Input-output
Division

Technical Series

Canada

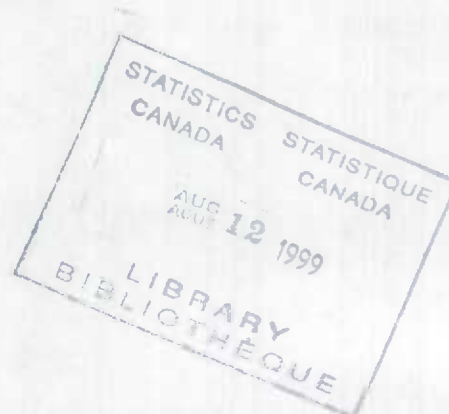## Input-Output
Technical Series

The Input-Output Division Technical Series are intended for users interested in input-output tables and related research for analysis and applications. Readers of the series are encouraged to contact the authors with comments and suggestions. A complete list of the titles that have been released appears at the back of this paper.

Papers in the series are distributed to Statistics Canada Regional Offices and Provincial Bureaus of Statistics. The series appears in the "Listing of Supplementary Documents" (11-207). A complete set is also maintained in the Statistics Canada Library and is available for consultation.

To obtain the list of titles and/or an individual paper, please contact:

Consulting and Marketing
Input-Output Division
Statistics Canada
23rd Floor, R.H. Coats Building
Ottawa, Ontario, K1A 0T6
(613) 951-3697

A Guide to using the Input-Output Model

of Statistics Canada

Erik Poole

58-E

June 1993

Table of Contents

Introduction

The Input-Output **(I-O)** model uses the Canadian Input-Output **(I-O)** tables to track and quantify the economic activity generated by changes in consumption or production. The Canadian I-O tables present one of the most complete and detailed accounting framework of the Canadian economy available. As such the model has the greatest potential of all major economic models for capturing the flows of goods and services between industries and consumers at relatively detailed levels.

One of the most common uses of the I-O model is to simulate the impact of a demand shock on the economy. By *shock,* we mean any change or departure from the status quo, in this case any change in demand for goods and services. Any increase in consumption of goods and services will generate both direct and indirect economic production, the latter resulting from the purchase of inputs. Clients of the I-O Division often wish to know how much total economic activity a new industrial project will generate and which industries or regions will benefit the most. The I-O model probably provides the first best answers to those questions.

Description of the tables supporting the model

There are three types of I-O tables:

- Input table
- Output table
- Final Demand table

The Canadian Input and Output tables are rectangular. At the most detailed level, they consist of 216 industries by 627 commodities (including primary inputs, and various margins). Each cell of information in the Input table contains the dollar value of the parts, services, raw materials or labour used up in the production process of the associated industry. The Input table provides a detailed decomposition of the total production costs.

The following table contains part of the Input table at the Medium (M) level. For example, the agricultural industry consumed $1,372.9 million dollars of fertilizer as an

input in 1989. The Output table works in a similar manner, but provides a detailed breakdown of the individual goods and services comprising the industry total output.

Input (USE) Table, National Model Public, C$ (000,000) 1989

M LEVEL	INDUSTRIES			
	1 AGRICU	2 FISHIN	3 LOGGIN	4 MINING
COMMODITIES				
61 OTHER NON-METALLIC MINERAL PRO	16.3	1.4	0.4	35.9
62 GASOLINE & FUEL OIL	766.3	54.6	168.5	157.7
63 OTHER PETROLEUM & COAL PROD.	139.2	6.3	4	72.7
64 INDUSTRIAL CHEMICALS	400.4	1.4	1	162.8
65 FERTILIZERS	1372.9	0	0	0
66 PHARMACEUTICALS	30	0	0	0
67 OTHER CHEMICAL PRODUCTS	600	0.6	6.9	207.3
68 SCIENTIFIC EQUIPMENT	0	0	0	0
69 OTHER MANUFACTURED PRODUCTS	0	12.6	0	0

The Final Demand table gives detailed information on goods and services that are bought by many categories of buyers (consumers, industries and government) for both consumption and investment purposes. For convenience, the Final Demand table includes imports, exports and non-tax government revenues. The following table shows part of the Final Demand table at the Medium (M) level for 1989. PE stands for *personal expenditures.* CON represents *construction.*

Final Demand Table, National Model Public, C$ (000), 1989

M LEVEL	FINAL DEMAND CATEGORIES			
	13 PE. OT	14 CON MA	15 CON MI	16 CON HO
COMMODITIES	Other services	Manufacturing	Mining, etc.	Housing & real estate
68 SCIENTIFIC EQUIPMENT	5.1	0	0	0
69 OTHER MANUFACTURED PRODUCTS	47.5	0	0	0
70 RESIDENTIAL CONSTRUCTION	0	0	0	38378.8
71 NON-RESIDENTIAL CONSTRUCTION	0	4202.2	6215.3	0
72 REPAIR CONSTRUCTION	195.8	0	0	0
73 PIPELINE TRANSPORTATION	18.5	0	0	0
74 TRANSPORTATION & STORAGE	8352.4	0	0	0
75 RADIO & TELEVISION BROADCASTIN	1439.3	0	0	0
76 TELEPHONE & TELEGRAPH	5091.8	0	0	0
77 POSTAL SERVICES	715.1	0	0	0
78 ELECTRIC POWER	198.6	0	0	0
79 OTHER UTILITIES	60.1	0	0	0

The tables are available in various levels of aggregation from 216 industries by

627 commodities at the most detailed level to only 16 industries by 49 commodities at the least detailed level. Generally, an I-O model simulation will report the results at three different levels of aggregation in order to facilitate data treatment and analysis.

Simulation model

The Input-Output (I-O) model simulates the impact of a shock or a change in final demand or industry output on the economy, in particular, the business sector[1]. The model exploits the interindustrial linkages of the input and output tables to track the total production of the goods and services in order to satisfy the final demand or output shock. It indicates which domestic industries were directly responsible for meeting the demand and how much of that demand was siphoned or "leaked" off to foreign imports and other "leakages" such as inventories and government services. We refer to this first round impact as the **direct effects.**

These direct suppliers will in turn purchase goods and services from other industries as inputs. The model repeats this process of purchasing intermediate inputs until the model has identified all the indirect commodities in the full chain of the production process. We refer to the accumulation of these rounds of impact as the **indirect effects**. The direct and indirect effects combine to form the **total effects**.

The impact of a given expenditure project can be measured by the amount of Gross Domestic Product (GDP) generated by industry or for the entire domestic business sector[2]. The gross output as measured in the total effects can be misleading because it contains double-counting (in fact, some output may be counted several times). To illustrate this point think of the price of a loaf of bread. It already includes the cost of the flour. Adding the cost of the flour to the price of the loaf of bread would result in a figure that has little economic meaning. However, gross output can be useful in making comparisons at the detailed industry level, where double counting is

---

[1] The business sector includes all individuals and companies that produce goods and services for sale at a price intended to cover all production costs.

[2] GDP at factor cost is essentially equivalent to value-added, i.e., the value added by the primary inputs (labour and capital services) to the intermediate inputs transformed in the production process. GDP at market prices includes taxes.

minimized.

The impact of a given expenditure project will depend on many factors, including the propensity to import goods and services as well as intermediate goods and services from abroad.

The graph on the following page gives an intuitive idea of what happens to an expenditure shock of $100. We can calculate the I-O GDP multiplier from this simple example: 0.55 ($54.55/$100.00)[3]. One of the principal advantages of the I-O model is to calculate GDP and its components such as labour income by industry and by province in the case of the interprovincial model.

---

[3] We could also calculate the I-O output multiplier: 1.36 ($136.37/$100.00). But it would have little economic meaning because gross output includes double-counting as we discussed above. The I-O output multiplier may resemble a Keynesian expenditure multiplier. It is not. The Keynesian multiplier measures GDP not gross output and includes **induced effects** from the spending of income (e.g., wages and salaries).

Input-Output simulation of an expenditure of $100 and the impact on the business sector
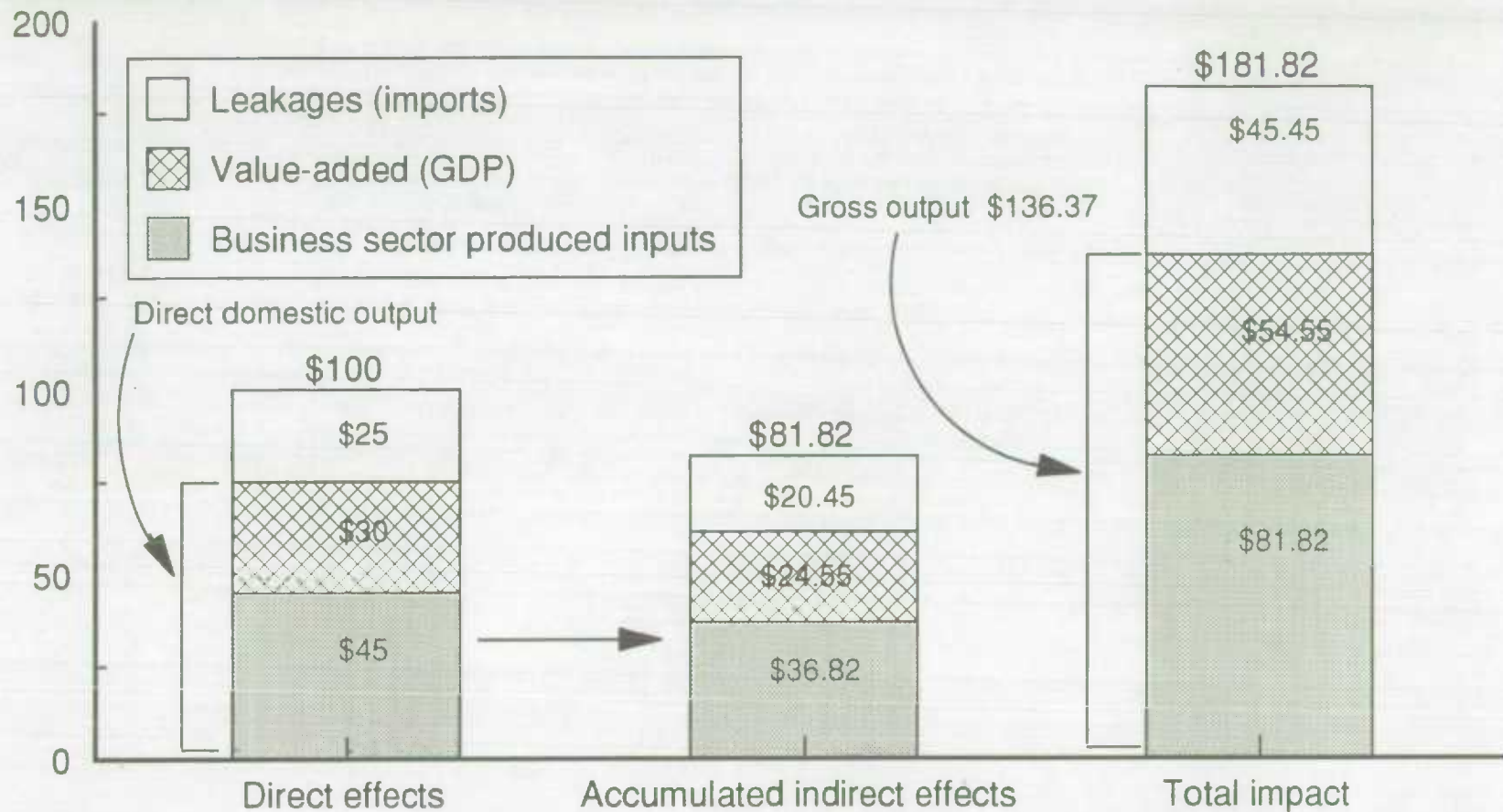
Examples

The potential uses of the I-O simulation model are numerous. Here are a few examples. Whenever possible, one of the best ways to use the model is compare the results of various alternative scenarios given a well defined set of criteria.

1.   **Short-term job creation**

Due to a recession or a regional unemployment problem, government may wish to create employment through different types of public work projects or targeted subsidy programs. The I-O model indicates which industries would be affected directly and indirectly and estimates how many jobs would be created.

2.   **Economic significance**

An analyst can use the I-O model to calculate the total value-added (GDP) generated by a shock. This figure as a percentage of national GDP allows the user to estimate the importance of the economic activity in question in relation to the overall economy. In a similar manner, we can calculate the significance of the activity by individual industry. We accomplish this by dividing the total production per industry generated by the model by the actual total production per industry.

3.   **Fiscal impacts**

The increase in the output of a particular industry will result in higher tax revenues for the government but will also draw more government subsidies. For instance, in some industries, net tax revenues are actually negative due to the importance of subsidies. The I-O model will give a rough estimate of the fiscal impact of a new investment project or increased industrial output. This may be particularly important, especially if additional public assistance is being proposed.

4. Multipliers

The I-O model calculates a certain number of I-O multipliers and ratios: GDP, labour income and employment. Different simulations will produce multipliers of varying magnitudes depending on the importance of leakages (e.g., imports). The multipliers provide a summary statistic of the economic impact of a given shock, and can be used to predict economic impacts of similar expenditures or investments of different magnitudes.

5. Resource utilization and intensity

A simulation will estimate the commodities used directly and indirectly as inputs to produce a given industry output or basket of goods and services. We can calculate resource or "factor intensities" as a percentage of total inputs. For example, some activities may be more labour intensive than others. Some activities may involve the use of inputs that produce negative externalities, such as environmental pollution.

6. Buy Canada Policy

To simulate the impact of a "Buy Canada" policy, we can set the import coefficients on the direct purchases to zero. Naturally, the model will not estimate the effect of increased costs that may result to the consumer or the taxpayer.

7. Imports as essential inputs

Many Canadian industries are dependent on imports as intermediate inputs to produce goods for both domestic consumption and export. Trade barriers placed on these imports may have adverse effects on certain Canadian industries. We can use the I-O model to estimate approximately how many of an industry's inputs are imported and which specific commodities are imported. The import and interindustry linkages will then allow the estimation of the impact of changing trade barriers on the performance of specific industries.

8.   Regional and interregional impacts

An analyst can use the Interprovincial model to determine output by industry for an individual province or for a group of provinces, as well as the interregional flow of goods and services between the provinces.

9.   Technological flows

To the extent that goods and services embody new technologies, the I-O model can be adapted to trace the flow of technologies throughout the economy. This is a relatively specialized use of the model.

Putting the I-O model into perspective and some cautionary notes

Most people think of the I-O model as an economic model. In many respects, it is not. The I-O model is a complex and detailed **accounting** model of the inter-industrial structure of the Canadian economy. Contrary to macro econometric and general equilibrium models, there are no money supply, no relative prices and no inflation in the I-O model. There are no limits on input supply and thus no bottlenecks occur in the model. The lack of relative prices means that there is no economic behaviour responding to scarce or limited resources.

The model says nothing about the ability of the economy to respond to increases in production in short periods of time. As with most other economy wide models, the I-O model does not automatically capture technological spin-offs and negative externalities such as environmental pollution, or positive externalities resulting from, for example, industrial clustering[4].

Effectively dealing with the limitations of the model requires experience and judgement. The results of modest shocks are most likely trustworthy. Large shocks simulating new demand or output may strain limited resources and cause price

---

[4] The jargon **externalities** refer to costs or benefits that accrue outside the production process (i.e., external to the production process).

changes with difficult to predict economic impacts. The model is static, not dynamic, and therefore calculates a new "equilibrium" without specifying the path to get there.

However, in spite of its limitations, the I-O model does a remarkably good job of capturing the structure of the Canadian economy, a structure that appears to be relatively stable in the medium term. The simplicity of the model can also be an advantage as the results are relatively reliable and easy to understand. Large, theoretically sophisticated macroeconomic models are sometimes difficult to fit to the data and produce ambiguous, difficult to interpret results. For these reasons, I-O modeling often provides the most cost effective means of analyzing a given economic problem.

Available models and data

At the present moment, the National 1989 and the Interprovincial 1984 I-O models are available for simulation purposes. The 1990 Interprovincial model could be available in 1994.

At various times, clients have requested the use of I-O price, energy and tax models[5]. Given their availability, arrangements can be made to use these models on request. Custom made I-O applications can be arranged.

---

[5] The Input Output Division no longer builds or maintains the closed version of the I-O model. In the closed version, labour incomes are respent. This is due to the difficulties in building such a model and the tendency to misuse the closed model for public policy purposes. For a further discussion, see *Statistics Canada's Input-Output Model: General Description, Critical Analysis of Partially Closed Version and Alternative Solutions*, Technical Series No. 52-E, Ottawa, Input-Output Division, June 1991, 19 p.

How to prepare a simulation

Simulations should be done according to scenarios that group like activities. For example, one simulation may involve the construction and start-up costs of establishing a new industrial plant. The second simulation may involve the operating costs of running the plant.

The client should first decide whether to shock the model with final demand expenditures or industry output. The best way for the client to maintain the greatest degree of control over the simulation is to prepare a vector column of expenditures or output by I-O commodities at the W-level (Worksheet level) which lists 602 or 627 I-O commodities, according to the vintage of the model. Input-Output commodity classifications are listed in Appendix B., *The input-output structure of the Canadian economy 1989,* Catalogue 15-201, Ottawa, Minister of Industry, Science and Technology, 1993, 223 p.

The client prepares two vector columns of I-O commodity codes and dollar amounts in the appropriate row. For a simulation involving shocks on a small number of commodities, the data can simply be mailed or faxed in and we will enter it manually. For larger numbers of commodities, say more than 10, in order to expedite the execution and delivery of the simulation, the data should be supplied on a 3 1/2 or 5 1/4 inch MS-DOS formatted diskette. This speeds up the process and eliminates the possibility of operator error which could occur when entering the data.

The simulation shock data can be sent to the I-O Division in a Lotus 1-2-3 .WK1 or .WK3 spreadsheet file or in an ordinary ASCII file. We will also accept Excel or Quattro-Pro spreadsheet files.

On the following page is a sample of how a spreadsheet containing data for an I-O simulation with the national model might appear. For an I-O simulation with the interprovincial model, each separate targeted province and/or territory should have its own column.

There are other questions that you might want ask:

• Do you wish, in addition to the computer print-out, to receive the results in Lotus 1-2-3 .WK1 files? If you do, please specify the size of the diskette.

• Do you wish to modify the leakage coefficients? For example, if you are sure that final demand will be satisfied by domestic producers only, direct import coefficients can be set to zero. If the shock is meant to simulate industrial output, then we will set the direct leakage coefficients to zero.

Interpreting simulation results

For each simulation, the customer receives numerous tables and pages of summary statistics and impact results by industry and by commodity. The most recent version of the national model contains extensive notes that explain in detail the various outputs and their associated concepts. The following tables at the Small (S) level of aggregation give an intuitive idea of a simulation result[6].

Industry output at various stages of production and competing imports
In dollars

Industry S aggregation	direct industry output	first round indirect industry output	other indirect industry output	total indirect industry output	gross industry output	competing imports[7]	duties on competing imports
Agricultural & Related Services Ind	0	29387.02	18545.52	47932.53	47932.53	24411.5	409.87
Fishing & Trapping Industries	0	144.75	331.43	476.18	476.18	76.32	0.18
Logging & Forestry Industries	194.02	224.14	2095.79	2319.93	2513.95	52.47	0.01
Mining, Quarrying & Oil Well Ind.	86.35	3299.2	16305.85	19605.04	19691.4	10939.09	6.87
Manufacturing Industries	482110.13	165975.09	92728.42	258703.5	740813.66	222642.11	15199.48
Construction Industries	0	5320.25	5825.88	11146.14	11146.14	0.02	0
Transportation & Storage Industries	61413.43	24792.82	17398.51	42191.33	103604.76	3576.91	0.01
Communication Industries	1.31	13802.69	7775.68	21578.38	21579.69	666	1.06
Other Utility Industries	808.19	9123.44	7421.85	16545.27	17353.46	41.94	0
Wholesale Trade Industries	75646.13	23220.65	12851.58	36072.23	111718.36	2816.54	30.1
Retail Trade Industries	201696.82	6412.12	4779.14	11191.26	212888.09	83.03	2.93
Finance Insurance & Real Est. Ind.	0	30699.74	25259.87	55959.59	55959.59	2136.82	0
Community, Business, Person. Serv.	3291.53	23218.5	17659.68	40878.2	44169.75	4167.22	0.46

[6] The sample simulation was actually generated by a $1,000,000 expenditure shock on *Vegetables, frozen, dried and preserved.*

[7] Non-competing imports include tropical fruit and other commodities which are not produced in Canada. Competing imports are also produced in Canada.

Direct and indirect effect on Gross Domestic Product (GDP) by Industry

In dollars

Industry S aggregation	wages and salaries	supplementary labour income	net income unincorp.	other surplus	GDP effect at factor cost
Agricultural & Related Services Ind	4772.79	203.85	4997.13	13086.05	23059.82
Fishing & Trapping Industries	81.78	3.95	181.98	72.4	340.11
Logging & Forestry Industries	566.69	78.93	80.02	303.16	1028.8
Mining, Quarrying & Oil Well Ind.	2652.5	296.41	46.72	8184.64	11180.27
Manufacturing Industries	119099.14	14347.1	235.68	132975.73	266657.65
Construction Industries	3938.67	385.09	441.84	979.01	5744.61
Transportation & Storage Industries·	30526.47	3830.3	2210.77	16295.47	52863.01
Communication Industries	8481.33	1009.32	52.9	6607.53	16151.08
Other Utility Industries	2942.88	398.36	13.62	10461.92	13816.78
Wholesale Trade Industries	49283.37	4759.65	1347.72	20344.25	75734.99
Retail Trade Industries	95167.09	7472.74	8985.29	30829.6	142454.72
Finance Insurance & Real Est. Ind.	15050.79	1041.98	1090.46	14842.09	32025.32
Community, Business, Person. Serv.	18645.8	1436.14	3001.37	6316.74	29400.05

The following is a partial list of the other tables supplied with a simulation result of the national model.

- Impact on government receipts
- Impact on business sector account
- Multipliers and other ratios
- Initial demand, direct leakages and direct commodity output
- Intermediate demand, indirect leakages and indirect commodity output
- Total demand, leakages and gross commodity output
- Industry output at various stages of production and competing imports
- Supply of commodities to each industry by origin
- Direct and indirect effect on gross domestic product (GDP) components by industry
- Indirect taxes and subsidies by industry
- Direct and indirect effect on labour by industry

Conclusion

The I-O model exploits the simple but detailed accounting relationships furnished by the I-O tables to measure the economic activity generated by a change in consumer or government expenditures, investment or industry output. The national and interprovincial versions of the I-O model provide more industry and commodity detail than any other comparable economic model, and because of this, are often used in conjunction with other economic models. Simulation results also show the effect on GDP by industry and its components such as labour income, taxes and subsidies.

The I-O model is essentially a resource allocation model which responds to shocks through quantity adjustments. It does not incorporate market behaviour — there are no relative prices — but still manages to provide a surprisingly useful and reliable portrait of the anatomy of production relationships in the economy.

Mathematical appendix

To illustrate the I-O model, we first look at a simple text book model with a minimum of detail, then we look at the equation that summarizes the Canadian I-O model[8].

In a text book industry by industry Leontieff input-output model, one attempts to calculate the $n \times 1$ gross output vector g for n I-O industries, that would satisfy the final demand vector f and the indirect industrial demand Ag in the following equilibrium equation

$$g = Ag + f,$$ (1)

where the $n \times n$ technical coefficient matrix A contains coefficients a_{ij} which represent the quantity of i th good needed to produce one unit of the j th good. The solution to the equation (1) is

$$g = (I-A)^{-1} f,$$ (2)

where I is the identity matrix. We refer to the matrix $(I-A)^{-1}$ as the *multiplier* or *impact matrix*. It shows the direct and indirect output requirements to meet the final demand f. Embodied in the impact matrix is the iterative process of an infinite number of successive demands for intermediate goods and services

$$\begin{aligned} g &= f + Af + A(Af) + A^3 f + ... + A^k f + ... \\ &= (I + A + A^2 + A^3 + ... + A^k + ...) f. \end{aligned}$$ (3)

As k tends to infinity, $A^k f$ tends to zero. For practical purposes, $A^k f \cong 0$ after 12 to 14 iterations. In the first round of production, f represents the direct output requirements to meet final demand f. In the second round of production, Af furnishes the goods and services necessary as inputs in the production of f, and so on until the term $A^k f$ converges to zero.

The Canadian I-O model by comparison is more complex. The technology is

---

[8] See Alpha C. CHIANG, *Fundamental methods of mathematical economics*, 3rd edition, New York, McGraw-Hill Book Company, 1984, 788 p.

rectangular, e.g., over 600 commodities by 216 industries, and we subtract leakages such as imports. Generally, we use the Canadian open I-O model to calculate the total output by industry necessary to respond to a given expenditure or investment. The output is determined by an equation similar to[9]

$$g = [I - D(I - \hat{\mu} - \hat{\alpha} - \hat{\beta})B]^{-1} D\,(I - \hat{\mu} - \hat{\alpha} - \hat{\beta})f, \qquad (5)$$

where g = vector of values of industry gross output;

D = domestic market share matrix, which is calculated by dividing each element in a column of the output matrix by the total of the column (total commodity output);

$\hat{\mu}$ = the import coefficients (the hat ^ designates a diagonal matrix where the off diagonal values are all zeros), which represent the propensity to import;

$\hat{\alpha}$ = the government production leakage coefficients;

$\hat{\beta}$ = the withdrawal from inventories leakage coefficients; and

B = the industry technology which is calculated by dividing each element in the columns of the input matrix by the total of the corresponding column (total industry inputs). Note that primary inputs are absent in the B matrix.

The matrix $[I - D(I - \hat{\mu} - \hat{\alpha} - \hat{\beta})B]^{-1} D$ is known as the impact or inverse matrix and is conceptually similar to the $(I - A)^{-1}$ matrix given in the previous example. In this specific case, it is the impact matrix of the final demand expenditure shock f on gross output by industry g.

Industry GDP components matrix Y are calculated by multiplying the matrix of primary input coefficients H times the gross output by industry g: $Y = Hg$.

For more detailed explanations, consult the documents listed under **References**.

---

[9] Equation (5) is a much simplified version of the equation that is presently used in the national model.
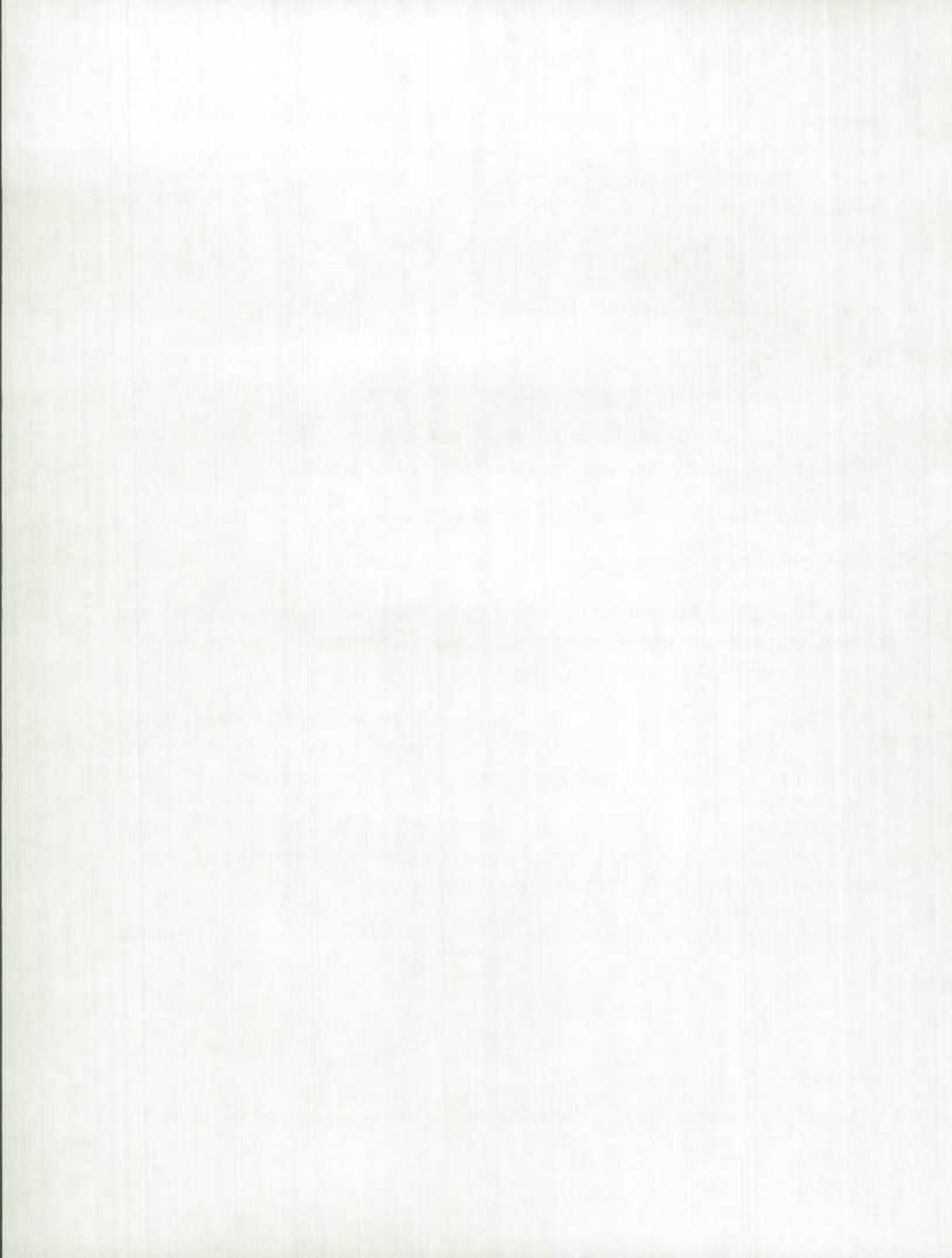
References

CHIANG, Alpha C., *Fundamental methods of mathematical economics,* 3rd edition, New York, McGraw-Hill Book Company, 1984, 788 p.

GRADY, Patrick, and MULLER, R. Andrew, "On the use and misuse of input-output based impact analysis in evaluation", *The Canadian Journal of Program Evaluation,* Vol. 3, No. 2, 1988, pp. 49-61.

HOFFMAN, *et al., User's Guide to Statistics Canada Structural Economic Models,* Technical Series No. 1, Ottawa, Input-Output Division, Statistics Canada, September 1981, sp.

MERCIER, Pierre, DURAND, René, and DIAZ, Aldo, *Specification of parameters for the National Input-Output Model,* Technical Series No. 18, Ottawa, Input-Output Division, December 1991, 8 p.

MILLER, Ronald E., and BLAIR, Peter D., *Input-Output Analysis. Foundations and Extensions,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1985, 464 p.

Statistics Canada's Input-Output Model: General Description, Critical Analysis of Partially Closed Version and Alternative Solutions, Technical Series No. 52-E, Ottawa, Input-Output Division, Statistics Canada, June 1991, 19 p.

STATISTICS CANADA, *The input-output structure of the Canadian economy 1961-1981,* Catalogue 15-510, Ottawa, Minister of Supply and Services Canada, 1987, 526 p.

STATISTICS CANADA, *The input-output structure of the Canadian economy 1989,* Catalogue 15-201, Ottawa, Minister of Industry, Science and Technology, 1993, 223 p.

(1)
Hoffman, *et al.*, *User's Guide to Statistics Canada Structural Economic Models*, Input-Output Division, Statistics Canada, Revised September 1980.

(2)
Hoffman, *et al.*, *Guide d'utilisation des modèles économiques et structuraux de Statistique Canada*, Division des entrées-sorties, Statistique Canada, Révisé septembre 1980.

(3)
Durand, R., and Rioux, R., *Estimating Final Demand Expenditure at Factor Cost and Net of Tax Price Indices in the Canadian Input-Output Tables*, Paper Presented at the International Round Table on Taxes and the CPI, Ottawa, Input- Output Division, Statistics Canada, March 3, 1987.

(4)
Siddiqi, Y., Murty, P.S.K., and Diena, J., *Highlights of the Public Sector Market Study, 1983*, Input-Output Division, Statistics Canada, September 1987.

(5)
Murty, P.S.K., *Size and Structure of the Public Sector Market, 1983, Sources and Methods*, Input-Output Division, Statistics Canada, September 1987.

(6)
Durand, R., *The Adding-Up Problem in the Computation of Aggregate Constant Price GDP*, Input-Output Division, Statistics Canada, October 1987.

(7)
Durand, R., and Markle, T., *Measuring the Variability of Input-Output Structures: A Progress Report*, Input-Output Division, Statistics Canada, December 1987.

(8)
Durand, R., and Markle, T., *On the Variability of Input-Output Structures: A Progress Report on the Constant Price Industrial Input Structures*, Input-Output Division, Statistics Canada, April 1988.

(9)
Durand, R., and Markle, T., *Structural Change in the Canadian Economy: The Supply Side in Current Prices*, Input-Output Division, Statistics Canada, July 1988.

(10)
Durand, R., *Statistics Canada's Price Model: A Detailed Description of the Structure and Simulation Capacities*, Input-Output Division, Statistics Canada, August 1988.

(11)
Durand, R., and Markle, T., *Structural Change in the Canadian Economy: The Supply Side in Constant Prices*, Input-Output Division, Statistics Canada, October 1988.

(12)
Durand, R., and Markle, T., *A Diversity Analysis of Structural Change Based on the Canadian Input-Output Tables*, Input-Output Division, Statistics Canada, January 1989.

(13)
Durand, R., and Diaz, A., *Input-Output Modelling of Commodity Indirect Taxes for Macroeconomic Analysis*, Input-Output Division, Statistics Canada, January 1989.

(14)
Murty, P.S.K., Généreux, P.A., Leblanc, D., and Greenberg, M., *Provincial Sales Tax Commodity Allocation Project, 1984 Sources and Methods*, Input-Output Division, Statistics Canada, January 1989.
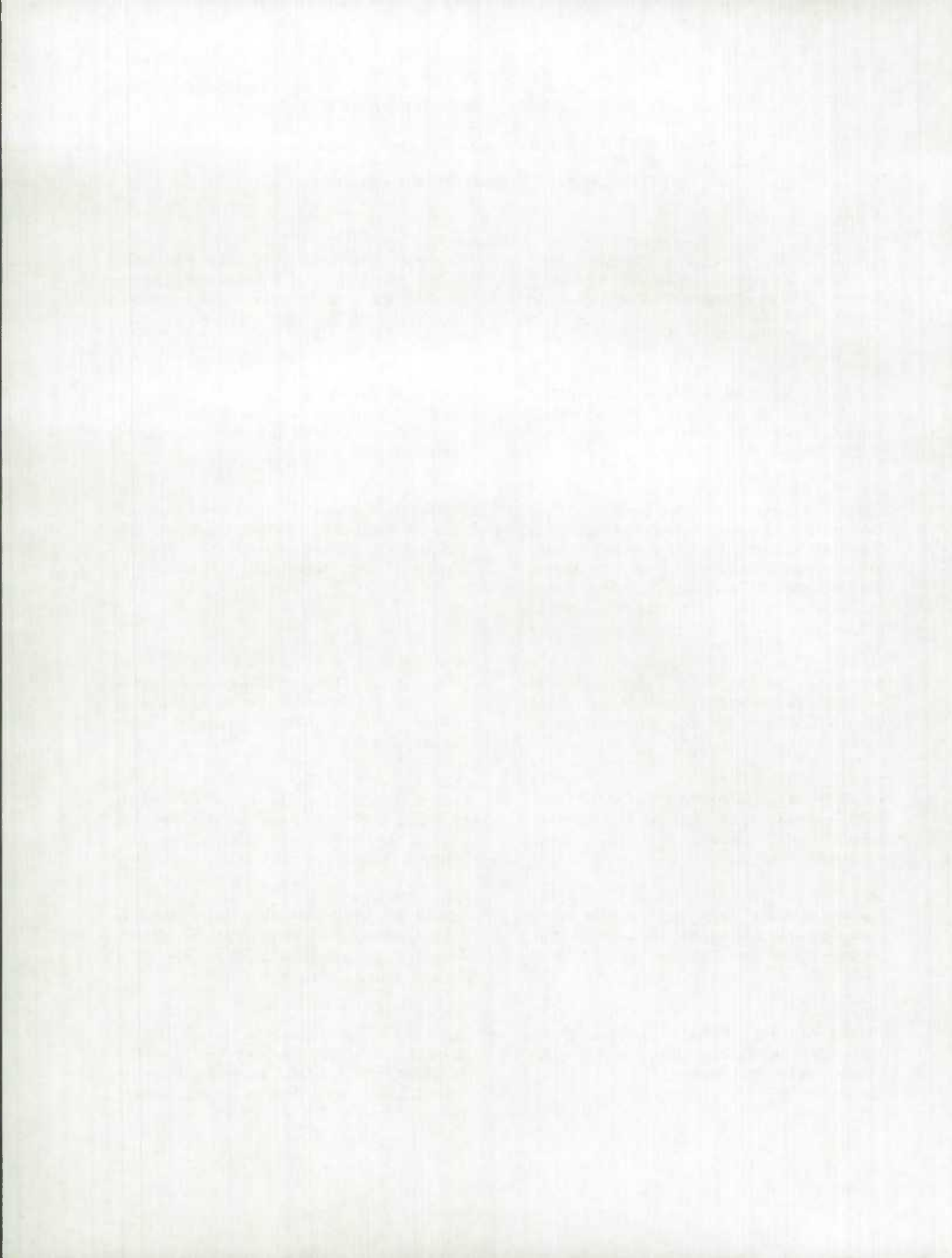
(15)
Durand, R., *The Balancing Process of the Regional Input-Output Tables*, Input-Output Division, Statistics Canada, February 1989.

(16)
Siddiqi, Y., Murty, P.S.K., and Diena, J., *Highlights of the Provincial Sales Tax Commodity Allocation Project, 1984*, Input-Output Division, Statistics Canada, January 1989. Reprinted from Canadian Economic Observer, May 1989.

(17)
Durand, R., *Aggregation Formulas for Multifactor Productivity*, Input-Output Division, Statistics Canada, June 1989.

(18-E)
Mercier, P., Durand, R., and Diaz, A., *Specification of parameters for the National Input-Output Model*, Input-Output Division, Statistics Canada, December 1991.

(18-F)
Mercier, P., Durand, R., et Diaz, A., *Spécification des paramètres du modèle d'entrées-sorties national*, Division des entrées-sorties, Statistique Canada, décembre 1991.

(19-E)
Siddiqi, Y., and Murty, P.S.K., *Commodity Indirect Taxes in the Canadian Input-Output Accounts, 1984*, Input-Output Division, Statistics Canada, July 6, 1989.

(19-F)
Siddiqi, Y., and Murty, P.S.K., *Impôts indirects sur les biens et services dans les comptes d'entrées-sorties du Canada, 1984*, Division des entrées-sorties, Statistique Canada, 6 juillet 1983.

(20)
Siddiqi, Y., and Murty, P.S.K., *Progress Report # 5: On the Temporal Variability of the Aggregate Input Structure*, Input-Output Division, Statistics Canada, September 1989.

(21)
Siddiqi, Y., and Murty, P.S.K., *Highlights of Commodity Taxes for 1984*, Input-Output Division, Statistics Canada, Canadian Economic Observer, September 1989.

(22)
Siddiqi, Y., and Murty, P.S.K., *Commodity Indirect Taxes - An Inventory before the GST*, Input-Output Division, Statistics Canada, Canadian Economic Observer, October 1989.

(23)
Murty, P.S.K., and Siddiqi, Y., *Government Expenditures on Goods and Services and Transfer Payments in Canada, 1961-1985*, Input-Output Division, Statistics Canada, December 1989.

(24)
Murty, P.S.K., and Siddiqi, Y., *Government Expenditures on Goods and Services anf Transfer Payments in Canada 1961-1985*, Input-Output Division, Statistics Canada, Reprint from Canadian Economic Observer, May 1990.

(25)
Siddiqi, Y., and Murty, P.S.K., *Commodity Indirect Taxes in the Canadian Input-Output Accounts, 1984-1986*, Input-Output Division, Statistics Canada, February 1990.

(26)
Durand, R., *Growth Accounting and the Quality Adjustment of the Capital Stock*, Input-Output Division, Statistics Canada, February 1990.

(27)
Durand, R., and Salem, M., *On a Dynamic Productivity Index Number Formula*, Input-Output Division, Statistics Canada, revised version February 1990.

(28)
Diaz, A., *The 1989 increase in Labour Compensation per Person: Was it caused by wage demands?*, Input-Output Division, Statistics Canada, June 1990.

(29)
Murty, P.S.K., *Federal Goods and Services Tax and the Canadian System of National Accounts*, Input-Output Division, Statistics Canada, October 1990.

(30)
Effective tax rates and net price indexes/Les taux de taxe actuels et les indices de prix net, Feature Article/Etude spéciale, Canadian Economic Observer/L'observateur économique canadien, November 1990/novembre 1990.

(31)
Salem, M., *Documentation of Capital Input and Capital Cost time series for Multifactor Productivity Measures*, Input-Output Division, Statistics Canada, reviewed and updated by R. Fortin and Y. Sabourin, December 1990.

(32)
Siddiqi, Y., and Murty, P.S.K., *Federal Sales Tax in the Canadian Input-Output Accounts*, Input-Output Division, Statistics Canada, July 1989. Draft, (Out of Print).

(33)
Murty, P.S.K., *New Paradigm to Analyze Government Transfer Payments with special reference to Canada*, Input-Output Division, Statistics Canada, Draft, January 3, 1991.

(34)
Durand, R., *Productivity Analysis and the Measurement of Gross Output Net of Intra-Industry Sales*, Input-Output Division, Statistics Canada, January 1991.

(35)
Murty, P.S.K., and Siddiqi, Y., *A New Paradigm to Analyze Commodity Indirect Taxes and Subsidies, 1986-1989*, Input-Output Division, Statistics Canada, April 5, 1991.

(36)
Généreux, P., *The Input-Output Structure of the Economies of the Yukon and Northwest Territories, 1984*, Input-Output Division, Statistics Canada, May 1991.

(37)
Généreux, P., *La structure par entrées-sorties des économies du Yukon et des territoires du Nord-Ouest, 1984*, Division des entrées-sorties, Statistique Canada, mai 1991.

(38)
Durand, R., *An Alternative to Double Deflation for Measuring Real Industry Value-Added*, Input-Output Division, Statistics Canada, June 1991.

(39)
Généreux, P., *I/O Tables in constant prices: Revised deflation process and analysis of the machinery and equipment sector*, Input-Output Division, Statistics Canada, September 1984. Reprint July, 1991.

(40)
Murty, P.S.K., and Siddiqi, Y., *Government subsidies to industries/Les subventions gouvernementales accordées aux industries*, Input-Output Division/Division des entrées-sorties, Statistics Canada/Statistique Canada, Reprint from Canadian Economic Observer/Réimprimé de l'observateur économique canadien, May 1991/mai 1991.

(41)
Diaz, A., *Alternative Concepts of Output and Productivity*, Input-Output Division, Statistics Canada, Catalogue 15-204, 1989 issue; July 1991.

(42)
Durand, R., *Aggregation, Integration and Productivity Analysis: An Overall Framework*, Input-Output Division, Statistics Canada, Catalogue 15-204, 1989 issue; July 1991.

(43)
Diaz, A., *The Statistics Canada Concepts and Measures of Productivity*, Input-Output Division, Statistics Canada, December 6, 1990. (Reprinted October 1991).

(44-E)
Dionne, M., *Measuring Capital Depreciation*, Input-Output Division, Statistics Canada, July 1991.

(44-F)
Dionne, M., *Mesure de la dépréciation du capital*, Division des entrées-sorties, Statistique Canada, novembre 1991.

(45)
Murty, P.S.K., and Siddiqi, Y., *Scope of Public Grants Economy in Canada*, Input-Output Division, Statistics Canada, December 6, 1991. (Draft).

(46)
Murty, P.S.K., et Siddiqi, Y., *Portée de l'économie des subventions publiques au Canada*, Division des entrées-sorties, Statistique Canada, le 6 décembre 1991. (Projet).

(47-E)
Gill, K., and Larose, M., *Sources and Methods of Estimating Employment by Input-Output Industries for the years 1961 to 1989*, Input-Output Division, Statistics Canada, November 1991, revised February 1993.

(47-F)
Gill, K., et Larose, M., *Sources et Méthodes d'estimation de l'emploi par industries entrées-sorties de 1961 à 1989*, Division des entrées-sorties, Statistique Canada, novembre 1991, révisé février 1993.

(48)
Murty,P.S.K., and Siddiqi, Y., *Transfer Payments in National Accounts and Grants Economics*, Input-Output Division, Statistics Canada, May 25, 1992.

(49)
Interprovincial and International Trade Flows of Goods 1984-1988/Flux du commerce international et interprovincial des biens 1984-1988, Input-Output Division/Division des entrées-sorties, Statistics Canada/Statistique Canada, June 1992/juin 1992. Cost/Coût=$500.00

(50)
Messinger, H., *Canada's Interprovincial Trade Flows of Goods, 1984-88/Flux du commerce interprovincial des biens au Canada 1984-1988*, Input-Output Division/Division des entrées-sorties, Statistics Canada/Statistique Canada, January 1993/janvier 1993. Forthcoming/A venir.

(51)
Webber, M., *Estimating Total Annual Hours Worked from the Canadian Labour Force Survey*, Labour and Household Surveys Analysis Division and Input-Output Division, Statistics Canada, April 1983.

(52-E)
Statistics Canada's input-Output Model: General description, Critical Analysis of Partially Closed Version and Alternative Solutions, Input-Output Division, Statistics Canada, June 1991.

(52-F)
Le modèle d'entrées-sorties de Statistique Canada: présentation générale, analyse critique de la version avec fermeture partielle et solutions de rechange, Division des entrées-sorties, Statistique Canada, juin 1991.

(53)
Murty, P.S.K., *A New Approach to Analyze Public Sector Grants: A Case Study of Canada*, Input-Output Division, Statistics Canada, January 1993.

(54)
Murty, P.S.K., *Scope of the Public Sector Grants in the Canadian Economy Revisited*, Input-Output Division, Statistics Canada, January 1993.

(55)
Murty, P.S.K., *A Blueprint for the System of Grant Accounts*, Input-Output Division, Statistics Canada, February 1993.

(56)
Murty, P.S.K., *The Need for a System of Grant Accounts*, Input-Output Division, Statistics Canada, March 1993.

(57-E)
Siddiqi, Y., and Salem, M., *Estimating More Timely Input-Output Accounts: A Synthetic Approach*, Input-Output Division, Statistics Canada, March 1993.

(57-F)
Siddiqi, Y., et Salem, M., *Estimaton des comptes d'entrées-sorties dans des délais raisonnables : une méthode synthétique*, Division des entrées-sorties, Statistique Canada, mars 1993

(58-E)
Poole, E., *A Guide to using the Input-Output Model of Statistics Canada*, Input-Output Division, Statistics Canada, June 1993.

(59)
Murty, P.S.K., *A System of Grant Accounts*, Input-Output Division, Statisics Canada, September 1993.
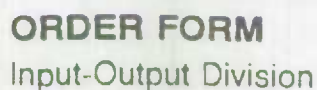
ORDER FORM
Input-Output Division

(Please print)

Company _____

Department _____

Attention _____

Address _____

City _____ Province _____

Postal Code _____ Tel. _____

METHOD OF PAYMENT

☐ Purchase Order Number *(please enclose)* _____

☐ Payment enclosed $ _____

☐ Bill me later (max. $500)

Charge to my: ☐ MasterCard ☐ VISA

Account Number [| | | | | | | | | | | | | | | |]

Expiry Date [| | | | |]

Signature _____

Client Reference Number _____

Catalogue Number	Title	Frequency/ Release Date	Annual Subscription or Book Price			Qty	Total $
			Canada $	United States US$	Other Countries US$		
15-201	System of National Accounts: The Input-Output Structure of the Canadian Economy, 1987	Annual 02/91	60.00	72.00	84.00		
15-204E	System of National Accounts: Aggregate Productivity Measures, 1989	Annual 07/91	40.00	48.00	56.00		
15-510	System of National Accounts: The Input-Output Structure of the Canadian Economy, 1961-1981	Occasional 01/88	66.00	79.00	79.00		
15-511	System of National Accounts: The Input-Output Structure of the Canadian Economy in Constant Dollars, 1961-1981	Occasional 01/88	66.00	79.00	79.00		

Version française de ce bon de commande disponible sur demande

Catalogue Number	Title	Frequency/ Release Date	Annual Subscription or Book Price			Qty	Total $
			Canada $	United States US$	Other Countries US$		
	CORPORATE PUBLICATIONS						
11-001E	The Daily	Daily	120.00	144.00	168.00		
11-002E	Infomat	Weekly	125.00	150.00	175.00		
11-008E	Canadian Social Trends	Quarterly	34.00	40.00	48.00		
11-010	Canadian Economic Observer	Monthly	220.00	260.00	310.00		
11-204E	Statistics Canada Catalogue 1990	Annual	13.95	16.70	19.50		

	SUBTOTAL
Canadian customers add 7% Goods and Services Tax.	GST (7%)
Please note that discounts are applied to the price of the publication and not to the total amount which might include special shipping and handling charges and the GST.	GRAND TOTAL

Cheque or money order should be made payable to the Receiver General for Canada/Publications. Canadian clients pay in Canadian funds. Clients from the United States and other countries pay total amount in US funds drawn on a US bank.

Order completed by: Date:

Subscriptions will begin with the next issue.

For faster service ☎ 1-800-267-6677 ☎

VISA and MasterCard Accounts

PF 0347 05/90