REGIONAL ECONOMIC ACCOUNTS IN ONTARIO

THE DESIGN AND ESTIMATION OF REGIONAL ECONOMIC ACCOUNTS IN ONTARIO

By

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ABSTRACT

Regional economics addresses a number of major tasks related to regional and local area development issues such as the planning of investment (private and public), the provision of public goods, urban redevelopment schemes, fiscal and financial relations among various levels of government and subsidy and area development programs. These issues are often surrounded by a sense of urgency stemming in part from the strong spirit of development in many communities and the rising awareness of regional disparity. Yet, the lack of adequate information on subnational economies has traditionally hampered efforts at analyzing many of these issues and at providing adequate choices for decision making.

The inadequacy of statistical data at the regional level seldom means, however, a complete lack of information. The available statistical and administrative data are usually prepared by a variety of government agencies and sources for different purposes and, consequently, lack a coherent or systematic framework which relates them meaningfully to each other and to data on the total economy. There is, thus, an obvious need to integrate these data sets with each other and with information on the economy as a whole in order to enhance their usefulness for analysis and decision making at the regional level.

It is maintained in this dissertation that a system of economic accounts provides a suitable framework for the integration and systematic treatment of available regional microdata. The application of economic accounting to various types of

regional information can give rise to a complete set of regional economic accounts useful for economic analysis at the regional level. This has been demonstrated by designing a system of regional accounts - based on national (provincial) accounting concepts - to Ontario and by estimating the accounting entries for each of its 10 economic regions. The estimation of regional entries is accomplished by a disaggregation or apportionment of the Ontario Accounts totals in the year of estimate (1971) on the basis of various allocation techniques and by using the microdata sets available at the industry and regional levels as allocators.

The systematic integration of fragmented regional data by means of an economic accounting framework produces consistency, comprehensiveness and comparability of economic data among the regions and between them and the total economy. It is hoped that economic accounting in Ontario at the regional level will increasingly become recognized as a flexible tool of analysis which can generate a useful interaction between data and method thereby improving both theory and empirical results. The principal achievement has been to highlight areas of weakness in constructing regional economic accounts. It is also hoped that it can serve as a benchmark in future research efforts.

The set of regional accounts for Ontario derived in this study was utilized in the context of a regional macro model (based on aggregate demand and supply) for the purpose of calculating a set of regional income multipliers. The multipliers based on

regional accounting data are a precise and powerful tool of analysis - especially in determining the multiplier effects of exogenous expenditure in each region - which enriches our knowledge of regional economies and appreciation of the effect of regional policies.

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Bahjat M. Hafez

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CHAPTER I

INTRODUCTION

1. Statement of the Problem

Private and public decisions that affect regional economies and their growth are continuously being taken. These decisions are often surrounded by a sense of urgency stemming in part from the strong spirit of development in many communities and the rising awareness of regional disparity. Among the issues involved are the planning of investment (private and public), the provision of public goods, urban redevelopment schemes, fiscal and financial relations among various levels of government and subsidy and area-development programs. In many decisions related to government expenditure, including those that do not appear to have a direct regional implication, the real issue to be resolved is not what to do but where to do it and how to rationalize or justify the choice of location.

The analysis of such problems and their resolution are clearly among the major tasks of regional economics. Yet, the lack of adequate information on subnational economies has traditionally hampered efforts at analyzing many of these pressing issues and at providing adequate choices for decision-making. The absence of adequate information to aid analysis and decision-making in this area, has been recognized some

two decades ago, as the following quotation from the Chairman of a U.S. Senate Committee on Economic Development suggests (Babb, 1958, 9):

> We do not know very much about the economics of our little economies. Facts are inadequate, statistics obscure, the framework fuzzy. Knowledge concerning what goes on in our local economies, be they communities or states or regions is in a relatively primitive state. The situation is comparable to our lack of knowledge about the national economy prior to about thirty years ago when we began to develop our first system of national accounts.

Because regional economic analysis is to a large extent policy oriented, the inadequacy of regional information has reflected itself in some confusion of thought over the objectives of regional policy. Further, the economic implications of many private and public decisions affecting the growth of regions have often been hard to determine. As a result, there has been a tendency to bypass the economic considerations inherent in many of these decisions. This in turn led to a feeling of uneasiness concerning the rigour of economic analysis at the regional level and the efficacy of regional policy. As McGrone (1967, 44) described it:

> It is thus clear that from many points of view the development of regional policy is hampered by inadequate regional statistics. Those who concern themselves with the regional question are sometimes accused of lack of rigour both in their application of the objectives and in their advocation of policy measures. But if regional economic policy is still insufficiently scientific this is in large measure because it is supported by inadequate statistical data.

However, the inadequacy of statistical data at the

regional level seldom means a complete lack of information. Thus, for example, the Census records (in Canada and Ontario) contain useful information on households and population at the regional level including data on labour force, employment, income and other socio-economic characteristics. Other types of Census records provide data on production, value added and wages and salaries in certain activities at the regional level. Employment and labour force surveys carried out regularly by Statistics Canada also supply useful information on employment and average earnings by industry at subnational and even sub-provincial levels of aggregation. Finally, a variety of administrative data collected by federal, provincial and local agencies on taxes, social security, revenues and financial statements of various government bodies can be, and often are, made available at the regional and local levels.

A main feature of these sub-national and sub-provincial (micro)[1] data sets is that they are produced by a variety of agencies and sources and for different purposes. Accordingly, they lack a coherent or a systematic framework which relates them meaningfully to each other and to data on the total economy. For this reason they are often bypassed by researchers and potential users of economic data at the regional level. Hence, there is an obvious need to integrate these

[1]The term 'micro' data is used in this context to denote data at a small geographic level of aggregation, e.g., regions, as compared to the 'macro' data at the national or provincial level.

data sets with each other and with information on the total economy in order to enhance their usefulness for analysis and decision making at the regional level (Ruggles and Ruggles, 1975, 205). It is recognised that this sort of integration will not result in regional data which correspond fully in scope and quality to the data available at the economy-wide level. It is nevertheless clear that the systematic treatment of existing but fragmented and incoherent information at the regional level will enhance the understanding of regional economic problems and improve the quality of government and business decisions related to regional problems (Solomon and Bilbija, 1959, 4).

2. Purpose of the Research

A system of economic accounts provides a suitable framework for the integration and systematic treatment of the regional microdata described above. The application of economic accounting to various types of regional information may give rise to a complete set of regional economic accounts useful for economic analysis at the regional level (Stone, 1961, 266, Ruggles and Ruggles, 1961, 123-124 and Hochwald, 1961, xix-xx). A number of empirical attempts have been undertaken in the literature to illustrate the value of constructing a system of regional economic accounts. One of the earliest was the pioneering work of Stone and Deane (Stone, 1961) which led to the development and estimation of a complete set of

income and expenditure accounts for the British regions in 1948. More recent work on the estimation of regional accounts in Britain was carried out at the Department of Applied Economics, Cambridge, and at the National Institute of Economic and Social Research (Woodward, 1970 and Brown, 1972).

The office of Business Economics in the United States Department of Commerce has been actively engaged in implementing a system of state and regional economic accounts for the U.S. (Graham and Romans, 1971). In addition, several researchers were busy preparing estimates of income and expenditure accounts for different U.S. metropolitan areas (Solomon and Bilbija, 1959), states (Moodie, 1964), and regions (Leven, 1961). In the meantime, a number of attempts to estimate regional economic accounts for India were underway (Tiwari, 1971, 103-117). Here in Canada, the efforts of certain provinces (including Ontario) to produce their own sets of regional accounts were traditionally encouraged by Statistics Canada. More recently, this agency has become involved in a deliberate and formal way with all the provinces in order to complement this effort (Provincial Economic Accounts 1961-1974, 1976, vi).

The present dissertation is an attempt to assess the feasibility of constructing regional accounts for Ontario and, therefore constitutes an extensive review of data sources which, under various assumptions, can be used for this purpose. From

this exercise we hope to identify the areas where data series are most likely to improve our factual knowledge about Ontario's regions.[2] The system of economic accounting as applied at the national (provincial) level[3] will provide the conceptual basis for this attempt. The resulting regional framework permits a systematic treatment of the regional microdata sets described above and culminates in a set of income and expenditure accounts for each of the 10 economic regions of Ontario in 1971.

Among the advantages in seeking to provide information in an accounting framework are comprehensiveness, double-entry consistency, and comparative economic analysis of each region in relation to other regions and in relation to the total economy. An accounting framework is also a flexible tool that permits interaction between method and data and benefits both theoretical analysis and empirical investigation (Ruggles and Ruggles, 1975, 214-215). Furthermore, economic accounts extended to the regional level may help in identifying deficiencies in existing data and in charting the course of future research (Hochwald, 1961, xix):

> Regardless of data limitations, regional accounts offer a flexible framework for economic analysis, a

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[2]The need for such data is apparent from this Province's recent emphasis on analyzing and solving some of its regional economic problems, (See Design for Development, 1966), and the author's experience with some of its efforts in this direction.

[3]The terms 'national' and 'provincial' accounts may be used synonymously in this context, since Ontario as a province of Canada, provides its own set of provincial accounts which can be used as a basis for regional estimates.

> framework which permits piecemeal implementation as the research resources at hand permit and the policy issues justify. Regional accounts are therefore also most helpful to indicate priorities for further research efforts. Even where the accounting model remains non-operational because of persistent data gaps, regional accounts encourage and facilitate a more explicit and precise statement of the multitudinous assumptions which inevitably underlie any regional projection.

In spite of its advantages and flexibility, a national (provincial) accounting scheme is not entirely suitable for the analysis of regional economic activity (Ruggles and Ruggles, 1961, 132 and 140-141, Leven, 1961, 152-157, and Graham and Romans, 1971, 3). The reason is that some economic accounting constructs which are important at the national level, such as saving for example (by persons and business), are less crucial at the regional level because of the openness of regional economies and the more or less perfect nature of capital markets in most advanced economies. Further, returns to capital (e.g., corporate profits) were found to be particularly irksome to allocate regionally. Other problems relate to the definition of the regions, their size and to the difficulties in measuring trade flows among them. It is generally concluded, however, that these limitations should not necessarily preclude the application of the well-established framework of economic accounting to prepare regional accounting estimates (Ruggles and Ruggles, 1961, 141-142).

The regional accounting scheme adopted in this study is based on the conceptual framework presented by Stone

(1961, 263-293). It illustrates in familiar matrix form a set of accounts for each of the 10 economic regions of Ontario coupled with accounts for the central government and for the rest of the world. The entries of the accounting matrix are filled essentially by a systematic and detailed disaggregation or apportionment of the Ontario Economic Accounts totals in the year of estimate 1971. The estimation of regional entries is accomplished on the basis of various allocation techniques and by using the micro-data sets available at the industry and regional levels as allocators. Finally, the empirical usefulness of the resulting estimates of regional accounts is illustrated by the construction of a regional macro model capable of calculating regional income multipliers that can be used in evaluating the regional impact of expenditure and investment programs.

The quality of the allocators used (as reflected in their relation or relevance to the Accounts totals being allocated) varies substantially depending on data availability at the regional and/or industry levels. Hence, the reliability or adequacy of the regional estimates produced also varies accordingly. In cases where the relation or relevance between the Accounts total and the allocator used (i.e., the variable selected for allocation purposes) is particularly weak, attention is drawn to the provisional or preliminary nature of the resulting regional estimates. In this way it is possible to narrow down on a few areas where future research efforts

could most profitably be directed in order to improve the construction of regional economic accounts in Ontario.

It has been intended from the beginning that the effort in this dissertation is to be made operational. This was in line with the real objective of the research which is to demonstrate first how an aggregate system of provincial economic accounts can be adapted to suit regional accounting needs and, second, how a systematic treatment or integration of various regional data can actually produce estimates for the evolving regional accounting structure. Hence, exercising judgement and making assumptions when it is necessary to get past data and methodological roadblocks are to be expected in this type of research. These assumptions may sometimes limit the adequacy or usefulness of the regional estimates. However, in view of the fact that this is the first attempt at constructing regional economic accounts in Ontario, the results are actually intended to be no more than a benchmark for future research. The estimates of regional accounts for the 10 economic regions contained in this study should be viewed with these limitations in mind.

3. Plan of Study

The remainder of the dissertation is contained in seven Chapters and two Appendices. In the next Chapter (Chapter II), a conceptual framework for the design of regional accounts from the existing system of provincial accounts in

Ontario is described. This Chapter also examines the feasibility of disaggregating the various components of the provincial accounts to produce regional estimates in the light of the conceptual and empirical interaction of the accounting structures at the provincial and regional levels. Chapter III discusses the pros and cons of using the allocation technique as the main tool of producing regional accounting estimates. The experience of various countries in the field of estimating regional economic accounts is also reviewed.

In Chapter IV, the regional allocation of the Ontario Accounts totals in the personal and government sectors among the 10 economic regions is discussed. Chapter V gives the details and the results of allocating the Accounts totals of the business sector between the regions. In both chapters, the data sources used are carefully assessed in terms of their relevance to the Accounts totals being allocated. A special effort is made at presenting and documenting all the information used including data obtained in special tabulations for purposes of this study.

In Chapter VI, all the results of the allocation exercise of the previous two chapters are integrated in a matrix showing all the regional accounting estimates for the 10 economic regions of Ontario in 1971. Finally, a regional macromodel is constructed in Chapter VII which incorporates estimates of aggregate supply and accounts for the feedback effects that characterize open regional economies. The regional

accounting estimates of Chapter VI on net regional trade, consumption, and taxes are subsequently used as parameters in this model for calculating a set of regional income multipliers useful for regional analysis.

Appendix A contains a description of the data sources and method used in generating estimates of wage and salary income by major industry in each region. Such estimates comprised part of the regional data utilized as allocators in Chapter V. Finally, Appendix B consists of a set of tables obtained from the Provincial Accounts Section of the Ontario Ministry of Treasury, showing the details of the income and expenditure accounts of the province by sector in 1970-1974. This information has been used for preparing the regional account estimates in this dissertation.

CHAPTER II

A FRAMEWORK FOR REGIONAL ECONOMIC ACCOUNTS

This chapter deals with the design and estimation of a system of regional accounts for Ontario. Such estimates are to be obtained by disaggregating the available income and expenditure accounts at the national or provincial level. The terms national and provincial are used synonymously in this context, since Ontario, as a province of Canada, provides its own set of provincial accounts which can be used as a basis for regional estimates. The principal objective of this chapter is the provision of a suitable framework for the construction of regional accounts from provincial income and expenditure flows. Various approaches to the measurement of final product at the regional level, and the conceptual difficulties involved, are examined. A simple accounting model is used to illustrate the basic approach to the estimation of regional accounts. Finally a general description of the method of estimation is given.

1. Feasibility of Disaggregation

Economic accounting is "an orderly presentation of what is taking place in an economic system, expressed in terms of transactions between its various parts" (Stone and Croft-Murray, 1959, 9). The accounting structure or framework

itself as a useful tool in theoretical analysis has long engaged the attention of economists. On this, Powelson wrote (1960, 1):

> The accounting structure is more than a set of rules and definitions; it is a frame of reference. It enables the economist to sort out basic concepts, to visualize economic events in orderly sequence, and to keep in mind essential relationships so that none is forgotten. It provides no automatic solution to economic problems but helps chart the method of attack. In short, the accounting structure would be useful to economic analysis even if no data were available for the variables of which it is composed.

With the rising interest in regional economic problems, attention was focussed on the feasibility of extending the national economic accounting structure or framework, deemed useful to economic analysis, to the regional level. The result has been a considerable discussion in the literature on the possibility of applying national (provincial) accounting constructs, particularly those related to product and expenditure flows, to the regions. Thus, for example, Richard and Nancy D. Ruggles wrote a special paper on this question which would "...focus on whether regional breakdowns of the national economic accounts are desirable and, if desirable, whether they are feasible either independently or as a derivative in the process of obtaining national estimates" (Ruggles and Ruggles, 1961, 121). The same question was also discussed by Stone (1961), Hochwald (1957), Leven (1961), and Graham and Romans (1971) among others.

Two main findings emerged from this careful scrutiny

of the conceptual applicability of economic accounting to subnational units. First, it has been argued, convincingly, that a national (provincial) accounting framework is not entirely suitable for the analysis of differences in regional economic activity. (See, for example, Ruggles and Ruggles, 1961, 132 and 140-141; Leven, 1961, 152-157; and Graham and Romans, 1971, 3). The reason is that some economic accounting constructs which are important at the national level, such as savings for example (by individuals and business), are less crucial at the regional level because of the 'openness' of regional economies and the more or less perfect nature of the geographic capital market in most advanced economies. Further, returns to capital (e.g., corporate profits) were found to be particularly irksome to allocate regionally. Other problems relate to the definition and size of regions and to the difficulties in measuring trade flows among them.

The second major finding was that, despite these problems, the attempt to disaggregate the major components of national income and product accounts to generate estimates of regional accounts is nevertheless useful and certainly a step in the right direction. It is perhaps appropriate to quote Ruggles and Ruggles (1961, 141-142) again on this point:[1]

> From a computational point of view, it is important that the data in the national economic accounts be

[1] See also (Stone, 1961, 266) for similar observations.

> disaggregated on a regional basis wherever this is feasible in terms of the basic statistics involved. It is recognized that the regional figures may not possess the same degree of reliability as the national figures; nevertheless, the experience with the personal income data by region has indicated the value of such efforts...Another reason why national accounts need to be disaggregated, at least in part, to the regional level is to ensure comparability between the different regions being analyzed. This is especially important since...one of the major tools of regional economic analysis is the comparative study of the levels at which different regions are operating and the behaviour of the regions over time. The advantage of a disaggregation of national totals is that it ensures that the same types of statistical sources and the same methodological approach are used in developing the estimates so that differences in data from region to region arising from these elements can be minimized.

Having examined the needs for regional accounts (Chapter I) and the feasibility of disaggregating, where possible, the basic economic accounting constructs, we present in the next section a conceptual framework for the design and estimation of a regional accounting system for Ontario based on the provincial economic accounts for the year 1971.

2. Conceptual Design

As stated above, economic accounts are essentially a systematic record of transactions taking place in an economy over a specific period of time between various transactors. Transactions may be classified into major activities represented by a number of related accounts such as: (1) production and cost; (2) appropriation, or income and outlay; (3) accumulation, or savings and investment; (4) financing (flow of funds); and (5) balance sheets and wealth statements

(Kendrick, 1971, 4). In their most familiar form, income and expenditure accounts, to which the present framework is confined, encompass the first three major activities. Classification by type of transactor is usually attempted on the basis of behavioural similarities of the major institutional entities such as households, business enterprises, and governments with respect to their activity in relation to the acquisition and disposition of income.

A system of regional accounts provides basic information on transactions within and between regions. As such, it can be based on two building blocks; one related to intra-regional and the other to inter-regional transactions. To illustrate this approach to regional accounting (due to Stone, 1961), consider n regions which share a common currency. Assume that a set of accounts similar to national (provincial) accounts is established for each region such that the three basic forms of economic activity production P, appropriation A, and capital accumulation K are distinguished. If the n regions were assumed to form an open economic system, it would be necessary to provide each region with an external account depicting its relationships with areas outside the regions. To simplify the presentation, we assume first that we have a closed economy that is, that all areas are part of the regional system and therefore no external account is necessary.

If the accounts are arranged in a matrix form with rows showing the incomings (credits) and columns showing the

outgoings (debits), then a typical intra-regional building block for, say region j, would appear as follows:

Table 2.1

The Intra-regional Building Block

		Outgoings		
		P	A	K
Incomings	P	0	C_{jj}	V_{jj}
	A	Y_{jj}	0	0
	K	D_{jj}	S_{jj}	0

In this table the incomings into the production account (the first row) arise from consumption C_{jj} and investment V_{jj} in region j. These are matched by the outgoings of the same account shown in the first column namely, income payments to domestic factors of production Y_{jj} and depreciation D_{jj} in region j. In the appropriation account the incomings (second row) are factor income Y_{jj} and the outgoings (second column) consist of expenditure on consumption C_{jj} and regional saving S_{jj}.

Finally the third row shows the incomings into the capital accumulation account, namely, depreciation allowance D_{jj} and saving S_{jj}, whereas the third column gives the outgoing entry V_{jj} or expenditure on investment in region j.

A complementary accounting system is needed to summarize transactions between the region and its external agents, i.e., other regions within the system. This block is

illustrated in the following table:

Table 2.2

The Inter-regional Building Block

		Region k		
		P	A	K
Region j	P	X_{jk}	0	0
	A	Y_{jk}	G_{jk}	0
	K	0	0	B_{jk}

The rows here define the three accounts in region j and the columns relate these to the same accounts for region k. Thus, X_{jk} denotes the exports of region j to region k, Y_{jk} shows factor income received by region j from region k, G_{jk} denotes the gifts and grants (i.e., transfers on current account) received by j from k and B_{jk} is the amount which j borrows from k.

These two types of building blocks are conceptually all that is necessary for a complete system of regional accounts. In a closed economy consisting of n regions, n intra-regional blocks and n(n-1) inter-regional blocks will be required. Thus, if n = 3, we would have three intra-regional blocks on the diagonal (as illustrated in Table 2.3 on page 19) to record transactions in each region and six inter-regional blocks showing transactions among the regions.

To estimate the cells of this accounting framework

Table 2.3

Accounts for Three Regions Ordered
by Region and Type of Account

		Region 1			Region 2			Region 3		
		P	A	K	P	A	K	P	A	K
Region 1	P	0	C_{11}	V_{11}	X_{12}	0	0	X_{13}	0	$\overline{0}$
	A	Y_{11}	0	0	Y_{12}	G_{12}	0	Y_{13}	G_{13}	0
	K	D_{11}	S_{11}	0	0	0	B_{12}	0	0	B_{13}
Region 2	P	X_{21}	0	0	0	C_{22}	V_{22}	X_{23}	0	0
	A	Y_{21}	G_{21}	0	Y_{22}	0	0	Y_{23}	G_{23}	0
	K	0	0	B_{21}	D_{22}	S_{22}	0	0	0	B_{23}
Region 3	P	X_{31}	0	0	X_{32}	0	0	0	C_{33}	V_{33}
	A	Y_{31}	G_{31}	0	Y_{32}	G_{32}	0	Y_{33}	0	0
	K	0	0	B_{31}	0	0	B_{32}	D_{33}	S_{33}	0

would require the existence of information on flows from each region to every other. For each region j, it is necessary to know its transactions with region k (such as exports X_{jk}, factor income Y_{jk}, current transfers G_{jk}, and borrowing B_{jk}) which in general, are not available. Certain simplifying procedures that are less demanding of regional data may be adopted, however, to allow the construction of useful regional accounts. Thus, the exports of region j, for example, to all other regions could be added up and shown as one entry $\Sigma_k X_{jk}$, and its imports from all other regions as another single entry $\Sigma_k X_{kj}$. The same procedure might be applied to its other inter-regional flows, i.e., factor income Y_{jk}, borrowing B_{jk}, and current transfers G_{jk}. An additional simplification can be obtained by dealing only with net flows on inter-regional transactions. Netting means here the elimination of identical but opposite flows between pairs of transactors so that only the balances are shown. Thus, the net exports of region j for example would be $X_j = \Sigma_k X_{jk} - \Sigma_k X_{kj}$, and similarly Y_j, G_j and B_j would represent net factor income, net gifts and net borrowing, respectively, in region j. One obvious advantage of this netting procedure is that it consolidates the inter-regional transactions of a given region with all other regions into one account.

As a result of these simplifying procedures and assumptions, the set of accounts presented in Table 2.3 can be transformed into a more convenient system of regional

accounts, which requires much less data, as presented in Table 2.4. In this Table, the intra-regional building blocks shown on the diagonal matrices remain unchanged. However, all pairwise flows are eliminated and an account borders the table on the right-hand side showing for each region the sum of its net transactions with all other regions (i.e., X_j, Y_j, G_j and B_j). The netting procedure shown in Table 2.4 leads to the following modification in the interpretation of the basic accounting relationships in the system. In the production account, gross income produced in region j, $Y_{jj} + D_{jj}$ is matched by consumption, gross investment and net exports in the region $C_{jj} + V_{jj} + X_j$. In the appropriation account, regional income plus net receipts of factor income and current transfers $Y_{jj} + Y_j + G_j$ are matched by consumption and savings in the region, $C_{jj} + S_{jj}$. The incomings into the capital accumulation account, namely, depreciation, savings, and net borrowing in the region j, $D_{jj} + S_{jj} + B_j$, are matched by the outgoing entry V_{jj}, or regional investment. In addition, it is known that $\sum_j X_j$, $\sum_j Y_j$, $\sum_j G_j$ and $\sum_j B_j$ in a closed system are all equal to zero because total net exports and net factor income must add to zero, the value of gifts received must equal the value given and total lending must equal total borrowing.

The information on intra and inter-regional transactions contained in Table 2.4 can be ordered differently by type of account first and then by region. This altered

Table 2.4

Accounts for Three Regions in Net Form with no Pairwise Transactions, Ordered by Region and Type of Account

		Region 1			Region 2			Region 3			All Regions		
		P	A	K	P	A	K	P	A	K	P	A	K
Region 1	P	0	C_{11}	V_{11}	0	0	0	0	0	0	X_1	0	0
	A	Y_{11}	0	0	0	0	0	0	0	0	Y_1	G_1	0
	K	D_{11}	S_{11}	0	0	0	0	0	0	0	0	0	B_1
Region 2	P	0	0	0	0	C_{22}	V_{22}	0	0	0	X_2	0	0
	A	0	0	0	Y_{22}	0	0	0	0	0	Y_2	G_2	0
	K	0	0	0	D_{22}	S_{22}	0	0	0	0	0	0	B_2
Region 3	P	0	0	0	0	0	0	0	C_{33}	V_{33}	X_3	0	0
	A	0	0	0	0	0	0	Y_{33}	0	0	Y_3	G_3	0
	K	0	0	0	0	0	0	D_{33}	S_{33}	0	0	0	B_3
All Regions	P	0	0	0	0	0	0	0	0	0	0	0	0
	A	0	0	0	0	0	0	0	0	0	0	0	0
	K	0	0	0	0	0	0	0	0	0	0	0	0

ordering is, in effect, a reclassification of the accounts. Instead of the region by activity system depicted in Table 2.4, in the new Table 2.5 (see page 24), the first three rows and columns relate to production accounts (one in each region), the second three to appropriation accounts and the third three to capital transactions accounts (Stone, 1961, 267-268). In this table, inter-regional transactions, namely, net exports and receipts of factor income, net current transfers, and net borrowing (X_j, Y_j, G_j and B_j), for each region are shown in the fourth column of the appropriate block. In both Tables (2.4 and 2.5) each account balances, and with the information on net inter-regional flows in a closed economy, we have 12 independent relationships connecting a total of twenty-seven flows.

3. Applications to Ontario

In order to render this sytem of regional accounts operational (particularly the one in Table 2.4), two further adjustments are required. First, the assumption that the regional system consists of all areas in the world may now be conveniently lifted. In principle this should not present any difficulties. By netting out inter-regional flows as described above, we can distinguish between flows shipped to other regions in the system and those shipped to the rest of the world. Furthermore, it is possible to combine any flows between a given region and the rest of the world with the

Table 2.5

Accounts for Three Regions in Net Form and Without Pairwise Transactions, Ordered by Type of Account and Region

		P				A				K			
		1	2	3	AR	1	2	3	AR	1	2	3	AR
P	Region 1	0	0	0	X_1	C_{11}	0	0	0	V_{11}	0	0	0
	Region 2	0	0	0	X_2	0	C_{22}	0	0	0	V_{22}	0	0
	Region 3	0	0	0	X_3	0	0	C_{33}	0	0	0	V_{33}	0
	All Regions	0	0	0	0	0	0	0	0	0	0	0	0
A	Region 1	Y_{11}	0	0	Y_1	0	0	0	G_1	0	0	0	0
	Region 2	0	Y_{22}	0	Y_2	0	0	0	G_2	0	0	0	0
	Region 3	0	0	Y_{33}	Y_3	0	0	0	G_3	0	0	0	0
	All Regions	0	0	0	0	0	0	0	0	0	0	0	0
K	Region 1	D_{11}	0	0	0	S_{11}	0	0	0	0	0	0	B_1
	Region 2	0	D_{22}	0	0	0	S_{22}	0	0	0	0	0	B_2
	Region 3	0	0	D_{33}	0	0	0	S_{33}	0	0	0	0	B_3
	All Regions	0	0	0	0	0	0	0	0	0	0	0	0

flows of that region to other regions, thus reducing the need for accounting information to a minimum (Stone, 1961, 273). Because of the paucity of regional data, such flows are combined in this study into one account called All the Regions and the Rest of the World Account.

The second adjustment relates to the treatment of government activity in regional accounts. In Ontario, a distinction is made between government departments and agencies at the local level (municipalities and public hospitals) and those at the provincial level.[2] The federal government is treated essentially as a non-resident in a national accounting sense (Chari and Frank, 1970, 6). In addition, information on federal government activity by province is usually limited to wages and salaries on current account (Provincial Economic Accounts 1961-1974, 1976, xvii).

It is customary in regional accounting to distinguish between the establishments of local or regional government (municipalities and public hospitals in the case of Ontario) and those of non-local government (the provincial and federal governments in Ontario). In general, the activities of local governments are geared to the local and regional economies; accordingly, their transactions on product, appropriation and capital accumulation accounts are appropriately amalgamated with those of the private sector in each region (Stone, 1961, 275). Similarly, factor payments arising from the producing

[2]Government business enterprises are included in the business sector.

activity of non-local government in each region are properly treated as part of regional income (Leven, 1961, 155-158 and Stone, 1961, 275).

The operations of non-local government establishments on appropriation and capital accounts are not, however, necessarily geared to, or influenced by, the level of economic activity in the regions. For this reason, the transactions of this type of government on appropriation and capital accounts are taken out of the regions and are given special outside the region accounts (Stone, 1961, 275). This is done primarily to highlight the role of non-local government in recycling the flow of public funds between the regions through taxation and other acts of public finance.

Although non-local government in the regions of Ontario involves both provincial and federal activities, the role of both governments in channelling the flow of public funds among the regions is basically complementary and is defined by agreed cost-sharing formulas. Because of this complementarity in fiscal and monetary roles, and due to the lack of sufficient information on federal government transactions in the Ontario Accounts, it was considered necessary to combine the two levels of government into one 'central government' sector rather than to treat each separately. Thus, in the present regional accounting framework, the appropriation and capital accumulation accounts of central government in Ontario (provincial and federal) are given special outside the region

accounts.

With these two adjustments, an operational framework for the estimation of regional economic accounts in Ontario based on provincial totals is established. The introduction of a central government account and the amalgamation of the rest of the world account with the account for all regions give rise to a complete set of accounts which are made to balance by the introduction of appropriate transfers (Stone, 1961, 275). This set of accounts with its new variables and balancing transfers is presented in Table 2.6 for two hypothetical regions. Table 2.6 follows the lines of Table 2.4 above except for its new central government account and its all regions account which includes the rest of the world. It should be noted that the subscripts k and j refer to the two hypothetical regions, g to central government and r to all regions and the rest of the world. Thus, the incomings into the production account of region j shown in the first row of the Table are:

C_{jj} = consumption by residents and local authorities in region j.

V_{jj} = gross investment in region j including inventory valuation adjustment and depreciation.

C_{jg} = sales by region j to central government for current expenditure.

V_{jg} = sales by region j to central government for capital expenditure (gross).

X_{jr} = net exports by region j to all other regions and the rest of the world.

Table 2.6

Typical Entries in the Regional Accounts of Ontario

		Region j			Region k			Central Government			All Regions & the rest of the world		
		P	A	K	P	A	K	P	A	K	P	A	K
Region j	P	0	C_{jj}	V_{jj}	0	0	0	0	C_{jg}	V_{jg}	X_{jr}	0	0
	A	Y_{jj}	0	0	0	0	0	0	G_{jg}	0	Y_{jr}	G_{jr}	0
	K	0	S_{jj}	0	0	0	0	0	0	T_{jg}	0	0	0
Region k	P	0	0	0	0	C_{kg}	V_{kg}	0	C_{kg}	V_{kg}	X_{kr}	0	0
	A	0	0	0	Y_{kk}	0	0	0	G_{kg}	0	Y_{kr}	G_{kr}	0
	K	0	0	0	0	S_{kk}	0	0	0	T_{kg}	0	0	0
Central Gov't.	P	0	0	0	0	0	0	E	0	0	0	0	0
	A	I_{gj}	D_{gj}	0	I_{gk}	D_{gk}	0	0	0	0	Y_{gr}	0	0
	K	0	0	B_{gj}	0	0	B_{gk}	0	S_{gg}	0	0	0	B_{gr}
All regions & the rest of the world	P	0	0	0	0	0	0	0	C_{rg}	0	0	0	0
	A	0	0	0	0	0	0	0	G_{rg}	0	M_{rr}	0	0
	K	0	0	B_{rj}	0	0	B_{rk}	0	0	T_{rg}	0	N_{rr}	0

As usual, these incomings into the product account are matched by the outgoings, shown in the first column of Table 2.6:

Y_{jj} = gross domestic income produced by factors of production located in region j, including inventory valuation adjustment and depreciation (denoted previously by Djj.)

I_{gj} = net indirect taxes paid by the private sector in region j to the central government and to local authorities. Expenditure of the latter taxes are reported in the transaction G_{jg}, and thus are subsequently returned to each region.

The second row describes the incomings into the appropriation account of region j, which are:

Y_{jj} = gross domestic income produced by factors in region j.

G_{jg} = transfers, gifts and grants received by region j from the central government including net indirect taxes levied by local authorities and initially routed into an expenditure through the central government's appropriation account.

Y_{jr} = net factor payments received by region j from all other regions and the rest of the world.

G_{jr} = net current transfers received by region j from all regions and the rest of the world. This entry includes mainly net remittances.

The matching outgoings of the appropriation account (column 2) are:

C_{jj} = consumption in region j.

S_{jj} = gross saving of region j which consist of personal savings, business retained earnings, capital consumption allowances and local government savings.

D_{gj} = direct taxes on income and other current transfers paid by the private sector in region j to the central government.

In region j's capital accumulation account, the following incoming entries appear in the third row of the Table:

S_{jj} = gross savings in region j.

T_{jg} = capital transfers by the central government to region j.

The matching outgoings are shown in the third column:

V_{jj} = gross investment in region j.

B_{gj} = net lending by local government in region j to the central government. (This entry is usually negative and hence constitutes borrowing.)

B_{rj} = net lending to all other regions and the rest of the world from region j.

Accordingly, we have a set of accounts for each region, similar to those of the province, which sum up on the production side to gross regional income (expenditure) at market prices. On the appropriation (income and outlay) side, the total derived is gross regional income plus current transfers. In the capital accumulation account, the column total relates to the gross addition to the region's wealth in the form of investment in fixed assets and stocks.

Next, the central government account is considered.

Since all central government productive activity is included in each region's gross regional product, the incomings and outgoings of the central government production account (seventh row and column) are all zeros, as might be expected. However, they are used to accommodate the residual error of estimate E. The incomings into the appropriation account shown in row 8 of Table 2.6 are:

I_{gh} = total indirect taxes less subsidies received by the central government from region (h = j,k).

D_{gh} = total direct taxes on income received from region (h = j,k).

Y_{gr} = factor income received by the central government. Interest payments on the public debt are treated as a negative income from property, and since they exceed interest and investment income received by the government, the entry itself is negative.

The matching outgoings shown in the 8th column are:

C_{hg} = central government current expenditures in region (h = j,k).

G_{hg} = government transfers to region (h = j,k).

S_{gg} = central government saving.

C_{rg} = central government expenditures abroad which are treated as imports in the provincial accounts and are not shown separately. Hence, this entry will be zero.

G_{rg} = net government transfers to the regions and the rest of the world.

In the capital account of the central government, the following incomings are shown in the nineth row of Table 2.6:

B_{gh} = net borrowing by the central government from region ($h = j,k$) (Usually negative and hence constitutes lending of the central government to the regions).

S_{gg} = savings of central government.

B_{gr} = central government borrowing from the regions and the rest of the world.

The matching outgoing entries displayed in column 9 of the Table are:

V_{hg} = total capital expenditures by the central government in region ($h = j,k$).

T_{hg} = net capital transfers by the central government to local governments in region ($h = j,k$).

T_{rg} = net capital transfers by the central government to the rest of the world.

As stated earlier, the Ontario provincial accounts provide the data base for the estimation of regional accounts according to the framework of Table 2.6. Those provincial accounts which actually pertain to a subnational unit provide little information on current and capital flows between Ontario and the rest of the world. In addition, it is well known that such flows are very difficult to estimate at the regional level (i.e., within Ontario). Accordingly, in making regional estimates, some of these flows are estimated as residuals.

Finally in the last set of accounts for all regions and the rest of the world, the incomings into the product account

(row 10) are all zeros since no record of any central government current expenditure abroad C_{rg} is shown in the Ontario provincial accounts. The matching outgoings that appear in column ten are:

X_{hr} = net exports of region h to all regions and the rest of the world (h = j,k).

Y_{hr} = net payments of factor income by region h to all regions and the rest of the world (h = j,k).

Y_{gr} = net payments of factor income by the central government to the rest of the world.

M_{rr} = a balancing transfer to the appropriation account equivalent to the negative of Ontario's trade balance with the rest of the world.

The incomings into the appropriation account shown in row 11 are:

G_{rg} = central government net current transfers to the rest of Canada and the rest of the world. In effect, this would be a balancing item between the receipts and expenditures of the central government in Ontario.

M_{rr} = the negative of Ontario's trade balance.

The matching outgoing entries of this account in column 11 are:

G_{hr} = net current transfers received by region h from the regions and the rest of the world (h = j,k).

N_{rr} = a balancing transfer to capital account equivalent to Ontario's net position on current account.

The incomings into the capital account of all regions and the

rest of the world are:

B_{rh} = net borrowing of region h from all other regions and the rest of the world. $\sum_h B_{rh}$ therefore is Ontario's private lending abroad (h = j,k).

T_{rg} = capital transfers by the central government to the rest of the world.

N_{rr} = the rest of the world's balance with Ontario on current account.

These are matched by the outgoing entry in the capital account shown in column 12:

B_{gr} = central government borrowing from all the regions and the rest of the world.

From this set of regional accounts the familiar provincial totals can be readily obtained. Thus, region j's product income identity gives the familiar accounting results:

$$C_{jj} + V_{jj} + C_{jg} + X_{jr} \equiv Y_{jj} + I_{gj}$$

Upon summing over j we get Ontario's provincial expenditure and product at market prices as shown in the accounts. Similarly, in the appropriation account of region j, we have:

$$Y_{jj} + G_{jg} + Y_{jr} + G_{jr} \equiv C_{jj} + S_{jj} + D_{gj}$$

Again by summing over j, the appropriate provincial magnitude would be obtained. As for the capital accumulation account, the following familiar relationship between regional savings, investment, capital transfers, and borrowing emerges:

$$S_{jj} + T_{jg} \equiv V_{jj} + B_{gj} + B_{rj}$$

If S_{jj} and V_{jj} are summed over j, the corresponding provincial totals would be obtained. Further, $\Sigma_j B_{rj}$ would give total net borrowing (lending) of the Ontario regions to the rest of Canada and the rest of the world.

4. Method of Estimation

The regional accounting scheme discussed above and illustrated in Table 2.6 provides a convenient framework for the estimation of economic accounts in Ontario's ten economic regions. An expanded 36 by 36 matrix based on Table 2.6 can be constructed for this purpose. In a closed system of n balancing accounts, the number of identities connecting the flows in the matrix would be n-1 (Stone, 1961, 272). Hence, in the Ontario regional accounts matrix, 35 independent relationships can be identified. In turn, these will connect a total of 157 flows of which 123 (including the residual error) will be estimated directly or by allocating the provincial accounts aggregates between the regions, using various regional data and indicators.[3]

If we have a total of k independent relationships connecting s variables (flows), some of which are given or can be estimated, then at most k of the remaining variables can be estimated as residuals, i.e., by combining the given variables with the independent relationships. In our case we would be

[3]For similar regional allocations of economic accounts, see Stone (1961), Woodward (1970, 65-97) and Tiwari (1971, 103-118). A formal illustration of the estimation procedure is given below in Chapter III.

just one variable short of the limit imposed by the number of independent relationships, since the total number of flows to be estimated as residuals is 34.

The flows that will be estimated as residuals are: net exports of each region (10 X_{jr}'s), net current transfers from each region to all regions and the rest of the world (10 G_{jr}'s), net borrowing by each region from all regions and the rest of the world (10 B_{rj}'s), central government current transfers abroad (G_{gr}), net borrowing by the central government from the regions and the rest of the world (B_{gr}), net trade balance (M_{rr}), and net balance on current account (N_{rr}).

Because of the current paucity of independent regional information, direct estimates are still rare in the field of regional accounting. Hence, the method of estimation adopted is essentially to allocate or disaggregate the components of provincial income and expenditure shown in the Ontario Accounts among the regions using suitable allocators drawn from available data at the regional level. The process of providing estimates for the entries of the Ontario regional accounts matrix based on Table 2.6 by means of allocation, however, involves three related steps. The first is an attempt to describe the allocation methods used in generating regional estimates. This description is contained in Chapter III. The second step is to supply the necessary documentation with respect to the allocation exercise by discussing in detail all the data sources employed in allocating the Accounts

totals among the 10 regions. This will be the task of Chapters IV and V. The third step is to present the resulting estimates in tabular format culminating in the 36 x 36 matrix showing the accounts for each region. These results are presented in Chapter VI.

CHAPTER III

REGIONAL ALLOCATION METHODS

In this chapter we present the allocation methods used in the estimation of regional accounts for Ontario in 1971. Allocation in this context means the disaggregation or breakdown of the provincial Accounts totals shown in Ontario Accounts (Ontario Statistics 1976) and in the tables of Appendix B among the regions by means of various 'allocators' or 'weights' to produce estimates of regional income and expenditure items. The first section provides a brief discussion of the role of the allocation techniques in the construction of regional accounts by various researchers. It is shown in this respect that such techniques have had widespread applicability in the field of regional accounting and have proven useful in generating regional accounting estimates. In section two we describe in some detail the three methods of allocation that are employed in this study. Section three concludes the chapter with a brief appraisal of the technique of allocation as a means of preparing regional estimates.

1. Role of Allocation Techniques in Estimating Regional Accounts

In examining the conceptual applicability of national economic accounting to subnational units, it was concluded in Chapter II that the allocation of provincial (national)

accounts totals to generate estimates of regional accounts was a step in the right direction. Among the advantages of this estimation technique is that it ensures that the basic accounting relationships are always satisfied. In addition, it simplifies conceptual and methodological problems in preparing the estimates, and facilitates comparability between the different regions being analyzed (Ruggles and Ruggles, 1961, 142).

A review of the literature on regional accounting illustrates the widespread use of the allocation techniques as well as their well-established role in preparing estimates of regional accounts. Thus, in the pioneering work of Richard Stone and Phyllis Deane on the development and application of regional accounting in Britain[1], the preparation of account estimates for the British regions was mainly accomplished by allocating the British income and expenditure totals to the 12 standard regions (Stone, 1961, 274 and Appendix). More recent work on regional accounts in Britain at the Department of Applied Economics, Cambridge, and at the National Institute of Economic and Social Research again relied on the allocation procedure for preparing regional estimates (Woodward, 1970). In presenting the methodology of this work Woodward wrote (page 65): "The method of estimation was, basically, to

[1]It will be recalled that this work provided the basis for the conceptual framework of the Ontario regional accounts presented in Chapter II.

disaggregate the components of GDP and domestic expenditure shown in the national accounts for the United Kingdom, distributing them among the regions by making use of all the available data".

In the United States, the allocation of U.S. income totals among the states is a major feature of the efforts underway at the Regional Economic Division (RED), Office of Business Economics (OBE) in the U.S. Department of Commerce, to implement regional economic accounts and to prepare state personal income estimates on a continuous basis. In describing the allocation procedure, Graham and Romans, the two project leaders responsible for these efforts at the Department commented (Graham and Romans, 1971, 13):

> All income estimates made in the RED are developed within the framework of the OBE's national income and product accounts by an allocation procedure. That is, area totals for each income component - beginning with those for the Nation - are allocated to the next smaller areas in accordance with those areas' proportionate shares of a related economic series. For many components, the allocating series is the one from which the larger area total was derived. For other components, the allocating series may be related directly or indirectly to the item being allocated. This approach permits the utilization of all available sources of information. Moreover, the use of an allocation method yields a large amount of analytically useful information on industrial sources of income at the local area level.

Several attempts to prepare estimates of state and regional income have been underway for some time in India. A study on the development of regional accounting practices there concluded that in most of these attempts, which dated

back to the forties, the allocation procedure played a major role in generating regional estimates (Tiwari, 1971, 103-117). In the words of the author (page 106):

> Estimates of state income or state domestic product have been compiled by the method of allocation, i.e., allocation of all India totals among States by suitable indicators, by compilation of estimates on the basis of data collected at the local level, or by a combined procedure depending upon the convenience of the estimator and availability of data.

In Canada, Statistics Canada traditionally encouraged and contributed to the efforts of certain provinces (including Ontario) that undertook to produce their own sets of regional income and expenditure accounts. More recently, the agency has become "involved in regional product measures in a deliberate and formal way...It was then agreed, in cooperation with the provinces, that Statistics Canada would complement work already done by the provinces...and in the process...provide estimates that would be comparable from one province to another as well as to Canada as a whole" (Provincial Economic Accounts 1961-1974, 1976, VI). Furthermore, in preparing these estimates the allocation technique has generally been applied (see page XV):

> The data sources and methodology used in producing the provincial accounts are generally very similar to those used in the National Accounts. In fact, most of the provincial series were estimated by distributing the National Accounts totals among the provinces by means of 'allocators' calculated from related data. This procedure not only ensured that the additivity constraint...would be automatically met, but also greatly simplified the methodological problems faced in producing the provincial accounts.

2. Methods of Allocation

In this study, the allocation procedure has been followed in preparing estimates for many of the regional accounting entries for Ontario shown in Table 2.6 of the previous Chapter. Although three allocation methods are used, they all share one common feature: a given provincial Accounts total is allocated to the regions in proportion to regional shares (percentages) of some additive variable total for Ontario. The attempt to distinguish between these methods is in part inspired by the kind of relationship or relevance that exists between the data used for allocation and the accounts totals being allocated. A further consideration is the staging or phasing of regional allocation. Depending on data availability, the accounts total to be allocated may be distributed directly to the regions or indirectly by breaking it down first into subtotals or subcomponents (e.g. industry subtotals), and then allocating each subtotal to the regions. Mention may also be made of the occasional need to assume that some of the Ontario Accounts totals in the year of estimate 1971 may be allocated to the regions in proportion to the relative regional shares of a certain additive variable that is only available in a given year, other then the year of estimate 1971.[2]

[2]The choice of the estimate year 1971 was based on the relative availability of regional and local data gathered in the course of the 1971 Census of Canada.

Method i

This method is called counterpart allocation and is adopted when an additive counterpart variable to the provincial Accounts total to be allocated is available from an alternative data source, and shows the required information by region. For example, a wage and salary counterpart to the Provincial Accounts total on wages and salaries is available in the 1971 Census data on the income of individuals by source (Statistics Canada, 94-761, 1975). Further, unpublished Census data contain a breakdown of wages and salaries by small geographic areas (e.g., Census subdivisions or counties) which could be regrouped into regional entities and added up into a provincial total[3]. The two totals, i.e., the Provincial Accounts total and the Census total on wages and salaries may or may not be the same because of possible differences in concept and coverage[4]. In any case, method i or counterpart allocation refers to allocating the Provincial Accounts total to the regions in proportion to the region's percentage of the counterpart Census total. That is, the percentage distribution of the Census total among the regions provides the necessary regional weights or allocators for the disaggregation of the Accounts total.

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[3]The geographic breakdown of income data was obtained from Statistics Canada through private correspondence. See Chapter IV for details.

[4]The magnitude and significance of such differences and their effect on the regional estimates will be dealt with along with data sources in Chapter IV.

Method ii

This method is called proxy allocation and is used as a second best alternative to method i. In many cases, a counterpart variable to the provincial Accounts total at the regional or local levels of data is not available. Accordingly, a suitable substitute or proxy additive variable available at the regional level would be sought for the purpose of allocating the Accounts total among the regions. For example, there is no counterpart information with respect to the Provincial Accounts total on federal government military pay and allowances at the local or regional levels. However, data showing the geographic distribution of labour force in defence services are available in the 1971 Census of Canada (Statistics Canada, 94-740, 94-742 and 94-743, 1975). It can be maintained that in the absence of a counterpart at the regional level to match the Accounts total on federal government military pay, the data on labour force in federal defence services by region could be used as a reasonable proxy for the purpose of allocating this Accounts total to the regions. Hence, method ii refers in general to allocating a given Accounts total or component to the regions in proportion to each region's percentage of the chosen proxy variable.

Method iii

This method is called two-stage allocation and is adopted when the provincial Accounts total to be allocated

has no counterpart data source or even a suitable proxy variable at the regional level which could be used for direct allocation. As the name suggests, the method is carried out in two stages[5]. The first stage consists of allocating the Accounts total or component to each industry in proportion to its percentage of an available counterpart or proxy variable depending on data availability[6]. In other words, the first stage is in effect an allocation of the Accounts total among industries instead of regions using the allocation mechanism of either method i or method ii. In the second stage, each industry subtotal thus obtained is in turn allocated to the regions using, once more, either a counterpart data source or a proxy variable with an appropriate breakdown at the regional level, i.e., by means of method i or method ii. After each industry subtotal is distributed among the regions, we sum up the industry figures for each region to obtain the desired regional allocation of the Accounts total in question.

To illustrate method iii, consider the hypothetical matrix arrangement shown in Table 3.1 below for three regions

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[5]It should be emphasized here that in each stage, a mechanism associated with either method i or method ii is employed depending on the type of the variable chosen for allocation. For a general description of multi-stage regional allocation procedures see Thompson (1957, 319-321).

[6]The industry allocation is used here partly as an example. But, in fact, it is the only way in which we use the two-stage procedure. Conceptually, other allocations could be made at the first stage (e.g., occupations).

and three industries.

Table 3.1

A Hypothetical Allocation of an Accounts Total by Industry and Region

Industries	Regions r	s	q	Total
i	A_{ir}	A_{is}	A_{iq}	$A_{i.}$
k	A_{kr}	A_{ks}	A_{kq}	$A_{k.}$
l	A_{lr}	A_{ls}	A_{lq}	$A_{l.}$
Total	$A_{.r}$	$A_{.s}$	$A_{.q}$	A

The regional entries are arranged in columns (r, s and q), while the industry subtotals are shown as rows (i, k and l). The Accounts total to be allocated is denoted by A, and the first stage of method iii is to allocate A among industries in the manner described above to obtain $A_{i.}$, $A_{k.}$, and $A_{l.}$ appearing in the column total of the table. The next stage is to allocate each of these industry subtotals among regions again following the procedure described in the foregoing paragraph. As a result, we obtain entries for each industry row shown in the table such as A_{ir}, A_{is} and A_{iq} for industry i (the first row), and so on. When all the entries in the matrix are filled following stage two, we sum each column in the matrix to derive each region's share in the Accounts total.

These are shown as $A._r$, $A._s$ and $A._q$ for each region, respectively, in the bottom row total of the table. The method assures that upon adding up these regional shares we derive the Ontario Accounts total A with which we started.

The use of method iii is called upon particularly in allocating certain Accounts components in the corporate business sector where an identification of the industrial origins of the economic activity involved appears to enhance the quality of regional allocation. The Accounts totals falling in this category include corporate profits, business gross fixed capital formation (private investment), capital consumption allowances and interest and investment income. The difficulties frequently encountered in any attempt to allocate these components among geographic areas at both the conceptual and data levels are well known and have received careful discussion in the literature (see Goldberg, 1968, and Kendrick, 1972, among others).

In dealing with these Accounts totals, a considerable simplification is achieved by adopting the procedure employed in the National Accounts for purposes of allocating the same components among the provinces (see Provincial Economic Accounts 1961-1974, 1976, XII). The procedure calls for a regional allocation or disaggregation which would reflect the location of productive activity underlying the Accounts total. A desirable step in this direction is to identify the activity itself by kind, i.e., to start with an industrial breakdown

of the activity (and hence the Accounts total in question) before assigning it to its geographic locations. This is essentially what stage one of method iii aspires to do. The result is often an improvement in the quality of regional estimates because of the increased prospects for obtaining regional counterparts or relevant proxies suitable for the allocation of industry subtotals.

3. Appraisal

In this section an evaluation of the allocation methods presented in the previous section is attempted. Clearly, any appraisal of the suitability of the allocation procedure in general can best be done in the light of the overall purpose calling for its use and of the available alternatives and data resources. As already stated in Chapters I and II, the main purpose behind preparing regional estimates was to provide a general framework for regional accounting in Ontario and to show how it could be applied given the available and limited amount of information. A parallel aim is to establish a bench-mark for future research in this field with an emphasis on concept and method leaving the door open for future empirical improvement.

The methods of allocation discussed above seem in general to serve these aims rather well. In the first place, the regional framework of Chapter II clearly shows that the structure and definitions of regional accounts are predetermined to a certain extent by the provincial (national)

accounting system. Furthermore, the analytical and statistical interdependence of national and regional estimates is well-known, particularly where aggregate accounts statistics are based on Census data and/or on various administrative records compiled at the local area levels (Hochwald, 1957, 9-16). The use of allocation methods to prepare regional estimates is thus seen as a plausible outcome of the conceptual and data interdependence between the macro (provincial or national) and the micro (regional) accounting systems. The significance of this data interdependence in improving accounting results and estimates in both directions (i.e., at the aggregate and regional levels) has been underlined in a recent study carried out by Statistics Canada on the relation between Census data and national income estimates (Rashid, 1976, 49) as follows:

> The figures in the national accounts are not precise or exact but estimates subject to revisions for a good many years following the period to which they actually refer...In fact, the results of the 1971 Census led to major modifications in the estimates of wages and salaries in the national accounts.

The basic alternative to the allocation technique is to prepare regional income estimates from independent local data (Leven, 1961, 148-195). The need to initiate substantial data gathering and survey work in this connection makes this alternative rather expensive and often deters the investigator from adopting it especially when estimates are required for several regions (Terry, 1964, 41). In addition, if separate

estimates of regional income and expenditure are prepared independently, the risk of sacrificing desirable comparability between different regions and between them and the province as a whole would arise. In the context of comparing alternative methods of estimation, the arguments in support of using the allocation procedure to provide regional estimates are aptly summarized by Nancy and Richard Ruggles (Ruggles and Ruggles, 1970, 69-70):

> To the extent that the national economic accounts are built up on the basis of data gathered regionally, such as income tax data, social security data, economic census data and data from regulatory agencies, regional information can be developed fairly easily from the national data. A considerable duplication of effort would be involved if each region tried to develop its own economic accounting data. Furthermore, if regional accounting data are not derived as breakdown of the general national economic accounts, analysis of regional behaviour cannot be analytically related to the operation of the national economy as a whole.

The advantages of the allocation procedure should not, however, blind us from recognizing certain drawbacks that are associated with its use in estimating regional income and expenditure. In the case of method i (counterpart allocation), for example, a potentially serious problem would be the lack of adequate correspondence in concept and coverage between the Accounts total and the counterpart variable used for allocation. A further drawback in the use of counterpart variables may arise because of the possibility of sampling errors associated with sample surveys that provide some of the counterpart data estimates. In particular, it is known that

sampling errors become larger, the smaller the geographic coverage of the area chosen for investigation.

The reliability of estimates obtained by means of method ii (proxy allocation) hinges, of course, on the relevance of the chosen variable to the Accounts total in question. This reliability could be challenged by the potential discovery and availability of more relevant proxies or even counterpart variables in the future. The main feature of proxy allocation that often decides its success or failure as a method of allocation lies in the discretion exercised by the researcher in selecting allocation proxies. In commenting on the use of proxy allocation at the U.S. Department of Commerce in estimating regional accounts, Terry wrote (Terry, 1964, 42-43):

> The choice of what variable to use as a proxy allocator must be a matter of judgement. This is because there are no independent checks on the resulting regional estimates. Such estimates would by definition, have met the only possible statistical check, namely, that the sum of estimates for regions which are exhaustive of the United States conform to the U.S. total.

Since method iii (two-stage allocation) is in effect an amalgam of both method i and method ii, it naturally inherits the drawbacks of both. However, this does not imply that method iii necessarily produces inferior estimates or wider margin of error. The reason lies in the possibility of averaging out errors in the last step of adding up industry figures for each region.

One of the main conclusions to be drawn from this discussion is that a quantitative appraisal of the accuracy of income accounting estimates prepared by allocation methods is very difficult to perform, mostly because of the lack of independent checks (Terry, 1964, 38-39)[7]. However it is possible to develop general criteria for assessing the adequacy of these estimates (Terry, 1964, 39):

> Adequacy in this context means that competent people are putting forth a good effort in preparing their estimates. Adequacy can then be regarded as a necessary, but not necessarily sufficient, condition in attaining accuracy. An appraisal of adequacy is dependent upon the authors of regional income account estimates supplying documentation as to how their estimates are prepared.

Accordingly, our next task is to supply as much documentation as is necessary on the sources of data used, along with the allocation methods presented in the foregoing section to generate estimates of regional accounts in Ontario. This documentation process will be attempted in Chapters IV and V which deal with the allocation of the Ontario Provincial Accounts totals among the regions. In general, the main totals or components of the Ontario Provincial Accounts can be arranged into 4 major sectors: the personal sector, the government sector, the business sector and the rest of the world sector. For regional accounting purposes, the fourth

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[7] In fact one may be tempted to argue along with Mack in her comments on Terry's work that "The awful truth about evaluating estimates is that it is as much work to evaluate them as to make them in the first place, perhaps more". (Mack, 1964, 44).

sector includes 'all other regions' and consists mainly of net interregional flows such as net regional exports and net borrowing which cannot be estimated by the methods of allocation discussed in this chapter mostly because of the lack of counterpart or proxy data at the regional level. Hence, these flows will be estimated as residuals, i.e., by balancing the incomings and outgoings of each region's accounts as already mentioned in Chapter II.

The procedure of allocating the major Accounts totals in the personal sector and in the government sector (both local and central) among the regions is presented in Chapter IV. The procedure of regional allocation as applied to the Accounts totals in the business sector is discussed in Chapter V. The set of regional estimates produced in these two Chapters (IV and V) will provide the regional data base required for completing the Ontario regional accounts matrix as presented in Table 2.6 of Chapter II. The process of filling the cells of this matrix is presented in Chapter VI.

CHAPTER IV

THE REGIONAL ALLOCATION OF THE PROVINCIAL ACCOUNTS: THE PERSONAL AND GOVERNMENT SECTORS

This Chapter contains a discussion of the regional allocation of major components in the personal and government sectors in the Ontario Provincial Accounts (hereafter referred to as the Accounts)[1]. It will be recalled from Chapter II that the government sector consists of local government and of central government for regional accounting purposes. It was also pointed out that the activities of central government on appropriation and capital accounts are taken out of the regions and are given special outside the region central government accounts.

The procedure of allocating the major Accounts totals in the personal sector among the regions as well as the data sources used are developed in section 1 of this Chapter. The regional allocation of the Accounts totals dealing with the local government sector is discussed in section 2. Finally, section 3 presents the data and method of disaggregating the

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[1]The Ontario Accounts are published in Ontario Statistics 1976, (Ontario Ministry of Treasury, Toronto, 1976). We also obtained from the Provincial Accounts Section of the Ministry a set of unpublished tables entitled, "Ontario Economic Accounts, 1970-74" showing more sectoral details. This set of Tables is found in Appendix B. For the methodology underlying the preparation of the Ontario Accounts see Chari and Frank (1970, 5-17).

Accounts totals on central government activity among the 10 economic regions of Ontario. To facilitate the exposition, the Accounts totals of each of these three sectors are arranged into income (revenue) items and expenditure items. In each sector, the allocation of income items and expenditure items are discussed, respectively.

1.a The Personal Sector - Income Items

On the income or receipts side, the major components of this sector are wages and salaries, farm self-employment income, non-farm self-employment income, interest and dividends and other investment income (including rent). Altogether, these components accounted for more than 89 percent of net provincial income at factor cost in 1971. In addition, consideration of various kinds of transfer payments received by persons (mostly from government sources) is necessary.

The regional allocation of these major components in the Accounts data has been accomplished on the basis of method i, counterpart allocation, using the 1971 Census of Canada data (Statistics Canada, 94-761, 1975, hereafter referred to as Census data) to produce a counterpart allocation. Estimates of income of individuals by sources corresponding to the Accounts components of personal income are available in this Census publication and provide the counterpart variable used for this purpose. The Census data are based on responses of individuals aged 15 years and over who were asked to report

their income in 1970 according to major sources. The resulting income estimates from each source for Canada as a whole and for each of the provinces were published recently as part of the 1971 Census (Statistics Canada, 94-761, 1975). The corresponding estimates for Ontario's Census divisions (counties) which can be grouped into regional data are not published but may be obtained on request. These data were acquired for purposes of this study from Statistics Canada. (Special tabulations prepared by the User Inquiry Services, Census Field).

Before describing how the regional allocation of the Accounts data was achieved, a word on their nature and their relation to the counterpart Census data is in order. Unlike Census data, the system of national (and provincial) accounts is built up from sources such as "financial and administrative records and reports, full Censuses, extrapolation from benchmarks, data from sample surveys and estimates based on one or more related indicators" (Rashid, 1976, 25). Furthermore, the Accounts data on income are based on a more comprehensive concept of income than the one employed in the Census. For example, in the Accounts, personal income includes supplementary income such as fringe benefits, income in kind and some imputed items which are excluded from the Census data on income. Also, investment income of certain non-commercial or non-profit institutions such as charities, universities, churches, etc. is considered part of personal income in the

Accounts, but is excluded from the Census data on income of individuals.

To shed more light on these and other differences in concept and coverage, a detailed evaluation of the income data from the 1971 Census was carried out recently by Statistics Canada (Rashid, 1976). This study compares the Census estimates of income to those reported in the 1970 national and provincial Accounts for Canada and each of the provinces. In order to make the comparison more meaningful, the Accounts concept (which is broader) has been narrowed down to conform to the one employed in the Census. The results of this comparison covering eight income components for Ontario are shown in Table 4.1.

In general, it seems that the relative differences in the case of the total and of the wage and salary component (which accounts for about 80 percent of the total) are small, being -4.5 and -0.8 percent, respectively. The relative shortfall of the Census estimates widens significantly, however, in the case of interest and dividends, other investment income, and miscellaneous government transfers where it becomes -28, -27 and -41 percent, respectively. According to the evaluation study, these differences are not unexpected and could be explained by various factors some of which relate to differences in methodology and to errors in response and to non-response in the Census. However, the underestimation in these three income components "is primarily due either to misreporting or

Table 4.1

Comparison Between Census Income Estimates and Adjusted Personal Income Estimates by Source of Income, Ontario, 1970

Income source	Census income estimate	Adjusted personal income estimates	Difference	
			Absolute 2-3	Relative (4÷3) x 100
1	2	3	4	5
		millions of dollars		percent
Wages and salaries	19,172.2	19,330.5	-158.3	-0.8
Non-farm self-employment	1,361.5	1,521.3	-159.8	-10.5
Farm self-employment	223.3	222.4	0.8	0.4
Employment income (Subtotal)	20,756.9	21,074.2	-317.3	-1.5
Interest and dividends	860.8	1,199.6	-338.8	-28.2
Other investment income (including rent)	345.5	471.6	-126.0	-26.7
Family and youtn allowances	218.1	219.3	-1.2	-0.5
Old age pensions	673.5	687.7	-14.2	-2.1
Misc. government transfers	408.2	694.9	-286.7	-41.3
Total	23,263.0	24,347.3	-1.084.3	-4.5

Source: Rashid (1976, Appendix A).

to non-reporting of, especially, small amounts." (Rashid, 1976, 22).

In the light of this evaluation, it seems plausible to assume that the errors are a constant proportion of the total in each region and therefore that the Census income data can provide a satisfactory estimate on which regional shares in each income component could be based. Accordingly, Census data on income by source was compiled for each economic region of Ontario (from county figures) to determine regional shares. This was accomplished by calculating, for each source of income reported in the Census data, the relative share of each region as a percentage of the Ontario total, as shown in Table 4.2. The 1971 Accounts totals or components corresponding to these income sources were then allocated to the regions in proportion to the regional percentage distribution calculated from the Census data given in Table 4.2 In the terminology of allocation methods discussed in Chapter III, method i was employed for the regional allocation of the Accounts totals on income and the counterpart variables were obtained from the Census data on income of individuals by source. The resulting regional estimates of the main Accounts totals on personal income are presented in Table 4.3.

Table 4.2

Percentage Regional Distribution of Census Income Estimates by Source of Income in Ontario, 1970

Region	Wages and Salaries	Non farm self-employment	Farm self-employment	Interest and dividends	Other investment income	Family and Youth Allowances	Old age pensions	Misc. gov't. transfers	Total transfers
	1	2	3	4	5	6	7	8	6-8
Eastern Ontario	11.78	10.87	11.66	10.88	10.31	12.38	12.33	14.22	12.93
Lake Ontario	3.76	4.63	7.17	4.05	4.30	5.05	6.24	5.88	5.93
Central Ontario	43.86	42.95	9.87	44.56	47.28	35.32	32.84	33.33	33.41
Niagara	10.73	9.69	9.42	10.53	10.31	11.47	12.18	12.26	12.09
Lake Erie	5.56	6.61	21.97	7.52	6.02	6.42	7.13	6.62	6.85
Lake St. Clair	6.46	6.53	13.00	6.02	5.73	6.88	7.58	6.37	7.08
Midwest	5.46	5.87	13.90	6.95	6.02	6.42	6.69	4.90	6.08
Georgian Bay	3.40	5.14	9.42	4.51	4.30	4.59	6.69	5.64	6.01
Northeast	6.42	5.43	2.24	3.47	4.30	8.26	5.50	7.35	6.54
Northwest	2.55	2.28	1.35	1.51	1.43	3.21	2.82	3.42	3.08
Ontario	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Data prepared by the User Inquiry Services Division, Census Field, Statistics Canada.

Table 4.3

The Regional Allocation of the Accounts Totals on Personal Income, 1971

($ million)

Region	Wages & Salaries	Income of non-farm Unincorporated Business	Net Income of farm Operators	Interest on public & consumer Debt	Interest & Misc. Investment Income	Transfer Payments to Persons
Eastern Ontario	2,652	185	41	146	73	399
Lake Ontario	846	79	25	56	30	181
Central Ontario	9,878	731	35	618	411	1,050
Niagara	2,415	165	33	143	86	372
Lake Erie	1,252	113	77	97	58	211
Lake St. Clair	1,454	111	46	81	67	219
Midwest	1,229	100	49	91	48	188
Georgian Bay	765	88	33	61	31	184
Northeast	1,445	92	8	51	55	201
Northwest	574	39	5	20	24	94
Ontario	22,510	1,703	352	1,364	883	3,3099
Allocated in proportion to Column No. in Table 4.2	(1)	(2)	(3)	(4)	(5)	(6-8)

1.b Personal Sector - Expenditure Items

On the expenditure side, the main Accounts total in the personal sector is consumer expenditure on goods and services or, as it is sometimes called, personal consumption. Although it would be useful to have data on this item by geographic detail, the fact is that consumer expenditure by region is difficult to estimate (Ruggles and Ruggles, 1961, 133). Part of the difficulty here is that estimates of consumer expenditure in the National Accounts are usually based on the records of the sellers rather than on the records of the purchasers of goods and services. Clearly, for regional accounting purposes the location of buyers is what matters. On this, very little if any, information could be obtained even at the provincial level. For this reason, it has been suggested that estimates of consumer expenditure at a subnational level may be prepared by means of an aggregation procedure, i.e., by aggregating individual consumption functions (Frank and Rash, 1968).

Before considering the applicability of this procedure to the estimation of regional consumption in Ontario, we may consider two alternative methods that rely on published information. The first utilizes data in family expenditure surveys to derive estimates of per capita consumption which are then multiplied by estimates of regional population (Gillen and Guccione, 1970, 279 and Palmer, 1971, 76-78). The results are either used directly as estimates of regional consumer

expenditure, or as proxies for allocating among the regions an aggregate consumption figure. In the second method, Census data on sales related to retail and service trades by location (Census division) may be used with proper adjustments as direct approximations of personal expenditure on goods and services by region, or as proxies for regional allocation purposes (Palmer, 1971, 70-71).

Each of these two methods has a number of shortcomings. Regional estimates of consumption based on family survey data are derived under the assumption that the income elasticity of demand for all commodities is unity. Therefore, the effect of income distribution within and between regions on consumption at the regional level is ignored. Furthermore, it leaves out expenditure by non-family persons. The second method does not account for sales from non-retail outlets, intermediate purchases in retail sales, provincial and local indirect taxes and income in kind (Palmer, 1971, 70). In any case, we tried both methods to prepare alternative estimates of personal consumption in the 10 regions of Ontario. The estimate of per capita consumption derived from the family expenditure survey of 1969 for Ontario was multiplied by estimates of regional population in 1971 and the result was used as a proxy for allocating the Accounts total on consumer expenditure among the regions (Statistics Canada, 62-536, occasional). The 1971 Census data on sales from retail and service trades by region provided the relevant proxy for allocating the Accounts total on

consumption among the regions using the second procedure (Statistics Canada, 97-703 and 97-743, June 1977). The resulting estimates based on retail and service sales data and on the family expenditure survey suffered from obvious drawbacks such as the wide variation in the proportion of consumption to disposable income among regions and the fact that the derived estimates of personal expenditure in certain regions were larger than disposable income in those regions. Given the quality of the data, these results (which are shown in Table 4.4) were not considered adequate.

As noted above, an aggregation procedure may also be used to generate estimates of consumer expenditure by persons in the 10 regions of Ontario (Frank and Rash, 1968). This procedure is based on the premise that the national or regional consumption function may be derived by aggregation of a single individual consumption function. Let,

$$C_i = a_1 + a_2 Y_i \qquad (1)$$

where C_i = consumer expenditure of the ith individual (i = 1...N)

Y_i = personal disposable income of the ith individual,

and a_1 and a_2 are constants. If equation (1) is summed over i individuals, we can obtain a linear relationship between aggregate consumption and income:

$$\sum_{i=1}^{N} C_i = a_1 N + a_2 \sum_{i=1}^{N} Y_i$$

or simply, $$C = a_1 N + a_2 Y \qquad (2)$$

Table 4.4

Estimates of Regional Consumption Based on Retail and Service Sales and on Family Expenditure Data, Ontario, 1971

($ million)

Region	Personal Disposable Income[a]	Retail and Service Data Consumption	Family Expenditure Survey Consumption
Eastern Ontario	2,883	2,673	2,673
Lake Ontario	1,049	936	1,092
Central Ontario	10,249	9,445	8,353
Niagara	2,594	2,361	2,539
Lake Erie	1,523	1,270	1,403
Lake St. Clair	1,628	1,381	1,515
Midwest	1,436	1,270	1,381
Georgian Bay	1,008	869	1,069
Northeast	1,491	1,448	1,604
Northwest	606	624	646
Ontario	24,467	22,275	22,275

[a]The estimates of personal disposable income by region are developed in Chapter VI (see Table 6.3).

where $C = \sum_{i=1}^{N} C_i$ and $Y = \sum_{i=1}^{N} Y_i$.

Frank and Rash fitted equation (2) using time series data on consumption, population and disposable income at the national level for the period 1957-1967. The following parametric information was obtained (with standard error in parentheses):

$$C = \underset{(0.0011)}{0.10111}\ N + \underset{(0.005)}{0.8163}\ Y \qquad (2a)$$

$$R^2 = 0.998$$

Because of the assumption that (2) can be obtained by aggregation from (1), values of a_1 and a_2 from (2a) can be inserted together with provincial time series data on personal disposable income and population in equation (2a) to generate annual estimates of consumer expenditure in Ontario during 1957-1967.

The above procedure avoids the aggregation problem in a simplistic manner by assuming that (1) holds for all consumers (Allen, 1964, 709). One might even object that the form of the individual relationship should be more sophisticated. In deciding on the usefulness of this procedure, however, it should be kept in mind that neither individual data nor regionally aggregated data presently exist. Any attempt to estimate individual or regional consumption functions will have to be based on survey work and empirical testing which normally require substantial funding and several years of preparation. Accordingly, we decided to use the parameters obtained from aggregated Canadian data to estimate

consumption in each region of Ontario. Because our year of estimate was 1971, we estimated equation (2) for the period 1957-1971, again using national time series. The following coefficients were obtained:

$$C = \underset{(0.02)}{0.092}\ N + \underset{(0.01)}{0.887}\ Y \qquad (2b)$$

$$R^2 = 0.999$$

Data on population and personal disposable income for each region in Ontario in 1971 were inserted in this equation to derive estimates of consumer expenditure by region in that year. The results are given in Table 4.5.

It can be seen from Table 4.5 that the estimates of consumer expenditure in each region (column 3), compare reasonably well to the estimates of personal disposable income in those regions. That is, no wide variations in the proportion of regional consumption to income are observed; a rather plausible feature in an advanced and well-integrated economy such as Ontario. More importantly, the difference between the sum of the regional consumption estimates ($22,411 million) and the Accounts total on consumer expenditure in 1971 ($22,275 million) is slight, being less than one percent.

The two remaining items of expenditure in the personal sector are personal saving and direct taxes paid by individuals to the provincial and federal governments. The first may be derived as the difference between personal disposable

Table 4.5

Estimates of Consumer Expenditure by Region, Ontario, 1971

($ million)

Region	Personal Disposable Income[a]	Pop. (000)	Consumer Expenditure	Adjusted Consumer Expenditure[b]
Eastern Ontario	2,883	923	2,642	2,628
Lake Ontario	1,049	375	965	958
Central Ontario	10,249	2,878	9,357	9,311
Niagara	2,594	879	2,382	2,361
Lake Erie	1,523	483	1,394	1,381
Lake St. Clair	1,628	522	1,492	1,492
Midwest	1,436	479	1,320	1,314
Georgian Bay	1,008	369	926	913
Northeast	1,491	552	1,373	1,360
Northwest	606	224	559	557
Ontario	24,467	7,703	22,411	22,275

[a] These estimates of personal disposable income in each region are developed in Table 6.3 in Chapter VI.

[b] In applying the coefficients of equation 2b to regional disposable income and population (columns 1 and 2), we obtain a set of regional consumption figures (in column 3) which add up to $22,411 million. Since this total was slightly larger than the Ontario Accounts total on consumption in the province in 1971 ($22,275 million), the results in column 3 were adjusted by multiplying each by a factor of $\frac{22275}{22411}$. The adjusted figures which sum up to Ontario's consumption in 1971 are shown in column 4.

income[2] and personal consumption in each region which are shown in columns 1 and 4 of table 4.5. Direct taxes collected by central government along with other income items of central government are allocated to the regions in a procedure described in section 3 below.

2. Local Government

As stated earlier, the income and expenditure items on local government activity are incorporated with those of the provincial government in the Ontario Accounts. Furthermore, the local government sector in each region consists of municipal governments and public hospitals located in the region. Consequently, it was necessary to obtain separate estimates at the provincial level for the transactions of these three public bodies: provincial government, municipal government and public hospitals. Such estimates were prepared for the author by the Ontario Provincial Accounts Section (OPAS), Central Statistical Services, Ontario Ministry of Treasury.

Detailed information on local government finance is published annually in the Municipal Financial Statistics (Ontario Ministry of Treasury, 1973). This publication which is usually known (and referred to hereafter) as the

[2]The method of estimating personal disposable income in each region by allocating the Accounts totals on personal income is discussed in Chapter VI below.

Blue Book contains detailed financial statements of municipal governments which may be grouped into regional entities. The information covered ranges from sources of revenue including borrowing to expenditure on current and capital accounts classified by function and department.

2.a Local Government - Income Items

The main income or revenue items in the local government sector are net indirect taxes collected by municipal governments, transfers from the provincial government to municipalities and to public hospitals on current account, transfers by provincial government to municipalities on capital account and net borrowing by municipalities from provincial and federal sources. These income items and the corresponding Accounts estimates obtained from the OPAS data source are presented separately for the municipalities and the public hospitals in Table 4.6.

Table 4.6

Income of Ontario Municipalities and Public Hospitals, 1971

($ million)

Income Item	Municipalities	Public Hospitals	Total
1. Indirect taxes	1,800	(...)[a]	1,800
2. Current transfers from provincial gov't.	1,394	935[b]	2,329
3. Capital transfers from provincial gov't.	126		126
4. Net borrowing from gov't.	84	(..)[c]	84
5. Other borrowing-d	48	(..)[c]	48

a = figure not applicable or appropriate.
b = includes both current and capital transfers to hospitals.
c = figure not available. Since this entry is usually small, it is assumed to be zero.
d = in each region, this small amount is added to personal and business borrowing and is estimated as a residual.

Source: Prepared by Ontario Provincial Accounts Section, Central Statistical Services, Ontario Ministry of Treasury.

The Accounts total on indirect taxes collected by municipalities in Ontario ($1,800 million) consisted mostly of property taxes and minor amounts of other revenue such as fees, licenses and miscellaneous receipts. The best available counterpart variable for allocating this total among the regions is the Blue Book's data on property taxes collected by municipal government in 1971. When these data were aggregated to the regional and provincial levels, the provincial total on property taxes reported in the Blue Book amounted to $1,495 million, or about 83 percent of the Accounts total on municipal indirect taxes; the difference (17 percent) being licenses and fees which are not reported in the Blue Book. Because of the lack of any information on licenses and fees that could be used for regional allocation, it was assumed that the geographic distribution of these receipts was proportional to the regional distribution of property taxes. On this assumption, the Accounts total on local government indirect taxes ($1,800 million) was allocated to each region in proportion to its percentage of the Blue Book's total, municipal property taxes, as shown in Table 4.7.

Table 4.7

The Regional Allocation of Local Government Indirect Taxes, Ontario, 1971.

Region	Municipal Property Taxes: Actual ($m)	Municipal Property Taxes: Percentage Shares	Allocated Total Indirect taxes ($m)
Eastern Ontario	148	9.9	178
Lake Ontario	48	3.2	58
Central Ontario	716	47.9	862
Niagara	162	10.8	194
Lake Erie	82	5.5	99
Lake St. Clair	85	5.7	103
Midwest	77	5.1	92
Georgian Bay	49	3.3	59
Northeast	97	6.5	117
Northwest	31	2.1	38
Ontario	1,495	100.0	1,800

Source: Municipal Financial Statistics 1971, (1973).

Current transfers from the provincial government to the municipalities amounted to $1,394 million in 1971, and were directly derived for each region and for Ontario from the Blue Book by aggregating county data[3]. The Accounts total on provincial government transfers to public hospitals was estimated at $935 million in 1971 by the OPAS at the request of the author; however, a breakdown by current and capital

[3]This direct estimation procedure was adopted because the Accounts total was identical to the Blue Book total in this case.

components was not available in this case. This total was allocated to the regions in proportion to each region's percentage share in the Ontario total of Public hospitals' ward revenues from government in 1972[4]. The regional distribution of this counterpart variable was obtained from a publication by the Ontario Ministry of Health entitled Hospital Statistics 1972, (1972, 137-144) which gave financial data on each public hospital in the province[5]. The geographic distribution of this variable on ward revenues and the resulting regional allocation of provincial transfers to public hospitals are presented in Table 4.8.

The last two income items in Table 4.6 are capital transfers from the provincial government to municipalities ($126 million) and net borrowing by the municipalities from the provincial government ($84 million). The regional estimates for these two income items were obtained directly from the Blue Book by aggregating county data. The direct estimation procedure was followed in this case because the Blue Book and the Accounts data were identical. Table 4.9 gives a summary of the resulting estimates derived from the regional allocation of the Accounts totals on the income items of local government.

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[4]Ward revenues denote government contribution to public hospitals and thus constitute a counterpart variable to total transfers.

[5]We used the 1972 publication because the 1971 report was not available.

Table 4.8

The Regional Allocation of Current Transfers to Public Hospitals, Ontario, 1971

Region	Public Hospitals' Ward Revenue From Ministry of Health, 1972		Total allocated (Provincial Transfers to Public Hospitals, 1971) ($m)
	Actual ($m)	Percentage Share	
Eastern Ontario	111.0	12.8	120
Lake Ontario	33.9	3.9	36
Central Ontario	347.5	40.2	376
Niagara	106.3	12.3	115
Lake Erie	66.0	7.6	71
Lake St. Clair	46.7	5.4	51
Midwest	44.7	5.2	49
Georgian Bay	35.2	4.1	38
Northeast	48.2	5.6	52
Northwest	25.5	2.9	27
Ontario	865.0	100.0	935

Source: Hospital Statistics 1972, (1972, 137-144).

Table 4.9

The Regional Allocation of Income Items of Municipalities and Public Hospitals, Ontario, 1971

($ million)

Region	Municipal Indirect Taxes	Current transfers from Provincial government: Municipalities	Current transfers from Provincial government: Public hospitals	Capital transfers prov. gov't. to municipalities	Net borrowing by municipalities
Eastern Ontario	178	170	120	21	3
Lake Ontario	58	63	36	7	2
Central Ontario	862	630	376	50	46
Niagara	194	155	115	18	16
Lake Erie	99	74	71	6	4
Lake St. Clair	103	79	51	7	5
Midwest	92	71	49	6	3
Georgian Bay	59	58	38	3	3
Northeast	117	67	52	5	1
Northwest	38	27	27	3	1
Ontario	1,800	1,394	935	126	84

Source: Municipal Financial Statistics 1971, (1973).
Hospital Statistics 1972, (1972).

2.b Local Government - Expenditure Items

The major Accounts totals on local government expenditure which include current expenditure, capital expenditure, capital consumption allowances and savings are presented separately for the municipalities and for public hospitals in Table 4.10.

Table 4.10

Expenditures of Ontario Municipalities and Public Hospitals, 1971

($m.)

Expenditure Item	Municipalities	Public Hospitals
1. Current expenditure	2,440	863
2. Capital expenditure	645	95
3. Capital consumption allowances	213	32
4. Saving	154	a

a = figure not available. Since this item is usually small, it is assumed to be zero.

Source: Data prepared by the Ontario Provincial Accounts Section, Central Statistical Services, Ontario Ministry of Treasury.

The Accounts totals on current and capital expenditure by municipalities have two counterpart variables in the Blue Book. When compared to the Accounts totals, the two variables in the Blue Book fell short by 7 percent on current expenditure and 19 percent on capital expenditure, respectively. These discrepancies were apparently due to the Blue Book's uneven consolidation of spending by certain local boards with the rest of municipal expenditure. In the words of the

Blue Book (Municipal Financial Information, 1974, VIII):

> The expenditures reported in this publication are for municipalities and local boards consolidated in municipalities financial statements only. Consolidation of local boards is by no means consistent across the province, and the activities of many local boards providing health, social, planning and recreation services are not reflected in the following tables of data.

The Blue Book data on municipal current and capital expenditure are nonetheless the best available counterpart variables for the regional allocation of the corresponding Accounts totals. The regional figures have been compiled from county data in the Blue Book and are presented together with the resulting percentage share of each region in the Ontario total in Table 4.11. Also shown in this Table are the two allocated totals, i.e., the Accounts totals on current and capital expenditure which have been distributed between the regions in proportion to these regional shares using method i.

In a tabulation prepared for the author by OPAS, capital consumption allowances (CCA) by municipalities were estimated at $213 million in 1971. This amount was allocated to the regions using method ii, proxy allocation. On the assumption that municipal government assets (a stock variable) can, on average, be capitalized or reflected in some annual (flow) variable related to municipal activity in the region, the percentage regional distribution of the sum of current and capital expenditure by municipalities (Table 4.11)

Table 4.11

The Regional Allocation of Current and Capital Expenditure by Municipalities, Ontario, 1971

Region	Blue Book Data				Allocated Accounts Totals	
	Current Expense		Capital Expense			
	Actual ($m)	Percentage Share	Actual ($m)	Percentage Share	Current Exp. ($m)	Capital Exp. ($m)
Eastern Ontario	265	11.7	60	11.5	286	74
Lake Ontario	95	4.2	19	3.7	103	24
Central Ontario	1,030	45.5	231	44.3	1,110	286
Niagara	245	10.8	80	15.3	264	98
Lake Erie	125	5.5	22	4.2	134	28
Lake St. Clair	140	6.2	31	6.0	151	39
Midwest	121	5.3	25	4.9	129	31
Georgian Bay	92	4.1	17	3.3	100	21
Northeast	105	4.6	26	4.9	112	32
Northwest	48	2.1	10	1.9	51	12
Ontario	2,266	100.0	521	100.0	2,440	645

Source: Municipal Financial Statistics 1971, (1973).

was used as a proxy for allocating depreciation allowances on these assets[6].

The last expenditure item attributed to municipal government is saving (estimated at $154 million in 1971). Since the Accounts estimate was identical to the Blue Book total in this case, the estimates of municipal savings by region were derived directly from the Blue Book by aggregating county data. The estimates of municipal capital consumption allowances and savings are shown in Table 4.12.

Table 4.12

The Regional Allocation of Capital Consumption Allowances and Savings of Municipalities, Ontario, 1971

($ million)

Region	Capital Consumption Allowances	Saving
Eastern Ontario	25	17
Lake Ontario	9	5
Central Ontario	96	65
Niagara	25	17
Lake Erie	11	10
Lake St. Clair	13	9
Midwest	11	11
Georgian Bay	8	8
Northeast	10	8
Northwest	5	4
Ontario	213	154

Source: Municipal Financial Statistics, (1973)

[6]The relation between the Accounts total on CCA and this proxy variable is not a good one; however, the regional estimates derived from this allocation may be construed as a rough average of the likely regional pattern of government CCA until more adequate data become available and provide the basis for improved estimates.

In 1971, public hospitals in Ontario spent $863 million in current expenditure and some $95 million in capital expenditure, while their share in capital consumption allowances was estimated at $32 million (OPAS, tabulations prepared for the author). The regional percentage distribution of the gross operating costs of public hospitals in 1972 obtained from Hospitals Statistics, 1972, (1972, 117-132), was the best available counterpart variable for allocating the Accounts total on current expenditure by hospitals. The same variable was used as a proxy (by means of method i) to produce a regional allocation of the Accounts totals on capital expenditure by hospitals, mainly because of the lack of more relevant variables on public hospitals activity at the regional level. While the proxy association between gross operating costs and the Accounts total on capital expenditure may not be ideal as a short term estimate, the resulting regional estimates may still be satisfactory when interpreted as long term averages or indicators of the hospitals' regional pattern of capital expenditure. Capital consumption allowances of hospitals were distributed regionally in proportion to each region's share in total depreciation on buildings and service equipment of public hospitals as calculated from data in the report on Hospital Statistics 1972, (1972, 129-137). The two allocation variables used (i.e., gross operating costs and depreciation) and the resulting regional estimates for the three Accounts totals on public hospitals, namely, current

expenditure, capital expenditure and CCA, are presented in Table 4.13.

3. Central Government

It will be recalled from the conceptual framework of regional accounting for Ontario discussed in Chapter II that the central government consists of the provincial and federal levels. Each of these has establishments in the regions which in the course of their activity generate factor incomes that are properly treated as part of regional income. However, the operations of central government on appropriation and capital accumulation accounts, unlike those of local government, are not necessarily geared to or influenced by the level of economic activity in the regions (Stone, 1961, 275). For this reason central government activity on appropriation and capital accounts are taken out of the regions and are given special outside the region accounts to highlight the role of central government in recycling the flow of public funds between the regions through acts of public finance.

It will also be recalled from Chapter II that in the Ontario Accounts, local and provincial government transactions are incorporated into one government sector and that the federal government is treated essentially as a non-resident (Chari and Frank, 1970, 6). Separate estimates of the Accounts totals by each level of government were thus obtained for this study from OPAS supplied data. Although the income and

Table 4.13

The Regional Allocation of Public Hospitals Expenditure and Capital Consumption Allowances (CCA), Ontario, 1971

Region	Gross Operating Costs		Depreciation		Allocated Accounts Totals		
	Actual ($m)	Percentage Shares	Actual ($m)	Percentage Shares	Current Exp.($m)	Capital Exp.($m)	CCA ($m)
Eastern Ontario	146	13.5	285.6	13.7	116	13	4
Lake Ontario	42	3.9	95.7	4.6	34	4	1
Central Ontario	439	40.7	849.5	40.8	351	38	13
Niagara	128	11.9	211.6	10.1	103	11	3
Lake Erie	76	7.0	140.4	6.7	60	7	2
Lake St. Clair	57	5.3	97.1	4.7	46	5	2
Midwest	57	5.3	129.9	6.2	46	5	2
Georgian Bay	42	3.9	100.0	4.8	34	4	2
Northeast	61	5.6	102.1	4.9	48	5	2
Northwest	31	2.9	73.0	3.5	25	3	1
Ontario	1,079	100.0	2,034.9	100.0	863	95	32

Source: Hospital Statistics 1972, (1972, Tables 17 and 21).

expenditure items to be allocated in this section are broken down by level of government (federal and provincial), this is done mostly to improve on the quality of regional allocation and the resulting estimates. For regional accounting purposes, there is no need, however, to present the regional estimates by each level of government separately because of the complementarity in fiscal and economic impact of the two levels of government on each region; hence, both are shown as central government in the final analysis.

3.a Central Government - Income Items

The five major Accounts totals that comprise the income or revenue of central government are presented separately for each of the provincial and federal levels of government in Table 4.14.

Table 4.14

Income of Central Government in Ontario by Major Source, 1971

($ million)

Income item	Provincial Government	Federal Government	Central Government
Direct taxes from persons	1,134	3,437	4,371
Other transfers from persons	914	907	1,821
Direct taxes from corporations	404	1,101	1,505
Net indirect taxes	1,751	1,761	3,512
Interest & investment income	329	19	348

Source: Prepared by the Ontario Provincial Accounts Section, Central Statistical Services, Ontario Ministry of Treasury.

The first item is direct taxes collected by the provincial and federal governments from persons, amounting to a total of $4,571 million in 1971. The best available counterpart variable for allocating this Accounts total among the regions is found in Taxation Statistics 1971, (1973). This publication contains data on incomes and income taxes by county based on a sample of about 6 percent of all income tax returns processed prior to December 31 of each calendar year. In 1971, the National Revenue estimate of direct taxes collected in Ontario was $4,128 million or about 11 percent below the Accounts Total of $4,571 million. The shortfall of the Revenue estimate may in part be caused by the relatively small sample size and by the fact that the published estimates exclude members of the Armed Forces. It is also estimated that the cut-off date of December 31 results in about one percent under-coverage (Rashid, 1976, 38)[7].

The geographic distribution of the National Revenue estimate of direct taxes was regarded as a counterpart variable useful for the regional allocation of the Accounts total on direct taxes. Thus, the latter total was allocated to the regions in proportion to the regional distribution of this counterpart variable. (The counterpart variable is shown in absolute and relative terms in Table 4.15).

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[7]This could lead to an underestimate in that many late filers are likely to be high income persons.

Table 4.15

The Regional Allocation of Direct Taxes from Persons, Ontario, 1971

Region	Actual ($m)	Percentage Share	Allocated Total (Direct Taxes) ($m)
Eastern Ontario	466	11.3	517
Lake Ontario	132	3.2	146
Central Ontario	1,882	45.6	2,084
Niagara	487	11.8	539
Lake Erie	227	5.5	251
Lake St. Clair	252	6.1	279
Midwest	220	5.3	242
Georgian Bay	128	3.1	142
Northeast	236	5.7	261
Northwest	98	2.4	110
Ontario	4,128	100.0	4,571

Source: Taxation Satistics 1971, (1973).

The Accounts total 'other transfers from persons' amounted to $1,821 million and consisted mostly of insurance contributions, Canada Pension Plan payments and other current transfers that are normally deducted at source from wage and salary earnings and paid to provincial and federal governments. Because these transfers are in effect a proportion of personal wage and salary earnings, it was decided to distribute the Accounts total on transfers between the regions in proportion to the percentage regional distribution of the Census income

estimate of wages and salaries (item 1 in Table 4.2). That is, the Census estimate was considered a proxy variable for allocating the Accounts total on transfers from persons to government by means of method ii. (The final allocation is reported in column 2 of Table 4.16).

The third income item in Table 4.14 is corporate profit taxes collected by central government (both provincial and federal). These amount to a total of $1,505 million in 1971 and are in effect a proportion of corporate profits earned in the same year. Hence, the regional percentages of these profits were considered the best available proxy variable for allocating the Accounts total on such taxes among the regions using method ii. However, it is first necessary to allocate profits among the regions since no published data on profits at the regional level exists. The regional allocation of the Accounts total on corporate profits will be discussed in detail, as part of the business sector in Chapter V below. However, we use that allocation here to allocate taxes. The final allocation of corporate profit taxes is shown in column 3 of Table 4.16.

The fourth income item in Table 4.14 relates to indirect taxes collected by provincial and federal authorities. The provincial share ($1,751 million in 1971) consists essentially of a retail sales tax and a gasoline tax. Since the geographic incidence of these taxes is mostly oriented to the location of consumption, consumer expenditure by region is

regarded as the best available proxy variable for allocating provincial indirect taxes among the regions. Hence, the Accounts total on such taxes in Table 4.14 was allocated to each region in proportion to its percentage of personal consumption calculated from the data in column 4 of Table 4.5 above using method ii. These consumption figures, it will be recalled, were based on the procedure of aggregating individual consumption functions (Frank and Rash, 1968). The final allocation of provincial indirect taxes is reported in column 4 of Table 4.16.

Federal indirect taxes are of two kinds: an import duty imposed on foreign imports ($442 million) and an excise levy ($1,319 million) directed to, and mostly collected at the production source rather than at the location of consumption (Statistics Canada, 13-549E, 3, Occasional, 77). If we assume that the ratio of foreign imports to personal consumption is the same for all the regions[8], the import duty will be the same per dollar of consumption in each region and, therefore, will vary in proportion to each region's consumption. On this assumption, personal consumption by region derived in Table 4.5 may be used as a proxy variable for the regional allocation of federal import duties. Thus, the Accounts total on import duties, like that on provincial sales tax, is assigned to the regions in proportion to the region's percentage

[8]This assumption is necessary because of the well-known lack of data on expenditure and foreign trade at the regional level.

of this proxy variable using method ii. The final allocation of import duties is reported in column 5 of Table 4.16.

Since the federal excise tax falls on the goods-producing sectors (agriculture, forestry, mining and manufacturing) and is levied at the production source, the Census data on the value of production in these sectors, by region, may be regarded as a useful proxy for regional allocation. Thus, the Census value of production, in these four sectors combined, was derived for each region and regional shares were calculated as percentages of the Ontario total[9]. The final allocation of the federal excise levy is reported in column 6 of Table 4.16.

The regional allocation of central government interest and investment income ($348 million altogether) has proven to be a difficult task owing to the lack of relevant counterpart or proxy data at the regional level. Since this item consists mostly of interest received by the provincial government on loans and advances, it was decided to allocate it between the regions in proportion to each region's share in provincial government current expenditure. The procedure

[9]The Census data on the value of production by county and region in these sectors were made available to the author by the Primary and Manufacturing Industries Section, Central Statistical Services, Ontario Ministry of Treasury. The use of this information as a proxy for allocating various accounts totals, particularly in the business sector, among the regions is discussed in detail in Chapter V below. (See Tables 5.2-5.4.)

Table 4.16

The Regional Allocation of Central Government Income, Ontario, 1971

($ million)

Region	Direct Taxes from Persons	Other Transfers from Persons	Direct Taxes on Corporations	Net Indirect Taxes			Interest & Investment Income
				Provincial	Federal Duty	Federal Excise	
Eastern Ontario	517	215	107	207	52	66	23
Lake Ontario	146	69	59	74	19	42	20
Central Ontario	2,084	799	688	737	186	558	153
Niagara	539	195	179	184	46	173	16
Lake Erie	251	101	83	108	27	86	15
Lake St. Clair	279	118	141	116	29	153	9
Midwest	242	99	90	103	26	94	34
Georgian Bay	142	62	45	72	18	34	15
Northeast	261	117	77	108	28	84	40
Northwest	110	46	36	42	11	29	23
Ontario	4,571	1,821	1,505	1,751	442	1,319	348

used in allocating such expenditures between the regions is discussed below along with other central government expenditure items. It is realized that the proxy relationship between the variable and the Accounts total is rather weak in this case; accordingly, the resulting estimates of government interest and investment income by region (shown in the last column of Table 4.16) are intended to serve only as rough orders of magnitude until more relevant data become available and lead eventually to better regional estimates.

To complete this discussion on the regional allocation of central government income items, Table 4.16 gives the resulting regional estimates for each of the five Accounts totals.

3.b. Central Government - Expenditure Items

The major Accounts totals on central government expenditure are presented by the two component levels of government (provincial and federal) in Table 4.17. First, we consider the Accounts total on current expenditure by provincial government ($1,538 million). This figure consists mainly of provincial government wages and salaries (about 60 percent of the total) and of purchases of goods and services on current account. At present, there is no published information on the geographic distribution of provincial government expenditures in Ontario. However, in the fiscal year 1973-74, the Ontario Ministry of Treasury introduced, on an experimental basis, a

Table 4.17

Expenditures in Ontario of Central Government (Provincial & Federal), 1971

($ million)

Expenditure Item	Provincial Government	Federal Government	Central Government
1. Current Expenditure	1,538	1,332	2,870
2. Capital Expenditure	474	..[a]	474
3. Payments of interest on public debt	584	775	1,359
4. Transfers to persons	1,187	1,785	2,972
5. Current transfers to local government	2,329	b	2,329
6. Capital transfers to local government	126	b	126
7. Capital consumption allowances	157	..[a]	157

a = figure not available, and was assumed to be zero. This omission is likely to understate the expenditure side of the regional accounts.
b = figure not applicable or appropriate.

Source: Prepared for the author by the Provincial Accounts Section, Central Statistical Services, Ontario Ministry of Treasury.

regional coding system based on a sample of all government programs. This sample covered 38 percent of total government wage and salary payments and 10 per cent of total purchases of goods and services on current and capital accounts in that fiscal year. Each ministry was required to code by geographic location all expenditures (associated with the sample programs) falling into these two categories. The results were recorded on a regional basis and the experiment was repeated for the following two fiscal years with progressive enlargement of the sample size. The updated results displayed a uniform and stable pattern of government spending among the regions during the three year period. The regional percentage distribution based on the 1973-74 sample was made available to the author for purposes of this study[10]. The percentage regional shares of both wages and salaries and purchases of goods and services are presented in Table 4.18.

In short, the information underlying this geographic distribution was considered counterpart data that could be used for the regional allocation of the Accounts totals on provincial government wages and salaries as well as purchases of goods and services on both current and capital accounts in 1971. These Accounts totals were allocated to the regions

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[10] Data prepared by the Economic Development Branch, Ontario Ministry of Treasury. Because of the experimental nature of the project, other details on the sample and on the programs included were not released.

Table 4.18

Regional Percentage Distribution of Provincial Government Wages and Salaries and Purchases, Ontario, 1973-4

Region	Wages & Salaries	Purchases
Eastern Ontario	7.4	5.6
Lake Ontario	6.9	4.4
Central Ontario	43.3	45.4
Niagara	5.1	3.8
Lake Erie	4.8	3.3
Lake St. Clair	3.3	1.8
Midwest	6.4	14.6
Georgian Bay	5.0	3.3
Northeast	12.2	10.1
Northwest	5.6	7.7
Ontario	100.0	100.0

Source: Prepared by the Economic Development Branch, Ontario Ministry of Treasury.

in proportion to the regional shares shown in Table 4.18 by means of method i (counterpart allocation). The resulting estimates of current and capital expenditure by region are presented in Table 4.19.

Information on federal government expenditure in the Provincial Accounts is limited to wages and salaries on current account (Provincial Economic Accounts, 1961-1974, 1976, XVIII). The lack of Accounts information on federal government capital expenditure is thus likely to cause an understatement of the estimated expenditure side compared to the income side in each region. Because regional net trade is derived as a residual, i.e., as the difference between total income and total known expenditure, this omission may in turn accentuate any possible trade surplus or understate any possible trade deficit in the regions.

The regional distribution of more than half the federal government civilian wages and salaries (56 percent) is reported annually by Census Metropolitan Areas (CMA) or major urban centres (Statistics Canada, 72-205, annual). The procedure followed in allocating total federal government wages and salaries among the regions consisted of three steps. First, the known amount of federal government payments of civilian wages and salaries in metropolitan areas was assigned to the respective regions. Second, the balance (44 percent) of such wage and salary payments was allocated regionally in proportion to the regional labour force in federal civilian

Table 4.19

Estimates of Provincial Government Current and Capital Expenditures by Region, Ontario, 1971

($ million)

Region	Current Expenditure			Capital Expenditure		
	Wages & Salaries	Purchases	Total	Wages & Salaries	Purchases	Total
Eastern Ontario	67	35	102	2	25	27
Lake Ontario	62	28	90	2	20	22
Central Ontario	393	286	679	12	202	214
Niagara	46	24	70	1	17	18
Lake Erie	44	21	65	1	15	16
Lake St. Clair	30	11	41	1	8	9
Midwest	58	92	150	2	65	67
Georgian Bay	45	21	66	1	15	16
Northeast	111	64	175	4	45	49
Northwest	51	49	100	2	34	36
Ontario	907	631	1,538	28	446	474

Source: Prepared by Ontario Provincial Accounts Section, Ontario Ministry of Treasury, and Table 4.18.

administration outside the metropolitan areas, or in the Census Agglomerations (CA's) of the 1971 Census of Canada (Statistics Canada, 94-740, 94-742 and 94-743, 1975)[11]. In effect, the Census data on this type of labour force in the CA areas were considered a proxy variable for allocating to the regions the balance of federal government civilian wages and salaries by means of method ii.

The third and last step consisted of allocating total military pay in 1971 ($265 million) among the regions. Again, it was assumed that military wages and salaries were in the same proportion as the percentage share of each region of military personnel (labour force in federal defence services) located in the CMA and CA areas in the 1971 Census (Statistics Canada, 94-742 and 94-743, 1975)[12]. The three steps of allocation as well as their results are presented in Table 4.20.

The third Accounts total in Table 4.17 to be allocated is payments of interest on the public debt by both the provincial government ($584 million) and by the federal government ($775 million). The combined total of such payments ($1,364 million) was allocated to the regions in proportion to each region's percentage share in the Census estimate of income from interest and dividends received by individuals (item 4

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[11]Census Agglomerations are urban areas with populations of 25,000 or over.

[12]Because areas with a population of less than 25,000 were not covered by the Census, total military personnel in CMA and CA areas was 66 percent of the Ontario total. (Table 4.20)

Table 4.20

The Regional Allocation of Federal Government Wages and Salaries, Ontario, 1971

Region	Civilian wages and salaries in CMA ($m)	Labour force in CA		Allocation of non-CMA wages & salaries ($m)	Military personnel in CMA and CA		Allocation of military pay ($m)	Final Allocation of total federal pay($m)
		Absolute	Relative		Absolute	Relative		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1 + 4 + 7 = 8)
Eastern Ontario	426	-	-	-	13,835	47.3	125	551
Lake Ontario	-	2,005	31.6	143	5,840	20.0	53	196
Central Ontario	127	390	6.1	28	4,330	14.8	39	194
Niagara	16	1,355	21.3	97	920	3.1	8	121
Lake Erie	24	245	3.9	18	1,945	6.7	18	60
Lake St. Clair	10	320	5.0	23	445	1.5	4	37
Midwest	7	320	5.1	23	300	1.0	3	33
Georgian Bay	-	215	3.4	15	680	2.3	6	21
Northeast	3	775	12.2	55	685	2.3	6	64
Northwest	-	725	11.4	52	260	1.0	3	55
Ontario total	613	6,350	100.0	454	29,240[a]	100.0	265	1,332

[a]Because areas with populations of less than 25,000 were not covered, this total came to 66% of total military personal located in Ontario (44,070).

Source: Statistics Canada, 72-205, Sept. 1971.
Statistics Canada, 94-740, Dec. 1974.
Statistics Canada, 94-742 and 94-743, May, 1975.

in Table 4.2). The final allocation of these interest payments are shown in column 1 of Table 4.21.

In 1971, the provincial and federal governments spent $1,187 million and $1,785 million, respectively, in the form of transfer payments to persons as shown by item 4 in Table 4.17[13]. The combined Accounts total of such payments ($2,972 million) was allocated to the regions by means of method i, counterpart allocation. The counterpart variable used is the regional percentage distribution of total government transfers based on the Census data on income of individuals by source. The sources making up total transfers include family and youth allowances, old age pensions and miscellaneous government transfers, i.e., the sum of sources 6-8 in Table 4.2. The allocated Accounts total itself is reported in column 2 of Table 4.21.

Item 5 in Table 4.17 gives the combined Accounts total on current transfers from the provincial government to both the municipalities ($1,394 million) and to public hospitals ($935 million). It will be recalled that each of these two totals has already been allocated to the regions along with other income items of the local government in the preceeding section (Table 4.9). Similarly, transfers by the provincial government to municipalities on capital account ($126 million,

[13]These transfer payments include unemployment insurance, veteran pensions and allowances, welfare, mothers' allowance and old age pensions among others.

or item 6 in Table 4.17) were also allocated to the regions as an income item of local government in the previous section (see Table 4.9).

Capital consumption allowances of the provincial government were estimated at $157 million in 1971 (see item 7 in Table 4.17). These allowances were distributed to the regions in proportion to the regional percentage distribution of the sum of provincial government current and capital expenditure calculated from the allocated totals shown in Table 4.19 using method ii. The relation between the expenditure proxy used for allocation and the Accounts total on capital consumption allowances is obviously tenuous; however, the lack of better variables made it necessary to generate these regional estimates of capital consumption allowances which are intended to serve at best as orders of magnitude. Such estimates are in column 3 of Table 4.21.

To conclude this section on the regional allocation of central government expenditures, Table 4.21 presents the resulting regional estimates for items 3, 4 and 7 of Table 4.17. It will be recalled that the regional esimates of the first two expenditure items in the latter table, namely, current and capital expenditure, have already been presented in Table 4.19 (for the provincial government) and in column 8 of Table 4.20 (for the federal government). Similarly, the results of the regional allocation of item 5 in Table 4.17 (current transfers to local government) and of item 6 in the

same table (capital transfers to local government) have been presented in Table 4.9.

Table 4.21

The Regional Allocation of Central Government Expenditures, Ontario, 1971

($ million)

Region	Payments of Interest on Public Debt	Transfers to Persons	Capital Consumption Allowances
Eastern Ontario	146	385	10
Lake Ontario	56	176	9
Central Ontario	618	994	69
Niagara	143	359	7
Lake Erie	97	203	7
Lake St. Clair	81	210	4
Midwest	91	181	16
Georgian Bay	61	179	7
Northeast	51	194	18
Northwest	20	91	10
Ontario	1,364	2,972	157

To summarize, the procedure and the data used in the regional allocation of the Accounts totals in the personal sector, the local government sector and the central government sector have been presented in this Chapter. Regional allocation has been accomplished by first arranging the major Accounts totals in each sector into income and expenditure items, and then by selecting the best available proxy and counterpart variables from various data sources to prepare regional estimates. A description of the regional allocation **of the Accounts totals in the business sector**

is presented in Chapter V below. The regional estimates of this Chapter and those of Chapter V will provide the empirical basis for constructing the Ontario regional accounts matrix. The procedure involved in completing this matrix is the task of Chapter VI.

CHAPTER V

THE REGIONAL ALLOCATION OF PROVINCIAL ACCOUNTS: THE BUSINESS SECTOR

The main Accounts components of the business sector are: domestic investment income and capital consumption allowances (CCA) on the income side and business gross fixed capital formation (BGFCF) on the expenditure side. Further, domestic investment income may usefully be broken down into two components: corporate profits and interest and miscellaneous investment income. It will be recalled from the discussion on allocation methods in Chapter III that these four Accounts components are allocated to the regions by means of method iii, the two stage allocation procedure. The first stage calls for allocating each total among major industries in proportion to industry shares calculated from industry counterpart or proxy variables; in the second stage, the magnitudes for each industry are allocated to the regions in proportion to regional shares derived from regional counterpart or proxy variables and then summed up to give regional estimates of each Accounts total. The two stages are discussed simultaneously for each of these four Accounts totals in the business sector beginning with the income items.

1. Corporate Profits

In the Ontario Accounts, business domestic investment income in 1971 was estimated at about $4,764 million of which some $3,881 million or over 81 percent were corporate profits before tax and the remaining $883 million were interest and miscellaneous investment income. The corporate profits total included some $683 million which were paid as dividends to non-residents in the same year. Since the Ontario income and expenditure accounts were compiled using a national (provincial) rather than a domestic concept, these dividends were subtracted from corporate profits and the residual ($3,198 million) was entered as the profit component of Ontario's provincial income.

In accordance with the first stage of method iii this latter total ($3,198 million) was allocated first to eight major industry groups in proportion to the industry shares in 1971 taxable income of corporations (Statistics Canada, 61-208, annual). Taxable income of corporations constitutes a plausible proxy variable for corporate profits and in fact may even be regarded as a counterpart variable with certain conceptual differences.[1] Thus in 1971, taxable income amounted to $3,221 million, or about 83 percent of the Accounts

[1] Corporate profits in the Accounts include dividends from Canadian corporations and capital gains which are non-taxable and hence, are excluded from the taxable income of corporations. For other minor differences in concept between the two data sources see (Statistics Canada, 61-208, 1972, 19-21).

total on corporate profits of $3,881 million. The industrial breakdown of corporate taxable income, the corresponding industrial shares (percentages) and the resulting allocation of corporate profits are shown in Table 5.1.

We now turn to the second stage of method iii, namely, the regional allocation of each industry subtotal of corporate profits shown in Table 5.1. The first subtotal is corporate profits in agriculture and forestry which amounted to only 0.4 percent of the total ($13 million). A careful search for adequate counterpart or proxy variables to allocate this item among the regions has shown that the Census value of production in agriculture and forestry by county constitutes the best available proxy variable for this purpose. Data on the value of agricultural products by Census division (county) are published in the 1971 Census of Agriculture (Statistics Canada, 96-707, 1973). The Census value of production in forestry (logging) by county is not published; however, such data for 1971 were obtained in special tabulations. (Tables prepared for this study by the Primary and Manufacturing Industries Section, Central Statistical Services, Ontario Ministry of Treasury)[2].

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[2]Since unpublished Census data on the value of production or value added in other sectors (to be used in subsequent allocations) were also obtained from the same data source, this source will be referred to hereafter in abbreviation as the Ontario Central Statistical Services Census data source, or simply OCSS Census data Source.

Table 5.1

Taxable Income of Corporations and Corporate Profits by Major Industry, Ontario, 1971

Major Industry	Taxable Income ($m)	Taxable Income Percentage shares	Allocated total (Corporate Profits) ($m)
Agriculture & Forestry	13	0.4	13
Mining	59	1.8	57
Manufacturing	1,506	46.8	1,497
Construction & Housing	140	4.3	137
Transportation & Utilities	189	5.9	189
Trade	541	16.8	537
Finance	615	19.1	611
Services	158	4.9	157
Total	3,221	100.0	3,198

Source: Statistics Canada, 61-208, 1972

The regional figures in agriculture and forestry were derived from both sources by aggregating county data. For each region, the figures in the two industries were added together to obtain the value of production in agriculture and forestry combined. The relative share of each region was then calculated as a percentage of the Ontario total, and these shares were used as a proxy variable for allocating corporate profits in agriculture and forestry among the regions. The procedure involved in preparing the regional relative shares

(percentages) and the resulting allocation is set out in Table 5.2.

The second item to be allocated, corporate profits in mining, amounted to $57 million in 1971. Again, the Census value of production in mining by county in 1971 seemed to be the best available proxy variable for allocating this profit component by region. The necessary data at the county level were obtained from the OCSS Census data source and were aggregated regionally to calculate regional percentage shares that could be used as a proxy for allocating corporate profits in mining. The mining value of production by region, the percentage regional shares and the allocation of corporate profits in mining according to these shares are shown in Table 5.3.

Corporate profits in manufacturing is by far the largest single component of corporate profits, with a share of about 47 percent in 1971 as shown in Table 5.1 above. This profit component was allocated to the regions using a version of the operating surplus concept adopted by Statistics Canada for allocating national profits in manufacturing to the provinces (Provincial Economic Accounts 1961-1974, 1976, xii). Operating surplus is defined as the excess of value added over labour income, depreciation and indirect taxes less subsidies. The unpublished Census data obtained at the county level from the OCSS Census data source were richer in the case of manufacturing, since they included in addition to the Census value

Table 5.2

The Regional Allocation of Corporate Profits in Agrictulture and Forestry, Ontario, 1971

($ million)

Region	Value of Production				Allocated total (Corporate profits in agriculture & forestry)
	Agriculture	Forestry	Agriculture & Forestry		
			Absolute(2+3)	Relative	
1	2	3	4	5(%)	6
Eastern Ontario	134.0	10.0	144.0	8.7	1.1
Lake Ontario	99.0	0.7	99.7	6.0	0.8
Central Ontario	120.0	-	120.0	7.2	0.9
Niagara	146.0	-	146.0	8.8	1.2
Lake Erie	304.0	0.2	304.2	18.3	2.4
Lake St. Clair	179.0	-	179.0	10.8	1.4
Midwest	271.0	0.2	271.2	16.3	2.1
Georgian Bay	176.0	1.5	177.5	10.7	1.4
Northeast	18.0	83.7	101.7	6.1	0.8
Northwest	8.0	109.1	117.1	7.1	0.9
Ontario	1,455.0	205.4	1,660.4	100.0	13.0

Source: Statistics Canada, 96-707, 1973, Special tablulations prepared by the Primary and Manufacturing Industries Section, Central Statistical Services, Ontario Ministry of Treasury.

Table 5.3

The Regional Allocation of Corporate Profits in Mining, Ontario, 1971

($ million)

Region	Value of Production in Mining		Allocated Total (corporate profits in mining)
	Absolute	Relative	
1	2	3	4
		(percent)	
Eastern Ontario	3.6	0.3	0.2
Lake Ontario	16.4	1.2	0.7
Central Ontario	14.3	1.0	0.6
Niagara	17.1	1.2	0.7
Lake Erie	3.3	0.2	0.1
Lake St. Clair	13.6	1.0	0.6
Midwest	13.3	0.9	0.5
Georgian Bay	4.1	0.3	0.2
Northeast	1,171.8	82.9	47.2
Northwest	155.9	11.0	6.3
Ontario	1,413.4	100.0	57.0

Source: Tabulations prepared by the Primary and Manufacturing Industries Section, Central Statistical Services, Ontario Ministry of Treasury.

of production, wages and salaries and value added. With this additional information it was possible to derive an approximation of the concept of operating surplus defined above by subtracting wages and salaries from value added for each county and for the province. By aggregating county data to the regional level we were able to calculate a percentage share for each region in the Ontario total of operating surplus in manufacturing. Accordingly, the Accounts subtotal on corporate profits in manufacturing was distributed to the regions in proportion to these percentage regional shares of the operating surplus which served as a proxy variable. Table 5.4 shows the Census data base obtained on manufacturing by region, illustrates the procedure used to calculate the operating surplus in each region and gives the resulting allocation of the Accounts subtotal on corporate profits in manufacturing among the regions.

We now turn to the regional allocation of corporate profits in the last five industries of Table 5.1, namely, construction, transportation and utilities, trade, finance and services. For these industries, no Census or other data on value of production, value added, wages and salaries or other indicators are available by small geographic areas. However, it is possible to produce consistent estimates of regional wage and salary income for each of these industries by assembling a variety of ingredient microdata sets (e.g., employment and average earnings by industry) available at the regional

Table 5.4

The Regional Allocation of Corporate Profits in Manufacturing, Ontario, 1971

($ million)

Region	Census Data on Manufacturing					Allocated total (Corporate Profits in Manufacturing)
	Value of Production	Value Added	Wages & Salaries	Operating Surplus(3-4) Absolute	Operating Surplus(3-4) % Shares	
1	2	3	4	5	6(%)	7
Eastern Ontario	1,522.3	511.6	333.8	177.8	5.2	77.8
Lake Ontario	961.2	376.3	221.4	154.9	4.5	67.4
Central Ontario	14,130.3	4,346.3	2,854.8	1,491.5	43.3	648.2
Niagara	4,242.2	1,551.3	1,032.7	518.6	15.0	224.6
Lake Erie	1,874.0	497.6	316.8	180.8	5.2	77.8
Lake St. Clair	3,738.1	985.8	548.9	436.9	12.7	190.1
Midwest	2,109.4	732.0	473.7	758.3	7.5	112.3
Georgian Bay	698.4	243.4	151.8	91.6	2.7	40.4
Northeast	904.0	368.8	295.1	73.7	2.1	31.4
Northwest	463.5	160.3	97.5	62.8	1.8	27.0
Ontario	30,643.4	9,773.4	6,326.5	3,446.9	100.0	1,497.0

Source: Tabulation prepared by the Primary and Manufacturing Industries Section, Central Statistical Services, Ontario Ministry of Treasury.

level. The procedure of generating estimates from microdata sets for a variety of analytical purposes including integration with Accounts estimates is becoming an increasingly recognised practise in economic research. On this, Ruggles and Ruggles (1975, 214) commented recently:

> Economists are now utilizing a variety of techniques for aligning, imputing, and merging and matching microdata from different sources to create new sets of microdata for particular analytic purposes. These same techniques can be used to provide general-purpose microdata sets which are integrated with the national accounts.

Accordingly, estimates of wage and salary income by major industry in the 10 economic regions were prepared and were considered the best available proxy variable for the allocation of the Accounts subtotals on corporate profits in construction, transportation and utilities, trade, finance and services among the regions. The data sources, method and results of the process of generating these estimates are described in detail in Appendix A. The regional percentage distributions of wage and salary income estimates in the five industries adopted for regional allocation purposes are presented in Table 5.5. The final regional allocation of the profits of these industries is shown in the last five rows of Table 5.6 which reports the final allocation for all industries. The required estimates of corporate profits by region are also given as the sum of each column in Table 5.6.

Table 5.5

Percentage Regional Distribution of Wage and Salary Income Estimates by Major Service Industries, Ontario, 1971

Region	Construction	Transp., Communic. & Utilities	Trade	Finance	Services
Eastern Ontario	9.7	9.7	9.0	8.3	11.6
Lake Ontario	4.2	3.6	4.0	2.5	3.9
Central Ontario	41.8	45.5	46.1	58.3	42.1
Niagara	11.1	9.1	10.6	7.7	11.1
Lake Erie	6.0	5.3	5.8	6.3	6.2
Lake St. Clair	7.1	7.0	7.3	5.6	7.2
Midwest	5.7	3.5	5.2	4.5	5.3
Georgian Bay	4.7	3.7	3.6	2.3	3.6
Northeast	7.2	7.8	5.8	3.2	6.1
Northwest	2.5	4.8	2.6	1.3	2.9
Ontario	100.0	100.0	100.0	100.0	100.0

Source: Appendix A, Table A-8.

Table 5.6

The Regional Allocation of Corporate Profits by Industry, Ontario, 1971

($ million)

	EO	LO	CO	N	LE	LSTC	MW	GB	NE	NW	Ont.
Agr. & forestry	1.1	0.8	0.9	1.2	2.4	1.4	2.1	1.4	0.8	0.9	13.0
Mining	0.2	0.7	0.6	0.7	0.1	0.6	0.5	0.2	47.2	6.3	57.0
Mfg.	77.8	67.4	648.2	224.6	77.8	190.1	112.3	40.4	31.4	27.0	1,497.0
Construction	13.3	5.8	57.3	15.2	8.2	9.7	7.8	6.4	9.9	3.4	137.0
Transp. & Utilities	18.3	6.8	86.0	17.2	10.0	13.2	6.6	7.0	14.8	9.1	189.0
Trade	48.3	21.5	247.6	56.9	31.1	39.3	27.9	19.3	31.1	14.0	537.0
Finance	50.7	15.3	356.2	47.0	38.5	34.2	27.5	14.1	19.6	7.9	611.0
Services	18.2	6.1	66.1	17.4	9.7	11.3	8.3	5.7	9.6	4.6	157.0
Total	227.9	124.4	1,462.9	380.2	177.8	299.8	193.0	94.5	164.5	73.2	3,198.0

2. Interest and Miscellaneous Investment Income

The first stage of method iii calls for an allocation of this Accounts total ($883 million) among major industry groups as a prelude to regional allocation. However, it was not possible in this case to find suitable counterpart or proxy provincial variables for this purpose. Hence resort was made to a breakdown by major industry of the National Accounts total entitled other investment income (prepared by the Gross Domestic Product Division, Statistics Canada, June 1977). This item corresponds closely to the Provincial Accounts total (interest and miscellaneous investment income) to be allocated. The percentage industrial distribution of the National Accounts total shown in Table 5.7 has thus been used to distribute the provincial Accounts total among the same major industries thereby completing stage one of method iii. (The resulting allocation is also given in Table 5.7).

As stated above, interest and miscellaneous investment income area relatively small portion (about 19 percent) of the Accounts total on domestic investment income, or the return to capital in Ontario. The main reason for splitting up these returns into two components, corporate profits and interest and miscellaneous investment income, was to achieve the best possible industrial allocation of the total. In particular, the availability of good proxy (or even counterpart) data on taxable income of corporations by major industry rendered this breakdown rather useful. However, in trying to allocate the

Table 5.7

Other Investment Income (Canada) and Interest and Miscellaneous Investment Income (Ontario) by Major Industry, 1971

Industry	Other Investment Income (Canada)		Allocated total (Interest and Misc. Investment Income) (Ontario) ($m)
	Absolute ($m)	Relative Shares %	
Agriculture	220	5.3	47
Mining	66	1.6	14
Manufacturing	544	13.3	117
Construction	191	4.7	42
Transp. & Utilities	1,220	29.7	262
Trade	228	5.6	50
Finance	1,471	35.8	316
Services	165	4.0	35
Total	4,105	100.0	883

Source: Special tabulations prepared by the Gross Domestic Product Division, Statistics Canada.

industry subtotals of interest and miscellaneous investment income among the regions as part of the second stage of method iii, it has not been possible to locate any better proxy variables at the regional level than the ones already used for allocating the industry subtotals of corporate profits among these regions. Consequently, it was decided to use the same regional proxy variable to allocate the industry subtotals of interest and miscellaneous investment income shown in Table 5.7 above between the regions.

Thus the subtotal on interest and miscellaneous investment income in agriculture ($47 million) was allocated to the regions in proportion to the region's percentage of the value of production as reported by the Census in this sector (see item 2 in Table 5.2). Similarly, the Accounts subtotal on investment income arising in mining ($14 million) was also distributed to the regions in proportion to the region's percentage of the Census data on the value of production in mining (see item 3 in Table 5.3). The subtotal on interest and miscellaneous investment income originating in the manufacturing industry ($117 million) was allocated among the regions in proportion to the region's percentage of Ontario's operating surplus (see item 6 in Table 5.4). Finally, the set of wage and salary income estimates by major industry and region prepared in Appendix A and used for allocating corporate profits in the construction, transportation and utilities, trade, finance and service industries were adopted for distributing

interest and miscellaneous investment income accruing in these five industries among the 10 economic regions (see Table 5.5). This completes the second stage of method iii applied to the allocation of the Accounts total on interest and investment income. The results of allocating this Accounts total first among industries and then among regions in accordance with the two stages of method iii are given in Table 5.8.

3. Capital Consumption Allowances

The Accounts total on private and public capital consumption allowances (CCA) was estimated at $3,946 million in 1971. The first stage of method iii requires that this total be distributed among major industries prior to the allocation of each industry subtotal among the regions in the second stage. The best available counterpart variable for producing an industry breakdown of CCA is found in a report entitled Fixed Capital Flows and Stocks, Ontario, 1955-1975 (Construction Division, Statistics Canada, 1976, hereafter referred to as the Report). The variable of interest in this report consists of capital consumption allowances (CCA) by major industry derived by applying a straight line depreciation formula to gross capital stock estimates in each industry. The Report's estimates of CCA may be classified into 11 major industry groups as shown in Table 5.9.

The main difference between the Accounts total on CCA and the Report's total is one of coverage; the former includes

Table 5.8

The Regional Allocation of Interest and Miscellaneous Investment Income by Industry, Ontario, 1971

($ million)

	EO	LO	CO	N	LE	LSTC	MW	GB	NE	NW	Ont.
Agriculture	4.3	3.2	3.9	4.7	9.8	5.8	8.7	5.7	0.6	.3	47.0
Mining	0.1	0.2	0.1	0.2	-	0.1	0.1	0.1	11.6	1.5	14.0
Mfg.	6.1	5.3	50.7	17.5	6.1	14.8	8.8	3.2	2.4	2.1	117.0
Construction	4.1	1.8	17.5	4.7	2.5	3.0	2.4	2.0	3.0	1.0	42.0
Transp. & Utilities	25.4	9.4	119.2	23.8	13.9	18.3	9.1	9.7	20.7	12.5	262.0
Trade	4.5	2.0	23.0	5.3	2.9	3.7	2.6	1.8	2.9	1.3	50.0
Finance	26.3	7.9	184.2	24.3	19.9	17.7	14.2	7.3	10.1	4.1	316.0
Services	4.1	1.4	14.7	3.9	2.2	2.5	1.8	1.3	2.1	1.0	35.0
Total	74.0	31.2	413.3	84.4	37.3	65.9	47.7	31.1	53.4	23.8	883.0

Table 5.9

Capital Consumption Allowances by Major Industry in Ontario, 1971

Industry		($m)
1.	Agriculture	216
2.	Forestry	11
3.	Mining	113
4.	Manufacturing	888
5.	Construction	78
6.	Transportation & Utilities	599
7.	Trade	159
8.	Finance	90
9.	Services (excluding institutions)	166
10.	Institutions (public & private)	191
11.	Government departments	315
	Total	2,826

Source: Fixed Capital Flows and Stocks, Ontario, 1955-1975, Construction Division, Statistics Canada, Oct. 1976.

CCA on residential construction (housing) and the latter does not. Thus, in order to use the Report's data as a basis for distributing the Accounts total on CCA between the major industries of Table 5.9, an estimate for CCA in housing is needed[3]. Correspondence with the Gross Domestic Product Division, Statistics Canada, revealed that the conceptual differences between the Accounts data and the Report's data on CCA were negligible and, in fact, this estimate may be derived as a residual, i.e., as the difference between the Accounts total ($3,946 million) and the Report's total ($2,826) on CCA. (The latter total includes depreciation in all major industries except housing). It is implicit in this method of estimation that the resulting industrial distribution of the Accounts total will, in effect, coincide with that of the Report as shown in Table 5.9 - the only difference being the addition of an estimate of CCA in the housing industry ($1,120 million).

Since we are dealing in this section with the allocation of capital consumption allowances in the business sector only, an additional adjustment to the industrial breakdown of

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[3]Since depreciation on residential construction is part of the Accounts total on CCA, the term 'housing industry' may conveniently be used in this context to denote the addition of a 'dummy industry' to the Report's list of major industries to accommodate this type of depreciation, which is part of the Accounts total but not of the Report's.

the Report's data in Table 5.9 is required. It is clear from this Table that the Report combines private and public institutions into a single industry, Institutions (item 10), and assigns a separate industry (item 11) for government departments. At a more general level, however, private institutions are usually classified under the service industry of item 9 in the Table, whereas public institutions (public schools, hospitals, etc.) are part of the public sector in the Accounts, i.e., the estimate of CCA by these institutions is combined with the estimate for government departments in the Accounts data.

Thus, in order to separate the business sector's part of CCA from the public sector in the Report's data, the figure on institutions (item 10 in Table 5.9) was subdivided into two component estimates; one for private institutions and one for public institutions. This was based on the assumption that the share to be assigned to public institutions plus the known CCA estimate for government departments (item 11) add up to total CCA in the public sector as a whole. Because of the lack of any major conceptual differences between the Accounts data and the Report in the treatment of CCA, it was further assumed that the Accounts total on public sector CCA ($402 million) may also serve as an estimate of CCA by this sector in the Report's data. Thus by subtracting $315 million, or the share of government departments in CCA, (item 11 in Table 5.9) from this Accounts total we derive an estimate

of CCA by public institutions alone ($87 million). This latter estimate was also subtracted from the figure on CCA by all institutions in item 10 ($191 million) to obtain an estimate of CCA by private institutions alone ($104 million). Finally, the two derived estimates for private institutions and public institutions were added to the CCA figure on the service industry (item 9) and to the CCA figure on government departments (item 11), respectively, to produce an adjusted industrial breakdown as shown in Table 5.10[4]. This completes the first stage of method iii with respect to the industrial allocation of the Accounts total on capital consumption allowances.

We now turn to the second stage of method iii in which the industry subtotals of business CCA shown in Table 5.10 (items 1-10) are allocated to the regions. Again, the Census data on the value of production by region in agriculture, forestry and mining presented in Table 5.2, and 5.3 appear to be the best available proxy variable for allocating CCA in these three sectors among the regions. It is important to note that the paucity of data at the regional level related to these industries restricts the scope of choice with respect to the allocation variables. Thus, the CCA total in each of these

[4]This adjusted industrial breakdown also includes the appended industry housing to the list of industries originally found in the Report and shown in Table 5.9. The breakdown of Table 5.10 also includes CCA by the public sector (item 11); however, this item was allocated to the regions along with other government sector items in Chapter IV.

Table 5.10

The Allocation of the Accounts Total on Capital Consumption Allowances by Major Industry, Ontario, 1971

Industry	($m)
1. Agriculture	216
2. Forestry	11
3. Mining	113
4. Manufacturing	888
5. Housing	1,120
6. Construction	78
7. Transp. & Utilities	599
8. Trade	159
9. Finance	90
10. Services	270
11. Public Sector	402
Total	3,946

Source: Table 5.9

three industries was allocated to the regions in proportion to each region's percentage of the value of production as reported in the Census data for the respective industry. These regional shares were calculated from the data in Tables 5.2 and 5.3 above and the resulting allocations are shown in Table 5.12.

In the case of manufacturing, three proxy variables at the regional level were obtained from the OCSS Census data source: The value of production, value added and wages and salaries. To determine which of these variables was most appropriate for the allocation of the Accounts subtotal on CCA in manufacturing among the regions, the following procedure was adopted. First, the ratio of CCA in manufacturing for Ontario to each of these variables was calculated for the period 1960-1974[5]. The time series ratio with the smallest variance was used as the criterion for selecting the best available proxy variable for regional allocation. This variable again turned out to be the value of production in manufacturing[6]; accordingly, regional shares calculated from the Census data on this variable found in Table 5.4 were used for

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[5]The time series data on CCA in manufacturing for Ontario were obtained from the Report on Fixed Capital Flows and Stocks in Ontario, 1976 and the time series data on value of production, value added and wages and salaries are found in Ontario Statistics, 1976, vol. 2, (Ontario Ministry of Treasury, 1976, 657).

[6]The variances were: 0.000011 for wages and salaries, 0.0000072 for value added and 0.0000012 for value of production.

distributing CCA in manufacturing among the regions in accordance with stage two of method iii.

Capital consumption allowances or depreciation in residential housing were allocated to the regions in proportion to each region's percentage of housing values derived from the 1971 Census data (Statistics Canada, 93-732, 1973). The regional percentages shown in Table 5.11 were calculated by aggregating county data on housing values and the resulting regional allocation of CCA in housing is reported in Table 5.12[7].

As for capital consumption allowances in the last five industries of the business sector (industries 6-10 in Table 5.10), namely, construction, transportation and utilities, trade, finance and services, these were again allocated to the regions in proportion to the set of regional wage and salary income estimates prepared for each of these industries in Appendix A; that is, in proportion to the region's percentage of wage and salary income in these industries shown in Table 5.5. These shares were adopted as the best available proxy for allocating CCA in each industry (see Table 5.12 for the allocation results).

The results on regional allocation of each CCA item

[7]Another regional aggregation, Average Cash Rents, was also derived from the 1971 Census of Housing and is shown in Table 5.11; it is intended to serve as a proxy for the regional allocation of the Accounts total on profits of persons from tenant-paid rent in Chapter VI below (see Table 6.2).

Table 5.11

Regional Distribution of Average Housing Values and Average Cash Rents, Ontario, 1971

Region	Ave. Housing Values		Ave. Cash Rents	
	Absolute ($m)	Percentage Shares	Absolute ($m)	Percentage Shares
Eastern Ontario	2,550	9.7	13.9	13.3
Lake Ontario	1,145	4.4	2.8	2.7
Central Ontario	11,527	43.9	54.8	52.4
Niagara	3,288	12.5	9.1	8.7
Lake Erie	1,484	5.6	5.3	5.1
Lake St. Clair	1,826	7.0	4.6	4.4
Midwest	1,558	5.9	5.0	4.8
Georgian Bay	1,095	4.2	2.5	2.4
Northeast	1,245	4.7	5.0	4.8
Northwest	541	2.1	1.5	1.4
Ontario	26,259	100.0	104.5	100.0

Source: Statistics Canada, 93-732, 1973, Vol. II.

of Table 5.10, except item 11, mark the completion of the second stage of method iii which has been used for allocating the Accounts total on CCA in the business sector. The regional allocation of all industries is reported in Table 5.12 and estimates of capital consumption allowances by region may readily be derived by summing the industry estimates for each region as shown in this table.

4. Business Gross Fixed Capital Formation (BGFCF)

The Accounts total on gross fixed capital formation by both the business and the public sectors was estimated at $7,209 million in 1971. The first stage of method iii requires that this total be distributed among major industries prior to the allocation of each industry subtotal among the regions in the second stage. The best available counterpart variable for producing an industry breakdown of the Accounts total on capital formation is found in the Report on Fixed Capital Flows and Stocks in Ontario already discussed in the previous section (Construction Division, Statistics Canada, Oct. 1976). It will be recalled that this Report provided the counterpart data for distributing the Accounts total on capital consumption allowances among major industries. The Report also contains a breakdown of gross fixed capital formation by the same major industries, shown here in Table 5.13.

The capital formation data in the Report were obtained by processing and re-arranging various information including

Table 5.12

The Regional Allocation of Business Capital Consumption Allowances by Industry, Ontario, 1971

($ million)

	EO	LO	CO	N	LE	LSTC	MW	GB	NB	NW	ONT.
Agriculture	19.9	14.7	17.9	21.6	45.1	26.6	40.2	26.1	2.6	1.3	216.0
Forestry	0.6	-	-	-	-	-	0.1	-	4.5	5.9	11.0
Mining	0.3	1.4	1.1	1.4	0.2	1.1	1.0	0.4	93.7	12.4	113.0
Manufacturing	44.4	27.5	409.4	122.6	54.2	108.3	61.3	20.4	26.6	13.3	888.0
Housing	108.6	49.3	491.7	140.0	62.7	78.4	66.2	47.0	52.6	23.5	1,120.0
Construction	7.6	3.3	32.6	8.7	4.7	5.5	4.4	3.7	5.6	1.9	78.0
Transp. & Utilities	58.1	21.5	272.5	54.5	31.7	41.9	21.0	22.2	46.9	28.7	599.0
Trade	14.3	6.4	73.3	16.9	9.2	11.6	8.3	5.7	9.2	4.1	159.0
Finance	7.5	2.2	52.5	6.9	5.7	5.0	4.0	2.1	2.9	1.2	90.0
Services	31.3	10.5	113.7	30.0	16.7	19.5	14.3	9.7	16.5	7.8	270.0
Total	292.6	136.8	1,464.7	402.6	230.2	297.9	220.8	137.3	261.1	100.1	3,544.0

the annual records of capital and repair expenditure of the Private and Public Investment Survey conducted by Statistics Canada (see the Report, 1976, v-vi). As in the case of capital consumption allowances, the basic difference between the Accounts total on gross fixed capital formation and the Report's total is one of coverage; the former includes capital formation in residential construction (housing) and the latter does not. In addition, there are a few minor differences in concept between the two data sources concerning the treatment of such items as capitalization of real estate commissions, adjustment for capital items charged to business operating accounts, residential improvements and capital expenditure on defence.

Correspondence with the Gross National Product Division, Statistics Canada, revealed that the total effect of these differences was negligible. Hence, it was decided to follow the same procedure used for estimating capital consumption allowances in housing. That is, the difference ($1,431 million) between the Accounts total on gross fixed capital formation ($7,209 million) and the Report's total ($5,788 million) was used as an estimate for capital formation in housing[8]. Thus, the first adjustment to the Report's industrial breakdown of capital formation was to add this estimate of capital formation in housing to the list of industries in Table 5.13

Since we are dealing in this section with the allocation

[8]This type of investment should be distinguished from capital formation in the construction industry which is shown separately as item 5 in Table 5.13.

Table 5.13

Gross Fixed Capital Formation by Major Industry, Ontario, 1971

Industry		($m)
1.	Agriculture	264
2.	Forestry	8
3.	Mining	228
4.	Manufacturing	1,291
5.	Construction	107
6.	Transportation and utilities	1,590
7.	Trade	205
8.	Finance	318
9.	Services (excluding institutions)	361
10.	Institutions (private & public)	544
11.	Government departments	862
	Total	5,778

Source: Fixed Capital Flows and Stocks in Ontario, 1955-1975, Construction Division, Statistics Canada, Oct. 1976).

of capital formation in the business sector only, an additional adjustment to the industrial breakdown of the Report's data in Table 5.13 is required. As can be seen from this Table, the Report combines private and public institutions into a single industry, Institutions, (item 10), and assigns a separate industry for government departments (item 11). As mentioned earlier, however, private institutions are usually considered part of the service industry (item 9), whereas public institutions (public schools, hospitals, etc.) are part of the public sector in the Accounts, i.e., the estimate of capital formation by these institutions is combined with those of government departments. Thus, in order to present the business sector's part of capital formation in the Report's data separately, item 10, Institutions, in Table 5.13 was subdivided into two component estimates; one for private institutions and one for public institutions. This was based on the assumption that the estimated share to be assigned to public institutions plus the known estimate for government departments (item 11) add up to total capital formation in the public sector as a whole. Because of the lack of any major conceptual differences between the Accounts data and the Report in the treatment of capital formation, it was further assumed that the Accounts total on public sector capital formation ($1,214 million) provides a corresponding estimate for capital formation by this sector that could be appended to the Report's data. Thus, by subtracting $862 million, or the share of

government departments in capital formation (item 11 in Table 5.13), from this Accounts total we derive an estimate of capital formation by public institutions alone ($352 million). This latter estimate was also subtracted from $544 million or the share of institutions (item 10) to obtain an estimate for capital formation by private institutions alone ($191 million). Finally the two derived estimates for private institutions and public institutions were added to the figure on capital formation in the service industry (item 9) and to the capital formation figure for government departments (item 11), respectively, to produce an adjusted industrial breakdown as shown in Table 5.14. This breakdown completes the first stage of method iii with respect to the industrial allocation of the Accounts total on capital formation.

Table 5.14

The Allocation of the Accounts Total on Gross Fixed Capital Formation by Industry, Ontario, 1971

Industry	($m)
1. Agriculture	264
2. Forestry	8
3. Mining	228
4. Manufacturing	1,291
5. Housing	1,431
6. Construction	107
7. Transp. & utilities	1,590
8. Trade	205

9. Finance	318
10. Services	553
11. Public sector	1,214
Total	7,209

Source: Table 4.13

We now come to the second stage of method iii in which the industry subtotals of business capital formation (items 1-10) in Table 5.13 are allocated to the regions[9]. The Census data on the value of production by region in agriculture, forestry and mining presented in Tables 5.2 and 5.3 above seem, once again, to be the best available proxy variables for allocating capital formation in these three sectors among the regions, especially in view of the lack of sufficient regional data on these sectors. Thus, capital formation in each of these three industries was allocated to the 10 economic regions in proportion to each region's percentage of the value of production in the respective industry calculated from the Census data. (The percentage regional shares are shown in Tables 5.2 and 5.3 above and the results on allocation are reported in Table 5.16).

As stated earlier three proxy variables on manufacturing were obtained at the regional level from the OCSS Census data source, namely, the value of production, value

[9]The regional allocation of capital formation by the public sector was accomplished in Chapter IV above (see pages 91-95).

added and wages and salaries. To determine which of these three variables was most appropriate for the allocation of the Accounts subtotal on capital formation in manufacturing, the same procedure used for selecting the most relevant variable for allocating capital consumption allowances in this industry was followed. Thus, the ratio of capital formation in manufacturing for Ontario as a whole to each of these three variables was calculated during 1960-1974[10]. The time series ratio with the smallest variance was used as a criterion for selecting the best available variable for regional allocation. Again, the value of production was the chosen proxy variable[11]. Accordingly, regional shares calculated from the data in Table 5.4 were used as a proxy for distributing capital formation in manufacturing among the regions as required by the second stage of method iii. (The results on regional allocation are presented in Table 5.16).

The Accounts subtotal on capital formation in residential construction (housing) was allocated to the regions in proportion to each region's percentage of the total value of building permits averaged over a three year period 1969-71

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[10]The time series data on capital formation in manufacturing for Ontario were obtained from the Report (Construction Division, Statistics Canada, Oct. 1976) and the time series data on value of production, value added and wages and salaries are found in Ontario Statistics, 1976, vol. II, (Ontario Ministry of Treasury, 1976, 657).

[11]The variances were 0.0013 for wages and salaries, 0.0004 for value added and 0.00007 for value of production.

(tabulations prepared by the Construction Division, Statistics Canada). These data were considered the best available proxy variable for this purpose and the averaging of annual values in 1969-1971 was deemed useful because of the 1-2 year lag between the issuance of building permits and the commencement of construction. The regional distribution of the average value of building permits is shown in Table 5.15 and the resulting regional allocation of capital formation in residential construction is reported in Table 5.16.

Finally, capital formation in the last five industries of the business sector in Table 5.1, namely, construction, transportation and utilities, trade, finance and services, was allocated to the regions in proportion to each region's percentage in wage and salary income originating in each of these industries and which was estimated in Appendix A for regional allocation purposes. These regional percentages (presented in Table 5.5) were thus considered the best available proxy for allocating gross fixed capital formation in each service industry. The results of this regional allocation are reported in Table 5.16.

This allocation marks the end of the second stage of method iii aimed at achieving a regional allocation of items 1-10 of the Accounts total on business gross capital formation as shown in Table 5.14. The results on the regional distribution of each item are presented in Table 5.16 and estimates of business capital formation in each region can be readily

Table 5.15

The Regional Percentage Distribution of the Average Value of Building Permits, Ontario, 1969-1971

Region	Percentage Distribution
Eastern Ontario	11.7
Lake Ontario	3.7
Central Ontario	49.2
Niagara	8.3
Lake Erie	5.3
Lake St. Clair	5.6
Midwest	5.5
Georgian Bay	3.9
Northeast	5.2
Northwest	1.6
Ontario	100.0

Source: Data prepared by the Construction Division, Statistics Canada.

Table 5.16

The Regional Allocation of Business Gross Fixed Capital Formation by Major Industry, Ontario, 1971

($ million)

	EO	LO	CO	N	LE	LSTC	MW	GB	NE	NW	ONT.
Agriculture	24.3	17.9	21.9	26.4	55.2	32.5	49.1	31.9	3.2	1.6	264.0
Forestry	0.4	-	-	-	-	-	-	-	3.3	4.3	8.0
Mining	0.7	2.7	2.3	2.7	0.4	2.3	2.1	0.7	189.0	25.1	228.0
Manufacturing	64.5	40.0	595.1	178.2	78.8	157.5	89.1	29.7	38.7	17.4	1,291.0
Housing	167.4	53.0	704.1	118.8	75.8	80.1	78.7	55.8	74.4	22.9	1,431.0
Construction	10.4	4.5	44.7	11.9	6.4	7.6	6.1	5.0	7.7	2.7	107.0
Transp. & utilities	154.2	57.2	723.5	144.7	84.3	111.3	55.7	58.8	124.0	76.3	1,590.0
Trade	18.4	8.2	94.5	21.7	11.9	15.0	10.7	7.4	11.9	5.3	205.0
Finance	26.4	8.0	185.4	24.5	20.0	17.8	14.3	7.3	10.2	4.1	318.0
Services	64.2	21.6	232.8	61.4	34.3	39.8	29.3	19.9	33.7	16.0	553.0
Total	530.0	213.1	2,604.3	590.3	367.1	463.9	335.1	216.5	496.1	177.7	5,995.0

derived by summing over industry estimates for each region.

To summarize, the method and data sources used in the regional allocation of the main Accounts totals in the business sector were presented in this Chapter. For this purpose, method iii, or the two stage allocation procedure was found particularly useful. A variety of data sources provided counterpart variables or proxies for allocating corporate profits, interest and miscellaneous investment income, capital consumption allowances and business capital formation among major industries as required by the first stage of method iii. Next, each industry magnitude was allocated to the regions by means of a relevant counterpart or proxy variable at the regional level. Finally, the results were summed over industries to produce the required regional allocation of each of the four Accounts totals. In the next Chapter, these results and the allocation results of the previous Chapter on the personal and business sectors will be used to complete the matrix of regional accounts for Ontario in 1971.

CHAPTER VI

ESTIMATES OF REGIONAL ECONOMIC ACCOUNTS FOR ONTARIO

This chapter attempts to draw together the conceptual design of regional accounting (described in Chapter II), the methods of allocation (discussed in Chapter III) and the results of regional allocation (presented in Chapters IV and V) in an effort to produce estimates for regional economic accounts in Ontario. The procedure followed is to arrange the Ontario Accounts components in 1971 in such a way as to generate either directly or by allocation estimates for the entries shown in Table 2.6 of Chapter II. This Table will thus provide the starting point for the estimates produced in the following sections. The estimates are shown separately according to major type of account and are eventually integrated into the 36x36 matrix showing all the Accounts for the 10 economic regions. The matrix is, of course, an enlarged version of the accounting arrangement shown in Table 2.6 of Chapter II.

The emphasis in this Chapter will be on how the individual entries of the Ontario regional accounts matrix are derived using the results of the previous four Chapters. Hence, a certain amount of repetition and referral to details in these Chapters is to be expected, and in fact, is unavoidable in view of the approach adopted. To minimize the

inconvenience that might result, only the broad conclusions are discussed and references to previous tabular and other material are made where necessary.

We start in section one by discussing the estimation of the major incoming entry into the appropriation account of each region, namely, regional income because it plays a basic role in determining other entries in the accounts. Section two deals with estimates for other incoming entries into the regional appropriation account. Section three presents all the outgoings of the appropriation account. In section four, estimates for both the product and capital accounts of each region are developed. All the entries of the central government account are estimated in section five. Section six is devoted to showing how estimates for all regions and the rest of the world account are derived as residuals, i.e., by balancing the incomings and outgoings of the rest of the system. Finally, section seven contains an overview of all the regional estimates obtained and some comments on the adequacy or reasonableness of residual estimates.

1. Incomings into the Regional Appropriation Account (Regional Income)

The incomings into this account for say region j (as shown in Table 2.6 on page 28 of Chapter II), are gross domestic income produced in region j Y_{jj}, current gifts and transfers received by the region from central government G_{jg}, net

factor income received by j from all other regions and the rest of the world Y_{jr} and net current transfers received by j from all regions and the rest of the world G_{jr}. In this section, estimates of each region's gross domestic income Y_{jj} are developed. These consist of the following provincial Accounts totals, arranged by personal and non-personal sectors:

A. Personal Sector

i. Labour income:

a. Wages and salaries (including supplementary labour income and military pay)

b. Farm self-employment income

c. Non-farm self-employment income

ii. Non-labour income

a. Net profit from tenant-paid rent

b. Net profit from owner-occupied rent

c. Personal dividends

d. Interest and miscellaneous investment income of persons

B. Non-personal sector

i. Corporate profits

ii. Government interest and investment income

iii. Capital consumption allowances (CCA)

Estimates of regional income are derived simply by allocating these Accounts totals to the regions using the methods and data sources described in Chapters III and IV. However, it is important to note that regional income estimates

prepared in this section refer to income produced within each region. The distinction between income produced within a region and income received by its residents is reminiscent of the difference between domestic and national (provincial) measures of income at the national level. It receives even more emphasis in regional accounting because the discrepancy between the two income measures is likely to be relatively large when applied to the income of regions. Greater economic 'openness' and factor mobility (of labour and capital) as well as functional interdependence among the regions may result in a substantial difference between income produced within a given region and income received by its residents.

The ability to identify sources (origins) and destinations (receipts) of regional income is, however, a function of data availability. Past experience has indicated that success in this regard is essentially limited to the Accounts components of the personal sector (Woodword, 1970, 74-75 and Brown, 1972, 60-63). Thus inter-regional income flows caused by differences between 'income-produced' and 'income-received' by the non-personal sectors (e.g., corporations and governments) have to be ignored for lack of information and because the location of non-persons "...in any sense other than that of their establishments has been taken to be unimportant in the scheme of regional accounting" (Brown, 1972, 61).

As for the personal sector, differences between income produced within a region and income received by its

residents may arise inter alia from inter-regional commuting of labour. Because the Ontario regions are relatively large in size and functionally independent (Camu, et al, 1964, 265), labour commuting between the regions may in general be assumed to be insignificant. Admittedly, the assumption may be contested in perhaps a few instances where conspicuous inter-regional commuting seems to occur, e.g., commuting between Hamilton in Niagara and Burlington in Central Ontario. In this, the direction of error is known but determination of the magnitude of error must await future research. In the remaining regions, the assumption offers a great advantage in that it simplifies the measurement of regional labour income. In view of the scarcity of reliable data on labour commuting, such measurement might not even be possible. On this assumption, labour income produced within each region would coincide with income received by labour residing in that region.

Thus, it is only in relation to the components of non-labour income (item A.ii above) that a distinction between regional sources and destinations will be attempted. Net profits from tenant-paid rent, personal dividends and interest and miscellaneous investment income of persons will be estimated for each region first on a where-produced basis (origins) and then on a where-received basis (destination). When each of these estimates is added to estimates of labour income and of income originating in the non-personal sector of each region, an approximation of regional income Y_{jj} on a

where-produced basis and on a where-received basis in each region would be derived, respectively. The difference between the two income measures (or specifically the difference between the regional origins and destinations of non-labour income of persons) constitutes the net flow of inter-regional factor income in Ontario for purposes of this study.

It will be recalled from the conceptual framework of regional accounting discussed in Chapter II that this net flow was denoted by Y_{jr} and was loosely referred to as the net flow of factor income in region j from all regions and the rest of the world. It is important now to define this net flow (Y_{jr}) more precisely in the context of regional income estimates in Ontario. First, we have just seen that it refers only to the net flow of non-labour income in the personal sector (i.e., to the difference between origins and destinations of profits from tenant-paid rent, personal dividends and interest and investment income)[1]. Second, it includes the net receipts of such income (by a given region) only from the rest of the Ontario regions, i.e., it does not include the net flow that could occur between each region in Ontario and the rest of the world.

The reason for this exclusion is that Ontario's income was compiled or estimated on a 'national' (provincial) basis rather than on a 'domestic' basis. This means that all factor payments by Ontario (and its component regions) to the rest

[1]Obviously the origin and destination of profits from owner-occupied rent are the same.

of Canada and the rest of the world are already subtracted from its income (and that of its component regions), while all receipts of such income by Ontario (and its component regions) from the rest of Canada and the rest of the world are already added to Ontario's income (and that of its regions). Since regional income estimates in this study are essentially derived by allocating the Ontario Accounts totals (income and expenditure components) between the regions, it follows that net factor income between each region and the rest of Canada and the rest of the world are already included in its regional income (Y_{jj}). Hence Y_{jr} refers to net receipts of non-labour income of persons (item ii above) in the jth region from the rest of the Ontario regions only, and $\Sigma_j Y_{jr}$ (j = i....s regions) would thus be equal to 0.

We now proceed with the estimation of regional income Y_{jj} on a where-produced basis in this section and then discuss in the next section income estimates on a where-received basis by adding estimates of Y_{jr}, net income earned in other regions to Y_{jj}. Under the assumption that net labour commuting is zero, estimates of labour income (item i.a-c) by region in Ontario are derived by allocating the Accounts totals on such income in proportion to the region's percentage of income of individuals **in** the Census data which have been compiled on a household or residency basis (Table 4.2 in Chapter IV).

The non-labour portion of personal income is allocated

to the regions in this section on a where-produced basis in accordance with the conceptual underpinnings of gross regional income Y_{jj}. Thus, profits from owner-occupied and tenant-paid rents are distributed to the regions in proportion to the regional percentage distribution of the proxy Census data on average housing values (method ii) and of the counterpart data on average cash rents (method i), respectively (see Table 5.11 in Chapter V). Personal dividends paid to Ontario residents are taken as a fixed proportion of corporate profits (of which they are a part) and have been allocated to the regions in proportion to the regional distribution of these profits[2].

It will be recalled from Chapters III and V that corporate profits, interest and miscellaneous investment income and business capital consumption allowances (CCA) were allocated to the regions by means of the two-stage allocation procedure of method iii. Thus, each of these Accounts totals

[2]In 1971, the Accounts total on corporate profits before tax in Ontario was estimated at $3,881 million of which, $175 million or 4.5 percent, were paid as dividends to Ontario residents. In estimating each region's gross domestic income Y_{jj}, personal dividends were allocated to the regions of origin in proportion to the regional distribution of corporate profits, and are not, for this reason, shown separately in Table 5.1 below. Dividends paid to non-residents amounted to $683 million or 17.6 percent of corporate profits. Since the Ontario Accounts were compiled on a 'national' basis, these dividends were subtracted from provincial income and, consequently, from regional income estimates.

was first broken down by industry and then industry sub-totals were in turn allocated to the regions using various data at the local level, and summed up to produce regional estimates (Tables 5.6, 5.2 and 5.12 of Chapter V).

The two remaining items in the non-personal sector (see page 141above) are government interest and investment income (item B.ii) and government capital consumption allowances, CCA (part of item B.iii). The first consisted mostly of interest payments on provincial government loans and advances and was allocated to the regions in proportion to the regional percentage distribution of proxy data on provincial government current expenditures (i.e., by means of method ii, see Table 4.16 in Chapter IV). The Accounts total on CCA by hospitals was allocated to the regions in proportion to the regional percentage distribution of the counterpart data on depreciation in public hospitals (see Table 4.13 in Chapter IV). The Accounts totals on CCA by municipal and central (provincial) governments were assigned regionally in proportion to the regional percentage distribution of the sum of current and capital expenditures by the two levels of government, respectively (see Table 4.12 and 4.21 in Chapter IV).

This completes the estimation of the 10 items comprising the personal and non-personal components of regional income Y_{jj} as shown on page 141 above. The results for all the regions are given in Table 6.1 and as necessary from the allocation procedure, the sum of regional incomes $\Sigma_j Y_{jj}$ equals

Table 6.1

Gross Domestic Income by Region, 1971

($ million)

	Ontario	Eastern Ontario	Lake Ontario	Central Ontario	Niagara	Lake Erie	Lake St. Clair	Mid-West	Georgian Bay	North-East	North-West
1. Wages, salaries, supplementary labour income & military pay.	22,510	2,652	846	9,878	2,415	1,252	1,454	1,229	765	1,445	574
2. Net income of farm operators.	352	41	25	35	33	77	46	49	33	8	5
3. Net income of non-farm unincorporated business.	1,703	185	79	731	165	113	111	100	88	92	39
4. Net profit from tenant-paid rent.	324	43	9	170	28	16	14	15	8	16	5
5. Net profit from owner-occupied rent.	447	43	20	196	56	25	31	27	19	21	9
6. Corporate profits less dividends paid to non-residents.	3,198	228	124	1,463	380	173	300	193	95	164	73
7. Interest and miscellaneous investment income.	885	75	31	413	85	57	66	48	31	54	24
8. Government interest and investment income.	398	23	20	153	16	15	9	34	15	40	23
9. Capital consumption allowances adjusted for inventory valuation and residual error.	3,182	267	124	1,324	353	204	254	204	124	236	92
10. Gross product at factor cost Y_{jj}.	32,949	3,557	1,278	14,363	3,531	1,937	2,285	1,899	1,178	2,016	844

the Ontario total as reported in the 1971 Accounts ($32,949 million).

2. Other Incomings into the Regional Appropriation Account

In this section, we consider first net factor income received by each region from all regions and the rest of the world Y_{jr}. As mentioned above, this net income flow is estimated only for the personal sector largely because information on the regional origins and destinations of income in the non-personal sector is not available. Further, and in line with the assumption adopted on inter-regional commuting and with the national concept underlying the compilation of the Ontario income Accounts, Y_{jr} refers only to net non-labour income received by persons in region j from all other regions. As such, it includes the difference between the payments (origins) of net profit from tenant-paid rent[3], personal dividends and personal interest and investment income on the one hand and the receipts (destinations) of such components on the other. The payments side provides an estimate of the amount of such income produced within a region and the destinations side gives an estimate of the amount received by the region, with the difference being Y_{jr}.

It will be recalled that the payments side has already been estimated in the course of allocating the personal components of the Accounts income totals among the regions to obtain estimates of regional gross domestic income (Y_{jj}). To

[3]Obviously owner-occupied rents are generated only on a residency basis.

estimate the destinations side, resort was made to the Census data on income of individuals by source which give a measure of income received by resident households. Accordingly, the receipts of net profits from tenant-paid rent were allocated to the regions by means of method ii, and in proportion to the regional percentage distribution of other investment income including rent (see income source 5 as shown in Table 4.2 in Chapter IV). Also, the receipts of personal dividends and interest and investment income were allocated to the regions in proportion to the regional percentage distribution of interest and dividends, or income source (4) of the same table, using method i. The estimates of both origins and destinations of these components of personal property income as well as the difference or net receipts of such income (Y_{jr}) are presented in Table 6.2.

Next we consider the entry G_{jg} (in Table 2.6 of Chapter II), or net current transfers and gifts received by region j from central government. The non-personal components of G_{jg} include all indirect taxes collected by local governments but entered for accounting purposes in the central government appropriation account as both an incoming entry in indirect taxes I_{gj} and an outgoing entry in current transfers G_{jg}. These were re-assigned to the regions in proportion to the regional percentage distribution of local government taxes calculated from the Blue Book using method i (see Table 4.8 in Chapter IV). The two other non-personal components

Table 6.2

Regional Origins and Destinations of Personal Property Income, 1971

($ million)

	Ontario	Eastern Ontario	Lake Ontario	Central Ontario	Niagara	Lake Erie	Lake St. Clair	Mid-West	Georgian Bay	North-East	North-West
Origins (payments)											
1. Net profit from tenant-paid rent.	324	43	9	170	28	16	14	15	8	16	5
2. Dividends paid to persons.	175	12	9	80	21	10	16	11	5	9	4
3. Interest and miscellaneous investment income.	885	75	31	413	85	57	66	48	31	54	24
4. Total (origins).	1,384	130	47	663	134	83	96	74	44	79	33
Destinations (receipts)											
5. Net profit from tenant-paid rent.	324	33	14	153	33	19	19	20	14	14	5
6. Dividends paid to persons.[1]	175										
7. Interest and miscellaneous investment income.	885	116	43	471	111	81	64	73	48	37	16
8. Total (destinations).	1,384	149	57	624	144	100	83	93	62	51	21
9. Net receipts (8 - 4) Y_{Jr}.		19	10	-39	10	17	-13	19	18	-28	-12

[1] combined with item 7 in the regional totals since the same allocators are used for both 6 and 7.

are transfers from central government to local government and transfers to hospitals in each region. The first was derived directly from the Blue Book by aggregating county data, whereas transfers to hospitals were allocated to the regions in proportion to the percentage regional distribution of the counterpart variable on public hospitals' ward revenue from government, (see Tables 4.8 and 4.9 in Chapter IV)[4].

The personal sector's share in current transfers G_{jg} consisted of transfer payments to persons such as unemployment insurance payments, veterans pensions and allowances, welfare, mothers' allowances, old age pensions, etc. These payments amounted to $2,972 million in 1971 and were allocated to the regions by means of method i, i.e., in proportion to the regional percentage distribution of total government transfers based on the Census data on income of individuals by source (see pages 57-60 and Table 4.2 in Chapter IV).

The last incoming entry into the regional appropriation account is current net transfers received by region j from all regions and the rest of the world (G_{jr}). In general, this is a small item consisting essentially of net remittances which are extremely elusive to trace in terms of both origins and destinations. Consequently, they are obtained as a residual, or as a balancing item between the incomings and outgoings of the regional appropriation account.

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[4]The results are shown in conjunction with the estimates of central government current account in Table 6.6 below.

The estimates generated so far provide the main components necessary for the derivation of personal income in each region. These components are: wages and salaries, farm self-employment income, non-farm self-employment income, owner-occupied rent (items 1, 2, 3 and 5 in Table 6.1), tenant-paid rent, dividends and interest received by persons (items 5-7 in Table 6.2) and government transfer payments. In addition, persons received about $122 million in 1971 as current transfers (mostly charitable contributions and bad debts). Like government transfers, this small amount was allocated to the regions in proportion to the regional percentage distribution of total transfers (i.e., the sum of sources 6-8 of the Census data on income of individuals by source using method i, see Table 4.2 and 4.21 in Chapter IV)[5]. Persons also received some $1,364 million in 1971 as interest on public and consumer debt. These payments were allocated to the regions in proportion to the regional percentage distribution of interest and dividends (source 4) as reported in the Census data on income (Tables 4.2 and 4.21 in Chapter IV), by means of method ii.

3. Outgoing Entries of the Regional Appropriation Account

The outgoing entries of the appropriation account consist of regional consumption C_{jj}, regional saving S_{jj} and

[5]In Table 6.3 on personal income, these transfers are combined with government transfers for allocation purposes and are shown as one entry totalling $3,099 million for Ontario.

direct taxes paid by the region to the central government D_{gj}. Since the first two components consist essentially of consumption and saving by persons which are normally considered a function of personal disposable income (PDI), it is convenient to derive an estimate of the latter first. Estimates of PDI by region could be readily obtained by subtracting from the estimates of personal income, personal direct taxes and personal transfers to government. The latter two components are part of the last outgoing entry of the appropriation account, namely, direct taxes D_{gj}[6]. Thus, it would be appropriate to start with this entry first in order to estimate (PDI) and accordingly derive the regional estimates of consumption C_{jj} and savings S_{jj} which comprise the other two outgoing entries of the regional appropriation account.

Personal direct taxes were allocated to the regions in proportion to the percentage distribution of the National Revenue data on direct taxes by means of method i (see Table 4.15 in Chapter IV). Transfers from persons to government consist mostly of insurance contributions, Canada Pension Plan payments and other current transfers that are usually deducted at source from wage and salary earnings. To allocate these transfers among the regions we considered the

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[6]This is in accordance with the scheme of regional accounting in Chapter II (Table 2.6). D_{gj} also includes corporate profit tax which is allocated to the regions in proportion to the regional percentage distribution of corporate profits (see item 6 in Table 6.1), or by means of method ii.

regional percentage distribution of wages and salaries as a reasonable proxy. Thus, personal transfers were allocated to the regions in proportion to the regional percentage distribution of wages and salaries by means of method ii (Table 4.16 in Chapter IV).

By subtracting personal direct taxes and transfers to government from estimates of personal income, we obtain an estimate of personal disposable income (PDI) in each region. It will be recalled from Chapter IV that estimates of personal consumer expenditure in each region, which comprised the main component of regional consumption (C_{jj}), were based on our estimated consumption function for Canada as a whole which was assumed to hold in each region. (The derived estimates are shown in Table 4.5 of Chapter IV). The steps involved in estimating personal income and PDI, as well as the results on personal consumption, are presented in Table 6.3.

The two other components of regional consumption are current expenditures by local government and hospitals in each region. The first was estimated by allocating the Accounts total among the regions in proportion to the regional percentage distribution of local government expenditures as reported in the Blue Book using method i (see Table 4.11 in Chapter IV). Estimates for the three components comprising regional consumption C_{jj} are presented in Table 6.4 below:

Table 6.3

Personal Disposable Income and Personal Expenditure by Region, 1971

($ million)

	Ontario	Eastern Ontario	Lake Ontario	Central Ontario	Niagara	Lake Erie	Lake St. Clair	Mid-West	Georgian Bay	North-East	North-West
1. Personal factor income (items 1 - 3 and 5, Table 6.1).	25,012	2,921	970	10,840	2,669	1,467	1,642	1,405	905	1,566	627
2. Dividends, interest and rent paid to persons.	1,384	149	57	624	144	100	83	93	62	51	21
3. Transfer payments to persons.	3,099	399	181	1,050	372	211	219	188	184	201	94
4. Interest on public and consumer debt.	1,364	146	56	618	143	97	81	91	61	51	20
5. Personal Income.	30,859	3,615	1,264	13,132	3,328	1,875	2,025	1,777	1,212	1,869	762
6. Less direct taxes on persons.	4,571	517	146	2,084	539	251	279	242	142	261	110
7. Less transfers from persons to government.	1,821	215	69	799	195	101	118	99	62	117	46
8. Personal disposable income.	24,467	2,883	1,049	10,249	2,594	1,523	1,628	1,436	1,008	1,491	606
9. Personal consumer expenditure.	22,275	2,626	946	9,374	2,347	1,376	1,467	1,306	905	1,379	549

Table 6.4

Estimates of Regional Consumption C_{jj}, Ontario, 1971

($ million)

Region	Personal Consumption	Local gov't. current expense	Hospitals current expense	Regional Consumption(C_{jj})
Eastern Ontario	2,628	286	116	3,030
Lake Ontario	958	103	34	1,095
Central Ontario	9,311	1,110	351	10,772
Niagara	2,361	264	103	2,728
Lake Erie	1,381	134	60	1,575
Lake St. Clair	1,492	151	46	1,689
Midwest	1,314	129	46	1,489
Georgian Bay	913	100	34	1,047
Northeast	1,360	112	48	1,520
Northwest	557	51	25	633
Ontario	22,375	2,440	863	25,577

Source: Tables 4.5, 4.11 and 4.13 in Chapter IV.

The last outgoing entry in the appropriation account is regional saving S_{jj}, which will be estimated together with regional investment V_{jj} as part of a regional saving and investment account in the next section.

4. Regional Product and Capital Accounts

The incoming entries into the product account, as shown in Table 2.6 of Chapter II, are: regional consumption C_{jj}, regional investment V_{jj}, central government current consumption in region j (C_{jg}), central government capital expenditure in the region (V_{jg}) and net regional exports to all regions

and the rest of the world (X_{jr}). C_{jj} has already been estimated as part of the appropriation account in each region. Central government current and capital expenditures in the regions are estimated as part of the central government account which we shall consider separately below. Also, net regional exports (derived as a residual) are discussed along with all the regions and the rest of the world account later in this Chapter.

As stated earlier, estimates of regional investment (V_{jj}) and regional savings (S_{jj}) are developed simultaneously in this section. The first consists of three components: business gross fixed capital formation (BGFCF), local government capital expenditure and hospitals' capital expenditure. As explained in Chapter IV, BGFCF has been allocated to the regions indirectly by means of method iii (two-stage allocation). This entailed first a breakdown of the Accounts total by industry, and secondly, industry subtotals were in turn allocated to the regions and summed up to produce regional estimates (see Table 4.16 in Chapter IV). Capital spending by local governments was distributed to the regions in proportion to the percentage regional distribution of the counterpart data on such spending as obtained from the Blue Book, i.e., by means of method i (see Table 4.11 in Chapter IV). Capital expenditure by hospitals was allocated to the regions in proportion to the regional percentage distribution of the proxy variable on gross operating costs of public hospitals,

using method ii (Table 4.13 in Chapter IV).

The five major components of regional savings S_{jj} are: personal net saving, retained (undistributed) profits, business capital consumption allowances (CCA), local government and hospital CCA and local government saving. Net personal saving is taken as a fixed proportion of personal gross saving in each region. The latter was derived as a residual, i.e., as the difference between personal disposable income (PDI) and estimates of consumer expenditure in each region (Table 4.5 in Chapter IV).

In 1971, corporations in Ontario retained 45.2 percent of their total corporate profits (less dividends paid to non-residents) before tax. In deriving regional estimates of retained profits, we assumed that each region retained the same percentage of its corporate profits as did the whole province, i.e., regional retained profits were calculated by applying Ontario's percentage (45.2) to each region's corporate profit estimate as shown in Table 6.1 above.

The regional allocation of capital consumption allowances by business and governments (including hospitals) has already been accomplished along with estimates of regional income Y_{jj} in section 1 of this Chapter. The last component of regional saving is local government saving which amounted to some $154 million in 1971. The regional figures for this saving item were obtained directly from the Blue Book by building up from county data. Thus, a regional investment and

saving account showing V_{jj} and S_{jj} for each region and for the province is obtained from these component estimates as can be seen in Table 6.5.

The outgoing entries of each region's product account as shown in Table 2.6 (Chapter II) are gross domestic income in each region (Y_{jj}) and indirect taxes collected from the region by central government (I_{gj}). The former has already been estimated as part of the appropriation account, and estimates for the latter will be derived as part of the central government account later in this Chapter.

We now turn to the capital account of each region. According to the conceptual framework established in Chapter II (Table 2.6), the incomings into this account comprise regional saving (S_{jj}) and transfers on capital account from central government to local government (T_{jg}). The first entry has already been estimated and is given in Table 6.5. The second entry (T_{jg}) will be dealt with later when we consider the central government account.

The outgoing entries of regional capital accounts include regional investment (V_{jj}), which has already been estimated for each region as part of the product account. Included also is net borrowing (lending) by central government to the regions (B_{gj}). Again,this entry will be estimated along with other central government transactions in the central government account. The last outgoing entry is net borrowing (lending) by each region from all the regions and

Table 6.5

Regional Investment and Saving Account, 1971

($ million)

	Ontario	Eastern Ontario	Lake Ontario	Central Ontario	Niagara	Lake Erie	Lake St. Clair	Mid-West	Georgian Bay	North-East	North-West
1. Business gross fixed capital formation adjusted for inventory valuation and residual error.	6,294	560	227	2,733	617	384	485	353	227	523	189
2. Local government gross capital expenditure.	646	74	24	286	98	28	39	31	21	32	12
3. Hospital gross capital expenditure.	95	13	4	38	11	7	5	5	4	5	3
Regional Investment V_{jj}.	7,040	647	255	3,057	728	419	529	389	252	560	209
4. Personal net saving.	1,905	223	90	760	215	128	141	112	90	97	49
5. Retained profits.	1,446	103	56	661	172	81	136	87	43	74	33
6. Business capital consumption allowances adjusted for inventory valuation and residual error.	2,780	231	103	1,148	314	181	234	178	108	206	78
7. Local government and hospitals capital consumption allowances.	245	29	10	109	28	13	15	13	10	12	6
8. Local government savings.	154	17	5	65	17	10	9	11	8	8	4
Regional Savings S_{jj}.	6,530	603	289	2,743	746	413	535	395	259	397	170

the rest of the world (B_{rj}). This will be derived as a residual by balancing the outgoings and incomings of the capital account in each region as will be shown in section 6 below.

5. Central Government Account

According to the conceptual framework of Chapter II, central government includes the provincial as well as the federal levels of government (Table 2.6). Since all the producing activities of central government are included in each region's gross regional product, the incomings and outgoings of the production account of central government are zeros as might be expected. However, they are used to accommodate the residual error of estimate E in the Ontario Accounts which amounted to $448 million in 1971.

Thus, we start with the incomings of the appropriation account of central government which consist of: net indirect taxes paid by the regions $\Sigma_j I_{gj}$, direct taxes $\Sigma_j D_{gj}$ and factor income received by central government from all regions and the rest of the world Y_{gr}. Net indirect taxes are levied by all three levels of government. The inclusion of local government indirect taxes (mostly property taxes) in the central government account was simply an accounting convenience since these taxes were subsequently returned to the regions as part of current transfers by central government in entry $\Sigma_j G_{jg}$. As pointed out in Chapter IV, the provincial Accounts total on

local government indirect taxes was allocated to the regions in proportion to the regional percentage distribution of the counterpart variable on local taxes obtained from the Blue Book by means of method i (see Table 4.7 in Chapter IV). The regional allocation of net indirect taxes paid by the regions to central government (i.e., to provincial and federal authorities) has been described in detail in section 3 of Chapter IV and the results are presented in Table 4.16.

The second incoming entry is direct taxes $\sum_j D_{gj}$ collected by central government. This has already been allocated to the regions in the context of estimating the outgoings of each region's appropriation account as discussed in section 3 above (See Table 6.3). The last incoming entry into the central government appropriation account is factor income received by the central government Y_{gr}. This included profits on government enterprises and interest and investment income of government which totalled $503 million in 1971. However, interest payments on public debt amounting to $1,216 million in the same year are treated as negative income from property (see Stone, 1961, 277), and consequently, the entry itself (Y_{gr}) is negative (-$713 million). It should be emphasized that profits of government enterprises and government interest and investment income have already been included in each region's gross domestic income Y_{jj} (see items 6 and 8 in Table 6.1). Further, interest payments on public debt have been assigned to the regions as part of personal income in

each region (see item 4 of Table 6.3 above). Hence, the government net property income Y_{gr} is introduced as an incoming entry in the central government appropriation account (without a regional breakdown) to maintain the accounting identity between total government receipts (incomings) and payments (outgoings).

The outgoings of the appropriation account of central government consist first of provincial and federal current expenditures in the regions $\sum_j C_{jg}$. The procedure used in estimating these two Accounts totals for the regions has been described in detail in section 3 of Chapter IV and the results were presented in Table 4.19 for provincial current expenditure and in Table 4.20 for federal current expenditure. The second outgoing entry is net current transfers and gifts received by the regions from central government $\sum_j G_{jg}$. The components of this entry have already been estimated for each region in connection with the incomings of the regional appropriation account, as discussed in section two of this Chapter. However, the final allocation of these transfers is shown in Table 6.6 below as an outgoing entry of the central government appropriation account.

Next, we consider the entry S_{gg} or central government saving. The Accounts total on government saving (both local and provincial) was $486 million in 1971. It will be recalled from section 4 above that local government saving was obtained directly from the Blue Book for each region and was added to

Table 6.6

Central Government Appropriation Account, 1971

($ million)

	Ontario	Eastern Ontario	Lake Ontario	Central Ontario	Niagara	Lake Erie	Lake St. Clair	Mid-West	Georgian Bay	North-East	North-West
Incomings:											
1. Local government indirect taxes.	1,800	178	58	862	194	94	103	42	59	117	38
2. Provincial indirect taxes.	1,751	207	74	737	184	108	116	103	72	108	42
3. Federal indirect taxes.	1,761	118	61	744	214	113	182	120	52	112	40
4. Total (I_{gj}).	5,312	503	193	2,343	597	320	401	315	183	337	120
5. Direct taxes on persons.	4,571	51	146	2,084	539	251	279	242	142	261	1
6. Transfers from persons.	1,821	215	69	799	195	101	118	99	62	117	46
7. Corporate profit tax.	1,505	107	59	688	179	83	141	90	45	77	36
8. Total (D_{gj}).	7,897	834	274	3,571	913	435	588	431	249	455	192
9. Factor income (Y_{gr}).	-713										
Outgoings:											
10. Provincial expenditure.	1,538	102	90	679	70	65	41	150	66	175	100
11. Federal expenditure.	1,332	551	196	194	121	60	37	33	29	64	55
12 Total (C_{jg}).	2,870	653	286	873	191	125	78	183	87	239	155
13. Transfers to persons.	2,972	385	176	994	359	203	210	181	179	194	91
14. Transfers to local government.	1,394	170	63	630	155	74	79	71	58	67	27
15. Transfers to hospitals.	935	120	36	376	115	71	51	49	38	52	27
16. Local government indirect taxes.	1,800	178	58	862	194	99	103	92	59	117	38
Total (G_{jg}).	7,101	853	333	2,862	823	447	443	393	334	430	183
17. Central government savings (S_{gr}).	332										
18. Current expenditure abroad (C_{rg}).	0										
19. Current transfers to the rest of the world (balancing item) (G_{rg})	2,193										

personal saving in the region to derive the entry for regional saving S_{jj} shown in Table 6.5. The Blue Book data on local government saving sum up to a total of $154 million. The difference between the Accounts total ($486 million) and this Blue Book total was assumed to be central government saving S_{gg} ($332 million in 1971) and was entered as an outgoing entry in the central government appropriation account.

Central government current expenditures abroad C_{rg} are treated as imports in the provincial Accounts. Hence, this entry will be zero. Net government current transfers to other regions and the rest of the world G_{rg} are in effect the difference between what the central government collects by way of taxes and other income from the Ontario regions and what it spends in these regions by way of current expenditures and transfers to individuals and institutions. Therefore, this entry is estimated as a residual or by balancing the incoming and outgoing entries of the appropriation account of central government. The estimates for all these entries are presented in Table 6.6 and item 20 of this Table shows the balancing amount on current transfers to the rest of Canada and the world (+$2,193 million in 1971)[7].

According to the regional accounting framework developed in Chapter II (Table 2.6), the first incoming entry

[7]While this is a large item, one should keep in mind that Ontario ranks foremost among the 'have' provinces of Canada and has traditionally been a donor province under federal-provincial tax and fiscal arrangements.

into the central government capital account is net borrowing by the central government from the regions $\Sigma_j B_{gj}$. In effect, this entry is negative and constitutes lending of central government to local governments in the regions. Due to the consolidation of provincial and local levels of government in the Ontario Provincial Accounts, no separate Accounts total on such lending was available from Accounts sources. Consequently, the Blue Book figures on borrowing by local governments from provincial and federal levels were aggregated to obtain direct regional estimates as already shown in Table 4.9 in Chapter IV.

The second incoming entry into the capital account of central government is saving S_{gg} which has already been estimated as an outgoing entry in the current account. The last incoming item is net central government borrowing from the regions and the rest of the world B_{gr}. This is obtained as a residual, or by balancing the incomings and the outgoings of the central government capital account.

The outgoing entries of the capital account consist first of central government capital expenditure in the regions $\Sigma_j V_{jg}$. Included in this total is provincial government capital spending which has been allocated to the regions in proportion to the percentage regional distribution of provincial government wages and salaries and purchases obtained from the Ontario government experimental coding study (see Table 4.18 and 4.19 in Chapter IV).

The second outgoing entry of the central government capital account is capital transfers from central government to local government in the regions $\Sigma_j T_{jg}$. As stated in Chapter IV, local government statements on these transfers found in the Blue Book were used as direct regional estimates for this entry (see Table 4.9 in Chapter IV).

The last outgoing entry of the central government capital account is capital transfers abroad T_{rg}. This entry is not shown in the Ontario Accounts and, therefore, is assumed to be zero[8]. Table 6.7 gives a summary of the regional estimates of the incomings and outgoings of the central government capital account.

6. All Regions and the Rest of the World Account

Most of the entries in this account are estimated as residuals, i.e., by balancing the incomings and outgoings of the individual regions' account, the central government account and all regions and the rest of the world account. Thus, taking region j as an example the incomings into its product account are regional consumption C_{jj}, regional investment V_{jj}, central government current consumption in the region C_{jg}, central government capital expenditure V_{jg} and

[8]Capital transfers abroad are essentially a federal government transaction undertaken on behalf of the country as a whole rather than on a provincial basis. Since the amount involved is usually very small, the assumption used is not likely to affect the regional estimates.

Table 6.7

Central Government Capital Account, 1971

($ million)

	Ontario	Eastern Ontario	Lake Ontario	Central Ontario	Niagara	Lake Erie	Lake St. Clair	Mid-West	Georgian Bay	North-East	North-West
Incomings:											
1. Local government borrowing from central government (B_{gj}).	-84	-3	-2	-46	-16	-4	-5	-3	-3	-1	-1
2. Central government saving (S_{gg}).	332										
3. Central government borrowing from all the regions and the rest of the world (balancing item((B_{gr}).	352										
Outgoings:											
4. Gross capital expenditure (V_{jg}).	474	27	22	214	18	16	9	67	16	49	36
5. Capital transfers to local government (T_{jg}).	126	21	7	50	18	6	7	6	3	5	3
6. Capital transfers to the rest of the world (T_{rg}).	0										

the region's net exports to all regions and the rest of the world X_{jr}. The sum of these incoming entries which represents the region's gross expenditure should equal the outgoings of the region's product account, namely, its gross domestic income Y_{jj} plus indirect taxes I_{gj}. Hence, we have the familiar accounting result (equality of income and expenditure) at the regional level:

$$Y_{jj} + I_{gj} \equiv C_{jj} + V_{jj} + C_{jg} + X_{jr}$$

All these entries were obtained by allocating the provincial Accounts totals to the regions except net exports X_{jr}, which is obtained as a residual, i.e., by balancing the incomings and outgoings of the region's product account. Further, upon summing over j, we derive the Ontario income and expenditure totals as shown in the 1971 Accounts (in $ millions):

$$\sum_j Y_{jj} + \sum_j I_{gj} \equiv \sum_j C_{jj} + \sum_j V_{jj} + \sum_j C_{jg} + \sum_j V_{jg} + \sum_j X_{jr}$$

$$\$32,949 + 5,312 \equiv \$25,577 + 7,040 + 2,870 + 474 + 2,300 \equiv \$38,211\text{m}.$$

The incomings into j's appropriation account are the region's gross domestic income Y_{jj}, the current transfers it received from central government G_{jg}, its net factor income from all regions and the rest of the world Y_{jr}[9] and its net

[9] It should be pointed out that Y_{jr} refers to net factor income received by region j from all regions in Ontario only. The balance of factor income between Ontario and the rest of the world is already included in the provincial Accounts income estimates which are based on a 'national' rather than a 'domestic' concept. Hence, $\sum_j Y_{jr} = 0$.

current transfers from all regions and the rest of the world G_{jr}. The outgoings are regional consumption C_{jj}, regional saving S_{jj} and direct taxes paid to the central government D_{gj}. Both sides in the appropriation account must be equal:

$$C_{jj} + S_{jj} + D_{gj} = Y_{jj} + G_{jg} + Y_{jr} + G_{jr}$$

All the entries have been estimated directly or by allocating the appropriate Accounts totals among the regions, with the exception of net current gifts from all the regions and the rest of the world G_{jr}. Again, this entry is estimated as a residual or by balancing the two sides of the appropriation account. If we sum over j (regions), we derive the provincial Accounts totals shown in the 1971 Accounts (in $ million):

$$\sum_j C_{jj} + \sum_j S_{jj} + \sum_j D_{gj} \equiv \sum_j Y_{jj} + \sum_j G_{jg} + \sum_j Y_{jr} + \sum_j G_{jr}$$

$\$25,577 + 6,530 + 7,897 \equiv \$32,949 + 7,101 + 0 - 47 \equiv \$40,004$m.

The incomings into region j's capital account are regional saving S_{jj} and capital transfers received from the central government T_{jg}. To match these we have the following outgoing entries: regional investment V_{jj}, net borrowing by the region from central government B_{gj} and net borrowing (lending) from all regions and the rest of the world B_{rj}. Hence, the following accounting identity applies to the region's capital account:

$$V_{jj} + B_{gj} + B_{rj} \equiv S_{jj} + T_{jg}$$

It will be recalled that these entries have been estimated

directly or by allocating the Accounts totals to the regions. The only exception is net borrowing (lending) from all regions and the rest of the world B_{rj} which has been obtained by balancing the two sides of the account. Again, if we sum over j, we derive the Accounts totals for the Province as shown in the 1971 Ontario Accounts:

$\$7,038 - 84 - 298 \equiv \$6,530 + 126 \equiv \$6,656$m.

We now turn to the central government account. It will be recalled that the incomings and outgoings of the product account here are all zeros and that this account is used basically to accommodate the residual error of estimate ($448 million in 1971). The incomings of the appropriation account are indirect taxes (less subsidies) collected from the regions by central government $\Sigma_j I_{gj}$, direct taxes paid by the regions to central government $\Sigma_j D_{gj}$, and net factor (property) income received (paid) by central government from (to) the regions and the rest of the world Y_{gr}[10]. On the outgoing side, we have central government current expenditure in the regions $\Sigma_j C_{jg}$ and abroad C_{rg}[11], central government current transfers to the regions $\Sigma_j G_{jg}$, central government saving S_{gg}, and central government current transfers to the rest of Canada G_{rg}. Hence, we have the following accounting result for the

[10] Because of the treatment of interest payments on public debt as a negative income from property, this entry is negative.

[11] Since central government current expenditure abroad C_{rg} is apparently regarded as an import item in the Ontario Accounts, it is treated as a zero entry.

central government appropriation account:

$$\sum_j C_{jg} + \sum_j G_{jg} + G_{rg} \equiv \sum_j I_{gj} + \sum_j D_{gj} + Y_{gr}$$

All these entries have been estimated directly or by allocation of the appropriation accounts totals, except current transfers by central government to the rest of the world G_{rg}. If we enter the regional estimates into the two sides of the identity and sum over j, we could obtain G_{rg} as a residual. This operation is illustrated in Table 6.6 in which G_{rg} is estimated at $2,193 million.

The incomings of the central government capital account consist of net borrowing (lending) by central government in the regions $\sum_j B_{gj}$, central government saving S_{gg} and central government net borrowing from all regions and the rest of the world B_{gr}. The column (outgoings) shows central government capital expenditure in the regions $\sum_j V_{jg}$, central government capital transfers to the regions $\sum_j T_{jg}$ and central government transfers abroad T_{rg} (which has no entry in the Ontario Accounts). Hence, we have the following accounting identity for the capital account of central government:

$$\sum_j V_{jg} + \sum_j T_{jg} \equiv \sum_j B_{gj} + S_{gg} + B_{gr}$$

All these entries have been estimated directly or by allocation, except central government borrowing abroad B_{gr} which is derived as a residual. Table 6.7 illustrates the balancing operation performed on central government capital account and gives the value assigned to B_{gr} as a residual ($352 million).

The incomings (row) of the product account in all the regions and the rest of the world account are all zeros since no record of any central government expenditure abroad G_{rg} is given in the Ontario Accounts. The outgoings of the product account consist of net exports by the regions to the regions and the rest of the world $\Sigma_j X_{jr}$, regional net factor income $\Sigma_j Y_{jr}$[12], central government net factor income Y_{gr} and a balancing transfer equivalent to Ontario's trade balance with the rest of the world M_{rr}. Hence, we have the following accounting identity:

$$\Sigma_j X_{jr} + \Sigma_j Y_{jr} + Y_{gr} + M_{rr} \equiv 0$$

$$\$2,300 + 0 - 713 - 1,587 \equiv 0 \text{ (in \$m)},$$

where M_{rr} is estimated as a residual at $1,587 million.

The incomings into the appropriation account of all regions and the rest of the world sector are current central government transfers to the rest of Canada (and the world) G_{rg} and Ontario's trade balance with the rest of the world M_{rr}. These have to be balanced against the outgoing entries which consist of net current transfers from the regions to the regions and the rest of the world $\Sigma_j G_{jr}$, and a balancing transfer to capital account equivalent to Ontario's net position on current account, i.e.:

[12] Again, this entry is zero by definition since it is confined only to inter-regional flows of factor income which add up to zero.

$$\sum_j G_{jr} + N_{rr} \equiv G_{rg} + M_{rr}$$

The estimates for these entries are $\sum_j G_{jr}$ = -$45 million, G_{rg} = $2,193 million and M_{rr} = -$1,587 million. By inserting these estimates in the above identity we derive N_{rr}, or Ontario's net position on current account, estimated at +$651 million in 1971.

Finally, the incomings of the capital account in all the regions and the rest of the world sectors are net borrowing (lending) by the regions from the regions and the rest of the world $\sum_j B_{rj}$ and Ontario's net position on current account N_{rr}. These are matched by the outgoing entry of the capital account, namely, net foreign borrowing by central government B_{gr}, as follows:

$$B_{gr} \equiv \sum_j B_{rj} + N_{rr}.$$

This accounting relation allows the derivation of net foreign borrowing by the central government B_{gr} as a residual, which amounted to $352 million in 1971 as shown in Table 6.7.

7. The Perspective of Regional Estimates

All the regional estimates prepared in this Chapter are presented in Table 6.8. This Table is a 36 by 36 matrix based on the regional accounting scheme of Chapter II (Table 2.6), the allocation methods discussed in Chapter III and the results of regional allocation shown in Chapters IV and V. While Table 2.6 depicted the accounting flows for two

Table 6.8

Income and Expenditure Accounts for Ontario's 10 Economic Regions, 1971

	Eastern Ontario			Lake Ontario			Central Ontario			Niagara			Lake Erie			Lake St. Clair			Midwest			Georgian Bay			Northeast			Northwest			Central Government			All Regions & the rest of the world			Totals
Eastern Ontario	0	3030	647																										0	653	27	-297	0	0	4060
	3557	0	0																										0	853	0	19	43	0	4472
	0	603	0																										0	0	21	0	0	0	624
Lake Ontario				0	1095	255																							0	286	22	-187	0	0	1471
				1278	0	0																							0	333	0	10	17	0	1638
				0	269	0																							0	0	7	0	0	0	276
Central Ontario							0	10772	3057																				0	873	214	1790	0	0	16706
							14363	0	0																				0	2862	0	-39	-100	0	17086
							0	2743	0																				0	0	50	0	0	0	2793
Niagara										0	2728	726																	0	191	18	465	0	0	4128
										3531	0	0																	0	823	0	10	23	0	4387
										0	746	0																	0	0	18	0	0	0	764
Lake Erie													0	1575	419														0	125	16	122	0	0	2257
													1937	0	0														0	447	0	17	22	0	2423
													0	413	0														0	0	6	0	0	0	419
Lake St. Clair																0	1689	529											0	78	9	380	0	0	2685
																2285	0	0											0	443	0	-13	47	0	2762
																0	535	0											0	0	7	0	0	0	542
Mid-west																			0	1489	389								0	183	67	86	0	0	2214
																			1899	0	0								0	393	0	19	4	0	2315
																			0	395	0								0	0	6	0	0	0	401
Georgian Bay																						0	1047	252					0	87	16	-41	0	0	1361
																						1178	0	0					0	334	0	18	25	0	1555
																						0	259	0					0	0	3	0	0	0	262
North-east																									0	1520	560		0	239	49	45	0	0	2413
																									2076	0	0		0	430	0	-28	-106	0	2372
																									0	397	0		0	0	5	0	0	0	402
North-west																												0	633	204	0	155	36	-64	0	0	964
																												844	0	0	0	183	0	-12	-20	0	995
																												0	170	0	0	0	3	0	0	0	173
Central Government	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	448	0	0	0	0	0	448
	503	839	0	193	274	0	2343	3571	0	597	913	0	320	435	0	401	538	0	315	431	0	183	249	0	337	455	0	120	192	0	0	0	0	-713	0	0	12496
	0	0	-3	0	0	-2	0	0	-46	0	0	-16	0	0	-4	0	0	-5	0	0	-3	0	0	-3	0	0	-1	0	0	-1	0	332	0	0	0	352	600
All Regions & the rest of the world	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2193	0	-1587	0	0	606
	0	0	20	0	0	23	0	0	48	0	0	54	0	0	4	0	0	13	0	0	15	0	0	13	0	0	-157	0	0	-30	0	0	0	0	651	0	353

hypothetical regions and for the central government and all the regions and the rest of the world accounts in symbols, the entries of Table 6.8 give the numerical results on these flows for each region in Ontario and for the latter two accounts.

Thus, concentrating only on the last 9 rows and columns (i.e., rows and columns 28-36 of Table 6.8), we may read the estimates for the Northwest (as an illustration) and for the Central government and all the regions and the rest of the world accounts. Column 28 gives the incomings in the product account of the Northwest, namely gross domestic income at market prices, $Y_{jj} + I_{gj}$, which is equal to the outgoing entries presented in row 28 and consisting of regional consumption and investment, C_{jj} and V_{jj}, central government consumption and investment in the region, C_{jg} and V_{jg} and the region's net exports X_{jr} (derived as a residual). This income-expenditure identity is satisfied by the following data in Table 6.8:

$\$844 + 120 \equiv \$633 + 204 + 155 + 36 - 64 \equiv \$964$ million

Row 29 gives the outgoing entries of the appropriation account of the Northwest, namely, the region's 'national' income $Y_{jj} + Y_{jr}$ plus transfers from central government and other regions and the rest of the world G_{jg} and G_{jr} (derived as a residual). These are equal to the incoming entries of column 29 which consist of the region's consumption C_{jj}, savings S_{jj} and direct taxes paid to central government D_{jg}.

Thus, we have (in $ million):

$$\$844 + 183 - 12 - 20 \equiv \$633 + 170 + 192 \equiv \$995 \text{ million}$$

Column 30, or the outgoings of the region's capital account gives the addition to the region's capital stock, namely, regional investment V_{jj} plus net borrowing from central government B_{gj} and from all regions and the rest of the world B_{rj} (derived as a residual). This addition is financed by regional savings S_{jj} and capital transfers from central government to the Northwest T_{jg}, as shown by the incoming entries in row 30:

$$\$204 - 1 - 30 \equiv \$170 + 3 \equiv \$173 \text{ million}$$

Moving on to central government, no entries are shown in the product account (column and row 31) since the producing activities of central government are treated as part of regional income. (This account is used, however, to accommodate the residual error of estimate in the Ontario Accounts, $448 million). In the appropriation account of central government, the incoming entries shown in row 32 are indirect and direct taxes collected from all the regions, $\Sigma_j I_{gj}$ and $\Sigma_j D_{gj}$ and net factor income Y_{gr}. These are matched by the outgoing entries of column 32 which consist of central government consumption and transfers to the regions $\Sigma_j C_{jg}$ and $\Sigma_j G_{jg}$, central government saving S_{gg} and its current transfers to the rest of Canada G_{gr} (derived as a residual). Hence we have from Table 6.8 the following data:

$5,312 + 7,897 - 1,713 ≡ $2,870 + 7,101 + 332 + 2,193 ≡

$12,496 million.

In the capital account of central government, the incoming entries (row 33) are net borrowing (lending) from the regions $\sum_j B_{gj}$, central government saving S_{gg} and its borrowing from the regions and the rest of the world B_{gr} (derived as a residual). These are balanced by central government capital expenditure in the regions $\sum_j V_{jg}$ and its capital transfers to these regions $\sum_j T_{jg}$; both being the outgoing entries of the capital account as shown in column 33. Again, we derive the empirical content of this accounting equality from the data in Table 6.8:

$-84 + 332 + 352 ≡ $474 + 126 ≡ $600 million.

We now turn to all the regions and the rest of the world account where we have zeros in the incoming entries of the product account (row 34 of Table 6.8) because there is no record in the Ontario Accounts of any government spending abroad. The outgoing entries of the product account (column 34) are net exports of the regions $\sum_j X_{jr}$, their net receipts of factor income $\sum_j Y_{jr}$, net factor income of central government Y_{gr} and a transfer to the appropriation account equal to Ontario's net trade balance M_{rr} derived as a residual. This accounting identity is satisfied by the following data in Table 6.8:

$0 ≡ $2,300 + 0 - 713 - 1,587 ≡ 0 ($ million).

In the appropriation account, net current transfers

from central government to the rest of the world or the rest of Canada, G_{gr} (derived as a residual) less the province's trade surplus M_{rr} comprise the incoming entries shown in row 35 of Table 6.8. These are equal to the outgoing entries of column 35, namely, net transfers to the regions from the rest of the world $\Sigma_j G_{jr}$ and the province's surplus on current account N_{rr} (derived as a residual): The information in Table 6.8 on this identity is:

$$\$2,193 - 1,587 \equiv \$-45 + 651 \equiv \$606 \text{ million.}$$

Finally in row 36, the incomings into the capital account of all the regions and the rest of the world account are net borrowing by the regions from the rest of the world $\Sigma_j B_{rj}$ and the province's surplus on current account N_{rr}. These are matched by the outgoing entry in column 36, namely, central government borrowing from the rest of the world B_{gr} (derived as a residual):

$$\$-298 + 651 \equiv \$353 \text{ million.}$$

The main feature of the regional accounting system adopted in this study is that it permits the estimation of a complete set of accounts for the regions and the rest of the world which are made to balance by the introduction of appropriate transfers or residuals (Stone, 1961, 275). The estimation of most of the regional entries was accomplished on the basis of the allocation methods described in Chapter III. It was concluded in that Chapter, however, that a quantitative appraisal of the accuracy of income accounting estimates

prepared by allocation methods would be difficult to perform, mostly because of the lack of independent checks (Terry, 1964, 38-39).

Nevertheless, it may be possible to comment briefly on the adequacy or reasonableness of the residual estimates obtained on the basis of the logical relationship that underlie the regional accounting system. As an example, we would expect an inverse relationship between net exports in each region and the identified items which help in financing any trade imbalance (Woodward, 1970, 99). One main item here is net central government current and capital expenditure in the regions, i.e., the difference between all sorts of taxes collected from the region (I_{gj} and D_{gj}) by the central government and its current and capital expenditure (C_{jg} and G_{jg}), plus its current and capital transfers (V_{jg} and T_{jg}) in the region. Another item which may be used to finance a region's trade imbalance is its net receipts of factor income from all other regions, Y_{jr}. As Table 6.9 below shows, this expected inverse relation between net exports and the sum of the two identified items of financing the trade imbalance is in general satisfied with respect to each region.

Still another way of checking the plausibility of the results in Table 6.8 is to compare the provincial entries obtained as residuals with those actually reported in the

Table 6.9

Net Regional Exports, Net Central Government Expenditure and Net Factor Income, Ontario, 1971

($ million)

Region	Net Exports X_{jr}	Net Central Government Expenditure[a]	Net Factor Income Y_{jr}	Sum of Net Expenditure & Factor Inc.
Eastern Ontario	-297	212	19	231
Lake Ontario	-187	181	10	191
Central Ontario	1,790	-1,915	-39	-1,954
Niagara	465	-460	10	-450
Lake Erie	122	-161	17	-144
Lake St. Clair	380	-402	-13	-415
Midwest	86	-97	19	-78
Georgian Bay	-41	8	18	26
Northeast	45	-69	-28	-97
Northwest	-64	65	-12	53

[a]This item is equal to $I_{gj} + D_{gj} - (C_{jg} + V_{jg} + G_{jg} + T_{jg})$ for each region j (j = 1....5 regions)

Source: Table 6.8

1971 Provincial Accounts or other sources[13]. According to the estimates of Table 6.8, the central government's current transfers to the rest of Canada G_{rg} were about $2,193 million in 1971. The Provincial Accounts total for Ontario's deficit on the federal government account was put at $2,327 million in that year. The Provincial Accounts estimate of Ontario's surplus on its trade balance is $2,010 million. This surplus is shown as $1,587 million in Table 6.8, but the difference between the two figures can be readily explained by the treatment of central government income from property Y_{gr} which is shown as a negative entry (-$713 million) and consequently reduces the export surplus by this amount. The estimate of central government net borrowing from all the regions and the rest of the world is given at about $352 million in 1971. In the fiscal year ending March 1972, the Ontario public accounts show the excess of government expenditure over revenue to be slightly over $519 million (Ontario Public Accounts 1971-72, 1972). While all of these comparisons are necessarily rather crude, they, nevertheless, indicate that our results are basically reasonable.

[13] In making this comparison, one should keep in mind that the residual estimates in Table 6.8 are affected by the residual error in both income and expenditure accounts totals which amounted to $448 million on each side in 1971.

CHAPTER VII

REGIONAL MULTIPLIERS

Regional income multipliers are one of the applications which illustrate the use of regional accounting data. In this Chapter, an attempt is made to calculate a set of regional multipliers using the accounting results of the previous Chapter. It is recognized that the figures generated depend on many uncertain assumptions and cannot be regarded as at all precise. Nevertheless, we expect these to give some indication of the relative size of the multiplier from region to region. For the purpose of this calculation, an extremely simple and conventional model is adopted. The specification of the model is presented in section 1 of this Chapter and the calculation of regional multipliers on the basis of the model and the regional accounting data of Chapter VI is discussed in section 2. Finally, a brief comment on the plausibility of the resulting regional multipliers is given in section 3.

1. The Model

In this section we present a simple macro model for the derivation of income multipliers in the economic regions. Unlike most models used for similar purposes,[1] there is explicit recognition of the fact that a strictly Keynesian or short-term

[1] See for example Archibald (1967, 23-39), Brown (1972, 180-185), Steele (1972, 115-130) and Wilson (1968, 374-380).

framework utilizing aggregate demand variations alone may not be adequate for measuring induced changes in real income (especially in view of the recent experience with accelerating inflation in most countries). Hence the model incorporates the role of aggregate supply in the process of induced income expansion. Another important feature of the model is the recognition of the importance of feedback effects on income via interregional trade owing to the considerable 'openness' that characterizes regional economies. Although repercussion of this sort might be important in the trade relations between the Ontario economic regions and between Ontario and the rest of Canada, they are likely to be less important in the context of trade between Ontario and the U.S., its main and giant trading partner. Nevertheless, some form of allowance for such feedback effects would certainly be desirable in determining the size of regional multipliers.

Because of these two features, the analytical horizon of the model as well as the multipliers to be derived can best be construed as extending slightly beyond the strictly short-term considerations (of say a year) and bordering on a semi medium-term framework (say 2-3 years).[2] This time dimension is also

[2]Note that the model is not dynamic, and therefore, this comment on its time horizon applies to its comparative static context. It is also assumed in this discussion that there are no imports of intermediate goods or foreign ownership. Alternatively, one may assume that even though intermediate goods and foreign ownership are present, their average magnitude does not vary substantially between the regions. This implies that their effect would be to reduce the value of the Keynesian multiplier in each region and in the province by the same proportion.

in line with certain allocation procedures followed in estimating some of the regional accounting entries in the last Chapter. It will be recalled that in allocating capital expenditure items (a stock) between the regions, we often used a flow variable (such as output) as a counterpart or a proxy allocator. This has the effect of assigning small amounts of capital over a large number of years rather than representing it as one lump sum in the year it is actually allocated. This is probably desirable in that it means that the multpliers developed from this data will be more representative rather than reflecting the unusual behaviour of a freak year.

The model to be adopted is extremely simple and conventional. Nevertheless, to be explicit we shall need to describe it in detail. The following notations will be used:

Y = income in region 1

C = consumption

$\bar{I}$ = exogenous investment

$\bar{G}$ = exogenous government expenditure

X = exports

M = imports

N = nominal wealth

P = price deflator

L = labour force

$\bar{K}$ = capital stock (given in the short to medium run)

W^s = supply price of labour (nominal)

W^d = demand price of labour (nominal)

Y_d = disposable income

t = marginal (average) tax rate

Y*,C* = income, consumption, etc. in all other regions

All variables are expressed in real terms unless otherwise specified. Essentially the model applies to each region separately with its trading partners lumped together under all other regions. Accordingly, starred letters appearing in the model denote corresponding variables in all other regions. Furthermore, lower case letters with a numerical subscript generally denote partial derivatives.

To capture repercussions or feedback effects on income, regional trade is treated as an endogenous variable in the model.[3] Regional exports are determined endogenously and are positively related to the level of real disposable income in all other regions, Y_d^*. Imports are also endogenous but depend on disposable income in the importing region itself, Y_d. The model consists of a product market (which determines aggregate demand), a production function and a labour market specification for the derivation of aggregate supply. There is no money market constraint since the analysis is conducted at a subnational level (Ontario). The price level P which affects labour market decisions (in a way to be specified below) and influences consumer expenditure through a wealth or a real balance effect (N/P), provides the link between various markets.

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[3] In this sense, the model is a variation on the class of models discussed extensively by Machlup (1965, Ch. VII-IX).

The basic relations in the model are an income identity, a production function and a labour market function in each region. These are shown below for a given region (say region 1):

Income identity (or income-product market equilibrium condition),

$$Y = C(Y_d, N/P) + \bar{I} + \bar{G} + X(Y_d^*) - M(Y_d) \qquad 7.1$$

The signs on the partial derivatives are:

$$c_1 > 0,\ c_2 > 0,^4\ x_1 > 0 \text{ and } m_1 > 0$$

where

$$Y_d = (1-t)Y \qquad 7.2$$

Mainly to simplify the algebra we assume that $t = 0$ until we complete the manipulations and then revert to 7.2.

The production function is given by

$$Y = y(L,\bar{K}) \qquad 7.3$$

where $y_1 > 0$ and $dK = 0$ since capital, $\bar{K}$ is assumed fixed in the short-term. The labour market equation on the supply side is:

$$W^s = h(P,L) \qquad 7.4$$

$$h_1 > 0,\ h_2 > 0$$

On the demand side, we adopt the notation $f(P,L) = Py_1(L,\bar{K})$ and write:

$$W^d = f(P,L) \qquad 7.5$$

$$f_1 > 0,\ f_2 < 0$$

We now assume that the response to price changes on the supply side of the labour market (i.e., by workers) is in general more sluggish (institutionally at least) than the corresponding response on the demand side, i.e., by firms (Branson, 1972, 116-122). This implies that

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[4] See next page for footnote.

[4]The consumption function in this model is of the following specification:

$$C = C(Y, N/P)$$

where N/P stands for real balances (nominal wealth divided by the price level).
Differentiating totally:

$$dC = c_1 dY + c_2 d(N/P)$$

$$= c_1 dY + c_2 \left\{ \frac{1}{P^2} (PdN - NdP) \right\}$$

$$= c_1 dY + c_2 \left\{ \frac{1}{P} dN - \frac{N}{P^2} dP \right\}$$

The real balance effect is essentially a price induced effect and is designed to capture the influence of a changing price level on the real value of a given amount of claims with a fixed money value (Pesek and Saving, 1967, 11-13). Further it has been observed that year-to-year fluctuations in liquid assets are usually relatively small (Ackley, 1961, 275). Thus it is plausible (and conveninent for this model) to assume that nominal wealth is fixed in the short-to-medium terms, i.e., dN = 0. On this assumption the total differential of the consumption function becomes:

$$dC = c_1 dY - c_2 N/P^2 dP$$

where c_1, $\frac{\partial C}{\partial Y}$ is the marginal propensity to consume and $c_2, \frac{\partial C}{\partial N/P}$, the derivative of the real balance effect is found to be positive in most empirical work (Darby, 1975, 22, Tanner, 1970, 473-485, Mayer, 1959, 275-91 and Scarth, 1973, 303-309).

$$f_1 > h_1 \qquad 7.6$$

If we differentiate totally the implicit equilibrium condition in the labour market we obtain:

$$h_1 dP + h_2 dL = f_1 dP + f_2 dL \qquad 7.7$$

re-arranging:

$$\frac{dL}{dP} = \frac{f_1 - h_1}{h_2 - f_2} \qquad 7.8$$

Total differentiation of the production function (7.3) gives:

$$dY = y_1 dL \qquad 7.9$$

By substituting for dL from 7.9 and rearranging 7.8 we may write:

$$\frac{dP}{dY} = \frac{h_2 - f_2}{y_1(f_1 - h_1)} \qquad 7.10$$

This expression gives the slope of the aggregate supply curve in the region which is positive by virtue of the signs assigned above to the partial derivatives. For simplicity, denote $\frac{h_2 - f_2}{y_1(f_1 - h_1)}$ by S and re-write 7.10 as:

$$dP = SdY \qquad 7.11$$

If we now differentiate totally the equilibrium condition in 7.1, assume that nominal wealth is constant or given in the short term (so that dN = 0, see footnote 4 above) and make use of 7.11 we obtain:

$$dY = (c_1 - c_2 \frac{N}{P^2} S)dY + d\bar{I} + d\bar{G} + x_1 dY^* - m_1 dY$$

which in reduced form becomes

$$dY = \frac{d\bar{I} + d\bar{G} + x_1 dY^*}{1 - (c_1 - m_1) + c_2 \frac{N}{P^2} S} \qquad 7.12$$

By the same token, we may derive a similar reduced form condition for dY* in all other regions:

$$dY^* = \frac{d\bar{I}^* + d\bar{G}^* + x_1^* dY}{1 - (c_1^* - m_1^*) + c_2^* \frac{N^*}{p^{2*}} S^*} \qquad 7.13$$

If we denote the denominators in 7.12 and 7.13 by D_1 and D_2, respectively, and then substitute for dY* from 7.13, equation 7.12 becomes:

$$dY D_1 = x_1 \left(\frac{d\bar{I}^* + d\bar{G}^* + x_1^* dY}{D_2} \right) + d\bar{I} + d\bar{G} \qquad 7.14$$

Upon simplification:

$$\left(D_1 - \frac{x_1 x_1^*}{D_2}\right) dY = x_1 \left(\frac{d\bar{I}^* + d\bar{G}^*}{D_2} \right) + d\bar{I} + d\bar{G} \qquad 7.15$$

and the derivative $\frac{dY}{d\bar{G}}$ or k the multiplier for a change in the exogenous variables in region 1 is:

$$k = \frac{1}{D_1 - \frac{x_1 x_1^*}{D_2}} \qquad 7.16$$

or,

$$= \frac{1}{1 - (c_1 - m_1) + c_2 \frac{N}{p^2} S - \frac{x_1 x_1^*}{D_2}}$$

$$k = \frac{1}{1 - \left(c_1 + \frac{x_1 x_1^*}{D_2} - m_1\right) + c_2 \frac{N_2}{p} S} \qquad 7.17$$

where:

c_1 = propensity (marginal or average) to consume in the region

$\frac{x_1 x_1^*}{D_2}$ = propensity to export with feedback effects via Y and Y*

m_1 = propensity to import

For use below we wish to define:

$e = \frac{x_1 x_1^*}{D_2} - m_1$, which we call 'propensity to balance trade' in the region after allowing for trade repercussions and,

$\beta = c_1 + e$ which we may also call 'propensity to add value locally' via induced expenditure in the region.[5]

Using this set of abbreviated notation, and reinstating the concept of disposable income defined in 7.2 above, we may rewrite the multiplier formula in 7.17 as:

$$k = \frac{1}{1 - \beta(1-t) + c_2 \frac{N}{P_2} S} \qquad 7.18$$

This formula will be used for the empirical calculation of the regional multiplier in each region.

2. Empirical Results

It may be recalled from Chapter VI that in the course of estimating regional accounts for the year 1971 the following magnitudes (that could be used for calculating regional multipliers) in each region were approximated:

[5] This terminology is borrowed from Archibald (1967, 27).

1. Estimates of personal consumption in the regions derived by inserting each region's personal disposable income and population in a consumption function estimated from Canadian time-series data. (See Chapter IV, Table 4.5). The marginal propensity to consume implicit in this function (0.887) thus provides the empirical proxy for c_1 in formula 7.18 for each region.

2. Taxes, direct and indirect, which are taken to be the difference between gross regional income at market prices and disposable income, expressed as a proportion of gross income in each region. Empirically, this gives the proxy for t in formula 7.18 and is unique for each region.

3. Net exports of goods and services which were derived as a balancing item, i.e., by deducting from gross regional income at market prices in each regions its domestic spending on personal consumption, investment and government expenditures. If net exports are expressed as proportions of personal disposable income $\dot{Y}_d$ in each region, the resulting coefficient may serve as a proxy for the e component of β in calculating the multiplier for each region using formula 7.18 above.

The last term in the denominator of the multiplier formula is $c_2 \frac{N}{P^2} S$ which in principle picks up the influence of the aggregate supply curve in the region through the real balance effect in the consumption function. On the assumptions made with respect to the signs of the partial derivatives this term

is necessarily positive and therefore works as might be expected in the direction of reducing the size of the regional multiplier. The problem now is to account somehow for this term empirically in each region. In principle this would entail the estimation of the real balance effect in regional consumption functions and separate regional aggregate supply curves in a well-specified macro-model. In the current state of regional data this undertaking would have to be based on survey work and empirical testing which normally require substantial funding and several years of preparation. The specification of the aggregate supply consideration is essential in any model designed to calculate regional multipliers. Yet, there is no indication at present that the necessary data will ever be developed. Under the circumstances it is likely that our best knowledge about this important issue will need to be gleaned from accounting data of the type developed in this dissertation. In the near future greater accuracy in our estimates will more likely arise through better accounting data than from econometric type research.

In this tightly qualified context, a solution to the problem of estimating regional supply curves and consumption functions with real balance effects would be to seek some plausible proxy or surrogate magnitudes at the provincial or

national levels. A glance at the relevant literature convinces one that empirical research on consumption functions (with real balance effects) and on macro models capable of yielding estimates of the slope of aggregate supply has barely begun even at the Canadian national level. For example, as far as we know, there are only two studies, one by Tanner (1970) and the second by Scarth (1973) on the empirical significance of the wealth or the real balance effect in estimated Canadian consumption functions. Judging from similar empirical evidence in other countries, particularly the U.S.A., Tanner's results would appear to be on the high side and therefore it was thought advisable not to use them.[6] Scarth's findings on the other hand were more in line with evidence available elsewhere and seemed likely to provide a reasonably adequate empirical basis for the magnitude of the wealth effect in Canada. His estimated equation which is based on seasonally unadjusted quarterly data for the 1950-1970 period is as follows (t ratios are given in brackets):

$$C/P = \underset{(0.20)}{52.67} - \underset{(14.5)}{879.49}Q_1 - \underset{(6.91)}{418.65}Q_2 - \underset{(12.2)}{738.55}Q_3 + \underset{(22.9)}{0.6635}\,(Y_d/P)^e_t + \underset{(6.44)}{0.1405}\left(\frac{M + FB_p - BF}{P}\right)_t$$

$$R^2 = 0.99, \quad DW = 1.28$$

where C/P = real consumption

Q = seasonal dummies

[6] The real balance coefficient ranged from 0.06 to 0.368 in the 12 U.S. studies using quarterly or annual data reported by Patinkin (1965, 656-657) whereas Tanner's coefficient in his best equation was about 2.16! (Tanner, 1970, 473-485)

M = money supply defined as currency plus chartered banks' deposits held by the public

$(Y_d/P)^e_t$ = real personal income

$FB_p = TMI_p + CSB_p$: Government of Canada direct and guaranteed securities held by the general public

BF = Foreigners' holdings of all Canadian bonds

The last term $(\frac{M+FB_p-BF}{P})$ represents the real balance effect as the money supply plus public holdings of government securities less foreign holdings of Canadian bonds. Our interest lies in the coefficient of this real balance effect (0.1405), and more precisely, in the elasticity of real consumption with respect to the wealth effect which reflects the normalized magnitude. In the Scarth formulation this would be:

$$E = \frac{\Delta C/P}{\Delta\{M + FB_p - BF\}/P} \cdot \frac{\{M + FB_p - BF\}/P}{C/P}$$

To convert the coefficient into elasticity it was necessary to obtain from Scarth's results the mean values for C/P (real consumption and $\{M + FB_p - BF\}/P$ (real balances) which were \$6,893.99 and \$18,562.55, respectively. Hence the elasticity E is:

$$E = 0.1405 \cdot \frac{18,562.55}{6,895.99} = 0.378$$

Our objective, however, is to estimate $c_2.N/P^2.S$ in formula 7.18. Upon multiplying this term by $P/C \cdot Y/P \cdot C/Y$, it is transformed to:

$$c_2 \frac{N/P}{C} \cdot \frac{SY}{P} \cdot \frac{C}{Y}$$

Since our C (real consumption) is Scarth's C/P, the elasticity

obtained from his equation serves as a proxy for $c_2\frac{N/P}{C}$ in this transformation (note that $c_2 = \partial C/\partial N/P$).

Next, we need an estimate for the normalized effect of the aggregate supply curve, i.e., the elasticity $S.\frac{Y}{P}$ (note that $S = \Delta P/\Delta Y$). Again, this estimate will be based on empirical work done at the national level. Two of the well-known macro models of the Canadian economy will be used to estimate the elasticity of S. The first is the Bank of Canada's elaborate quarterly model known as RDX2 which puts the stationary state or equilibrium value of the aggregate supply coefficient $\frac{\Delta P}{\Delta Y}$ at about 0.0088 (Helliwell, et.al., 1971, 245-262). This result is based on a simulation experiment in which government purchases were increased by $100 million and the effects on real output and prices were traced over the solution period 1963-1970(during which Canada was on a fixed exchange rate). If this $\frac{\Delta P}{\Delta Y}$ coefficient is translated into the required elasticity using the mean values of real output and the price deflator, a value of about 0.546 is derived, and this would constitute our first estimate of S in formula 7.18.

Another macro model of the Canadian economy known as TRACE has been used in a number of simulation experiments to calculate annual impact multipliers for fiscal and monetary policy in 1957 (a year in which Canada was on a flexible exchange rate) and in 1964 (a year of fixed exchange, Choudhry, et.al., 1972, 104-105). In the fiscal simulations, the elasticities of the slope of the aggregate supply curve were estimated at 0.358 and 0.19 in 1957 and 1964, respectively. It will be recalled that

most of our empirical findings and estimates throughout this study pertain to the year 1971 when Canada's exchange rate was floating. Since the TRACE impact results reflected a notable difference in the effect on real output and prices of a given change in government purchases depending on whether the country was on a fixed or floating exchange rate, it would seem plausible to assume that the TRACE result which is more applicable to our model (and to the year 1971) is the flexible exchange elasticity of 0.358 in 1957, i.e., the higher of the two values. This might also suggest that the RDX2 elasticity of 0.546 (based on a fixed exchange rate period) would probably have to be adjusted upwards if it were to apply to a floating exchange rate year (1971) and if it were to be compared to the TRACE elasticity in 1957.

A case can also be made for adjusting upwards the two elasticities reported in TRACE since both are based on an impact response which is normally lower than stationary state or equilibrium effects. In their recent survey on inflation, Laidler and Parkin put some emphasis on this point by arguing (1975,776):

> Whatever their differences in these respects, however, all the major models produce a response to monetary and/or fiscal policy changes which first affects real output and employment and only subsequently and often with very long lags, affect the rate of inflation.

However, no adjustments of this sort are attempted here since any fruitful effort in this direction would probably necessitate a re-run of each of the two models with proper

adjustments in their dynamic structure; a task that lies beyond the scope of this study. Instead, we shall simply take the 1957 TRACE value of 0.378 and the RDX2 value of 0.546 as minimum estimates of the aggregate supply elasticity for possible impact and stationary state or equilibrium responses on real output and prices in the Canadian economy associated with fiscal policy changes during periods of flexible exchange rate. When these two values are multiplied by the elasticity of the real balance effect of 0.378 based on Scarth's results and C/Y of 0.91 (see Table 4.5), the two alternative coefficients for the term $c_2 \frac{N}{P^2} S$ in the multiplier formula of 7.18 would be 0.125 (for TRACE) and 0.191 (for RDX2). Broadly speaking, these two coefficients will reflect the influence of the aggregate supply via the real balance effect (at the national level at least) in the context of our model for the derivation of regional multipliers.

Thus, we have accounted for all the coefficients we need to calculate the multiplier in each region. We have used our estimated marginal propensity to consume as a proxy for c_1 in each region and two alternative national proxies for the possible influence of aggregate supply. Two important leakages were also estimated differentially on the basis of each region's unique structure and simultaneous income and trade interactions with the rest of the province and the rest of the world. Income multipliers for each of the 10 economic regions are calculated by inserting these coefficients in formula 7.18. The results as well as all the relevant

Table 7.1

Net Income Leakages and Regional Income Multipliers in Ontario, 1971

Region	Gross Regional Income at Market Prices $Y_{jj}+Y_{jr}+I_{gj}$	Personal Disposable Income	Net Exports X_{jr}	Net Trade Coefficient (3÷2)100 e	Marginal propensity to consume (c_1=0.887)	Local Value Added $\beta=c_1+e$	Net Tax Coefficient $(\frac{1-2}{1})100$	Multiplier k TRACE c_2NS/p^2 = 0.126	Multiplier k RDX2 c_2NS/p^2 = 0.191
	1	2	3	4	5	6	7	8	9
Eastern Ontario	4,079	2,883	-297	-0.103	0.887	0.784	0.293	1.75	1.57
Lake Ontario	1,481	1,049	-187	-0.178	0.887	0.709	0.292	1.60	1.45
Central Ontario	16,667	10,249	1,790	-.175	0.887	1.062	0.385	2.11	1.86
Niagara	4,138	2,594	465	-.179	0.887	1.066	0.373	2.19	1.91
Lake Erie	2,274	1,523	122	0.080	0.887	0.967	0.330	2.09	1.84
Lake St. Clair	2,673	1,628	380	0.233	0.887	1.120	0.391	2.25	1.96
Midwest	2,233	1,436	86	0.060	0.887	0.947	0.357	1.93	1.72
Georgian Bay	1,379	1,008	-41	-0.041	0.887	0.846	0.269	1.97	1.75
Northeast	2,385	1,491	45	-.030	0.887	0.917	0.375	1.81	1.62
Northwest	952	606	-64	-0.106	0.887	0.781	0.363	1.59	1.44
Ontario	38,260	24,465	2,300	0.076	0.887	0.963	0.360	1.96	1.74

Source: Table 6.8

regional coefficients representing various leakages from the income stream are summarized in Table 7.1.

3. An Assessment

What in general can be said about the results shown in Table 7.1? First, our multipliers seem, on the whole, to be somewhat higher than those reported in other studies using essentially similar approaches. For example, Brown (1972, 137) using a similar model without trade feedback effects (which make k larger) and without aggregate supply (which makes k smaller), concluded that the range of multiplier values for the British regions would be 1.18-1.24 and the multiplier for the country as a whole was 1.41. Later, Steele (1972, 126) refined the same model (but still without considering aggregate supply) and established a range of 1.11-1.38 for regional multipliers in Britain without trade feedback effects and a range of 1.21-1.53 for multipliers with feedback effects. The difference between our results and those reported in the two British studies might be attributable to the difference in the net trade balance of Ontario (and its regions) and that of Britain (and its regions). However, our findings still suggest that trade feedback effects seem to be important in raising the value of k in the Ontario regions.

Second, the inclusion of feedback effects into the analysis implies that the region's propensity to 'balance trade' rather than its propensity to import becomes the relevant magnitude in deciding its multiplier size. It also implies that

certain regions may end up having larger multipliers than the nation or the province as a whole, as our results in Table 7.1 demonstrate. Again this may not be a typical result in regional models that neglect feedback effects and focus instead on import leakages only. Yet it seems plausible if one considers the fact that by tracing the export surplus of the province to its regional origins and by regionalizing the analysis of income determination one may indeed find that induced income expansion is likely to be greater in those areas of concentrated prosperity than in the province as a whole where it tends to become diffused, or averaged between exporting and importing regions.

Third, apart from the comparative significance of the overall size of regional multipliers the range of variation in their value between the regions does not seem to be very important. Thus looking at the high multiplier values under TRACE in Table 7.1 one finds that the standard deviation is 0.236 and the spread between the highest values in Lake St. Clair and the lowest in the Northwest is 0.66. Similarly the relatively small multiplier values reported under (RDX2) show even a lower standard deviation (about 0.186) and a smaller spread of 0.52 between the extremes. This result which incidentally is in line with the other empirical evidence on regional multipliers referred to above[7] suggests that net income leakages from rich and poor regions tend somehow to be automatically self-balancing (in the

[7] See Brown (1972, 187) and Steele (1972, 126).

sense that large import leakages from the latter are offset by smaller tax leakages and vice versa) partly because of the progressive tax and fiscal system in the province. The net outcome of this built-in fiscal flexibility is smaller variations in the size of the regional income multiplier. This fact also suggests that spill-overs from poorer regions are not likely to be heavy in this case. From the policy viewpoint, this conclusion would be rather re-assuring since it drives home the point that the built-in tax and fiscal flexibility of modern and integrated economies remains an effective policy tool for moderating not only interpersonal but also interregional income inequality, provided that the initiating expenditure can itself be focussed on the region needing expenditure stimulus.

Finally, one might wish to consider the trade-off in any additional effort aimed at pinning down more precisely the regional differences in the size of the multiplier. In the framework of our analysis this could be done for example by estimating regional consumption functions as well as labour market and aggregate supply models. It could also be accomplished by articulating trade and other financial flows between the regions. However, the cost of such refinements seems restrictive in the current state of regional data gathering and information, and in any event does not appear to be justified by the expected returns. With more systematic improvement in the regional accounts data in the future many of the difficulties in this respect may conceivably be overcome.

In summary, this Chapter specified a simple macro model for the derivation of regional income multipliers. The specification included an allowance for the role of aggregate supply in macro models and the impact of trade feedback effects in determining the size of regional multipliers. The model was then estimated empirically from the data on regional accounts prepared in the previous Chapter. Finally, a set of income multipliers for the 10 economic regions was calculated using the above model.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

This study demonstrated how a systematic treatment or integration of existing regional economic data could make a positive contribution to economic analysis at the regional level. The systematic integration of data was achieved by means of an economic accounting framework designed to ensure consistency, comprehensiveness and comparability of economic data among the regions and between them and the total economy. It is hoped that economic accounting in Ontario at the regional level will increasingly become recognized as a flexible tool of analysis which can produce a useful interaction between data and method thereby improving both theory and empirical results. The principal achievement has been to highlight areas of weakness in constructing regional economic accounts. It is hoped that it can serve as a benchmark in future research efforts.

The possibility of constructing a set of regional accounts in a familiar matrix form for the 10 economic regions of Ontario based on the provincial accounts system has been demonstrated. Furthermore, the generation of regional estimates by disaggregating or apportioning the Ontario Accounts totals among those regions on the basis of regional information and by deriving some of the estimates as residuals has been illustrated. In short, the construction of regional economic accounts in Ontario has shown that it is possible to adapt existing

conceptual schemes of accounting at the provincial level and to integrate a variety of data in order to estimate the regional entries of the accounting matrix.

As noted above, the process of producing regional economic accounts in Ontario in 1971 was essentially intended to establish a benchmark for future research. The data base used still has a number of gaps which necessarily impose limitations on the usefulness of the results reported in this study. Yet in the process of constructing the accounts, more has been learned about the data requirements and about the strengths and weaknesses of existing information. Some of the main findings and conclusions derived in the process which may be of interest for future research efforts are as follows.

1. On the assumption that no major flows of labour commuting occur between the Ontario regions, the 1971 Census data on income of individuals by source at the regional level provide a feasible basis for allocating the major Accounts Totals of personal income among these regions. The major components of personal income which account for about 89 percent of total net provincial income at factor cost consist of wages and salaries, net income of non-farm operators, net income of farm operators and dividends, interest and miscellaneous investment income of persons including rent. The same Census information may be used to derive regional estimates of personal receipts of transfer payments from government and other sources and interest on public and consumer debt.

2. On the other hand, through the lengthy process of search and review of data sources, it became increasingly clear that substantial improvement in regional accounts must await the development of data of certain types. For example, inter-regional flows of labour income, particularly wages and salaries, can only be developed when reliable information on the location of workers and their commuting patterns become available. Further, the regional allocation of certain items of government income (e.g., interest income received by the provincial government) can be improved considerably if the regional sources of this type of income are recorded by the reporting government agencies.

3. On the expenditure side, estimates of personal consumption by region were obtained by first estimating a national consumption function and, then by inserting each region's personal disposable income and population in the estimated equation. In addition to the aggregation problem which might arise in this procedure, we cannot expect the use of a national consumption function to reveal wide variations among Ontario's regions. Hence, this method should not be used if it can be avoided. For this reason, two alternative methods relying on published information were tried; the first consisted of allocating the Accounts total on personal consumption among the regions using a proxy allocator obtained by multiplying regional population by per capita consumption derived from the family expenditure survey of 1969 in Ontario. The second method allocated the

same accounts total among the regions using as a proxy the 1971 Census data on sales from retail and service trades by region. Both methods produced unsatisfactory results, however. Thus, there is a need to initiate research aimed at estimating directly regional consumption functions in Ontario for the purpose of improving the construction of regional accounts.

4. Data on the income and expenditure of local government (municipalities and hospitals) are available on an annual basis in their financial statements and annual reports. With a few exceptions, these data are generally compatible in concept and coverage with the Accounts totals and therefore can be reliably used for allocation purposes to derive time-series estimates for the regional accounts components of the local government sector.

5. In both income and expenditure items of local government, it is desirable to eliminate as much as possible all the conceptual and coverage differences that exist between the Accounts data and the local government administrative data. In many cases, slight variations in the definition of current and capital expenditures, revenues and depreciation items of local government and public hospitals adopted by these agencies on the one hand and by the Provincial Accounts Section of the Ontario Ministry of Treasury on the other, seem to be responsible for these differences. Their elimination should not be a difficult task and could easily be achieved with a reconciliation of the main data series between the Ontario Provincial Accounts

Section of the Ontario Ministry of Treasury and other agencies of the Ontario government which collect and publish the administrative data on municipal finance and hospital statistics. A reconciliation of this sort will be of great value to any future effort for constructing regional accounts for Ontario.

6. As for central government (i.e., provincial and federal), the regional allocation of the income items (taxes, transfers and interest and investment income) was in general facilitated by the availability of counterpart and proxy allocators at the regional level. Consequently, the derivation of regional accounts estimates on a time-series basis in this sector of the Accounts as well should not be, on the whole, a complex task.

7. More difficulties are likely to be encountered when allocating central government expenditures between the regions. To facilitate the job, it is necessary that the Ontario government experimental study on coding government expenditure items by region be extended in scope and coverage and be made available for any concerted effort at producing regional economic accounts for the province.

8. At present, information on federal government expenditures in the provincial Accounts is restricted to wages and salaries on current account. The unavailability of data, particularly on capital expenditure by the federal government in the Ontario regions, results in an understatement of the expenditure side of the regional accounts. Because net regional exports

were derived in the present scheme as a residual, i.e., as the difference between regional income and known expenditures, the neglect of federal government capital expenditure contributed to the imprecision of net regional trade estimates. Hence, it is essential that more emphasis be placed on the need to gather data on federal capital expenditures in the regions without having to resolve at once all the problems of definition related to the classification of expenditures between current and capital items (Burkhead, 1964, 66-68).

9. As for the regional allocation of the accounts totals in the business sector, one useful approach is to adopt a two-stage allocation procedure. Thus, for example, the accounts total on corporate profits may be broken down first by major industries using counterpart or proxy variables. Each industry subtotal could then be allocated to the regions by means of regional counterpart variables or proxies. The chances of obtaining the latter type of regional proxies are better for the goods-producing sectors because of the availability of Census data on value of production, value added or wages and salaries at the regional level. For the allocation of industry subtotals in service industries between the regions, however, reliance was made on the creation of a synthetic set of estimates of wage and salary income by region in each of these industries to serve as proxies for allocation.

10. Because of data availability, the effort of constructing a set of regional income and expenditure accounts for

the Ontario regions is likely to produce more reliable estimates on the income side than on the expenditure side. Furthermore, the estimation of net regional trade as a residual, i.e., as the difference between total income and total known expenditure in each region means that gross regional expenditure cannot be estimated independently of regional income (Palmer, 1971, 204).

11. In terms of adequacy of the regional entries, the results obtained were shown to be on the whole reasonable. Thus, despite the data problems outlined above and the inherent difficulty in checking independently on the accuracy of these results, it was shown that the residual estimates obtained were on the whole in line with those actually reported in the Ontario Accounts and in other sources. In particular, the key residual estimates passed the test imposed by the logical relationships that underlie the accounting system. For example, it was shown that the expected inverse relation between each region's net trade balance and the sum of its account with the central government and its net receipts of factor income was always satisfied.

12. The set of regional accounts for Ontario derived in this study was utilized in the context of a regional macro model (based on aggregate demand and supply) for the purpose of calculating a set of regional income multipliers. The estimation of useful regional models for this purpose is not, however, a problem-free task; despite the fact that most of the coefficients on leakages required for the model were obtained from the regional accounting results. The main difficulties here arise from

the need to estimate regional aggregate supply curves and real balance effects in regional consumption functions.

13. Net income leakages from poor regions (e.g., through net imports) tend to be moderated by smaller tax leakages and by larger central government benefits (i.e, by relatively larger net central government expenditures and transfers in the region). The opposite is also true of the well-to-do regions. As a result, the values of regional income multipliers in Ontario do not reveal wide interregional differences. This, in turn, suggests that the progressive tax and fiscal system in the province probably works in favour of reducing interregional differences in income in addition to its traditional role as a moderator of income differences between persons.

14. The derivation of a set of comparable regional multipliers on the basis of a well-specified regional macro model, and a consistent set of regional accounts estimates makes it possible to determine the multiplier effects of exogenous expenditure in each region. Previous research has explored the regional effect of exogenous shocks which are spread over the province as a whole. (See Kubursi, Williams and George, 1975, 69-72). The multipliers based on regional accounting data, therefore, are a more precise and powerful tool of analysis which enriches our knowledge of regional economies and appreciation of the effect of regional policies.

APPENDIX A

ESTIMATES OF WAGE AND SALARY INCOME BY INDUSTRY AND REGION

APPENDIX A

ESTIMATES OF WAGE AND SALARY INCOME BY INDUSTRY AND REGION

In this Appendix, two separate estimates of wage and salary income by industry are compiled for each region using a variety of data sources. Various techniques are utilized for merging and matching information from these sources to generate new sets of data useful for the allocation of some of the Accounts totals among the regions. Such techniques are increasingly used by economists as part of their research to provide general purpose data sets which may also be integrated with the system of national accounts (see Ruggles and Ruggles, 1975, 214). The results of the income estimates have been used in allocating some of the Provincial Accounts totals among the regions in Chapter V. Thus, corporate profits, interest and investment income, capital consumption allowances and private investment were first allocated between major industries and then the service industry subtotals were allocated to the regions on the basis of regional wage and salary income in these industries. Hence, it is important to present the data and methods used in preparing the income estimates.

1. Data Sources

The data used for preparing estimates of wage and salary income by major industry in the regions were derived

from four main sources:

1. The first source is "Estimates of Employees by Province and Industry, 1961-1972" published by Statistics Canada (72-513, occasional). In this publication, results from a monthly survey of employment in larger firms (usually employing 20 or more employees) and from a monthly sample survey of smaller firms supplemented by data from other sources are combined to provide a measure of aggregate employment by industry and province.

Agriculture is the only major industry which is not covered by the two employment surveys and the supplementary data, with the result that no employment estimates are prepared for this sector. The well-known problems of preparing comparable and reliable estimates of employment in agriculture are probably among the reasons for excluding agriculture. Such problems relate to the extent of seasonal, part-time and family labour in this sector. As already noted, the purpose of preparing wage and salary income estimates by industry and region in this Appendix, from employment and other data, is to assist in the regional allocation of certain Accounts components, particularly those originating in the service sectors for which no production data are available from Census sources. Because Census data on agriculture are available at the local level (and have been used in regional allocation), there is no need to prepare estimates of regional wage and

salary income in this sector[1]. Hence, the exclusion of agriculture from employment or other data sources used in this Appendix is irrelevant.

Furthermore, this source does not provide separate estimates of employment in forestry and construction at the Ontario level after 1970. This is because the adjustments and revisions that were made to the estimates of employees in smaller firms since January 1971 "were considered to be unreliable at the provincial level" (Statistics Canada, 72-513, introduction). An estimate of total employees in these two industries combined could be easily derived, however, by subtracting the estimates in all other sectors from the provincial total. This residual was 152.5 thousand in 1971. In order to subdivide it between forestry and construction, we assumed that the ratio of employment in the first industry to employment in the second industry, as calculated from the 1970 estimates (1/13) applied in 1971 as well. On this assumption, it was possible to derive estimates of employees in 9 major industry groups for Ontario in 1971 as shown in Table A-1 below.

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[1]It will be recalled that the Accounts total on income of farm operators was allocated to the regions in proportion to the percentage regional distribution of farm self-employment income derived from the Census data on income of individuals by sources (see Table 4-2 in Chapter IV). Other Accounts totals on agriculture were allocated to the regions on the basis of regional production data taken from the Census of Agriculture (see p. 104 and Table 5-2 in Chapter V, for example).

Table A-1

Estimates of Employees by Major Industry in Ontario, 1971

Industry	Employees (000)
Forestry	10.9
Mining	36.9
Manufacturing	806.6
Construction	141.6
Transportation and utilities	222.6
Trade	439.9
Finance	136.0
Public Administration	190.5
Services	731.6
Total	2,716.6

Source: Statistics Canada, 72-513, Table 9.

2. The second data source is based on "Employment, Earnings and Hours" (Statistics Canada, 72-002, monthly). Our interest here lies basically in the data on earnings found in this publication and, in particular, on earnings by major industry to match the estimates of employees by major industry in Ontario shown in Table A-1 above. Information on earnings and other variables in this publication is collected through the monthly employment survey of larger firms mentioned above which contributed to the data base of source 1.

The employee concept in the survey includes all wage earners and salaried employees on the payroll of the reporting firms, including regular part-time persons working seven hours

or more in the pay period (i.e., a week). It excludes working owners or part-time workers in unincorporated businesses, non-working directors, the self-employed, unpaid family workers, volunteer workers, pensioners, homeworkers, and persons providing services to a firm on the basis of a contract for services (Statistics Canada, 72-002, May 1977, 119-120). For the survey purposes, earnings denote the total of weekly wages of wage earners and salaries of the salaried employees. Thus, for each major industry, average weekly earnings were derived from this publication by dividing this total by the number of reported wage earners and salaried employees, including part-time persons working seven or more hours during the week.

In general, "the survey covers larger companies only, that is, companies having 20 or more employees in any month of the year. However, all the establishments of a multi-establishment company are included if the company had 20 or more employees in total in any month of the year even though any single establishment may have had only a few employees" (Statistics Canada, 72-002, May 1977, 117). Each reporting unit is assigned geographically to a province, to a county (Census subdivision) and sometimes to an industrial class on the basis of its principal activity.

As already pointed out, the employment survey excludes agriculture, which we have also excluded from our list of major industry groups for which wage and salary income estimates

are being prepared. In addition, the survey does not cover non-commercial services such as education, health and welfare services which form part of the service sector. In this case and mainly because of the lack of a better alternative, we had to assume that average weekly earnings in commercial services reflected more or less the average of such earnings in all the service industries including the non-commercial sector. Another major industry not covered by the employment survey is public administration. The assumption we made here was that average earnings in this sector were equal to average earnings for the industrial composite, that is, to the sum of the industries included in the survey.

Using the direct estimates on average weekly earnings by major industry and the two above-mentioned assumptions, we prepared estimates of average annual earnings for the 9 industry groups reported in Table A.1. These annual estimates were derived by multiplying the estimated weekly data on earnings by 52 weeks. The results are shown in Table A.2 below:

Table A.2

Estimates of Average Weekly and Annual Earnings by Major Industry in Ontario, 1971

Industry	Average Weekly Earnings $	Average Annual Earnings $
Forestry	168.54	8,764

Mining	177.52	9,231
Manufacturing	152.14	7,911
Construction	197.66	10,278
Transportation and Utilities	161.06	8,375
Trade	110.25	5,733
Finance	134.26	6,982
Public Administration	143.04	7,438
Services	103.51	5,383
Total (industrial composite)	143.04	7,438

Source: Statistics Canada, 72-002, monthly.

3. This source comprises unpublished tabulations based on the monthly employment survey covering firms employing 20 or more employees. As noted above each reporting unit in this survey is assigned geographically to a province, to a county (i.e., Census subdivision) and sometimes to urban areas. Based on this geographic coding, the Monthly Employment, Payroll and Labour Income Section in Statistics Canada prepares monthly estimates of employment and average weekly earnings (in all industries covered by the survey) by county for Ontario. Since these estimates were not published, an arrangement was made with this Section to obtain them for purposes of this study.

In order to prepare estimates of average weekly and annual earnings by region, the monthly figures were processed as follows. First, simple annual averages for both employees and average weekly earnings were calculated for each county from the original monthly data in 1971. Second, a weighted

regional average of weekly earnings was obtained for each region, with weights based on the number of employees in the counties comprising each region. Third, the resulting weighted average of weekly earnings for each region was multiplied by 52 weeks to derive average annual earnings by region in 1971. The weekly and annual earnings estimates are both shown in Table A.3 below:

Table A.3

Estimates of Average Weekly and Annual Earnings by Region in Ontario, 1971

Region	Average Weekly Earnings $	Average Annual Earnings $
Eastern Ontario	128.63	6,687
Lake Ontario	131.55	6,843
Central Ontario	144.45	7,514
Niagara	147.50	7,670
Lake Erie	132.45	6,890
Lake St. Clair	169.45	8,814
Midwest	126.00	6,552
Georgian Bay	120.07	6,245
Northeast	157.33	8,181
Northwest	148.40	7,717
Ontario (Industrial Composite)	143.04	7,438

Source: Data prepared by the Employment, Payroll and Labour Income Section, Statistics Canada.

Since the estimates of average earnings by industry and by region shown in Table A.2 and A.3 are derived from the

same source (the monthly employment survey), the Ontario average or the industrial composite average is the same in both Tables.

4. The fourth source consists of the 1971 Census of Canada data on employed labour force which were compiled on the basis of a one-third sample and included persons 15 years and over who worked for pay or profit, or in unpaid family work (Statistics Canada, 94-701, 1975). This source of information is thus broader in concept and coverage than the one on wage and salary employment discussed in source 1 above, since it includes the self-employed as well as other non-wage and salary employees.

Our interest in this Census data source stems from the fact that it contains an unpublished breakdown of employed labour force by major industry and by region. This breakdown, which has been prepared by the Census Division in Statistics Canada for purposes of this study, is shown in Table A.4 on page 223.

2. Method of Estimation

As stated above, the purpose of this Appendix is to generate estimates of regional wage and salary income by industry to be used as proxy variables for regional allocation. The microdata sets in the data sources described above will be properly aligned and merged in order to produce these estimates. One useful way of presenting the method used for matching these microdata sets is by means of a model expressed

Table A.4

Estimates of Employment Labour Force by Major Industry and Region in Ontario, 1971

(Matrix L)

(000)

Industry / Region	Forestry	Mining	Mfg.	Const.	Transp. & Utilities	Trade	Finance	P. Adm.	Services	Total[a]
Eastern Ontario	0.8	0.7	45.5	19.9	22.5	45.8	13.6	84.3	94.6	327.8
Lake Ontario	0.3	0.7	35.4	8.7	8.2	20.1	4.0	12.7	31.3	121.5
Central Ontario	0.2	3.8	331.2	77.5	75.3	212.0	85.6	69.9	308.5	1183.9
Niagara	0.1	0.9	118.2	20.5	19.0	48.3	11.3	13.9	80.7	312.4
Lake Erie	0.1	0.5	44.3	11.9	11.9	29.1	10.0	10.5	49.6	167.9
Lake St. Clair	-	0.8	58.9	11.1	12.5	29.2	7.0	8.4	45.2	173.1
Midwest	0.1	0.6	65.7	12.2	8.6	27.6	7.7	8.4	45.2	176.1
Georgian Bay	0.4	0.4	27.5	10.7	9.4	20.4	4.1	11.5	32.0	116.4
Northeast	2.4	26.9	31.5	12.6	15.3	24.9	4.4	14.1	41.6	173.8
Northwest	3.0	3.6	14.1	4.8	9.9	11.6	1.9	5.9	21.1	75.9
Ontario [a]	7.3	38.9	772.3	190.0	212.7	469.1	149.5	239.5	749.8	2829.1

[a]Table may not necessarily add up due to rounding.

Source: Prepared by the Census Division, Statistics Canada, August 1976.

in matrix notation, with rows denoting industries (i = 1....n) and columns representing regions (j = 1....r). Further, capital letters indicate matrices and those with hats (^) describe diagonal matrices. Barred (-) lower case letters denote column or row vectors obtained by summing across rows or columns in the appropriate matrix.

We start out by defining the following row vector for Ontario: n = a row vector of (wage and salary) employees by industry in Ontario with elements n_i, i = 1....n industries. This vector contains the data obtained from Source (1) and shown in Table A.1 above. Also given is matrix L of order r by n with elements l_{ij} denoting estimates of employed labour force in industry i and region j. These estimates are derived from data source (4) described above and are shown in Table A.4. We wish to distribute vector n regionally and matrix L may be used for this purpose. That is, wage and salary earners are assumed to be distributed among the industries and regions in the same proportion as the labour force (which may serve as a counterpart variable in terms of allocation method i). This gives rise to a new matrix M (of the same dimensions as Matrix L) presented in Table A.5 on page 225 and computed by taking the product of L and a diagonal matrix with the elements n_i^* in the major diagonal, where n_i^* is the number of wage and salary earners per labour force employee.

The data on average annual earnings by industry in Table A.2 define a row vector e with component e_i denoting

Table A.5

Estimates of Wage and Salary Employment by Industry and Region in Ontario, 1971

(Matrix M)

(000)

Region \ Industry	Forestry	Mining	Mfg.	Const.	Transp. & Utilities	Trade	Finance	P. Adm.	Services	Total
Eastern Ontario	1.2	.7	47.6	14.9	23.6	43.1	12.4	67.1	92.2	302.8
Lake Ontario	.4	.7	37.1	6.5	8.7	18.9	3.7	10.1	30.7	116.8
Central Ontario	.3	3.6	346.0	57.8	99.7	198.8	77.8	55.6	300.7	1140.3
Niagara	.2	.8	123.4	15.3	19.8	45.3	10.2	11.0	79.0	305.0
Lake Erie	.1	.5	46.0	8.9	12.5	27.3	9.1	8.4	48.3	161.1
Lake St. Clair	-	.7	61.3	8.4	13.1	27.3	6.4	6.7	43.9	167.8
Midwest	.2	.6	68.6	9.1	8.9	26.0	6.9	6.7	43.9	170.9
Georgian Bay	.6	.4	29.0	7.9	9.8	18.9	3.7	9.1	31.5	110.9
Northeast	3.5	25.5	33.1	9.3	16.0	23.3	3.9	11.2	41.0	166.8
Northwest	4.4	3.4	14.5	3.5	10.5	11.0	1.8	4.6	20.5	74.2
Ontario	10.9	36.9	806.6	141.6	222.5	439.9	136.0	190.5	731.6	2716.6

Source: Tables A-1 and A-4.

average annual earnings in industry i in Ontario. These same components may also define a diagonal matrix $\hat{E}$ of order r by n with elements e_i on the diagonal. Post-multiplying matrix $\hat{E}$ by matrix M we obtain:

$$M\hat{E} = S,$$

where S is a matrix of order r by n with the typical component s_{ji} representing wage and salary income in region j and industry i based on average earnings by industry in the province. Matrix S is shown as Table A.6 on page 227. Further, upon summing each row of matrix S (i.e., over industries), we obtain a column vector $\bar{s}$ of dimension r by 1 with elements $\bar{s}_j$ showing wage and salary income in each region.

The data shown in Table A.3 provide an estimate of average annual earnings in each region in 1971. These annual estimates may define a new column vector p of order r by 1 with components p_j denoting average annual earnings in each region. The same estimates may be arranged differently in a diagonal matrix $\hat{P}$ of order r by r with the elements p_j on its diagonal. We now use this infomration to derive an alternate estimate of wage and salary income in each region as a check on our previous results. In order to do this, we multiply these estimates of <u>average</u> earnings by estimates of wage and salary employees in each region. The latter can be obtained by summing rows of matrix M, which provide estimates of wage and salary employment by industry and region (Table A.4). The summing operation produces a column vector $\bar{m}$ of order

Table A.6

Estimates of Wage and Salary Income by Industry and Region in Ontario, 1971 (Matrix S)

($ million)

Region \ Industry	Forestry	Mining	Mfg.	Const.	Transp. Utilities	Trade	Finance	P. Adm.	Services	Total
Eastern Ontario	10.5	6.5	376.6	153.1	177.7	247.1	86.6	499.1	496.3	2073.5
Lake Ontario	3.5	6.4	293.5	66.8	72.7	108.4	25.8	75.1	165.2	817.6
Central Ontario	2.6	33.2	2737.3	594.1	535.0	1139.7	543.2	413.6	1618.5	7917.2
Niagara	1.8	7.4	976.3	157.3	155.3	259.7	71.2	81.8	425.2	2146.5
Lake Erie	.9	4.6	363.9	71.5	104.7	156.5	63.5	62.5	260.0	1108.1
Lake St. CLair	-	6.5	485.0	86.3	109.7	156.5	44.7	49.8	236.3	1174.8
Midwest	.8	5.5	542.7	73.5	74.5	149.1	48.2	49.8	236.3	1201.4
Georgian Bay	5.2	3.7	221.4	81.2	82.1	108.4	25.8	67.7	169.5	773.0
Northeast	30.7	235.4	261.9	75.6	34.0	133.4	27.2	83.3	220.7	1222.2
Northwest	38.6	31.4	114.7	36.0	87.1	63.1	12.6	34.2	110.3	528.8
Ontario	95.5	340.6	6381.3	1455.4	1564.3	2521.9	948.8	1416.9	3938.3	18963.0

r by 1 with components $\bar{m}_j$ showing estimates of wage and salary employment in each region. Now we post-multiply vector $\bar{m}$ by the diagonal matrix $\hat{P}$:

$$\hat{P}\bar{m} = q,$$

where q is a column vector of order r by 1 with components q_j showing estimates of wage and salary income in each region derived by multiplying the region's estimated employment $\bar{m}$ by its estimated average earnings p_j.

So far we have two separate estimates of regional wage and salary income, namely, vectors $\bar{s}$ and q which are reproduced in Table A.7 below for comparison.

Table A.7

Alternative Estimates of Regional Wage and Salary Income, 1971

	Vectors $\bar{s}$ and q ($m)	
Region	$\bar{s}$	q
Eastern Ontario	2,073.5	2,024.9
Lake Ontario	817.6	799.3
Central Ontario	7,917.2	8,568.2
Niagara	2,146.5	2,339.4
Lake Erie	1,108.1	1,110.0
Lake St. Clair	1,174.8	1,472.0
Midwest	1,201.4	1,119.7
Georgian Bay	773.0	692.6
Northeast	1,222.2	1,420.7
Northwest	528.8	572.6

Source: Tables A.6, A.5 and A.3.

The first (vector $\bar{s}$) is based on estimates of employment by industry in each region and on average earnings in each

industry in Ontario, whereas the second (vector q) is based on estimates of total employees in each region and on the region's earnings level. The industrial composition underlying vector $\bar{s}$, namely, matrix S provides a useful alternative means of estimating wage and salary income by industry and region. In comparison the estimates of wage and salary income of vector q, being based on average earnings in each region, are probably a more accurate indicator of the overall income level in the regions. Accordingly, the problem is to adjust matrix S such that a new matrix Q of dimension r by n is derived with the property that each typical component, say q_{ij}, denotes wage and salary income in industry i and region j adjusted to the general level of earnings in each region. Furthermore, upon summing across columns (i.e., over industries), a row vector $\bar{q}$ of dimension 1 by r showing regional wage and salary income is obtained, which is equal to vector q as shown in Table A.7.

The procedure involved in computing matrix Q begins with defining a new r by r diagonal matrix $\hat{\alpha}$. A typical component on the diagonal of this matrix such as α_j denotes the ratio of wage and salary income in region j, computed on the basis of its overall earnings level p_j (from data source iii) to its wage and salary income based on average earnings by industry for Ontario $\hat{E}$ (from data source ii), or simply $q_j/\bar{s}_j$. Next, we transpose matrix S and post-multiply it by matrix $\hat{\alpha}$

$$S' \hat{\alpha} = Q.$$

Matrix Q is of dimension n by r and meets the above mentioned adjustment requirements, as can be readily verified by summing over industries. Its transpose is shown in Table A.8 on page 231.

As already pointed out, the information on wage and salary income by industry and region contained in Table A.8 contributed to the regional allocation of some of the Provincial Accounts components in the course of preparing estimates of regional accounts in Chapter V. In particular, wage and salary income in the service industries (transportation and utilities, trade, finance and services) by region were used in Table 5.5 of Chapter V as proxy variables for allocating the Accounts totals on private investment, corporate profits interest and investment income and capital consumption allowances attributed to service industries among the regions by means of method iii, or the two-stage allocation procedure described in Chapter III.

Table A.8

Alternative Estimates of Wage and Salary Income by Industry and Region in Ontario, 1971 (Matrix Q)

($ million)

Region \ Industry	Forestry	Mining	Mfg.	Const.	Transp. & Utilities	Trade	Finance	P. Adm.	Services	Total
Eastern Ontario	10.3	6.7	367.9	149.6	193.2	241.4	84.6	487.6	484.9	2025.8
Lake Ontario	3.4	6.3	287.0	65.3	71.3	106.0	25.2	73.4	161.6	799.6
Central Ontario	2.8	35.9	2961.8	642.8	903.5	1233.2	587.7	447.5	1751.2	8566.4
Niagara	2.0	8.1	1064.2	171.5	180.7	283.1	77.6	89.2	463.5	2339.7
Lake Erie	.9	4.6	364.3	91.6	104.8	156.7	63.5	62.5	260.3	1109.2
Lake St. Clair	-	8.2	610.6	108.7	138.1	197.0	56.3	62.7	297.5	1479.1
Midwest	1.7	5.1	505.8	87.1	69.4	139.0	44.9	46.4	220.2	1119.7
Georgian Bay	4.7	3.3	205.5	72.8	73.6	97.1	23.1	60.6	151.9	692.6
Northeast	35.7	273.5	304.3	111.1	155.7	155.0	31.6	96.8	256.5	1420.2
Northwest	41.8	34.0	124.2	39.0	95.2	68.3	13.6	37.0	119.5	572.7
Ontario	103.3	385.4	6795.6	1539.5	1985.5	2676.8	1008.1	1463.7	4167.1	20125.0

Source: Tables A.6 and A.7.

A P P E N D I X B

T A B L E S

ONTARIO ECONOMIC ACCOUNTS

TABLE B-1

PROVINCIAL INCOME AND GROSS PROVINCIAL PRODUCT, 1970-74

	1970	1971	1972	1973	1974
			$ millions		
1. Wages, salaries and supplementary labour income	20,182	22,245	24,795	27,910	32,105
2. Military pay and allowances	277	265	289	313	338
3. Corporate profits before taxes	3,428	3,881	4,815	6,471	8,233
4. Deduct: Dividends paid to non-residents	- 625	- 683	- 789	- 912	- 1,058
5. Interest and miscellaneous investment income	1,147	1,233	1,537	1,805	2,304
6. Accrued net income of farm operators from farm production	337	352	478	610	587
7. Net income of non-farm unincorporated business including rent	2,258	2,474	2,596	2,832	3,040
8. Inventory valuation adjustment	- 80	- 317	- 446	- 510	- 1,009
9. Net Provincial Income at Factor Cost	26,924	29,450	33,275	38,519	44,540
10. Indirect taxes less subsidies	4,863	5,263	5,977	6,679	7,896
11. Capital consumption allowances and miscellaneous valuation adjustments	3,691	3,946	4,374	5,049	5,564
12. Residual error	164	- 447	- 396	- 401	+ 270
13. Gross Provincial Product at Market Prices	35,314	38,212	43,230	49,846	58,270

GROSS PROVINCIAL EXPENDITURE, 1970-74

		1970	1971	1972	1973	1974
		$ millions				
1.	Personal expenditure on consumer goods and services	20,284	22,274	24,947	28,050	31,896
2.	Government expenditure on goods and services:					
3.	Current expenditure	4,782	5,243	5,921	6,621	7,932
4.	Capital expenditure	1,083	1,214	1,324	1,403	1,746
5.	Business gross fixed capital formation:					
6.	New residential and non-residential construction	3,063	3,454	4,058	4,705	5,418
7.	New machinery and equipment	2,614	2,541	2,714	3,402	4,162
8.	Value of physical change in inventories:					
9.	Non-farm business inventories	85	132	433	476	1,221
10.	Farm inventories and grain in commercial channels	134	- 277	103	- 280	- 55
11.	Exports of goods and services abroad	10,354	10,995	12,180	15,164	17,784
12.	Deduct: Imports of goods and services from abroad	- 8,311	- 8,985	-10,152	- 11,590	- 13,320
13.	Exports of labour services to Federal government	1,216	1,332	1,480	1,656	1,939
14.	Deduct: Federal government investment income received from or accrued in Ontario	- 177	- 174	- 208	- 193	- 218
15.	Dividends received from R.O.C.	228	219	358	372	415
16.	Deduct: Dividends paid to R.O.C.	- 205	- 204	- 325	- 342	- 381
17.	Residual error	+ 164	+ 448	+ 397	+ 402	- 269
18.	Gross Provincial Expenditure at Market Prices	35,314	38,212	43,230	49,846	58,270

TABLE B-3

RELATION BETWEEN NET PROVINCIAL INCOME AT FACTOR COST, PERSONAL INCOME, PERSONAL DISPOSABLE INCOME, AND PERSONAL SAVING, 1970-74

	1970	1971	1972	1973	1974
	$ millions				
1. Net Provincial Income at Factor Cost	26,924	29,450	33,275	38,519	44,540
2. Add: Transfer payments (excluding interest on public debt and transfers from Ontario corporations)	2,589	3,073	3,459	3,813	4,680
3. Add: Interest on public debt	1,054	1,147	1,293	1,455	1,651
4. Add: Interest on consumer debt	233	217	224	328	479
5. Deduct: Earnings not paid out to persons	- 2,826	- 3,030	- 3,628	- 5,152	- 6,353
6. Equals: Personal Income	27,974	30,857	34,623	38,963	44,997
7. Deduct: Personal direct taxes	- 5,058	- 5,652	- 6,263	- 7,105	- 8,656
8. Deduct: Other current transfers to governments	- 727	- 740	- 673	- 669	- 686
9. Equals: Personal disposable income	22,189	24,465	27,687	31,189	35,655
10. Deduct: Personal expenditure on consumer goods and services	- 20,284	- 22,274	- 24,947	- 28,050	- 31,896
11. Deduct: Transfers to corporations	- 233	- 217	- 224	- 328	- 479
12. Deduct: Transfers to rest of world	- 69	- 69	- 78	- 94	- 89
13. Equals: Saving of persons and unincorporated business	1,603	1,905	2,438	2,717	3,191

TABLE B-4

RELATION BETWEEN GROSS PROVINCIAL PRODUCT AT MARKET PRICES AND GROSS DOMESTIC PRODUCT AT FACTOR COST, 1970-74.

		1970	1971	1972	1973	1974
				$ millions		
1.	Gross Provincial Product at Market Prices	35,314	38,212	43,230	49,846	58,270
2.	Deduct: Residual error of estimate	+ 164	+ 447	+ 396	+ 401	- 270
3.	Indirect taxes less subsidies	- 4,863	- 5,263	-5,977	- 6,679	- 7,896
4.	Factor incomes received from non-residents	- 1,872	- 1,941	-2,222	- 2,500	- 2,893
5.	Add: Factor inomes paid to non-residents	1,230	1,279	1,412	1,582	1,884
6.	Gross Domestic Product at Factor Cost	29,973	32,734	36,839	42,650	49,095

TABLE B-5

SECTOR ACCOUNTS CONSOLIDATION, 1970-74
PROVINCIAL INCOME AND PRODUCT

	1970	1971	1972	1973	1974
	$ millions				
1. Personal Sector	717	817	908	967	1,102
2. Wages, salaries and supplementary labour income	717	817	908	967	1,102
3. Business Sector	22,294	24,319	27,515	32,072	37,028
4. Wages, salaries and supplementary labour income	15,255	16,709	18,654	21,038	24,001
5. Domestic investment income	4,524	5,101	6,233	8,102	10,409
6. Net income of farm operators from farm production	337	352	478	610	587
7. Net income of non-farm unincorporated business, including rent	2,258	2,474	2,596	2,832	3,040
8. Inventory valuation adjustment	- 80	- 317	- 446	- 510	- 1,009
9. Government Sector	3,271	3,652	4,042	4,562	5,401
10. Wages, salaries and supplementary labour income	3,271	3,652	4,042	4,562	5,401
11. Federal Government Sector	1,039	1,158	1,272	1,463	1,721
12. Wages, salaries and supplementary labour income paid	939	1,067	1,191	1,343	1,601
13. Military pay and allowances	277	265	289	313	338
14. Less: Investment income received or accrued by Federal government	- 177	- 174	- 208	- 193	- 218

TABLE B-5 CONT'D.

		1970	1971	1972	1973	1974
		----------	----------	$ millions	----------	----------
15.	Rest of Canada Sector	23	15	33	30	34
16.	Dividends paid to persons	228	219	358	372	415
17.	Less: Dividends received by persons	- 205	- 204	- 325	- 342	- 381
18.	Rest of World Sector	- 420	- 511	- 495	- 575	- 746
19.	Investment income paid	428	390	384	472	539
20.	Less: Investment income received	- 848	- 901	- 879	-1,047	-1,285
21.	Net Provincial Income at Factor Cost	26,924	29,450	33,275	38,519	44,540
22.	Capital consumption allowances and Miscellaneous valuation adjustments	3,691	3,946	4,374	5,049	5,564
23.	Indirect taxes	5,107	5,497	6,258	7,019	8,757
24.	Less: Subsidies	- 244	- 234	- 281	- 340	- 861
25.	Residual error	- 164	- 447	- 396	- 401	+ 27
26.	Gross Provincial Product at Market Prices	35,314	38,212	43,230	49,846	58,270

TABLE B-6

SECTOR ACCOUNTS CONSOLIDATION, 1970-74
GROSS PROVINCIAL EXPENDITURE

	1970	1971	1972	1973	1974
	$ millions				
1. Personal Expenditure on Consumer Goods and Services	20,284	22,274	24,947	28,050	31,896
2. Purchases from business	18,933	20,833	23,386	26,324	29,933
3. Purchases of direct services	717	817	908	967	1,102
4. Purchases from non-residents	634	624	653	759	861
5. Government Expenditure on Goods and Services	5,865	6,457	7,245	8,024	9,678
6. Purchases from business	2,205	2,403	2,742	2,937	3,678
7. Purchases of direct services from persons	3,271	3,652	4,042	4,562	5,401
8. Purchases from government for use of own capital	389	402	461	525	599
9. Business Gross Fixed Capital Formation	5,677	5,995	6,772	8,107	9,580
10. New construction	3,063	3,454	4,058	4,705	5,418
11. New machinery and equipment	2,614	2,541	2,714	3,402	4,162

TABLE B-6 CONT'D.

		1970	1971	1972	1973	1974
		$ millions				
12.	Value of Physical Change in Inventories	219	- 145	- 536	196	1,166
13.	Non-farm business inventories	85	132	433	476	1,221
14.	Farm inventories and grain in commercial channels	134	- 277	103	- 280	- 55
15.	Exports of Goods and Services	11,798	12,546	14,018	17,192	20,138
16.	To Federal government	1,216	1,332	1,480	1,656	1,939
17.	To rest of Canada	228	219	358	372	415
18.	To rest of World	10,354	10,995	12,180	15,164	17,784
19.	Deduct: Imports of Goods and Services	- 8,693	- 9,363	-10,685	- 12,125	- 13,919
20.	From Federal government	- 177	- 174	- 208	- 193	- 218
21.	From rest of Canada	- 205	- 204	- 325	- 342	- 381
22.	From rest of World	- 8,311	- 8,985	-10,152	- 11,590	- 13,320
23.	Residual Error	+ 164	+ 448	+ 397	+ 402	- 269
24.	Gross Provincial Expenditure at Market Prices	35,314	38,212	43,230	49,846	58,270

TABLE B-7

CURRENT ACCOUNT: PERSONAL SECTOR, 1970-74
INCOME

	1970	1971	1972	1973	1974
	$ millions				
1. Wages, salaries and supplementary labour income from domestic sources					
a) Business (31a)	15,255	16,709	18,654	21,038	24,001
b) Government					
i) On current account (18b)	3,232	3,610	3,990	4,506	5,325
ii) On capital account (81a)	39	42	52	56	76
c) Persons (8a ii)	717	817	908	967	1,102
2. Wages, salaries and supplementary labour income from Federal Government					
a) On current account (36a)	933	1,062	1,181	1,335	1,589
b) On capital account (36b)	6	5	10	8	12
c) Military pay and allowances (36c)	277	265	289	313	338
3. Net income of non-farm unincorporated business, including rental income (31d)	2,258	2,474	2,596	2,832	3,040
4. Net income of farm operators from farm production (31c)	337	352	478	610	587
5. Interest, dividends and miscellaneous investment income (68a i)	2,308	2,422	2,977	3,456	4,213

TABLE B-7 CONT'D.

	1970	1971	1972	1973	1974
	$ million				
6. Other current transfers					
a) From domestic sources:					
i) Ontario government to persons (21a)	1,031	1,187	1,106	1,196	1,423
ii) Ontario government capital assistance to unincorporated business (21d)	1	4	8	8	9
iii) Ontario corporations - charitable contributions and bad debts (68a ii)	23	26	29	29	34
b) From other Canadian sources:					
i) Federal Government to persons except Canada Pension Plan (38a)	1,443	1,716	2,124	2,349	2,924
ii) Canada Pension Plan (38b)	42	69	103	137	194
iii) Federal Government capital assistance to unincorporated business (38d ii)	1	1	2	1	2
iv) R.O.C. corporations - charitable contributions and bad debts (47)	29	32	35	35	41
c) From rest of the World (56)	42	64	81	87	87
7. Total	27,974	30,857	34,623	38,963	44,997

TABLE B-8

CURRENT ACCOUNT: PERSONAL SECTOR, 1970-74
EXPENDITURE

	1970	1971	1972	1973	1974
	$ millions				
8. Purchase of goods and services					
a) From domestic sources:					
i) Ontario business (24)	18,933	20,833	23,386	26,324	29,933
ii) Direct services from persons (1c)	717	817	908	967	1,102
b) Direct purchases from abroad:					
Travel and military pay abroad (59a)	634	624	653	759	861
9. Transfers to government					
a) Paid to Ontario Government					
i) Employer and employee contributions to social insurance and government pension funds (13a)	162	176	204	258	283
ii) Other direct taxes (13b)	980	1,134	1,233	1,403	1,688
iii) Other current transfers (13c)	726	738	671	666	683
b) Paid to Federal Government:					
i) Employer and employee contributions to social insurance and government pension funds (except Canada Pension Plan) (42a i)	431	453	577	676	991
ii) Contributions to Canada Pension Plan (42a ii)	430	452	477	510	654
iii) Other direct taxes (42a iii)	3,055	3,437	3,772	4,258	5,040
iv) Other current transfers (42a iv)	1	2	2	3	3

TABLE B-8 CONT'D.

	1970	1971	1972	1973	1974
	$ millions				
10. Other current transfers					
a) To Ontario corporations - interest on consumer debt (68d)	233	217	224	328	479
b) To rest of the world - personal remittances (61)	69	69	78	94	89
11. Saving (74)	1,603	1,905	2,438	2,717	3,191
12. Total	27,974	30,857	34,623	38,963	44,997

TABLE B-9

CURRENT ACCOUNT: GOVERNMENT SECTOR, 1970-74
REVENUE

	1970	1971	1972	1973	1974
	$ millions				
13. Transfers from personal sector					
a) Employer and employee contributions to social insurance and government pension funds (9a i)	162	176	204	258	283
b) Other direct taxes (9a ii)	980	1,134	1,233	1,403	1,688
c) Other current transfers (9a iii)	726	738	671	666	683
14. Taxes from business sector					
a) Direct taxes - corporations (68b i)	371	404	467	583	834
b) Indirect taxes - business (32a i)	3,358	3,551	4,022	4,469	5,023
15. Transfers from Federal government (38c)	1,028	1,233	1,290	1,289	1,498
16. Investment income					
a) Remittances from government business enterprises (68b iii)	-	-	19	20	22
b) Interest and miscellaneous investment income (68b ii)	285	329	331	393	500
17. Total	6,910	7,565	8,237	9,081	10,531

CURRENT ACCOUNT: GOVERNMENT SECTOR, 1970-74
EXPENDITURE

		1970	1971	1972	1973	1974
				$ millions		
18.	Purchase of goods and services					
	a) From Ontario business (25a)	1,161	1,231	1,470	1,590	2,008
	b) Direct services from persons - wages, salaries and supplementary labour income (1b i)	3,232	3,610	3,990	4,506	5,325
19.	Capital consumption allowances (77b)	389	402	461	525	599
20.	Interest on the public debt					
	a) To Ontario residents (72)	205	235	263	297	300
	b) To Canada Pension Plan (41)	106	148	183	223	272
	c) To R.O.C. residents (50)	84	99	110	124	124
	d) To non-residents abroad (60)	98	107	114	135	157
21.	Other transfer payments to Ontario residents					
	a) Transfers to persons (6a i)	1,031	1,187	1,106	1,196	1,423
	b) Subsidies to business (32b i)	27	49	54	68	105
	c) Capital assistance to corporations and government business enterprises (76c ii)	3	7	4	5	7
	d) Capital assistance to unincorporated business (6a ii)	1	4	8	8	9
22.	Saving (75)	573	486	474	404	202
23.	Total	6,910	7,565	8,237	9,081	10,531

TABLE B-11

OPERATING ACCOUNT: BUSINESS SECTOR, 1970-74
REVENUE

		1970	1971	1972	1973	1974
		$ millions				
24.	Current sales to persons (8a i)	18,933	20,833	23,386	26,324	29,933
25.	Sales to Ontario government					
	a) On current account (18a)	1,161	1,231	1,470	1,590	2,008
	b) On capital account (81b)	1,044	1,172	1,272	1,347	1,670
26.	Sales to non-residents abroad (55)	9,926	10,605	11,796	14,692	17,245
27.	Business gross fixed capital formation					
	a) Unincorporated business:					
	i) Construction (82a i)	811	962	1,121	1,227	1,454
	ii) Machinery and equipment (82a ii)	543	583	689	782	955
	b) Corporations and government business enterprises					
	i) Construction (82b i)	2,252	2,492	2,937	3,478	3,964
	ii) Machinery and equipment (82b ii)	2,071	1,958	2,025	2,620	3,207
28.	Value of physical change in inventories					
	a) Unincorporated business (83a)	134	-277	103	-280	-55
	b) Corporations and government business enterprises (83b)	85	132	433	476	1,221
29.	Residual error (85)	+164	+448	+397	+402	-269
30.	Total	37,124	40,139	45,629	52,658	61,333

TABLE B-12

OPERATING ACCOUNT: BUSINESS SECTOR, 1970-74
EXPENDITURE

	1970	1971	1972	1973	1974
			$ millions		
31. Factor costs					
a) Wages, salaries and supplementary labour income paid to persons (1a)	15,255	16,709	18,654	21,038	24,001
b) Domestic investment income (64)	4,524	5,101	6,233	8,102	10,409
c) Net income of farm operators from farm production (4)	337	352	478	610	587
d) Net income of non-farm unincorporated business, including rent (3)	2,258	2,474	2,596	2,832	3,040
e) Inventory valuation adjustment (78)	- 80	-317	-446	-510	-1,009
32. Other costs					
a) Indirect taxes paid					
i) To Ontario government (14b)	3,358	3,551	4,022	4,469	5,023
ii) To federal government (42b ii)	1,749	1,946	2,236	2,550	3,734
less b) Subsidies received from:					
i) Ontario government (21b)	- 27	- 49	- 54	- 68	-105
ii) Federal government (38d i)	-217	-185	-227	-272	-756
c) Capital consumption allowances and miscellaneous valuation adjustments					
i) Persons and unincorporated business (77a)	1,113	1,192	1,311	1,557	1,784
ii) Corporations and government business enterprises (77c)	2,189	2,352	2,602	2,967	3,181
33. Direct purchases of goods and services from non-residents abroad (59b)	6,829	7,460	8,620	9,784	11,174
34. Residual error (79)	-164	-447	-396	-401	+270
35. Total	37,124	40,139	45,629	52,658	61,333

TABLE B-13

ONTARIO TRANSACTIONS ON FEDERAL GOVERNMENT ACCOUNTS, 1970-74
RECEIPTS OF ONTARIO, PAYMENTS OF FEDERAL GOVERNMENT

	1970	1971	1972	1973	1974
			$ millions		
36. Factor Incomes Paid: wages, salaries and supplementary labour income paid to persons					
a) On current account (2a)	933	1,062	1,181	1,335	1,589
b) On capital account (2b)	6	5	10	8	12
c) Military pay and allowances (2c)	277	265	289	313	338
37. Interest on the public debt (69d)	732	775	875	986	1,168
38. Other transfer payments					
a) To persons except Canada Pension Plan (6b i)	1,443	1,716	2,124	2,349	2,924
b) Canada Pension Plan (6b ii)	42	69	103	137	194
c) To Government (15)	1,028	1,233	1,290	1,289	1,498
d) To business					
i) Subsidies (32b ii)	217	185	227	272	756
ii) Capital assistance to unincorporated business (6b iii)	1	1	2	1	2
iii) Capital assistance to corporations and government business enterprises (76c i)	42	75	80	101	81
39. Total	4,721	5,386	6,181	6,791	8,562

TABLE B-14

ONTARIO TRANSACTIONS ON FEDERAL GOVERNMENT ACCOUNT, 1970-74
PAYMENTS OF ONTARIO, RECEIPTS OF FEDERAL GOVERNMENT

	1970	1971	1972	1973	1974
			$ millions		
40. Factor incomes received					
a) Interest on loans, advances and investments (69b)	16	19	22	25	26
b) Federal business enterprises profits accrued in Ontario (69c)	161	155	186	168	192
41. Interest on Canada Pension Plan: from government (20b)	106	148	183	223	272
42. Other transfers					
a) From persons					
i) Employer and employee contributions to social insurance and government pension funds (9bi)	431	453	577	676	991
ii) Contributions to Canada Pension Plan (9bii)	430	452	477	510	654
iii) Other direct taxes (9biii)	3,055	3,437	3,772	4,258	5,040
iv) Other current transfers (9biv)	1	2	2	3	3
b) From Business:					
i) Direct taxes-corporations (69a)	1,005	1,101	1,271	1,547	2,068
ii) Indirect taxes (32aii)	1,749	1,946	2,236	2,550	3,734
43. Surplus (+) or deficit (-) (84a)	- 2,233	- 2,327	- 2,545	- 3,169	- 4,418
44. Total	4,721	5,386	6,181	6,791	8,562

TABLE B-15

ONTARIO TRANSACTIONS ON REST OF CANADA ACCOUNT, 1970-74
RECEIPTS OF ONTARIO, PAYMENTS OF REST OF CANADA

		1970	1971	1972	1973	1974
				$ millions		
45.	Corporate dividends paid to persons by R.O.C. business (65)	228	219	358	372	415
46.	Interest on public debt paid by R.O.C. government (70b)	117	137	155	172	183
47.	Transfers from R.O.C. business to persons (6biv)	29	32	35	35	41
48.	Total	374	388	548	579	639

TABLE B-16

ONTARIO TRANSACTIONS ON REST OF CANADA, 1970-74
PAYMENTS OF ONTARIO, RECEIPTS OF REST OF CANADA

	1970	1971	1972	1973	1974
			$ millions		
49. Corporate dividends paid to R.O.C. persons by Ontario business (70ai)	205	204	325	342	381
50. Interest on public debt paid to R.O.C. (20c)	84	99	110	124	124
51. Transfers from Ontario business to R.O.C. persons (70aii)	42	46	51	51	60
52. Surplus (+) or deficit (-) (84b)	+ 43	+ 39	+ 62	+ 62	+ 74
53. Total	374	388	548	579	639

TABLE B-17

ONTARIO TRANSACTIONS ON REST OF THE WORLD ACCOUNT, 1970-74
ONTARIO EXPORTS ABROAD, PAYMENTS OF REST OF THE WORLD

	1970	1971	1972	1973	1974
			$ millions		
54. Interest, dividends and miscellaneous investment income received by					
a) Personal sector (66a)	49	45	46	47	47
b) Government (66b)	5	4	4	4	4
c) Business (66c)	374	341	334	421	488
55. Other payment for purchases of goods and services from business (26)	9,926	10,605	11,796	14,692	17,245
56. Current transfers to persons (6c)	42	64	81	87	87
57. Total	10,396	11,059	12,261	15,251	17,871

TABLE B-18

ONTARIO TRANSACTIONS ON REST OF THE WORLD ACCOUNT, 1970-74
ONTARIO IMPORTS FROM ABROAD, PAYMENTS TO REST OF THE WORLD

	1970	1971	1972	1973	1974
			$ millions		
58. Factor incomes paid by business					
a) Interest and miscellaneous investment income (71a)	428	422	415	477	608
b) Corporate dividends (71b)	420	479	464	570	677
59. Purchases of goods and services by					
a) Persons - travel and military pay abroad (8b)	634	624	653	759	861
b) Business (33)	6,829	7,460	8,620	9,784	11,174
60. Interest on the public debt (20d)	98	107	114	135	157
61. Current transfers from persons (10b)	69	69	78	94	89
62. Surplus (+) or deficit (-) (84c)	+ 1,918	+ 1,898	+ 1,917	+ 3,432	+ 4,305
63. Total	10,396	11,059	12,261	15,251	17,871

TABLE B-19

INVESTMENT INCOME APPROPRIATION ACCOUNT, 1970-74
SOURCE

		1970	1971	1972	1973	1974
				$ millions		
64.	Domestic investment income (31b)	4,524	5,101	6,233	8,102	10,409
65.	Dividends from R.O.C. (45)	228	219	358	372	415
66.	Interest, dividends and miscellaneous investment income received from abroad by a) Persons (54a)	49	45	46	47	47
	b) Government (54b)	5	4	4	4	4
	c) Business (54c)	374	341	334	421	488
67.	Total	5,180	5,710	6,975	8,946	11,363

TABLE B-20

INVESTMENT INCOME APPROPRIATION ACCOUNT, 1970-74
DISPOSITION

	1970	1971	1972	1973	1974
			$ millions		
68. To Ontario residents:					
a) Persons					
i) Interest, dividends and miscellaneous investment income (5)	2,308	2,422	2,977	3,456	4,213
ii) Transfers from Ontario corporations (6aiii)	23	26	29	29	34
b) Government					
i) Corporate taxes (14a)	371	404	467	583	834
ii) Interest and miscellaneous investment income (16b)	285	329	331	393	500
iii) Remittances from government business enterprises (16a)	-	-	19	20	22
c) Business					
i) Retained portion of taxable profits of corporations (76a)	1,181	1,446	1,916	3,045	3,840
ii) Retained earnings of government business enterprises (76b)	22	21	19	23	38
less d) Transfers of interest on consumer debt (10a)	- 233	- 217	- 224	- 328	- 47
69. To Federal Government					
a) Corporate taxes (42bi)	1,005	1,101	1,271	1,547	2,06
b) Interest on federal loans, advances and investments (40a)	16	19	22	25	2
c) Profits of federal business enterprises accrued in Ontario (40b)	161	155	186	168	19
less d) Transfers of interest on public debt (37)	- 732	- 775	- 875	- 986	-1,16

TABLE B-20 CONT'D.

	1970	1971	1972	1973	1974
			$ millions		
70. To other Canadian residents:					
a) To persons					
i) Dividends (49)	205	204	325	342	381
ii) Charitable contributions (51)	42	46	51	51	60
less b) Transfers of interest on public debt (46)	- 117	- 137	- 155	- 172	- 183
71. To rest of World:					
a) Interest and miscellaneous investment income (58a)	428	422	415	477	608
b) Dividends (58b)	420	479	464	570	677
ss 72. Interest on public debt received by Ontario persons (20a)	- 205	- 235	- 263	- 297	- 30(
73. Total	5,180	5,710	6,975	8,946	11,36:

TABLE B-21

PROVINCIAL SAVING AND INVESTMENT ACCOUNT, 1970-74
SOURCE

	1970	1971	1972	1973	1974
			$ millions		
74. Personal net saving (11)	1,603	1,905	2,438	2,717	3,191
75. Government net saving (22)	573	486	474	404	202
76. Business net saving					
a) Retained profits of corporations (68c i)	1,181	1,446	1,916	3,045	3,840
b) Retained profits of government business enterprises (68c ii)	22	21	19	23	38
c) Capital assistance to corporations and government business enterprises from					
i) Federal Government (38d iii)	42	75	80	101	81
ii) Ontario Government (21c)	3	7	4	5	7
77. Capital consumption allowances and miscellaneous valuation adjustments					
a) Unincorporated business (32c i)	1,113	1,192	1,311	1,557	1,784
b) Government (19)	389	402	461	525	599
c) Corporate and government business enterprises (32c ii)	2,189	2,352	2,602	2,967	3,181
78. Inventory valuation adjustment (31e)	- 80	- 317	- 446	- 510	- 1,009
79. Residual error (34)	- 164	- 447	- 396	- 401	+ 270
80. Total	6,871	7,122	8,463	10,433	12,184

TABLE B-22

PROVINCIAL SAVING AND INVESTMENT ACCOUNT, 1970-74
DISPOSITION

	1970	1971	1972	1973	1974
	$ millions				
81. Government capital formation					
a) Wages, salaries and supplementary labour income on capital account (1b ii)	39	42	52	56	76
b) Purchases of capital goods and services from Ontario business (25b)	1,044	1,172	1,272	1,347	1,670
82. Business gross fixed capital formation by					
a) Unincorporated business					
i) Construction (27a i)	811	962	1,121	1,227	1,454
ii) Machinery and equipment (27a ii)	543	583	689	782	955
b) Corporate and government business enterprises					
i) Construction (27b i)	2,252	2,492	2,937	3,478	3,964
ii) Machinery and equipment (27b ii)	2,071	1,958	2,025	2,620	3,207
83. Value of physical change in inventories					
a) Unincorporated business (28a)	134	- 277	103	- 280	- 55
b) Corporate and government business enterprises (28b)	85	132	433	476	1,221
84. Surplus (+) or deficit (-) on other accounts					
a) On federal account (43)	- 2,233	- 2,327	- 2,545	- 3,169	- 4,418
b) On rest of Canada account (52)	+ 43	+ 39	+ 62	+ 62	+ 74
c) On rest of the World account (62)	+ 1,918	+ 1,898	+ 1,917	+ 3,432	+ 4,305
85. Residual error (29)	+ 164	+ 448	+ 397	+ 402	- 269
86. Total	6,871	7,122	8,463	10,433	12,184

Source: Prepared by the Provincial Accounts Section, Ontario Ministry of Treasury.

BIBLIOGRAPHY

Ackley, G. (1961) Macroeconomic Theory. New York, The MacMillan Co.

Allen, R.G.D. (1964) Mathematical Economics. 2nd ed. London, MacMillan & Co. Ltd.

Archibald, G.C. (1967) 'Regional Multiplier Effects in the U.K.' Oxford Economic Papers 19, 22-45

Babb, Jervis J. (1958) 'Problems of Local Growth and Area Development'. The Little Economies. New York, Committee for Economic Development

Branson, William H. (1972) Macroeconomic Theory and Policy. New York, Harper and Row

Brown, A.J. (1972) The Framework of Regional Economics in the United Kingdom. Cambridge, The University Press

Burkhead, J. (1964) 'The Government Sector in Regional Accounts'. In W.Z. Hirsch ed., Elements of Regional Accounts. Baltimore, The John Hopkins Press

Camu, P., E.P. Weeks and Z.M. Sametz (1964) Economic Geography of Canada. Toronto, University of Toronto Press

Chari, M.V. and R.H. Frank (1970) 'The Development of Ontario Economic Accounts'. Ontario Economic Review 8, 6, 5-17

Choudhry, N.K., et.al. (1972) The Trace Econometric Model of the Canadian Economy. Toronto, University of Toronto Press

Darby, Michael (1975) 'Postwar U.S. Consumption, Consumer Expenditure and Savings'. American Economic Review 65, 217-222

Design for Development (1966). Toronto, Government of Ontario

Fixed Capital Flows and Stocks in Ontario, 1955-1975 (1976). Ottawa, Construction Division, Statistics Canada

Frank, R.H. and I.M. Rash (1968) 'The Pattern of Consumer Expenditure at Provincial and Regional Levels'. Ontario Economic Review 6, 4, 8-19

Gillen, W.J. and A. Guccione (1970) 'The Estimation of Postwar Regional Consumption Functions in Canada'. Canadian Journal of Economics 3, 2, 276-290

Goldberg, K. (1968) 'The Measurement and Allocation of Corporate Profits in Regional Sector Accounts'. Journal of Regional Science 8, 159-163

Graham, Robert E. and J. Thomas Romans (1971) 'Regional Economic Accounting in the U.S. Office of Business Economics: An Appraisal'. Review of Income and Wealth 1, 2-28

Helliwell, John F., et.al. (1971) The Structure of RDX2: Part 1. Ottawa, Bank of Canada Staff Research Studies 77, 245-262

Hochwald, W. (1957) 'Conceptual Issues of Regional Income Estimation'. In National Bureau of Economic Research, Studies in Income and Wealth: Regional Income 21, Princeton, Princeton University Press

_____ (1961) Design of Regional Accounts. Baltimore, The John Hopkins Press

Hospital Statistics (1972). Toronto, Ministry of Health, Ontario Government

Kendrick, John W. (1972) Economic Accounts and Their Uses. New York, McGraw-Hill

Kubursi, A.A., J.R. Williams and P.J. George (1975) 'Sub-Provincial Regional Income Multipliers in the Ontario Economy: An Input-Output Approach'. The Canadian Journal of Economics 8, 1, 67-92

Laidler, D.E.W. and J.M. Parkin (1975) 'Inflation - A Survey'. The Economic Journal 85, 340, 741-809

Leven, Charles L. (1961) 'Regional Income and Product Accounts: Construction and Applications'. In W. Hochwald, ed., Design of Regional Accounts. Baltimore, The John Hopkins Press

Machlup, Fritz (1965) International Trade and the National Income Multiplier. New York, Augustus M. Kelly

Mack, Ruth P. (1964) 'Comment: Regional Income Account Estimates'. In W.Z. Hirsch, ed., Elements of Regional Accounts. Baltimore, The John Hopkins Press

Mayer, Thomas (1959) 'The Empirical Significance of the Real Balance Effect'. The Quarterly Journal of Economics LXXIII, 275-91

McCrone, G. (1967) 'The Application of Regional Accounting in the United Kingdom'. Regional Studies 1, 39-45

Moodie, H.T. (1964) Theory and Application of Regional Income and Product Accounts. Unpublished Ph.D. Dissertation, University of California, Los Angeles

Municipal Financial Information (1974). Toronto, Municipal Finance Branch, Ministry of Treasury, Ontario Government

Municipal Financial Statistics 1971 (1973). Toronto, Municipal Finance Branch, Ministry of Treasury, Ontario Government

Ontario Public Accounts 1971-72 (1972). Toronto, Government of Ontario

Ontario Statistics 1976 (1976). Vol. 1 & 2, Toronto, Central Statistical Services, Ministry of Treasury, Ontario Government

Palmer, John R. (1971) Design and Construction of Regional Income and Product Accounts for Prince Edward Island. Halifax, Institute of Public Affairs, Dalhousie University, Research Report No. 87

Patinkin, Don (1965) Money, Interest and Prices. 2nd ed., New York, Harper and Row

Pesek, Boris P. and Thomas R. Saving (1967) Money, Wealth and Economic Theory. New York, McMillan Co.

Powelson, John A. (1960) National Income and Flow-of-Funds Analysis. New York, McGraw-Hill

Provincial Economic Accounts 1961-1974 (1976). Ottawa, Gross National Product Division, Statistics Canada

Rashid, A. (1976) An Evaluation of Income Data from the 1971 Census of Canada. Ottawa, Characteristics Division, Statistics Canada, Research Memo No. 71-EC-5

Ruggles, Nancy and Richard Ruggles (1961) 'Regional Breakdown of National Economic Accounts'. In W. Hochwald, ed., Design of Regional Accounts. Baltimore, The John Hopkins Press, 121-142

_____ (1970) The Design of Economic Accounts. New York, National Bureau of Economic Research

_____ (1975) 'The Role of Micro-data in the National Economic and Social Accounts'. Review of Income and Wealth 2, 21, 203-216

Scarth, William M. (1973) 'The Financing of Stabilization Policies: Evidence for the Canadian Economy'. The Canadian Journal of Economics 6, 3, 301-318

Solomon, Ezra and Zarko Bilbija (1959) Metropolitan Chicago: An Economic Analysis. Chicago, Chicago Free Press

Statistics Canada (1973, 93-732) 1971 Census of Canada: Housing. 2, 3. Ottawa, Information Canada

_____ (1973, 96-707) 1971 Census of Canada: Agriculture. 4, 2. Ottawa, Information Canada

_____ (1974, 94-709) 1971 Census of Canada: Labour Force and Individual Income. 3, 1. Ottawa, Information Canada

_____ (1974, 94-740) 1971 Census of Canada: Industries for Canada and the Provinces. 3, 4. Ottawa, Information Canada

_____ (1975, 94-742) 1971 Census of Canada: Industries for Census Metropolitan Areas. 3, 4. Ottawa, Information Canada

_____ (1975, 94-743) 1971 Census of Canada: Industries for Census Agglomerations. 3, 4. Ottawa, Information Canada

_____ (1975, 94-761) 1971 Census of Canada: Income of Individuals by source for Canada and the Provinces. 3, 6. Ottawa, Information Canada

_____ (1977, 97-703) 1971 Census of Canada: Retail Trade. 7, 3. Ottawa, Information Canada

_____ (1977, 97-743) 1971 Census of Canada: Services Trade. 9, 3. Ottawa, Information Canada

_____ (Annual, 61-206) Private and Public Investment in Canada. Ottawa, Information Canada

_____ (Annual, 61-208) Corporations Taxation Statistics 1972. Ottawa, Information Canada

_____ (Annual 72-205) Federal Government Employment in Metropolitan Areas 1971. Ottawa, Information Canada

_____ (Monthly, 72-002) Employment, Earnings and Hours. Ottawa, Information Canada

_____ (Occasional, 13-549E) System of National Accounts, National Income and Expenditure Accounts 3, Ottawa, Information Canada

_____ (Occasional, 62-536) Family Expenditure in Canada 1969. 2, Ottawa, Information Canada

_____ (Occasional, 72-513) Estimates of Employees by Province and Industry 1961-1972. Ottawa, Information Canada

Steele, D.B. (1972) 'A Numbers Game, or the Return of Regional Multipliers'. Regional Studies 6, 115-130

Stone, Richard and Giovanna Croft-Murray (1959) Social Accounting and Economic Models. London, Bowes and Bowes

Stone, Richard (1961) 'Social Accounting at the Regional Level: A Survey'. In W. Isard and J.H. Cumberland, eds. Regional Economic Planning. Paris, Organization for Economic Cooperation and Development

Tanner, J.E. (1970) 'Empirical Evidence on the Short-Run Real Balance Effect in Canada'. Journal of Money, Credit and Banking 2, 4, 473-485

Taxation Statistics 1971 (1973). Ottawa, Department of National Revenue

Terry, Edwin F. (1964) 'Regional Income Accounts Estimates'. In W. Z. Hirsch, ed., Elements of Regional Accounts. Baltimore, The John Hopkins Press, 25-34

Tiwari, S.G. (1971) 'Regional Accounting in India'. Review of Income and Wealth 1, 103-118

Thompson, Lorin A. (1957) 'Appraisal of Alternative Methods of Estimating Local Area Incomes'. In National Bureau of Economic Research, Studies in Income and Wealth: Regional Income 21. Princeton, Princeton University Press, 319-337

Wilson, Thomas (1968) 'The Regional Multiplier: A Critique'. Oxford Economic Papers 20, 374-393

Woodward, V.H. (1970) 'Regional Social Accounts for the United Kingdom'. In National Institute of Economic and Social Research, Regional Paper 1, Cambridge, University Press, 63-176

Special Tabulations

Average Earnings by County, Ontario (prepared by the Employment, Payroll and Labour Income Section, Statistics Canada, Ottawa, August 1976)

Breakdown of Labour Force by Industry and Region, 1971 (prepared by the Census Division, Statistics Canada, Ottawa, March 1976)

Income of Individuals by Source in 1971 for Ontario Counties (prepared by the User Inquiry Services, Census Field, Statistics Canada, Ottawa, October 1976)

Industrial Breakdown of National Interest and Miscellaneous Investment Income (prepared by the Gross National Product Division, Statistics Canada, Ottawa, June 1977)

Ontario Economic Accounts 1970-1974 and Various Estimates (prepared by the Provincial Accounts Section, Central Statistical Services, Ontario Ministry of Treasury, Toronto, September 1976)

Provincial Government Expenditure by Region (prepared by the Economic Development Branch, Ontario Ministry of Treasury, Toronto, April 1977)

Value of Building Permits by County, 1969-1971 (prepared by the Construction Division, Statistics Canada, Ottawa, June 1976)

Value of Production and Other Data by County; Goods Producing Sectors (prepared by the Primary and Manufacturing Industries Section, Central Statistical Services, Ontario Ministry of Treasury, Toronto, March 1976)