

Economic Measurement And Regional Science

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"When you cannot measure . . . your knowledge is of a meager and unsatisfactory kind" Lord Kelvin**

During my graduate student days at the University of Wisconsin I encountered a professor who, in a course on economic theory, insisted upon classifying economic propositions in terms of their separate characteristics of validity, truth and relevance. It was immediately possible then to dispose of certain propositions as "valid but untrue" or "valid and true but irrelevant." We never exhausted the semantic variations, much less the philosophical depths, implicit in these relationships, but most of us remembered the words and the professor. It came through to us that many propositions and systems are valid in the sense that they are internally consistent and logical. But if we wish to add truth to a proposition, we must find some correspondence with the world out there; that is, we must measure.

Measurement activity goes on in all the sciences and of course underlies much that is undertaken in the name of regional science. My remarks today are influenced by my learning experiences as a teacher and as a participant in various economic measurement efforts—especially measurements of personal income within the framework of a set of national accounts. The concept of income and its measurement has had an interesting and well documented history. Paul Studenski in his book, *The Income of Nations*, (17, pp 13-15) assigns pioneering distinction to Sir William Petty and Gregory King in England and to Pierre le Pesant Sieur de Boisguillebert and Seigneur le Prestre de Vauban in France, in the 17th Century for originating the comprehensive production concept that dominates the field in free enterprise economies of today. On the other hand, he points out that Adam Smith's introduction of the restricted material production concept, in the light of the influence it exerted for over a century, can be said to have been a serious interruption in the logical development of economic analysis and to have retarded the growth of national income

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**While this statement owes much to my experience as an economist in the Regional Economic Measurement Division of the Bureau of Economic Analysis, the views expressed are my own and not necessarily those of the Bureau.

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theory and practice. Moreover, this concept that only material goods are evidence of production, after virtual extinction by the mid-nineteenth century, was suddenly revived in a perverse and unexpected form by Karl Marx in his socialist theory.

The first estimates of national income for the United States were made in 1843 by a professor of moral philosophy at the University of Virginia, George Tucker.¹ But the takeoff for U.S. national income accounting came nearly a century later, possibly as part of the national response to the challenge of the Great Depression. Dr. Simon Kuznets was borrowed by the U.S. Department of Commerce from the National Bureau of Economic Research to set up and supervise the study and estimation of national income for the initial period, 1929-32. Work in these early years was confined to the income side of the accounts, and the product side that a decade later was to become the gross national product was undeveloped. The more or less full-blown development of the national income and product accounts came in the 1940's. The exploration of the product side of the accounts was in part a response to the war effort demand for a new level of economic intelligence—How was the output to be divided between military and civilian uses and what kind of a tax structure could curb private spending? Post World War II landmarks in the development of the national accounts included splitting of gross national product into real and price components, detailed quarterly estimates, the placing of the Federal budget on a national income and products basis, the plant and equipment survey, and the Survey of Manufactures sales and inventory expectations. In the 1960's, the first measures of gross national product originating in the various industries were established, together with initiation of the input-output program. There were further strides in the development of the balance of payments accounts, a start in the exploration of national wealth and the development and analysis of information on the activities and economic impact of U.S. multinational corporations, expanded analysis and research on the system of leading, coincident, and lagging business indicators, and the development of information to analyze the impact of changes in the environment.

In the 1940's, the administrative home of these developing measurement and analytical activities had been established as the Office of Business Economics. In 1972, it was renamed the Bureau of Economic Analysis (BEA). This change in name reflected substantive changes through the years. Most economists have long recognized the Bureau as the preeminent measurement agency which maintains the world's best set of national income and product accounts. They have not been as fully aware of the Bureau's analytical work. Analysis in the form of methodological research has facilitated increasingly articulate measurement efforts. The latter, in turn, have made possible increasingly complex and relevant analytical undertakings.²

The movement of the Bureau from simple to complex measurement and to a more analytical output mix has been echoed in the regional field. Concurrent with the evolution of the national accounts, starting in the

1930's, was the formation of the basis for regional accounts. This long development came in response to an interest in regional measurement of income dating back at least to the work of Oswald W. Knauth for 1919 (10) and that of Maurice Leven and Willford I. King for 1919, 1920 and 1921. (12). The Department of Commerce State series on income payments to individuals for years 1929-37 was initiated in 1939 by Robert R. Nathan and John L. Martin. (13)

Concern for regional development had not appeared in focussed form during the Great Depression when excess capacity and unemployment characterized even the most prosperous areas of the country. Likewise, it was not of critical interest during the period of super-full employment during World War II. However, the latent idea remained. Estimates appeared on a more or less regular basis from year to year. Starting in 1944 they appeared in each August issue of the *Survey of Current Business*, the monthly Commerce publication.

Despite the growing interest in regional income data, it was not until June of 1955 that regional income within the United States was made the principal subject of a meeting of the conference on Research in Income and Wealth. (8)

In 1955, the State income payments series was converted to a personal income basis to accord with the definition of personal income in the national accounts. In 1956 there appeared a landmark Supplement to the *Survey of Current Business* which presented the definitions, sources and methods of estimation and the statistical series for State personal income starting with 1929. (16)

The legislative ferment of the 1960's, which resulted in the Area Redevelopment Act, the Appalachian Regional Development Act, and the Public Works and Economic Development Act, was an outgrowth of a rising interest in the regional dimensions of the national economy.

State quarterly estimates as a series first appeared in the December 1966 issue of the *Survey* (5). Meanwhile, initial work on measurements for metropolitan areas had been authorized. The first publication of such metropolitan area estimates, in the May 1967 issue of the *Survey* (7), was made possible by the extension of the regional economic information system to include counties. This extension had begun in 1964 as part of the reimbursable work program designed to prepare projections for the United States Water Resources Council.

The most recent versions of local area income estimates cover all counties or corresponding local areas, whether contained within a Standard Metropolitan Statistical Area (SMSA) or not. Not only estimates of income but also a system of inter-county and inter-State linkages known as residence adjustments are now in place. (4) The 1975 benchmark revisions of the national accounts have been carried into the State and local area estimates. This has also involved integration of the national border worker estimates (involving principally Mexico and Canada) with the residence adjustment system in the regional estimates.

As with the national accounts work, the Bureau of Economic Analysis in

the regional field has undertaken more work of an analytical nature in recent years. The original Regional Economics Division was established in 1964. In 1972, it was divided into two parts, the Regional Economic Measurement Division and the Regional Economic Analysis Division. The two divisions today operate administratively within the purview of an Associate Director for Regional Economics.

While analysis has grown in relative importance within the regional work mix, efforts continue to strengthen and broaden the measurement effort. First, a word of orientation concerning the measurement effort. Some of us learned, in our training as economists, that an individual's income over a period of time might be measured as his consumption plus his change in net worth. If we were forced to adopt such a measurement procedure for the national and regional accounts, it would be highly frustrating, since we cannot presently measure consumption on a regional basis in a satisfactory manner. Secondly, measurement of the change in net worth implies a prior measurement of wealth particularized by local area and industry. But this is not now possible. Wealth accounts are in an early stage of development nationally and nonexistent regionally.

What we do measure is income received by place-of-residence for some components and by place-of-work for others. The place-of-work components are then adjusted to a place-of-residence basis so that personal income in its entirety can be presented by place-of-residence. In general, measurement occurs by way of identifying and measuring income transactions. In particular, it involves the allocation of national personal income components to the State and local areas. When evidence of transactions does not exist, imputations of such transactions are made in a few cases, such as the value of services rendered by banks to depositors and the value of service rendered to owners by owner-occupied houses.

The difficulties involved in converting national measurements to regional application have been well documented. (9, 15) Problem measurement areas are of both a statistical and conceptual nature. Statistical problems, like the poor, are always with us. There is never enough information, available in satisfactory quality, soon enough, to satisfy all requirements. An example of a conceptual problem arises in the tenuous nature of State estimates of farm income by quarter, on a seasonally adjusted-at-annual-rates basis.

My own involvement with economic measurements has had something of a fortuitous character. My economic training was somewhat conventional, though at a Department of Economics whose faculty had been trained in part by the famous institutionalist, John R. Commons. Later, as a faculty member, in economics at the University of North Carolina, my preconditioning in favor of measurement made it impossible to reject the opportunity to participate in the work and deliberations of the Conference on the Measurement of County Income.³ My interest in county income was partly one of curiosity. This work offered a chance to gain a firsthand research experience involving the economy of North Carolina and at least comparative secondhand knowledge of the economies of neighboring

States. I might add that the reaction of some of my colleagues (where it counted) was very sympathetic and supportive while that of others was a mixture of disapproval and incredulity. Moreover, our original findings concerning per capita income were not popular in all quarters. At any rate, this work put me in touch with such early observers of regionalism through the focus of the social sciences as Milton S. Heath, Rupert Vance, and Howard Odum. (14)

At this point I must make a disclaimer. I am not a regional scientist in any strict sense. For one thing, I was not present at the "creation" in Detroit on December 27, 1954. And then, for another thing, despite my affinity for measurement, and, I hope, relevance, I have not extended my professional pursuits to any wider ambit than certain specialized concerns of an economic nature. Of course, one of the strengths of the regional science movement, as practiced by Walter Isard and others, has been its openness to the several social science specialties and to those of us who bring to it the conventional intellectual baggage of these disciplines. Accordingly, it was quite natural for Walter Isard to approach F. Stuart Chapin, Jr. a planning professor and younger colleague of Odum and Vance concerning the organization of a section of the Regional Science Association. I was present at the first organizational meeting in Chapel Hill on March 27, 1962. This meeting provided the occasion for Walter Isard to present a paper on economic complex analysis. It also resulted in the creation of the Southeastern Regional Science Association, the forerunner of the present Southern Regional Science Association.

Analysis has been the dominant mode of scholarly work within the association. On the inside cover of the *Review of Regional Studies* we find a statement of focus which mentions specifically the "extension and application of innovative techniques of analysis." My own rough estimate of the articles published in the *Review* between 1969 and 1976 places about 54 percent in the analytical category, while 22 percent deals with measurement, 17 percent with policy, and 6 percent with other concerns. That our publication reflects, for the most part, analysis rather than measurement, is neither to be regretted nor applauded. It does give evidence, however, of a level of data affluence which can easily be taken for granted. John Adams is known, among others, for the following statement:

"I must study Politicks and War that my sons may have liberty to study Mathematicks and Philosophy. My sons ought to study Mathematicks and Philosophy, Geography, Commerce and Agriculture, in order to give their children a right to study Painting, Poetry, Musick, Architecture, Statuary, Tapestry and Porcelaine." John Adams to Abigail, Paris, 1780.

To some degree similar statements can be made about economic measurement. If military science has a regional science counterpart, then, to paraphrase Edwin J. Coleman, measurement is its trench warfare and hand to hand combat an occasional operating condition. The thousands of measurements needed to maintain income series require continuous con-

tact with numerous data-producing agencies, both private and governmental, and in the latter group, both Federal and State.

Today's economic commentary forms an important part of the context within which regional science is now practiced. However, this commentary (both theoretical and applied) stands on the shoulders of those who did important work in income measurement many years ago and of some who still work among us. The latter include a few key administrators who hold the data gathering and measurement effort together one deadline after another.

Some contend that the exciting days of economic measurement occurred in the golden era of the 1930's and 1940's. It was then that the concept of the national accounts took root and underwent refinement during and after the Second World War—a time of mobilization, and an era of intellectual euphoria. It is true that some parts of economic measurement appear to have become routine—but you will hear from those who assemble the accounts that each month and each quarter poses new formulations of the economic puzzle. The concepts and theories change slowly, but the economic realities which they interpret are invariably complex and unique.

Economic reality becomes no simpler when viewed regionally. The course of personal income by quarter nationally is a subtle thing in relation to the other parts of the national accounts. When you add the nuances of California, Illinois, and Michigan, not to mention those of metropolitan Los Angeles, Chicago and Detroit, you have written a still more complex scenario—and one which, in a statistical sense is acted out on the set stage of national accounts, even though we know that national and regional consequences of economic activity are simultaneous.

So, if national economic accounting has not become routine, we can say of the regional economic accounts that they have not even been fully specified—this remains the work of the future. What, then, of the regional economic measurement future? What may lie ahead?

The regional work still reflects the influence of the Bureau's first Associate Director for Regional Economics, Robert E. Graham, Jr. More recently his successor, Daniel H. Garnick, has accented the analytical thrust while at the same time pushing to strengthen and broaden the measurement foundations.

Let me enumerate some measurement proposals under consideration in the Regional Economic Measurement Division and in the Regional Economic Analysis Division of the Bureau. The largest of these is an interrelated set of proposals involving: (a) further development of State economic accounts in current and constant dollars, (b) improvements in the timeliness and quality of the SMSA and county estimates of total and per capita income, and (c) quarterly series of personal income estimates for selected SMSA's and nonmetropolitan portions of States. If these interrelated proposals were fully implemented, they would lift the quality and timeliness of regional economic measurement effort.

Let me amplify briefly. First, the further development of economic

accounts for States would include income and product accounts depicting the transactions of producing establishments located within each State, personal income and outlay accounts for persons resident in each State, and State and local government receipts and expenditures accounts. Supporting tables would include gross domestic product, measures of consumer costs relative to the national average, and other tables providing additional detail. In addition, for each State, a table of inter-State and foreign commodity trade flows, by type of product, would be prepared at intervals appropriate to current data sources.

There has been an increase in demand for economic data at the State level. Uncoordinated efforts to meet these demands have resulted in a proliferation of series which lack comparability, series to series, State to State, and time period to time period. State and Federal agencies as well as business units have tried to support research and data development efforts that make use of concepts employed in the national accounts. However, such projects have not been coordinated and have not commanded the resources or access to primary data sources required to produce a consistent set of accounts. Preparation of the State economic accounts by the Bureau of Economic Analysis would overcome these problems and would provide the needed data base in a more dependable way and at less cost than the sum of the costs of the individual efforts now undertaken.

Second, proposed improvements in State and county personal income estimates are extensive, including farm and nonfarm self employment income, Federal wage and salary disbursements and rental income and transfer payments. Conversion of wages and employment from a place-of-work to a place-of-residence basis would have high priority, as would reconciliation and editing of a greatly expanded administrative record file containing the subnational wage and salary disbursements and employment data. Attention would be given to improving the processing and evaluation of the wage and employment statistics generated by the Federal/State cooperative program on unemployment insurance statistics.

The proposed measurement improvements are considered in the context of recent developments—notably, a change in the use of the subnational income estimates. The recent proliferation of tax limitation legislation in the various States has increased the demand for current and timely State personal income data. Formulas for determining the limits in almost all cases include personal income as the measure defined and reported by the Bureau of Economic Analysis. The State and county personal income measures are currently used by Federal agencies for the jurisdictional allocation of more than \$50 billion in Federal grants. The current widespread use of such measures as per capita personal income as a basis for distributing Federal grants-in-aid is relatively recent phenomenon and one which places an increased burden on the State and county personal income measures because the programs specify the use of the most current estimates. This increased program use occurs at a time when source materials are generally more detailed, less well edited, and more subject to delays in transmission. A program to forestall qualitative retrog-

ression in the face of these statistical and operating conditions is urgent. (6) Recent adverse developments include the cancellation of the Internal Revenue Service small area data program and the delay in the 1980 commuting data from the Bureau of the Census. On the positive side, BEA has obtained access to IRS data (minus individual identifiers) which will facilitate improved estimates of nonfarm proprietors' income and improvements in the residence adjustment process.

Third, the proposed selective sub-State quarterly estimates of personal income would provide up-to-date measures of the economic health and tax base of many urban, labor market, and rural areas of the Nation. They would meet an informational need for developing fiscal, monetary, and other Federal and State policies which take into account the stabilization of local area economies. These estimates would facilitate a sharp increase in the currency and scope of the Bureau's Regional Economic Analysis program. In addition, the preparation of this series would lay the foundation for preparation of preliminary annual county estimates of personal income with a lag of six months instead of the current lag of fifteen months. Development of a quarterly personal income series for selected SMSA's would require preparation of fifteen to twenty component estimates for such areas. The selection would be from 357 areas: the 234 SMSA's that lie wholly within individual States, the 73 State portions of multi-State SMSA's, and 50 non-SMSA portions of each State. Historical quarterly estimates would be maintained for relevant counties in order to be able to provide for changing SMSA definitions. Estimates would be consistent with the latest quarterly national and State data prepared by the Bureau. Quarterly estimates would be consistent with corresponding annual totals prepared for these areas. Despite the fact that current revenue sharing legislation directs the Secretary of Commerce to develop such estimates, no funding has been provided and current progress in this direction is minimal.

In addition to the three proposed interrelated undertakings mentioned above, the current agenda for improvements in regional economic measurement include:

- a. the permanent funding of the work on the maintenance and analysis of the Social Security Administration's Continuous Work History Sample: The status of the work with this file to date has been documented in a recent publication. (2) The processing of annual data on the geographic movement of workers has heretofore been undertaken on a reimbursable contract basis. But experience with wide variations in such annual support has demonstrated the need for a stable source of funding to ensure the development and up-to-date maintenance of the data. The file has been a one percent sample of the covered employees in terms of their county of employment, age, race, sex, industry and wages earned. The same persons are included in the sample each year. This permits construction of a continuous work history file for these individuals. The Social Security Administration removes all individual identifiers from the data before making them available to the Bureau of Economic Analysis.

These work history data have important applications in the field of regional economics: economic and demographic projections for States and other areas, migration studies for a variety of public agencies and private groups, incorporation of a large number of manpower and related programs into BEA's current capability for socioeconomic impact analyses, and assistance in the development of current commuting patterns by county. Despite its large potential, however, the file's permanent funding remains an unattained objective. Moreover, the file has been unavailable since 1979 (since data for the first quarter of 1976).

b. continued refinement of annual State and county estimates of employment by industry consistent with the wage and salary and proprietors' income components of the personal income account: No other series of annual employment estimates meeting this requirement is available on a nationwide basis. This series is a key one in projections work, in the regional impact analysis system, in numerous econometric forecasting models, and in an increasing number of Federal and State fund allocation formulas.⁴ If successful, current attempts to improve disclosure avoidance techniques will permit release of 2 digit Standard Industrial Classification earnings *and* employment estimates at the county level.

and c. funding for personal income estimates in the Territories of the United States: The geographic expansion of the United States has left six major island groups in territorial status. They are: in the Caribbean area—Puerto Rico and the Virgin Islands of the United States; and in the Pacific area—Guam, the Trust Territory of the Pacific Islands, the Northern Mariana Islands and American Samoa.

The major output of the Regional Economic Information System in the Bureau is the State, SMSA, and county series of personal income and employment estimates. Various legislative enactments have underlined the importance of comparable estimates for Puerto Rico and the other underlying areas of the United States. An example concerns the requirements of the National School Lunch Act (42 U.S.C. 1951 et seq.) for which the Bureau of Economic Analysis now prepares *ad hoc* estimates of per capita personal income. A second example appears in the 1977 amendments to Title II of the Public Works Employment Act of 1976 which authorized Antirecession Fiscal Assistance of "countercyclical aid" to American Territories. Pursuant to this amendment the Secretary of the Treasury, in consultation with the Secretary of Commerce, investigated alternative methods of making allocations to the American Territories including "the extent to which these territories can be made part of the regular allocation system applicable to the several States." The regular allocation system requires estimates of personal income.

Noting the limitations of the *ad hoc* estimates, territorial requests have been made from time to time for preparation of personal income estimates comparable to those available for the States. It appears clear that the several territories cannot develop their own series on personal income with the same objectivity and credibility as can the Bureau of Economic Analysis. Apart from the logic of its role, ample precedent exists in the

1953 estimates prepared for the Territory of Hawaii by BEA's predecessor agency, the Office of Business Economics.

The foregoing are three interrelated proposals plus three further areas of improvement more recently considered. The timing and degree of realization of each will depend upon available resources. Some of these proposals will mature into statistical series, others will be realized in modified form, and still others may give way to other priorities. The point is that the measurement agenda are numerous and evolving. In some sense they mirror the evolution of economic activity in our economy—nationally and regionally. As economic activity in a free economy never approaches a definitive pattern, likewise no economic measurement program is ever finished. This evolution of national and regional economic activity requires a continuously adaptive economic measurement effort. This adaptive measurement process must serve a continuously innovating analytical establishment. The latter, in turn, will serve the social sciences.

In closing, I return to my *leit motif*. Economic measurement continues to be involved with the truth of economic propositions. As such it continues in the service of social science generally, and of regional science in particular.

FOOTNOTES

¹Not related as far as I know to one S. Tucker who has been quoted by Paul Anthony Samuelson to the effect that "I've been rich; I've been poor. Believe me, rich is better." (3, p. 170)

²Of this relationship the Director of the Office of Business Economics (presently, Director, Bureau of Economic Analysis) wrote: "Although I want to uphold and strengthen OBE's analytical arm, I see clearly that the main focus of our work should be the care of the U.S. national accounts. Our fundamental responsibility to the public is to maintain the quantity, quality, and timeliness of these estimates." George Jaszi, "Review," (3, p. 194)

³Member organizations included the Universities of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee and Virginia and Tennessee Valley Authority. Chairman of the steering and executive committees was James W. Martin of the University of Kentucky. Chairman of the technical committee was Lewis C. Copeland of the Tennessee Valley Authority. Services of Charles F. Schwartz and Robert E. Graham, Jr. were provided by the Office of Business Economics of the U.S. Department of Commerce; participation of

Werner Hochwald was arranged by the Federal Reserve Bank of St. Louis. (10)

⁴A related project of several years duration has been the display of comparable employment data by region, State and county by industry from the several censuses of population. These and similar compilations save expensive and time-consuming data preparation which must otherwise be undertaken before analysis, of even a rudimentary sort, can be undertaken. It is expected that this continuing process of compilation in the interest of the economic, as distinguished from the demographic, analyst may be continued to span the data of future decennial and quinquennial census surveys. (1)

The author initiated this work for selected regional areas at the University of North Carolina (Chapel Hill) in 1960. In 1962, as Director of the Office of Economic Programs, Edgar S. Dunn, Jr. accepted the project with a national scope within the Commerce Department's Business Defense Services Administration. The Economics Division of the Commerce Department's Office of Business Economics in 1964.

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