)

CORRELATION MATRIX -- INDUSTRY 2 (1980 data base)

	IIT1	IIT2	IIT3	PD	VA	LAG	KIN	SAR	NTW
IIT1	1.00	-0.024	0.543	0.284	0.323	-0.309	0.059	0.035	0.034
IIT2	-0.024	1.00	0.328	0.226	-0.239	-0.006	-0.090	0.334	0.237
IIT3	0.543	0.328	1.00	-0.056	0.378	-0.403	-0.065	0.003	0.417
PD	0.284	0.226	0.056	1.00	-0.274	-0.046	-0.121	0.111	0.044
VA	0.323	-0.329	0.378	-0.274	1.00	-0.408	-0.190	0.165	0.356
LAG	-0.409	-0.006	-0.403	-0.046	-0.407	1.00	0.224	-0.284	0.019
KIN	0.059	-0.690	-0.065	-0.121	-0.190	0.224	1.00	0.049	-0.054
SAR	0.035	0.334	-0.003	-0.111	0.165	-0.284	0.049	1.00	0.116
NTW	0.054	0.237	0.417	0.044	0.356	0.019	-0.054	0.116	1.00

TABLE 6.11

STYLIZED SUMMARY: SELECTED ECONOMETRIC STUDIES OF INTRA-INDUSTRY TRADE

Studies Industry Cross-Section	(+) ALD_{jk}	(-) $ADSD_{jk}$	(+) AMS_{jk}	(+) DMS_{jk}	(+) ESC_{i}	(+) PD_{i}	(-) MNE	(-) TNP_{i}	(+) LWS_{i}	MAX R^2
Pagoulatos & Sorensen (U.S. total)	---	YES	---	---	NO	YES	YES	---	---	.40
Finger & De Rosa (U.S. bilateral)	---	---	---	NO	NO	---	---	---	---	.19
Caves (OECD 13 bilateral)	---	---	---	NO	NO	YES	YES	NO	---	.27 (log)
Toh (U.S. manufacturing 1970, 1971)	---	---	---	---	YES	YES	YES	YES	YES	.331 .301
Lundberg (Sweden, 1970 1977, manufacturing)	YES	YES	---	---	YES	NO	---	---	(?)	.321 .253
Gavelin and Lundberg (Sweden total)	---	---	---	YES	YES	---	---	---	---	.34
Cross-Country										
Loertscher & Wolter (OECD 13 bilateral & cross-industry)	NO	YES	YES	NO	NO	---	NO	YES	---	.15
Havrylyshyn & Civan (62 countries, total)	YES	---	YES	---	YES(?)	---	---	YES	---	.78
Bano (Canada cross country, 27 bilateral, cross industry & time series)	YES	YES(?)	YES	(?)	YES	YES	---	(?)	NO	.618 (log) .790 .820

N.B. The specifications as well as the econometric procedures are not strictly speaking comparable; this should be taken as an indicative, stylized, summary. Expected signs are shown for each *type* of independent variable. Results are represented as significant tests supporting the expectation (YES), or as insignificant results or opposite signs as NO. Overall fit is indicated by the maximum R^2 in any equation.

variable. As Table 6.9 shows, the coefficient associated with the PDi is positive and is about 0.12. It is significant at the 5 percent level in four cases shown in the Tables.

Second, it is posited that the high costs for sales promotion indicate product differentiation. Therefore, sales to advertisement ratios (SARi) were employed as another proxy measure for product differentiation. As Table 6.9(a) and (b) show, the estimate on SARi is negative in a number of cases. However, if the coefficient estimate is statistically significant at the 10 percent level, it tends to be positive. Hence, the evidence appears to suggest that there exists a positive relationship between SARi and IIT, although there is no strong support for this variable.

These results are consistent with those of other studies as far as direction is concerned. Loertscher and Wolter (1980), found the coefficient positive but statistically insignificant at conventional levels. Likewise, Pagoulatos and Sorensen (1975) obtained the same results concerning sign and significance of this variable. Results from this study, however, show that the coefficient is positive and significant at the conventional levels in a few cases. Hufbauer's (1970) proxy measure seems to perform better.

As far as the SARi variable is concerned, our results are consistent with those of Lundberg (1982). The estimated coefficient for SARi was negative in Lundberg's (1982) study. In our case, also in most cases the estimated coefficient on this variable is negative.

6.5.2 Tariff Variables (NPTi, NTWi, ETWi)

It is hypothesized that the degree of IIT is a decreasing function of tariff protection (any kind of trade restrictions) i.e., $\delta IITi/\delta TNPi < 0$, $\delta IITi/\delta NTWi < 0$, and $\delta IITi/\delta ETWi < 0$.

Tables 6.9(a) through 6.9(b) show the following. First, the estimates on NTPi are negative as expected. But they are statistically insignificant at conventional levels (especially in case-1 Table 6.9(a)). Second, the estimate on NTWi is negative as expected and significant at conventional levels, especially in equations 5 through 9 of Tables 6.9(a) and 6.9(b), but changes in the signs of coefficients are also observed. For instance, the coefficient is positive and significant at the 10 percent level in equation 5 of Table 6.9(b). Third, in the non-linear models the coefficients on the variable NTWi are consistently positive regardless of the IIT indices used and the combination of variables employed as tables 6.9(c) show. Fourth, the estimates on ETWi are negative as expected except in one case (equation 2 of Table 6.9(a)). Fifth, Tables 6.9(d) and 6.9(e) show that the estimates for NTPi change sign across equations regardless of the functional forms of the models used. Sixth, "t" values are consistently low showing a weak relationship between IIT and nominal tariffs. These results are consistent with those of Bergstrand (1982),[9] Toh (1982), and Messerlin and Becuwe (1984). Toh's (1982) findings showed that the estimates on tariff variables were not statistically significant at conventional levels (in all the different sets of equations used, p. 293).

It has been noted that the hypothesis concerning the relationship between IIT and tariff protection is straight-forward as far as cross country comparison is concerned. Empirical evidence has shown that intra-industry trade pattern had emerged and flourished due to trade liberalization. In fact, the explanation of the phenomenon of IIT became of major concern when economists investigated the consequences of trade liberalization coupled with economic integration in Europe. However, in terms of industrial categories, there does not seem to exist a strong relationship between the level of IIT and protection. Tariffs reduce both exports and imports of differentiated products. There is no method of determining in advance how the bilateral trade ratios might be affected commodity by commodity.

Caves' (1981) noted that trade controls might in fact not be the important factor in explaining variations in intra-industry trade. Rather, the phenomenon heavily depends on the

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[9] The positive signs on the NTPi estimates are consistent with Bergstrand's (1982) observation about the intra-industry trade for "sake" between United States and Japan. He pointed out that despite stiff tariff duties imposed by one country on import of "sake" from the other, IIT takes place between them (Bergstrand, p. 45).

structure of product markets and the behavior of the firms.

6.5.3 The Share of Wage Costs (WSi) and Average Wage (WEi)

It is postulated that the degree of IIT is positively related to labors' share (WSi) and the average wage (WEi) in an industry i (i.e., $\delta IITi/\delta WSi > 0$ and $\delta IITi/\delta WEi > 0$).

It is argued that the growth of firm-specific knowledge in an industry might be positively related to the stock of general technical knowledge embodied in the labor force, i.e., human capital. Following Lundberg (1982), average wage (WE) in an industry is employed as a proxy measure for human capital. This is based on the assumption that wages above a minimum wage rate reflect returns to human capital and that the rate of return to human capital is the same in all sectors. WS is used as a measure of productivty in the relevant industry.

Thus, the higher WE and WS in an industry, the higher would be the magnitude of IIT. The results of this study do not support the above hypotheses, as Tables 6.9(d) and 6.9(e) show. Average wage (WE) has negative coefficients which are statistically insignificant at conventional levels (except in equation 1 of Table 6.9(d)). These results are contrary to those of Lundberg (1982). Labor's share (SW) and average wage (AW) have positive coefficients of varying degrees of significance in his findings. A plausible reason for contrary results in this study is that these variables may not be true measures of human capital in the Canadian context.

6.5.4 The Levels of Disaggregation (LDAGi)

It is postulated that intra-industry trade is a decreasing function of the level of disaggregation, i.e., $\delta IITi/\delta LDAGi < 0$. The estimate on LDAGi is negative in many cases, but the sign changes across equations, as shown in Tables 6.9(a) and 6.9(b). The coefficient is statistically different from zero in equations 7 through 9 of Table 6.9(b). The coefficient is approximately 0.8 whenever it is significant.

The results indicate that some of the share of IIT is caused by the level of aggregation in SITC industrial groups. However, the evidence is not strong on this point, and the result should be taken as suggestive.

6.5.5 Capital Intensity (KINi)

By hypothesis, $\delta IITi/\delta KINi < 0$. The coefficient estimate on this explanatory variable is positive in most of the cases as shown in Table 6.9. However, it is never statistically different from zero at conventional levels. This evidence suggests that, in fact, factor intensity is not an important determinant of IIT.

6.6 Stylized Summary of Some Empirical Findings

In a cross industry analysis, Pagoulatos and Sorensens' (1978) findings showed R^2 values of .36 to .40, Finger and De Rosa's (1979) about .015 to .186 and Caves' (1981) about .27 to .29. Toh's (1982) study yielded different values for different sets of variables for the years 1970 and 1971. These values ranged between .203 to .331. Lundberg (1982) obtained R^2 values ranging from .185 to .321 for different sets of equations. A stylized summary of these findings is presented in Table 6.11.

The matrix of simple correlations (Table 6.10) indicates that multicollinearity was not a problem in the data used. In order to test for the presence of heteroskedasticity, Park-Glejser tests were performed for a few equations for both cross country and cross industry analyses, which was not confirmed.

6.7 Elasticity Estimates

An analysis of elasticity estimates consistent with the estimated models of Talbes 6.1 through 6.4 and 6.9(a) through 6.9(e) (Tables A.6.12(a,b) through A.6.14(a,b)) suggest that the level of development (ALDjk), the size of the market (AMSjk), the similarity of the market size (ADS2) (based on cross country linear estimates) have the greatest positive impact on IIT. In addition G-L adjusted measure is more sensitive to the level of development than the G-L unadjusted and Aquino adjusted measures. Elasticity estimates (based on cross industry analysis) show that product differentiation (PDi) and economies of scale (ESCi) have the greatest positive impact on IIT (in particular IITB is more sensitive with respect to PDi and ESCi). Level of the tariff protection, human capital element exert a negative impact on IIT.

6.8 Summary of Findings

Our empirical results reveal a few interesting observations. First, intra-industry trade is a real phenomenon. The evidence show that intra-industry trade is influenced by a number of factors both among countries and across industries. Thus, IIT is not merely an arbitrary consequence of "categorical aggregation" of products of different industries within the same SITC classifications.

Second, the distance between Canada and her trading partners does matter in terms of transport cost in determining the share of IIT.

Third, in a cross section comparison, the analysis suggests that intra-industry trade intensity across countries is a decreasing function of the absolute differences in bilateral incomes per capita.

Fourth, in a time series comparison, the share of IIT in Canada's total foreign trade is negatively related to the differences of the country's per capita incomes.

Fifth, the analysis suggests that the intensity of IIT increases with the increasing average market size and decreasing market size differentials of the trading partners. However, no strong support is found for the "average market size."

Sixth, the evidence shows that the intensity of IIT is greatly influenced by average level of development of Canada and her trade partners. The evidence also suggests that the level of development has become more important over time.

Seventh, across industries, product differentiation, and economies of scale appear to be important determinants of IIT. No strong support was found for factor intensity, human capital element, productivity, tariffs, and the level of aggregation.

Finally, the elasticity estimates lend further support to the above evidence.

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

The phenomenon of intra-industry international trade, has received increasing academic attention, in the form of both theoretical and empirical work. The attention is warranted at least for three main reasons. First, on theoretical ground the traditional factor proportions theory has been found inadequate in explaining a substantial amount of modern trade flows among countries. Second, on empirical ground various non-factor proportions influences have been identified as the determinants of intra-industry trade. Third, from a trade policy standpoint it has been recognized that adjustment to trade expansion would be easier for a country if trade takes the pattern of intra-industry trade.

There have been many attempts at measuring the extent of intra-industry trade of a customs union, particularly of the European Economic Community (EEC), the Free Trade Areas and the OECD countries. Studies have also been done on less developed and centrally planned economies. In addition, during the last few years the economic analysis of intra-industry trade has gone beyond the measurement and methodological issues. Several contributions in the trade literature have extended our knowledge of the determinants of the commodity composition of trade between countries. However, no detailed investigation has previously been conducted in the context of the Canadian economy. This thesis, therefore, is an attempt to fill this lacuna.

The purpose of this thesis has been to measure the extent of intra-industry trade in Canada's total foreign trade, to analyse the nature of the factors which influence the intra-industry trade pattern of Canada and to test various country-specific and industry-specific hypotheses concerning intra-industry trade. The measurement has been performed from a number of perspectives. First, the intensity of intra-industry trade has been identified at different levels of aggregation. The object of this analysis has been to gain some insights concerning the debate on the issue of the problem of "categorical aggregation," i.e., whether intra trade is a real phenomenon or a "statistical artifact." For this analysis the Grubel and Lloyd index (equation 3.6) has been computed at different levels of aggregation for all SITC classes in relation to Canada's 29 trading partners. Second, the magnitude of Canada's intra-industry trade has been computed across countries. For cross country analysis different alternative measures have been applied in relation to each specific trading partner for a few selected years. The main purpose of this analysis has been to identify the strength and distribution of intra-industry trade between Canada and her various trade partner countries, and also to examine the performance of various indices in the presence or absence of trade imbalances between trading partners. Third, the level of intra-industry trade has been identified across industries at the 2-digit and 3-digit divisions for the entire population of industries for the years 1962, 1966, 1971, 1976, and 1980. The purpose of this analysis has been to identify the intensity of intra-industry trade in each industry in order to gain some insights into the characteristics of these trade flows with regard to their input requirements. Finally, the trends in Canada's intra-industry trade through time has been examined. The temporal analysis has been done as follows: (a) in relation to the World as a whole; (b) in relation to 29 countries; and (c) in relation to all SITC industrial groups. The purpose here has been to investigate the level of and trends in intra-industry trade through time.

To accomplish this purpose four indices of intra-industry trade have been computed. They are: (a) the Grubel and Lloyd index for the level of aggregation; (b) the Grubel and Lloyd unadjusted index; (c) the Grubel and Lloyd adjusted index; and (d) the Aquino adjusted index.

Chapter Three of this thesis provided an analysis of the existing techniques of the measurement of intra-industry trade. The analysis of various alternative measures of intra-industry trade indicated that the Grubel and Lloyd (1975) measures have some advantages over the other indices with respect to: (a) the concept of an "industry" at an appropriate level of aggregation; (b) the analysis of the bias arising from trade imbalances and (c) the formulation and testing of hypotheses concerning the phenomenon of intra-industry trade.

The link between trade theories and the phenomenon of intra-industry trade was discussed in Chapter Two. An interesting aspect of the explanation of intra-industry trade is that empirical studies have preceded theoretical development. It was noted that there has been a substantial debate on the economic analysis of intra-industry trade, with inconclusive results. The question as to whether the emergence of intra-industry trade implies a search for a new theory, or whether the existing theories are sufficient to explain modern trade flows among nations seems to be unsettled.

The majority of economists however, argue that the levels of and trends in intra-industry trade do not imply the need for a new theory to explain why nations trade in similar products. Indeed, an extended version of the factors proportions theory is capable of explaining this phenomenon. Various underlying assumptions of the H-O-S theorem have been relaxed. Factors such as product differentiation, economies of scale, transport costs, the size of the markets, the level of development and the level of trade barriers have been incorporated in the H-O-S theorem in order to accommodate the existence of this phenomenon. The rationale probably is that a good theory is useful for purposes other than predictions, such as serving as "filing system" in which we can store our observed knowledge.

The major findings of the empirical estimations of intra-industry trade indices in Chapter Four are summarized as follows.

Intra-Industry Trade at Different Levels of Aggregation

The analysis of the magnitude of intra-industry trade as a function of aggregation levels, reveals a number of interesting observations: (a) that the values of intra-industry trade indices tend to decrease as the number of digits increase for almost all the trading partners and in all commodity groups; (b) that measured intra-industry trade rises rapidly as the degree of aggregation increases, reaching 78.85 percent at the 1-digit level, 58.47 percent at the 2-digit level, 45.12 percent at the 3-digit level, 27.22 percent at the 4-digit level, and 15.39 percent at the 5-digit level in SITC 6 in trade with the U.S.A.; (c) examples do occur of values of the indices increasing as the number of digits increase. For instance, SITC 1, 2, 7, and 8 with different countries. In these cases, 2 and 3-digit estimates are greater than the 1-digit values; (d) moderately high levels of intra-industry trade exist at all levels of aggregation in all commodity groups, particularly in trade with the U.S.A., the Netherlands, Denmark, Finland, Norway, Switzerland, and France; (e) in SITC 5 values over 90 and less than 3 percent are found at the 1-digit level. These values are strikingly high with developed trading partners such as the U.S.A. (80.06), the United Kingdom (78.10), Belgium-Luxembourg (78.08), Italy (85.03), Japan (60.52), Australia (80.73), Norway (99.47), and Portugal (98.97). At the 3-digit level, values range from 42.86 (Netherlands), to 1.42 (Turkey). High magnitudes are found at the 4-digit level in trade with the United Kingdom, Belgium-Luxembourg, France, the Netherlands, Sweden, Spain, and the U.S.A. At the 5-digit level, values of 18.33 and 7.16 percent are found for different countries; (f) that high values are found at all levels of aggregation in SITC 0 through 4, a finding which appears at first glance, surprising and interesting. A closer look at these findings suggest that intra-industry trade does not emerge simply from aggregation. Some exaggeration of the importance of intra-industry trade obviously exists at high levels of aggregation, yet intra-industry trade retains its status as a real phenomenon at low levels of aggregation. These findings, thus, lend support to the hypothesis that intra-industry trade cannot be exlained away in terms of statistical illusion. Intra-industry trade is apparently a real phenomenon, potentially influenced by various economic and other forces, rather than a mere statistical artifact.

Intra-Industry Trade by Country, by Industry, and Through Time

Cross country analysis reveals the following: first, that Canada's share of intra-industry trade is remarkably high in trade with developed countries in particular with the U.S.A., the EEC, and the OECD countries. Second, intra-industry trade in Canada has developed with the less developed countries (LDCs), particulary with those countries which are specialized in manufactured and semi-manufactured goods, such as India, Hong

Kong, New Zealand, Singapore, and the Philippines. Low values are found in trade with rich oil exporting countries, e.g., Kuwait and Venezuela. Third, the differences in intra-industry trade values among trading partners are quite pronounced for different commodity groups. For instance, the values range from 0 (with Kuwait), 5.78 (with Ireland), to 50.16 (with the U.S.A.), SITC 0 in 1980 (G-L unadjusted index).

A closer examination of the intra-industry trade pattern of indices revealed asimilar pattern as has been found for a number of other developed market economies with some additional striking results. Across industry results show a wide variation in the intensity of intra-industry trade among industries. These estimates range from high values of 88.23 percent for inorganic chemicals (SITC 513) to virtually zero for non-alcoholic beverages (SITC 111). Within SITC 5, 6, and 7, wide variations in the distribution of intra-industry trade is observed. Organic and inorganic chemicals groups 512, 513, 514, demonstrate high values while several others, such as 521, 531, and 523, show relatively low values. Industrial groups falling under SITC 6 and 7 show high values of intra-industry trade particularly in SITC 611 (leather), 612 (manufacture of leather), 613 (fur skins), 642 (articles of paper), 6 (pulp board), 693 (wire products), and 674 (universal plate and sheets of iron and steel). SITC 7 stands out with the largest share of intra-industry trade.

Fourth, temporal analysis indicates that a substantial growth in intra-industry trade has taken place over the years 1962-1980, both across countries and across industries, but cyclical variations are also noticeable in almost all the industrial sectors of the economy. The highest growth has occurred in SITC 7 (machinery and equipment). In addition intra-industry trade indensity has tended to decline through time in trade with a few countries. For instance, between 1962-1975, the share of Canada's intra-industry trade with the rest of the world increased by 20.5 percent (G-L unadjusted index), while between 1979-1980, intra-industry trade fell by 13.42 percent with the rest of the world. The share of intra-industry trade with the U.S.A. grew by 35.45 percent between 1962-1969, reached at the highest 37.15 percent in 1978, with a slight fall in 1979-1980. It is also striking that in the cases of India, Hong Kong, and Ireland the share of intra-industry trade declined over the relevant years. As far as the growth across countries is concerned, in 1962 out of 29 trading partners, 15 demonstrated intra-industry trade values above 30 percent, 7 at 40 percent or higher, and 4 above 50 percent. In 1970 many countries showed 60 percent and larger values. From 1970-1980 cyclical variations are observable.

This analysis indicates that the trends in intra-industry trade are indeterminante as figures 4.4.3 through 4.4.8 and 4.5.1 through 4.5.10 demonstrate. These findings suggest that growth in intra-industry trade depends upon the rate of growth of per capita income among trading partners. Its growth is also determined by domestic and foreign demand and supply conditions along with the international environment at different points in time. There does not seem to be an a priori ground to assume that the growth in such trade pattern will take place simply as a result of the progress of time. Furthermore, income per capita does matter but income per capita is not the only factor that matters. An interesting observation is that Kuwait's per capita income is very high, but its intra-industry trade is virtually zero. On the other hand, South Korea's per capita income is low and her domestic market is small, but her international trade is prone to an intra-industry trade pattern.

Product Differentiation Coefficients

The estimations of product differentiation coefficients by employing Hufbauer's proxy measure were also performed. These results (as reported in Appendix Table A.2.1) suggest that product differentiation in Canada's industrial sectors is reasonably high. High values were obtained in many SITC 4 divisions -- such as 001 (Live Animals), 012 (Meat, dried, salted, and smoked), 011 (Meat, fresh, chilled, or forzen), 032 (Fish in airtight containers), 047 (Meal, Flour, and Cereals), 071 (Coffee). These coefficients are larger in SITC 5, 6, 7, and 8. SITC 7 (Machinery and Transport Equipment) stands out with larger coefficients particularly in SITC 732 (Road Motor Vehicles), 729 (Electric Machinery and Apparatus), 754

(Aircraft) 735 (Ships and Boats), 724 (Telecommunication Apparatus), and 894 (Toys, Games, and Sporting Goods). These findings also suggest that product differentiation across industries has grown over time. Cyclical variations in certain inustries are observed suggesting that some industries have responded to domestic and international environment.

The econometric results of Chapter Six reveal a few interesting observations. First, the cross country analysis suggests that the level of development is an important determinant in intra-industry trade. The evidence also suggests that the level of development has become more important over time in shaping Canada's intra-industry trade. An analysis of elasticity estimates (reported in Appendix A.2.1) lends further support to the main hypothesis that the level of development, the size of the market, and the similarity of market sizes have the greatest positive impact on intra-industry trade. Second, the geographical distance between Canada and her trading partners turned out to be an important determinant of intra-industry trade. In addition, elasticity estimates show that the distance between trading partners exerts a greater negative impact on intra-industry trade than the market size differential. This implies that transport cost, in fact, is one of the main determinants of intra-industry trade.

Third, similarity in culture and language between Canada and her trading partners seem to be a statistically significant determinant but their roles are not unambiguously clarified as they yield significant explanatory power only in a few equations (for the year 1962). The evidence suggests that their influence has declined over time. This probably implies that economic agents care more for a wide range of varieties regarless of national attributes.

Fourth, the industry analysis lends support to the main hypotheses that intra-industry trade is an increasing function of product differentiation and economies of scale. Fifth, evidence on tariff protection is not clear. No significant relationship was found between the capital intensity of products and the share of intra-industry trade in the manufacturing sectors of the economy. This probably implies that export and import industries utilize indistinguishable capital labor ratios and therefore differences in factor intensity is not a major determinant of comparative advantage. The evidence seems to suggest that it is time that both theorists and applied econometricians abandon the assumptions that there exists only two factors of production.

Although the empirical support from regression analysis was far from overpowering, the overall findings seem to support intra-industry trade theories. On the basis of these findings one could conclude that intra-industry trade in Canada was not born by accident, rather it appeared to be an offspring of an economic marriage between commodity characteristics and national attributes. It was neither a mere "statistical artifact," nor a temporary response to trade liberalization policy. It is a real phenomenon determined by various factors. Enough intra-industry trade exists in Canada to warrant policy-makers attention. Caves' assertion may humbly be quoted here:

> There is much to applaud in intra-industry trade and little to deplore. (1981)

Policy Implications

Canada is the sixth largest trading nation in the world and its volume of trade on a per capita basis is the highest among industrial countries. Furthermore, Canada has one of the highest elasticities of exports with respect to imports of any of the industrialized nations (Aquino, 1978). The external trade of the Canadian economy has grown markedly during the last few decades. Its degree of openness as measured by the ratio of exports to Gross Domestic Product (GDP) has risen from 19.62 percent in 1962 to 26.43 percent in 1976, and reached 36.81 percent in 1980. This growth has taken place in the context of rapid economic development (as measured by GDP per capita) and expanding market size. The expansion of market size has taken the form of both an increase in the size of the domestic market (as measured by the level of domestic GNP) and improved access to export markets following the Dillon, Kennedy, and Tokyo tariff rounds, the Auto-pact Agreement (1965) with the United States and the Defence Sharing Act. Thus the problems and policy issues relating to the international sector of the Canadian economy become of prime importance. Due to the fact that the foreign sector is a key part of the Canadian economy, the performance of the economy has been thought to be related to factors in the international market, and any attempt to improve the former would demand improvement in the latter.

Wonnacott and Wonnacott (1967), Wonnacott (1975), The Economic Council of Canada(1975), The Canadian Standing Senate Committee On Foreign Affairs, 1978), and the recent MacDonald Commission (1984) have addressed the question of attaining the maximum gains from international trade. In this respect a case for free trade between Canada and the United States has been suggested. The crux of the argument is that Canada is one of the very few industrialized nations lacking free access to a market of at least 200 million people, and therefore, is limited in the extent to which it can achieve either economies of scale or specialization. The small size of the Canadian market results in productivity in Canadian manufacturing which is substantially below that of the United States (a gap of about 25-30%). Wonnacott and Wonnacott have further argued that trade liberalization would lead to substantial benefits from more efficient large scale production where much of the expansion of trade would be of an intra-industry nature. More precisely, specialization would take place within industries and within plants. The rationalization process may result in the Canadian plants becoming part of an integrated Canada-U.S. system ending up with increased intra-industry trade. From the standpoint of the economy as a whole, this is considered to be a more desirable form of adjustment to freer trade than the conventional one associated with the factor proportions theory of trade. This is because resource reallocation takes place within the industries. From the above analysis one can infer that the greater the share of intra-industry trade in Canada's total foreign trade, the lower will be the adjustment costs to free trade. This should allay the fears of protectionists that trade liberalization policy will tend to cause high adjustment costs in terms of employment and income.

To be more precise, the concept of intra-industry trade throws light on Canada's economic performance concerning international trade, industrial structure and the international competitive positions of Canadian manufacturing sector. The phenomenon of intra-industry has therefore increasing implications for the future structural adjustment process in the Canadian economy as well as for the trade and industrial policy that is likely to be pursued.

The prevalence of significant measured intra-industry trade in all industries, primary goods and manufactures, raw materials, and semi-processed goods, clearly indicate that there exists a potential for enhancing intra-industry trade in the future if the industrial policy is geared toward enhancing new technological development, and encouraging specialization and scale. Future industrial policy strategy should put more emphasis on reorganization and rationalization of the manufacturing sector on an industry by industry basis in order to achieve the possible economies of scale and to be competitive with the rest of the world. Besides, concerted efforts seem to be necessary in order to harmonize international freight rate structures.

Evidence also suggest that Canada indeed has other alternatives (besides Canada-U.S.A. free trade movement). There exists a potential for promoting intra-industry trade with the developing countries. New initiatives, to extend the market horizons and to strenghten international trade relations will have to become an integral part of a general policy. Greater economic cooperation is called for between both developed and less developed trading partners and greater harmonization of domestic and international economic policies seems to be the need of a more integrated world in which Canada has much to offer to its own citizens and to the world as a whole.

Avenues For Future Research

As was pointed out in Chapter One, we viewed this thesis as an attempt to fill the lacuna existed so far in the context of intra-industry trade in Canada. The research commenced here will be continued. Further research could concentrate on the determinants of Canada's intra-industry trade. Analysis of the theoretically important determinants of intra-industry trade can be further extended. This could be done by employing a number of more sophisticated variables in particular: the human capital intensity, economies of scale, the degree of openness, trade and non-trade barriers, and the dynamic roles of multinationals.

APPENDIX A.2

The Hufbauer Measure of Product Differentiation

To the best of my knowledge, Hufbauer is the first economist to provide an empirical measure of product differentiation in international trade flows. His index of product differentiation has acquired widespread credibility and has been employed as an explanatory variable in many empirical studies, such as those of McLease (1979); Pagoulatos and Sorensen (1975); Loertscher, Rudolf and Wolter (1980); and Finger and De Rosa (1979).

This measure is derived from the coefficient of variation in unit values of exports destined to different countries. The measure is defined as:

$$\text{Measure of Product Differentiation} = Un/Vn$$

In this expression, "Un" denotes the standard deviation of export unit values for shipments of products to different countries; "Vn" represents the unweighted mean of unit values. The unit values, Pn are in turn defined by the ratio (VXn/QXn), where VXn represents the value of exports, and QXn represents the quantity of exports. As an example, let:

Export of commodity (n) to country	Unit Price of commodity (n) in different countries
1	P1n
2	P2n
3	P3n
.	.
.	.
.	.
.	.
N	PNn

The unweighted mean of unit values is:

$$Vn = \sum_{j=1}^{N} \frac{Pjn}{N}$$

The standard deviation of unit value is:

$$\sigma = Un = \sqrt{\sum_{j=1}^{N} \frac{(Pjn-Vn)^2}{N-1}}$$

So

$$Pd = \frac{Un}{Vn} = \sqrt{\sum_{j=1}^{N} \frac{(Pjn-Vn)^2}{N-1}} \Bigg/ \sum_{j=1}^{N} \frac{Pjn}{N}$$

= a measure of Product differentiation.

Hufbauer has computed this index of product differentiation at a 7-digit SITC level using 1965 U.S. export data. However, the results have been reported at the three digit level as simple averages of the component seven-digit coefficients (Hufbauer, 1970, Table A-2, pp. 212-220). The resultant product differentiation index is therefore a composite measure of price variation and the composition of trade flows at seven-digit levels.

In this study Hufbauer's (1970) index has been employed to estimate product differentiation coefficients using Canada's export values and quantities for a period of four years -- 1971, 1976, 1980, and 1981.

Table 2.1 shows that product differentiation in Canada's industrial sectors is quite high. High values are found in SITCs 001, 041, 054, 259, 276, 284, 285, 512, 513, 611, 621, 631, 698, 711, 712, 714, 724, 729, 733, 735, 725, 841, 861, 864, and 891. These coefficients are substantial, particularly in SITC 7. These results are consistent with the empirical results of the intra-industry indices. In all the above mentioned SITC industrial groups, intra-industry trade intensity is strong.

A comparison of our estimates with the results of Hufbauer's estimated product coefficients for the United States indicates that products are more differentiated in Canada in the United States. This is consistent with the general consensus among economists that Canadian firms are producing too many varieties and hence are not exploiting the economies of scale arising from longer production runs.

The results also suggest that product differentiation has increased over time, with variations in certain industries. For example in 1971, the coefficient for SITC 001 was 1.8987. This has grown to 5.7001 in 1976, fallen to 1.8451 in 1980 and again risen to 3.7704 in 1981. For SITC 512 the coefficient was 1.5756 in 1971, increased to 1.6665 in 1976, to 3.0093 in 1980 and finally in 1981 further increased to 3.5433. In SITC 513, the coefficient increased from 2.0007 in 1971 to 3.0493 in 1980. In most of the SITC 6 and 7 industrial groups the same pattern is observed. In SITC 5 the coefficient varies from 0.7708 to 3.5433 in 1980. In SITC 6, the coefficient ranges from 0.5934 to 2.5734. In SITC category 7, the values of coefficients are substantial, ranging between 1.6786 and 4.3430; and in SITC 8, the values vary in the range of 0.6275 to 8.3438.

These estimated coefficients are employed as an independent variable for the empirical tests of the hypotheses concerning the relationship between intra-industry trade intensity and product differentiation in Canada's industrial sectors.

APPENDIX TABLE A.2.1

CANADA'S PRODUCT DIFFERENTIATION CO-EFFICIENTS THROUGH TIME (1971-1981)

SITC	DESCRIPTION	*(PD-CAN) 1971	(PD-CAN) 1976	(PD-CAN) 1980	(PD-CAN) 1981	(PD-USA) 1970
001	Live Animals	1.8987	2.4030	1.8451	3.7704	
011	Meat, fresh, chilled or frozen	1.8639	.8105	.9133	1.5371	
012	Meat, dried, salted or smoked, whether or not in airtight containers	.8062	1.5558	2.2013	.5046	
013	Meat in airtight containers, n.e.s. and meat preparations, whether or not in airtight containers	1.2546	1.1646	.7229	.5046	.4205
022	Milk and cream	.5164	.4697	.9187	1.6597	
023	Butter	.3394	.0974	.4939	.3852	
024	Cheese and curd	.7377	.5491	.6097	.5604	
025	Eggs	NIL	NIL	NIL	NIL	
031	Fish, fresh and simply preserved	.7846	.7757	.8968	.9430	
032	Fish, in airtight containers, n.e.s. and fish preparations, whether or not in airtight containers (including crustacea & molluscs)	1.0976	.9371	.7175	.7334	.3576
043	Barley, unmilled	.1729	.1300	.3063	.3250	
044	Maize (corn,) unmilled	1.0406	.6104	.7949	.5652	
045	Cereals, unmilled, other than wheat, rice, barley and maize	.8045	2.8971	3.0714	2.3509	
046	Meal and flour of wheat or of meslin	.3944	.0848	.2705	.2757	.2198
047	Meal and flour of cereals, except meal and flour of wheat or of meslin	1.0218	.8839	.6706	.6845	.2620
048	Cereal preparations and preparations of flour and starch of fruits and vegetables	.7065	.6568	.8001	.9039	.4364
051	Fruit, fresh, and nuts (not including oil nuts), fresh or dried	.4655	.9393	.8430	.8517	
052	Dried fruit (including artificially dehydrated)	.4764	.6605	.6479	.7096	
053	Fruit, preserved and fruit preparations	.6709	.5365	.5107	.4684	.2617
054	Vegetables, fresh, frozen or simply preserved (including dried leguminous vegetables); roots tubers and other edible vegetable products, n.e.s., fresh or dried	.4486	1.0642	2.5626	1.4653	
055	Vegetables, roots and tubers, preserved or prepared, n.e.s., whether or not in airtight containers	.8584	.7610	.4694	.4446	.4571
061	Sugar and honey	.2924	.5823	.6600	.6295	.4667
062	Sugar confectionery and other sugar preparations (except chocolate confectionery)	2.6014	1.1502	.5498	3.1838	.6005
071	Coffee	1.0742	.7751	.8948	.4394	
073	Chocolate and other food preparations containing cocoa or chocolate, n.e.s.	.3012	.4708	.5113	.4850	
074	Tea and mate	1.4142	1.4142	.2504	.3192	
075	Spices	.6581	.4845	1.1786	.7531	

APPENDIX TABLE A.2.1
(cont'd)

SITC	DESCRIPTION	*(PD-CAN) 1971	(PD-CAN) 1976	(PD-CAN) 1980	(PD-CAN) 1981	(PD-USA) 1970
081	Feeding-stuff for animals (not including unmilled cereals).	NIL	.6669	.7385	.8264	
091	Margarine and shortening	.6329	.1139	.7744	.6022	.2640
099	Food preparations, n.e.s.	.5854	.8536	2.6547	.7941	
111	Non-alcoholic beverages, n.e.s.	.9694	.2803	.2682	.3078	.3705
112	Alcoholic beverages	2.0798	1.4960	1.4118	1.4923	.4948
121	Tobacco, unmanufactured	.5082	.4899	.3468	.2986	
122	Tobacco manufactured	1.8118	1.5815	1.3125	1.5256	.1780
211	Hides and skins (except fur skins), undressed	.8344	.7660	.8731	.7813	
212	Fur skins, undressed	.5396	1.0336	1.9055	.9235	
221	Oil-seeds, oil nuts and oil kernels	.9307	.6314	.6299	.3879	
231	Crude rubber (including synthetic and reclaimed)	NIL	1.7321	.8098	.8253	.4298
242	Wood in the rough or roughly squared	1.6680	1.0489	1.0834	1.1507	.4511
243	Wood, shaped or simply worked	1.5263	1.2530	1.2418	1.0959	
251	Pulp and waste paper	.3171	.3732	.3236	.3308	.2267
262	Wool and other animal hair	.4738	1.6859	.6298	.8127	
263	Cotton	.3470	1.0811	1.1848	.4600	
264	Jute	.2530	NIL	NIL	.7907	
265	Vegetable fibres, except cotton and jute	.5563	.9806	.6322	NIL	
267	Waste materials from textile fabrics (including rags)	.8190	.6447	.5775	.4529	
273	Stone, sand and gravel	.9995	1.5371	2.0556	1.5208	
274	Sulphur and unroasted iron pyrites	.2786	.3039	.2564	.1906	
275	Natural abrasives (including industrial diamonds).	NIL	.8054	2.0118	1.9097	
281	Iron ore and concentrates	1.8538	.2593	.2722	.3385	
282	Iron and steel scrap	1.1681	.7860	1.1585	.9287	
283	Ores and concentrates of non-ferrous base metals.	1.2637	1.1646	1.4074	1.6809	
284	Non-ferrous metal scrap	.6560	.7830	3.2669	2.6351	
285	Silver and platinum ores	2.2258	3.3546	3.6256	3.7564	
286	Ores & concentrates of uranium & thorium	NIL	NIL	NIL	NIL	
292	Crude vegetable materials, n.e.s.	.1843	2.8258	3.1188	3.4040	
321	Coal, coke and briquettes	.3106	1.0051	.7498	.7033	
411	Animal oils and fats	.6518	.6143	NIL	.4414	
421	Fixed vegetable oils, soft	.2701	.1106	.2981	.2070	.1889
422	Other fixed vegetable oils	.5284	.5564	.6556	.3630	
431	Animal and vegetable oils and fats, processed, and waxes of animal or vegetable origin.	.6013	1.3493	.6248	.7224	

APPENDIX TABLE A.2.1
(cont'd)

SITC	DESCRIPTION	*(PD-CAN) 1971	(PD-CAN) 1976	(PD-CAN) 1980	(PD-CAN) 1981	(PD-USA) 1970
512	Organic chemicals	1.5756	1.6665	3.0493	3.5433	.9175
513	Inorganic chemicals: Elements, oxides and halogen salts	1.0652	2.4087	2.5200	2.6463	.7741
514	Other inorganic chemicals	3.1659	4.5232	2.8426	2.6163	1.1162
515	Radioactive and associated materials	NIL	NIL	NIL	NIL	2.4360
521	Mineral tar & crude chemicals from coal, petroleum and natural gas	.8403	NIL	.2619	.7708	.8008
533	Pigments, paints, varnishes & related materials	1.3132	1.6585	1.5463	1.6080	.9093
541	Medical and Pharmaceutical products	NIL	NIL	NIL	NIL	1.4745
551	Essential oils, perfume & flavour materials	.8856	1.1382	.9623	1.0039	.7488
553	Perfumery & comestics, dentifrices and other toiler preparations (except soaps)	NIL	NIL	NIL	NIL	.2990
554	Soaps, cleansing & polishing preparations	NIL	NIL	NIL	NIL	.7618
561	Fertilizers, manufactured	3.0522	.9951	.8479	1.1370	.4791
571	Explosives and pyrotechnic products	NIL	NIL	NIL	NIL	1.2713
581	Plastic materials, regenerated cellulose and artificial resins	.8425	.7824	.8249	1.1049	.9093
599	Chemical materials & products, n.e.s.	.6775	.1788	1.3856	1.4775	.7512
611	Leather	4.0177	2.1090	2.6222	2.5796	.5896
612	Manufactures of leather or of artificial or reconstituted leather n.e.s.	NIL	NIL	NIL	NIL	.5896
613	Fur skins, tanned or dressed (including dyed)	NIL	NIL	NIL	NIL	.5903
621	Materials of rubber	1.5243	3.6024	4.4697	6.0865	.8769
629	Articles of rubber, n.e.s.	2.7359	2.4654	1.8832	1.6723	.7106
631	Veneers, plywood boards, "improved or reconstituted wood and other wood, worked n.e.s.	.4449	.5838	1.1194	1.3523	.6834
632	Wood manufactures, n.e.s.	1.5447	NIL	7.8369	9.7005	.9511
633	Cork manufactures	NIL	NIL	NIL	NIL	.8320
641	Paper and paperboard	.8445	.7879	.9102	.9746	.8279
642	Articles made of paper pulp, of paper or of paperboard	NIL	NIL	NIL	NIL	.9943
651	Textile yarn and thread	1.2749	1.7321	1.2778	.9802	.4592
652	Cotton fabrics, woven (not including narrow or special fabrics)	NIL	.3912	.7322	.5934	.4774
653	Textile fabrics, woven (not including narrow or special fabrics), other than cotton fabrics	1.0441	.8248	1.4871	1.6206	.5954
654	Tulle, lace, embroidery, ribbons, trimmings and other small wares	1.2995	.6739	.8695	1.0749	.6057
655	Special textile fabrics & related products	1.9566	.8491	1.1237	1.2836	.6167
656	Made-up articles, wholly or chiefly of textile materials, n.e.s.	NIL	NIL	NIL	NIL	.5873
657	Floor covering, tapestries, etc.	NIL	NIL	NIL	NIL	.5132
661	Lime, cement & fabricated building materials except glass and clay materials	NIL	NIL	4.1912	4.8705	.6718
662	Clay construction materials and refractory construction materials	1.9388	1.1020	.5479	1.9186	.7651

APPENDIX TABLE A.2.1
(cont'd)

SITC	DESCRIPTION	*(PD-CAN) 1971	(PD-CAN) 1976	(PD-CAN) 1980	(PD-CAN) 1981	(PD-USA) 1970
663	Mineral manufactures, n.e.s.	NIL	NIL	NIL	NIL	.7681
664	Glass	.3883	NIL	NIL	NIL	.9109
665	Glassware	NIL	NIL	NIL	NIL	.6279
667	Pearls & precious & semi-precious stones, unworked or worked pearls, not set or strung	NIL	NIL	NIL	NIL	.8435
671	Pig iron, speigeleisen, sponge iron, iron and steel powders and shot and ferro-alloys	1.9070	1.8110	2.2362	.5320	.6917
672	Ingots & other primary forms (including blanks for tubes & pipes) of iron or steel	.4989	.9095	1.2601	.5270	.5479
673	Iron & steel bars, rods, angles, shapes and sections (including sheet pilling)	1.3146	.7637	.9575	.8558	.6916
674	Universals, plates and sheets of iron or steel	1.0383	1.0853	.7552	.9620	.5159
676	Rails and railway track construction material of iron or steel	.5907	1.3269	.8997	.9644	.5494
677	Iron & steel wire (excluding wire rod)	1.6156	.5851	.8425	.8569	.6908
678	Tubes, pipes and fittings of iron or steel	1.7069	1.1207	1.1207	1.1440	.8713
679	Iron and steel castings and forgings, unworked, n.e.s.	1.3674	.7241	.8833	.8928	1.3266
681	Silver, platinum and other metals of the platinum group	1.4010	1.5224	1.3331	1.5755	.3357
682	Copper	.9118	1.0849	1.1674	.5687	.5589
683	Nickel	.6058	.4865	.6071	.6045	.6729
684	Aluminium	.5011	.6724	.8516	.9119	.7498
685	Lead	.6096	1.1336	.3441	.8831	.6040
689	Miscellaneous non-ferrous base metals employed in metallurgy	1.2594	1.0338	2.4503	1.4712	.9489
691	Finished structural parts and structures n.e.s.	NIL	NIL	NIL	NIL	.8109
692	Metal containers for storage & transport	NIL	NIL	NIL	NIL	1.3287
693	Wire products (excluding electric) and fencing grills	1.2536	2.1901	1.0533	.9667	.8969
694	Nails, screws, nuts, bolts, rivets, and similar articles of iron, steel or of copper	1.2725	.7357	.6718	.4208	2.0906
695	Tools for use in the hand or in machines	NIL	NIL	NIL	NIL	1.2815
696	Cutlery	NIL	NIL	NIL	NIL	.5900
697	Household equipment of base metals	NIL	NIL	NIL	NIL	.5870
698	Manufactures of metal, n.e.s.	2.4264	NIL	3.0100	6.2876	1.0341
711	Power generating machinery, other than electric	4.1589	3.3626	5.6998	4.3430	.9855
712	Agricultural machinery & implements	2.6071	NIL	3.4795	2.9190	.5654
714	Office machines	1.8161	2.2175	3.0244	NIL	.5958

APPENDIX TABLE A.2.1
(cont'd)

SITC	DESCRIPTION	*(PD-CAN) 1971	(PD-CAN) 1976	(PD-CAN) 1980	(PD-CAN) 1981	(PD-USA) 1970
715	Metalworking machine	NIL	NIL	NIL	NIL	1.3156
717	Textile and leather machinery	NIL	NIL	NIL	NIL	1.1986
718	Machines for special industries	NIL	NIL	NIL	NIL	1.2200
719	Machinery & appliances (other than electrical) and machine parts, n.e.s.	NIL	NIL	NIL	NIL	1.2075
722	Electric power machinery & switchgear	NIL	NIL	NIL	NIL	1.7492
723	Equipment for distributing electricity	NIL	.9117	1.7739	1.6786	.8825
724	Telecommunications apparatus	3.3589	3.7004	3.2236	4.5452	.9608
725	Domestic electrical equipment	NIL	NIL	NIL	NIL	.5320
726	Electric apparatus for medical purposes and radiological apparatus.	NIL	NIL	NIL	NIL	.5320
729	Other electrical machinery and apparatus	6.4080	NIL	6.0778	11.0036	1.5192
731	Railway vehicles.	2.1658	2.1706	2.6934	2.4247	.8476
732	Road motor vehicles	6.4400	NIL	3.3602	2.1621	.5504
733	Road vehicles other than motor vehicles	1.0501	1.3616	1.9348	3.1823	.5108
734	Aircraft	1.9989	2.3988	2.1862	2.0046	1.0225
735	Ships and boats	1.2634	4.0044	3.0121	4.3655	1.3093
812	Sanitary, plumbing, heating and lighting fixtures and fittings.	NIL	NIL	NIL	NIL	.9592
821	Furniture	NIL	NIL	NIL	NIL	.5360
831	Travel goods, handbags and similar articles	NIL	NIL	NIL	NIL	.6300
841	Clothing (except fur clothing)	2.7965	NIL	5.5033	5.3696	.5137
851	Footwear	1.2265	.4551	.5357	.6275	-
861	Scientific, medical, optical, measuring and controlling instruments and apparatus.	5.4303	8.1109	3.7956	8.3438	1.2224
862	Photographic and cinematographic supplies	NIL	NIL	NIL	NIL	1.9434
863	Developed cinematographic film	1.6821	1.2505	.6045	.6556	1.0525
864	Watches and clocks	4.2611	4.3800	2.5771	4.4900	1.1907
891	Musical instruments, sound recorders and reproducers and parts and accessories therefor.	5.1770	4.4914	6.5780	4.3042	1.5929
892	Printed matter	NIL	NIL	NIL	NIL	1.3470
893	Articles of artificial plastic materials, n.e.s.	1.2786	NIL	NIL	NIL	.59[illegible]
894	Perambulators, toys, games and sporting goods.	3.5412	3.4892	3.7503	6.5475	.7867
895	Office & stationery supplies, n.e.s.	NIL	NIL	NIL	NIL	.9424
897	Jewellery and goldsmiths' and silversmiths' wares	NIL	NIL	NIL	NIL	.9424
899	Manufactured articles, n.e.s.	NIL	NIL	NIL	NIL	.7360
931		NIL	NIL	NIL	NIL	
941		NIL	NIL	NIL	NIL	
951		16.3936	NIL	NIL	NIL	
971			25.0742	25.9520	30.6647	

* PD-CAN is the product differentiation coefficient as computed by the student for Canada.

PD-USA is the product differentiation coefficient as computed by Hufbauer for the USA.

SOURCE : THE EXTERNAL TRADE DIVISION, STATISTICS CANADA OTTAWA

APPENDIX TABLE A.2.2

CONCORDANCE BETWEEN UNITED NATIONS' STANDARD INTERNATIONAL TRADE CLASSIFICATION (SITC) AND CANADA'S STANDARD INDUSTRIAL CLASSIFICATION (SIC)

SITC	001	061	251	284	533	653	683	729
SIC	0110	0190	2710	2950	3781	1820	2950	3150
	0190	1089		6270		1830	2980	3250
						1890		3350
						2390		3399
								3411
SITC	011	081	262	285	551	654	684	731
SIC	1011	1020	0110	0590	3750	1892	2960	3260
	1012	1050	0190		3799	1899		
		1060	1851					
		1083						
SITC	022	099	263	289	561	655	685	732
SIC	1040	1031	1810	0510	3720	1840	3050	3110
		1089			3782	1854	2980	3150
						3993		3230
								3250
								3290
SITC	025	111	264	291	581	661	693	733
SIC	0110	1091	1871	1011	1650	3520	3050	3290
	1089		1872	1012	3730	3599		
SITC	031	121	266	292	599	662	695	734
SIC	0410	1510	1831	0130	1040	3510	3060	3210
	1020		1831	0190		3591	3150	3280
SITC	041	122	267	321	611	671	698	841
SIC	0130	1530	6270	0610	1720	2910	2960	1750
				0720			2970	2310
				3690			3050	2390
							3060	2431
							3090	2441
							3399	2450
							3970	2480
							3999	2499
SITC	046	211	273	331	621	677	711	842
SIC	1050	1011	0730	0640	1629	3050	2010	2460
			0830				3150	
			0870				3250	

TABLE A.2.2 (cont'd)

SITC	048	212	274	332	631	678	712	861
SIC	1050	0190	0790	3651	2520	2920	3110	3911
	1071	0470		2690		2940	3150	3914
	1072					3090		
	1089							
SITC	051	221	275	411	632	679	714	863
SIC	0150	0130	3570	1011	2541	2910	3180	8420
	0190		3920	1020	2560	2940		
	1089				2592			
	1030				2599			
SITC	052	231	276	421	641	681	723	864
SIC	1031	0190	0710	1083	2710	2950	3380	3910
		2720	0799		2720		3399	
			3591		2740			
SITC	054	241	281	512	651	682	724	891
SIC	0130	1031	0580	3781	1830	2950	3340	3994
	0150	2510		3782		2970	3350	3932
	1031			3783		3050		
	1031					3090		
SITC		242	282	513	652			894
SIC		2599	6270	3570	1810			3931
				3782				3932
SITC		243	283	521				
SIC		2513	0599	3690				
		2541						
		2542						

APPENDIX TABLE A.4.1.1

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY AT DIFFERENT LEVELS OF AGGREGATION, 1971 (%)

SITC	LEVELS OF AGGREGATION	U.S.A.	JAPAN	BEL-LUX	U.K.	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND	IRELAND
0	1 - digit	94.98	26.11	15.28	28.69	70.62	20.85	30.07	42.94	84.37	75.25	86.49	36.08	12.28	95.25	86.95
	2 - digit	64.01	14.37	14.36	27.09	33.51	34.85	11.20	23.98	32.55	14.67	22.05	19.04	24.41	13.08	42.44
	3 - digit	43.85	10.94	11.97	21.04	19.89	24.26	7.94	15.81	18.98	7.22	9.52	16.10	15.58	12.35	23.12
	4 - digit	39.41	10.46	11.72	20.39	18.74	20.36	8.30	14.10	18.15	5.06	7.69	14.06	13.59	11.30	23.69
	5 - digit	27.10	9.98	12.21	14.55	16.95	17.13	7.66	12.73	18.18	4.65	6.97	12.41	15.37	9.28	20.86
1	1 - digit	12.35	37.42	13.93	60.31	1.18	50.06	2.65	28.24	73.41	9.31	5.57	6.38	62.24	80.08	93.18
	2 - digit	22.47	30.45	13.12	23.45	14.15	46.28	2.90	27.33	44.90	10.00	27.68	13.97	20.75	59.74	41.02
	3 - digit	29.55	29.06	19.03	25.11	13.35	35.83	2.18	25.04	22.54	9.92	28.00	21.63	12.45	45.61	25.52
	4 - digit	26.30	29.06	14.29	19.59	10.43	29.33	1.73	21.91	17.58	8.64	28.00	21.63	12.45	37.52	25.52
	5 - digit	18.73	29.06	14.29	16.03	8.53	24.00	1.30	21.91	17.58	8.64	28.00	21.63	12.45	33.77	25.52
2	1 - digit	44.49	1.98	2.93	13.09	3.54	3.07	6.07	6.26	92.34	0.58	6.57	1.46	40.21	9.86	33.48
	2 - digit	49.57	19.57	8.06	21.33	26.52	23.28	15.71	7.43	31.48	1.67	18.92	16.57	15.08	5.47	19.22
	3 - digit	43.92	13.80	14.93	16.12	25.23	19.55	15.82	7.67	21.34	1.55	14.33	13.23	18.86	9.39	11.43
	4 - digit	34.83	10.02	12.03	13.30	22.56	16.47	11.80	7.95	15.39	1.28	12.18	10.41	7.80	8.22	7.36
	5 - digit	23.38	8.47	10.28	10.23	16.21	10.68	8.93	4.94	11.38	1.20	10.04	10.61	5.53	7.73	7.36

APPENDIX TABLE A.4.1.1

(cont'd)

SITC	LEVELS OF AGGREGATION	U.S.A	JAPAN	BEL—LUX	U.K.	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND	IRELAND
3	1 - digit	29.10	0.01	0.00	50.11	69.46	5.90	79.58	47.67	0.00	0.00	0.00	1.92	42.85	0.00	0.00
	2 - digit	21.10	4.69	0.00	30.57	24.04	4.63	31.04	16.11	0.00	0.00	0.00	0.48	7.14	0.00	0.00
	3 - digit	26.00	5.32	0.00	21.86	17.44	4.45	21.21	9.86	0.00	0.00	0.00	0.29	5.56	0.00	0.00
	4 - digit	24.61	4.04	0.00	17.44	10.84	2.85	13.99	6.96	0.00	0.00	0.00	0.24	5.56	0.00	0.00
	5 - digit	15.53	4.04	0.00	12.25	9.86	2.62	13.99	6.09	0.00	0.00	0.00	0.24	5.56	0.00	0.00
4	1 - digit	20.34	0.83	0.00	9.52	13.82	31.78	0.00	27.71	0.00	0.00	0.00	0.00	0.00	58.53	0.00
	2 - digit	30.98	0.62	0.00	26.95	6.97	11.69	0.00	8.73	0.00	0.00	0.00	0.00	0.00	11.84	0.00
	3 - digit	29.58	0.57	0.00	29.05	4.86	8.59	0.00	4.99	0.00	0.00	0.00	0.00	0.00	6.77	0.00
	4 - digit	30.49	0.39	0.00	18.94	4.32	8.06	0.00	3.49	0.00	0.00	0.00	0.00	0.00	5.26	0.00
	5 - digit	23.46	0.39	0.00	12.83	4.32	8.06	0.00	3.49	0.00	0.00	0.00	0.00	0.00	5.26	0.00
5	1 - digit	71.87	80.04	97.85	98.31	40.00	20.41	85.64	94.84	56.87	55.00	99.56	59.75	64.75	17.78	29.84
	2 - digit	38.14	33.69	42.74	41.65	27.04	29.92	26.82	44.36	37.00	23.29	43.50	44.72	43.59	15.38	12.37
	3 - digit	34.85	28.81	34.92	36.73	27.26	24.39	23.68	34.26	27.57	20.63	28.26	39.60	42.67	17.93	7.74
	4 - digit	27.53	20.00	22.97	26.14	18.34	17.78	19.37	24.04	19.59	14.54	26.66	25.75	26.42	14.94	6.03
	5 - digit	8.74	9.97	13.85	10.26	9.85	8.40	11.51	13.17	12.85	12.80	23.33	23.52	22.16	7.98	5.53
6	1 - digit	82.39	31.36	85.24	68.94	79.04	93.47	87.23	78.00	81.75	7.72	76.76	25.87	60.05	90.08	90.54
	2 - digit	51.04	14.65	37.07	28.49	25.29	26.45	20.68	35.43	18.79	7.20	39.60	37.39	35.53	39.87	30.75
	3 - digit	43.99	11.59	28.00	27.21	19.05	19.45	12.26	22.86	13.54	8.30	24.53	20.17	22.79	19.93	16.71
	4 - digit	27.03	8.28	19.01	19.60	14.43	12.18	9.37	20.07	11.26	6.49	19.63	15.92	16.37	13.95	13.27
	5 - digit	15.70	6.39	12.84	11.69	10.61	9.39	7.32	13.25	8.06	4.74	13.04	13.28	13.28	10.66	10.28

APPENDIX TABLE A.4.1.1

(cont'd)

SITC	LEVELS OF AGGREGATION	U.S.A.	JAPAN	BEL—LUX	U.K.	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND	IRELAND
7	1 - digit	83.17	9.50	99.70	46.34	44.01	25.30	34.30	81.63	63.16	14.08	50.87	71.22	26.70	24.67	65.62
	2 - digit	75.74	13.13	91.11	51.21	45.65	31.65	38.67	60.32	67.04	19.51	50.62	60.32	27.53	29.41	71.15
	3 - digit	60.99	17.45	52.74	33.29	36.74	24.71	30.66	46.08	42.35	17.31	30.05	38.46	25.47	22.97	37.99
	4 - digit	39.71	18.81	39.49	27.84	27.28	21.04	25.49	28.45	29.86	22.57	23.06	30.30	22.77	19.90	27.97
	5 - digit	26.00	12.71	26.23	18.35	19.73	14.90	17.90	20.10	18.62	14.91	17.62	23.74	14.48	13.66	20.06
8	1 - digit	45.64	7.40	19.87	23.32	10.42	28.79	3.66	30.41	17.11	4.74	22.33	24.24	58.47	69.48	19.20
	2 - digit	51.65	4.70	48.71	37.72	12.21	18.37	3.73	28.66	29.34	3.75	29.67	25.61	48.64	25.99	19.67
	3 - digit	40.82	4.99	43.61	32.92	11.59	14.43	3.58	24.36	21.87	6.61	23.37	21.55	34.22	22.65	20.43
	4 - digit	29.59	4.01	25.63	21.06	9.71	11.44	3.83	16.23	15.86	5.01	17.01	15.20	22.00	16.73	20.48
	5 - digit	12.07	3.23	17.40	10.13	5.80	7.00	3.28	8.71	10.34	2.06	11.38	10.64	13.62	9.23	14.35
9	1 - digit	56.65	2.32	13.36	75.74	11.28	2.35	22.33	11.97	42.87	5.34	5.62	5.72	0.20	0.11	67.14
	2 - digit	64.39	33.56	17.59	30.05	7.15	38.39	16.11	28.16	11.01	1.35	1.87	3.64	0.07	0.05	45.34
	3 - digit	64.06	37.47	18.87	23.38	6.54	33.49	15.74	26.20	6.46	0.76	1.12	3.23	0.04	0.05	40.98
	4 - digit	52.91	28.86	19.03	19.01	4.70	30.06	16.61	21.67	6.46	0.76	1.12	2.69	0.04	0.04	40.98
	5 - digit	35.27	28.86	16.92	13.82	4.17	24.05	13.29	21.67	6.46	0.76	1.12	2.69	0.03	0.04	40.98

APPENDIX TABLE A.4.1.1

(cont'd)

SITC	AGGREGATION LEVELS OF	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILIPPINES
0	1 - digit	63.04	92.03	8.66	13.14	29.05	92.94	10.03	52.42	51.39	0.00	3.64	85.40	65.27	43.40
	2 - digit	15.36	19.34	14.51	18.73	6.90	35.66	16.22	6.97	8.99	0.00	10.20	9.80	15.83	14.23
	3 - digit	7.28	9.18	12.05	12.42	5.88	17.69	8.89	5.30	6.78	0.00	5.19	3.88	9.55	8.58
	4 - digit	5.12	6.54	10.01	10.73	4.46	13.26	8.04	4.82	6.32	0.00	4.07	3.15	9.75	9.74
	5 - digit	4.23	7.75	10.31	9.15	3.93	11.16	5.92	0.00	5.78	0.00	3.86	2.88	6.75	7.66
1	1 - digit	1.31	5.38	17.32	98.57	32.87	1.15	0.00	0.00	36.11	0.00	0.00	40.00	57.14	0.00
	2 - digit	34.29	6.46	11.03	56.15	20.58	3.74	0.00	0.00	11.69	0.00	0.00	26.67	19.05	0.00
	3 - digit	34.04	6.45	7.75	42.71	19.45	3.04	0.00	0.00	6.69	0.00	0.00	20.00	11.43	0.00
	4 - digit	26.63	5.75	7.63	40.82	12.86	2.66	0.00	0.00	6.12	0.00	0.00	20.00	11.43	0.00
	5 - digit	25.63	5.75	7.63	40.82	12.86	2.66	0.00	0.00	6.12	0.00	0.00	20.00	11.43	0.00
2	1 - digit	20.56	6.51	97.65	95.28	2.58	82.83	6.65	13.09	0.55	0.00	0.00	81.27	3.95	35.00
	2 - digit	23.80	13.62	20.70	11.75	0.44	25.27	4.74	6.30	3.30	0.00	0.60	22.74	4.16	12.40
	3 - digit	12.26	6.59	16.21	7.12	0.26	17.39	5.51	5.51	1.48	0.00	3.05	12.55	6.55	8.07
	4 - digit	11.05	4.50	14.07	6.16	0.25	12.35	3.33	3.76	1.16	0.00	2.23	11.33	7.17	6.12
	5 - digit	11.57	3.66	12.03	5.97	0.25	12.13	2.86	0.00	1.16	0.00	2.00	10.50	3.60	5.49

APPENDIX TABLE A.4.1.1

(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILIPPINES
3	1 - digit	0.00	29.62	33.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.90	0.00
	2 - digit	0.00	9.90	34.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	12.90	0.00
	3 - digit	0.00	5.94	34.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	12.90	0.00
	4 - digit	0.00	4.95	32.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	12.90	0.00
	5 - digit	0.00	4.24	19.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	7.74	0.00
4	1 - digit	0.00	59.06	34.09	0.00	0.00	0.00	0.00	61.53	0.00	0.00	0.00	0.00	0.00	0.00
	2 - digit	0.00	23.90	17.33	0.00	0.00	0.00	0.00	16.60	0.00	0.00	0.00	0.00	0.00	0.00
	3 - digit	0.00	14.34	14.89	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
	4 - digit	0.00	11.95	13.03	0.00	0.00	0.00	0.00	8.33	0.00	0.00	0.00	0.00	0.00	0.00
	5 - digit	0.00	11.95	13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	1 - digit	27.87	64.59	24.87	11.40	1.60	45.70	1.18	1.99	18.18	0.00	10.81	13.52	1.50	2.27
	2 - digit	24.65	31.87	17.85	14.66	0.28	33.01	5.16	0.00	40.78	0.00	0.70	23.75	7.12	4.07
	3 - digit	12.90	28.93	15.42	7.54	0.12	20.82	5.69	8.07	31.29	0.00	0.37	17.99	8.45	4.89
	4 - digit	9.54	19.83	10.99	6.03	0.09	16.59	4.56	5.27	20.71	0.00	0.64	13.33	6.46	3.32
	5 - digit	9.54	17.02	8.92	5.39	0.09	14.71	4.56	4.03	18.53	0.00	0.69	10.23	4.07	2.34

APPENDIX TABLE A.4.1.1

(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILLIPPINES
6	1 - digit	72.30	59.44	16.97	30.02	4.55	82.75	49.07	47.25	53.25	0.00	16.72	1.61	55.41	94.21
	2 - digit	24.68	30.05	26.40	24.41	12.28	28.08	26.14	30.45	40.26	0.00	8.31	24.67	12.27	23.31
	3 - digit	11.03	18.08	21.85	19.34	4.65	25.86	14.98	16.53	22.11	0.00	4.15	12.38	5.72	14.88
	4 - digit	6.95	12.30	15.09	15.48	3.20	18.53	9.40	13.48	16.24	0.00	4.27	9.80	3.96	8.20
	5 - digit	5.17	8.34	12.88	13.22	3.20	12.31	6.45	9.73	12.90	0.00	2.25	8.33	2.74	6.90
7	1 - digit	40.60	98.37	11.06	16.48	18.22	39.89	95.05	62.35	2.92	0.00	1.50	8.95	35.10	26.35
	2 - digit	37.95	44.31	11.98	24.07	6.21	48.31	40.92	48.40	54.19	0.00	11.41	42.49	33.88	19.87
	3 - digit	16.54	27.42	10.35	17.19	3.11	32.67	19.84	21.96	27.82	0.00	6.18	21.28	23.95	9.54
	4 - digit	12.52	19.09	7.75	12.28	2.44	21.84	13.41	17.80	20.85	0.00	4.74	15.74	16.10	6.55
	5 - digit	11.20	14.43	6.17	10.56	2.14	15.67	10.84	13.48	10.37	0.00	4.39	12.46	13.92	5.53
8	1 - digit	24.95	24.86	27.14	82.34	58.87	6.40	3.22	73.28	6.01	0.00	0.98	5.29	10.27	4.64
	2 - digit	20.03	17.27	24.64	36.72	52.23	10.06	21.52	22.11	33.22	0.00	1.12	10.65	19.47	11.47
	3 - digit	16.62	14.57	29.31	28.39	29.37	9.68	13.84	18.04	25.96	0.00	1.36	16.70	14.95	10.22
	4 - digit	9.67	8.22	17.91	15.73	16.98	6.76	5.05	11.72	12.95	0.00	0.68	14.25	6.42	4.68
	5 - digit	6.45	6.02	12.14	12.47	16.35	4.01	3.16	7.98	9.65	0.00	0.63	5.62	3.62	2.82
9	1 - digit	1.01	81.22	16.99	92.62	7.67	19.15	28.58	27.09	50.54	13.69	98.52	31.25	1.44	65.83
	2 - digit	0.72	16.36	17.02	22.99	11.36	36.20	29.30	18.25	20.29	13.69	65.74	19.00	1.40	65.83
	3 - digit	0.66	9.13	17.63	15.26	12.10	38.40	28.07	17.00	19.92	13.69	59.18	16.28	1.38	65.83
	4 - digit	0.55	8.22	18.90	15.26	12.10	35.09	20.80	14.87	17.43	13.69	59.18	31.83	1.19	65.83
	5 - digit	0.55	7.47	17.44	15.26	12.10	35.09	20.88	14.87	17.43	13.69	59.18	14.25	1.19	65.83

Source: Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.1.2

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY AT DIFFERENT LEVELS OF AGGREGATION, 1962 (%)

SITC	LEVELS OF AGGREGATION	U.S.A.	JAPAN	BEL-LUX	U.K.	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND	IRELAND
0	1 - digit	92.31	15.34	1.63	15.69	39.89	4.28	66.05	29.50	24.91	6.78	5.44	49.22	46.78	32.91	60.47
	2 - digit	62.25	19.44	20.79	23.14	18.58	24.89	27.63	23.25	36.63	8.53	14.95	16.02	25.25	8.42	9.55
	3 - digit	33.08	10.81	11.76	21.90	13.09	19.20	16.57	17.86	29.93	4.01	9.67	16.48	14.41	32.57	4.70
	4 - digit	33.08	10.81	11.76	21.90	13.09	19.20	16.57	17.86	29.93	4.01	9.67	16.48	14.41	32.57	4.70
	5 - digit	33.08	10.81	11.76	21.90	13.09	19.20	16.57	17.86	29.93	4.01	9.67	16.48	14.41	32.57	4.70
1	1 - digit	14.59	75.00	2.95	60.01	3.63	21.02	15.79	68.44	82.06	68.29	0.00	1.14	1.45	38.91	44.77
	2 - digit	12.97	75.00	3.20	22.86	21.97	34.30	62.94	26.94	42.46	68.29	0.00	5.93	1.20	42.28	47.18
	3 - digit	19.16	75.00	1.98	15.30	21.42	32.64	24.34	39.14	27.70	68.29	0.00	6.89	1.15	1.76	47.66
	4 - digit	19.16	75.00	1.98	15.30	21.42	32.64	24.34	39.14	27.70	68.29	0.00	6.89	1.15	3.76	47.66
	5 - digit	19.16	75.00	1.98	15.30	21.42	32.64	24.34	39.14	27.70	68.29	0.00	6.89	1.15	3.76	47.66
2	1 - digit	45.53	5.50	12.42	21.49	3.29	3.46	9.30	25.35	98.53	10.28	74.75	2.33	79.54	1.45	42.75
	2 - digit	40.44	17.13	10.62	22.52	22.54	8.18	15.25	28.17	30.35	10.16	18.64	15.40	31.57	2.16	21.41
	3 - digit	39.12	14.51	8.01	17.68	19.60	8.14	20.69	12.52	25.24	8.54	10.63	9.65	18.14	3.76	11.79
	4 - digit	39.12	14.51	8.01	17.68	19.60	8.14	20.69	12.52	25.24	8.54	10.63	9.65	18.14	3.76	11.79
	5 - digit	39.12	14.51	1.08	17.68	19.60	8.14	20.69	12.52	25.22	8.54	10.63	9.65	18.14	3.76	11.79

APPENDIX TABLE A.4.1.2

(cont'd)

SITC	LEVELS OF AGGREGATION	U.S.A.	JAPAN	BEL—LUX	U.K.	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND	IRELAND
3	1 - digit	53.95	0.00	0.00	29.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2 - digit	41.25	0.00	0.00	22.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3 - digit	0.00	0.00	0.00	20.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4 - digit	0.00	0.00	0.00	20.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5 - digit	23.20	0.00	0.00	20.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	1 - digit	11.66	30.12	46.00	69.94	76.47	0.00	56.49	79.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2 - digit	19.23	25.01	13.58	65.63	36.16	0.00	20.02	18.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3 - digit	13.09	23.99	8.95	59.43	18.08	0.00	11.30	10.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4 - digit	13.09	23.99	8.95	59.43	18.08	0.00	11.30	10.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5 - digit	13.09	23.99	8.95	59.43	18.08	0.00	11.30	10.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	1 - digit	64.66	93.62	93.52	74.65	29.56	17.44	84.69	67.17	49.02	19.06	12.40	34.00	93.91	9.19	9.05
	2 - digit	37.19	36.45	32.69	36.92	24.08	15.44	34.82	30.89	36.17	12.82	20.41	28.04	35.48	16.85	5.86
	3 - digit	24.48	32.55	26.68	33.52	25.15	14.16	21.50	28.34	29.37	8.62	15.89	25.51	30.99	20.07	5.14
	4 - digit	24.48	32.55	26.68	33.52	25.15	14.16	21.50	28.34	29.37	8.62	15.89	25.51	30.99	20.07	5.14
	5 - digit	24.48	32.55	26.68	33.52	25.15	14.16	21.50	28.34	29.37	8.62	15.89	25.51	30.99	20.07	5.14

APPENDIX TABLE A.4.1.2

SITC	LEVELS OF AGGREGATION	U.S.A	JAPAN	BEL—LUX	U.K.	FRANCE	GERMANY W.	ITALY	NETHERLANDS	DENMARK	AUSTRIA	FINLAND	NORWAY	SWEDEN	SWITZERLAND	IRELAND
6	1 - digit	74.69	26.75	47.64	70.47	76.48	89.98	95.37	64.47	95.46	38.02	49.56	50.48	84.85	80.48	61.86
	2 - digit	43.69	14.03	35.81	32.98	18.19	0.00	38.51	15.78	21.32	20.90	29.36	14.96	32.33	41.75	32.27
	3 - digit	30.66	7.81	25.56	27.40	14.81	19.23	11.42	26.55	26.55	8.30	9.18	13.52	17.47	18.35	18.58
	4 - digit	30.66	7.81	25.56	27.40	14.81	19.23	11.42	26.55	26.55	8.30	9.18	13.52	17.47	18.35	10.58
	5 - digit	30.66	7.81	25.56	27.40	14.81	19.23	11.42	26.55	13.82	8.30	9.18	13.52	17.47	18.35	18.58
7	1 - digit	33.51	82.32	48.28	21.35	86.34	48.15	58.69	93.53	48.38	53.14	17.30	65.80	43.41	59.97	82.31
	2 - digit	58.09	51.42	38.80	20.82	49.51	33.37	62.96	67.06	40.16	42.53	25.22	57.97	46.71	36.56	37.06
	3 - digit	38.49	26.21	24.38	24.40	44.47	22.71	40.22	42.05	27.41	25.41	16.71	32.70	32.22	21.77	25.43
	4 - digit	38.47	26.21	24.38	24.40	44.47	22.71	40.22	42.05	27.41	25.41	16.71	32.70	32.22	21.77	25.43
	5 - digit	38.47	26.21	24.38	24.40	44.47	22.71	40.22	42.05	27.41	25.43	16.71	32.70	32.22	21.77	25.43
8	1 - digit	28.10	1.60	42.17	28.31	10.30	58.60	91.20	98.37	10.23	9.00	96.22	14.21	58.25	20.91	82.31
	2 - digit	46.02	13.23	14.82	32.29	20.05	45.15	33.13	10.25	10.74	6.09	53.12	17.43	47.65	18.78	26.97
	3 - digit	29.37	5.56	11.35	28.96	18.95	20.79	11.88	29.42	11.17	7.50	53.37	23.06	42.41	4.54	20.46
	4 - digit	29.37	5.56	11.35	28.96	18.95	20.79	11.88	29.42	11.17	7.50	53.37	23.06	42.41	4.54	20.46
	5 - digit	29.37	5.56	11.35	28.96	18.95	20.79	11.88	29.42	11.17	7.50	53.37	23.06	42.41	4.54	20.46
9	1 - digit.	30.19	10.42	80.56	15.23	93.45	56.95	85.68	12.62	53.23	65.62	78.26	20.16	13.37	8.80	58.64
	2 - digit	43.63	34.08	28.87	24.97	41.21	28.75	10.08	26.64	42.07	27.55	43.63	20.40	8.39	5.07	36.54
	3 - digit	62.46	38.86	21.49	30.68	33.75	20.40	17.42	9.68	40.48	19.93	36.70	20.16	7.26	78.64	32.16
	4 - digit	62.46	38.86	21.49	30.68	33.75	20.40	17.42	9.68	40.48	19.93	36.70	20.16	7.26	78.64	32.16
	5 - digit	62.46	38.86	21.49	30.68	33.75	20.40	17.42	9.68	40.48	19.93	36.70	20.16	7.26	78.64	32.16

APPENDIX TABLE A.4.1.2
(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILLIPPINES
0	1 - digit	29.60	32.13	10.69	17.06	0.00	51.32	0.00	0.00	51.37	0.00	1.64	3.47	2.27	5.00
	2 - digit	5.70	14.80	7.51	2.51	0.00	14.46	0.00	0.00	9.23	0.00	3.34	0.50	3.33	1.26
	3 - digit	5.11	14.45	6.16	1.03	0.00	7.59	0.00	0.00	4.47	0.00	1.07	0.19	1.28	0.61
	4 - digit	5.11	14.45	6.16	1.03	0.00	7.59	0.00	0.00	4.47	0.00	1.07	0.19	1.28	0.61
	5 - digit	5.11	14.45	6.16	1.03	0.00	7.59	0.00	0.00	4.47	0.00	1.07	0.19	1.28	0.61
1	1 - digit	38.60	29.35	99.86	10.34	40.35	4.16	0.00	0.00	36.11	0.00	0.00	54.54	0.00	88.88
	2 - digit	15.98	29.35	35.36	10.26	13.45	4.31	0.00	0.00	36.11	0.00	0.00	18.18	0.00	29.63
	3 - digit	9.09	29.35	22.46	10.35	8.07	13.83	0.00	0.00	36.11	0.00	0.00	10.91	0.00	14.81
	4 - digit	9.09	29.35	22.46	10.35	8.07	13.83	0.00	0.00	36.11	0.00	0.00	10.91	0.00	14.81
	5 - digit	9.09	29.35	0.00	10.35	8.07	13.83	0.00	0.00	36.11	0.00	0.00	10.91	0.00	14.81
2	1 - digit	12.61	8.70	47.26	61.86	44.44	98.55	11.43	0.00	0.55	0.00	0.00	86.16	39.82	73.14
	2 - digit	15.04	12.50	23.25	14.48	11.11	40.45	3.21	0.00	1.55	0.00	0.00	8.80	16.10	9.14
	3 - digit	7.12	7.37	11.84	9.38	5.55	29.55	1.51	0.00	0.70	0.00	0.00	3.59	14.86	4.30
	4 - digit	7.12	7.37	11.84	9.38	5.55	29.55	1.51	0.00	0.70	0.00	0.00	3.59	14.86	4.30
	5 - digit	7.12	7.37	0.00	9.38	5.55	29.55	1.51	0.00	0.70	0.00	0.00	3.59	14.86	4.30

APPENDIX TABLE A.4.1.2
(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILIPPINES
3	1-digit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-digit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3-digit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4-digit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5-digit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	1-digit	0.00	73.82	65.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-digit	0.00	73.82	32.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3-digit	0.00	73.82	25.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4-digit	0.00	73.82	25.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5-digit	0.00	73.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	1-digit	15.78	96.47	11.51	5.79	0.00	29.01	0.00	0.00	18.18	0.00	10.81	43.58	14.90	0.00
	2-digit	2.23	40.76	26.72	6.41	0.00	25.25	0.00	0.00	16.41	0.00	2.21	23.71	22.36	0.00
	3-digit	1.11	29.58	21.83	5.38	0.00	19.69	0.00	0.00	13.20	0.00	1.44	25.97	1.14	0.00
	4-digit	1.11	29.58	21.83	5.38	0.00	19.69	0.00	0.00	13.20	0.00	1.44	25.97	1.14	0.00
	5-digit	1.11	29.58	0.00	5.38	0.00	19.69	0.00	0.00	13.28	0.00	1.44	25.97	1.14	0.00

APPENDIX TABLE A.4.1.2
(cont'd)

SITC	LEVELS OF AGGREGATION	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA	PHILLIPPINES
6	1-digit	28.16	45.17	11.14	0.50	3.48	64.72	3.41	0.00	53.25	0.00	0.13	1.61	84.33	5.88
	2-digit	17.16	9.96	21.54	3.47	0.58	35.39	7.58	0.00	36.20	0.00	3.86	0.64	18.26	5.93
	3-digit	7.27	3.41	12.38	2.83	0.23	18.39	2.55	0.00	17.37	0.00	2.78	1.57	5.16	2.66
	4-digit	7.27	3.41	12.38	2.83	0.23	18.39	2.55	0.00	17.37	0.00	2.78	1.57	5.16	2.66
	5-digit	7.27	3.41	0.00	2.83	0.23	18.35	2.55	0.00	17.37	0.00	2.78	1.57	5.16	2.66
7	1-digit	16.15	46.10	3.43	0.00	0.00	39.71	5.96	0.00	2.92	0.00	0.05	0.95	0.57	0.00
	2-digit	8.78	30.58	4.81	0.00	0.00	13.52	16.71	0.00	2.09	0.00	0.04	1.02	0.42	0.00
	3-digit	15.45	21.72	9.64	0.00	0.00	9.09	6.08	0.00	6.74	0.00	0.03	6.65	4.64	0.00
	4-digit	15.45	21.72	9.64	0.00	0.00	9.09	6.08	0.00	6.74	0.00	0.03	6.65	4.64	0.00
	5-digit	15.45	21.72	0.00	0.00	0.00	9.09	6.08	0.00	6.74	0.00	0.03	6.65	4.64	0.00
8	1-digit	85.86	6.62	17.94	0.00	0.00	8.19	72.97	0.00	6.01	0.00	2.07	5.29	32.95	42.01
	2-digit	14.38	8.93	17.25	0.00	0.00	11.86	25.83	0.00	4.16	0.00	1.76	22.74	21.01	15.07
	3-digit	5.08	7.51	20.52	0.00	0.00	11.81	17.01	0.00	4.35	0.00	0.59	11.37	16.72	10.87
	4-digit	5.08	7.51	20.52	0.00	0.00	11.81	17.01	0.00	4.35	0.00	0.59	11.37	16.72	10.87
	5-digit	5.08	7.51	0.00	0.00	0.00	11.81	17.01	0.00	4.35	0.00	0.59	11.37	16.72	10.87
9	1-digit	70.00	55.55	13.20	54.86	66.66	9.27	74.62	0.00	50.54	0.00	39.65	31.25	61.23	57.14
	2-digit	35.10	55.55	9.25	49.32	28.28	6.28	75.49	0.00	50.54	0.00	39.65	31.25	27.84	57.14
	3-digit	28.12	55.55	8.45	48.21	20.60	5.68	74.57	0.00	50.54	0.00	39.65	31.25	23.05	57.14
	4-digit	28.12	55.55	8.45	48.21	20.60	5.68	74.57	0.00	50.54	0.00	39.65	31.25	23.05	57.14
	5-digit	28.12	55.55	8.45	48.21	20.60	5.68	74.57	0.00	50.54	0.00	39.65	31.25	23.05	57.14

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.2.1

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY SITC 0 THROUGH 9, SUMMARY VALUES (1976)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN	FRANCE
0	FOOD & LIVE ANIMALS	(a)	51.28	7.32	7.28	8.40	21.84	17.51	25.09	20.96	33.71	13.24	27.08	19.72	12.24	32.61
		(b)	74.44	50.25	57.48	51.82	42.93	45.53	53.36	34.60	34.53	49.90	50.08	41.06	57.69	53.02
		(c)	63.59	35.88	43.37	36.04	38.31	41.92	39.44	30.78	34.32	41.32	40.61	33.76	39.86	46.42
1	BEVERAGE AND TOBACCO	(a)	12.39	21.97	3.22	2.60	25.26	31.09	1.79	20.88	7.38	24.66	19.30	68.98	25.82	0.70
		(b)	83.15	97.93	98.84	76.22	74.35	36.02	100.00	47.78	56.83	40.57	89.41	78.57	33.33	100.00
		(c)	61.66	51.63	48.85	68.51	59.20	35.41	76.94	37.37	35.47	33.08	83.09	69.77	33.33	81.31
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS	(a)	32.76	0.86	1.73	1.26	3.35	6.21	1.15	11.82	39.52	7.39	34.38	3.49	16.78	8.04
		(b)	72.61	44.15	58.99	55.25	38.39	61.23	76.82	44.26	58.78	97.32	51.49	86.04	59.64	84.04
		(c)	60.62	33.37	35.40	28.88	30.44	41.44	36.09	31.55	44.38	44.53	41.67	33.82	46.10	44.95
3	MINERAL FUELS LUBRICANTS AND RELATED MATERIALS	(a)	11.63	0.07	5.53	3.42	33.16	61.14	0.00	0.00	0.00	28.33	0.01	0.00	2.68	49.99
		(b)	48.08	37.24	83.87	75.00	96.49	75.27	0.00	0.00	0.00	58.53	75.00	0.00	76.31	92.33
		(c)	37.86	34.24	55.61	74.99	89.90	75.27	50.00	0.00	50.00	58.34	50.40	50.00	74.59	89.69
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	16.60	2.54	0.03	15.65	1.66	34.09	57.35	0.00	0.00	7.93	0.00	31.74	50.00	2.80
		(b)	60.14	76.63	25.00	25.00	33.94	41.91	73.34	0.00	0.00	41.60	0.00	61.19	73.91	25.00
		(c)	51.32	71.67	25.00	25.00	29.22	33.69	62.11	0.00	0.00	40.62	50.00	61.20	73.91	11.21

APPENDIX TABLE A.4.2.1
(cont'd)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN	FRANCE
5	CHEMICALS	(a)	47.94	44.51	66.06	43.65	50.96	48.66	13.35	10.08	46.31	20.46	17.36	28.01	28.05	35.56
		(b)	65.19	52.79	78.42	49.73	85.93	60.74	59.34	86.46	51.30	90.28	63.94	76.97	94.34	85.54
		(c)	53.34	47.59	70.88	46.61	50.04	50.90	42.95	44.28	49.32	60.42	56.07	44.71	85.46	68.85
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	53.58	13.96	45.24	28.86	38.99	32.49	22.88	41.05	41.90	42.76	48.97	3.00	32.38	32.81
		(b)	60.48	46.48	48.82	37.50	52.68	45.98	91.01	48.13	68.39	45.40	82.08	81.49	45.43	38.89
		(c)	57.72	36.94	47.39	34.55	47.73	40.28	67.91	40.53	52.03	43.56	57.97	42.32	40.10	38.06
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	72.20	8.37	63.54	33.41	60.16	40.03	0.00	42.88	39.56	18.62	40.94	58.57	20.99	64.82
		(b)	99.77	97.17	72.80	80.22	69.24	92.93	0.00	83.42	82.62	97.29	79.22	70.15	99.22	73.15
		(c)	78.14	56.54	69.21	60.63	66.06	77.03	0.00	68.41	69.50	77.53	63.53	65.16	79.64	66.00
8	MISCELLANEOUS MANUFACTURED ARTICLES.	(a)	34.64	6.55	34.22	5.76	40.31	28.57	16.97	30.37	18.86	43.05	8.28	6.13	39.51	14.82
		(b)	92.45	73.69	77.99	65.72	78.37	88.33	86.40	86.56	93.76	68.89	92.08	92.12	90.99	92.84
		(c)	73.12	58.73	50.16	42.88	56.10	67.89	63.09	47.38	83.76	51.39	43.79	64.06	60.22	72.90
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	48.58	4.66	52.65	10.17	21.22	24.19	24.46	37.94	47.20	13.79	38.02	9.20	24.76	18.05
		(b)	99.15	96.38	100.00	100.00	100.00	100.00	100.00	100.00	98.15	100.00	92.09	100.00	100.00	99.65
		(c)	95.72	94.80	92.80	97.47	99.47	93.99	99.99	99.99	98.16	91.54	92.01	35.22	88.68	96.36

APPENDIX TABLE A.4.2.1
(cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	KUWAIT	ISRAEL	VENEZUELA	BRAZIL	INDIA
0	FOOD AND LIVE ANIMALS.	(a)	18.69	25.18	25.24	26.22	4.94	6.93	2.52	44.57	22.79	27.80	0.00	7.84	23.39	16.90	18.99
		(b)	31.18	34.98	81.26	40.30	48.20	49.94	81.42	55.62	34.10	53.73	0.00	37.28	39.87	32.44	27.88
		(c)	30.80	32.19	56.76	32.68	34.80	47.27	49.61	50.10	34.09	48.15	50.00	32.55	35.49	32.13	27.86
1	BEVERAGE AND TOBACCO.	(a)	7.50	16.43	0.17	1.71	10.63	63.92	0.00	7.65	0.00	2.81	0.00	8.79	0.00	26.66	13.33
		(b)	55.55	100.00	100.00	100.00	79.53	87.87	0.00	98.48	0.00	50.00	0.00	63.96	0.00	72.72	33.33
		(c)	34.94	60.72	75.93	75.93	79.56	76.53	50.00	39.70	50.00	50.00	50.00	57.31	50.00	40.13	33.33
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS.	(a)	19.82	9.87	9.20	10.78	35.68	32.44	9.74	41.25	0.53	7.11	0.00	23.37	0.00	34.41	15.05
		(b)	32.49	82.84	71.34	75.38	35.79	32.86	40.08	62.22	30.76	40.80	0.00	35.03	0.00	43.34	36.49
		(c)	29.24	45.75	29.55	38.70	35.62	32.75	40.08	53.86	28.12	40.02	50.00	30.88	50.00	39.58	36.03
3	MINERAL FUELS LUBRICANTS AND RELATED MATERIALS.	(a)	0.00	3.69	0.00	0.00	36.52	0.00	0.00	26.86	0.00	12.12	0.00	0.00	0.00	0.00	0.00
		(b)	0.00	75.00	0.00	0.00	75.00	0.00	0.00	33.33	0.00	25.00	0.00	0.00	85.71	0.00	0.00
		(c)	50.00	75.00	50.00	50.00	75.00	50.00	0.00	25.00	50.00	25.00	50.00	50.00	50.96	50.00	0.00
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	0.00	0.70	25.48	26.91	41.06	0.00	0.00	16.19	9.86	0.00	0.00	24.67	0.00	0.00	0.10
		(b)	0.00	33.33	25.98	29.15	100.00	0.00	0.00	85.62	39.34	0.00	0.00	88.07	0.00	0.00	77.77
		(c)	50.00	25.00	25.00	25.00	73.29	50.00	0.00	85.41	34.14	0.00	0.00	52.26	50.00	50.00	66.67

APPENDIX TABLE A.4.2.1
(cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	KUWAIT	ISRAEL	VENEZUELA	BRAZIL	INDIA
5	CHEMICALS	(a)	0.08	[illegible]4.16	41.62	30.72	24.88	12.86	0.20	32.74	11.38	0.56	0.00	40.43	36.98	7.89	10.88
		(b)	80.00	79.94	52.14	63.83	58.40	37.71	33.33	97.21	39.64	51.30	0.00	45.31	41.26	81.54	39.42
		(c)	34.06	65.65	51.41	53.60	36.59	31.91	29.56	52.80	33.14	28.42	50.00	44.95	38.38	42.08	27.81
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	38.14	29.92	19.59	32.41	19.64	30.66	1.26	35.71	58.59	17.10	0.53	28.79	1.53	25.40	22.50
		(b)	39.54	37.05	27.85	44.63	54.95	74.93	47.92	39.02	79.53	31.65	75.00	63.62	50.03	38.76	30.59
		(c)	38.26	34.89	27.13	39.64	36.60	55.74	27.87	33.87	73.41	30.13	32.13	50.32	26.04	37.35	30.34
7	MACHINERY AND TRANSPORT EQUIPMENT	(a)	5.38	31.07	44.75	54.74	6.96	4.44	2.64	28.28	0.00	37.10	0.00	0.00	0.66	64,06	92.84
		(b)	86.25	35.50	50.32	70.30	93.90	82.73	96.97	91.20	0.00	69.96	0.00	0.00	76.26	84.25	25.32
		(c)	49.20	64.00	48.78	59.74	59.97	55.68	71.13	66.91	50.00	51.93	50.00	0.00	75.74	63.87	62.99
8	MISCELLENEOUS MANUFACTURED ARTICLES.	(a)	7.57	37.07	4.83	8.04	21.42	34.68	24.39	2.84	0.22	17.71	0.00	7.39	4.08	3.17	3.08
		(b)	56.47	54.00	86.69	72.11	88.23	62.18	31.08	80.20	84.59	63.95	0.00	54.19	79.78	37.42	89.02
		(c)	44.75	45.95	47.50	44.98	71.87	54.93	30.74	46.55	30.85	57.12	50.00	40.05	35.90	29.05	32.89
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KING.	(a)	56.83	23.36	17.31	23.25	88.94	62.94	91.52	10.98	1.74	39.46	12.50	56.33	64.26	38.72	37.59
		(b)	100.00	96.03	99.08	100.00	99.45	93.50	100.00	100.00	100.00	100.00	100.00	97.70	90.58	100.00	99.76
		(c)	99.99	96.02	99.08	97.44	99.38	93.39	100.00	99.72	99.99	99.99	99.99	97.21	90.58	95.43	99.74

NB: (a) IITB - Unadjusted G-L Index
(b) IITC - Adjusted G-L Index
(c) IITQ - Antonio adjusted index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.2.2
(cont'd)

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY
SITC 0 THROUGH 9, SUMMARY VALUES (1971)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN	FRANCE
0	FOOD & LIVE ANIMALS.	(a)	59.61	11.27	5.04	12.66	16.96	14.91	26.83	36.38	30.36	10.70	39.60	28.03	8.77	32.70
		(b)	62.76	43.17	35.32	42.11	39.50	51.97	35.65	41.84	35.10	51.31	46.93	77.69	71.46	46.30
		(c)	59.70	34.09	32.68	37.91	33.65	44.92	35.57	39.85	30.18	38.42	43.13	41.05	46.17	41.68
1	BEVERAGE AND TOBACCO.	(a)	8.83	37.42	10.93	2.65	25.24	22.72	9.31	43.54	4.24	38.74	38.89	6.38	20.74	1.12
		(b)	71.54	100.00	78.46	100.00	89.37	37.67	100.00	46.72	76.19	77.38	52.97	100.00	33.33	94.28
		(c)	61.03	97.62	64.71	76.15	76.60	35.49	79.88	46.73	36.53	62.02	50.14	51.86	33.33	77.19
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS.	(a)	31.94	1.31	1.86	3.94	2.26	7.39	0.58	13.56	4.98	2.57	45.75	1.16	19.09	2.76
		(b)	71.74	66.21	63.57	64.95	36.12	56.42	100.00	40.50	75.89	33.94	49.55	79.69	47.48	77.83
		(c)	58.25	31.05	48.67	30.00	27.75	40.61	37.62	32.34	38.86	83.74	48.70	31.91	39.91	38.52
3	MINERAL FUELS, LUBRICANTS AND RELATED MATERIALS.	(a)	16.48	0.01	0.00	28.98	15.85	31.56	0.00	0.00	0.00	5.90	0.00	0.48	14.28	27.27
		(b)	56.48	80.00	0.00	36.42	33.26	62.98	0.00	0.00	0.00	100.00	0.00	25.00	33.33	39.4[illegible]
		(c)	41.29	49.41	50.00	35.06	33.11	61.04	0.00	0.00	0.00	98.76	50.00	25.00	27.29	36.2[illegible]
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	20.25	0.53	0.00	0.00	9.17	9.05	0.00	0.00	0.00	10.56	0.00	0.00	0.00	6.50
		(b)	99.58	63.95	0.00	0.00	33.11	95.09	0.00	0.00	0.00	33.23	0.00	0.00	0.00	47.05
		(c)	44.31	55.57	50.00	50.00	25.18	70.46	50.00	0.00	0.00	27.79	50.00	50.00	50.00	40.58

APPENDIX TABLE A.4.2.2
(cont'd)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN	FRANCE
5	CHEMICALS	(a)	46.75	31.92	59.14	50.16	60.78	51.95	32.12	12.34	48.66	17.13	46.36	45.23	54.61	31.98
		(b)	65.04	39.87	60.44	58.57	64.08	52.84	58.40	41.37	48.88	83.96	81.51	75.69	84.34	79.95
		(c)	54.39	37.17	58.70	54.70	59.23	52.55	45.98	40.43	48.57	59.59	68.67	64.43	71.74	53.49
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	48.45	13.18	38.23	30.21	36.70	32.52	4.81	40.69	45.71	35.34	32.21	14.33	27.97	31.43
		(b)	58.80	42.03	44.84	34.64	47.05	47.17	62.31	44.93	59.55	37.80	39.40	55.40	46.50	39.76
		(c)	54.17	32.46	41.50	31.89	42.20	40.63	48.64	40.37	54.46	35.55	35.17	50.02	41.17	37.51
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	78.36	9.24	70.58	28.73	55.78	40.53	13.21	49.90	41.32	21.22	49.85	54.32	26.42	38.44
		(b)	94.22	97.30	70.79	83.77	68.33	87.48	88.79	76.05	81.23	83.88	78.93	76.27	98.93	87.33
		(c)	77.24	53.20	70.57	68.24	61.49	72.40	57.05	65.33	59.84	62.96	68.30	61.20	80.07	72.13
8	MISCELLANEOUS MANUFACTURED ARTICLES.	(a)	36.10	7.30	17.23	2.89	25.49	21.72	4.33	16.39	20.57	17.91	15.87	21.33	40.84	9.80
		(b)	79.10	98.67	86.68	79.06	83.80	93.16	91.50	85.36	92.09	62.20	92.74	88.03	69.86	94.03
		(c)	60.55	53.20	58.49	54.56	54.51	64.48	77.74	50.87	62.91	50.73	47.04	64.34	54.15	65.02
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	46.17	1.65	13.36	22.29	9.64	31.12	1.78	67.14	1.87	1.99	14.90	5.37	0.08	4.00
		(b)	81.51	71.42	100.00	99.84	80.55	41.09	33.33	100.00	33.33	84.72	34.76	93.93	42.85	35.49
		(c)	71.83	45.65	50.34	52.47	48.13	38.88	33.33	97.46	33.33	34.77	34.76	93.94	28.14	33.67

APPENDIX TABLE A.4.2.2
(cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NETHERLANDS	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	KUWAIT	ISRAEL	VENEZUELA	BRAZIL	INDIA
0	FOOD AND LIVE ANIMALS.	(a)	13.40	31.12	31.25	30.81	4.11	4.51	8.02	47.65	5.06	18.96	0.00	14.67	7.45	28.68	19.98
		(b)	30.88	32.67	49.57	33.48	47.46	34.39	27.63	56.26	50.51	36.16	0.00	34.30	46.63	33.59	30.61
		(c)	30.55	32.59	35.04	28.92	37.33	31.18	26.52	48.17	33.20	35.80	50.00	33.60	35.97	32.93	30.57
1	BEVERAGE AND TOBACCO.	(a)	0.00	64.29	1.31	5.88	14.04	77.14	24.65	1.15	0.00	0.00	0.00	11.12	0.00	20.00	19.04
		(b)	0.00	80.27	100.00	100.00	81.09	78.26	75.00	40.67	0.00	0.00	0.00	44.68	0.00	50.00	33.33
		(c)	50.00	74.59	75.73	75.94	73.92	76.79	75.00	100.00	0.00	50.00	50.00	37.35	50.00	37.50	33.33
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS.	(a)	11.62	8.73	100.00	4.87	35.00	34.91	0.94	46.77	1.72	4.83	0.00	1.07	0.51	33.32	1.82
		(b)	33.20	88.50	48.67	74.85	35.83	36.64	36.63	56.46	25.90	36.94	0.00	37.50	65.42	41.00	46.14
		(c)	30.80	65.70	33.91	39.74	34.44	33.92	35.59	55.06	25.19	34.37	50.00	35.04	31.95	36.46	35.49
3	MINERAL FUELS, LUBRICANTS AND RELATED MATERIALS.	(a)	0.00	0.00	0.00	9.87	29.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	9.67
		(b)	0.00	0.00	0.00	33.33	89.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.48	0.00	75.00
		(c)	50.00	50.00	50.00	33.23	74.99	50.00	0.00	0.00	0.00	0.00	0.00	0.00	53.15	0.00	74.99
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	0.00	14.63	0.00	19.68	33.75	0.00	0.00	0.00	0.00	15.38	0.00	0.00	0.00	0.00	0.00
		(b)	0.00	25.00	0.00	33.33	99.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00
		(c)	50.00	25.00	50.00	25.00	96.77	50.00	50.00	50.00	0.00	25.00	0.00	0.00	50.00	50.00	0.00

APPENDIX TABLE A.4.2.2 (cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NETHERLANDS	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	KUWAIT	ISRAEL	VENEZUELA	BRAZIL	INDIA
5	CHEMICALS	(a)	1.70	15.31	12.90	39.73	17.69	4.78	0.53	31.32	1.09	1.12	0.00	58.03	1.70	10.38	0.97
		(b)	75.00	86.12	46.30	61.50	71.12	41.95	33.33	68.53	98.85	56.66	0.00	71.33	37.50	76.73	65.07
		(c)	31.58	59.20	39.89	50.19	38.92	27.00	31.23	56.96	36.02	33.41	50.00	61.65	31.64	53.33	40.99
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	11.31	30.76	22.46	26.55	13.58	6.27	0.87	36.53	25.20	21.09	0.00	32.10	0.26	11.19	28.07
		(b)	30.48	34.14	22.17	30.52	87.57	62.92	37.41	37.25	41.05	27.15	0.00	37.09	66.60	36.92	34.63
		(c)	27.20	33.46	25.98	30.05	47.38	35.24	27.36	36.15	33.52	26.84	50.00	36.05	31.32	32.59	33.87
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	0.07	20.40	43.72	26.56	6.93	1.41	0.12	27.17	32.60	25.31	0.00	25.53	0.00	4.23	1.28
		(b)	75.00	82.66	45.40	71.45	95.86	91.59	100.00	64.83	93.58	51.07	0.00	79.84	100.00	89.56	83.77
		(c)	50.67	66.06	44.80	57.22	56.56	67.02	61.92	53.18	69.98	37.03	50.00	66.78	50.24	56.28	49.97
8	MISCELLENEOUS MANUFACTURED ARTICLES.	(a)	16.57	27.49	2.88	4.37	41.21	26.42	18.81	3.45	0.79	8.64	0.00	4.95	3.07	6.47	24.29
		(b)	30.45	39.56	33.03	72.25	73.18	59.50	59.49	86.46	86.93	53.54	0.00	94.30	90.00	71.60	34.23
		(c)	29.33	36.80	32.84	37.42	64.65	49.41	56.79	65.83	57.53	46.97	50.00	50.08	45.07	36.21	31.58
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	26.66	0.11	0.00	17.33	46.76	15.95	28.18	1.53	0.00	29.62	0.00	71.29	0.00	96.74	96.05
		(b)	33.33	100.00	0.00	76.53	67.11	35.71	50.98	100.00	0.00	100.00	0.00	100.00	0.00	98.34	100.00
		(c)	33.33	99.76	50.00	37.91	51.51	35.71	40.07	95.93	50.00	65.21	50.00	99.99	50.00	98.34	99.77

NB: (a) IITB - Unadjusted G-L Index
(b) IITC - Adjusted G-L Index
(c) IITQ - Antonio adjusted index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.2.3

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY
SITC 0 THROUGH 9, SUMMARY VALUES (1966)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN	FRANCE
0	FOOD & LIVE ANIMALS	(a)	56.47	5.81	2.29	14.33	16.93	12.32	3.67	23.01	3.97	6.54	29.16	14.67	11.91	22.53
		(b)	58.60	38.37	40.99	39.88	41.22	57.47	33.65	36.06	36.25	61.88	65.40	38.45	60.66	39.73
		(c)	56.98	30.12	32.89	32.18	36.30	41.99	33.40	33.50	34.99	38.85	41.79	30.34	44.04	38.18
1	BEVERAGE AND TOBACCO	(a)	8.57	43.54	3.67	5.97	22.18	22.88	12.93	40.31	36.20	50.18	33.59	11.73	0.00	2.10
		(b)	61.00	100.00	71.42	92.83	73.19	36.42	100.00	63.19	100.00	59.05	46.47	74.28	0.00	100.00
		(c)	57.28	99.68	69.94	75.61	69.90	35.51	80.39	47.12	62.10	50.83	42.00	66.95	50.00	82.93
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS.	(a)	33.01	2.86	5.68	4.20	4.86	8.72	10.10	30.73	26.76	3.07	56.17	1.66	12.09	5.76
		(b)	75.73	61.23	58.34	79.41	38.58	50.24	75.29	46.23	39.01	80.14	57.86	51.12	39.57	87.90
		(c)	63.00	38.34	36.45	36.25	30.92	40.14	73.75	40.18	38.22	47.70	56.29	34.38	38.82	41.86
3	MINERAL FUELS, LUBRICANTS AND RELATED MATERIALS.	(a)	30.52	0.01	0.00	0.00	0.00	20.91	0.00	0.00	0.00	0.00	0.00	0.00	100.00	1.60
		(b)	53.15	100.00	0.00	0.00	0.00	99.29	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00
		(c)	43.61	48.42	50.00	50.00	50.00	86.36	0.00	0.00	50.00	50.00	0.00	50.00	99.99	99.18
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	10.27	1.77	0.00	19.81	13.50	26.00	0.00	0.00	0.00	4.17	0.00	43.90	0.00	0.00
		(b)	93.32	37.33	0.00	25.00	27.13	100.00	0.00	0.00	0.00	25.00	0.00	100.00	0.00	0.00
		(c)	57.47	29.00	0.00	25.00	25.92	68.27	50.00	0.00	0.00	25.00	50.00	74.99	50.00	50.00

APPENDIX TABLE A.4.2.3
(cont'd)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN	FRANCE
5	CHEMICALS	(a)	47.12	26.32	48.77	48.96	40.00	66.18	32.55	73.55	42.42	15.09	41.06	11.31	63.50	27.84
		(b)	67.57	49.52	90.88	56.17	72.92	68.81	47.19	76.21	58.78	82.77	59.84	91.15	65.24	76.56
		(c)	59.13	40.28	65.72	50.98	61.06	66.80	49.91	76.21	50.00	61.20	58.72	60.83	62.85	56.69
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	45.24	11.41	13.02	26.16	38.43	28.64	10.76	19.29	26.27	35.11	33.04	38.37	22.33	30.40
		(b)	56.27	39.13	48.02	41.14	53.97	44.92	68.72	42.10	46.57	45.84	35.43	52.28	46.19	36.49
		(c)	51.49	31.13	40.05	35.03	46.38	39.68	45.81	32.78	40.46	39.35	34.65	52.05	37.99	35.71
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	56.50	25.89	51.70	29.73	48.28	26.82	20.13	22.09	9.37	22.82	28.05	56.56	21.02	49.62
		(b)	98.38	95.02	64.77	47.25	71.28	95.68	67.02	85.22	81.68	76.89	69.11	57.63	94.63	86.00
		(c)	79.90	60.01	55.21	44.82	65.10	75.70	50.21	65.85	58.67	59.08	51.45	56.82	75.80	65.75
8	MISCELLENEOUS MANUFACTURED ARTICLES.	(a)	18.07	1.32	21.11	3.88	30.23	24.41	6.95	25.13	56.79	15.07	10.65	32.41	41.80	9.46
		(b)	90.83	83.55	78.90	89.86	81.47	82.92	89.40	79.37	74.18	68.91	80.10	42.12	71.21	56.84
		(c)	62.75	55.50	62.51	62.69	55.28	62.83	65.05	50.69	57.53	50.29	43.54	38.24	57.13	65.30
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	21.69	2.01	28.34	12.97	33.69	16.29	14.66	69.56	18.98	22.94	27.14	24.12	16.38	13.21
		(b)	74.38	100.00	100.00	54.54	37.27	100.00	68.75	100.00	46.87	60.88	53.11	77.42	44.44	100.00
		(c)	66.19	98.94	83.53	53.19	37.26	67.97	68.75	98.90	36.77	48.44	53.12	73.75	44.44	86.28

APPENDIX TABLE A.4.2.3
(cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	KUWAIT	ISRAEL	VENEZUELA	BRAZIL	INDIA
0	FOOD AND LIVE ANIMALS.	(a)	14.56	17.27	21.49	22.95	7.66	10.84	27.06	24.99	1.11		0.00	10.76	0.91	5.22	9.20
		(b)	26.43	33.26	46.67	35.93	38.31	25.57	29.17	40.20	36.25		0.00	33.16	35.52	50.27	32.48
		(c)	26.21	32.35	30.30	27.60	34.20	25.20	25.24	35.44	33.15		50.00	33.17	34.55	8.40	31.57
1	BEVERAGE AND TOBACCO.	(a)	0.00	66.98	4.73	11.34	11.72	0.00	0.00	2.81	0.00		0.00	15.65	40.00	31.32	0.00
		(b)	0.00	80.11	100.00	100.00	44.35	0.00	0.00	100.00	0.00		0.00	60.00	100.00	33.33	0.00
		(c)	50.00	80.11	77.10	76.34	37.96	50.00	50.00	58.57	50.00		0.00	52.41	100.00	33.33	50.00
2	CRUDE MATERIALS INEDIBLE EXCEPT FUELS.	(a)	29.17	2.30	5.49	2.75	25.72	23.38	36.61	54.04	3.32		0.00	2.17	5.14	31.35	9.35
		(b)	31.38	89.38	68.03	81.75	49.44	36.25	36.64	59.23	24.82		0.00	31.72	36.29	41.76	36.15
		(c)	31.17	57.82	32.16	58.41	38.17	32.42	36.59	53.18	24.83		50.00	29.64	33.70	40.13	33.95
3	MINERAL FUELS, LUBRICANTS AND RELATED MATERIALS.	(a)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.02	0.00	0.00
		(b)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	100.00	0.00	0.00
		(c)	50.00	50.00	0.00	0.00	50.00	50.00	0.00	50.00	0.00		50.00	0.00	59.25	0.00	50.00
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	0.00	16.55	0.00	0.00	11.46	0.00	0.00	0.00	0.00		0.00	0.00	4.29	0.00	0.00
		(b)	0.00	93.52	0.00	0.00	33.33	0.00	0.00	0.00	0.00		0.00	0.00	33.33	0.00	0.00
		(c)	50.00	59.98	50.00	50.00	33.33	50.00	0.00	50.00	0.00		0.00	50.00	28.35	50.00	50.00

APPENDIX TABLE A.4.2.3
(cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	KUWAIT	ISRAEL	VENEZUELA	BRAZIL	INDIA
5	CHEMICALS	(a)	19.81	36.29	25.71	36.18	14.23	0.67	0.85	10.68	0.00		0.00	67.07	0.00	16.04	1.40
		(b)	52.10	38.86	90.47	39.90	80.76	75.00	33.33	58.74	0.00		0.00	69.42	0.00	86.12	34.28
		(c)	35.10	37.96	47.98	38.05	46.98	26.09	33.12	39.60	50.00		50.00	67.30	50.00	57.31	33.94
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	5.42	34.30	10.59	12.44	22.56	2.00	0.92	33.00	13.94		0.00	23.56	0.02	6.51	25.32
		(b)	45.53	59.45	33.27	36.11	69.16	89.12	66.66	37.43	29.64		0.00	41.98	75.00	43.48	31.89
		(c)	35.05	51.45	28.45	30.22	42.02	33.61	33.24	32.93	29.30		50.00	39.73	46.12	32.85	31.74
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	1.59	21.25	43.84	17.37	5.60	0.00	0.00	45.49	57.90		0.00	20.38	0.00	22.83	0.92
		(b)	85.29	48.94	89.23	76.08	85.46	100.00	0.00	46.83	58.04		0.00	84.87	0.00	91.21	83.16
		(c)	33.17	40.51	65.89	62.84	63.38	51.34	50.00	46.25	57.76		50.00	57.73	50.00	50.75	45.28
8	MISCELLENEOUS MANUFACTURED ARTICLES.	(a)	12.15	4.83	38.12	3.61	38.82	14.84	37.39	5.42	0.00		0.00	9.02	0.00	43.97	11.81
		(b)	31.57	100.00	48.53	88.48	62.87	59.76	54.54	81.38	0.00		0.00	92.68	0.00	47.60	58.90
		(c)	29.39	86.22	43.26	53.20	52.62	42.20	46.44	60.67	50.00		50.00	40.75	50.00	47.60	32.73
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND.	(a)	88.00	0.00	14.28	10.40	61.25	87.17	18.75	4.58	0.00		0.00	36.66	51.65	25.00	42.03
		(b)	100.00	0.00	100.00	100.00	89.93	100.00	100.00	100.00	0.00		0.00	100.00	96.46	100.00	71.31
		(c)	100.00	0.00	99.99	95.28	89.93	96.96	100.00	99.32	50.00		50.00	99.99	96.46	98.63	71.42

NB: (a) IITB - Unadjusted G-L Index
(b) IITC - Adjusted G-L Index
(c) Antonio adjusted index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.2.4

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE BY COUNTRY AND BY INDUSTRY. SITC 0 THROUGH 9, SUMMARY VALUES (1962)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	FRANCE	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN
0	FOOD AND LIVE ANIMALS	(a)	51.39	5.67	1.11	16.20	27.38	13.60	8.89	3.37	21.31	12.27	2.59	22.18	20.62	29.09
		(b)	55.67	36.94	68.11	40.62	41.47	46.13	56.64	49.80	35.24	41.80	60.46	89.05	41.89	62.19
		(c)	54.35	34.16	42.41	38.56	37.97	37.92	45.78	37.83	34.40	37.04	37.11	60.63	36.45	60.71
1	BEVERAGE AND TOBACCO	(a)	9.03	75.00	2.53	3.63	15.43	48.96	21.95	68.29	44.77	0.00	20.90	46.60	1.14	1.45
		(b)	61.87	100.00	85.71	100.00	97.75	71.54	36.57	100.00	100.00	0.00	99.45	56.79	100.00	100.00
		(c)	52.57	99.99	79.04	95.75	96.73	67.92	35.37	100.00	53.84	100.00	45.26	56.56	37.54	78.48
2	CRUDE MATERIALS INEDIBLE, EXCEPT FUELS.	(a)	34.57	4.97	6.88	2.83	8.26	11.42	11.41	9.39	16.79	32.01	2.29	62.00	0.97	33.92
		(b)	75.94	90.35	55.45	86.08	88.82	45.06	53.09	91.41	39.28	42.82	66.31	62.92	41.60	42.64
		(c)	66.26	42.62	44.79	43.75	40.86	38.64	40.02	76.77	37.76	40.41	41.56	62.27	33.97	42.43
3	MINERAL FUELS LUBRICANTS AND RELATED MATERIALS.	(a)	28.05	0.00	16.66	0.00	0.00	0.00	29.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		(b)	51.99	0.00	36.23	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		(c)	49.07	50.00	34.20	50.00	50.00	50.00	84.45	50.00	0.00	50.00	50.00	0.00	0.00	50.00
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	11.66	26.01	59.57	33.33	18.83	26.72	61.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		(b)	100.00	86.37	63.69	43.58	33.33	33.59	88.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		(c)	76.65	84.90	60.35	43.59	33.33	33.60	81.34	50.00	50.00	0.00	50.00	0.00	50.00	50.00

APPENDIX TABLE A.4.2.4
(cont'd)

SITC GROUP	DESCRIPTIONS		U.S.A.	JAPAN	BEL-LUX	FRANCE	ITALY	NETHERLANDS	U.K.	AUSTRIA	IRELAND	FINLAND	W.GERMANY	DENMARK	NORWAY	SWEDEN
5	CHEMICALS	(a)	42.76	48.19	22.94	24.40	54.56	48.05	63.27	13.33	9.85	7.56	16.97	47.25	26.60	53.36
		(b)	66.13	51.47	48.14	82.53	64.42	71.53	84.75	67.10	100.00	60.97	97.28	96.38	78.36	56.82
		(c)	53.37	50.57	44.11	58.49	58.46	63.17	68.60	59.78	65.43	47.31	61.72	78.17	55.08	55.40
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	39.58	10.21	37.99	29.85	34.13	43.57	37.02	21.33	25.38	18.60	39.56	43.08	38.46	35.07
		(b)	52.99	38.18	78.69	39.02	35.79	67.58	52.53	56.10	41.03	37.53	43.96	45.13	65.77	41.34
		(c)	49.47	35.91	64.64	38.79	35.72	53.75	47.95	40.69	37.23	36.55	43.56	44.14	61.63	39.51
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	33.41	45.94	29.69	48.98	53.84	61.85	21.35	37.94	40.11	16.01	37.40	37.23	53.99	37.06
		(b)	99.71	55.81	70.40	56.73	91.73	66.12	100.00	71.40	48.73	92.57	77.67	76.95	82.05	85.37
		(c)	85.40	52.05	64.04	53.16	85.90	64.60	80.86	67.95	47.62	69.51	64.35	71.87	73.86	72.96
8	MISCELLANEOUS MANUFACTURED ARTICLES.	(a)	27.54	1.60	34.74	10.20	8.49	47.47	27.68	8.91	30.31	81.61	54.46	8.82	14.21	56.54
		(b)	98.02	100.00	43.12	98.99	100.00	48.25	97.77	99.02	53.39	84.81	92.92	86.18	100.00	97.06
		(c)	80.13	59.31	43.12	61.97	49.80	48.07	82.02	66.47	49.91	82.82	63.04	56.88	76.02	79.19
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIEF ACCORDING TO KIND.	(a)	30.19	10.42	0.00	68.30	35.46	11.35	15.23	30.20	51.87	55.07	22.63	41.72	20.16	12.04
		(b)	100.00	100.00	0.00	73.08	38.88	89.87	100.00	46.03	88.46	70.37	39.74	78.37	100.00	90.00
		(c)	78.80	73.20	0.00	73.03	37.99	84.02	86.52	46.03	88.46	70.37	38.58	72.30	98.19	88.33

Key: (a) = G-L Unadjusted index (b) = G-L Adjusted index (c) = Antonio adjusted G-L index

APPENDIX TABLE A.4.2.4
(cont'd)

SITC GROUP	DESCRIPTIONS		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA
0	FOOD AND LIVE ANIMALS.	(a)	1.68	12.11	21.49	13.21	3.91	5.70	0.00	20.61	0.00		17.65	0.00	1.26	1.15	0.85
		(b)	33.76	36.80	46.67	41.12	36.65	33.44	0.00	40.17	0.00		34.36	0.00	34.83	33.33	37.81
		(c)	33.34	34.23	30.30	38.03	36.33	33.40	50.00	37.66	50.00		34.18	50.00	33.48	3.47	33.71
1	BEVERAGE AND TOBACCO.	(a)	29.62	36.75	4.73	29.35	35.43	10.34	13.45	4.16	0.00		36.11	0.00	0.00	18.18	0.00
		(b)	33.33	94.44	100.00	100.00	35.48	100.00	33.33	100.00	0.00		100.00	0.00	0.00	33.33	0.00
		(c)	33.33	91.36	77.10	99.99	35.47	98.78	33.33	80.14	50.00		99.99	50.00	50.00	54.54	50.00
2	CRUDE MATERIALS INEDIBLE, EXCEPT FUELS.	(a)	24.38	1.44	5.49	6.90	20.15	24.43	14.81	63.11	3.90		0.30	0.00	0.00	28.99	16.58
		(b)	33.33	99.04	68.03	79.24	42.64	39.49	33.33	64.03	34.12		55.00	0.00	0.00	33.65	41.64
		(c)	33.33	46.32	32.16	53.73	37.17	39.49	33.33	63.67	33.38		44.62	50.00	50.00	33.57	38.59
3	MINERAL FUELS LUBRICANTS AND RELATED MATERIALS.	(a)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
		(b)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
		(c)	0.00	50.00	50.00	0.00	0.00	50.00	0.00	0.00	0.00		0.00	50.00	50.00	0.00	0.00
4	ANIMAL AND VEGETABLE OILS AND FATS.	(a)	0.00	0.00	25.71	73.82	38.49	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
		(b)	0.00	0.00	90.47	100.00	58.78	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
		(c)	50.00,	50.00	47.98	99.99	58.79	50.00	50.00	50.00	0.00		0.00	0.00	50.00	50.00	50.00

<u>APPENDIX TABLE A.4.2.4</u>
<u>(cont'd)</u>

SITC GROUP	DESCRIPTION		PHILIPPINES	SWITZERLAND	PORTUGAL	SPAIN	AUSTRALIA	NEW ZEALAND	TURKEY	HONG-KONG	S. KOREA	SINGAPORE	ISRAEL	KUWAIT	VENEZUELA	BRAZIL	INDIA.
5	CHEMICALS	(a)	0.00	8.58	10.59	56.51	9.87	5.79	0.00	12.23	0.00		18.18	0.00	4.10	40.62	5.35
		(b)	0.00	93.36	33.27	53.57	85.76	100.00	0.00	42.16	0.00		100.00	0.00	37.96	93.20	35.94
		(c)	50.00	59.10	28.45	57.73	48.97	56.97	50.00	35.71	50.00		47.50	50.00	37.96	71.98	35.93
6	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS.	(a)	2.16	34.66	43.84	15.73	9.99	0.50	1.16	32.72	1.70		29.46	0.00	0.13	0.67	28.51
		(b)	36.78	43.06	89.23	34.64	89.64	100.00	33.33	50.55	50.00		55.33	0.00	100.00	41.66	33.80
		(c)	33.86	41.92	65.89	33.83	49.15	[illegible]	33.34	42.44	34.49		54.51	50.00	35.54	33.54	38.80
7	MACHINERY AND TRANSPORT EQUIPMENT.	(a)	0.00	44.24	38.12	41.75	3.43	0.00	0.00	15.01	3.66		2.80	0.00	0.05	0.95	0.57
		(b)	0.00	73.77	48.53	90.56	100.00	0.00	0.00	37.81	61.53		95.83	0.00	100.00	100.00	100.00
		(c)	50.00	67.89	43.26	68.34	64.42	50.00	50.00	36.09	34.99		52.74	50.00	60.55	58.79	61.63
8	MISCELLANEOUS MANUFACTURED ARTICLES.	(a)	19.60	16.48	14.28	5.06	17.70	0.00	0.00	6.41	35.13		4.32	0.00	1.38	3.52	17.40
		(b)	46.66	78.84	100.00	76.40	98.64	0.00	0.00	78.29	48.14		71.92	0.00	66.66	66.66	52.79
		(c)	36.00	63.47	99.99	58.79	84.52	50.00	50.00	63.40	48.15		49.48	50.00	41.13	34.55	43.87
9	COMMODITIES AND TRANSACTIONS NOT CLASSIFIED ACCORDING TO KIND	(a)	57.14	7.12	0.00	55.55	13.20	50.14	31.11	9.27	74.62		50.54	0.00	39.65	31.25	29.58
		(b)	100.00	80.95	0.00	100.00	100.00	91.39	46.66	100.00	100.00		100.00	0.00	100.00	100.00	48.31
		(c)	100.00	69.29	0.00	99.99	93.45	55.28	46.66	97.83	97.33		100.00	0.00	99.99	99.99	48.20

NB: (a) IIIB - Unadjusted G-L Index
(b) IITC - Adjusted G-L Index
(c) Antorio adjusted Index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.5.1

CANADA'S INTRA-INDUSTRY TRADE WITH THE U.S.A.
2-DIGIT SITC (1962-1980)

SITC	DESCRIPTION	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
00	Live Animals	15.39	100.00	99.99	15.39	25.35	100.00	99.99	25.35	76.01	100.00	99.99	76.01	92.98	100.00	99.99	92.98	60.[illegible]7	95.54	93.75	63.72
01	Meat and Meat Preparations	81.34	90.80	89.35	89.58	60.36	92.87	86.77	65.00	56.22	92.89	86.95	60.52	55.79	100.00	98.86	55.79	54.56	95.29	90.64	57.25
02	Dairy products and eggs	34.11	100.00	93.76	34.11	39.81	93.39	82.86	42.63	61.41	100.00	87.04	61.41	40.53	98.99	70.58	40.95	59.61	84.95	80.47	70.16
03	Fish and Fish preparations	11.99	100.00	83.88	11.99	21.35	91.96	75.13	23.21	30.08	88.97	76.00	33.81	44.34	91.11	84.16	48.66	47.31	92.35	80.91	51.23
04	Cereals and Cereal preparations	43.32	55.54	54.96	81.60	49.30	61.51	56.22	81.14	59.95	62.39	60.33	96.07	51.62	69.13	60.03	74.67	50.60	74.82	59.52	67.63
05	Fruits and Vegetables	14.89	100.00	91.64	14.89	20.62	100.00	88.73	20.62	21.78	96.47	90.21	22.57	13.23	96.78	87.49	13.67	16.80	98.10	76.05	17.12
06	Sugar, sugar preparations and honey	64.24	73.50	72.66	87.34	65.73	67.82	67.31	96.92	62.30	83.74	83.74	74.39	83.79	97.62	81.05	85.82	65.41	100.00	95.83	65.41
07	Coffee, tea, Cocoa, spics manufactures thereof	21.97	73.08	62.76	30.07	32.72	58.09	52.58	56.33	54.19	68.29	64.24	79.35	37.92	85.01	73.40	44.60	21.96	71.95	44.56	30.53
08	Feeding stuff for animals (not including unmilled cereals)	82.76	100.00	99.99	82.76	89.27	92.84	86.44	96.16	85.10	100.00	90.19	85.10	59.03	91.83	90.25	64.28	51.20	88.37	76.88	57.94

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
09	Miscellaneous food preparations	20.69	100.00	82.04	20.69	80.29	99.49	82.83	80.70	18.35	100.00	85.86	18.35	17.83	100.00	72.84	17.83	25.04	100.00	78.78	25.04
11	Beverages	4.33	91.48	90.95	4.73	5.35	84.53	84.39	6.33	5.53	83.36	82.36	6.63	6.78	81.56	80.26	8.32	16.24	80.12	72.63	20.27
12	Tobacco and tobacco manufactures	35.43	100.00	90.84	35.42	18.75	100.00	99.54	18.75	48.92	100.00	88.35	48.92	80.77	97.81	89.08	82.58	50.51	86.67	80.70	58.28
21	Hides, skins and furnskins, undressed	76.53	85.63	83.30	89.38	74.61	76.75	75.82	97.22	68.52	100.00	85.67	68.52	67.28	100.00	92.86	67.28	57.73	96.73	85.05	59.68
22	Oil-Seeds, oil nuts and oil kernels	9.57	100.00	99.99	9.57	13.24	100.00	99.99	13.24	17.69	100.00	99.99	17.69	36.37	100.00	99.99	36.37	21.05	76.68	69.48	27.45
23	Crude rubber (including synthetic and reclained)	58.37	100.00	99.99	58.37	88.14	100.00	99.99	88.14	99.46	100.00	99.99	99.46	92.85	100.00	99.99	92.85	64.52	67.52	61.79	95.55
24	Wood, lumber and Cork	23.24	99.24	85.12	23.41	25.97	99.63	83.89	26.07	18.34	68.34	56.21	26.79	27.68	66.17	61.40	41.83	25.79	65.55	62.20	39.35
25	Pulp and Waste paper	7.09	100.00	99.99	7.09	4.57	100.00	79.66	4.57	7.29	100.00	89.78	7.29	6.75	100.00	80.84	6.75	5.58	98.87	82.41	5.65
26	Textiles fibres (not manufactured into yarn, thread or fabrics) and their waste	13.22	96.38	63.70	13.72	17.93	97.57	62.54	18.38	15.55	99.16	62.64	15.68	14.25	87.36	67.03	16.31	12.36	71.03	60.76	17.40

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
27	Crude fertilizers and crude minerals (excluding coal, petroleum and precious stones)	57.90	86.94	78.97	66.60	48.21	69.75	66.84	69.11	49.11	68.36	65.30	71.84	57.29	65.05	63.59	88.07	57.29	70.26	56.67	81.54
28	Metalliferous ores and metal scrap	33.77	96.13	79.38	35.13	34.30	86.74	79.63	39.54	39.20	79.74	64.81	49.15	33.79	93.82	77.93	36.02	67.18	77.10	63.72	87.13
29	Crude animal and vegetable materials, n.e.s.	66.39	100.00	98.90	66.39	69.26	83.21	73.09	83.23	71.12	74.00	72.31	96.10	55.16	75.01	66.48	73.54	58.33	91.13	76.93	64.01
32	Coal, coke and briquettes	9.99	100.00	99.99	9.99	16.56	100.00	99.99	16.56	20.47	100.00	99.99	20.47	10.82	100.00	99.99	10.82	14.81	100.00	93.01	14.81
33	Petroleum and petroleum products	17.67	62.50	53.04	28.27	11.28	52.53	34.81	21.47	8.42	76.89	36.75	10.96	6.59	78.16	41.74	8.44	62.14	97.78	87.05	63.55
34	Gas, natural and manufactured	6.34	100.00	99.99	34.36	26.00	100.00	99.99	26.00	5.29	100.00	99.99	5.29	1.19	100.00	99.99	1.19	1.13	67.05	67.05	1.68

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITD	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
35	Electric energy	34.36	100.00	99.99	34.36	77.29	100.00	99.99	77.29	36.01	100.00	99.99	36.01	10.75	100.00	99.99	10.75	0.60	100.00	99.99	0.60
41	Animal oil and fats	28.01	100.00	99.99	28.01	49.09	96.62	86.62	56.67	97.70	99.33	96.89	98.36	33.86	83.75	79.10	40.43	60.88	85.49	82.87	71.21
42	Fixed vegetable oils and fats	4.81	100.00	84.03	4.81	2.85	100.00	71.75	2.85	2.84	100.00	66.10	2.84	9.12	100.00	91.58	9.12	14.83	71.85	66.86	20.64
43	Animal and vegetable oils and fats, processed, and waxes of animal or vegetable origin	13.05	100.00	99.99	13.05	7.09	100.00	99.99	7.09	3.98	100.00	72.44	3.98	8.96	100.00	72.72	8.96	7.31	100.00	71.65	7.31
51	Chemical elements and compounds	73.53	100.00	95.10	73.53	63.84	77.46	70.70	82.40	62.43	73.48	61.47	84.95	60.29	66.13	57.92	91.17	58.18	69.25	52.73	84.00
52	Mineral tar and crude chemicals from coal, petroleum and natural gas	50.39	100.00	99.99	50.39	16.68	100.00	99.99	16.68	23.14	100.00	99.99	23.14	18.34	100.00	99.99	18.34	52.58	71.82	65.39	73.20
53	Dyeing, tanning and colouring materials	4.15	100.00	85.66	4.15	3.13	100.00	67.37	3.13	8.25	100.00	60.49	8.25	20.09	100.00	60.65	20.09	12.20	100.00	62.78	12.20

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
54	Medicinal and pharmaceutical products	14.96	100.00	99.99	14.96	20.64	100.00	87.35	20.64	22.44	100.00	85.74	22.44	27.64	100.00	89.05	27.64	20.74	100.00	82.73	20.74
55	Essential oils and perfume materials; toilet, polishing and cleansing preparations	9.70	100.00	95.00	9.70	7.85	100.00	80.44	7.85	9.66	100.00	79.56	9.66	9.20	100.00	86.23	9.20	23.66	100.00	94.80	23.66
56	Fertilizers, manufactured	35.59	100.00	99.99	35.59	22.95	95.42	86.96	24.05	15.51	92.10	85.97	16.85	22.05	85.36	83.94	25.83	22.10	67.72	66.87	32.63
57	Explosives and pyrotechnic products	20.71	100.00	99.99	20.71	69.11	76.26	76.27	90.62	88.83	100.00	90.31	88.83	26.25	100.00	83.20	26.25	0.00	0.00	50.00	0.00
58	Plastic materials, regenerated ecllulose and atificial resins	6.12	100.00	99.99	6.12	7.48	100.00	84.43	7.48	14.99	100.00	83.78	14.99	17.21	100.00	85.22	17.21	21.07	100.00	57.79	21.07
59	Chemical materials and products n.e.c.	16.39	100.00	99.99	16.39	44.04	91.65	83.55	48.04	33.66	91.75	88.39	36.68	19.65	94.75	91.69	20.74	33.72	98.36	75.31	34.28

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
61	Leather, leather manufactures, n.e.s. and dressed furskins	79.65	91.19	84.82	87.34	59.41	100.00	77.70	59.41	52.82	100.00	78.71	52.82	35.67	100.00	82.88	35.67	76.28	100.00	87.10	76.28
62	Rubber manufacture n.e.s.	34.65	100.00	94.69	34.65	23.23	100.00	79.14	23.23	31.08	100.00	87.09	31.08	89.95	100.00	87.33	89.95	79.69	83.91	76.72	94.97
63	Wood and Cork manufactures (excluding furniture)	50.44	95.54	88.69	52.79	38.42	89.09	82.03	43.12	50.62	87.09	72.54	58.11	59.01	72.14	65.81	81.80	36.08	84.97	66.42	42.47
64	Paper, paper board and manufactures thereof	15.77	84.11	83.23	18.75	14.84	70.32	67.69	21.11	20.05	72.24	67.12	27.76	33.71	69.88	66.80	48.24	22.54	69.37	62.30	32.49
65	Textile yarn, fabrics, made-up articls and related products	9.29	100.00	74.35	9.29	20.57	90.12	61.65	22.82	28.30	87.68	67.87	32.27	12.82	92.52	74.32	13.86	17.64	100.00	68.50	17.64
66	Non-metallic mineral manufactures, n.e.s.	23.51	95.88	73.62	24.52	24.98	90.03	68.16	27.75	37.85	76.81	62.60	49.28	40.10	90.06	69.81	44.53	52.46	80.02	65.69	65.55
67	Iron and Steel	62.91	76.32	73.68	82.43	67.96	80.95	70.14	83.96	72.76	73.75	73.34	98.65	62.95	78.56	76.15	80.13	59.65	79.93	74.29	74.62

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
68	Non-ferrous metals	16.59	99.09	82.51	16.74	41.64	85.75	77.31	48.56	31.90	76.81	68.06	41.53	33.00	73.02	45.19	45.19	38.29	72.00	68.47	53.19
69	manufactures of metal n.e.s.	9.40	100.00	76.27	9.40	30.74	91.14	68.53	33.73	43.76	98.87	74.47	44.26	50.33	99.24	76.62	50.72	49.70	88.13	71.10	56.38
71	machinery, other than electric	35.37	100.00	86.60	35.37	45.78	99.82	77.87	45.86	60.64	98.08	78.82	61.82	54.32	99.02	80.89	54.86	51.22	79.99	71.26	6.02
72	Electrical machinery, apparatus and appliance	34.86	100.00	77.00	34.86	55.90	91.32	77.23	61.21	57.69	99.09	78.17	58.22	45.17	100.00	80.96	45.17	43.07	99.29	72.24	43.38
73	Transport equipment	29.71	98.59	70.83	30.13	62.42	98.00	76.88	63.69	82.77	88.53	71.99	93.48	81.39	99.86	77.86	81.50	33.04	100.00	76.68	33.04
81	Sanitary, plambing, heating and lighting fixtures and fittings	23.35	100.00	99.99	23.35	22.68	100.00	93.86	22.68	50.05	100.00	93.90	50.05	22.44	100.00	94.78	22.44	46.45	100.00	86.47	46.45
82	Furniture	18.04	100.00	99.99	18.04	29.06	66.74	66.74	43.54	60.01	66.82	66.79	89.80	44.45	66.72	66.72	66.61	75.43	86.57	66.87	87.12
83	Travel goods handbags and similar articles	4.35	100.00	99.99	4.35	97.87	100.00	99.99	97.87	61.54	100.00	99.99	61.54	37.15	100.00	99.99	37.15	46.25	100.00	92.05	46.25

APPENDIX TABLE A.4.5.1
(cont'd)

SITC	DESCRIPTIONS	1962				1966				1971				1976				1980			
		IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS	IITB	IITC	IITQ	IITS
84	Clothing	36.63	99.56	96.35	36.79	59.79	83.76	75.31	71.39	64.15	91.30	85.10	70.26	65.08	94.32	88.44	69.00	58.35	78.39	59.69	74.43
85	Footwear	70.52	100.00	99.99	70.52	85.09	100.00	97.84	85.09	43.91	99.95	91.27	43.93	83.15	99.07	98.90	83.92	94.73	97.90	97.89	96.75
86	Professional, scientific and controlling instruments; photographic and optical goods, watches and clocks	39.10	100.00	94.12	39.10	5.96	94.86	57.27	6.28	17.04	94.18	62.94	18.10	25.75	97.91	70.89	26.30	0.00	0.00	0.00	0.00
89	Miscellaneous manufactured article n.e.s.	18.26	100.00	80.75	18.26	18.47	90.35	67.39	20.44	30.36	91.59	67.61	33.15	28.85	93.84	71.72	30.74	33.11	99.31	73.36	33.34

IITB = G-L Unadjusted measure
IITC = G-L Adjusted index
IITQ = Antonio adjusted Index
IITS = G-L measure of Aggregation

Source: Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.6.1

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE WITH JAPAN THROUGH TIME (1962-1980)

SITC	DESCRIPTION		1962	1966	1967	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
0	Food and Live Animals	*	5.67	5.81	7.54	8.14	11.19	11.27	13.63	10.02	7.75	7.19	7.32	7.93	85.27	7.57	9.38
		**	36.94	38.37	41.95	46.60	40.80	43.17	51.06	50.39	52.91	50.90	50.25	50.60	100.00	75.15	75.95
		***	34.16	30.12	32.14	33.14	33.85	34.09	36.78	35.23	34.91	33.69	35.88	40.05	99.99	49.99	40.21
1	Beverage and Tobacco		75.00	43.54	44.79	42.80	33.53	37.42	43.94	44.73	32.54	51.77	21.97	45.72	10.86	31.32	43.39
			100.00	100.00	98.61	100.00	100.00	100.00	100.00	99.04	99.72	98.89	97.93	99.61	81.49	99.70	97.53
			99.99	99.68	98.61	96.69	96.54	97.62	91.08	60.40	58.91	94.07	51.63	79.92	55.24	65.87	75.21
2	Crude Materials inedible except fuels		4.97	2.86	1.58	1.30	0.74	1.31	1.27	0.92	0.91	1.63	0.86	2.36	50.91	1.79	3.65
			90.35	61.23	84.39	78.19	65.21	66.21	50.78	67.12	61.72	65.81	44.15	63.86	98.12	74.95	76.11
			42.62	38.34	43.59	40.59	37.51	31.05	31.08	32.40	34.96	50.01	33.37	43.55	81.48	53.92	48.23
3	Mineral fuels, lubricant and related Materials.		0.00	0.01	0.01	0.01	0.01	0.01	0.11	0.04	0.02	0.01	0.07	0.04	1.59	0.02	0.01
			0.00	100.00	100.00	100.00	100.00	80.00	66.09	83.33	86.48	84.37	37.24	84.26	61.17	90.40	71.77
			50.00	48.42	49.40	49.93	48.22	49.41	61.99	50.01	51.55	50.30	34.24	51.50	47.56	50.04	50.17
4	Animal and Vegetable oils and fats		26.01	1.77	5.33	0.18	0.22	0.53	0.26	1.07	1.57	1.33	2.54	2.19	0.01	1.97	2.32
			86.37	37.33	34.21	52.38	52.17	63.95	33.33	85.95	79.27	70.43	76.63	74.59	100.00	74.73	74.70
			84.90	29.00	26.03	44.04	42.52	55.57	25.52	72.65	59.16	47.91	71.67	54.48	49.14	49.57	56.89

APPENDIX TABLE A.4.6.1
(cont'd)

SITC	DESCRIPTION	1962	1966	1967	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
5	Chemicals	48.19 51.47 50.57	26.32 49.52 40.28	32.85 49.19 42.73	30.68 47.50 41.44	35.28 49.30 43.04	31.92 39.87 37.17	38.40 46.95 43.95	42.35 55.13 49.70	40.78 49.13 44.85	39.15 46.56 41.04	44.51 52.79 47.59	43.39 60.92 52.61	2.02 96.96 60.83	44.81 54.64 49.95	33.12 54.74 50.15
6	Manufactured goods classified by materials	10.21 38.18 35.91	11.41 39.13 31.13	25.11 38.12 33.11	24.51 36.82 31.79	23.01 42.47 35.83	13.18 42.03 32.46	12.98 43.49 33.49	20.82 40.69 34.38	14.33 46.01 34.37	11.25 48.27 36.93	13.96 46.48 36.94	14.47 46.46 35.79	45.91 59.24 55.67	22.42 45.68 38.34	28.58 43.19 38.23
7	Machinery and Transport Equipments.	45.94 55.81 52.05	25.89 95.02 60.01	25.79 86.84 57.68	17.86 89.04 55.78	11.72 96.23 61.24	9.24 97.30 53.20	5.16 97.42 53.68	7.59 94.90 60.62	8.81 95.46 59.32	14.23 99.21 66.86	8.37 97.17 56.54	6.36 79.01 64.44	28.41 39.33 34.50	7.74 94.09 58.55	6.69 90.89 55.20
8	Miscellaneous Manufactured Articles.	1.60 100.00 59.31	1.32 83.55 55.50	1.58 85.65 58.21	1.02 85.99 55.27	3.04 78.41 53.60	7.30 98.67 53.20	7.18 93.87 53.73	7.00 80.21 57.05	11.76 73.15 53.98	7.86 76.48 58.19	6.55 73.69 58.73	4.41 75.05 55.94	5.27 97.93 59.28	13.78 76.48 49.23	11.55 86.83 50.54
9	Commodities and Transactions n.e.s.	10.42 100.00 73.20	2.01 100.00 98.94	2.27 100.00 97.86	1.79 100.00 95.84	5.01 95.60 90.67	1.65 71.42 45.65	0.21 82.38 71.08	0.96 100.00 38.44	0.75 84.61 61.69	11.14 96.52 96.11	4.66 96.38 94.80	0.40 66.82 64.54	8.11 79.38 61.31	26.40 33.65 33.54	9.39 41.23 37.01

* Adjusted - G-L Index *** Unadjusted G-L Index *** Antonio adjusted G-L Index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.6.2

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE WITH EEC THROUGH TIME (1962-1980)

SITC	DESCRIPTION	1962	1966	1967	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
0	Food & Live Animals	*12.57 **68.16 ***44.50	17.37 66.46 43.81	17.56 65.05 43.87	20.83 62.98 45.16	21.73 62.37 46.06	21.30 62.81 45.73	23.83 62.17 45.91	21.57 56.66 45.85	18.02 53.57 41.44	19.31 50.32 41.67	18.22 50.70 43.53	20.71 46.09 41.15	23.50 47.99 41.01	20.28 49.17 41.82	18.40 51.44 42.47
1	Beverage and Tobacco	33.00 41.44 39.47	36.20 36.46 36.40	34.55 36.28 35.88	31.34 38.06 36.40	36.35 37.21 35.74	35.01 39.44 34.77	33.14 40.58 35.57	26.07 40.81 34.57	31.67 41.18 35.61	26.05 44.40 36.15	22.77 41.08 33.91	17.64 40.94 33.06	19.26 40.11 32.72	21.82 30.55 29.76	14.22 36.36 33.34
2	Crude Materials inedible except fuels.	11.29 62.16 44.56	8.51 60.22 43.15	7.36 57.30 41.93	6.07 58.25 39.66	5.25 63.93 42.12	6.14 69.46 41.85	5.97 67.55 40.23	6.62 70.64 42.75	6.89 79.38 48.14	5.61 78.84 45.19	6.96 81.93 49.29	7.34 77.34 51.31	6.93 76.11 42.94	7.87 78.59 48.88	5.22 79.52 45.42
3	Mineral fuels; lubricant and related materials.	39.92 100.00 84.76	13.33 99.29 91.60	4.16 100.00 94.90	19.98 100.00 84.80	62.64 89.86 74.72	69.02 97.41 80.46	35.71 95.60 86.68	38.10 97.05 72.96	37.15 84.26 60.94	46.60 92.40 90.38	34.90 85.63 78.03	53.32 58.04 55.47	41.01 94.25 75.31	16.36 73.45 65.97	36.22 72.72 68.82
4	Animal and Vegetable oils and fats	65.77 84.67 76.41	54.45 66.10 54.08	58.68 81.29 59.68	62.01 85.73 59.62	30.09 99.52 63.97	16.18 95.53 67.52	29.52 97.70 75.22	39.64 86.24 48.91	34.33 70.05 45.74	40.06 69.54 63.13	19.07 54.56 40.89	14.71 87.21 37.80	17.28 52.52 35.45	11.74 56.02 35.73	21.06 58.80 34.71

APPENDIX TABLE A.4.6.2
(cont'd)

SITC	* DESCRIPTION	1962	1966	1967	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
5	Chemicals	61.16	67.71	63.21	60.31	58.97	54.03	53.21	53.13	43.61	48.22	48.87	51.49	55.03	53.21	53.96
		87.32	78.43	75.52	78.39	68.74	72.19	78.58	78.89	79.98	83.67	79.98	85.44	77.73	72.51	54.10
		69.93	71.04	67.21	68.83	60.61	60.95	64.57	64.47	63.56	68.96	62.83	63.15	59.65	58.01	54.04
6	Manufactured goods classified by Materials.	41.53	34.49	35.97	34.82	28.36	36.60	39.91	38.74	39.29	38.88	40.56	42.00	41.41	44.17	38.57
		49.11	41.45	43.78	45.34	47.43	43.50	41.92	43.06	39.97	40.71	46.14	43.51	41.04	47.90	49.82
		46.95	39.04	40.60	41.05	38.82	40.33	41.03	41.14	39.69	39.91	43.61	42.85	41.17	43.89	43.42
7	Machinery and Transport Equipments.	36.56	34.53	31.88	35.73	46.40	37.94	37.32	43.09	42.33	40.28	43.95	43.49	36.91	37.76	42.58
		95.07	91.52	95.18	90.11	84.84	88.90	87.98	89.34	93.55	90.51	92.14	92.02	98.33	87.49	80.50
		79.51	75.45	77.78	75.84	70.49	74.43	73.25	72.80	74.82	74.68	77.76	77.83	80.18	66.15	63.18
8	Miscellaneous Manufactured articles.	34.52	18.99	16.34	15.31	16.39	16.62	19.03	19.71	22.92	22.09	25.75	21.70	29.45	36.44	46.41
		97.57	84.75	85.99	84.67	84.74	87.72	86.37	87.67	88.57	85.06	83.58	86.52	87.83	88.68	88.47
		67.79	65.66	65.97	65.67	65.63	65.66	66.13	67.89	65.49	67.38	65.58	68.99	69.68	65.93	66.07
9	Commodities and Transactions n.e.s.	36.53	26.06	27.82	24.70	31.82	23.51	20.96	21.15	8.30	17.81	20.06	8.26	6.35	27.57	23.31
		97.63	95.73	100.00	61.58	48.08	54.47	100.00	100.00	100.00	100.00	100.00	100.00	100.00	35.04	34.98
		76.67	58.67	73.56	52.88	44.22	41.32	58.47	65.48	77.96	93.71	97.19	90.77	57.03	29.28	33.89

* Adjusted - G-L Index
** Unadjusted G-L Index
*** Antonio adjusted G-L Index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX TABLE A.4.6.3

CANADA'S INTRA-INDUSTRY INTERNATIONAL TRADE WITH LDCS THROUGH TIME (1962-1980)

SITC	DESCRIPTION		1962	1966	1967	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
0	Food & Live animals	*	32.62	18.91	27.96	29.79	32.14	27.32	28.86	31.13	30.49	27.28	27.89	30.76	30.75	29.84	22.68
		**	40.59	40.31	40.39	40.38	40.05	39.54	40.15	42.82	42.26	42.39	41.37	41.02	41.80	37.29	39.04
		***	38.96	36.05	37.78	38.08	38.17	37.38	37.55	39.53	38.44	37.87	37.48	37.83	38.55	35.26	34.90
1	Beverage and Tobacco		77.72	65.88	60.01	61.82	51.78	39.32	40.55	36.49	20.33	31.31	23.68	27.28	30.64	22.41	26.94
			84.42	79.52	80.68	74.51	79.73	71.43	71.57	94.69	96.71	91.39	98.85	92.67	75.32	46.69	56.07
			79.47	72.49	72.61	69.01	70.15	61.01	61.32	63.05	64.07	62.15	67.95	58.10	52.97	38.24	43.29
2	Crude materials, inedible except fuels		69.64	62.75	59.26	54.49	50.33	48.03	49.07	51.11	46.33	53.96	45.74	45.31	41.64	45.28	40.91
			83.94	78.74	77.42	75.73	81.90	85.94	80.60	81.13	81.13	82.42	77.23	81.15	77.91	69.16	69.58
			73.29	68.77	65.16	66.75	66.04	68.58	67.00	63.87	62.17	62.13	59.51	57.61	55.46	53.50	50.57
3	Mineral Fuels, lubricant and related materials		0.90	0.45	0.51	0.77	1.17	0.67	1.40	0.99	3.15	2.42	1.61	1.74	2.46	13.75	13.77
			97.63	97.56	95.19	99.64	75.42	87.15	87.85	84.15	95.86	98.63	68.31	56.84	46.48	61.64	74.97
			70.73	59.79	59.77	60.98	53.69	57.11	55.42	53.93	52.71	51.03	43.65	37.01	32.92	55.47	57.21
4	Animals and Vegetable Oil and fats		32.66	19.65	15.58	12.98	20.34	20.46	28.43	42.76	39.14	40.86	51.02	42.47	45.61	39.13	26.24
			70.47	33.06	37.25	64.21	44.16	30.72	43.76	50.40	42.03	42.88	51.76	69.53	69.96	70.62	70.56
			54.87	28.87	29.55	58.16	42.76	30.59	43.24	48.29	41.60	42.39	51.60	55.82	53.01	48.66	51.06
5	Chemicals		43.81	54.32	60.94	54.51	56.40	55.00	59.47	55.16	60.28	60.37	53.05	59.74	53.11	32.12	28.01
			79.55	81.77	81.57	82.61	73.75	77.27	75.95	72.58	76.96	69.13	75.89	72.38	59.21	67.59	73.18
			67.33	68.80	68.11	64.59	63.57	63.27	65.04	61.96	65.71	63.34	63.45	62.98	54.78	47.21	47.10

APPENDIX TABLE A.4.6.3
(cont'd)

SITC	DESCRIPTION	1962	1966	1967	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
6	Manufactured goods classified by materials	36.81 64.97 53.82	45.11 58.01 54.07	[illegible] 56.14 52.77	49.58 58.43 54.69	41.35 62.58 55.12	47.73 58.19 54.58	54.76 56.28 55.63	53.84 58.24 56.21	50.66 58.90 55.48	48.93 60.56 56.08	50.91 57.62 54.99	37.13 55.25 46.74	45.62 57.54 51.82	50.08 56.18 52.44	41.63 62.87 52.89
7	Machinery and transport equipments.	30.46 99.99 79.70	40.44 89.73 66.92	43.95 91.61 70.56	38.82 92.08 70.67	45.31 91.22 67.20	47.64 93.29 72.31	53.05 90.80 73.77	61.66 89.03 77.76	62.55 90.83 78.55	52.10 91.33 77.12	54.79 92.07 72.49	52.46 90.75 70.69	44.14 83.48 64.59	45.58 75.38 64.81	44.85 76.75 65.23
8	Miscellaneous Manufactured Articles.	55.03 91.53 79.18	35.79 81.29 [illegible]	29.70 82.88 65.97	26.07 80.91 61.13	27.07 79.09 60.86	25.50 83.01 57.63	21.96 83.99 57.09	19.86 85.10 60.54	23.40 86.04 59.75	19.38 86.63 56.02	15.55 87.07 54.02	17.60 88.36 58.10	25.95 78.78 50.79	23.93 85.40 53.22	30.27 81.96 53.17
9	Commodities and Transactions n.e.s.	76.17 97.04 96.59	62.92 65.19 63.49	55.49 72.94 71.87	68.38 100.00 95.46	63.61 100.00 97.95	50.87 95.67 87.38	44.03 99.86 93.81	32.56 100.00 96.79	79.06 99.74 98.69	72.33 99.33 82.89	53.82 99.59 97.02	37.22 100.00 91.89	46.59 93.77 82.16	56.34 64.36 59.80	64.84 99.96 73.35

* Adjusted - G-L Index ** Unadjusted G-L Index *** Antonio adjusted G-L Index

Source: 1. Department of Industry, Trade and Commerce, Government of Canada, Ottawa (1982).

APPENDIX A.6.1

Elasticity Estimates: An Analysis

Tables 6-11 through 6-13 present the elasticity estimates consistent with the estimated models of Tables 6-1 through 6-4 and 6-9(a) through 6-9(e).

As Table 6-11(a) shows, AMSjk and ADS2jk have the greatest positive impact on IIT (for cross country analysis). IITC is more responsive with respect to ALDjk than IITB and IITQ. Further, the distance (DISTjk) between trading partners exerts a greater negative impact on intra-industry trade in Canada than the development stage and market size differences. From Table 6-11(b) it is evident that all the elasticity estimates are less than unity in absolute terms. Thus, in general all the country-specific variables (based on non-linear model results) such as the average level of development, the development stage differentials, average market size, the market size differentials, distance, income similarities, and market size similarities are inelastic with respect to IIT (regardless of the definition of IIT used).

Table 6-11(a) (based on linear model coefficients) show that the elasticity estimates on variables AMSjk, ADS2 and DISTjk are greater than unity and those of ADSDjk, DMSjk, ADS1jk are less than unity. Only IITC is highly elastic with respect to ALDjk.

In summary, the evidence suggests that Linder and Gray's theses are applicable to Canada.[1]

As far as industry-specific variables are concerned, Table 6.12 shows that the elasticity estimates are less than unity, indicating that IIT is less sensitive with respect to these variables. However, product differentiation and economies of scale exert a positive impact on IIT, whereas WS, WE, NTP, and SAR exert a negative influences on intra-industry trade. Table 13 shows that LDP and LESC have the greatest positive impact on IITB. IITB is "responsive" with respect to LWE and LWS. While IITC and IITQ are "inelastic" with respect to LWE and LWS. The indices are "inelastic" with respect to nominal tariffs and LSAR. bears serious policy implications.

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[1] Note that "t" values are high on these coefficients.

TABLE A.6.12(a)

MEASURED ELASTICITY COEFFICIENTS BASED ON THE LINEAR MODELS OF TABLE 6.1[1]

Endogenous Variables	Predetermined Variables						
	ALD_{jk}	$ADSD_{jk}$	AMS_{jk}	DMS_{jk}	$ADSS1_{jk}$	ADSS2	$DIST_{jk}$
IIT_B	0.424	-0.97	35.10	-0.514	0.165	40.10	-45.17
IIT_C	8.090	-0.109	45.11	-1.090	0.269	27.31	-11.91
IIT_Q	0.474	-0.074	17.36	-0.181	0.187	10.46	-4.67

TABLE A.6.12(b)

MEASURED ELASTICITY COEFFICIENTS BASED ON THE NON-LINEAR MODELS OF TABLE 6.4[2]

	$LALD_{jk}$	$LADSD_{jk}$	$LAMS_{jk}$	$LDMS_{jk}$	LADS1	LADS2	LDIST
$LIIT_B$	0.12	-0.06	0.68	-0.14	0.03	0.36	-0.61
$LIIT_C$	0.69	-0.03	-0.26	-0.09	0.06	0.10	-0.39
$LIIT_Q$	0.04	-0.05	0.05	-0.07	0.04	0.09	-0.40

1. The above elasticities have been derived by using the estimated coefficients of the linear models in Table 6.1 and the means of the variables under consideration.
2. These coefficients have been taken from Table 6.4.

TABLE A.6.13

THE MEASURED ELASTICITIES BASED ON LINEAR MODELS OF TABLE 6.9(d)[1]

Endogenous Variables	Predetermined Variables						
	PD_1	ESC_1	$LDAG_1$	KIN_1	WS_1	WE_1	TNP_1
IIT_B	0.374	0.558	-0.174	0.152	-0.077	-1.372	-0.150
IIT_C	0.048	0.285	0.045	0.045	0.039	0.534	0.014
IIT_Q	0.178	0.188	0.122	0.048	0.321	0.316	0.071

1. The elasticity coefficients were computed using the estimated coefficients in Table 6.9(d) (LINEAR MODELS) and the means of the variables under consideration.

TABLE A.6.14(a)

ESTIMATED ELASTICITY COEFFICIENTS[1]

Endogenous Variables	Predetermined Variables								
	LPD_i	$LESC_i$	$LDAG_i$	$LKIN_i$	LWS_i	LWE_i	$LTNP_i$	$LSAR_i$	$LNTW_i$
IIT_B	0.839	0.933	-0.367	0.441				-0.029	0.528
IIT_C	0.292	-0.376	-0.841	-0.035				0.039	0.124
IIT_Q	-0.145	-0.055	-0.153	0.015				-0.053	0.139

TABLE A.6.14(b)

ESTIMATED ELASTICITY COEFFICIENTS[2]

Endogenous Variables	LPD_i	$LESC_i$	$LDAG_i$	$LKIN_i$	LWS_i	LWE_i	$LTNP_i$
IIT_B	1.094	2.455	-0.499	-0.121	-3.385	-3.46	-0.035
IIT_C	-0.079	-0.256	-0.056	0.024	-0.097	-0.077	0.032
IIT_Q	0.145	-0.240	-0.114	-0.105	-0.118	0.114	-0.020

1. Based on Table 6.9(c).
2. Based on Table 6.9(e).

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