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CHAPTER 4

THE DESIGN OF THE WEALTH INVENTORY AND ESTIMATES

From the beginning of the Wealth Inventory Planning Study, the staff and Advisory Committee have considered that a prime purpose of an inventory was the provision of basic data for wealth and balance sheet estimates within the framework of the national economic accounts broadly viewed.[1] The investment and financial flows in the accounts, together with revaluations, explain changes in the related balance sheets. Thus, the structure of the income and product accounts, as integrated with the investment and financial transaction subaccounts, determines the structure of the associated balance sheets and wealth estimates.

In chapters 4 and 5, we discuss the main characteristics of economic accounts as they affect the design of wealth statements and balance sheets, and thus of the data collections needed as a basis for stock estimates. The wealth inventory can and should provide much more detail by industry and type of asset than is published in national accounts, as will be developed below. But it is desirable for the detail to be collapsible into the broader categories used, or planned for use, in the economic accounts at the time the wealth inventory is blueprinted.

Unfortunately, there is not now one fully integrated system of economic accounts in the United States, although progress in that direction has been made. Early work in interindustry sales and purchase relationships (input-output) was done in the Bureau of Labor Statistics. But tables for 1958 are being prepared in the Office of Business Economics, on a basis consistent with the national income and product accounts. Thus, a disaggregation of domestic tangible wealth by industry consistent with the official production accounts could also be used in interindustry analysis.

In the case of sector capital accounts and financial flows, however, the development work—including partial balance sheets—was done in the Federal Reserve Board. Although this work has moved in the direction of greater consistency with the income and product accounts, some further modifications in both sets of accounts would be necessary to achieve a synthesis. The paper by Mr. Gorman of OBE (app. I, pt. F) demonstrates one way in which the present income accounts could be elaborated in the direction of capital accounts and balance sheets. The comments by Mr. Sigel of the FRB indicate that further discussion between the two agencies is needed to achieve a meeting of minds.

[1] See "The National Economic Accounts of the United States: Review, Appraisal, and Recommendations" for discussion of a possible comprehensive integration of the several types of economic accounts.

The work of Raymond Goldsmith for the National Bureau of Economic Research on national balance sheets, by sector, differs somewhat in basic framework from that in the two Government agencies. It would be helpful in delineating detailed data requirements on assets and liabilities, by sector, if agreement were reached on the basic structure of accounts. This is preferable to the use of reconciliation tables. Apparently, there are not many major divergencies to be resolved. But resolution will require some changes in both sets of accounts. The discussion in chapter 4 must therefore relate to general features of the accounts, with reference to alternative approaches in some instances.

Relevant Features of Economic Accounts

The economic accounts have developed out of the need for summary statistics describing economic behavior which could be used in testing explanatory hypotheses. Theories of economic behavior, in turn, have influenced the structure of the accounts. The discipline of an accounting framework has been found to be advantageous in obtaining comprehensive and consistent coverage of the various sectors, demonstrating their interrelationships, making possible cross-checks (or derivation of some magnitudes as residuals), and pointing up data needs.

Mr. Jaszi, now Director of the Office of Business Economics, has put it "* * * study of economic behavior calls for a comprehensive accounting system showing the economy in terms of an interrelated network of flows and stocks." He sees the essence of the accounting approach as "the division of the economy into groups of transactors and the depiction of the economic process in terms of their transactions." The distinction between current and capital account transactions is also viewed as fundamental.[2]

In what follows, we shall be particularly concerned with (1) the groupings of transactors into sectors or industry groups, and, (2) the classifications of transactions particularly in capital accounts, since related wealth estimates and balance sheets must have a consistent structure if they are to be used in conjunction with the flow accounts. Immediately, however, it becomes apparent that the structure of the accounts differs depending on whether one is interested in studying the production function of the economy and its component industries, or the process of income distribution, spending, saving, investing, and financing by the various transactors grouped according to common institutional and behavioral characteristics.

The heart of the national economic accounts, the production account, comprising sales of final products (including inventory accumulation) and the associated factor incomes and other charges against product, can be deconsolidated in two directions. On the one hand, domestic product may be deconsolidated into income and product originating by industry. On the asset side, domestic wealth can be viewed correspondingly as the sum of tangible assets used in all industries. Here, industries are defined in terms of collections of establishments producing a common range of products as will be discussed further below. Interest centers on the real tangible assets technically required for each industry's production.

[2] See "A Critique of the United States Income and Product Accounts," pp. 21–22.

On the other hand, when interest centers on the factors influencing demand for final products—on income, current consumption, saving, investment, and financial transactions—a different sectoring is required. For income, demand, and financial analysis, transactors with similar motivations and responses are grouped primarily by institutional groupings or sectors—households, financial and nonfinancial business (corporate and noncorporate), and governments. Within the business sector, industries would be composed of collections of companies, since ultimate decisionmaking responsibility rests in corporate central offices in the case of multiestablishment companies.

Sector deconsolidation requires several activity subaccounts. Incomes from current production, plus transfer payments and other redistributions, are credited to sector appropriation accounts, and become the source of funds for spending or saving. Saving is credited to the capital account, and together with borrowing (net increase in liabilities) is matched by tangible investment and lending (net acquisition of financial assets).

The associated sector balance sheets thus include financial as well as tangible assets, liabilities, and net worth. When these are consolidated, domestic financial assets and liabilities wash out, and national net worth is seen to consist of domestic tangibles, net foreign claims, and the difference between the market valuation of going concerns and the market value of the underlying assets.[3]

It is the domestic tangible wealth, unadjusted for national residence of owners, which it seems appropriate to disaggregate by industry for production analysis.

In other words, national net worth may be deconsolidated into the component sector balance sheets, showing financial as well as tangible items, and sector net worth—to be discussed in chapter 5. Or, domestic net worth as tangible wealth may be disaggregated by industry of use, discussed in this chapter. The view has gradually spread in economic accounting circles that interindustry relationship accounts and the associated wealth and flow of funds accounts and the related balance sheets can each tie into the basic national production accounts even though a complete reconciliation with one another would be difficult, if not impossible.

Domestic Wealth by Industry

Tangible wealth estimates by industry are useful in conjunction with industry output, or real product, and labor input estimates for deriving statistical production functions, average and marginal capital coefficients, estimates of real capital used per worker, analyses of the composition of capital by industry, and other production analyses. For these purposes, wealth must be estimated consistently with real domestic product, by industry.

Total domestic product is the sum of net value added in all the industries into which productive activities are divided. The outputs of the establishments of each industry are sold to other producing units, and to final demand sectors. In turn, managers of establishments purchase intermediate products from other industries, and the services of human and nonhuman capital from the owners of the basic

[3] See ch. 5.

factors of production. These relationships can be shown in the form of a matrix. Upon consolidation, purchases and sales among the various industries cancel out, and sales of final products (gross domestic product) and purchases of factor services (gross domestic income) and other charges against product remain. For each industry, total sales plus inventory change (gross output) less intermediate product purchases equal product originating (sometimes called net output or net value added).

For production analysis, the tangible wealth (or capital) used in production should be allocated by the same collection of establishments or industries used to derive the gross and net output estimates. The capital stock used in each industry changes in each period as a result of gross investment less capital consumption, or net investment (allocated by industry of use) and changes in the value of survival capital.

INDUSTRY SECTORING

The industry sectoring for domestic income and product, and thus for domestic tangible wealth estimates, raises several major data collection problems. These are the matters of industry classification, establishment reporting and the treatment of leased assets.

Classification.—The standard industrial classification developed by the Office of Statistical Standards provides the basic classificatory system used in Federal reporting programs. The differences between the industry classifications used by OBE in its 1964 revisions and the latest (1957) revision of the SIC, as amended have become minor, involving chiefly a few rearrangements of industry groupings.

The working groups of the Wealth Study were set up along one-digit industry lines, for the most part.[4] In general, the industry groups favored tabulation of wealth data according to SIC classifications, although in some cases in less-than-four-digit detail. (See particularly the reports on the regulated industries.) Presentation of data and estimates would vary according to purpose, but all the data could be tabulated by fine industry detail. Publication of additional detail would involve relatively minor additional cost compared with the collection cost. In any case, the detail should be preserved in basic records.

It is with respect to preparation of estimates from the detail that judgment must be exercised as to the degree of detail which would be appropriate. In general, OBE publishes estimates by two-digit industry groupings. With the growing use of computers that can quickly handle large bodies of estimates for analysis, further thought should be given to the possible desirability of preparing estimates for finer industrial groupings if additional resources were available.

Members of some groups were of the opinion that certain current SIC classifications are out of date—in the agricultural services area, for example. There is also an especial need in a wealth survey to provide more separate industry classifications for firms or establish-

[4] Note, however, that the natural resources group covered not only mineral industries, but also forestry and fisheries, and considered the problem of natural resource valuation generally. The household group was set up mainly from the viewpoint of households as a consuming sector; while the two government groups considered governments in their dual capacity as producers and instruments of collective consumption. In addition to the domestic industry groups, the group on net foreign claims was necessary to provide the bridge from national to domestic wealth.

ments that are engaged primarily in leasing structures and/or equipment of particular types to specific industries or industry groupings. Industries of such firms could then be classed with their respective leasing industries. This would not work for firms renting out a wide variety of equipment; in this case a different approach to allocation of leased capital goods is discussed later.

It is recognized that the SIC must be revised occasionally—the Technical Committee on Standard Industrial Classification which advises the Bureau of the Budget recommends a revision every decade. It would be desirable if a revision or supplementary amendments are to be made, that they be undertaken prior to the beginning of the wealth inventory cycle, and with regard to its requirements to the extent that they are peculiar. For the sake of continuity in the statistics, revisions in classifications should not be undertaken unless there are compelling reasons. When they are made, the first subsequent collection should use both bases of classification in order to provide overlapping data for use in linking time series.

The establishment basis.—The establishment is not an ideal basis of reporting for purposes of production analysis, but it is probably the best practical basis available. Industries are defined in the SIC manual in terms of a range of activities (products) common to a number of establishments. The establishment is defined in terms of a single location. In addition to the primary products in terms of which an industry is defined, some or all of the establishments classed in that industry (because their outputs consist predominately of the primary products) may produce other secondary products. So not only are industries not coterminous with single products, but their outputs often go beyond a specific set of products. On average, establishments in the various four-digit manufacturing industries, for example, are about 90 percent "pure" with respect to the ratio of the value of primary to total products shipped.

Thus, technical relations within an industry, including capital coefficients, can appear to change (or differ among establishments) due to changes (or differences) in product mix. But instability due to mix is generally far less than would be the case if data were collected only for companies, many of the largest of which have establishments in several or many industries.

It would not seem feasible to try to associate tangible capital (or even labor) with particular outputs. This would work for production workers, materials, and possibly certain types of special purpose machines used only for a single product. But more or less arbitrary allocations of overhead capital (and nonproduction workers) to individual products would be required, and would probably not advance most types of production analyses as compared with analyses by industries defined in terms of groups of products.

The economic censuses for the several industries are based on establishment reporting. Firms in the regulated areas, however, report to the commissions on a company basis. Fortunately, major secondary activities and related assets are generally shown separately.

In the case of the Federal Government, real properties are reported in some detail to the General Services Administration on an installation basis (comparable to the establishment of private industry) while machinery, equipment, and inventories are reported in gross

categories to the Treasury Department on an agency basis. The recommendation of the working group that an inventory of "personality" be undertaken opens the way to using the installation basis of reporting for all tangible property. This would make possible a somewhat more refined classification of Federal general governmental activities and tangible assets by functions.

Not all data can be reported on an establishment basis in the case in multiestablishment firms. This is, of course, true of financial transactions and balance sheet data, since the firm is the financial decision-making unit. Books may be kept on gross tangible assets for establishments, by at least broad categories. With the adoption of group-depreciation methods in 1962, it is expected that asset-type detail and depreciation estimates will be readily available for a declining proportion of establishments. Pilot studies will be required to determine the extent to which tangible-asset detail can be collected from the books and/or underlying property records for establishments.

The establishment basis of reporting poses problems with respect to the treatment of central offices and auxiliaries which service several establishments. The census treatment, whereby they are omitted from three- and four-digit industry tabulations, but included at the two-digit level is a practical expedient. Certainly the collection agency cannot be expected to attempt to allocate the capital assets of overhead establishments among producing establishments. But the underlying data should be preserved and identified so that estimators could attempt an allocation if it seemed fruitful for their purposes. Such an allocation is hardly feasible in regional analysis, however.

Leased assets.—It is a practical necessity that asset data be collected from owners. Yet, for purposes of production analyses, it is the tangible assets *used* by an establishment which are related to its production. Because of the apparent increase in the practice of leasing machinery and equipment, as well as plant and other structures, the divergence between owned and used assets may be growing, as well as differing among industries. This highlights the need for collecting data required to adjust asset information from an ownership to a use basis. This means subtracting assets leased out from the total assets of certain industries, and adding assets leased into the assets of others.

The simplest means of making approximate adjustments would appear to be through colection of rental data in conjunction with asset data. For firms and/or establishments engaged in leasing assets out, the leased assets should be separately identified and reported by major types, and the gross rentals received likewise reported for the same asset classes. For establishments leasing assets in, gross rental paid should be reported for the corresponding major types. Ratios of asset values to rentals received could then be applied to rentals paid, by type, in order to accomplish a rough transfer of assets to a use basis. Refinements of this procedure should be considered in order to take account of varying rental bases depending on the extent of auxiliary service that is included in the leasing agreement. But the general aproach appears to be sound. The census of manufactures already obtains data on rentals paid, but not in detail with respect to type of asset.

ASSOCIATED CAPACITY AND OUTPUT DATA

Estimates of the percentage utilization of tangible capital assets would add to the uses to which wealth estimates could be put. Because of the problems, discussed below, of collecting the data necessary for the estimates, any program to obtain such data should be accomplished separately, and after the wealth data have been obtained, if it is necessary to establish priorities. Currently, various measures of percentage utilization are available, each based on a different conceptual framework. A description and appraisal of most of these can be found in "Measures of Productive Capacity," hearings before the Subcommittee on Economic Statistics of the Joint Economic Committee and in a study by Daniel Creamer for the Commission on Money and Credit which appears in "Inflation, Growth and Employment" (Prentice Hall, 1964).

In brief, current capacity measures range from a survey of capacity utilization conducted by McGraw-Hill, through the measures of Lawrence Klein and Daniel Creamer which are based on economic variables, to series assembled by the Federal Reserve Board which are based on engineering estimates. The variety of methods used reflects the fact that, to date, no suitable way has been found to frame questions on capacity and capacity utilization which can be answered in a meaningful and consistent manner through surveys or data analyses. A dynamic, operational definition of capacity is very difficult to frame.[5]

A discussion of the problems of defining capacity and some suggested questions for inclusion on the various questionnaires used to collect wealth data appear in a paper by Almarin Phillips which appears in appendix I, part G, of this report.

The methods employed by McGraw-Hill and Daniel Creamer could be substantially strengthened by benchmark data on wealth, accompanied by supplemental data collected on capacity. The McGraw-Hill survey asks the company each year for the rate at which it operated and the rate at which it would have preferred to operate. Undoubtedly, an aggregate company operating rate is difficult to determine, particularly for the large, multiproduct companies which comprise the McGraw-Hill survey. Those sectors in which operating rate estimates are more measurable and highly important, such as manufacturing, are surveyed by censuses on an establishment basis. The answers to the questions posed by McGraw-Hill could better be answered at the establishment level in conjunction with asset questions. Perhaps this could be accomplished soon for single product establishments where definitional problems are at a minimum. The capacity utilization estimates could be associated with the gross book value of the capital employed for the purposes of weighting the more aggregative utilization rates. In addition, much could be learned, through linking establishments with their parent companies, about the estimates obtained from the companies themselves by McGraw-Hill. Al-

[5] Even if the expensive task of finding the point of minimum average cost on the cost curve of each establishment were undertaken, the questions of the time periods would remain unanswered by this form of static analysis. The familiar questions of one, two, and three shifts, 5-, 6-, or 7-day workweek, are unanswerable other than by convention. User cost calculations would be required to make any advances along this line. At the other end of the scale, engineering estimates suffer from the same need to define the time period by convention and, in the case of multiproduct establishments, cannot be interpreted without supplementary economic data on relative product prices.

ternatively, company estimates could be obtained for benchmark years through the company plant and equipment survey of OBE–SEC. These estimates could be compared with the estimates of the component establishments collected by Census.[6]

If data on output, employment and other aspects of production could be collected along with asset and capacity data, consistency would be insured.

The Creamer method is based on the lowest fixed capital-output ratio in the benchmark or any subsequent year. As Creamer points out in the study referred to above, his capacity measure relies on the accuracy and consistency of the underlying capital and output series. Certainly, existing measures of capital stand to be greatly improved as a result of the recommendations for a wealth inventory contained in this report. Further, if accompanying capacity and actual output data are also gotten, a much improved benchmark becomes available for continuing estimates of the Creamer variety.

Consideration should also be given to identification of standby capacity in terms of capital equipment used chiefly to meet seasonal, cyclical, or erratic peaks in demand.

The purpose of the foregoing discussion has been to indicate how existing capacity measures can be improved through a wealth inventory, accompanied by questions designed to obtain relevant supplemental data. No attempt has been made here to suggest or evaluate new approaches to capacity and capacity utilization measures, except for those which appear in appendix I, part G, by Phillips. It is strongly recommended, however, that continued discussion in and out of Government be devoted to improving operational capacity definitions. The wealth inventory can be looked to as a source of better capital stock estimates which can be used in making capacity estimates.

Tangible Asset Classification

Most broad estimates of tangible wealth constructed to date have been highly aggregative with respect to asset-type detail. Where asset-type detail now exists, it generally consists of, at most, a breakdown into the following categories:

1. Land and natural resources.
2. Residential structures.
3. Nonresidential structures.
4. Producers durable goods.
5. Consumers durable goods.
6. Inventories (excluding those of households).
7. Net foreign claims.

Some wealth estimates for specific sectors provide some additional detail.[7]

Capital expenditures data exist in greater detail. OBE publishes quarterly or annual totals—part of gross national product estimates—

[6] The problem of aggregating establishment utilization indexes could be solved through the use of an input-output table. Such a table would serve to indicate bottlenecks in certain industries which would effectively limit the realizable output of some establishments within the economic framework. An alternative method of checking individual utilization rates against one important aspect of aggregate potential is to ask each establishment for the employment associated with full utilization of its capacity. Such data could serve many uses, such as providing a firmer basis for growth analysis.

[7] See stub from Goldsmith's study which appears in app. I, pt. B.

for 11 consumer durables categories, inventory change, 21 equipment categories (not published since 1954), and 25 residential and nonresidential construction classes. More detail is available at OBE, and at BDSA and the Census Bureau which supply OBE with basic data. For machinery and equipment, maximum detail is contained in the Census of Manufacturers. Volume II of the 1958 Census contains data on shipments by seven-digit product breakdowns. The dollar totals shown for each of these products are accompanied by physical-unit data when appropriate. Benchmarks for detailed time-series estimates of machinery and equipment expenditures can be constructed using these census data and annual survey data on product classes (five digit).

Asset-type detail has both analytical uses, and uses connected with the preparation of refined wealth estimates on a depreciated replacement cost basis. Analytical uses are enumerated in chapter 2 of this report. They include the analysis of market demand for specific types of tangible assets, general economic forecasting, and long-term projections.

Aside from these analytical uses, considerable asset-type detail for reproducible tangibles is of importance in constructing wealth estimates. The reflation of gross book values to replacement cost bases is greatly facilitated by a high degree of asset-type detail. Such detail would permit the reflation of each asset-type class by the price index relevant to it, rather than necessitate the use of gross price indexes to reflate a highly aggregated total. Thus, the investment in each type of assets, distributed over time, could be reflated by a price index which would fully reflect changes in the prices of each asset-type. The greater the asset-type detail, the more refined are the resulting estimates, if comparable price index detail is available. This approach is implemented by OBE in its estimates of GNP in constant dollars, which are built up by deflating components, in finer detail than actually published, by relevant price indexes.

Asset-type detail is also useful in making the depreciation estimates necessary for net stock estimates. Each type of asset presumably has its own unique life-curve, reflecting the decline in its value over its useful life. Obviously, if asset-type detail is substantially lacking, depreciation can only be estimated using a composite life curve which would reduce the accuracy of the resulting estimates, theoretically, if not practically. Also, detail on rented assets and associated rentals, by type, are required to convert data from an ownership to a use basis.

One problem in obtaining asset-type detail is that some economic units maintain more detail than others in the same industry. This imposes the constraint that across-the-board asset-type detail cannot exceed that of the unit which has the least amount except by estimation. The importance of this constraint is reflected in part by the experience of IRS in its "Life of Depreciable Assets" study. This study was undertaken to assess the extent to which actual depreciation charges differed from those prescribed in 1942 in Bulletin F, for as many asset types as possible. The study was expected to provide a basis for the adoption of new depreciation guidelines. Originally, it was hoped that data on cost, by year of acquisition, could be obtained for about 200 asset classes, of which about 25 were used in any one industry. The primary data source for the LDA study was

schedule G of the U.S. corporation income tax return. When schedules were found to be 90 percent complete, the needed data were simply abstracted from the form. When the form was less than 90 percent complete, data were imputed where possible for firms with less than $50 million of total assets. When the returns from larger firms were inadequate, IRS sought additional detail from the companies. Of the 557,000 returns sampled, data from 48 percent representing 72 percent of total depreciable assets, were unusable as reported on the tax forms. Furthermore, in spite of the cooperation of the companies upon reinterview by IRS representatives, the goals of the LDA were not fulfilled because of the lack of information. Too often, the respondents were unable to classify their assets and, as a result, the totals shown for miscellaneous accounts such as general industrial equipment are overstated. In other cases, classifications had to be collapsed because of the absence of the relevant breakdown in the records of the company.

The new depreciation guidelines adopted by the IRS may impose further, serious limitations on the potential availability of asset-type detail. For IRS purposes depreciation need be computed only for broad asset-type classes. Those which follow are relevant to the problem of obtaining detail useful for making wealth estimates:

(1) Office furniture and fixtures.
(2) Transportation equipment broken down into eight categories.
(3) Land improvements.
(4) Buildings broken down into 13 categories.
(5) Agriculture broken down into machinery and equipment, four categories of animals, trees and vines, and farm buildings.

All other depreciable assets are broken down by industry of use rather than type.

Aside from detail on reproducible assets, analytical needs call for breakdowns of inventories and land. Manufacturers' inventories are currently broken down in four-digit industry detail, but inventory-type detail is limited to that on stage of fabrication—raw materials, goods in process, and finished goods. More information would be desirable on the composition of raw materials inventories. In the agricultural sector, there are estimates of the inventories of crops in storage, and livestock, though not of growing crops.

Aside from that of the Federal Government, detail on nonagricultural land by type is not available. Some data are available for certain regions as a result of land-use studies. There are many analytical uses to which a breakdown of land could be put. Such a breakdown, at a minimum, should show separately residential site land, nonresidential site land, productive land (broken down by resource), land under roads and streets, and vacant land.

The foregoing discussion implicitly underscores the important need for feasibility studies to determine (1) what degree of asset-type detail can be obtained across the board, from all or the most important using establishments, based on present accounts; and (2) the problems involved in getting extensive detail from underlying property records from a small sample of firms.

As stated earlier, asset-type detail is required both for the general purposes of economic analysis, such as demand studies, and for use in preparing the wealth estimates themselves. Most economic analysis

can be served by somewhat broader asset classes than those which would be desirable for constructing wealth estimates. For this latter purpose, since each type of asset has a unique life expectancy and has been purchased over time at varying prices, extensive detail could be used to advantage. Of course such detail would be useful, as well, for the economic analysis of specific markets.

Census 7-digit product classifications represent the greatest amount of detail currently collected on capital equipment. Perhaps, this level of classification, or the somewhat more aggregative Census 5-digit product classes, can serve as a basis of discussions with industry representatives as to what sort of wealth detail is appropriate for each industry. These classes can then be supplemented and collapsed where necessary, and the resulting classifications used as the basis for coding and collecting data on tangible assets.

The design of the collection effort can then be determined. Perhaps it might prove feasible to collect the broad totals on a basis similar to that used in the collection of data on asset and rental payments by the Census Bureau through its annual survey sample. More detailed breaks could be collected on a subsample basis, with inquiries specifically tailored to each of the responding industries. This differentiated-detail approach is used in the economic censuses and surveys. In view of existing recordkeeping practices of business, differing levels of detail will have to be collected at different levels of company organization.

For each of the two main purposes for which asset-type detail is important there are several guideposts which should be used to determine the actual detail collected. The detail obtained for use in constructing wealth estimates should reflect three objectives: First, asset-type detail should be sufficient to permit revaluation of stocks with price indexes which are not overly gross. Second, such detail should be sufficient to permit a unique depreciation rate to be applied to each important asset class. Third, such detail should be sufficient to permit the estimation of appropriate ratios required to prepare value estimates of leased assets.

For purposes of serving the needs of general economic analysis, four criteria applicable to asset-type detail should serve as guideposts. First, the detail should be sufficient for important analytical uses, actual and prospective. Second, where recommended by sector working groups, asset-type detail should be provided for broad categories which cut across industry lines, such as transportation and construction equipment. Third, detail should, where possible, tie into existing flow data such as those of OBE; it is suggested that any contemplated changes to flow accounts be made prior to the wealth inventory. Fourth, classes should be well defined and not so broad that all detail is biased, as occurred in the IRS study where the "general industrial equipment" class was overstated at the expense of other classes.

Supplemental Physical Volume Data

Thus far, our discussion has presupposed the collection of value data by asset type. Some of the reports of the various working groups contain recommendations to obtain supplemental physical volume data for some items of tangible wealth. Many of these data are currently available (as indicated in the section reviewing existing data

in the reports) and others can be readily collected along with gross book-value data in a wealth inventory. Information on physical magnitudes increases the value of depreciated replacement cost estimates. These magnitudes are particularly useful in connection with market demand analysis and studies of long-term availabilities and requirements, such as those of the Office of Emergency Planning. No attempt will be made to evaluate the specific recommendations made by the working groups for physical-unit data, since they are familiar with the data needs of their sectors. Rather, the concern here will be with the usefulness of these data in preparing wealth estimates. It should be observed, however, that physical-unit data are not very useful unless they are collected by relatively homogeneous categories (which would be very numerous), or belong to categories with a relatively stable internal mix.

Physical unit data can provide part of the means of obtaining three types of information necessary for wealth estimates. These are (1) direct estimates of gross replacement cost, (2) data on the age-distribution of the physical units underlying the gross book-value totals, and (3) useful-life estimates for various types of plant and equipment.

Gross replacement cost estimates can be derived by multiplying current prices by the number of existing physical units. Examples of the use of this approach in projecting the costs of future projects are found in the reports of the working groups on Federal Government and service industry wealth. In the former the Department of Army calculates the cost of future construction by computing the average cost (per square foot, etc.) for various major categories of real property by type of construction. This per unit cost figure is then adjusted for regional cost differences, and multiplied by the number of physical units to be constructed. Similarly the figure of $20,000 per bed is currently used by hospitals to estimate the cost of erecting new units or additions. This method can also be widely used in valuing land by type. If prices of used depreciable assets were available, physical units times average price for successive age groups could also be used to obtain market value estimates directly rather than through depreciation of replacement cost by year of acquisition.

As implied above, application of this method is limited since it cannot be extended to asset-type classes which comprise many different subgroups. Since the method is essentially akin to revaluation using market prices, it is obvious that the physical-unit data are useless for current-value estimates unless current prices or unit values are available, also. These limitations prevent the adoption of this technique as a general procedure for obtaining wealth estimates. However, estimates based on this method can be used in selected areas as a basis against which to check estimates derived by the methods discussed in chapter 7.

Where physical-unit data distributed by age are available, or can be obtained inexpensively, they can be useful in preparing wealth estimates in replacement cost dollars for asset classes for which the dollar value data, distributed by periods, are unobtainable. An example will elucidate this use. Assume firms report a gross book value of $300 at the end of a wealth inventory year for a particular type of machine, of which they are the exclusive holders. Also, assume that a trade

group publishes the following physical inventory of these machines, distributed by their age as shown in column 1 of table I. With this information, the derivation of replacement cost estimates is shown in the remaining columns of the table.

TABLE 1.—*Revaluation of fixed reproducible tangible assets based on physical unit data*

	Number of machines (1)	Price index (base year equals 3 years ago) (2)	(1) by (2) (3)	Percent of total (4)	(4) by $300 (5)	Price index (base year equals latest year) [1] (6)	Replacement cost (5) divided by (6) (7)
New	3	120	360	14.4	$43.2	100.0	$43.2
1 year old	8	120	960	38.4	115.2	100.0	115.2
2 years old	8	110	880	35.2	105.6	91.7	115.2
3 years old	3	100	300	12.0	36.0	83.3	43.2
Total			2,500	100.0	300.0		316.8

[1] The price index used to derive the replacement cost figures is the same as that in column 2 except that the base year has changed. The question of whether a Laspayres or Paache index is appropriate for the revaluation is ignored here.

These age distributions of physical units have been developed primarily by trade groups and trade publication houses, for use in demand analyses and projections. Two notable examples of such data are those compiled by McGraw-Hill on metalworking equipment and published in American Machinist & Metalworking Manufacturing and those compiled by R. L. Polk & Co. on automobiles.

The American Machinist inventory of metalworking equipment is conducted every 5 years. Detailed breakdowns of 167 machinery and equipment types for 24 geographic areas and 44 using industries are given. Three age breaks are reported: (1) less than 10 years old; (2) 10 to 20 years old; and (3) over 20 years old. The first two age intervals probably are too wide to be usable for preparing wealth estimates and would need to be broken down further. For the 1963 inventory, questionnaires were sent to 34,000 metalworking plants from which 7,370 responses were received; the data were inflated to universe totals based on the ratio of employment of respondents to total employment for each industry.

R. L. Polk & Co. publishes annual data on automobile registrations by manufacturer. From these data, the age composition, by year, of the physical stock of automobiles can be seen. Such data would greatly facilitate the revaluation of the gross book value of automobiles to a replacement cost basis. The R. L. Polk data were also used by Charles Friedman of OBE in a study appearing in the September 1963 Survey of Current Business to draw up survivorship curves for automobiles. These curves are integral to length-of-life studies required as part of the process of estimating depreciation. Of course, the curves do not answer the questions of how the value of an asset declines over its lifetime.

Geographic Detail

There is increasing interest in regional economic estimates and analysis, but no complete set of regional economic accounts has been developed. So far, OBE has provided only estimates of personal income by State, and is currently engaged in extending the personal income estimates to standard metropolitan statistical areas (SMSA's) and at a future date to countries which could be combined into other significant regional groupings.

The production account and associated tangible wealth estimates would seem peculiarly well suited to regional deconsolidation, owing to the establishment basis of much industry data. For the business sector composed of industries of companies in financial accounts, regional breaks would present major difficulties. But if an allocation procedure were used to distribute company financial assets by establishment, by region, the component establishment data would be needed on a regional basis. Hence, we discuss regional data in connection with the production approach.

In general, it seemed sensible to the working groups to try to obtain tangible wealth data for all States and at least the major SMSA's, where applicable, thus following the lead of OBE. For the broad data coming from economic censuses and other comprehensive sources, the county is generally used as the basic geographical unit. Types of wealth which are available on a State basis, but not by county, might be so distributed by interested analysts based on relevant criteria for which the more detailed data were available.

When a sample survey approach is used as the source for certain types of wealth data (such as household wealth other than housing and major durables), it would be expensive to have large enough samples to provide reasonably accurate State data. In this case, broader regional samples could be designed, and the blownup estimates allocated to States by interested users on the basis of correlated data which were available on a State basis.

Certain types of equipment, such as interstate transportation vehicles, do not have a fixed location. The Department of Defense does not supply geographic detail on military equipment. Only national totals would be shown for categories such as these, although users might attempt regional distributions of nonmilitary items, such as transportation equipment, based on related types of data for which State distributions were available.