system. The conventional model implicitly employed in much of the literature on local government finance assumes that variations in grants are independent of local characteristics and fiscal behavior. An alternative formulation would treat the aid level as dependent on local characteristics, such as income, or the level of local expenditure, as when grants are provided on a matching basis. In that case there is a simultaneous determination of grant and expenditure levels. Secondly, aid programs differ in terms of the intralocal incidence of aid financing, varying from the complete absence of local incidence to total local incidence. The impact of aid programs on local activity, in terms of both income and substitution effects, can be expected to depend on the degree of local incidence. Thus, it is necessary to consider the determinants of aid grants and the relationship between levels of aid and levels of local income net of aid-financing taxes.

In the interstate analysis of urban fiscal activity by Dresch, it is assumed that grants-in-aid have a complete local incidence and hence have no influence on the local budget constraint. This assumption is justified on the ground that, across states, gross differences in levels of aid reflect differences in the distribution of responsibility for the provision of local revenue between the state and local governments. In this context, several alternative influences of grants are considered, most importantly possible differences in the *intralocal* incidence of state relative to local taxes and the imposition of state governmental controls over local activity accompanying increases in relative state revenue responsibility. Thus, the effect of grants is not through the level of payments but through the relative dependence of the locality on state financing. To measure this relative reliance, an aid rate (aid relative to expenditure) is utilized in the expenditure equations.

The effect of aid is quantified in the analysis of undeflated expenditures and local revenues; an increase in grants of one dollar is associated with an increase of $0.15 to $0.25 in total expenditures or revenue, and most of the coefficients measuring this association are not statistically significant. Alternative specifications of the aid variable are compared and these aid effects are attributed to the use of the aid rate; it is argued that conventional aid level variables vastly overstate the impact of grants.

Stephen P. Dresch
Raymond J. Struyk

2. NATIONAL INCOME, CONSUMPTION, AND CAPITAL FORMATION

Introduction

Two separate lines of research have been pursued during the past year. The household capital formation and savings project, under my direction, is concerned with the development of behavioral relations that underly the acquisition of both tangible and financial assets by households. These studies involve analysis of both time-series and cross-sectional relationships. The latter are based on a set of experimental survey data obtained by the U.S. Bureau of the Census, with which the National Bureau is collaborating on the over-all project. The survey data will be used mainly for analysis of financial asset changes. In addition, the survey is designed to facilitate investigation of the potential uses of anticipatory data relating to changes in both tangible and financial assets.

A second research area, and the major one, concerns analysis of economic and social accounts. Here, Richard and Nancy Ruggles are studying disaggregation problems. They have been concentrating on the construction of subsector estimates, using existing data, and on the development and exploitation of microdata sets that would permit types of disaggregation not otherwise possible. John Kendrick and

Robert Eisner are directing studies that involve expansion or elaboration of the present system of national accounts. Kendrick's work is focused on constructing estimates of imputed value for selected nonmarket activities—unpaid household work, the opportunity cost of students, and volunteer labor. In addition, Kendrick is estimating both stocks and flows of "intangible" assets. Eisner is directing a series of studies concerned partly with activities not ordinarily included in national accounts and partly with refinement and improvement of the present accounts. Projects now under way range from analysis of capital gains to the valuation and allocation of time spent in the household. These projects are discussed in more detail below.

F. Thomas Juster

Household Capital Formation and Savings

The time-series analysis of demand for consumer durable goods is now close to completion. Virtually all parts of the study, including the specification, estimation, and analysis of durable goods demand models, are in manuscript form. An objective (nonanticipatory) model has been estimated and compared with models incorporating both objective and anticipatory data and with one incorporating only the latter. A paper comparing the objective and anticipatory models was presented at the CIRET conference held in Madrid last October.

The objective model has a tripartite structure based on the partial adjustment of actual to desired stocks of durables, the formation of expectations via response to past forecast errors, and different response mechanisms for transitory and permanent changes in financial variables. Thus the model explains observed changes in the stock of consumer durables as the sum of planned changes (those due to expected movements in the underlying behavioral variables) and unplanned changes (those due to unforeseen movements in behavioral variables). The model can be used to explain purchases, as distinguished from net investment, on the usual assumption that purchases are equal to net investment plus depreciation measured as some fraction of initial stock.

The first part of the objective model, i.e., expected or planned investment, can be compared with an anticipatory model that includes only subjective purchase expectations and a variable measuring consumer financial expectations. The complete objective model—expected (planned) plus unexpected (unplanned) changes in stocks of durables—can be compared with an anticipatory model which includes purchase expectations, expectations about financial variables, and unanticipated changes in financial variables.

The empirical results are striking. Over the period 1949-67 the objective model explains about 88 per cent of the variance of net investment in automobiles, and a little over 93 per cent of the variance of net investment in nonauto durables and in total durables. For gross investment (purchases), the objective model explains over 93 per cent of the variance in automobiles and about 99 per cent of the variance in both nonauto durables and the total. All of the substantive economic variables in the model have significant t ratios and reasonable regression coefficients, and the implied lag structures are plausible. The objective model implies a mean lag of under one year, with the peak response in the second and third quarters. These results, and the implied elasticities, are comparable to and generally a little better than those obtained by other investigators.

The anticipatory model cannot be estimated for the same time period because the basic data are unavailable; strict comparability can be achieved only for the period beginning in 1960, and only for net and gross investment in automobiles. A comparison of the objective and anticipatory models for this shorter period indicates that the much simpler (two variable) anticipatory model does just as well as the much more complex (seven variables, including a

lagged dependent variable) objective model for planned investment, and slightly outperforms the objective model for total investment. Despite the fact that the anticipatory model does not strictly relate to total durables purchases, it does about as well as the objective model even with total durables as the variable to be explained.

Moreover, when the anticipatory variables are simply added to the fully specified objective model, both expected purchases and consumer expectations add significantly to the variance explained by the objective model; all but one of the substantive economic variables in the objective model are reduced to virtually random numbers This conclusion holds for both automobile and total durable goods purchases. The only objective variables that continue to exert a net influence on purchases, holding anticipatory variables constant, are relative prices and the unemployment rate. In both models, the latter variable represents unexpected changes in financial circumstances, hence it is predicted to be significant holding plans and expectations constant. A possible interpretation of the finding that relative prices have a significant influence net of expectations is that price movements are generally unforeseen by consumers and are thus not adequately accounted for in subjectively expressed plans and expectations. It is interesting that among those variables included in the objective model, relative price is the only one for which the state of consumer information might be substantially altered by actual investigation of a potential transaction; the other variables in the model are clearly known to the consumer unit at the time purchase and other expectations are measured.

Recent empirical work has suggested a slight modification of the anticipatory model which seems to provide better structural properties. The basic idea is that the variable used to measure consumer expectations (actually, the Index of Consumer Sentiment developed by the Survey Research Center at Michigan) is best interpreted as a measure of the state of consumer uncertainty. It can be argued that consumer uncertainty makes a net contribution to the explanation of purchase decisions only when it is changing systematically; otherwise the purchase expectations variable will reflect the full influence of the state of uncertainty. The model implied by this interpretation is a nonlinear version of the anticipatory model described above: purchases are specified to be a function of purchase expectations, current unemployment, and changes in the SRC Index of Consumer Sentiment multiplied by a dummy (1, 0) interaction variable. The interaction variable has a value of 1 if, and only if, consumer sentiment is changing systematically; otherwise, it has a value of 0.

We plan to complete two manuscripts within the next few months. The first will cover the analysis and interpretation of the objective model of durable goods demand, and will incorporate comparisons of objective and anticipatory models. The second will concentrate on the anticipatory models, focusing on the interpretation and proper specification of the uncertainty variable. This paper will also incorporate an analysis of optimal forecasting methods for the anticipations model, analyzing questions of useful forecast span, single-quarter forecasts versus the average of multiquarter forecasts, and so forth. Both of these papers are being written in conjunction with Paul Wachtel.

The experimental survey work being carried out in conjunction with the U.S. Bureau of the Census is now sufficiently far along so that we have begun to obtain substantive empirical results. At present the initial survey and a six-months reinterview are on tape, and a number of preliminary regressions have been estimated. The focus is on analysis of alternative ex ante durable goods expenditure variables; analysis of the ex ante savings data is being deferred, since savings during the available six-month span are likely to be seriously affected by seasonal factors. For durables, the preliminary results suggest that expected expenditure variables have less forecasting value than variables reflecting the probability of acquiring specific items like automobiles, houses, or appliances.

The results also suggest that the omission of probabilities for the purchase of multiple units within a given time span has a perceptible effect on forecast accuracy. That is, probabilities of buying "more than one," which were obtained in the experimental survey, appear to contribute to the explanation of total purchases.

Since the results of the second reinterview (conducted in May 1969) are now on hand and can be incorporated into the basic analysis tape, we expect to begin substantive analysis of the savings data within a few months. A wide range of questions will be investigated here: the contribution of various types of family income to an explanation of savings behavior, the association between durables purchase expectations, savings expectations, and the corresponding actuals; the question of what explains savings and durable goods expectations, as well as observed savings and durable goods purchases; and so on. Michael Landsberger, formerly at the University of Pennsylvania, joined the project staff in July and will be working mainly on the cross-section analysis of the experimental survey data.

The fourth wave of interviews on the experimental survey was completed as scheduled in November 1969; these data are now being edited and coded at the Census Bureau. The fifth and final wave, originally scheduled for May-June 1970, has been postponed for a few months because of budgetary constraints. It is now expected that we will obtain fifth-wave interviews in the late summer or early fall of 1970. The data set for this experimental survey will eventually comprise two full years of information for roughly 4,000 households, and will permit simultaneous analysis of differences over time and several sets of differences among families for the same time span. It will also be possible to relate differences in both expectations and actual behavior for identical families, a procedure which simulates the behavior of expectational variables in time series much more closely than the usual cross-section analysis.

Processing and preparation of the basic survey data for analysis is under the supervision of Avrohn Eisenstein. Teresita Rodriguez has joined the project as a research assistant, working mainly with data processing on the time-series analysis.

F. Thomas Juster

The Design and Use of Economic Accounts

Our recently published study, *The Design of Economic Accounts,* provides a framework within which the accounts can be disaggregated. Our current work is concerned with this question in two ways. First, in the tradition of national accounts estimation, a variety of sources of information are being drawn on to disaggregate major sectors and subsectors and to provide systematic and consistent data. Second, microdata sets are being created for specific subsectors of the economy to permit the use of simulation techniques and to provide for estimates which could not otherwise be constructed.

At present, research on the development and use of national economic accounts is focused on three separate segments of the system: (1) investigation of techniques for providing price indexes related to the national economic accounts, (2) subsector disaggregation of income and balance sheets for the household and enterprise sectors, and (3) the development of microdata sets with the objective of developing social as well as economic accounts.

In present practice, the price information on which the deflation of the national accounts is based derives in large part from the Cost of Living and Wholesale Price Indexes. Neither was designed primarily to fit into the national accounts. Moreover, the samples underlying these price indexes do not take into account the intercorrelation which normally exists among prices, and as a result considerable sampling inefficiency exists. Given suitable computer processing techniques, it is now possible to improve the specification of the price

observations required for the development of price indexes that would deflate both the end-use and income-originating measures of gross national product. Preliminary analysis suggests that it would be possible to provide more valid information with substantially fewer observations than are now used in the Wholesale and Consumer Price Indexes.

The disaggregation of the household and enterprise sector has as its object the development (for one point in time) of more detailed income statements and balance sheets for specific subsectors. For the household sector, an attempt will be made to examine specific socio-economic groups, such as the aged and those belonging to certain poverty classes. For the enterprise sector, attention will be focused on certain unincorporated enterprise subsectors, such as farm and professional. Other work is being undertaken regarding the microeconomic behavior of establishments in the manufacturing sector and the manner in which such behavior is related to productivity, wages, and price determination.

Finally, related research is concerned with developing microdata sets for the household and enterprise sectors. This work involves the addition of imputed information from a variety of sources to the basic information obtained from samples of households and establishments. This research has the dual function of using microdata sets on households and enterprises to assist in subsector disaggregation, and of developing techniques of integrating supplementary data into already existing microdata sets.

Nancy D. Ruggles
Richard Ruggles

Studies in the National Income Accounts

Most of my time in recent months has been devoted to writing the monograph on postwar productivity trends (reported on in Section 1), and the national income studies have moved slowly as a consequence. With regard to imputations for nonmarket economic activities, Elizabeth Wehle, Jennifer Rowley, and Harold Wolozin are planning early completion of monographs on unpaid household work, opportunity cost of students, and volunteer labor, respectively. When these monographs are finished, I plan to write a summary essay covering these and other imputations—chiefly rental values of nonbusiness capital goods and final goods and services charged to current expense by business.

With regard to the total investment and capital stock project, some preliminary findings about the intangibles are summarized in the report on productivity mentioned above. The estimates involved in this study are being revised and checked by my principal assistant, Jennifer Rowley. We then plan to design appendix tables and write up the sources and methods underlying the estimates. By 1971, I hope to start on the analysis and to make some headway in writing the text. This study has been supported by grants from the National Science Foundation and by the general funds of the National Bureau.

John W. Kendrick

Measurement and Analysis of National Income (Nonincome Income)

Work is under way on the following major topics: capital gains, the value of services and investment in education, the value of services and net investment in automobiles owned by households, depreciation of business capital stock, executive compensation (with particular focus on stock options), the valuation and allocation of household time, and the depletion of natural resources. The broad plan of research and some of the initial undertakings were described in last year's *Annual Report* (pp. 58-59).

At the American Statistical Association meetings in Detroit, December 1970, reports

will be presented by Michael McElroy on "Capital Gains and the Concept of Income," by Allan Mendelowitz on "Measurement of Economic Depreciation," by Wolfhard Ramm on "Services of Household Durables: The Case of Automobiles," and, possibly, by Robert Eisner and Arthur B. Treadway on the general concept and aims of the project. McElroy's work consists of a careful theoretical analysis of the origins of capital gains and their status as income, estimates of capital gains on corporate stock from 1946 through 1968, estimates of capital gains of unincorporated business from 1946 to 1966, and other estimates from a variety of sources. Mendelowitz is applying accepted capital value theory to the estimation of economic depreciation, relating depreciation to exhaustion of an originally anticipated net revenue stream. After exploring relations among expected revenue streams, discount rates, asset service lives, and depreciation, Mendelowitz is estimating revenue stream profiles by relating actual revenue to prior gross investment rates. Initial results, based on data from McGraw-Hill capital expenditure surveys, have been promising.

Ramm is using highly disaggregated market data on auto prices, qualities, and quantities to estimate hedonic price deflators and ex post depreciation patterns. This will allow the construction of more rigorous estimates of stocks, income (including capital gains), and net investment flows for automobiles. This work promises to be the first comprehensive study of its kind, and will result in empirical estimates, for most of the postwar period, that utilize the major methodological suggestions in recent literature. The theoretical work has been completed, the laborious process of collecting information and transferring it to computer-usable formats is largely completed, and initial econometric results for several years have been obtained.

Robert Wallace has been working with Project Talent[1] data, relating information on a number of schooling inputs (aptitude, achievement and personality tests scores for successive years) to post-high-school income, education, and occupation. The statistical work controls for a number of sociological factors and attempts to identify school outputs by reference to the subsequent incomes that various human capital components appear to command in the market. Wallace's tentative findings suggest that output variables representing "technical training," as opposed to "verbal training" or personality characteristics, are most relevant in determining future incomes.

Among further studies recently begun, that of Peter McCabe on the valuation and allocation of household time concerns services of human capital not traded in the market but either consumed directly by the household or applied to the production of more human capital. Stephen Zabor is undertaking an analysis of executive compensation, with particular attention to stock options and other items of deferred compensation. John Soladay is beginning work on natural resource depletion, focused on the theoretical basis for the accounting of exploration costs, on investment in the exploitation of natural resources, and on the capital gains and depreciation on these investments.

Renewal of financial support from the National Science Foundation is under consideration. If obtained, it will permit extension of the study to several other areas as well as completion of the econometric re-estimation of key economic relations on the basis of revised accounts.

Robert Eisner

Capital Gains and the Theory and Measurement of Income

While considerable attention has been focused on the tax treatment of capital gains and losses and, in a predominantly theoretical way, their behavioral implications in individuals' consumption and portfolio decisions, there has

[1] A survey of 100,000 high school students conducted by the American Research Institute (Palo Alto) in 1960, with follow-ups in subsequent years.

been no systematic appraisal of their relevance to the theory and measurement of income. This project is a conceptual and statistical attempt to explore the role of capital gains and losses as a form of income.

Present practice is to exclude capital gains and losses, whether realized or not, from estimates of personal income. This results in a measure which, for purposes of assessing both the magnitude and the distribution of individuals' purchasing power, is considerably narrower than the theoretically appropriate Haig-Hicks concepts of individual income as consumption plus the change in net worth. Accrued gains and losses are large and highly variable: for the years 1947-64, annual gains on major asset groups—corporate stocks, residential real estate, and the physical capital of the unincorporated business sector (including farms)—range from minus $50 billion to over $100 billion, averaging $26.3 billion after adjustment for price level changes. By comparison, over the same period personal saving averaged $18.3 billion and in almost every year was exceeded in absolute amount by capital gains (or losses). These estimates are preliminary, and minor revisions will be undertaken in the near future.

At present I am attempting to distribute this expanded measure of income over income size classes. Not only is this measure likely to show greater inequality than the distribution of income as measured by the Office of Business Economics, but its trend over time may well be toward more inequality. Inequality in the size distribution of OBE personal income has remained virtually constant during the past twenty-five years.

A second phase of the study is analysis of the relevance of capital gains and losses to the measurement of current economic activity or output. It can be argued that major portions of accrued gains reflect "output" in a broad sense, and that they do not cancel out when the basic Haig-Hicks concept of income is summed over individuals. The problem, it is maintained here, is strictly one of measurement, a conclusion that runs counter to the conventional notion of capital gains and losses as "unproductive" increments to wealth. It is argued that the net result of including these gains and losses in national income is a reallocation of income over time precisely analogous to the treatment of tangible investment by the OBE. A set of consistent stock/flow accounts has been developed as an expository framework for this expanded concept of national income.

Michael B. McElroy

3. URBAN AND REGIONAL STUDIES

Introduction

The National Bureau's research program in urban economics has expanded dramatically during the past year. Studies started last year and the year before have begun to come to fruition, and a number of new staff members have joined the Bureau's urban studies group.

The major part of the ongoing research is related to the development of a large-scale, experimental computer simulation model for studying the processes of urban development. We are carrying out concurrently the over-all design and programming of the computer simulation model and the empirical investigation of the behavioral relationships needed for the model. Although all members of the urban studies group have made important contributions to the model design, Greg Ingram has assumed principal responsibility for its over-all design and implementation. Special recognition should also be given to Royce Ginn, particularly for his help in solving the complex programming problems encountered in developing