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Constructing Regional Input-output Accounts:

The Recent Canadian Experience

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Abstract *Canadian input-output accounts are at the core of the Canadian System of National Accounts, with regular annual input-output tables at the national level dating back to 1961. Statistics Canada commenced an annual regional (or provincial) input-output program starting with the 1997 reference year after a number of experimental and occasional compilations. The new regional IO program is conducted under a mandate that demands comparable statistical quality for every region's input-output data and has access to significantly improved informational resources such as new and expanded regional surveys designed for the enhanced regional IO tables. The paper deals with the experience of Canadian SNA in constructing and estimating the new regional IO framework. The regional accounting framework posed new conceptual challenges and unique statistical problems. The paper deals with regionalization on an issue-by-issue basis, outlines the problems encountered and the conceptual and statistical solutions that have been implemented.*

Introduction

In Canada, input-output tables have a long history as benchmark statistics for national accounts. The history dates back to 1961, the initial year of annual input-output time series that continue to this day. Starting with the 1997 reference year, Statistics Canada commenced a new and massive annual survey program to compile economic statistics at the regional (provincial and territorial) level. This program was mandated under an agreement between the Government of Canada and three Atlantic provinces, whereby the revenue from a single harmonized tax on goods and services (similar to the value added tax in Europe) would be divided among the federal and the three signatory governments based on a formula that uses annual regional input-output tables.

Prior to the current program that calls for annual regional input-output tables for 10 provinces and three territories, interregional input-output tables were produced on an occasional basis for the years 1974, 1979, 1984 and 1990.

These tables were intended for modeling purposes and did not qualify for benchmark status. The latest regional input-output tables, which are quite similar to the tables under the current program, were compiled for 1996 and released in November 1999.

The regional tables produced under the new Statistics Canada mandate will play the same role as the national tables, serving as benchmarks for SNA annual and sub-annual series. Presently, the current price national input-output tables are completed 28 months after the reference year, the constant price IO tables are completed 32 months after the reference year, and the new annual current price regional tables are completed 34 months after the reference year (see Lal, 2000).

The Accounting Framework

The Canadian national input-output tables follow closely the commodity-by-industry framework recommended by the United Nations as its international standard (UN, 1968, 1993). A distinguishing feature of the Canadian accounts is their rectangular format, permitting the articulation of many commodities per industry, be they outputs or inputs. Similarly, a commodity may be produced by many industries and purchased by many users. The national and the interregional tables distinguish 300 industries based on the North American Industry Classification (NAICS) and 727 commodities and 170 categories of final demand, comprised of 52 personal expenditure groups, 52 industry groups for machinery and equipment, 53 industry groups for construction, 2 inventory groups, 6 categories of government expenditures, and 5 imports and exports. Beginning with the 1999 reference year, there are 14 regions: 10 provinces, three territories, and one territorial enclave that contains government production[1].

The accounting framework of the interregional (or interprovincial, as they are known in Canada) input-output tables is an extension of the framework of the

[1] The Territory of Nunavut was added to the tables as of reference year 1999. Tables for 1997 and 1998 have 13 regions.

national input-output accounts. The interregional framework consists of two sets of tables: 1) an input-output table for each region and 2) an interregional trade flows table. The format of a regional input-output table differs from that of a national table in one essential respect: the final expenditure categories include regional import and regional export columns in addition to foreign export and foreign import columns of the national tables.

The interregional trade flows tables provide a further regional breakdown for each column of regional export and import, i.e., a matrix which identifies the exporting and importing regions for each commodity. The data sources used in developing the flows are: survey of manufactures destination of shipments, wholesale origin and destination survey, transportation origin and destination surveys, and destination of services data from business services surveys.

The concept of a trade flow is as follows: A trade flow is constituted by the sale of commodities from a region or abroad to another region or abroad. Exports can originate from a region if the goods or services are produced in that region or withdrawn from inventories of establishment in that region. The region of export or import refers to the ultimate region of origin and destination rather than the port of lading or the regions where goods are trans-shipped. A regional export also occurs when goods and services are purchased within a region by non-residents while staying in that region (e.g., hotel accommodation, meals or entertainment). Similarly, imports are defined for a region if the goods or services are destined for the region's current expenditure, for capital formation in the region, used as intermediate inputs by establishment in that region or make up additions to inventories. Goods that are shipped into a region but destined for another region do not constitute imports.

The 1993 SNA identifies three types of institutional units that require different treatments in regionalization of accounts: regional units, multiregional units and national units. Multiregional units have their centre of interest in more than one region but do not pertain to the entire country. For national units such as

national governments, their centre of interest is not located geographically, even in the sense of a multi-regional location. When regional source data is available, a bottom-up-approach is used where the sum of (actual) provincial data becomes the national total. This is done for all goods producing industries, trade, and several service industries. In cases where there is no detailed regional data, the approach used is generally top-down where national estimates are allocated to regions based on industry specific methodologies. Starting with the 1997 reference year when regional surveys and other sources came on stream, the top-down approach is used in only a few areas. Two pieces of regional information are always available for all industries: Wages and salaries and mixed income by industry.

Regionalization Issues

Spatial boundary

The development of regional accounts within an existing national framework encounters a number of economic activities that properly belong in the national jurisdiction but do not unambiguously fit into any one region. Examples include our embassies, our armed forces stationed abroad, and activities relating to offshore oil and gas extraction. These activities do not take place within the spatial boundary of a province or territory. In Canada offshore activities do not present a problem for regionalization, because under the Constitution provinces and territories each have their respective jurisdiction over offshore resources. From a regional perspective, transactions in these territorial enclaves, although part of national GDP, have no economic impact on the region where the main responsibility centre happens to be located. To deal with this issue, two alternatives were considered: the first envisaged allocating these expenditures back to the regions. With this option, all such expenditures would be accounted for within ten provinces and three territories. However this would distort the GDP of the regions. The other alternative calls for creating an extra region that accommodates all such activities. The latter option was adopted creating a fourteenth region over and above the ten provinces and three territories.

Central Government Output

The output of government services is defined as the sum of the costs incurred in producing the services. The costs consist of intermediate inputs, compensation of employees, consumption of capital, and other taxes on production (SNA 1993 6.91). Canada's federal system of government consists of 3 main levels: federal, provincial or territorial, and municipal. The last two levels of government do not present any regionalization problems because their services are generally limited to the geographic boundaries of a single region.

Activities of the central or federal government are undertaken on behalf of all residents of Canada in all regions of the country. As such, the federal government is a resident of all regions of the country. In the allocation of federal government expenditures, the central conceptual question was where goods and services are used in order to produce the government output. The convention adopted for this purpose is that production occurs in the region where transactions occur[2]. That is, the region where wages and salaries are paid, intermediate inputs are used and physical capital is consumed. This criterion is more relevant for national accounting because it suggests that it is the economic impact of government activities on the regional economy that is of direct relevance for measuring production and in presenting economic policy choices to policy makers. Using this criterion requires a special treatment for expenditures in territorial enclaves. This is dealt with through devising a fourteenth region.

Data on intermediate consumption of the federal government by region is obtained from departmental expenditures by object, available for each responsibility centre across Canada. Data on compensation of employees by region is available from administrative data, while the consumption of capital is estimated from the data on regional capital stock based on surveys of capital expenditure.

[2] When the region where services are consumed cannot be identified, a treatment is used to approximate the actual flow of goods and services. For example, the expenditures related to a coast guard vessel which patrols several provinces are assigned to the province of the home port of the vessel.

One of the criteria that was also considered, but not used, calls for allocation of federal government revenues and expenditures on the basis of benefits received by each region. Based on this "service benefit criterion" federal expenditures would be allocated on a per capita basis regardless of in which regions expenditures are incurred. This criterion assumes that such expenditures generate services that benefit every Canadian. This option was rejected because national accounting requires that we measure transactions.

The main data source used to effect regional distributions based on the location of transactions is administrative data obtained from numerous federal government departments based on the relationship of "Responsibility Centres" and the provinces where these entities are physically located. The Responsibility Centre, an organizational entity responsible for maintaining a budget and accountable for revenues and expenditures, is a key component of the federal government accounting system. Expenditures and revenues of government departments are maintained in the accounting system classified by Responsibility Centre and by line object code. Responsibility Centres are coded by province and most expenditures charged to a Responsibility Centre are for goods and services used by that centre in that province or territory. Where this relationship is not maintained, alternative sources (e.g., the provincial distribution of departmental personnel) are used to make the allocation.

Sales of goods and services that are part of government output are regionally allocated on a basis consistent with government expenditure discussed above. Since revenues are typically received by governments in the region where goods and services are produced, they are distributed to provinces and territories based on proxies such as the distribution of employees or their wages and salaries by province of employment.

Wages and salaries and depreciation of physical capital are the main components of government GDP. Indirect taxes are allocated to provinces and territories using administrative records. Salaries and wages data by province

were based mainly on the regional distribution of work obtained from personal income tax (T-4) sources. Depreciation was distributed by province based on the regional distribution of the stock of capital computed from fixed capital formation surveys.

Taxes

Taxes on production are predominantly collected by local and provincial governments. Activities of these governments fall completely within boundaries of regions and present no regionalization problems. Tax on products is one of the elements in the spread between producers' (approximate basic) prices and purchasers' prices. In Canada, taxes on products are levied by all three levels of government: federal, provincial and municipal. Only federal taxes that are applicable to, and collected in, all provinces and territories present a regionalization issue. The federal government exacts a number of consumption taxes on goods and services, the largest of which are the Goods and Services Tax (GST), fuel tax, and federal excise taxes such as the sales tax on tobacco. These commodity taxes are allocated to regions where taxable commodities are consumed as an intermediate use or purchased by final demand categories. Similarly, other federal commodity taxes such as excise duties, excise taxes and import duties are distributed based on the regional consumption of the relevant commodities.

Subsidies

In the Canadian System of National Accounts (CSNA), the valuation of output is at modified basic prices: the value of output excludes all taxes and subsidies on products (see Siddiqi and Salem, 1998). When production and consumption are regionalized, subsidies are allocate to the region of the producer. In order to allocate federal subsidies, individual subsidy programs are examined to determine their regional allocation based on the criterion of where the primary recipient producer is located. When subsidies have a national or multi-regional impact, such as subsidies to rail transport companies, they are allocated to

regions based on the amount of service produced in each region (e.g., the number of miles of transportation services provided in each region). Data for regional allocation of transport subsidies is obtained from the Transportation Commission. For subsidies paid by provincial and local governments, it is assumed that recipients of subsidies reside within the boundaries of the region making the disbursement.

Head Offices

Head offices and ancillary units (e.g., warehouses) serve all of the establishments that make up the enterprise. They often undertake significant expenditure on behalf of their establishments (e.g., purchase of data processing services that are delivered directly to constituent establishments) or incur costs that benefit them indirectly (e.g., wages of managers, advertising services). Head offices typically do not receive a corresponding service revenue from their establishments in compensation for these services.

The problem of multi-establishment head offices and ancillary units has two dimensions: 1) classification and 2) allocation. The 1993 SNA points out that where a "head office is located separately from the establishments in which principal or secondary activities of the enterprises are carried out . . . the entire costs of the central ancillary activities must be distributed over the establishments which they serve, for example in proportion to the latter's outputs or costs and added to the latter's' own cost." (UN 1993 5.29). This approach works well at the national level but does not work at the regional level where the head office is located in one region but some or all of its constituent establishments may be located in other regions. And, it is important that head office value added is recognized in the region of head office. If head office expenses were allocated to all constituent establishments in different regions, the head office would be effectively "moved" to other regions. Consequently, the actual host region's GDP would be reduced or understated while those of other regions would be overstated.

In order to preserve the GDP associated with the head office in the region of its actual residence, the treatment adopted in the Canadian accounts is to impute an output for the services provided by head office or ancillary units equal to the sum of their own intermediate expenses plus labour compensation for head office staff. The head office output is then shown as a purchased input of all establishments in all industries and regions served by the head office or ancillary units.

Up to reference year 1999 the accounts do not include a head office industry. For this period, outputs, GDP and other statistics of head office and ancillary units are classified to the industry of their primary establishment.

Beginning with reference year 2000, Statistics Canada's national accounts will use data from the Head Office Survey to create a Head Office Industry as provided under the NAICS. Therefore, output, GDP and other statistics of head offices will no longer be classified to the industry of their primary activity[3]. The Head Office Survey will be integrated with all other business surveys after the datd is collected.

Offshore production

Production in offshore locations, such as oil rigs that extract crude oil or natural gas from the ocean floor and commercial offshore fisheries, are significant components of the Canadian economy. Both industries operate on both the east coast and the west coast of Canada. This gives rise to the question of allocation of activities which are within Canadian waters but seem to be outside of the geographic boundaries of provinces and territories.

While offshore production has often been allocated to a territorial enclave or extra-regio in some regional accounts (see, Lacey, 2000), they can be allocated to provinces and territories in the Canadian accounts because of a special

[3] In addition to intermediate inputs and labour cost, a profit component may be added to the imputation of output when adequate data is available.

feature of the Canadian Constitution. The latter delineates provincial boundaries within national waters based on distance from provincial shores for purposes of natural resource ownership and exploitation rights. Since the location of these activities are unambiguously defined, the only problem that remains is the determination of the treatment of construction projects undertaken by a resident of province A within the geographic boundary of province B. These situations typically occur with large construction projects. Their treatment in the Canadian accounts is to create a notional establishment in the province where the project is conducted for the duration of the project. This establishment will have an output, intermediate inputs, and pay salaries and wages on its dedicated labour force in the province of the project and earn a surplus on its dedicated capital stock. To avoid double counting, statistics reported in the province of residency of the entity are removed from the accounts.

Construction

Construction is defined on an activity basis in the Canadian input-output accounts. It is defined as the activity of putting in place buildings and structures by specialized trades organized and managed by general contractors. Construction by contractors and construction by industries and governments on their own-account are combined into one input-output construction industry. The separation of own-account construction activities from other productive activities of industries was adopted because there are no complete details on values of materials and services separately for construction contractors and for own-account producers. It is more reliable to assign a commodity such as ready-mix concrete, for example, to a *total* construction activity than it is to distribute it among contract and own-account producers. This implies a shift of materials and labour compensation from industries producing own-account construction to the construction industry.

Another feature of the industry is that construction is broken down into seven different structure-types (e.g., residential construction, non-residential building

construction, road, highway and airstrip construction, etc.) and repair construction. Each structure type is treated as an industry with outputs, intermediate inputs and GDP components. Hence, the sub-contract sales of special trades to general contractors are netted out of production and intermediate inputs, materials, services and primary factors are routed directly to the construction industry. This approach was also followed in developing interregional input-output tables.

Following this concept of construction, value added, consisting of labour and capital compensation, belong in the region where the structure is put in place, regardless of the residency of the contractor or its labour force. When regional boundaries are crossed by contractors, this is implemented by creating a notional establishment that employs the labour and capital dedicated to the project in the region where the work is put in place .

This treatment has implications for construction activity in territorial enclaves such as Canadian embassies and defence bases abroad. When construction takes place in a territorial enclave by Canadian contractors, production and GDP are deemed to occur in Canada in the 14th region by a notional construction establishment. However, when the contractor is not a Canadian resident, the value of work put in place is shown as an import of services in the 14th region. Similarly, construction put in place by Canadian contractors in foreign territorial enclaves within the geographic boundaries of Canada are shown as an export of services and the compensation of labour and capital will not constitute GDP in Canada.

Financial Institutions

The regional distribution of financial institutions presents unique problems that involve both conceptual issues regarding the nature of production and problems with the measurement of financial services. Some of these issues are the subject of current debate even at the national level in a number of countries. The CSNA has decided on a number of conventions to regionalize statistics of the

financial services industries taking into account the existing concepts and conventions recommended by 1993 SNA.

Banks and other deposit accepting credit intermediaries

In Canada, this group includes a wide range of institutions that have a fundamental economic factor in common: they are legally chartered to accept deposits from the public and/or corporations and other institutions. These institutions produce two distinct products that are treated differently in the Canadian accounts: 1) financial intermediation services (measured by the FISIM convention) by facilitating the transfer of funds from savers to borrowers, and 2) other financial services provided on a fee-for-service basis. The institutions' remuneration for intermediation services is implicit or hidden in the interest rates at which they borrow from depositors or other lenders and the rate at which they provide loans or equivalent funds to their clients. The second type of financial services is an important part of these institutions' product line. Services such as account maintenance, provision of cash (bills), acting as members of a national clearing house for cheques and other transfers, etc., are typically services that their clients pay for explicitly (although there are inevitably situations in which some cross subsidization is practiced). The 1993 SNA provides specific recommendations on how to measure financial intermediation output of these institutions (this output is known as Financial Intermediation Services Indirectly Measured, FISIM). However, the recommendations do not deal with regionalization issues.

FISIM is measured as the interest income received by the institution on funds it lent out (in the form of loans or other assets) less the interest it paid on its liabilities (deposits or other forms of borrowing). When the CSNA considered the regional allocation of FISIM, it deliberated about alternative concepts of production that imply very different patterns of regional allocation. The most plausible alternatives were:

1. Nearly all FISIM is produced at the head office location because this is where funds are pooled, matched as to term, where decisions are made for most large loans, where intermediation risk (default risk and interest rate risk) is managed, etc. Accordingly, a small amount of output would appear in regions other than the head office to account for the wages paid, depreciation incurred, and intermediate goods and services purchased in regions to deliver services to clients across the country. No profit would be attributed to a region other than the head office.
2. Output of FISIM is produced in every region where borrowing and lending (the essence of intermediation) takes place between the institutions and their clients; output should be allocated based on the share of each region in these activities.

The second alternative concept of production was selected for the regional accounts: output is produced when a lender loans funds to a bank, *and* when a borrower receives funds from a bank. Each type of transaction comprises a component of FISIM. Using this concept of output, production in the regions will vary depending on how much borrowing and lending activity takes place in each region, with some regions potentially showing flows of net lending and others showing net borrowing from other regions. This is consistent with the notion of intermediation service underlying SNA's concept, where production is deemed to occur when funds are either borrowed or lent out. While total FISIM is the difference between the interest received by the institution and the interest paid out, each component of FISIM is measured by the spread between the transaction's interest rate and a "reference rate" that may be interpreted as the pure cost of funds to the institution. Interest income and other property income (e.g., income from treasury activities) that depend on the institution's informational resources located and used at head office (or abroad) and are allocated to the head office region.

To implement this allocation of FISIM, CSNA estimates interest income and interest expense for each region based on data on average levels of assets and

liabilities held in each region and the reported total interest income on each asset and liability group at the national level. Net interest income by region is adjusted to remove the interest income that accrues from the lending of institutions' own loanable funds, as recommended by 1993 SNA.

The second product of deposit accepting institutions is financial services for which explicit fees are charged. Regional estimates for the output of these products present no conceptual problems, though a number of practical difficulties and data gaps still exist. For instance, because fee incomes are not reported by region, total fees at the national level must be allocated to regions. Average levels of assets and liabilities by region are used as a guide to allocate fees that relate to each type of asset or liability (e.g., the amounts held in chequing accounts is used to allocate fees earned from managing chequing accounts).

Life and non-life insurance

Like other financial services, underwriters of life and non-life insurance tend to be located in great concentration in one region, whereas their clients are dispersed across all regions. Like banking, provision of insurance services also depends on a network that can market and deliver the product and provide customer service. Therefore, we find a regional network that incurs operating expenses in all regions but does not necessarily show the entire profit in regions where activities are conducted.

In order to deal with the question of where insurance services should be deemed to be produced, we started by examining what insurance service really is. We found the most crucial part of insurance provision to be risk management through risk pooling and re-insurance (as opposed to, e.g., wealth management). In the case of a pure term life insurance as well as property and casualty insurance, there is a compelling argument that the security offered by an insurance policy is a product of risk pooling. For instance, if a company in Toronto performed risk pooling and re-insuring such that it could underwrite policies for residents of all

provinces and sell these services through telephone and mail, the service should be deemed to have been produced entirely in Toronto and consumed by the personal sector of regions where clients are located. Accordingly, the regional location of insurance production is taken to be the head-office province. However, the network that distributes and delivers these services is located across all regions. In relation to these regional operations, the insurer incurs wages and salaries, commissions paid to sales staff, other intermediate expenses, and depreciation of physical capital located at their regional offices. This suggests that a part of the total output of insurance is produced by its regional operations and must be allocated there. A direct consequence of this concept of production is that production and consumption of services are geographically separated and generate interregional flows of payment between the producing and consuming regions.

The CSNA measures the output of insurance along the lines recommended by 1993 SNA as premiums net of claims and adjustment expenses, plus the investment income from actuarial reserves plus change in those reserves. This product does not isolate risk pooling and distribution as separate services, allowing different allocations for each component of the output of insurance. Therefore, only a single insurance cost of service is allocated to regions.

Given adequate data on intermediate or operating expenditures by region, wages and salaries and commissions, and a proportional amount of the insurer's profit would allow us to estimate how much service was delivered in regions outside of the head-office. However, this data is not available at the present time. In order to allocate the output that corresponds to distribution and delivery services produced where clients are located, wages and salaries are used as a proxy for output in each region.

Investment Brokers

In Canada, after the recent deregulation of financial services, institutions delivering these services are largely owned by chartered banks. There are two

distinct services here. First, brokerage services, consisting of purchase and sale of publicly traded financial assets (such as bonds, equities, etc.) for clients. Clients are either persons or financial corporations engaged in wealth management. While they may interact with their clients through their network of local offices located in the regions, brokers provide these services by executing trades at their head office locations. Trades of public or private debt and equity are executed at exchanges or through the electronic trading networks and electronic settlement infrastructure owned and operated by brokerage houses.

Clearly, there is some production taking place in the head office province where either the virtual or the physical exchanges follow client instructions and transact their trade. However, these services are sometimes combined with provision of financial advice to clients in their region of residence. There are wages, salaries and commissions corresponding to the services provided in regions. These services are produced and consumed in the same region, while that part of the service that relates to trade execution is produced in the head office province and consumed in the province of residence of the client. It should be noted that there is no adequate data on transactions by province of residence of clients. As such, data on the cost of these services are presently allocated to provinces using proxies that relate to investment income.

Open-End Investment Funds

In Canada and the US, open-end investment funds, known as mutual funds, are a significant wealth management vehicle for the personal sector. Members of the public purchase and hold units of mutual funds, which in turn invest their funds in a wide range of (mostly publicly traded) financial assets. With professional management of the asset portfolio, the value of underlying securities of the fund grows and so does the market value of the units of the fund held by the investing public.

From an operational point of view, the funds contract out the job of management of the monies in the fund to asset management companies. These companies

collect a fee based on a pre-set percentage of the market value of assets under management. The funds also hire accountants, lawyers and other professional services needed to properly manage its affairs and conform to regulatory requirements. At the end of each accounting period, the fund debits all of the above costs against assets in the fund subject to a pre-set limit specified in the fund prospectus. The collectivity of these fees are known as the "MER" or management expense ratio of the fund. The MER is therefore the cost paid by unit holders for fund management services, and is also the output or production of the mutual fund. What is interesting about mutual funds is that they are non-profit trusts, legal entities that have no employees but merely purchase a bundle of professional services (from across the country) and employ them for the benefit of the unit holder without generating any direct labour income or profit.

Once the nature of the product has been defined, we need to address the question of the location of production and of consumption. The consumption of the MER product is straightforward and unambiguous, because it strictly depends on the region where the beneficiaries (investors) are located and receive the benefits of professional investment management services. This means that personal expenditure on mutual funds services (the commodity) can be simply allocated to the region of the residence of the survey respondent. However, no data is collected on the regional residence of funds' beneficiaries by the industry association, the tax authorities, or by Statistics Canada. In the income and expenditure accounts, as well as input-output accounts, personal expenditure of the MER is allocated to regions using proxies related to investment income of the personal sector.

The issue of production of mutual fund services, measured by the MER, is less straightforward. This is because a mutual fund is simply a legal entity and not a production unit in the usual sense. Whereas an enterprise or an establishment employs labour and capital to add value to intermediate inputs as they are transformed into a product or service, a mutual fund is a legal vehicle that purchases services of money management, legal and audit services, printing

services and so on, on behalf of the beneficiary. The mutual fund employs no labour and makes no profit, thereby having zero value added. As such, the regional location of the mutual fund is not helpful in identifying where production occurs. This is because the services that the fund purchases and bundles for investors are produced by money managers and other professional services firms located in all regions of the country.

SNA's decision on the regional production of mutual fund services was influenced by a number of institutional factors that have to do with how the industry is organized in Canada. About 80% of the MER is paid by the fund to an investment management company that makes day-to-day decisions about the mix of financial assets owned by the fund and pays out commissions (to brokers) as it buys or sells securities on behalf of the fund. The remaining 20% is paid by the fund for legal, audit and other professional services related to issuance of units and financial statements. This suggests that the location of money management services, where day-to-day management decisions benefiting the investor are made, is where "output" is mostly produced. Furthermore, it suggests that ancillary professional services that are combined with these services to make up the MER are effectively sub-contracted out and are likely allocated in the region of the money management company. Clearly, the region of production of these services does not coincide with the region of consumption. Consequently, the interprovincial flow tables would show exports of these services from those regions where money management is concentrated and imports of services into other regions.

Operationally, the data required for effecting this regional distribution is not available. In Canada, the money management company is most often owned by the fund sponsor and appears as a subsidiary in its consolidated income statement. This means that the regional location of the investment manager and that of the head office of the sponsor would tend to coincide. A practical way to regionally allocate this output is to use the regional location of fund sponsors and the amount of assets they have "under management". Data on these assets at

the company level is available from the industry association, as is information on the regions where the companies operations are located. This data is used to estimate their operating income by region on the assumption that incomes from MER are roughly proportional to the size of portfolios for all companies.

There is a second expense (and output) associated with purchase of mutual fund units. Companies sponsoring a fund—that is, marketing and distributing units of the fund---often charge a fee or "load" against the fund to compensate their licensed sales forces and financial advisors who recommend the fund. These commissions or fees are paid by the investor either at the time of the investment, at the time of withdrawal of investment by persons, or at some point in between. These charges relate strictly to the sale or distribution of mutual funds. They are received by their sponsors who, as legal entities, are licensed investment brokers or investment advisors classified for SNA purposes to a different NAICS industry (but the same working level IO industry). The production of these services, purchased as a commission on sales, presents no conceptual or statistical complexity. Services are produced in the region where the sales force is located and interfaces with clients and where the payment is made (production and consumption occur in the same region). Operationally, it is important to note that labour compensation of the sales force is by far the largest component of the cost of this service and is the most reliably available data. Accordingly, sales charges related to mutual funds are allocated to regions using data on labour compensation by region.

Concluding Comments

While the concepts and conventions of national accounting have a long and well established history, regional accounts are still in relatively uncharted territory. Recommendations and guidelines of international organizations largely focus on clarifying concepts and devising conventions at a national or unitary level. This has left statistical agencies in a position of working out many sub-national issues[4].

The mandate of Canada's SNA was recently expanded to include a set of rigorous regional economic accounts with a high degree of reliability and the same industrial, sectoral and commodity detail as the national accounts. These regional accounts are benchmarks for other sub-national statistics of the Canadian SNA. The execution of this project necessitated research, discussion and debate over a number of conceptual and measurement issues that are essential to any sub-national accounting framework.

At Statistics Canada, expanding and upgrading economic surveys to support high quality regional economic accounts is an on-going project. As surveys are redesigned or revamped to provide better and more effective source data, opportunities arise for better tailoring data collection vehicles to regional accounts by providing appropriate feedback based on the on-going work of regionalization of input-output accounts. New or improved data obtained from these surveys (e.g., the head office survey) often spur more discussion of regionalization issues. We expect this work, and discussion of concepts and measurement issues, to continue over the next few years.

[4] For instance, an earlier paper (Siddiqi and Salem, 1995) shows how a number of issues were dealt with when the 1990 regional input-output tables were implemented.

Appendix

The System of Classification

Following the national tables, regional input-output tables have been built around three classification systems: one for industries, one for commodities, and one for categories of final demand. Beginning with the 1997 reference year, the industry classification is based on the North American Industry Classification (NAICS). The commodity classification is specifically designed for the input-output system and reflects the structure of the input-output classification of industries. For goods, the commodity classification is based on the international Harmonized System of Classification and is fully concorded to other classification schemes used in various Statistics Canada surveys and the classification systems used in the administrative data received from the three levels of government. As there is yet no Canadian standard classification for services, the tables use a classification which defines service classes in terms of the product characteristics of the relevant industries. However, work is underway at Statistics Canada to produce a standard classification of services.

Since production accounts in the CSNA are integrated, the Canadian input-output accounts follow the same classification of transactors as used in the income and expenditure accounts. The latter divides transactors into business, government, personal and non-resident sectors. Accordingly, the accounts for transactors in the business sector, classified by industry, appear in the output (**V**) and intermediate use (**U**) matrices. The accounts of transactors in the government sector, the personal sector and the non-resident sector are all contained in the final demand matrix. In the regional context, non-residents refer to all economic agents located outside the boundaries of a region, be they in other regions or abroad. Effecting such a demarcation gives rise to a number of special problems which are dealt with later in the paper.

The tables contain two sets of interrelated accounts, the Commodity Accounts and the Industry Accounts. The Commodity Accounts detail the supply and disposition of individual goods and non-factor services. The Industry Accounts detail the commodity composition of the output of industries as well as the complete costs of production, including taxes, subsidies, royalties, the remuneration of labour and the operating surplus of industries. The dimensions and the relationships between the matrices making up the national input-output accounts are presented in Chart 1.

The Commodity Accounts

The **V** matrix displays the production of each commodity by each industry valued at *producers' prices* or approximate basic value in the UN-SNA terminology, defined as selling prices at the boundary of producing establishments, excluding sales and excise taxes which may apply after the final stage of production. In

addition to production by domestic industry, commodities are also supplied by two of the categories in the final demand matrix: imports and withdrawals from inventories.

Since input-output analysis is concerned with technological relationships of production processes, the accounting framework relates inputs of industries to production, rather than to shipments. Production values are obtained by adjusting shipments for withdrawals or additions to the producers' inventories of both goods-in-process and finished goods. This is discussed more extensively later in the description of final demand categories.

The **U** matrix shows use of each commodity by each industry as intermediate inputs for the purpose of production of other commodities on a current basis. Consistent with the production concept, the entries refer to amounts of commodities used in the production process and not to purchases. The value of commodities purchased but not yet used are shown as additions to inventories of raw materials. In order to have a uniform basis of valuation, entries in the use matrix do not usually represent actual transaction values but estimates of producers' values of transactions. The full cost of a commodity to the using establishment--the purchasers' price value of the commodity--often includes wholesale and retail trade margins, the cost of for-hire transportation (transport margin), and commodity taxes such as sales and excise taxes. These margins, which together account for the difference between the producers' price and the purchasers' price valuation, are treated as separate commodity inputs. In the use matrix, industries are shown as purchasing each margin separately from the producers of those margins (and as remitting a tax margin)[5]. Taxes which are levied on commodities after the final production stage over and above the producers' price are shown as inputs into the purchasing industry as a tax margin purchased by that industry.

The **F** matrix shows the final demand for each commodity by each category. Final demand categories are: personal expenditure, fixed capital formation, additions to (the value of physical change in) inventories, gross government expenditure (on goods and services) and exports; two other categories, imports and withdrawals from (the value of physical change in) inventories constitute sources of supply additional to domestic business industries in the current period[6]. Commodities in the **U** and the **F** matrices include those originating from imports, withdrawals from inventories or from government production. Thus, three negative adjustments are required to maintain equality between the output

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5. This treatment, showing purchases of appropriate amounts by each using entity from the supplier of each margin, is identically applied to purchases of final demand transactors discussed below.

6. The relatively small values of goods and services produced by the government sector are treated in the final demand matrix since the producing entities are not classified as business sector industries in the Canadian System of National Accounts. The costs incurred in producing these goods and services are included in the gross government expenditure column of this matrix. An additional source of supply in the final demand matrix is sales of used machinery and equipment (e.g., used vehicles) and incomes of some non-profit organizations.

of domestic industries: one for imports, because they are extraneous to the production by Canadian industries; one for inventory withdrawals since their production occurred in an earlier period; and one for government sales of goods and services because their production costs are already accounted for in the government gross expenditure column.

The Industry Accounts

The business sector[7] industry accounts are shown in matrices **V**, **U** and **YI**. The total output of each industry, classified by commodity, is shown in the industry's row in matrix **V**. The intermediate inputs of each industry are shown in the industry's column in the **U** matrix while its uses of primary inputs are shown in the **YI** matrix. Primary inputs in the **YI** matrix consist of the following: net indirect taxes (divided into commodity indirect taxes, other indirect taxes, and subsidies which are negative entries), wages and salaries, supplementary labour income (which include employers' contributions toward employee pension plans, unemployment insurance plan, health care plans, etc.), net income of unincorporated businesses and operating surplus (in the case of incorporated businesses).

Commodity indirect taxes represent the sum of commodity taxes levied beyond the producers' price valuation level. While those paid by industries are shown in the **YI** matrix, those paid by final demand categories are shown in the **YF** matrix. The principal taxes represented here are the Federal Manufacturers Sales Tax, excise taxes and duties, motor fuel duties imposed by provincial governments, sales taxes imposed by provinces and municipalities, and the profits of provincial liquor control commissions. Customs import duties are not included as they are part of the producers' price value. The "other indirect taxes" include property taxes and certain fees and licensing charges which are treated as indirect taxes in the CSNA. Under the present treatment, government subsidies received by industries are treated as revenues and are shown as negative entries in the receiving industry's input vector.

For each and every industry, total output equals total input, both intermediate and primary.

Gross Domestic Product by Industry

The derivation of industry GDP is an integral part of the input-output accounts. The industry distribution of the Gross Domestic Product at factor cost (or their components) is explicitly shown in matrix YI, in the case of the business sector.

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7. The present accounting framework of the Canadian System of National Accounts treats establishments belonging to the business sector and those in the non-business sector differently. Presently, explicit industry accounts are developed only for the business sector, although an explicit treatment is planned for many such entities in the non-business sector.

In the case of the non-business sector, however, it does not come out of the present accounting framework, but it can be obtained by recasting the data in matrix YF. At the aggregate level, Gross Domestic Product at market price, the sum of all elements of primary inputs in matrices YI and YF, is equal to final demand expenditures on domestic products, the sum of all elements of matrices F and YF.

The Trade Flows

It is evident from a comparison of Charts 1 and 2A how the framework of the interregional input-output tables has evolved from that of the national tables' framework while maintaining its essential features. While the concept of an international import and export is part of the existing framework, introduction of interregional trade into the existing framework requires that we clarify the concept of an interregional trade flow. A trade flow is constituted by the sale of commodities from a region or abroad to another region or abroad. Exports can originate from a region if the goods or services are produced in that region, or are withdrawn from inventories of establishments in that region. A regional export also occurs when goods or services (e.g., hotel accommodation, meals or entertainment) are purchased within a region by a non-resident while staying in that region. Similarly, imports are defined for a region if the goods or services are destined for the region's current expenditure, for capital formation in the region, are used as intermediate inputs by establishments in that region or make up additions to inventories.

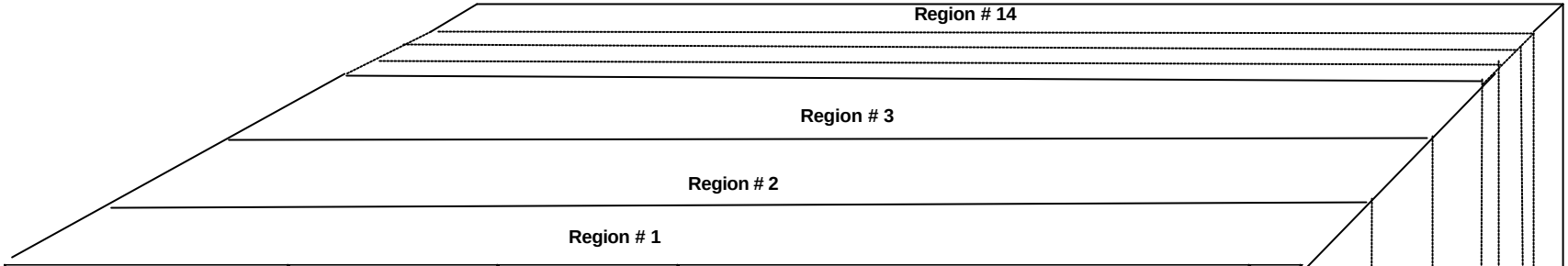
As Chart 2B shows, interregional final demand tables have two additional columns: regional exports and regional imports[8]. The extension of the national framework to an interregional level requires that we impose two additional constraints in the form of identities. First, across regions, total regional imports equal total regional exports or, to put it another way, the net (interregional) trade balance of regions sum to zero. Furthermore, the sum of foreign exports (foreign imports) of regions equal total national exports (imports). Second, across regions, total supply equals total disposition for each commodity. Furthermore, for each commodity the sum of supplies across all regions is equal to total national supply and the sum of dispositions across all regions is equal to total national disposition. The constraints imposed by the rectangular accounting framework are particularly important for the development of interregional accounts. This is because although several sources exist that *indicate* trade flows (e.g., survey of manufacturers destination of shipments, wholesale origin and destination survey, transportation origin and destination surveys) they are very often not adequate for developing a complete matrix of regional input-output values or interregional trade flows.

[8] The interregional trade flows tables provide a further regional breakdown for each column of regional export and import, i.e., a matrix which identifies the exporting and importing regions for each commodity. The subscript i in Chart 2B refers to the second (regional) dimension of these matrices.

Finally, it should be noted that, as in the national framework, goods and services are valued at approximate basic prices. This makes the interregional imports and exports more complex, since a good imported from another region may precipitate imports of various margins from other regions.

The Accounting Framework

Regional Input-Output Tables



	COMMODITIES 1 … 719	INDUSTRIES Business & Non-business 1 …. 300	FINAL DEMAND CATEGORIES								TOTAL
			PE	FCF	VPC	GCE	IX	PX	IM	PM	
COMMODITIES 1 … 719		Intermediate Inputs									COM
INDUSTRIES Business & Non-business 1…300	Outputs										IND
Indirect Taxes on Products 720 Other Taxes on Production 721 Subsidies on Products 722 Other Subsidies on Production 723 Wages & Salaries 724 Suppl. Labour Income 725 Mixed Income 726 Other Operating Surplus 727		Primary Inputs									GDP
TOTAL	Commodity	Industry	GDP								

Region's own consumption	

Canadian Interregional Trade Flows Matrix

Region of Origin \ Region of Destination	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	North West Territories	Yukon Territories	Nunavut	Territorial Enclaves	International Exports
Newfoundland															
Prince Edward Island															
Nova Scotia															
New Brunswick															
Quebec															
Ontario															
Manitoba															
Saskatchewan															
Alberta															
British Columbia															
North West Territories															
Yukon Territories															
Nunavut															
Territorial Enclaves															
International Imports															

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