The Derivation of Provincial (Inter-regional) Trade Flows: The Canadian Experience

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Paper prepared for presentation at the 14th International Input-Output Techniques Conference, held
October 10 to 15, 2002 at the Université du Québec à Montréal, Montréal, Canada.

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Abstract. The measurement of annual provincial (inter-regional) trade flows represents an important recent development in the Canadian System of National Accounts. The availability of the provincial trade flows allows for the generation of balanced provincial Input-Output tables and for the articulation of the provincial Gross Domestic Product Expenditures-based. Further, provincial trade flows provide insights on current economic issues and are used in provincial impact models. The main objective of this paper is to document concepts, data sources and methods that characterize inter-regional trade flows; as a consequence, the paper may assist in the development of other countries' interregional trade flows. The paper also reconciles the official provincial trade flows with various data sources such as the merchandise trade by province as well as the destination of shipment data. Finally, the paper presents some of the major recent trends in provincial trade flows in Canada.

INTRODUCTION

Canada's interprovincial and international trade flow estimates trace Canada's exchanges of commodities (goods and services) between each province/territory and with foreigners. These provincial/territorial trade flows, whether interprovincial or international, are available annually since the eighties.

The trade flows represent a very recent addition to the set of provincial statistics within the context of the Canadian System of National Accounts (SNA) and are important for a number of reasons. First, the availability of the annual provincial trade flows allows for the generation of balanced provincial Input-Output tables and for the computation of the provincial Gross Domestic Product Expenditures-based, both in current and constant dollars. In essence, without provincial trade flows, both of these products could not be fully articulated on a provincial basis.

Secondly, annual provincial trade flows highlight the provincial economic interdependencies and provide insights on current economic and trade-related issues. The provincial trade flows by commodity are used by many provincial governments in measuring the benefits of various policies related to regional economic expansion. Similarly, as part of the on-going world trade negotiations to further liberalize services, provincial trade flows by commodity are used by selected provincial governments to estimate the impact of such trade negotiations on their economies.

Thirdly, provincial IO tables with their associated interprovincial trade flows are used in inter-provincial models allowing for a variety of analysis such as measuring the effects of a major manufacturing plant expansion, quantifying the benefits of the construction of a pipeline across the country or assessing the impacts of a price increase in energy.

This paper describes the underpinnings of the interprovincial and international trade flow estimates. Specifically, the paper presents an overview of the data sources and of the methods[1] used in the derivation of the interprovincial and international trade flows, verifies the accuracy of the key data sources and finally, presents a brief analysis of major trends over the past decade in provincial trade flows.

RECENT DEVELOPMENTS

The year 1997 represents a key year in the development of the interprovincial and international trade flows. Three fundamental developments contributed to strengthen considerably the interprovincial and inter national trade flows from 1997 onwards. The three areas are:

1. The various surveys that collect data on provincial trade are more comprehensive and robust from 1997 onwards than in previous years; furthermore, important data sources are scheduled to be carried out at regular intervals if not on an annual cycle, thus ensuring data quality in the coming years.
2. Trade information is analyzed, reconciled and integrated in a detailed set of official provincial/territorial Input-Output (IO) tables from 1997 onwards; issues such as data gaps as well as conceptual and measurement problems are dealt within an integrated IO framework, thus ensuring overall quality. These IO tables provide provincial sources of production from which exports are generated and provincial sources of domestic demand which are satisfied by imports. Furthermore, the survey information that buttresses these provincial IO tables has also been expanded and/or strengthened considerably, contributing not only to the overall quality of the provincial IO tables but also to the overall quality of the provincial trade flows program.
3. Finally, trade flow information is reconciled with other System of National Accounts relevant variables such as the provincial/territorial Gross Domestic Product Expenditures-based and its components and the provincial/territorial Gross Domestic Product by Industry, thus improving overall data consistency.

[1] The present description of the data sources and methods is consistent with the latest release of the 1992-2001 trade flows. The interprovincial and international trade flows are developed as an integral part of the provincial in put-output tables; the detailed description of this provincial input-output framework as well as of its data sources and methods is not, however, part of this paper. Readers may refer to Statistics Canada, *The input-output structure of the Canadian economy*, catalogue no. 15-510, for additional information on IO framework; for information on data sources and methods of provincial IO tables, readers may refer to an unpublished document of Statistics Canada entitled *Provincial Input-Output Accounts for Reference Year 1998: Industry Sources and Methods*, November 2001.

The impetus for these three improvements stems primarily from The Project to Improve Provincial Economic Statistics (PIPES). PIPES was the outcome of discussions between the Government of Canada and three of the provincial governments on sales tax harmonization efforts. As a result of these discussions, it was agreed to replace the federal Goods and Sales Tax and the provincial sales taxes of the participating provinces with a single tax, the Harmonized Sales Tax and to redistribute the tax revenues among the participating parties using, among other things, aggregate statistics from the Provincial Input-Output Tables and from the Provincial Economic Accounts[2]. In order for this revenue allocation method to be accurate and effective, provincial IO tables with their associated interprovincial trade flows are to be derived annually while the data sources feeding these provincial IO tables are to be expanded and enhanced.

THE IMPORTANCE OF INTEGRATION

There is no single data source for measuring interprovincial and international trade flows. Information was drawn from administrative statistics where possible and from a variety of surveys, a number of which are recent additions to the field of provincial trade flows. Key information includes, among others, the Merchandise Trade of Canada statistics by province, the destination of shipments from the Annual Survey of Manufacturers, the Wholesale Trade Commodity Survey by Origin and Destination, the destination of sales from the Survey of Services Industries, and finally, out-of-province expenditures from the Canadian Travel Survey.

However, these disparate trade data have different and varied shortcomings in terms of coverage, frequency, valuation and consistency and may not accord entirely with the desired concepts and definitions for the accurate measurement of the provincial trade flows. Hence, given the limitations of the survey/administrative information, interprovincial and international trade flows are developed through a blended approach of, on one hand, survey/administrative data providing essential information on provincial trade *patterns* and on the other hand, an economic structural accounting framework in which the trade patterns are transformed into trade flow measures consistent with provincial supply (mainly production) and demand statistics; the provincial IO tables are the basis of the economic structural accounting framework since the IO tables are the most detailed economic accounting framework available.

The importance of the reconciliation and integration of the trade flows with provincial supply and demand statistics (the latter derived from the provincial IO tables) should be highlighted. The integration of the provincial trade flows within the provincial IO tables improves the overall quality of the estimates as it subjects the basic source data (whether for the trade flows or for the IO tables) to a system of logical and economic relationships not available for data generated in a narrower context. This often leads to an interactive process whereby insight is gained into the quality of the basic source data, imbalances between demand and supply are reviewed and

[2] Statistics Canada, *Provincial Economic Accounts*, catalogue no.13-213.

perceived deficiencies are remedied[3]. For example, in cases where exports are larger than domestic production, a review of the exports, production and inventory changes is triggered in order to eventually satisfy the relationship whereby exports can not be more than domestic production (plus withdrawals from stocks). Hence, disparate information on trade patterns benefit substantially from their integration into an accounting framework and their reconciliation with IO sources of production and of demand. In a similar manner, the provincial IO estimates of production and demand are improved from their reconciliation with trade flows. Major and unusual changes in provincial trade flows often lead to a review of various elements of the provincial IO tables and of the source data that buttress these tables.

ACCOUNTING FRAMEWORK

Interprovincial trade flows measure the annual sales of goods and services among Canada's provinces and territories while international trade by province reflects annual sales between individual provinces/territories and the rest of the world. Provincial trade flows (whether interprovincial or international) are estimated for each of the 725 or so commodities (goods and services) identified in the IO framework.

Origin and Destination

In analyzing economic interdependence, it is necessary to maintain the link between the original supply sources and final consumers, by commodity. It follows then that the point of origin (that is, the original supply source) is where goods and services are produced or goods are sold out of inventory stocks of producers, wholesalers and retailers. The point of destination (that is, the final consumer) is the point where goods and services are purchased for current consumption, capital formation, input into the production process of other commodities, or added to inventory stocks. Point of origin and destination can be a province, territory or outside Canada.

The provincial IO tables as well as the interprovincial and international trade flows are consistent with this concept. Therefore, wholesalers and retailers are not shown as consumers of the goods which they purchase nor as producers of those goods which they sell; they are viewed as intermediaries between the original supply sources and final consumers.

Trade can also be generated through travel when goods and services are consumed by non-residents of a province (e.g. hotel accommodations and restaur ant meals) even though production and consumption actually occur within a single province. In such cases origin represents the province of production and the province of residence of the consumer (traveler) determines the province of destination.

[3] For more information on economic relationships, readers may refer to Statistics Canada, The input-output structure of the Canadian economy, catalogue no. 15-510.

Valuation

Trade flows of goods are valued in producer prices. In manufacturing, this is often referred to as the "factory gate price". By this definition, the valuation of a good excludes all costs associated with transportation, distributive trade (wholesale and retail mark-ups) as well as commodity taxes. This method of valuation was selected over market prices (that is, price that includes all costs) since it more accurately measures the value of trade flows of goods and services; it permits the decomposition of market price into its separate costs.

To illustrate this point, take a good produced in Québec, purchased by a wholesaler in Ontario and subsequently sold to a customer in Alberta via a retailer; in addition, a Manitoba trucker transported the good from Québec to Alberta. As a final consumer, Alberta is importing from three provinces, namely Québec, Ontario and Manitoba.

The producer price value of the good is an import from Québec, the wholesale mark-up is an import from Ontario while the transportation service, from Manitoba. The retail margin is Alberta's own production and hence, there is no interprovincial trade flow generated[4]. If the trade flows were valued in purchaser prices for the above example, there would only be a single trade flow from Québec to Alberta (Ontario and Manitoba would not be factored in).

This is a key definition that is often misunderstood. Interprovincial and international trade flows must be valued in producer prices and only in producer prices if appropriate trade flows are to be quantified.

Accounting Identities

The principal accounting identities used in the derivation of interprovincial and international trade flows of goods and services are as follows:

1) In each province and for each commodity, total domestic supply must be identical to sales to the rest of the world (international exports), to other provinces (interprovincial exports), and to its own province. Total domestic supply is defined as the value of production plus shipments out of the inventories of producers, wholesalers and retailers. Estimates of the total domestic supply originate with the provincial IO tables. Each side of the identity (whether trade flows or components of total domestic supply) is often measured from different data sources.
2) In each province and for each commodity, total domestic demand must be identical to purchases from the rest of the world (international imports), from other provinces (interprovincial imports), and from its own province. Total domestic demand is equal to final domestic demand (personal expenditure, capital formation and government expenditure) plus intermediate domestic

4 It is an intraprovincial flow.

demand (inputs into the production process) plus additions to inventory stocks of producers, wholesalers and retailers. Again, estimates of the total domestic demand originate with the provincial IO tables. Each side of the identity (whether trade flows or components of total domestic demand) is often measured from different data sources.

3) In each province and for each commodity, total domestic supply minus total domestic demand equals total exports minus total imports. This yields a measure of net trade by province and by commodity.
4) For each commodity, the sum of international exports and imports by province are identical to their national counterparts.
5) For each commodity, interprovincial exports and imports are identical when summed over all provinces since one province's exports are another province's imports.
6) For each commodity, the sums over all provinces for total domestic supply and demand, combined with foreign supply and demand, equal the national values of total supply and total demand, respectively, for each commodity.

Goods purchased outside Canada and re-exported to the rest of the world are not part of the provincial identities. They are recorded as a separate element (a trade flow from rest of world to outside Canada)[5].

The above identities collectively form an accounting framework for adjusting source data, for filling data gaps and for analyzing the quality and consistency of the information used in the derivation of trade flow estimates . The above identities respected for each commodity for each year at the lowest level of detail possible (currently about 725 commodities).

The following table presents not only the accounting framework and identities just reviewed but also a summary of the trade between the various provinces and territories as well as international flows by provinces for 1997[6].

[5] While re-exports are excluded from the international imports and exports as part of the international and interprovincial trade flows program, they are included in the comparable estimates in the provincial GDP expenditures-based program.

[6] A number of conceptual changes were introduced with the release of the 1997 provincial I/O tables in 2001; the most important change dealt with the capitalization of software. Due to time constraints, while the national tables were revised historically, the provincial IO tables for 1996 were not. However, these changes had no impact on interprovincial and international trade flows; they have an impact on the value of goods and services purchased and absorbed within the same province or territory (that is, the diagonal).

Table 1: Interprovincial and International Trade Flows by Province and Territory
All Goods and Services, 1997 ($millions)

Lightly shaded data represents interprovincial trade flows, darker shading represents international trade flows.

Origin \ Destination	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Yuk.	NWT/ Nun.	Gvt Abr	World	Supply
Nfld.	14 618	29	168	107	339	325	15	13	37	32	1	4	0	3 273	18 962
P.E.I.	46	3 665	117	179	132	207	12	8	21	22	1	0	0	603	5 012
N.S.	484	249	28 839	907	798	1 127	75	64	225	241	3	26	0	4 450	37 489
N.B.	335	254	996	22 066	1 746	1 656	52	33	94	87	2	3	0	5 770	33 093
Que.	1 085	271	1 615	2 067	252 138	22 795	1272	1 100	3 541	3436	41	208	5	61 646	351220
Ont.	2 099	520	3 678	2 788	27 799	466 158	4 575	4 001	13 078	10 976	170	442	48	163 643	699 975
Man.	49	19	115	102	1 292	3 161	37 998	1 339	1 636	1086	8	39	0	8 337	55 181
Sask.	23	16	61	38	640	2 476	836	38 003	2 294	658	10	18	0	11 749	56 822
Alta.	183	33	219	174	2 493	9 113	2 142	3 586	148 304	6 506	92	339	2	36 504	209 691
B.C.	108	24	191	190	1 774	4 069	756	1 050	5 843	161 508	159	182	2	33 813	209 667
Yukon	0	0	0	0	4	22	2	3	36	64	1 630	18	0	278	2 060
NWT/ Nun.	2	0	9	1	53	313	11	12	104	77	3	4 316	0	492	5 396
Gvt Abr	0	0	1	1	4	7	1	0	1	4	0	0	630	8	656
World	3 028	496	6 261	6 136	62 310	159 262	8736	8 014	27 522	30 421	183	463	402	18 038	331 271
Demand	22 061	5 574	42 269	34 756	351 523	670 693	56 483	57 226	202 735	215 119	2 303	6 058	1 090	348 604	2 016 493

The year 1997 is used as it coincides with the start of major improvements in both the provincial trade flows and the provincial IO tables and further, 1997 is the most recent year for which data are finalized (that is, 1997 is the most recent year for which data are not subject to change). The above mentioned accounting identities are all present and respected in Table 1.

The above table represents the total of all interprovincial and international trade flows for 1997. There is a similar table for each of the 725 or so commodities and they are known as Commodity Trade Flows Tables.

The numbers along each row (except those on the diagonal) represent the exports of the province or territory identified at the head of the row toward the other provinces or territories and the rest of the world. The last number along a row represents the total domestic supply of the exporting province or territory.

The numbers down each column (except those on the diagonal) represent the imports of the province or territory identified at the top of the column from other provinces or territories and the rest of the world. The last number at the bottom of a column represents the total domestic demand of the importing province or territory.

Both total domestic supply and demand estimates are derived from the provincial IO tables.

The numbers along the diagonal represent the value of the goods produced and absorbed within the same province or territory. The number on the diagonal at the

"world" intersection represents goods imported from outside Canada and re-exported to the rest of the world. These re-exported international imports have been excluded both from international imports and exports of all provinces or territories.

Note, however, that since one province's exports are another province's imports, the Canada total of interprovincial exports is equal to total interprovincial imports. Finally, the number on the diagonal at the intersection of the total supply column and total demand row represents Canada's total supply or demand both from domestic and foreign sources.

Because trade flows are derived in a fully balanced set of provincial IO tables, whereby the demand/supply constraints are derived from these tables, changes in trade flows are often traced to changes in these demand/supply constraints ; furthermore, these constraints yield net trade estimates, providing reliable constraints for the derivation of provincial trade flows as a result of PIPES which brought about additional and more coherent data to strengthen these constraints.

From the above table, as an example, Québec's domestic supply (mainly production) amounts to $351 billion; from this supply, $62 billion is exported abroad, $252 billion is sold to users within Québec and finally, $37 billion is sold other provinces (more than half to Ontario users). On the other hand, Québec requires $352 billion of goods ad services, very close to its domestic production. Its overall domestic demand is satisfied by its own production ($252 billion), from imports from abroad ($62 billion) and finally from other provinces ($37 billion, $28 from Ontario alone).

Internationally, Ontario accounts for about half of the trade (whether imports or exports). Not only does Ontario dominate foreign trade, it is an important trading partner for every province and territory in Canada. Ontario is the principal source of domestic imports for every province in Canada. Furthermore, Ontario is an important destination for all provinces though it is not the leading domestic market for Newfoundland, New Brunswick (NB) and British Columbia (BC). Québec is the most important destination for Newfoundland and New Brunswick commodities. Alberta is BC's destination of choice.

The strongest trade link in Canada is between Ontario and Québec and represents nearly 30%[7] of all interprovincial trade. The interprovincial trade between Ontario and Alberta accounts for 13% of all trade in Canada while Alberta to British Columbia is 7%.

Interprovincially, all provinces other than Ontario (surplus of $ 24.9 billion) and Québec (surplus of $0.4 billion) posted a deficit in trade while many provinces recorded a surplus in their trade with foreign clients. For example, Nova Scotia's trade deficit equals $4.8 billion ($3.0 in interprovincial trade combined with $1.8 in exchanges with foreigners).

[7] Ontario to Québec trade ($27,799 billion) combined with Québec to Ontario trade ($22,795) divided by total interprovincial trade ($174,785 billion).

There are many more interesting observations that can be mentioned but they are best presented in the section on analysis later in this paper. At this point, the purpose of this last table is to understand the accounting framework and identities that contribute to the overall quality of the trade flows and the analysis that can be drawn from these trade flows.

DATA SOURCES AND LIMITATIONS

There is no single data for measuring interprovincial and international trade flows. Information is drawn from a variety of surveys and administrative statistics and these various data sources are presented in the following section. Conceptual and statistical data limitations are also examined while approaches to resolve these built -in data biases are discussed at length. Finally, data gaps and proxies are documented and explained.

While the interprovincial and international trade flows are developed as an integral part of the provincial input-output tables, basis for the derivation of the domestic demand/supply constraints, the data sources of the provincial IO tables, are not part of this paper[8].

While this section presents the data sources and their limitations, the following section reviews how the source data on provincial trade patterns are reconciled with the domestic demand/supply controls so that the accounting identities are respected.

INTERNATIONAL TRADE FLOW ESTIMATES BY PROVINCE

At the national level, Statistics Canada produces two highly detailed international trade aggregates: Canadian International Merchandise Trade[9] and Canadian Balance of International Payments[10]. While there is a provincial dimension for the Canadian International Merchandise Trade, there is no comparable measure at the provincial/territorial level for the Canadian Balance of International Payments.

Goods

The provincial estimates from the Canadian International Merchandise Trade are the initial source for merchandise trade statistics by province/territory in the interprovincial and international trade flows program. The Canadian International Merchandise Trade is developed from administrative documents that record international flows of mostly goods.

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[8] For information on data sources and methods of provincial IO tables, readers may refer to an unpublished document of Statistics Canada entitled *Provincial Input-Output for Reference Year 1998: Industry Sources and Methods*, November 2001.

[9] Statistics Canada, *International Merchandise Trade*, catalogue no. 65-001.

[10] Statistics Canada, *Canada's Balance of International Payments*, catalogue 67-001.

When goods are imported into or exported from Canada, declarations must be filled with customs officials giving such information as description and value of goods, origin and port of clearance of commodities, etc.

Since 1990, the Canada and USA administrations are using the other's import data to replace its own export data. Thus Canada' exports to the USA are in effect USA imports from Canada while Canada's imports continue to be based on customs document filled with the Canadian administration.

This approach is based on the notion that customs based trade statistics are more accurate at measuring imports than they are at measuring exports. This is the case because customs authorities are typically more vigilant with respect to goods entering the country than they are with goods leaving the country.

The provincial dimension of export and import data published within the Canadian International Merchandise Trade program are s aid to be 'by province of origin' for the export estimates and 'by province of customs clearance' for the imports.

For the export data, the province of origin is said to represent the province in which the goods were grown, extracted or manufactured, thus corresponding to the requirement of the trade flows program. However, the bulk of the Canadian exports are to the USA and since our export estimates are based on the USA imports from Canada, the province of origin for the bulk of our exports (that is, based on USA import data from Canada) is in effect the last point of direct shipment to the USA. The last point of direct shipment may not always be the point of production.

A number of problem-areas may distort the merchandise trade data:

- when a wholesaler or retailer sells a good, the province of export does not always coincide with the province of the producer,
- transportation routing and storage facilities can cause distortions in identifying province of production, and
- using US import documents to measure Canadian sales to US markets exacerbated the problems of identifying province of production for international exports to the United States. These documents may rely on the use of the address of the Canadian exporter to identify the province of origin and thus, this may result in a "head office bias".

Therefore, merchandise exports by province are not entirely consistent with the requirement of the interprovincial and international trade flows program (that is, province of production) as they may reflect the last point of direct shipment to the USA.

For various grains, efforts are focused in the Canadian International Merchandise Trade program to publish the export data that are closer to the concept of province of production than by province of last direct shipments since they use data from the Canadian Grain Commission to reallocate exports based on province of production.

There are at least three important additional STC sources that may be used to complement international merchandise exports for specific goods. International exports by province for energy commodities (namely, natural gas, crude oil and electricity) are provided by the STC Energy Section. Also, the Census of Mines yields data on international exports which are used to validate the international merchandise exports for mining commodities. Furthermore, the Annual Surveys of Manufacturers and the Wholesale Trade Commodity Survey by Origin and Destination provide key information about international exports; while both handle manufactured goods, the first deals with exports shipped directly from manufacturers while the latter, exports sent abroad by wholesalers. It will be shown later in this paper how this information is used to complement the international merchandise exports, thus strengthening the estimates in interprovincial and international trade flows program.

The provincial dimension of import data published within the Canadian International Merchandise Trade program is by province of customs clearance and, unfortunately, not consistent with the province of destination concept required by the interprovincial and international trade flows program (that is, province of consumption). Goods are often customs cleared in the province that they enter Canada; this causes serious problems in determining the province of domestic demand as defined earlier.

Imports by province based on the provinces of clearance would tend to overstate imports in provinces that are major entry points, and hence an understatement in the others. Major centers for import customs clearances are in British Columbia for Asia Pacific Rim goods, in Ontario for USA merchandise and in Nova Scotia for European goods. As such, imports according to customs clearance data is understated in most other provinces and the territories.

Since the Wholesale Trade Commodity Survey by Origin and Destination also provides information as to the extent of goods purchased from abroad and their sales across the provincial boundaries, it will be shown later in this paper how the international merchandise imports of manufactured goods are adjusted to mitigate some of the data limitations of the provincial estimates from the Canadian international merchandise imports.

In summary, international exports by province from the Canadian International Merchandise Trade program are closer to concept required by the interprovincial and international trade flows program than are international imports. A number of steps are taken to re-allocate provincial international exports and imports before integrating these international trade flows with interprovincial trade flows in a provincial IO framework. International exports are confronted with other data sources (for example, energy and mining commodities). Also, there is one other key adjustment that will be the subject of a chapter later in this paper. Provincial re-allocation of international trade (both exports and imports) is made, for manufactured goods, by applying results from the Wholesale Trade Commodity Survey by Origin and Destination. The wholesale results are used to mitigate some of the inherent data limitations in the provincial estimates from the Canadian International Merchandise Trade program. The aim is to produce international exports and

imports that are closer to the requirement of the interprovincial and international trade flows program (that is, province of origin and province of destination).

Furthermore, later in this paper, a comparison of the export[11] and import by province data from the Canadian International Merchandise Trade will be compared with their equivalents from the interprovincial and international trade flows program.

Services

The Canadian Balance of International Payments (BOP) is the basis of the measure of Canada's international trade flows in the System of National Accounts (SNA); unfortunately, they are not produced by province/territory as is required by the interprovincial and international trade flows program .

The Balance of Payments (BOP) Accounts are devoted exclusively to the national economy's transactions with non-residents. In essence, the BOP program consists of two tasks: making various adjustments to the merchandise (goods) trade referred to above and deriving international trade flows for services , both at the national level. These estimates determine the national controls for the international trade flows by province.

The BOP adjustments to the Canadian International Merchandise Trade are necessary in order to ensure that all economic transactions between residents and non-residents which involve merchandise trade are properly reflected in the SNA; the merchandise trade statistics cover only the physical movement of goods as reflected on the customs documents. These BOP adjustments to merchandise trade fall into broad categories of timing, valuation and coverage[12]. The BOP adjustments to merchandise trade are only made at the national level; thus, the provincial dimension of these adjustments is estimated using international merchandise trade data by province.

[11] Merchandise trade includes goods for re-export purposes (re-exports refer to goods of foreign origin that have not been noticeably transformed in Canada).

[12] For an explanation of the BOP adjustments, see, Statistics Canada, *Canada's Balance of International Payments and International Investment Position. Concepts, Sources, Methods and Products,* catalogue no. 67-506. For a summary of the BOP adjustments, see page 28 of the publication. As an example, customs data for crude petroleum are replaced by price and volume information from Statistics Canada and National Energy Board.

BOP international trade in services is obtained mostly from surveys; these survey results do not yield a provincial dimension as they are compiled at a national level only. They are four main categories of services: commercial services, travel, transportation, and government services. In essence, since surveyed data are generally unavailable at the provincial/territorial level, the national data are allocated according to the province/territory in which the activity is estimated to take place; a wide range of allocators are used such as:

- wages by province to allocate many of the commercial services,

- number of international students by host province to apportion education-related travel,

- cargo tonnage of foreign carriers by province to distribute air freight payments and

- number of foreign representatives by province to allocate foreign government spending in Canada.

The latest provincial allocation of BOP national estimates refer to 1996 and these 1996 patterns are currently used as a starting point for international trade in services by province for all years since 1996.

The exercise to allocate by province the BOP national estimates is lengthy and, due. To resource constraints, has not been replicated for current years by the BOP staff[13]; furthermore, there is no overall documentation[14] of the exercise to allocate national BOP international trade in services by province.

While the initial provincial patterns for international trade in services refer to the economic situation of the mid-nineties, additional STC sources are used to complement specific services in international trade. They are:

- annual surveys of the business services industries. International exports for business services by province were provided by the question on the geographic residence of clients from these annual surveys. The latest survey refers to 1998, though one is planned for reference year 2003. This was the first time in 1998 that such a question was asked; while the data were never published they were used in the interprovincial and international trade flows program.

- various annual transport surveys provide rail/truck/marine origin and destination transport data which are used in the derivation of both international transport imports and exports.

- the International Travel Survey is the basis for provincial allocation of specific travel-related commodities in deriving both international imports and exports.

[13] An update of these BOP 1996 provincial estimates is currently being considered in Statistics Canada.
[14] However, estimates of business services by province of activity and some relevant documentation can be found in Statistics Canada, *Canada's international transaction in services, 1990 and 1991,* catalogue 67-203.

- Wholesale Trade Commodity Surveys by Origin and Destination provide a pattern to provincialize the wholesale margins for both international imports and exports. The latest survey refers to 1998, though one for reference year 2001 is underway.

In summary, the provincial distribution of services is essentially determined by various provincial indicators (1996 data). A number of related data are used to re-allocate international exports and imports by province before integrating these international flows with interprovincial trade flows in a provincial IO framework.

INTERPROVINCIAL TRADE FLOW ESTIMATES

Measures of interprovincial trade can be obtained by: (1) asking producers where goods and services are sold: (2) asking buyers where goods and services originated from; and (3) asking carriers the origin and destination of goods transported.

Data sources on interprovincial trade flows for manufacturing, agriculture and mining commodities as well as business services depend mostly upon the first approach where statistics are drawn from surveys of producers who report destinations of sales. For goods, the main weakness in this approach is that the first destination is reported, which may not necessarily coincide with the desired concept of final destination.

The second approach was used for wholesalers who reported the origin from which goods were purchased and the destination of sales; it was also used to measure the value of trade generated by travel expenditures out-of-province as travellers are asked about the origin of their travel expenditures. Wholesale trade commodity surveys by origin and destination attempts to remedy the weakness in the manufactured goods whereby the first destination may not coincide with the concept of final destination.

The third approach (transportation data) was not used in the current provincial trade flows program. Specifically, origin/destination transportation data by commodity are not currently used as an alternative means of deriving trade flows of primary and manufactured goods and/or of determining the accuracy of the trade flows derived from other sources for a number of reasons; they are: the transport of goods are only measured in quantities (not values), there is no direct linkages in cases of multi-mode transport of goods, commodity detail for many manufactured goods is not well specified or too broad and finally, many goods are packed in containers with no or little commodity specification as they are moved across the country.

Finally, various proxy measures and assumptions are used to generate trade flows for commodities for which no trade patterns exist. As a result, there is a myriad of different data sources on interprovincial trade flows; a copy of the detailed source data for each of the commodities is available upon request.

Primary Goods

Trade patterns are generally well covered by annual surveys from a variety of surveys and/or from administrative records. Interprovincial movements of agricultural products, whether livestock, grains and dairy products, are derived from surveys from Agriculture Division of Statistics Canada (STC) or from administrative records from the Canadian Grain Commission, Canadian Dairy Commission as well as from Agriculture Canada, among others.

The methodology to drive interprovincial trade flows for the livestock commodities, whether cattle, hogs and poultry, reflects the data availability on interprovincial movements (number of animals) for most livestock commodities by month. Interprovincial trade flows for cattle/calves and for hogs include separate estimates of animals for slaughter and for feeder purposes.

In regards to grains and oil seeds, the methodology is lengthy and less straightforward than with livestock. Interprovincial movements of various grains from Canadian Grain Commission as well interprovincial flows of canola (in metric tones) from STC Agriculture Division combined with the provincial demand from establishments engaged in milling flour and in crushing oil seeds provide the basis of the interprovincial flow estimates .

The major source of data for interprovincial trade flows for many of metallic and non-metallic ores and concentrates is the data on the destination of shipments from the Annual Census of Mines, Quarries and Sand Pits conducted by Natural Resources Canada.

The Energy Section of STC compiles annual provincial estimates on trade in crude oil, natural gas, and coal. However, the coverage and the objective of the Energy Section's trade flows for crude oil[15] is not entirely suitable for the provincial IO tables and for the trade flows programs; as a result, it is necessary to adjust the Energy Section's trade flows. Specifically, the Energy Section's trade flows are consistent with the value of crude oil production on which provincial royalties are levied; this has the effect of excluding the impact of the Saskatchewan Lloydminster upgrader. For the purpose of deriving provincial IO tables and the trade flows programs, the value of crude oil production also includes the impact of the Lloydminster upgrader. As a consequence, it is necessary to modify the Energy Section's trade patterns for crude oil based on our understanding of the trade movements of crude oil while respecting the domestic demand/supply constraints: an additional substantial amount is said to be shipped to Ontario.

15 Energy Section's trade flows are based on provincial government data (who in turn collect data from producers) combined with various survey results on users (such as oil and gas pipelines, gas distributors, refineries).

Manufactured Goods

The major source of data for interprovincial trade flows of manufactured goods is the information on the destination of shipments from the STC Annual Survey of Manufacturers (ASM). This is an extremely important data source in terms of interprovincial trade flows as the survey coverage is good and the quality of the results are reliable through time.

This information was compiled at the establishment level providing initial interprovincial trade patterns as well as international exports of the establishments' total shipments; these trade flow patterns are then applied to all of the individual commodities that make up the establishments' total shipments. One of the interesting features of these trade data lies in the fact that the destination of goods is in fact on the same valuation basis as the shipment data (that is, in producers' values).

These patterns are then adjusted as required to deal with the following limitations of the ASM destination of shipments information:

i) As pointed out above, geographic distribution is only reported on the total value of shipments at the establishment level and not by commodity. This implies that the pattern of destination for an establishment producing multiple goods is identical. For example, an Ontario dairy establishment produces milk and cheese; for simplicity sake, assume that it sells all its milk within province and all its cheese to out-of-province consumers. According to the initial trade pattern, the share of out-of-province sales would be identical for both commodities; hence, fresh milk produced in Ontario is said to be exported to, say, Yukon. In cases where commodity mix does vary by destination, the domestic supply and demand controls, wholesale activities and economic intelligence are used in dealing with this problem.

ii) Destination information was not collected for small manufacturing establishments (except for a special arrangement for Québec small firms). The definition of a "small establishment" and their importance in manufacturing activities vary by province. Small firms for Canada account for close to 8% of all manufacturing shipments[16]; furthermore, in specific provinces or territories, their importance doubles. In the ASM, the destination of these establishments' shipments was imputed to be the province of origin; that is, shipments are said to be purchased by consumers within the province of the establishment. The non-reporting of destination of shipments by small firms was not regarded as a serious problem at the national level but may in fact bias trade flows for some specific provinces.

    Consequently, in the interprovincial and international trade flows program, following a review of the data on the destination of shipments for Québec small firms[17], the ASM hypothesis was not respected. It was assumed instead that

[16] More than doubled their importance since 1984.

[17] Recent ASM data for the Québec small establishments clearly shows that they proportionately export significantly less than their large establisyments counterparts. Nevertheless, about one third of their shipments

small establishments have sales outside their provinces but more than likely the sales are to markets closer to home than their large manufacturing counterparts. Thus the destination of shipments for small establishments in the trade flows program diverges than with their ASM treatment.

Major efforts were undertaken to alleviate this issue as part of the PIPES initiative; in the redesign ASM for reference year 2000, the small firms will be asked to complete the question on destination of shipments. The objective is to ensure data quality across provinces. However, in an effort not to unduly increase response burden, small firms will not be asked to provide a breakdown of shipments by province of destination, just the total shipped to other provinces.

iii) Another significant limitation of the ASM destination of shipment data centers around the issue that the destination of shipments identified in ASM are not necessarily the final destination of the shipments. The ASM question on the shipment destination asks for first destination of goods shipped, which could be a wholesaler, retailer or another manufacturer who in turn re-sells the products; these, in fact, could be re-sold to clients within or outside the province or even to customers in foreign markets. This question on first destination is thus inconsistent with the desired concept of final destination/consumption as described earlier. This problem can be partially corrected with information on origin of purchases and destination of sales by wholesalers as they are the most active in terms of buying and re-selling goods across various geographical jurisdictions.

Therefore, an important bridge between first and final destination is the Wholesale Trade Commodity Survey by Origin and Destination which provides information on origin of purchases and destination of sales of wholesalers. It will be demonstrated that the results from the Wholesale Origin and Destination Survey are used to mitigate some of the inherent data limitations in the destination of shipment information from the Annual Survey of Manufacturers. This is addressed later in the paper.

Other Goods

Construction and utilities make up the remainder of goods not included in the primary and manufacturing sectors. These, however, add very little to interprovincial trade flows other than for electricity. The output of construction cannot by nature be traded outside the province where work is put in place. Construction, nevertheless, generates interprovincial trade to the extent that materials and services (such as engineering and architectural) are imported. Wages and salaries of provincial non-resident construction workers and profits of out-of-province contracting firms, under national accounting concepts, are accrued to the province or territory where construction activities occur. Electricity is the only utility where there are measured

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leave the province, equally exported to other provinces and abroad; on the other hand, more than 60% of shipments from large establishments leave Québec, the bulk for foreign markets.

trade flows, mainly among neighboring provinces ; these trade flows are obtained from published electricity disposition tables by the STC Energy Section.

Services

Services are broadly grouped in the areas of: transportation, communications, business services, financial services, wholesale and retail margins as well as personal and recreational services.

Transportation services

The prime data source for the interprovincial trade flows for various transportation services is origin/destination data by carriers; while not ideal for the purpose at hand, it is readily available and provides an outline of the interprovincial trade in transportation services. Interprovincial trade of air transportation is derived from origin/destination of passenger traffic volume, supplied by STC Transportation Division. Interprovincial trade patterns for truck, rail and water transportation are derived from statistics on the origin and destination of goods transported by the respective carriers; these statistics are also compiled by STC Transportation Division. Trade flow patterns for transportation margins are estimated by combining origin/destination statistics for the three major modes of transport (truck, rail and water).

Taxi and bus (urban and interurban) transportation are mostly consumed within the province of production; trade generated through travel, when non-residents use these services, are derived from the Canadian Travel Survey. Trade for pipeline transportation reflects movements of oil and gas as provided by STC Energy Section. Grain storage is based on the flows of the major grain commodities (wheat, barley and other grains).

Communications

Trade patterns for communications are developed in the categories of telephone and telecommunications, and postal services, radio and television broadcasting as well as cable and other subscription programming; these trade patterns reflect mostly proxies and assumptions as source data on trade is rather limited.

In regards to telephone and telecommunications, there is no available information on trade flows. In deriving a trade pattern for telephone and telecommunications, it is said that all local calls are consumed within the province of production. Furthermore, it is assumed that a significant share of the long distance telephone calls are absorbed within the province of production, with the remainder allocated to various provinces of destination of the long distance calls, using domestic demand as an indicator of trade. Interprovincial trade patterns for postal services are obtained from Canada Post data on origin and destination of the quantities of mail transported among the provinces and territories.

There is no available data on trade flows for radio and television broadcasting. This commodity includes local, national and network radio and television broadcasting. It is assumed that there are no trade flows for revenues of local radio and television since production and absorption take place within province. Trade patterns for national and network advertising sales are allocated provincially using provincial demand for advertising services as a weighting factor.

As with other commodities within this group, there is no data on trade patterns for cable and other subscription programming. However, the trade flows for this commodity reflect the estimated flows for specialty services from providers to cable firms and of direct-to-home satellite services to persons. Flows are developed based on the provincial domestic demand for specialty services and direct-to-home satellite service as an indicator of trade by province.

Business and computer services

Trade patterns for business and computer services are developed from the occasional information on the destination of sales from the STC annual surveys of various services industries; a question on destination of sales was included for the 1998 surveys of services industries with one planned for the reference year 2003. This data on the destination of sales was used for many services ranging from architectural services to computer services to travel agents to advertising services.

Financial services

There is no survey information on origin and destination for financial services to draw from; this contrasts to many other goods and services which rely on survey data or administrative records to derive interprovincial flows. Consequently, interprovincial trade flows for financial services were arbitrarily derived based on a number of perceived economic situations and relationships within the Canadian economy. For example, in the case of imputed banking services (interest charged on loans less interest paid on deposits), the production of these services for persons and for small businesses are mostly assumed to be absorbed within the province of production; the output of banking services for large corporations and governmental institutions are allocated to the province of destination using domestic demand for these services as an indicator of trade. For selected financial services, total interprovincial trade flows are used as a pattern.

It should be stressed, however, that the published trade flows for all financial services are always validated against their historic al values. In essence, published trade flows for these services fluctuate as a result of changes in domestic supply/demand constraints.

Wholesale and retail margins

Interprovincial trade distributions for wholesale margins (mark-ups of wholesalers) are derived from the Wholesale Trade Commodity Survey by Origin and Destination; the location of the wholesaler represents the province of origin of the wholesale margin, and the destination of wholesale sale represents the destination of the

wholesale margin. Retail margins are mostly produced and consumed within province. The interprovincial trade patterns for retail margins are estimated from results of the early-nineties survey[18] of growing small and medium-sized enterprises ; the survey provides the proportion of out-of-province sales of small to medium-sized retailers.

Personal and recreational services

Various recreation and personal services can be exported when consumed by non-residents (travel and tourism). Interprovincial trade in these services were derived from the Canadian Travel Survey which contains information on the province of origin of travelers and province of travel expenditures by broad categories of outlays such as transportation fares, vehicle operations, accommodations, restaurants and drinking places. These expenditure trade flows are allocated to appropriate commodities such as accommodations, meals, alcoholic beverages consumed on licensed premises, motor vehicle rentals as well as recreation and entertainment services.

ADJUSTMENTS BASED ON WHOLESALE ORIGIN/DESTINATION DATA

Inherent data limitations in the destination of shipment information from the Annual Survey of Manufacturers as well as in the provincial estimates from the Canadian International Merchandise Trade program were presented earlier; they are:

- the ASM question on the shipment destination asks for first destination of goods shipped, which may *not* be the point of consumption,
- the international merchandise exports by province often reflect the last point of shipment, which may *not* be the point of production, and
- the international merchandise imports by province reflect the province of entry into Canada, which may *not* be the province of consumption.

The purpose of this section is to show that the results from the Wholesale Trade Commodity Surveys by Origin and Destination (which provide information on origin of purchases and destination of sales of wholesalers) are used to mitigate some of these data limitations.

Wholesale Trade Commodity Surveys by Origin and Destination were carried out for 1996 and 1998[19] while one is being conducted presently for reference year 2001; it is anticipated, because of their importance in providing more robust interprovincial and international trade flows for manufactured goods, that wholesale trade commodity surveys by origin and destination will be conducted in the future at regular intervals. Wholesalers are defined as those who actually take possession of goods purchased, thus excluding those who acted as brokers and agents. This was a sample survey

[18] See Statistics Canada, *Strategies for Success. A Profile of Growing Small and Medium-sized Enterprises in Canada*, catalogue no. 61-523.

[19] 1996 Interprovincial Wholesale Commodity Survey and the Origin/Destination by Commodity – Wholesale Agents and Brokers: Annex to the 1998 Annual Wholesale Trade Survey.

providing origin and destination information for about 100-120 commodity groupings, depending on the survey year.

In the Wholesale Trade Commodity Surveys by Origin and Destination, there are three geographic references identified for each wholesaler:

point (province) of residency (location) of wholesaler,

point (province or foreign country) of origin of wholesale purchases, and

point (province or foreign country) of destination of wholesale sales.

To link the ASM and international merchandise trade estimates with the wholesale results, it is necessary to make a number of assumptions in regards to the wholesale trade activity. When a wholesaler purchases from domestic sources, it is assumed that the origin of a wholesale purchase represents the point of production while the destination of the sale is the point of consumption. When a wholesaler purchases from outside Canada, it is assumed that the wholesaler is located in the province of import. When a wholesaler sells outside the country, exports are recorded from the province of the wholesaler. It follows then that the destination of shipment information from the Annual Survey of Manufacturers as well as the provincial estimates from the Canadian International Merchandise Trade can be adjusted for the wholesale trade activity.

For example, the ASM identifies a British Columbia manufacturer that ships all its product to various Ontario purchasers; in turn, these buyers could be another Ontario manufacturer that uses it as an input into its production process, or an Ontario wholesaler that re-sells it to various retailers across the Maritimes or an Ontario retailer that sells it in its stores. Both the manufacturer and the retailer are said to be the final user and hence, the first destination is the final and correct one. In parallel, the Wholesale Trade Commodity Surveys by Origin and Destination provides data on the Ontario wholesaler that purchased goods from British Columbia (presumably the same British Columbia manufacturer) and resells to retailers across the Maritimes. As a result of adjusting the ASM destination data, the British Columbia manufacturer will be shown to ship its products to the Maritime provinces.

Therefore, the results from the Wholesale Trade Commodity Surveys by Origin and Destination are used to identify the proportion of the ASM shipments that are to wholesalers and to calculate the amounts which are, in turn, re-sold within or outside the province of the wholesaler or on international markets.

Also, the international merchandise imports by province reflect the province of entry into Canada. Since the Wholesale Trade Commodity Surveys by Origin and Destination identifies the purchases that originated from foreign sources and which

are re-sold across Canada, it is then possible to re-allocate the imports to their province of absorption.[20]

Furthermore, since the international merchandise exports by province reflect the last point of shipment and may thus not always reflect the point of production, it is possible to reallocate the exports to their province of production based on the movements of international exports quantified in the Wholesale Trade Commodity Surveys by Origin and Destination.

As a result of this exercise, the adjusted destination of shipment information from the Annual Survey of Manufacturers and the modified estimates from the Canadian International Merchandise Trade program are closer to the requirement of the provincial trade flows program, that is, interprovincial and international exports by province of production and interprovincial and international imports by province of demand.[21]

While this intricate exercise is very helpful in estimating more robust provincial trade flows, there are nevertheless a number of data issues. The lack of extensive commodity information from the Wholesale Trade Commodity Surveys by Origin and Destination (only about 100-120 trade commodity groups are identified) implies that wholesale trade patterns are applied to many commodities identified in the ASM; in the case of dairy products, wholesale trade patterns on dairy products are assigned to each ASM dairy product (whether, milk, cheese, butter, etc.).

It is important to note that the origin and destination information provided by the wholesalers is not entirely sufficient. What is *not* provided by the Wholesale Trade Commodity Survey by Origin and Destination are the destinations for each of the geographic dimensions of the purchases; what is provided are the destinations for the sum of all purchases, for a particular commodity. As a result, it is necessary to assume that, for each wholesaler, the pattern of destinations of their sales is identical for each of the origins of their purchases. For example, if an Alberta wholesaler purchases industrial chemicals from Alberta and Ontario and re-sells them to Québec and abroad (for example, Japan), it is assumed that the purchases from Alberta are re-sold to Québec clients and to customers from abroad and that the Ontario purchases are also re-sold to Québec and foreign buyers. It is conceivable that in reality, all of the Alberta purchases are sold to Japanese customers while the Ontario purchases are destined exclusively to Québec markets.

[20] The international imports for a number of goods are further re-allocated based on demand estimates; for example, some food-related and clothing items are re-allocated based on personal consumption while various industrial goods, on industrial demand.

[21] With the help of a hypothetical example, an overview of the steps involved in adjusting the destination shipments and international merchandise trade for the wholesale activity is available upon request.

Potential problems exist with the assumptions used in linking the destination of shipment information from the Annual Survey of Manufacturers and the provincial estimates from the Canadian International Merchandise Trade program with the results from the Wholesale Trade Commodity Surveys by Origin and Destination. The adjusted provincial trade flows are biased if:

- a wholesaler purchased from another wholesaler located in a different province,

- foreign sales were not exported from the province of wholesaler; and

- foreign purchases were not imported (customs cleared) directly into the province of wholesaler.

While it is a complex and lengthy operation, the linking of the destination of shipments and of the international trade with the results of the wholesale commodity surveys yields provincial trade patterns that are of higher quality and closer to the requirements of the provincial trade flows program.

As result of this exercise, for example, PEI international imports of manufactured goods are estimated to be significantly larger than the published international imports by the International Merchandise Trade program in 1997; very few imports are in fact customs cleared in PEI. This adjustment explains the bulk of the differences in PEI international imports between the Canadian International Merchandise Trade and the provincial trade flows programs; it will be addressed again later.

Another interesting example highlights the importance of the Ontario wholesalers of pharmaceuticals in the marketing of these products in Canada. A large share (roughly, a quarter) of the Ontario production of pharmaceuticals is re-sold by Ontario wholesalers mainly to two major markets, Québec and abroad; the ASM destination of shipments identifies only the first destination which is Ontario. These two examples clearly illustrate the need for the Wholesale Trade Commodity Survey by Origin and Destination and their beneficial impact on the trade flows program.

Here are two general observations about the wholesale trade activity in Canada. Wholesalers are very active in the import/export business. Furthermore, a significant share of wholesale purchases originates from the same province of residency of the wholesaler and is sold by that wholesaler in the same province as the province of its residency; in other words, they do not cross provincial boundaries for their activities.

RESPECTING THE ACCOUNTING IDENTITIES: BALANCING THE COMMODITIES

When interprovincial and international trade patterns have been estimated, they are entered in the structural accounting framework described earlier. The objective is to reconcile the provincial trade patterns with provincial domestic supply and demand controls (derived from provincial IO tables) through analysis and adjustments to

either the trade patterns and/or the provincial domestic supply and demand controls. This lengthy, time-consuming and complex process, carried out for each of the 725 or so commodities, involves data confrontation between the measured provincial trade patterns and the domestic supply/demand constraints. Any differences between them must be analyzed and remedied; elements of the measured provincial trade patterns and/or the domestic supply/demand constraints will be modified so that the differences are remedied.

The principal accounting identities used in the derivation of interprovincial and international trade flows are:

1) In each province and for each commodity, total domestic supply (production plus shipments out of the inventories) must be identical to sales to the rest of the world (international exports), to other provinces (interprovincial exports), and to its own province.

2) In each province and for each commodity, total domestic demand (personal expenditures, capital formation, government expenditures, inputs into the production process plus additions to inventory stocks) must be identical to purchases from the rest of the world (international imports), from other provinces (interprovincial imports), and from its own province.

3) The sum of international exports and imports by province are identical to their national counterparts.

The more prominent causes of disparities between the measured trade flows and the related domestic supply and demand controls are due to differences in concepts, definitions, coverage, valuation and classification, as well as to data gaps and to timing. The different treatment of trade flows for crude oil, previously presented in this paper, is a classic example of the main difficulties encountered in reconciling flows and domestic supply and demand controls. Furthermore, the data sources for the components of the identities do not necessarily originate from the same data sources, further exacerbating the imbalances in the identities by commodity.

In this process, all data are reviewed and subject to change. For example, adjustments are done to account for cases where there is production but no destinations, demand without any origins of purchase or vice versa; port of clearance reporting and multi-level wholesale activity can yield various inconsistencies. The use of the same geographic distribution for all commodities produced by a manufacturer can also produce imbalances and so on.

Any differences or imbalances between the measured trade flows and the related supply and demand controls need to be analyzed through examining alternative trade indicators, micro economic analysis, consultation with industry experts and provincial economic authorities. Measures such as foreign import content of demand and per capita imports help tremendously in identifying outliers; provincial trade flows are always analyzed in a time series approach in order to ensure data quality and consistency. Any change in trade patterns is rationalized.

Judgment and economic intelligence is an essential ingredient in adjusting interprovincial and international trade patterns (or adjusting the elements that make up the supply and demand controls). Trade flows are adjusted to reflect the analysts' economic knowledge of the actual trade flows. Perceived economic trading blocks are respected; for example, the western provinces are more likely to trade with each other than with the Maritimes. Also, data that are judged to be the weakest are the first one to be modified; inventories, interprovincial and international trade by province as well as the commodity composition of the industry purchases are often viewed as weaker than are, say, commodity output data[22].

Eventually, after a number of modifications and adjustments, the differences are all accounted for and thus eliminated. There are no ready-made statistical approaches to solving such imbalances ; the only approach is laborious investigation. Each commodity faces different problems and/or characteristics.

This process of balancing the commodity trade flows where the measured trade patterns are reconciled with the supply/demand constraints is time-consuming. Not only is it carried out at the lowest level of detail (that is, for each of the 725 or so commodities), the number of identities for any commodities is rather large; there are more than 25 identities to respect for each commodity. Furthermore, when the accounting identities are not respected for a particular commodity, corrections cannot be made by dealing with each identity in isolation. Although some problems are obvious within an identity, independent balancing causes other identities to change. For example, imposing adjustments to balance columns (origin of demand identities) will create imbalances along the rows (destination of supply identities). Therefore, a commodity matrix has to be analyzed and balanced as an interdependent system; balancing a commodity is a multi-dimensional iterative process.

In summary, interprovincial and international trade detail for each commodity are reconciled and balanced with provincial supply and demand controls (derived from provincial IO tables) through analysis and data adjustments. Identities that are not satisfied are examined and investigated for the reasons of the inconsistencies; these reasons relate to, among others, conceptual, valuation and coverage differences.

This lengthy and complex process is labour-intensive; in fact, both the derivation of the initial provincial trade flows and the reconciliation of these initial trade patterns with supply/demand constraints require major investment in resources, whether human or technical.

Further, it is crucial and very worthwhile as it imposes additional constraints on the data; the measured provincial trade patterns, based on survey or administrative data, are subjected to a system of logical economic relationships not available to most survey or administrative data. The provincial trade flows thus derived are said to be of superior quality than the measured provincial trade patterns. Users of these measured provincial trade patterns, often published, should be careful in their use as

[22] Trade flow information plays an important role inbalancing provincial IO tables and improving its overall quality as elements of the supply/demand constraints are constantly reviewed, challenged and analyzed.

these patterns have not been challenged and reconciled against other source data while the interprovincial and international trade flows have.

Finally, it is important to realize that the supply-demand accounting identities, derived from the provincial IO tables, determine the net trade balance for each commodity (725 or so) in each province and territory. The task then consists of quantifying imports and exports (whether international or interprovincial) so that their net trade will equal the one derived from the supply-demand accounting identities. This is an important observation as the derivation of the net trade balance using the supply-demand accounting identities (instead of using the provincial trade flows) strengthens considerably the interprovincial and international trade flows estimates. This derivation of the net trade balance using the identities provides an additional limitation on the size and the nature of the trade flows. Also, the survey information that buttresses these provincial Input -Output tables was also expanded and/or strengthened considerably at great cost, contributing to the overall quality of the demand/supply constraints.

ACCURACY OF KEY SOURCE DATA

To what extent is the Canadian International Merchandise Trade by province accurate?

Since the Canadian International Merchandise Trade estimates by province are key to the derivation of the provincial trade flows, how do they compare with equivalent estimates from the provincial trade flows programs? How accurate are the Canadian International Merchandise Trade estimates by province after they are confronted with other data sets and subjected to a system of logical and economic relationships that characterizes the provincial trade flows? Furthermore, because the Canadian International Merchandise Trade estimates by province are available traditionally much earlier than are the comparable estimates from the provincial trade flows program, provincial government users, among others, have been mining these trade estimates as a gauge of the performance of international exports and imports in their respective provincial economies; the question arises as to their reliability?

Table 2A presents a comparison[23] of the Canadian International Merchandise Trade

[23] While both merchandise imports/exports from the Canadian International Merchandise Trade and provincial trade flows programs exclude the impact of re-exports, a number of conceptual differences exist between the two databanks. The imports and exports from the Canadian International Merchandise Trade are largely based on customs documents which records cross-border of goods. The exports of goods in the provincial trade flows program include the BOP adjustments related to goods, the goods which are in effect imbedded in the BOP services but exclude various margin costs such as wholesale and transport margins. The imports of goods in the provincial trade flows also include the BOP adjustments related to goods and the goods which are in effect imbedded in the BOP services as well as the transportation costs from the exporting countries to the Canadian borders.
Differences in valuation stem from the fact that exports-imports of goods in the provincial trade flows program are valued at producers' values (that is, exports at the plant while the imports are valued at the Canadian border). In the Canadian International Merchandise Trade, exports and imports are valued at the border of the exporting

estimates by province as well as the international exports and imports from the provincial trade flows program; also ratios of the two data sources as well as domestic demand and domestic supply for total goods are shown. In the Canadian International Merchandise Trade, exports are said to be by province of origin while imports, by province of clearance; in the provincial trade flows program, exports are published by province of origin while imports, by province of consumption.

Table 2A: Comparison of International Merchandise Trade and Trade Flows for Goods by Province, 1997

International Imports of Goods

	Merchandise Trade	Shares	Trade Flows	Shares	Adjustment Ratios		Demand	Shares
	$ millions	%	$ millions	%	%		$ millions	%
Nfld.	1 427	0.4	2 780	1.0	1.95		9 346	1.3
P.E.I.	27	0.0	427	0.2	16.05		2 123	0.3
N.S.	4 556	1.5	5 704	2.1	1.25		16 369	2.3
N.B.	3 820	1.7	5 610	2.1	1.47		15 049	2.1
P.Q.	37 767	15.9	53 564	19.9	1.42		150 345	20.7
Ont.	162 513	63.2	136 172	50.6	0.84	Domestic	301 230	41.5
Man.	8 479	2.8	7 529	2.8	0.89	Demand	22 850	3.1
Sask.	4 560	1.6	7 047	2.6	1.55		25 673	3.5
Alb.	9 042	3.3	23 660	8.8	2.62		97 409	13.4
B.C.	22 663	8.5	25 891	9.6	1.14		82 938	11.4
Yuk.	44	0.0	150	0.1	3.38		725	0.1
NWT/Nun.	9	0.0	392	0.1	42.05		2 059	0.3
Abroad	0	0.0	284	0.1	0.00		318	0.0
Total	254 907	98.9	269 210	100.0	1.05		726 434	100.0
Re-exports	18 038		17 885 [1]			Foreign Demand	284 589	
Total	272 945		287 095			Total	1 011 023	

International Exports of Goods

	Merchandise Trade	Shares	Trade Flows	Shares	Adjustment Ratios		Supply	Shares
	$ millions	%	$ millions (excl. re-exports)	%	%		$ millions	%
Nfld.	2 516	0.9	2 558	1.0	1.02		7 219	1.0
P.E.I.	435	0.1	444	0.2	1.02		1 770	0.2
N.S.	3 161	1.2	3 266	1.2	1.03		12 171	1.7
N.B.	5 471	2.1	4 460	1.7	0.82		14 091	1.9
P.Q.	50 258	18.1	50 308	18.9	1.00	Domestic	150 771	20.8
Ont.	139 363	49.3	135 768	50.9	0.97	Supply	308 966	42.7
Man.	7 314	2.4	6 583	2.5	0.90		21 143	2.9
Sask.	10 807	3.6	9 150	3.4	0.85		27 215	3.8
Alb.	33 482	12.2	29 346	11.0	0.88		104 377	14.4
B.C.	26 761	9.9	24 233	9.1	0.91		73 883	10.2
Yuk.	81	0.1	177	0.1	2.19		566	0.1
NWT/Nun.	385	0.1	413	0.2	1.07		1 753	0.2
Abroad	0	0.0	0	0.0	0.00		1	0.0
Total	280 034	100.0	266 706	100.0	0.95		723 926	100.0
Re-exports	18 038		17 885 [1]			Foreign Supply	287 097	
Total	298 072		284 591			Total	1 011 023	

[1] Part of ITD re-exports assigned to services commodities.

The adjustments to Canadian International Merchandise Trade estimates by province carried out in the derivation of the provincial trade flows, due to the use of the results from the wholesale trade survey and the data confrontation with the domestic supply/demand constraints, are substantially more important for the

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countries with the transportation costs for the Canadian imports between the foreign borders and the Canadian border recorded in the BOP services component of SNA (they are not recorded in the Canadian International Merchandise Trade).

imports than they are for exports. In other words, the Canadian International Merchandise Trade exports are substantially closer to the requirement of the provincial trade flows program than the imports.

Imports

To a large extent, while the provincial imports from the Canadian International Merchandise Trade are the starting point in the trade flows program, they are by themselves of a limited use to gauge the import performance because the adjustments are so significant; adjustments are necessary to reflect the proper province of consumption since imports from the Canadian International Merchandise Trade program are not entirely in line with domestic demand by province.

Prince Edward Island (PEI) has the largest adjustment ratio for imports. PEI international imports for goods are in 1997 about sixteen times larger in the provincial trade flows program than in Canadian International Merchandise Trade since little imports are custom cleared in PEI though PEI uses imports to satisfy its domestic demand. For Newfoundland and Alberta, the ratios in the two estimates are still substantial.

It is important to note that Ontario is a major entry point for international imports as a substantial share of the international imports in the Canadian International Merchandise Trade are re-allocated to other provinces.

Exports

In terms of international exports, the differences are much smaller than with imports and it suggests that the Canadian International Merchandise exports are close to the concept of province of origin. The differences are concentrated in a few large commodities.

Table 2B presents those adjustment ratios over time. Interestingly**,** these adjustment ratios appear to be more stable for exports than for imports over time.

The higher overall international exports for Newfoundland in the provincial trade flows program in 1996 and 1998 are attributable to higher foreign exports in fish-related commodities while, in PEI, fish products and frozen potatoes are responsible for the increased international exports of goods in the provincial trade flows program.[24]

In short, the exports by province from the Canadian International Merchandise Trade program are closer to the concept as required by the provincial trade flows program (that is, province of origin) and are thus a better gauge to measure the performance of international exports of goods by province. On the other hand, the merchandise imports statistics are a less reliable measure in accurately assessing the performance of the imports consumed in a province.

[24] Since the difference is concentrated in a few large commodities, these discrepancies in international exports could be reviewed and investigated further with the Canadian International Merchandise Trade personnel.

Table 2B: Comparison of International Merchandise Trade and Trade Flows for Goods by Province, 1996, 1997, 1998

International Imports of Goods

	Merchandise Trade			Trade Flows			Adjustment Ratios		
	1996	1997	1998	1996	1997	1998	1996	1997	1998
	$ millions	$ millions	$ millions	$ millions	$ millions	$ millions			
Nfld.	978	1 427	1 126	2 231	2 780	2 987	2.28	1.95	2.65
P.E.I.	33	27	17	323	427	522	9.75	16.05	31.14
N.S.	3 268	4 556	4 754	4 592	5 704	5 966	1.41	1.25	1.26
N.B.	3 797	3 820	3 591	5 269	5 610	5 534	1.39	1.47	1.54
P.Q.	34 605	37 767	41 278	46 757	53 564	58 738	1.35	1.42	1.42
Ont.	137 848	162 513	177 339	118 327	136 172	147 310	0.86	0.84	0.83
Man.	6 201	8 479	9 206	6 269	7 529	8 125	1.01	0.89	0.88
Sask.	3 569	4 560	4 595	5 581	7 047	7 429	1.56	1.55	1.62
Alb.	7 121	9 042	10 599	18 026	23 660	27 624	2.53	2.62	2.61
B.C.	18 564	22 663	24 885	23 093	25 891	27 018	1.24	1.14	1.09
Yuk.	43	44	36	152	150	177	3.57	3.38	4.96
NWT/Nun.	12	9	7	301	392	475	25.78	42.05	64.44
Abroad	0	0	0	288	284	285	0.00	0.00	0.00
Canada	216 039	254 907	277 433	231 209	269 210	292 190	1.06	1.05	1.05

International Exports of Goods

	Merchandise Trade			Trade Flows			Adjustment Ratios		
	1996	1997	1998	1996	1997	1998	1996	1997	1998
		$ millions			$ millions				
Nfld.	2 284	2 516	2 645	2 412	2 558	2 885	1.06	1.02	1.09
P.E.I.	354	435	466	372	444	571	1.05	1.02	1.23
N.S.	3 117	3 161	3 440	2 922	3 266	3 606	0.94	1.03	1.05
N.B.	5 396	5 471	5 459	4 348	4 460	4 571	0.81	0.82	0.84
P.Q.	46 915	50 258	55 365	46 805	50 308	56 001	1.00	1.00	1.01
Ont.	127 803	139 363	154 760	124 955	135 768	151 174	0.98	0.97	0.98
Man.	6 220	7 314	8 069	5 706	6 583	7 248	0.92	0.90	0.90
Sask.	9 312	10 807	9 924	8 548	9 150	8 644	0.92	0.85	0.87
Alb.	31 698	33 482	31 010	27 526	29 346	27 946	0.87	0.88	0.90
B.C.	25 765	26 761	26 045	23 326	24 233	23 281	0.91	0.91	0.89
Yuk.	185	81	7	287	177	98	1.55	2.19	14.32
NWT/Nun.	247	385	319	486	413	261	1.96	1.07	0.82
Abroad	0	0	0	0	0	0	0.00	0.00	0.00
Canada	259 295	280 034	297 509	247 693	266 706	286 286	0.96	0.95	0.96

Finally, in the recent past, the import/export estimates from the Canadian International Merchandise Trade were available two months after the end of the reference year while equivalent estimates from the provincial trade flows were released ten months and hence, the former had a major comparative advantage. As of reference year 2001, the release of the total international import/export estimates from the provincial trade flows have been advanced significantly thus diminishing the appeal of the early release of the Canadian International Merchandise Trade data. Due to the preliminary nature of these international import/export estimates from the provincial trade flows program, they are still subject to adjustments. Nevertheless, the detailed import and export information can only be obtained from the Canadian International Merchandise Trade program.

Does the ASM Destination of Shipments Present an Accurate Picture?

The data on destination of shipments from the ASM is a key source of information in the derivation of the provincial trade flows. Does it present an accurate picture of the trade patterns for Canadian manufacturers? The following table 3 presents the ASM destination of shipments as well as the provincial trade flows for manufactured commodities.

Table 3: ASM - DOS and Trade Flows[(1)] for Manufactured Commodities - 1997

	ASM Shipments	Destination Shares						
	$ millions	Intraprovincial Trade (%)		Interprovincial Exports (%)		International Exports (%)		Total (%)
Origin		ASM - DOS	Trade Flows	ASM - DOS	Trade Flows	ASM - DOS	Trade Flows	
Nfld.	1 598	44	30	9	6	47	64	100
P.E.I.	776	23	23	31	34	46	43	100
N.S.	6 383	33	32	29	30	38	38	100
N.B.	8 205	26	21	29	37	44	42	100
P.Q.	102 328	41	35	20	22	40	43	100
Ont.	228 187	44	32	12	15	43	53	100
Man.	9 908	29	24	34	35	37	41	100
Sask.	6 109	39	30	34	31	27	40	100
Alb.	34 553	45	41	28	28	27	31	100
B.C.	34 143	43	34	12	12	45	53	100
Yuk.	22	90	70	6	13	4	17	100
NWT/Nun.	29	81	84	18	8	0	8	100
Canada	432 241	42	33	17	19	41	48	100

It is clear that the above table provides a rather different picture of the importance of the various ultimate markets for Canadian manufacturers' shipments because, to a large extent, the provincial trade flows benefit from the results of the wholesale trade survey and the data confrontation with the domestic supply/demand constraints. The divergence between the two sets of data can be traced in effect to the different objectives of the two programs: the ASM destination shipments show the shipments to the first destination while the provincial trade flows present the shipments of manufactured commodities to its final consumers.

International exports from the provincial trade flows program accounts for 48% in 1997 of the total Canadian manufacturing production[25] while comparable estimate from the ASM shipment destination data equals 41%. This shift came at the expense of mainly intraprovincial trade as the importance of interprovincial exports was relatively stable at 17-19.

INTERPROVINCIAL AND INTERNATIONAL TRADE FLOWS FOR CURRENT YEARS

There is a need for provincial trade flows in the current years; the availability of interprovincial and international trade exports and imports allows for the complete articulation of the provincial/territorial Gross Domestic Product Expenditure-based as the latter is a timely and widely-used economic variable.

However, the estimation of the interprovincial and international trade flows described in this paper relies on the derivation of provincial I-O tables (that is, on the availability

[25] The trade flows also include the manufactured commodities by non-manufacturing industries; the latter account for the small share of total manufactured commodities.

of the provincial inputs, outputs and final demand matrices) in order to calculate provincial supply/demand constraints. The approach to derive these provincial IO tables requires a substantial and comprehensive database as well as significant and time-consuming analysis. These IO tables are available approximately 34 months after the end of the reference year (that is, preliminary 1998 IO tables were released in October 2001). They are known as 'benchmark' IO tables.

Unfortunately, such a substantial and comprehensive database is not available for the more current years; hence the approach to derive IO tables based on such a comprehensive database can not be duplicated for the current years. How can the interprovincial and international trade flows be estimated without the IO tables (without the supply/demand constraints) for the current years?

The estimation of the interprovincial and international trade flows for the current years (for non-IO benchmark years) could be estimated with related information. For example, international exports and imports could reflect changes in international merchandise trade by province while changes in gross output could be the proxy for interprovincial exports; for interprovincial imports, gross output of the province from which the interprovincial imports originate could be used.

Alternatively, for the current years, a methodology has been developed and refined in order to estimate the provincial I-O tables which rely on a less than ideal database; as a result, provincial trade flows are estimated and constrained by the supply/demand controls.

These estimated IO tables, contrary to the benchmarked ones, are referred to as 'synthetic' or 'projected' provincial IO tables[26] as they rely on a less comprehensive database. This methodology focuses on constructing complete provincial IO tables, using all available economic data and related indicators; the emphasis is on ensuring that trends are properly reflected. This methodology, in essence, is a projection of the most recent benchmarked provincial IO tables and its associated trade matrix using the following limited but current information:

- internally-produced current price provincial Gross Outputs from the provincial GDP by industry program (as an example, monthly shipments by industry by province are used to derive Gross Outputs for the goods producing industries),
- major components of the provincial Gross Domestic Product Expenditure-based from the Provincial Economic Accounts as well as their details ,
- industrial and provincial distribution of the private and public investment,
- international merchandise trade by province,
- national Balance of Payments estimates and their breakdown,
- trade flows for agricultural and energy commodities,
- miscellaneous heterogeneous information such as provincial employment and wages by industry,

[26] The methodology to derive the provincial synthetic IO Tables is akin to the one described in Siddiqi, Y. and Salem, M, *A Synthetic Approach to Projecting Input-Output Tables*, Economic Systems Research, Vol. 7, No. 4, 1995, pages 397-411 as well as Siddiqi, Y. and Salem, M., *Estimating More Timely Input-Output Accounts: A Synthetic Approach*, Technical Series #57-E, Input-Output Division, Statistics Canada, March 1993.

- and finally, economic intelligence gathered through press releases and provincial governments.

The advantage of estimating the trade flows within the context of the projected provincial IO tables center around coherency and use of available information. For example, an interprovincial export of a province to another is in fact an identical interprovincial import for the latter province; furthermore, trade in a commodity is a function of known and up-to-date information that are used to derive the supply/demand constraints. This coherency is respected only in the full articulation of the provincial IO tables (whether benchmark or projected tables) with its associated trade flows.

The process to derive synthetic IO tables can be divided into the following steps:

a) project the various matrices of the provincial benchmark IO tables (gross output and input matrices as well as final demand matrix) and its associated trade flows using the limited information derived above in order to yield *unbalanced* tables; that is, many of the economic identities are not satisfied (for example, by commodity, the supply is not equal to its disposition while, by industry, outputs are not equal to inputs),

b) balance the tables using a mathematical balancing technique[27] after various discretionary adjustments are performed that reduce the magnitude of the imbalances, and

c) analyze the provincial trade flows and other SNA aggregates thus estimated.

The availability of the 'synthetic' or 'projected' balanced provincial IO tables has enormous benefits. First and foremost, the trade flows are quantified; these inferred interprovincial and international trade flows, while not as robust as its equivalent ones derived from the benchmark IO tables, are an important component of the provincial GDP Expenditure based estimates; without them, total provincial GDP could not be estimated as well as the economic behaviour of the provincial economies could not be quantified.

Furthermore, these inferred trade flows are consistent with other relevant key information such as the provincial GDP Expenditure-based estimates and provincial Gross Output derived in conjunction with the provincial GDP by industry program. Finally, the projected provincial IO tables provide a mechanism for integrating a myriad of data and as a result, point to areas of inconsistency within provincial GDP Expenditure-based and provincial Gross Output/GDP by industry estimates.

[27] The balancing stage relies on a statistical balancing technique. In essence, this technique is an iterative process, which attempts to respect the relationships of the raw estimates in the projected tables while minimizing the differences between the pre-balanced (raw) and post-balanced provincial IO tables. The imbalances, whether in commodity or industry accounts, are re-distributed over the variables in the provincial IO tables and its trade flow matrix based on the relative values of the variables. In parallel, work is progressing on alternative approaches to balancing the data for the projected national and provincial IO tables.

Hence, provincial trade flows associated with the benchmark provincial IO tables form a structural base for estimating provincial trade flows in the current reference year[28] and thus allows for the timely and complete articulation of the provincial/territorial Gross Domestic Product Expenditures-based since interprovincial and international exports and imports are key components of the latter aggregate.

ANALYSIS OF PROVINCIAL TRADE FLOWS, 1992 to 2001[29]

Increased reliance on North-South trade

In 2001, Canadians exported to foreign markets more than $440 billion in goods and services, about 41% of Canada's Gross Domestic Product (GDP) and imported almost $385 billion in goods and services or 35% of GDP; these estimates exclude re-exports. Both international exports (+143%) and imports (+109%) have more than doubled in the nineties. The USA continued to be Canada's most important trading partner.

On the other hand, interprovincial trade[30] reached $213 billion in 2001 an advance of about 60% since 1992. Interestingly, since 1998, international sales have been more than twice that of domestic exports. This is in contrast to the 1980s when interprovincial trade was on par with international trade.

The evolution of interprovincial and international trade by province between 1992 and 2001 changed considerably in this nine-year span as Canadians increased their foreign sales and purchases. Trade patterns were shaped by a number of events. The nineties began with a recession and ended with strong economic expansion that moderated considerably by 2001; also the low Canadian dollar, falling from a level of $0.90 in late 1991 to near $0.60 ten years later, helped our exports abroad. The 1989 Free Trade Agreement with the United States, Canada's largest trading partner, was modified in 1994 to include Mexico; the North American Free Trade Agreement (NAFTA) set the stage for a major expansion of trade abroad. The Internal Trade Agreement, with the aim of eliminating interprovincial trade barriers, was implemented in the mid-nineties without much fanfare and with less apparent impact on interprovincial trade.

Every year since 1992 (except for 2001) the growth in international exports has been superior to the gain in interprovincial exports; while interprovincial exports rose modestly in 2001, international sales to foreign markets fell 2% in parallel with the US slowdown. Nevertheless, this increased reliance on foreign sales mirrors the shift from east-west trade patterns, prevalent years ago, to a north-south trade that characterizes the Canadian economy at the turn of this century.

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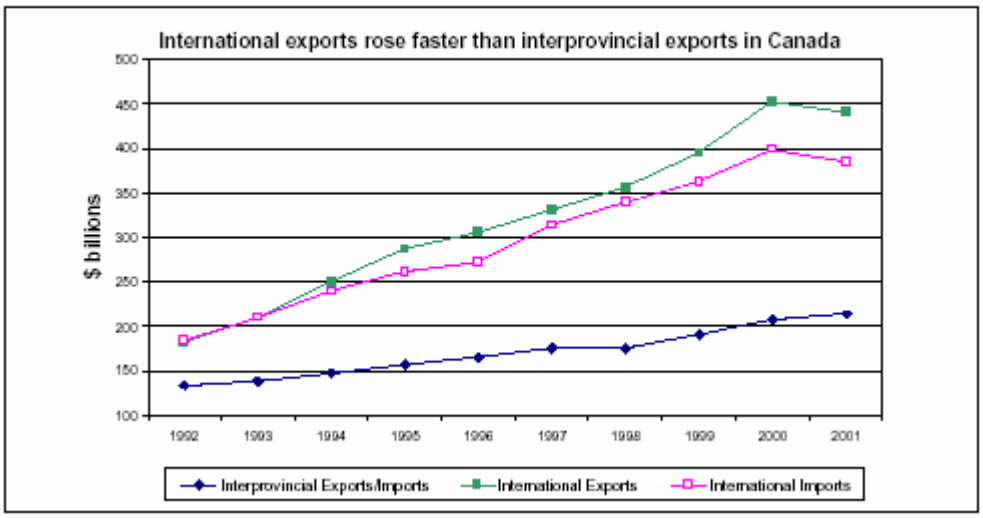
[28] While provincial trade flows exist prior to 1996, there were provincial IO tables (which rely on a substantial and comprehensive database) for only 1984 and 1990. The methodology to derive flows for years prior to 1996 was essence similar to the methods used to estimate the non-IO benchmark years (the current years).

[29] Provincial trade flows from 1998 forward are still subject to change.

[30] Interprovincial exports for Canada equal interprovincial imports for all provinces.

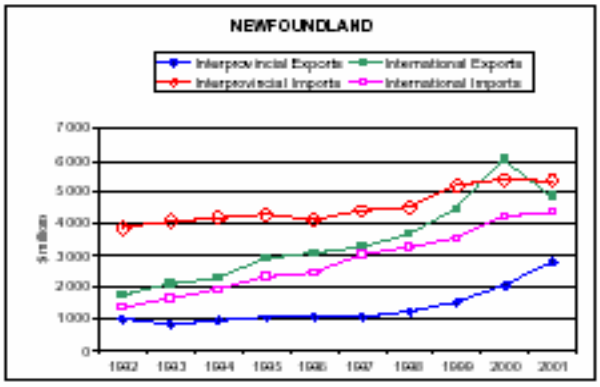
Chart 1: Comparison of Interprovincial and International Trade, Canada, 1992 to 2001

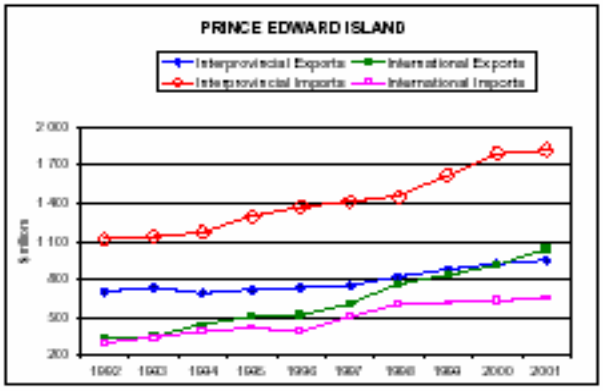


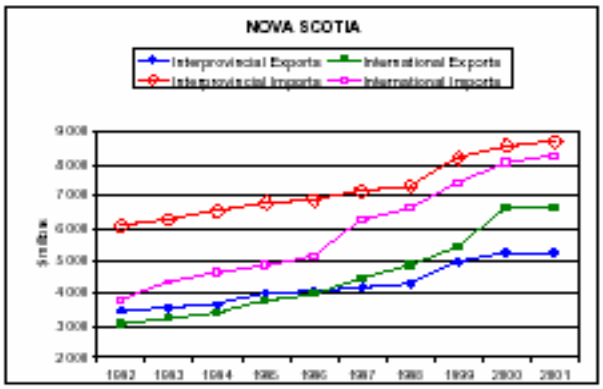
Provinces increase their reliance on international exports instead of exports to other provinces with one exception. Between 1992 and 2001, while Newfoundland was the province with the largest increase in total exports (whether to foreign or Canadian customers), it was the only province where the growth was larger in interprovincial exports (187%) than in international sales (175%). Hibernia started pumping oil in late 1997; most of its production in earlier years was to foreign clients. However, as of 2000, in line with the major expansion of the Saint John (NB) refinery completed in that year, Hibernia oil was shipped to Canadian markets.

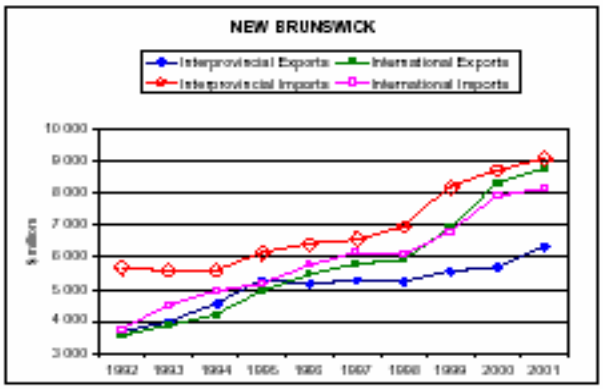
Interprovincial imports are important to the functioning of many provincial/territorial economies. Interprovincial imports are the largest trade components in the three smallest regional economies (PEI, Yukon and Northwest Territories). In fact, had it not been for the spike in Newfoundland international exports in 2000, interprovincial imports would be the most important in the six smallest regional economies.

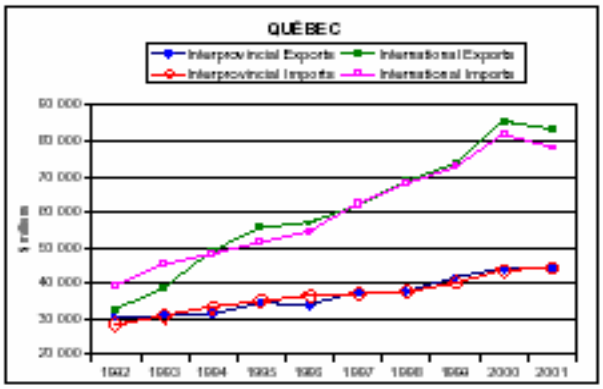
Chart 2: Comparison of Interprovincial and International Trade, by Province, 1992 to 2001











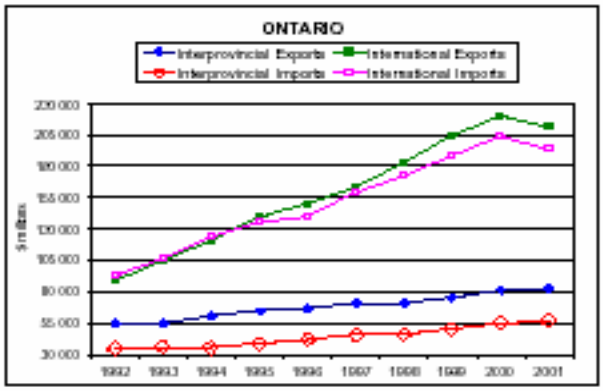
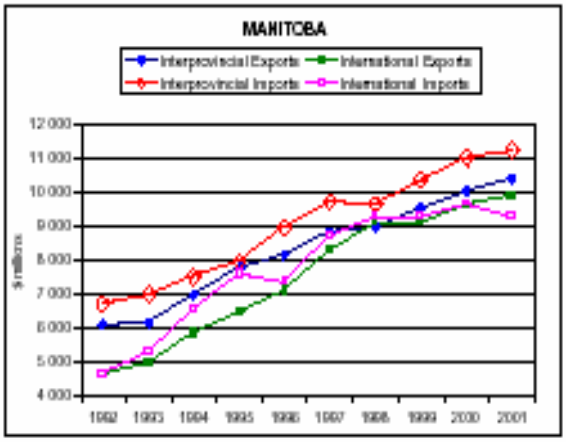
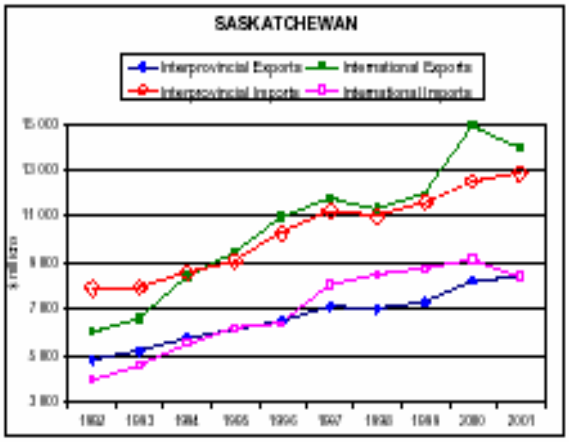
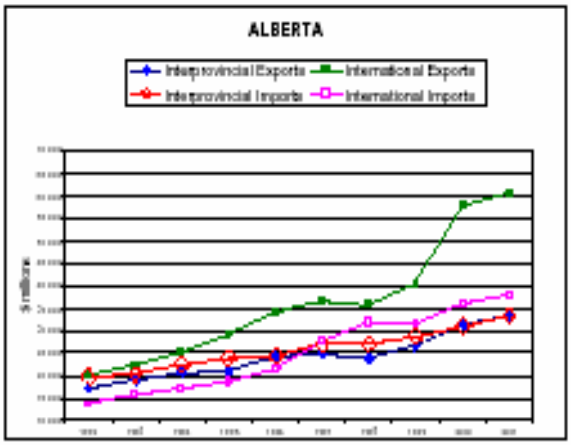
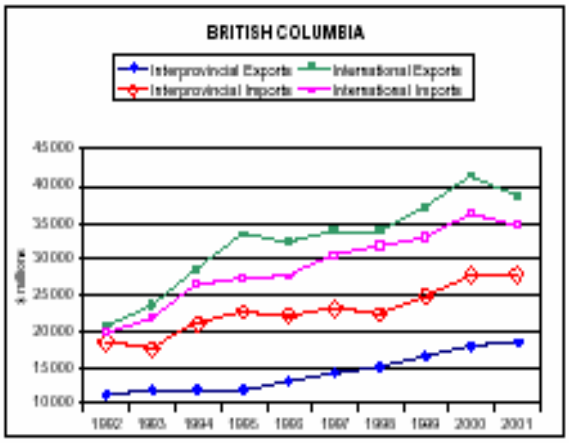


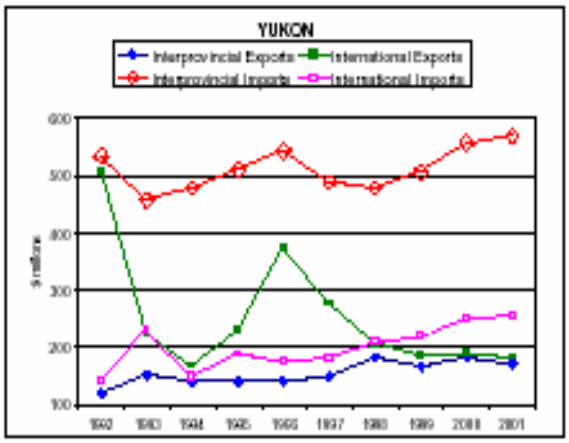
Chart 2: continued

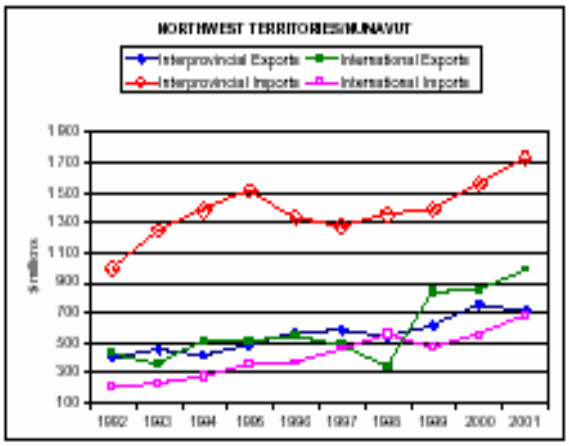












Most smaller provincial economies continue to post trade deficits

In 2001, overall, the largest two provincial economies (Ontario and Québec) as well as Saskatchewan and Alberta registered trade surplus while other provinces, mostly smaller ones, posted trade deficits.

Table 4 shows the provinces' overall trade balances as well as their total exports and imports (both interprovincial and international) for 1992, 1997 and 2001[31]; the values (in current prices) are in millions of dollars received by the producers.

Ontario's overall trade balance (total exports minus total imports) topped $44 billion in 2001, up from almost $16 billion in 1992; Alberta's trade position mirrored Ontario's performance, increasing from $4 to $21 billion. Two provinces, Québec and Saskatchewan, reversed their trade balance, from a deficit in 1992 to a surplus nine years later. Other provinces continued to be in a deficit position in terms of their overall trade with outsiders (domestic and foreign together).

The largest overall trade deficits are in Nova Scotia and British Columbia, both of which are home to major international ports.

Ontario's remarkable trade surplus both in terms of its interprovincial and international exchanges between 1992 and 2001 was led by a huge interprovincial trade surplus of at least $20 billion. In contrast, many provinces registered a deficit in its interprovincial trade and a surplus with its international trade.

Ontario's international trade surplus stems from its dominant position in Canada in the motor vehicle assemblies (and of its manufacturers of car parts) whose production is highly exported to the USA markets. Often overlooked, however, is Ontario's prevailing surplus in interprovincial trade; this reflects the significant contribution of financial companies, which have their headquarters in Toronto, and the increasing role of many business services, such as engineers, architects and computer-related consultants in the other provincial economies.

Table 5 presents for 1997 only the provincial trade balances as well as their exports and imports for total goods, on one hand, and for total services, on the other.

Alberta's commanding international trade surplus in 2001 was orchestrated by recent higher prices and expanding production for energy commodities; to a smaller extent, Saskatchewan also benefited from increasing sales to outsiders of energy products.

[31] The trade balances by provinces are charted in Appendix 2.

Table 4: Exports and Imports by Province or Territory, for all Goods and Services, 1992, 1997 and 2001 ($ millions)

	Interprovincial Exports			International Exports (excluding re-exports)			Total Exports (excluding re-exports)		
	1992	1997	2001	1992	1997	2001	1992	1997	2001
Nfld.	982	1 071	2 820	1 768	3 273	4 886	2 750	4 344	7 706
P.E.I.	696	744	949	328	603	1 034	1 024	1 347	1 983
N.S.	3 461	4 200	5 251	3 038	4 450	6 675	6 499	8 650	11 926
N.B.	3 691	5 257	6 311	3 585	5 770	8 788	7 276	11 027	15 099
P.Q.	30 685	37 436	44 358	32 559	61 646	83 712	63 244	99 082	128 070
Ont.	54 261	70 174	82 300	87 678	163 643	212 500	141 939	233 817	294 800
Man.	6 148	8 846	10 422	4 717	8 337	9 951	10 865	17 183	20 373
Sask.	4 779	7 070	8 401	5 974	11 749	14 044	10 753	18 819	22 445
Alb.	17 390	24 883	33 151	19 925	36 504	59 187	37 315	61 387	92 338
B.C.	11 232	14 346	18 437	20 776	33 813	38 524	32 008	48 159	56 961
Yuk.	120	152	171	508	278	184	628	430	355
NWT/Nun.	406	587	706	427	492	990	833	1 079	1 696
Gvt. Abr.	0	18	35	202	8	20	202	26	55
Total	133 851	174 784	213 312	181 485	330 566	440 495	315 336	505 350	653 807

	Interprovincial Imports			International Imports (excluding re-exports)			Total Imports (excluding re-exports)		
	1992	1997	2001	1992	1997	2001	1992	1997	2001
Nfld.	3 875	4 415	5 365	1 345	3 028	4 354	5 220	7 443	9 719
P.E.I.	1 115	1 413	1 829	287	496	649	1 402	1 909	2 478
N.S.	6 081	7 170	8 707	3 770	6 260	8 237	9 851	13 430	16 944
N.B.	5 675	6 554	9 048	3 762	6 136	8 109	9 437	12 690	17 157
P.Q.	28 574	37 075	44 315	39 343	62 310	77 964	67 917	99 385	122 279
Ont.	34 178	45 273	56 424	92 238	159 262	194 167	126 416	204 535	250 591
Man.	6 741	9 749	11 278	4 705	8 736	9 303	11 446	18 485	20 581
Sask.	7 886	11 209	12 827	3 878	8 014	8 348	11 764	19 223	21 175
Alb.	19 626	26 909	33 336	13 624	27 522	37 810	33 250	54 431	71 146
B.C.	18 463	23 190	27 836	19 717	30 421	34 600	38 180	53 611	62 436
Yuk.	536	490	571	142	183	256	678	673	827
NWT/Nun.	998	1 279	1 727	211	463	682	1 209	1 742	2 409
Gvt. Abr.	103	58	49	1 072	402	471	1 175	460	520
Total	133 851	174 784	213 312	184 094	313 233	384 950	317 945	488 017	598 262

	Interprovincial Balances			International Balances			Overall Trade Balances		
	1992	1997	2001	1992	1997	2001	1992	1997	2001
Nfld.	-2 893	-3 344	-2 545	423	245	532	-2 470	-3 099	-2 013
P.E.I.	-419	-669	-880	41	107	385	-378	-562	-495
N.S.	-2 620	-2 970	-3 456	-732	-1 810	-1 562	-3 352	-4 780	-5 018
N.B.	-1 984	-1 297	-2 737	-177	-366	679	-2 161	-1 663	-2 058
P.Q.	2 111	361	43	-6 784	-664	5 748	-4 673	-303	5 791
Ont.	20 083	24 901	25 876	-4 560	4 381	18 333	15 523	29 282	44 209
Man.	-593	-903	-856	12	-399	648	-581	-1 302	-208
Sask.	-3 107	-4 139	-4 426	2 096	3 735	5 696	-1 011	-404	1 270
Alb.	-2 236	-2 026	-185	6 301	8 982	21 377	4 065	6 956	21 192
B.C.	-7 231	-8 844	-9 399	1 059	3 392	3 924	-6 172	-5 452	-5 475
Yuk.	-416	-338	-400	366	95	-72	-50	-243	-472
NWT/Nun.	-592	-692	-1 021	216	29	308	-376	-663	-713
Gvt. Abr.	-103	-40	-14	-870	-394	-451	-973	-434	-465
Total	0	0	0	-2 609	17 333	55 545	-2 609	17 333	55 545

Table 5: Exports and Imports by Province or Territory, for Goods and Services Separately, 1997
($ millions)

	Interprovincial Exports			International Exports			Total Exports		
	Goods	Services	Total	Goods (excluding re-exports)	Services	Total	Goods (excluding re-exports)	Services	Total
Nfld.	535	535	1 070	2 558	715	3 273	3 093	1 250	4 343
P.E.I.	426	318	744	444	159	603	870	477	1 347
N.S.	2 441	1 759	4 200	3 266	1 184	4 450	5 707	2 943	8 650
N.B.	3 862	1 395	5 257	4 460	1 310	5 770	8 322	2 705	11 027
P.Q.	25 540	11 896	37 436	50 308	11 338	61 646	75 848	23 234	99 082
Ont.	37 525	32 650	70 175	135 768	27 875	163 643	173 293	60 525	233 818
Man.	4 947	3 899	8 846	6 583	1 754	8 337	11 530	5 653	17 183
Sask.	5 314	1 756	7 070	9 150	2 599	11 749	14 464	4 355	18 819
Alb.	17 098	7 785	24 883	29 346	7 158	36 504	46 444	14 943	61 387
B.C.	5 909	8 438	14 347	24 233	9 580	33 813	30 142	18 018	48 160
Yuk.	48	103	151	177	102	279	225	205	430
NWT/Nun.	299	288	587	413	79	492	712	367	1 079
Gvt. Abr.	0	19	19	0	8	8	0	27	27
Total	103 944	70 841	174 785	266 706	63 861	330 567	370 650	134 702	505 352

	Interprovincial Imports			International Imports			Total Imports		
	Goods	Services	Total	Goods (excluding re-exports)	Services	Total	Goods (excluding re-exports)	Services	Total
Nfld.	2 440	1 974	4 414	2 780	248	3 028	5 220	2 222	7 442
P.E.I.	796	618	1 414	427	69	496	1 223	687	1 910
N.S.	4 200	2 970	7 170	5 704	556	6 260	9 904	3 526	13 430
N.B.	3 670	2 884	6 554	5 610	526	6 136	9 280	3 410	12 690
P.Q.	21 858	15 218	37 076	53 564	8 745	62 309	75 422	23 963	99 385
Ont.	29 384	15 889	45 273	136 172	23 090	159 262	165 556	38 979	204 535
Man.	5 709	4 040	9 749	7 529	1 207	8 736	13 238	5 247	18 485
Sask.	5 875	5 334	11 209	7 047	967	8 014	12 922	6 301	19 223
Alb.	15 815	11 094	26 909	23 660	3 861	27 521	39 475	14 955	54 430
B.C.	13 306	9 884	23 190	25 891	4 530	30 421	39 197	14 414	53 611
Yuk.	233	257	490	150	33	183	383	290	673
NWT/Nun.	625	654	1 279	392	70	462	1 017	724	1 741
Gvt. Abr.	33	25	58	284	118	402	317	143	460
Total	103 944	70 841	174 785	269 210	44 020	313 230	373 154	114 861	488 015

	Interprovincial Balances			International Balances			Provincial Trade Balances		
	Goods	Services	Total	Goods (excluding re-exports)	Services	Total	Goods (excluding re-exports)	Services	Total
Nfld.	-1 905	-1 439	-3 344	-222	467	245	-2 127	-972	-3 099
P.E.I.	-370	-300	-670	17	90	107	-353	-210	-563
N.S.	-1 759	-1 211	-2 970	-2 438	628	-1 810	-4 197	-583	-4 780
N.B.	192	-1 489	-1 297	-1 150	784	-366	-958	-705	-1 663
Quebec	3 682	-3 322	360	-3 256	2 593	-663	426	-729	-303
Ontario	8 141	16 761	24 902	-404	4 785	4 381	7 737	21 546	29 283
Manitoba	-762	-141	-903	-946	547	-399	-1 708	406	-1 302
Sask.	-561	-3 578	-4 139	2 103	1 632	3 735	1 542	-1 946	-404
Alberta	1 283	-3 309	-2 026	5 686	3 297	8 983	6 969	-12	6 957
B.C.	-7 397	-1 446	-8 843	-1 658	5 050	3 392	-9 055	3 604	-5 451
Yukon	-185	-154	-339	27	69	96	-158	-85	-243
NWT/Nun.	-326	-366	-692	21	9	30	-305	-357	-662
Gov't Abroad	-33	-6	-39	-284	-110	-394	-317	-116	-433
Total	0	0	0	-2 504	19 841	17 337	-2 504	19 841	17 337

Québec is the second largest trader among provinces. In 2001 its interprovincial imports matched its exports to other provinces, contrasting with its 1992 $2 billion surplus in interprovincial trade. Over the period in question, Québec's interprovincial imports of services including financial and business ones grew very rapidly resulting in a lower surplus in interprovincial trade.

British Columbia posted the largest interprovincial trade deficit ($9 billion) as it concentrates on exporting abroad most of its available goods while importing substantial amounts of manufactured products from other provinces.

Saskatchewan, with a much smaller population base, is second with a $4 billion deficit in interprovincial trade as this resource-based economy imports a considerable amount of services from other provinces.

Nova Scotia posted sizeable deficits both in interprovincial and international trade throughout the period, the only one to do so; also, overall, it is the only one to increase its trade deficit (along with PEI). Further, Nova Scotia has one of the largest international trade deficit in goods among provinces (see table 5).

Manitoba registered modest surpluses/deficits as its exports and imports were well matched for both interprovincial and international trade.

New Brunswick: a very export-oriented economy

Exports are a major source of economic growth in Canada and for most of the provincial economies. International exports grew rapidly after the recession of the early nineties while the growth in interprovincial exports has been more modest.

In 2001, based on the importance of exports within GDP, New Brunswick (NB) leads all provincial economies (exports are 75% of GDP), followed by Saskatchewan and Ontario.

NB was also the leader back in 1992. Foreign sales of frozen seafood, wood-related commodities, electricity and refined petroleum products propel led the NB trade and economy.

Interestingly, Canada's globalization index surpasses 40% in 2001 as its proportion of merchandise (goods) exports shipped to the USA in 2001 equals 87% of total Canadian exports.

Table 6 presents data on the openness of the individual provincial economies as well as of various countries.

Table 6: Indexes of Provincial Economies' Openness, 1992, 1997 and 2001

	Indexes of Globalization [1]			Indexes of Provincialization [2]			Indexes of Openness [3]		
	1992	1997	2001	1992	1997	2001	1992	1997	2001
Exports									
Nfld.	18	31	35	10	10	20	29	44	55
P.E.I.	14	21	30	30	27	28	44	53	58
N.S.	17	22	27	19	21	21	36	43	48
N.B.	25	34	43	26	31	31	52	63	75
Que.	20	33	36	19	20	19	40	54	56
Ont.	31	45	48	19	19	19	49	67	67
Man.	19	28	28	25	30	30	44	59	58
Sask.	28	40	42	23	24	25	51	63	68
Alta.	27	34	40	23	23	22	50	56	62
B.C.	24	30	30	13	13	14	37	42	44
Yukon	47	25	16	11	14	15	58	36	31
NWT/Nun.	20	18	26	19	22	18	38	33	44
Canada	26	37	41	19	20	20	45	58	60

	Indexes of Globalization [1]		
	1992	1997	2001
Canada	26	37	41
Germany	25	28	35
France	24	26	28
Italy	19	24	28
U.K.	24	28	27
Japan	10	11	11
USA	10	12	10

Source: DFAIT

[1] Indexes of Globalization: international exports divided by GDP.
[2] Indexes of Provincialization: interprovincial exports divided by GDP.
[3] Indexes of Provincial Economies Openness: international/interprovincial exports divided by GDP

More than half of the Canadian manufacturers' production is now exported.

The past decade was characterized, among other things, by trade liberalization (both internal and external), a strong USA demand and a weak Canadian loonie to the American dollar. What was the impact of these economic factors on manufacturers?

Table 7 presents the main destination of manufacturers' shipments between 1992 and 2001; the possible destinations are sales to buyers within its own province, sales to consumers outside the province of production and finally, to foreign clients.

Table 7: Trade Flows for Manufactured Commodities, 1992, 1997 and 2001

	Production		Destination Shares									
			Intraprovincial Trade (%)			Interprovincial Exports (%)			International Exports (%)			Total (%)
	$millions	%										
	2001		1992	1997	2001	1992	1997	2001	1992	1997	2001	
Origin												
Nfld.	3 805	0.7	45	30	24	7	6	7	48	64	68	100
P.E.I.	1 442	0.3	34	23	16	0	34	31	29	43	53	100
N.S.	8 972	1.6	37	32	30	30	30	30	33	38	40	100
N.B.	12 285	2.2	30	21	17	34	37	33	36	42	50	100
P.Q.	136 555	24.0	42	35	33	27	22	20	31	43	48	100
Ont.	295 670	52.0	39	32	30	18	15	13	42	53	57	100
Man.	12 552	2.2	34	24	22	35	35	36	31	41	41	100
Sask.	9 116	1.6	43	30	26	25	31	30	33	40	44	100
Alb.	49 618	8.7	47	41	41	28	28	25	24	31	35	100
B.C.	38 017	6.7	45	34	34	13	12	14	42	53	52	100
Yuk.	66	0.0	86	70	64	8	13	11	6	17	25	100
NWT/Nun.	202	0.0	82	84	85	4	8	11	14	8	3	100
Canada	568 291	100.0	41	33	31	22	19	17	38	48	51	100

Canadian exports of manufactured goods reached new summits and importance by 2001; preliminary data suggests that by 2001 more than 50% of Canadian manufacturing shipments were exported abroad, in sharp contrast to the less than 40% of shipments of manufactured goods exported in 1992. In fact, it has surpassed the 50% mark since 1998. Conversely, by 2001, only 31% of manufacturing shipments were destined for places within the province where the goods were produced.

By 2001, all provinces (except NWT/Nunavut) increased the importance of their international exports. Furthermore, many provinces had shares of international exports above 50%, with Newfoundland leading the way at 68% in large part due to the coming on stream of the Come-by-Chance refinery and the continued expansion of the processed fish industry. Ontario's shares of international exports, at 57% in 2001, topped the 50% mark in the mid-nineties.

Both PEI and NB export shares jumped to at least 50%. In PEI, international exports of frozen seafood and frozen potatoes contributed to the sharp advance while, as mentioned, foreign sales of frozen seafood, wood-related commodities, electricity and refined petroleum products accounted for the rise in NB.

On the other hand, NS performance was not as spectacular (stellar growth in international exports in tires, wood products and railway rolling stock were partially offset by a drop in foreign exports of processed fish products).

Aircraft and related parts were the main contributor to Québec 's increase in foreign export shares between 1992 and 2001.

BC international export shares of manufactured commodities, while above the 50% mark, fell marginally between 1997 and 2001 led, naturally, by a drop in foreign sales of lumber.

Finally, in 2001, as in 1992, manufacturing shipments from the Prairies, as a group, were still the least likely to be exported abroad. International exports accounted for 35% of Alberta's provincial manufacturing shipments; it was the lowest among the provinces. The relatively longer distances separating these provinces from large urban centres and from major sea ports may explain this economic reality!

CONCLUSIONS

Between 1992 and 2001, a period whereby the North American Free Trade Agreement and the Internal Trade Agreement were implemented, there has been a widening gap between interprovincial and international trade. Canadian producers have been actively seeking markets abroad to expand sales while Canadian customers have shown an unrelenting increased preference for foreign goods.

The purpose of this paper has been to present the data sources and the methodologies of provincial (interprovincial and international) trade flows in Canada. It is important to continue to invest in the data sources necessary for the derivation of provincial trade flows as appropriate data sources , while often difficult to obtain, are the backbone of the trade flows program.

The interprovincial trade flows are a unique feature of the SNA provincial program; there is no national counterpart. Without provincial trade flows, it would be impossible to produce fully articulated provincial Input -Output tables and total provincial GDP Expenditure-based. Furthermore, the derivation of the provincial trade flows consistent with provincial IO tables improves the overall quality of not only the trade flows but also the IO tables as all IO estimates are constantly reviewed, challenged and analyzed.

While these provincial IO tables with their associated trade flows were developed to strengthen the HST revenue allocation, they nevertheless will help us in our understanding of the provincial economic performance. This new annual set of provincial statistics, fully articulated with the addition of the interprovincial trade flow estimates, may prove to be very useful in a wide range of other applications ranging from regional development policy formulation to fiscal arrangements to business investment marketing.

Appendix 1. Related Statistics Canada Publications and Articles

Interprovincial and International Trade Flows of Goods, 1984-1988 (released June 1992) (Bilingual) Input-Output Technical Paper #49. This paper contains a description of Sources and Methods as well as annual trade flows for goods.

Interprovincial Trade Flows of Goods and Services, Hans Messinger, Canadian Economic Observer, catalogue no. 11-010, October1993

The Economic Benefits of the Interprovincial Trade in Canada (based on the 1990 Interprovincial and International Trade Flows) (released in August 1996) STC catalogue no.15-514.

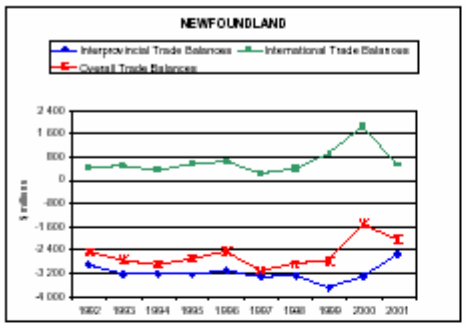
Interprovincial Trade in Canada 1984-1996 (released in February 1998) STC catalogue no. 15-546.

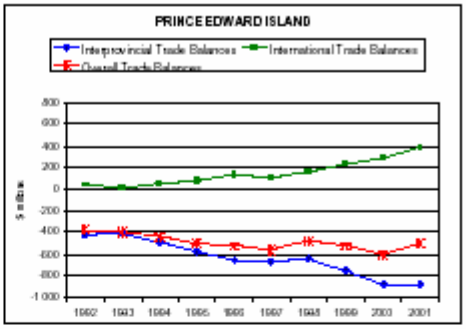
Interprovincial and International Trade in Canada 1992-1998 (released in June 2000) STC catalogue no. 15-546. These estimates, available as of October 1999, were based on the preliminary provincial IO Tables for 1996; 1992 to 1995 estimates are final while 1996 to 1998 data were revised later.

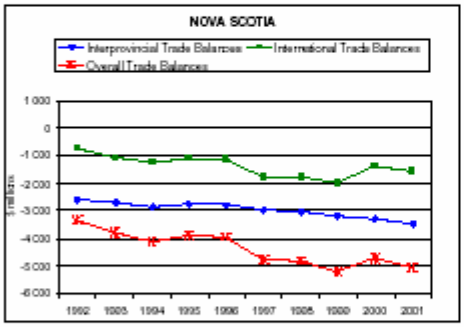
Appendix 2 — Comparison of Interprovincial Trade Balances, by Province, 1992 to 2001.

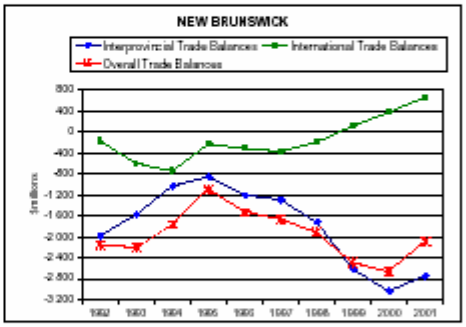
Appendix 2.

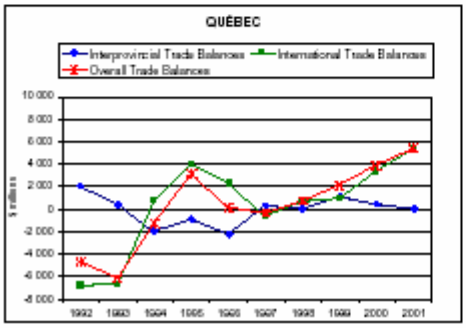
Comparison of Interprovincial and International Trade Balances, by Province, 1992 to 2001

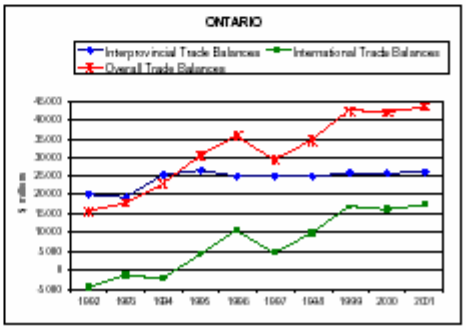












Appendix 2 (continued)