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Conceptual Issues of Regional Income Estimation

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Conceptual Issues

On all levels, the statistician must prepare his estimates of income with the help of data collected for other purposes. As a result, even under the most favorable circumstances, any system of income accounts is based on numerous decisions on how to reconcile the available data with the income concepts best suited to the policy issues the accounting system is designed to serve. Adjustments are necessary to define the income recipients, the aggregates into which they are grouped, the income transactions, and the very purposes of the estimates. In addition to these conceptual problems, problems also arise from the statistical limitations of existing data.

While both sorts of problems, conceptual and statistical, are common to any geographic level of income estimation, many issues of regional income estimation are distinct from those encountered in the compilation of national aggregates. Some of these distinct problems refer to the different stages of economic and institutional development among regions, problems encountered also in the international and intertemporal comparison of income estimates. Some problems may refer to the consolidation of national accounts where the region comprises a number of sovereign nations. Wherever the region is part of a larger national universe, however, the distinctive problems of regional income estimation refer to the regional identification of national transactors and transactions. It is with this latter range of problems that this paper will be primarily concerned.

DATA PROBLEMS

Where national income statistics are based on census data or a complete set of administrative records, corresponding information for areas within the nation should be readily available. But disclosure rules may prevent the use of individual data for small areas,

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and special tabulations (which can be provided more readily with modern tabulating equipment) may be needed.

The difficulties become more serious where the national data are built on sample surveys or projections of past relationships. A sample adequate for the national universe may not give the information needed for regional estimates; the smaller the area under investigation, the greater this difficulty. Regional income estimates may call for a new sample design; for small areas, a special census may be necessary and feasible.

On the national scene, the inevitable gaps in basic data are filled (especially for intercensal years) by assuming that certain basic relations among the major income components are stable and will be maintained through the period following a bench-mark census. This assumption greatly facilitates the construction of reasonably reliable total income estimates as long as current information is available for at least some of the major components, such as payrolls. These stability assumptions are less valid for smaller areas where shifts in any particular source of income are likely to carry much greater relative weight in the total income. This problem also grows worse as the area under consideration declines in size. It is particularly serious for income sources subject to erratic fluctuations, such as farm income.

In the national accounts, many items of information can be obtained from the records of either the buyer or the seller. This flexibility is not permissible for local income estimation where buyer and seller may reside in different regions. Data taken from the accounting records of the payor rather than the payee must therefore be adjusted for residence of the income recipient. This situs problem, however, presents difficulties that go beyond those arising purely out of the statistical limitations of existing data.

INSTITUTIONAL PROBLEMS

National income is the net product of, or net return on, the economic activity of all the private and public institutions that make up a nation. Many of these institutions are held together by the common bond of a national market and monetary system; they are defined in terms of legal and ownership interests, rather than by geographic boundaries. To the extent that the income creating activities of these national institutions are not confined to a particular region, serious problems of regional allocation arise about the transactors to be included, about the grouping of these transactors into regional sectors, and about the range of transactions to be covered by the regional accounts.

Transactors. Individuals and corporate institutions in different parts of the country often represent different forms of economic activity and different stages of economic development. The wide range of activities subsumed under a single total of national income, therefore, may be the product of transactors not readily comparable among regions, and regional income estimation is faced with all the difficulties familiar from attempts to compare national income accounts in different countries. To the extent that regions within a country are more likely than foreign countries to have a common institutional pattern, this aspect of the regional transactor problem may be of less importance.

More serious, and unique to regional income estimation, is the difficulty of identifying regional income recipients. Many national transactors are involved in economic activities that extend beyond the boundaries of any specific region. It is then more or less arbitrary which particular activity should be imputed to the income of one region. Though similar problems occur whenever domestic transactors have foreign business transactions, the demarcation of domestic and foreign activities is usually much more sharply defined than the demarcation of regional activities within the nation, and regional imputations are therefore likely to be more arbitrary. This difficulty is most pronounced in the case of supraregional transactors, such as the large corporation with many branch plants, or the central government, as these national institutions may have little reason to keep their internal records in a way to facilitate regional analysis.

Even where the local residence of the income recipient can be identified, the same transactor may operate in different geographic areas as a consumer and as a producer. The distinction between income received and income produced, a distinction somewhat blurred in the derivation of the national accounts, therefore is of vital significance in clearly defining the regional aggregates to be measured and the regional transactors to be subsumed in regional income estimation. The region may either aggregate all productive factors employed in a geographic area, or it may aggregate the owners of productive factors residing in this same area. Though referring to the same geographic area, these aggregates will be different; the size and direction of this difference will depend on the characteristics of the area labor market and the extent of absentee ownership.

Sectors. National income estimates derive their usefulness for economic analysis and public policy from the detail they show for the major categories that appear of strategic importance in explaining variations of the total. The major industries into which the national economy has been divided may or may not be suitable for regional income estimation. As any system of aggregating the multitudinous economic activities of the nation ultimately depends on the purposes the estimates are designed to serve, so will a system of regional industry aggregates be determined by the objectives of regional analysis. In a sense, any regional income estimation can be described as an attempt to introduce a new dimension into national industry aggregates, the "region" being an "industry" defined by common spatial characteristics.

Two issues come up in this context. First, different regions have obviously a different industry mix, and income variations among regions will at least partly reflect differences in the regional distribution of high- and low-income industries. Yet, for industrial comparisons among regions, the industry must be defined consistently.

Second, there is a close interrelation of the most suitable definitions for the industry and the region. Where the purpose of regional analysis is the better understanding of local economic development in response to national change, data for a small one-industry or few-industries region may be most promising. Where the purpose is to show the importance of interregional income flows in stimulating national growth, a picture of income movements by major domestic economic regions may be more helpful.

Transactions. The scope of activities whose results are included in the estimates of net income needs careful definition on all levels of income estimation. Market transactions are excluded as "gross" to the extent that their count would duplicate the final products turned out or the resources put in. Nonmarket transactions are included to the extent that their neglect would understate the performance of the economy. As the range of activities carried on outside normal commercial channels may differ among various regions, any decision about the scope of activities to be covered by regional income estimation will influence interregional comparisons of income estimates.

The pricing of these transactions may also be influenced by differences in the market structure. For market prices will reflect to some extent these differences, and the monetary counterparts of products turned out or income earned thus may measure different performances in real terms. These problems of regional price differentials are minimized in a well-integrated national market with free mobility of goods and funds, a condition approximated in the American domestic economy.

There is still another problem of even greater concern to regional income estimation. National income is defined by the boundaries of the nation; transactions crossing these boundaries must be allocated to one of several nations in line with certain rules defining the rest of the world account, which summarizes the relations between "nationals" and "foreigners." The regional "rest-of-the-world" account is much less clearly defined than is its national counterpart, reflecting the very difficulty of identifying "regional" and "foreign" transactors. Also, the relative importance of transactions crossing area boundaries increase as the size of the area decreases. Thus, the allocation of interregional transactions to a particular region is at the same time more important and more arbitrary than the corresponding decision on the national level. The construction of any accounting system is limited by the nature of the transactions that provide the data for the accounts; income estimates for an economy whose boundaries are not coterminous with the spatial extent of the institutions operating within it are therefore necessarily incomplete.

POLICY PROBLEMS

National income attempts to be a commonly agreed-upon yardstick by which to measure the success of economic activity and the state of national welfare. The task of both, subsuming the diverse economic activities within a nation under a single total, and distinguishing within it the major categories explaining changes of this total, raises a host of problems that are solved by a more or less conscious adaptation of the aggregates to fit the policy questions the national income data should help to answer. Regional income estimation reflects to a good deal the same type of problem on a regional level. Its totals measure the over-all performance of the regional economy over time and permit interregional comparisons. To the extent that the major categories reflect consumer income and purchasing power, regional income estimates facilitate the analysis of market potentials and the setting of sales quotas. To the extent that income can be taken as an index of ability to pay, they serve as a guide to local and state fiscal equalization.

Yet the differences among policy objectives of national and regional income estimation are important. National income measures the activities of an essentially closed economy where international transactions, regardless of their numerical importance, are clearly set aside from domestic business by a rest-of-the-world account which, as the "balance of trade," is the oldest social accounting device and by itself has major policy implications. In such an economy, changes in net product, in aggregate incomes, and in total expenditures are all closely interrelated and refer to the same set of institutions. Consequently, each account or system of measurement aids in the interpretation or evaluation of changes in the other two measures, and the welfare implications of the total are relatively clear.

But regional income estimation is concerned with an essentially open economy where the distinction between intra- and interregional transactions is blurred. A regional rest-of-the-world account lacks clear definition and has no direct policy implications as no independent regional commercial or monetary policies are contemplated within the nation. Debt entries in a regional sector account are matched by corresponding credit entries in some other sector account only through the use of multipurpose residuals of ambiguous meaning. The residual may stand either for intraregional transactions not accounted for, or a net balance with the rest of the world. In either case, the interpretation will depend on additional information gathered from other data. Regional income estimates form essentially a single-entry subcategory of the national accounts, rather than a self-contained double-entry bookkeeping system.

The necessarily incomplete sector structure and transaction coverage of regional income accounts will thus be shaped by two distinct policy considerations. One set of determinants is influenced by policies made in and by the region, policies whose scope is limited by national sovereignty. Another set of determinants is given by the extent to which a regional breakdown of national totals may contribute to the analysis of national issues and the formulation of national policies. In both cases, the region is analyzed as the integral part of a larger national market, and regional development is responding to national rather than regional demand. For policy purposes, therefore, the industrial origin of income received by area residents, and a record of regional production by key industries as they adapt themselves to changes in the national market, may be more helpful than regional expenditure estimates required for the technical completion of a regional accounting system.

Problems of Estimation

Regional income can be estimated from independent local data or through the allocation of national totals to the region. The paucity of regional data will usually force the investigator to use a combination of both methods. In either case, to emphasize the analytical and statistical interdependence of regional and national estimates, the data should be reconciled to conform with national control totals.

The structure and definition of regional accounts is thus predetermined to some extent by the national accounting systems. The discussion will therefore follow the conceptual framework of national income statistics, indicating for each major component of national income and output measures the problems arising in its regional allocation. Passing attention will also be given to the possibility of developing regional counterparts for national accounts outside the income and product systems, such as regional moneyflows and balance of payments estimates.

INCOME ESTIMATES

Regional income estimation has been primarily concerned with estimates of *personal income,* a concept focused on the current receipts of clearly identified local households and thus well adapted to the particular needs and limitations of regional economic analysis. *Other items* will be discussed to illustrate the difficulties of establishing a more extensive system of regional income and product accounts when the institutional elements of the regional economy are not coterminous with its geographic boundaries. In all cases, *supplementary data* on physical activities, though not part of an income accounting system, appear indispensable for the process of estimation as well as the interpretation of the findings.

Personal Income. Estimates of personal income by domestic regions in the American economy have been greatly facilitated by the Department of Commerce series of state personal income. Since the concept of income payments to individuals on a residence basis is close to the Internal Revenue definition of taxable income, further improvements in the tabulation of income tax returns by regions might overcome some of the remaining data problems. The conceptual issues raised by the major components of this series are discussed below.

1. Although there may be serious statistical problems for certain elements of *labor income,* there appear few institutional barriers to its estimation on a regional basis. Wage and salary disbursements covered by social security programs are currently reported on, or adjusted to, an establishment basis. Recent additions to covered pay rolls increase the facility with which these data can be collected by regions. The result is a measure of wages and salaries paid out locally, rather than a measure of income receipts, a debit entry against gross regional product, rather than a credit entry re-

ferring to factor receipts by in-region households whose members may or may not work at in-region jobs. The regional debit and credit entries of this component, however, are likely to be in close accord within a commuting area; major problems of adjustment arise only in regions that cut across commuting paths.

The "other labor income" component raises more serious difficulties. Most contributions to private pension and welfare funds are made by corporations not reporting on an establishment basis. In general, recorded transactions relating to this component will include payments made by in-region firms with no out-region plants and by in-region firms with out-region plants when the home office is in the region. On the other hand, the record will not include payments by out-region firms with in-region plants.

2. While *proprietors' income* presents serious data problems of estimation (on both a national and regional basis), it is not usually an ambiguous concept when applied to the region. The institution producing the income is typically a small business or family farm and can readily be identified by region. Problems arise where the business enterprise and the associated household do not both operate within relatively close geographical boundaries, as in the case of absentee ownership. Regional estimates are then dependent on a careful separation of enterprise and household records, a separation unnecessary for the national accounts where it is conceptually appropriate to use either type of transaction, or a combination of both, as a basis for estimates of the total.

The estimation of proprietors' income is plagued with deficiencies in data requiring laborious piecing together and adjustment of various types of information from numerous sources, some only inferentially connected with noncorporate business income. In this context, projections of bench-mark data may be necessary, though the validity of these projections decreases with a shrinkage of the area under consideration. Relationships that can appropriately be assumed stable for the national accounts are liable to vary widely on the local level where erratic shifts in demand and production may greatly affect proprietors' income in single industries, such as agriculture.

3. Personal *property income*, such as rent, interest, and dividends, can be allocated to regions rather readily when the basic data are taken from recipient records. The allocation becomes more ambiguous when derived from national accounts based on payor rather than payee records.

Income from rental property cannot be identified regionally when estimated on the basis of factor payments to households. This ambiguity does not exist in the case of rents imputed from owner-occupied nonfarm dwellings, as in this instance there is by definition a complete identity of factor payments with the location of household receipts.

The estimation of interest income is also based primarily on records of payments rather than receipts. For the national economy, interest payments must equal interest receipts, and the source of the data is therefore of minor importance. For the region, such an assumption is of limited validity, and no reliable estimate of receipts can be prepared from data on interest paid. An important point in connection with the measurement of interest payments and receipts on a regional basis is the fact that many transactions are conducted through financial intermediaries, such as commercial banks, trust funds, and insurance companies. Since interest is a measure of factor incomes, the measurement of the interest flow as recorded by transactions between financial institutions will not identify the geographic source of the factor services, except in the case of a closed economy.

Similar considerations apply to an estimate of corporate dividends received in the region. In all these cases, the household services of property evidenced by the factor payment of rent, interest, or dividends are distinctly less bound by spatial considerations than the household services of labor exchanged for wages or proprietors' income. The regional allocation of property income from payment records is therefore more ambiguous than the allocation of labor and proprietors' income within a commuting area.

4. *Transfer payments* to individuals do not raise particular conceptual problems in a system of regional accounts so long as these payments are measured at the point of receipt. If they are measured on the basis of payments made, the noncongruence of institutional jurisdiction with regional boundaries raises by now familiar problems. The logic of regional accounting requires the estimate of transfer receipts by the region, yet such receipts may be paid out by an agency that has jurisdiction beyond the area included in the estimate.

Other Items. Items other than personal income, such as corporate profits, illustrate again the difficulties of establishing a system of regional income accounts when the institutional elements of the regional economy are not coterminous with its geographic boundaries. Corporate profits are reported on a company rather than an establishment basis. Therefore, any measure of regional corporate profits based on recorded transactions is subject to considerable ambiguity. In general, available regional records will include corporate profits of in-region firms with no out-region branches plus profits of in-region firms with out-region plants when the home office is located in the region. The records are likely to exclude in-region operations of firms with an out-region home office.

Estimates of corporate profits are based on corporate income tax returns, which usually do not contain separate reports by establishments. Regional adjustments for domestic and foreign dividends received, branch profits, and income taxes paid are not possible from this information. Similar difficulties apply to regional adjustments for a change in business inventories. To the extent that income reports are not available on an establishment basis, the construction of regional corporate accounts is limited. Any estimate of corporate profits for a regional economy must therefore be ambiguous as it cannot be based exclusively on accounting records.

Supplementary Data. Regional income estimation is thus dependent on a variety of allocators taken from records of physical activities, rather than from income accounts. Employment records and figures on the age distribution of the population can help in the allocation of transfer payments. Data on physical inputs and outputs can be used for the allocation of corporate earnings. Crop reports and farm management data can be used for the allocation of net farm income.

Supplementary data are needed not only for the regional allocation of national income but also for an interpretation of the findings. Income estimates have little meaning in and of themselves; they can be grasped better if expressed in terms that relate income totals to other events and developments in the economy. Thus, income is often quoted on a per capita basis—of total population, of the labor force, or of the employed—to relate the estimate more explicitly to the income-producing members of the social system. Here again, the interpretation of regional estimates is beset with two difficulties. First, to the extent that outside information has been used in the process of allocating national totals, the very interrelations to be analyzed by income estimates have already been assumed in the estimating process, and the resultant income data are not independent of the supplementary information used for this interpretation. Second, the income of an open economy may be influenced by factors outside the region as much as by regional activities proper, and the association of regional income with supplementary data suffers from the general ambiguity inherent in any attempt to give specific spatial content to nationwide forces and institutions.

PRODUCT ESTIMATES

The measurement of national income can be approached either by summing income flows or by summing product values. The combination of the two yields a set of interrelated accounts revealing the structure of the economy, and thus contributing to a better understanding of its functioning. It throws into clear relief the nature of the accounting relations that must always hold true among the component transactions summarized.

As explained before, regional income estimation does not yield this essential characteristic of a double-entry economic accounting system because of the ambiguity of the regional rest-of-the-world account. Thus, in the national accounts, saving and investment are necessarily equal. For the regional accounts, no such identification of residual balances is possible, as any difference between regional income and expenditure may be due either to in-region savings or to out-region transactions. The resultant net balance belongs either to an external rest-of-the-world account or to an internal saving-investment account, neither one of which has been clearly defined in regional income studies.

Production within the geographic boundaries of the region, measured by summing the net value added by all production activities located in the region, therefore has no clearly defined accounting relations either to income produced or to income received by regional factors of production. Such a measure of output on a locational or regional product basis is a very useful indication of aggregate changes in the regional economy; it is sectored, however, by physical activities, rather than by legal transactors, just as the columns and rows of an interindustry or interregion relations table. In the absence of a regional rest-of-the-world account, these estimates of regional production activity can be reconciled with income data only on the national level, when summed for all regions. Their reconciliation for any particular region would presuppose independent estimates of regional consumption, saving, and investment.

Personal Consumption. Estimates of personal consumption expenditures for commodities are based (in the national accounts) on transaction records of the seller, rather than the buyer. This procedure strikingly illustrates the close relation between national accounting concepts and a closed economy, where the vast bulk of household expenditures on consumer goods is reflected in commodity flow data pertaining to business institutions of the same universe. Relatively minor exceptions are recorded in the rest-of-the-world account. For regional accounts, the use of sales data to establish estimates for personal consumption expenditures yields an ambiguous total, as there is no record of the extent to which in-region purchases made by out-region households are represented in the estimates of total retail sales, nor is there any record of the converse possibility. This may be of minor significance within shopping areas that do not cut across retail trading paths, though these very paths, especially for fashion and specialty goods, are also unknown.

Estimates of personal consumption expenditures for services are based again on transaction records of the seller. Even if all the national data were available for the region, the resulting estimate would be ambiguous, as service flows, even more than retail trade flows, cover a complete continuum of distance between the location of the buyer and the seller. The local bank performs a service to the local consumer and so does the trust company located in a distant financial center. The location of service sales is therefore not sufficient to establish the location of household payments for consumer services. The problem is most serious for those services that, almost by definition, are nonlocal, such as tourist expenditures, an item of major importance for many regions. In a tourist region, services are an important "export" paid for by out-region households. The converse is true for regions which possess little in the way of tourist attractions.

Private Investment. Construction might appear the least ambiguous component in a system of regional income and product accounts. It is an estimate of the value of new construction at site and therefore by definition strictly local in character. Yet even here, the regional classification of this investment component is not clear whenever the construction is done for an out-region owner. Thus, viewing the region as an aggregate of spatially defined transactors, the conflict between allocation by site of physical activities or by legal residence of institutional transactors pervades all aspects of a regional accounting system.

Producers' durable equipment estimates present problems analogous to the estimation of consumer expenditures, as the national estimates are again based on records of the seller rather than the buyer. A regional application of the commodity flow method of estimating business purchases of producers' durables would measure the sales of regional manufacturers, rather than the local expenditures on this component of private investment. As the market for capital equipment is nationwide, the discrepancy between regional sales and purchases of durables is likely to be serious. In addition, there remain all the problems of regional identification for the investment expenditures of the institutional buyer whose jurisdiction extends beyond the area under investigation.

Changes in business inventories can be estimated for local firms, such as retailers and farms, provided the sample data used for the national estimates are adapted to regional surveys. For transactors with jurisdiction beyond the region, however, once again the differences between institutional and geographic sectoring rise to plague the regional estimates. Most corporate records are a poor source of data for the regional allocation of a change in business inventories.

Net foreign investment in the national accounts presents a clearly defined summary of the rest-of-the-world account. In a regional accounting system this component should mean net out-region investment. The nonmeasurability of this flow for an open economy lies at the very core of all the conceptual issues in regional income estimation.

Government Purchases. Estimation of the government component on a regional basis highlights again problems peculiar to social accounting for an open economy. The most obvious issue is the measurement of regional receipts and expenditures for a government whose jurisdiction extends beyond the geographic limits of the region. In the national accounts the federal government is sovereign, and all transactions by foreign governments are included in the rest-of-the-world account. Such a treatment for a system of regional accounts, even if a regional rest-of-the-world account could be constructed, would be questionable and involve a highly provincial philosophy of government. It appears necessary, therefore, to have at least two government accounts, one for in-region governments and one for supraregional governments with wider jurisdiction.

For in-region governments, the measurement of receipts and expenditures parallels that of the national accounts, albeit the data problems are much greater. However, estimates of receipts and expenditures by in-region governments will not precisely correspond to estimates of taxes paid by in-region firms and households, nor will they correspond to in-region business and household sales to governments, because in-region governments, as all other in-region transactors, are free to deal with out-region firms and households in purchasing their goods and services. In general, taxes paid will be fairly close to taxes received, unless regional boundaries cut through major trade or commuting areas. Yet, sales by residents to governments need have little relation to purchases by in-region governments, except in the case of employee compensation.

The regional allocation of purchases by supraregional governments presents many difficulties. Expenditures for labor services of in-region households should certainly be included in the regional accounts, yet the treatment of expenditures for business goods and services is less clear. An estimate of expenditures where disbursed does not match a corresponding estimate of sales by in-region firms to supraregional governments. On the other hand, there are no records available for estimating government expenditures on goods and services produced in the region without regard to the point of final sale. If regional accounts are to parallel the national accounts, it would seem that this latter type of estimate is really what is required.

Government subsidies consist chiefly of payments to farmers by the federal government and can be estimated on a regional basis. In the national accounts, the current surplus or deficit of government enterprise is subtracted from or added to those subsidies. In the regional accounts, a corresponding treatment appears feasible for in-region governments. For supraregional governments, the allocation of net operating losses or revenues to any particular area within their jurisdiction presupposes spatial identification of the beneficiaries, which may not be possible.

WEALTH ESTIMATES

A national rest-of-the-world account shows the net change in foreign assets and liabilities arising out of the international flow of goods and services, factor incomes, and cash contributions. Thus, it depends on records of foreign financial claims as part of a national wealth estimate. Two national accounting systems are oriented toward the measurement of changes in national wealth as evidenced in the structure of financial claims and debts: claims of and against foreigners are recorded in the international *balance of payments,* and changes in the financial claims of domestic transactors are recorded in an accounting of *domestic moneyflows.*

Balance of Payments. Regional balance of payments estimates are beset with difficulties of estimation on current and capital account, all of which reflect fundamental differences in interregional and international relations, rather than mere statistical deficiencies. Internationally, balance of payments problems are approached by deliberate commercial and foreign exchange rate policies; information on the movement of commodities and capital across national boundaries is available because of the administrative controls over these movements. In the domestic free trade area, with minimal restriction to the flow of goods and the migration of people, a common monetary unit, and a high mobility of bank funds, no such controls exist. Interregional balance of payments adjustments take the form of price and income changes in a free market. These adjustments are brought about through free commodity as well as factor movements, and the type of data most helpful for policy determination therefore differs from the international situation.

On current account, balance of payments studies have utilized two different methods of estimating interregional movements of goods and services. One method derives a trade balance from computing the difference between regional production and consumption; this approach does not offer independent data for the interpretation of residuals in regional income and product. The other method estimates the interregional physical flow of goods by various transportation media, first estimating the physical volume of trade and then estimating the value of this physical volume. As data for long-haul shipments by rail, by water, and by pipeline are more adequate than data for short-haul truck movements, the method is useful only for larger regions comprising one or more states. Transportation data obviously are of little help in estimating service transactions in the regional balance of payments, with the exception of freight charges, which are closely related to merchandise shipments.

On capital account, some information may be available concerning security transactions of financial institutions, though very little is known about the beneficiaries of these transactions. Even less is known about such transactions by households. Data on the interregional flow of funds by Federal Reserve districts are recorded by the Interdistrict Settlement Fund, though these data do not permit classification of the underlying commercial and financial transactions and therefore do not permit separation of the items on current and capital account. Any estimate of interregional capital flows is thus essentially an interpretation of residuals in the regional balance of payments and as such partakes of the core difficulty in regional income determination, the all-pervasive presence of multipurpose residuals which may relate to an internal savings-investment account or to an external rest-of-the-world account.

Domestic Moneyflows. Changes in the balance of payments among domestic transactor groups are shown by a study of moneyflows that attempts a comprehensive accounting for the flow of funds through the domestic economy. Yet, as changes in the ownership of funds are necessarily related to legal rather than geographic entities, the sectoring of a domestic moneyflows system is determined by the institutional characteristics of the transactors whose jurisdiction may extend beyond the boundaries of the region. In an open economy relevant for regional income determination, geographic and institutional sectors can be reconciled only for those transactors whose residence status and area of jurisdiction can be defined without ambiguity. The region thus becomes a group of transactors identified by common spatial interests, such as households, small business, and local governments, for which, provided the necessary data were collected, a consolidated regional balance sheet could conceivably be constructed. A consolidation of financial wealth estimates on a regional basis appears less feasible for supraregion transactors, such as big business, large financial institutions, and the central government. It is for this very reason that no reconciliation has yet been achieved between the Interdistrict Settlement Fund data (recording payments by geographic regions without identifying ownership) and the moneyflows accounts (recording changes in the ownership of funds).

Conclusion

The preceding discussion has centered on the possibility of estimating regional income in a system paralleling the national accounts in concept and structure. An essential feature of the national accounts is their firm basis on recorded transactions measuring value flows among economic units in whose accounting records the national boundaries are identifiable. It is therefore possible to speak of the national income as an aggregate of individual incomes received by transactors whose national identity is plain, and correspondingly of the national product as an aggregate of final outputs produced by individual firms and government agencies whose national identity is equally well defined.

Since a region within the national economy is essentially an open system, regional sectoring of economic activity may but partly coincide with the spatial jurisdiction of institutional transactors that cannot properly be identified with a particular geographic area. And even where the local residence of the income recipient can be identified, ambiguities may remain for some activities of the economic unit. Households as consumers, for example, may have a regional identity that differs from their identification as producers. These considerations alone are sufficient to introduce serious problems into regional income determination regardless of data availability. In fact, the absence of data is most frequently the result of deeper conceptual issues. Even under ideal data conditions, many value flows would not be recorded, and therefore not measured, by region.

In a complete social accounting system, each economic transaction is seen from two points of view, as the source and the termination of a circuit value flow that must be the same wherever it is measured. In a system of regional accounts this condition does not always obtain, as the source and termination of value flows may relate to different, but overlapping, sets of economic institutions. Regional income estimation paralleling the national accounts is thus limited to those components that can be constructed on a single-entry basis with little ambiguity. This condition is most readily met by personal income, whose estimation on the state level is undertaken by the Department of Commerce and whose estimation on the county level has made some progress in recent years. This does not preclude more ambitious attempts toward regional economic accounting so long as it is understood that the resultant accounts depend on activity, rather than on institutional sectoring. Interindustry relations accounting illustrates a system of sectors based on physical activities in the productive process, rather than legal transactions of economic units, and thus may offer additional information to interpret some of the ambiguous residuals in the regional transactor accounts, residuals which may stand either for intraregional transactions not accounted for or for a net balance with the rest of the world. In a system of sectoring by economic activities, the region is viewed as a sector with common spatial characteristics to measure geographic activity patterns of the domestic economy, analogous to the industry as a sector with common production characteristics to measure technological patterns of the economy. Personal income estimates and a regional input-output matrix are thus two basic and interrelated tools of the regional analyst.

Regional analysis is concerned with a better understanding of spatial barriers to perfect economic mobility. National policies on regional resource allocation will be influenced by the residents of the region, as they express their influence and their interests as voters, as workers, and as property owners. They will also be shaped by policy makers in supraregional institutions directing private and public funds toward employment. These twofold policy aspects of regional economic analysis are mirrored in the dichotomy of the regional accounts, which permit institutional sectoring for local policy making by households, small business, and local government, yet must resort to activity sectoring for the regional interests of national decision-making units, such as the large corporation, the investment fund, and the central government. Conceptual issues of regional income estimation are thus determined by the national institutional setting of which the region is a part.

COMMENT

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Werner Hochwald has written a wide-ranging and thought-provoking paper on the "possibility of estimating regional income in a system paralleling the national accounts in concept and structure." He finds two fundamental conceptual difficulties "sufficient to introduce serious problems into regional income determination regardless of data availability." The first is that "regional sectoring of economic activity may but partly coincide with the spatial jurisdiction of institutional transactors who cannot properly be identified with a particular geographic area." To illustrate the second, he cites the example of households whose regional identities as consumers and as producers are different.

The social accounting framework is certainly useful, since its very comprehensiveness tends to assure attention to the ramifications and consequences of any decision on the treatment of a given income item. Hochwald does not, however, develop the nature of the income and product aggregates to be measured. I think that more explicit consideration of these concepts is essential to a perspective on his paper. I shall discuss the income aggregates only.

Consider first the problem of differences between the region of employment of productive factors and the region of residence of the owners of these factors. This problem has generally been resolved by distinguishing "income produced" (the income originated by the factors employed in a given region) and "income received" (the income accruing to the residents of that region). The distinction has been formalized at the national level in United Nations studies as "net geographical product at factor cost" (income produced) and "national income at factor cost" (income received). In general, for any given region, income received will exceed income produced to the extent that receipts of service and property income by in-region residents who own factors employed outside the region exceed payments to factors employed within the given region but owned without. Of the two income types, the net flow of property income is generally the more important in making for disparity between the two measures.

Many of Hochwald's comments have rather different implications, depending on whether income produced or income received is being measured. Thus, the difficulty with wages and salaries where regions cut across commuting paths is a problem that affects only the measurement of income received, given the availability of data on an establishment basis. The difficulties with the various elements of property income, on the other hand, are problems that bear on the estimation of income produced, since an approximation to income received is fairly readily available in individual income tax returns. More explicit reference by Hochwald to the bearing of his remarks on each of these concepts would have been helpful in enabling the reader to assess the possibilities of estimating regional income. Had he done so, I think it would have become clear that the principal obstacles he noted lie in the estimation of income produced, rather than of income received.

Hochwald's second basic conceptual difficulty in regional income estimation involves institutional transactors whose operations extend beyond the particular region under study and whose records are accordingly kept in "supraregional" terms. To my mind, were all data available, this problem would offer no obstacle to the estimation of income received. The principal remaining obstacle to the measurement of this concept—securing a regional distribution of undistributed corporate profits—could readily be solved by allocating the undistributed profits for each firm among the regions in proportion to the total value of each firm's stock held by the residents of the various regions. Only in connection with income produced is the obstacle noted by Hochwald a fundamental conceptual one. Here some probably arbitrary form of "activity sectoring" is needed, i.e. allocation by some index of regional distribution of the firm's activities—assets, payroll, etc. This observation bears on the greater difficulty of estimating income produced than income received already noted. The fundamental source of this difficulty, as Hochwald's remarks clearly suggest, is the lack of congruence between the area of operation of the producing units (firms, governments, nonprofit institutions) and the regional areas for which income measures are desired.

In summary, I cannot agree with Hochwald that the region-of-residence–region-of-employment question raises serious problems regardless of data availability, for I think that these are resolved by more precise specification of the income concept being measured. And the supraregional transactors raise serious conceptual problems only in the estimation of income produced. In this latter case, his suggested line of solution—activity sectoring—seems appropriate. But are the differences between these two concepts of sufficient quantitative magnitude to warrant this effort?

To secure an approximate answer to this question, at least for the census divisions, I have drawn on Maurice Leven's state income estimates for 1919 to 1921, adjusted so far as possible to conform to the Department of Commerce "income payments" concept (with the addition of imputed rents on owner-occupied dwellings). The technique used is admittedly extremely crude, assuming among other things uniform rates of return on agricultural and nonagricultural property in the various states, but the results are roughly suggestive of the disparity between the income aggregates. The following table shows the percentage excess of income received over income produced for census regions (with the two exceptions noted) for 1920, ranked from high to low:

Middle Atlantic [a]	5
New England	4
Pacific	2
West South Central	1
East North Central	—1
East South Central	—5
South Atlantic [b]	—6
West North Central	—7
Mountain	—7

[a] Includes Delaware and Maryland.

[b] Excludes Delaware, Maryland, and the District of Columbia.

Source: Property income received in each state was derived directly from Maurice Leven, *Income in the Various States: Its Sources and Distribution, 1919, 1920 and 1921*, National Bureau of Economic Research, 1925. Property income originating in each state is the sum of separate estimates for agriculture and nonagriculture, it being assumed that the share of each state in the country-wide total of property income originating in each of these sectors is the same as the share of each state in property originating such income. Data on agricultural and nonagricultural property by state were taken from the 1920 census of agriculture and the 1922 census of wealth, respectively. Service income received in each state was assumed equal to service income originating there. If an attempt had been made to include a correction for the difference between the two based on the present Department of Commerce adjustment, there would have been little effect on the regional figures, though the figures for a few states would have been somewhat altered. Fuller detail regarding sources and methods is given in a forthcoming paper on state incomes, 1880–1950, to be published as part of a University of Pennsylvania study of population redistribution and economic growth in the United States since 1870.

This table indicates that the quantitative difference between income produced and income received was around ±5 per cent for the census regions. As might be expected, comparison of the figures for regions with those for states shows that the magnitude of the difference between the two concepts widens as the geographic unit is narrowed. Delaware, New York, and Rhode Island led the states with income received in excess of income produced, the figures for these states being 11, 9, and 8 per cent, respectively. The Dakotas and Nevada were at the opposite end with income received roughly 15 per cent less than income produced. From these calculations, it seems clear that the difference between the two concepts is significant, even for so comprehensive a measure as total income and for areas as large as census regions and states.

I should like just to note two other points. A clear implication of Hochwald's discussion is the desirability of securing regional estimates of income produced. With this I agree, since such estimates would be invaluable as a basis for interregional comparisons of resource productivity within given industries. There is another income concept, however, the estimation of which might be considered. The income concepts discussed to this point have been valued implicitly at factor cost. A measure of income at market prices for the various regions might also be of considerable use. I do not refer to the present income concept, which includes indirect business taxes along with several miscellaneous items, but to a measure in which factor payments are taken net of direct taxes but inclusive of government transfers and free government services. Hochwald has noted that "Regional analysis is concerned with a better understanding of spatial barriers to perfect economic mobility." This income concept, which sheds light on the inducements to factors to move, would be the one pertinent to such an analysis. Of course, study of the respects in which this concept departs from those previously noted might reveal the quantitative differences to be relatively insignificant. The Department of Commerce adjustment of the 1946 income payments figures to exclude personal taxes did not yield any major alterations in the regional figures, though the effects at the state level may have been more significant. But an exploration of the desirability and possibility of estimating this aggregate is at least called for.

Finally, I should like to mention a point that I believe is implicit in the initial section of Hochwald's paper. He points out the similarity between the problems arising in regional income measurement and those arising in international income and product comparisons. I think a question similar to that presently being asked about international comparisons must be asked here: Are the fundamental decisions underlying the present national income and product measures, geared as they are to short-run analyses of an economy with a relatively stable institutional structure, appropriate to the measurement of regional income and product, the potential uses of which involve comparisons of economies with considerably different economic and social structures? Would it be desirable to broaden the range of imputations for nonmarket activity beyond that embodied in the national measure? Are valuation procedures adequate? Might not valuation of farm income in kind at retail rather than at farm prices provide better regional comparison, however adequate the present technique may be at the national level? Are the present assumptions about the final product of government and financial intermediaries in the measurement of national income defensible at the regional level? The answers to these questions must ultimately rest on analysis not only of the conceptual issues but also of the magnitudes involved. Full consideration of the conceptual issues of regional income estimation calls for a thoroughgoing reexamination in the light of the needs of *regional* income analysis of the decisions on scope, valuation, and netness made in the measurement of *national* income and product.

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Perhaps the most important thing to discuss in connection with Werner Hochwald's paper is whether or not the national accounts should be used as a guide for analysis at the regional level.[1] His paper appears to have been written as a sequel to a serious attempt at regional income and product estimation that used the national accounts framework. He considers the core of the problem to be the lack of an interregional balance of payments. Other data problems are mentioned, and the final impression one receives is that there must be something fundamentally wrong with the basic approach of applying national accounts concepts at the regional level.

To state my own conclusion, as a national accounts specialist concerned mainly with national problems, some parts of the national accounts framework are useful for regional analysis while others are not. The particular parts chosen for development depend on the particular problems confronting the regional analyst.

The concept of the *national* product refers to all incomes received by factors of production resident in a geographic area, whether or not these incomes are earned from production within that area. This total could be obtained by proceeding from the existing state income payments series and adding a distribution of profits and other investment income items according to the resi-

[1] Defining a region as a state or group of states.

dence of their owners, but it is difficult to see what useful purpose this additional exercise would serve. Market analysis, income and expenditure analysis, and other types of analysis on a regional basis can make use of the Department of Commerce personal income series by states or the Bureau of Labor Statistics and other surveys of income and expenditure conducted by household enumeration.

The *domestic* product refers to production within strict geographic boundaries. However, problems of allocating company profits and other investment income items remain if one adopts a factor share approach to regional product estimation. Not much is known about how companies allocate national overhead to their regional operations. There are also unsolved problems in deciding upon a regional allocation of interest. The determining factor could be the location of the physical assets that produce the value out of which interest is paid.

Hochwald also discusses the expenditure side items of consumption, government spending, and gross domestic investment. These items may have individualized uses, but as aggregates are not useful at the local level.[2]

Although this approach is not emphasized by Hochwald, I think one that uses an estimate of domestic or geographic product obtained from business establishments, farms, and other sources to build up an estimate of output by what might be called "the direct industry approach" deserves consideration. According to the United Nations Statistical Office, this approach is most frequently used in various statistically and economically underdeveloped countries. It can be used in advanced countries also; indeed, the Department of Commerce quarterly national accounts reports have used it to some extent in the past year, even though the industry data themselves are not formalized and are used only as related economic indicators. The direct industry approach also lends itself to the measurement of the volume of output through time.

If the Federal Reserve Board index of production were expanded to cover the extractive and service industries, with perhaps some allowance for government output, an indicator of movements in the aggregate volume of output would result. There are real problems, of course, which become progressively more difficult as one leaves commodity industries and grapples with service groups. Consideration of such a measure might lead to further useful refinements. For instance, one could change the present Federal Reserve Board index formula (net value added weights times quantity indicators) to the Geary formula (deflated outputs minus deflated

[2] See D. J. Daly's comment, below.

inputs).[3] This formula has the advantage of taking into account changes in vertical integration of industry. A new weighting system for components of the BLS general wholesale price index is also implied by this framework.[4]

What I am driving at is that it is feasible and useful, at both national and regional levels, to attempt to integrate data on input-output and on industrial distribution of domestic product and to obtain the indicators of output, input, employment, prices, and values over time. The conceptual framework does not contain insurmountable problems and data are available in quantity at both regional and national levels. The main problems are those of classifying industry consistently and of obtaining quantity indicators in noncommodity industries. All regional problems requiring a consideration of value, volume, and price components by separate industries within the region can make use of this approach. At some future date, it may become a third independent source estimate for the domestic product at factor cost.

Nothing has been said of the complications inherent in interregional flows of money or goods, or in the regional allocation of investment income items. As a matter of fact, the large and useful plan outlined could be developed almost entirely without reference to interregional balance of payments data. For instance, the establishments within a region can report their purchases or sales without saying where they bought or sold the items. These can be deflated and differenced, as noted above. Local employment and real capital formation can be checked against local output. Much can be done by using the part of the national accounts system that concerns production measurement on a geographic or domestic product basis. At the outset, there is no need to get into the area of interregional moneyflows, or even interregional commodity trade.

In summary, I agree with Hochwald that much useful analytical work can be done with existing income estimates and existing cross-sectional sample survey data, by region. Further, the entire area of

[3] The algebra for the quantity, price, and value correlatives, using base weighted quantities and currently weighted prices, capital letters for outputs and small letters for inputs, would be as follows (see R. C. Geary, "The Concept of Net Volume of Output with Special Reference to Irish Data," *Journal of the Royal Statistical Society*, Vol. 107, 1944, pp. 251–259):

$$\frac{Q_1P_0 - q_1p_0}{Q_0P_0 - q_0p_0} \times \frac{P_1Q_1 - p_1q_1}{P_0Q_1 - p_0q_1} = \frac{P_1Q_1 - p_1q_1}{P_0Q_0 - p_0q_0}$$

[4] Such a price weighting system would utilize positive weights for outputs and negative weights for inputs, thus avoiding weighting duplication. Its parts would be more interesting than the total, which would be simply the well-known deflator implicit in current and constant dollars "GNP." A transactions deflator could be got by summing, ignoring signs.

industry net value added might be examined and, in the long run, this approach might be a third system of classification and estimation of the domestic product, utilizing independent source data by industries. It need hardly be repeated that it is not the totals that count but the interplay of their parts, as both Hochwald and Perloff have pointed out.

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Various papers and comments in this volume refer to the possibilities of developing estimates at the state level of the complete expenditure side of regional accounts. Werner Hochwald deals with various conceptual and statistical problems involved in producing such estimates, but he does not explain *why* one should go beyond the existing state income series. Harvey S. Perloff writes, "The measurement of the value of output within each of the states by way of final-product purchases by consumers, and by government and business on capital account (that is, the regional counterpart of GNP) appears impractical" (page 58). He does not, however, deal with the analytical possibilities of such a series. Will the expenditure side be as helpful at the state level as it has been at the national level? One of the uses of such data is to interpret changes over time in aggregate income at the state or provincial level, and their appropriateness for this purpose will be examined here.

At the national level, gross national product and its main expenditure components quite appropriately get considerable attention in analyses of changes in aggregate demand. Emphasis on the expenditure categories of investment, consumption, and government expenditure was encouraged by Keynes' *General Theory*.[1] Even for large countries, however, information on developments in particular industries and areas is sometimes necessary to throw light on the reasons for some of the changes in total output.

In analyzing changes in output in a small country, the expenditure total and its components continue to be helpful, but greater emphasis is required on certain key industries. In small, high-income countries, the sale of certain major commodities in world markets provides the foreign exchange to purchase imports, and investment in these industries is an important influence on domestic activity. In Canada, for example, current conditions and prospects for export sales of such items as wheat, newsprint, and base metals have a profound influence on general activity but are played down in a

[1] John Maynard Keynes. *The General Theory of Employment, Interest and Money*, Harcourt, Brace, 1936.

statistical presentation that emphasizes expenditure aggregates.

At the state level within a country, this emphasis on key industries is also appropriate. For most of the commodity-producing industries, the United States is a national market with many geographic areas producing only a limited range of the products purchased in the region. Cotton and tobacco in the South, wheat in the West, and citrus fruits in California and Florida are illustrations of specialization in agriculture. Mining and fishing also have a geographic location influenced by available natural resources. In manufacturing, cars from Detroit, steel from the Great Lakes area, textiles from New England and the South are illustrations of this regional specialization. The changes in markets and the availability of natural resources for the important commodities in a region heavily influence its secular growth and cyclical vulnerability. Emphasis on regional expenditures draws attention away from these industrial differences, which underlie many of the special economic features of a region.

A further problem at the regional level in attempting a statistical total of expenditures is the lack of data on merchandise trade. At the national level, this material arises as a by-product of a national administrative organization established to collect tariffs and administer various matters affecting international trade. At the state level, this basic organization is missing, and no satisfactory way of collecting the basic primary data is available, although Hochwald and others have experimented with various expedients. Even if the data *were* available, however, I think that a regional income total built up as a sum of expenditures would be less satisfactory than one built up as a sum of the income or product of industries for analyzing the reasons for changes over time.