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Consumers' Tangible Assets

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A Scope and Concepts

Evaluating consumers' tangible assets other than land and residences calls for a rather liberal sprinkling of imagination and guesses on the basis of fragmentary information. The paucity of reliable data is no doubt the reason estimating the total value of consumers' capital at different dates and the part played by consumers' capital in business cycles has received so little attention. Changes in the value of this capital relative to changes in the value of other forms of tangible assets and of consumers' debts deserve intensive study. Information on stock of various goods in consumers' hands and on its age distribution at various dates would be useful in forecasting fluctuations in consumer demand.

The main purpose of this paper is to describe the nature of the data needed for more adequate estimates of consumers' tangible assets and to suggest techniques for their collection. First, however, we review some previous estimates and consider the character and limitations of the data. We then present some very tentative estimates of consumers' tangible assets for 1929, 1939, and 1946. Consumers' tangible assets can probably never be estimated with a high degree of precision, but substantial improvement is possible.

1 *Concepts*

Before we can evaluate the usefulness of existing data we must define our concepts explicitly. The value of goods owned by private individuals and families for personal use must be distinguished from the value of all consumer goods. Durability must be defined before proposals for collecting more data are considered, since the methods depend upon the nature of the data.

a *Ownership units*

In broad terms the household is the ownership unit. More specifically, the owning group is defined as the civilian, noninstitutional population, i.e., members of private families and

single persons living alone or as lodgers and servants in private households and in lodging houses, hotels, etc. The holdings of lodgers and servants are important chiefly in the case of more or less personal goods, since by definition they own few if any household goods. For the sake of brevity, the civilian noninstitutional population will be referred to as consumers.

Since persons living in institutions of various types and on military and naval posts are relatively few, except during wars, and their tangible assets are rather negligible on the average, their inclusion or exclusion is of minor importance. It would be desirable to exclude their assets when studying changes in the value of consumers' capital in relation to business cycles, since they would not change with fluctuations in economic conditions in the same manner as the holdings of the civilian noninstitutional population. If they are excluded, however, their value should be estimated in some manner and presented as a separate component in the national balance sheet.[1]

Goods purchased and in the possession of consumers will be treated as owned by them even though they may not have title because of outstanding credit obligations. It would be impractical to do otherwise and it would be undesirable to try if the value of consumer goods is to be compared with outstanding consumer credit.

b *Consumers' tangible assets*

Consumers' tangible assets may be defined as consumer durable goods in accordance with Simon Kuznets' classification, i.e., commodities that, without marked change, are ordinarily employed in their ultimate use for three years or more. At the other extreme, consumers' tangible assets may be defined to include not only durables and semidurables but also the food

[1] It would be extremely difficult, though not impossible, to obtain directly from institutional residents the information requisite to evaluate their assets. When estimating national consumption for 1935-36, the National Resources Committee calculated roughly the disbursements of the institutional agencies themselves for the maintenance and care of residents, but did not include expenditures by the 2 million residents from their personal funds because information was lacking on the allocation of such funds.

on the pantry shelf, cleaning supplies, toilet preparations, the coal in the bin, the fuel oil in the tank, etc.

The former seems too narrow a definition for the purpose at hand. Semidurable goods, which Mr. Kuznets defines as ordinarily employed in their ultimate use for six months to three years, comprise a substantial total and should be included in consumers' wealth. Moreover, the demarcation between durable and semidurable goods, so defined, is often tenuous. Perishable commodities of the types illustrated above are easy to distinguish. Though many can be stored for long periods, they are more or less completely consumed when used.

We define consumers' tangible assets as goods that are ordidinarily employed in their ultimate use for more than six months. Separate estimates of the value of durable and semidurable goods owned by consumers would be useful in studying changes in assets in different phases of business cycles, but their significance would be limited by the difficulty of classification.

The valuation of residences is outside the scope of this paper. Other tangible assets of consumers fall into seven broad groups:

1) Automobiles, which will be dealt with separately because of particular interest in their value and also because data available for their evaluation are more adequate than those available for the evaluation of other consumer goods.
2) Motorcycles, bicycles, and other wheelgoods, boats, and pleasure aircraft.
3) Household furniture, equipment, and furnishings (both durable and semidurable).
4) Radios, phonographs, musical instruments.
5) Clothing, personal accessories, footwear.
6) Jewelry, watches, clocks.
7) Other goods
   a) Play and sports equipment not included under 2 and 4
   b) Books and other durable printed matter
   c) Luggage
   d) Ophthalmic products and orthopedic appliances

e) Writing equipment (durable)
f) Tombstones and monuments
g) Private collections of art, coins, stamps, etc.

Many of these goods—automobiles, housefurnishings and equipment, writing equipment, books, etc.—are owned and used by business establishments, governmental bodies, and institutions; moreover, the goods themselves are indistinguishable from those used by private individuals for personal living.

Similarly, many persons use their automobiles and certain other durable goods partly for business purposes. If the concept of ownership units is to be adhered to, the value of such goods must be apportioned between consumer and nonconsumer use. Indeed, if it is not, the national balance sheet will presumably contain duplicate entries, since the portion of the value of such goods chargeable to business should appear among the assets of farms, nonfarm entrepreneurs, and landlords.

A third point, in addition to degrees of durability and purpose, is the treatment of goods not in use. Commodities not in use but in usable condition (or in need of ordinary repair) may be deemed of little or no value by their owners, but they are certainly part of total consumers' stocks. They may later be used by their owners or could be used by others if given away or sold.

c *Value*

Any method of valuation will yield only an approximation to the 'true' value.[2] The capitalization method used for valuing certain wealth items is in general not practicable for consumers' stocks. Valuation at original cost—a common business practice and hence the basis for valuing much of business capital—is not appropriate if interest centers in the current value of the stock of consumer goods. Therefore, current market prices seem the most logical basis.

[2] See Simon Kuznets, 'On the Measurement of National Wealth', *Studies in Income and Wealth, Volume Two,* pp. 23-33, for discussions of alternative methods of valuation.

In one respect, consumer goods are less difficult to value at current prices than are producer durable goods; in another, more difficult. Since consumer durables generally have a shorter life than producers' equipment, the proportion of the total consumers' stock that passes through the market in a year exceeds that of producer goods, making it easier to determine a representative price. A bigger difficulty arises from the wide variations in the specific characteristics of many consumer goods and continuous style changes. This difficulty is avoided in part if the utility and general characteristics of the commodity rather than its exact physical characteristics are considered. In other words, prices for equivalent rather than identical consumer goods should be used.

The use of current prices of equivalent articles rather than prices at the time of purchase avoids a hybrid value composite made up of prices determined at many dates under varying circumstances. The problem is to select appropriate current prices for goods purchased earlier. For automobiles, the secondhand market is sufficiently active to yield reasonable average prices for automobiles of various ages.[3] This is true of only a few other consumer durables, however, certainly not of commodities with a usual 'life' of merely a few years. For goods that cannot be priced in the secondhand market, the prices of equivalent new commodities, adjusted as well as possible for the consumption that has already taken place, must be substituted. Secondhand market prices are preferable because they take into account changes in the characteristics of the commodity.

Should the value of consumers' tangible assets represent the value in hand, so to speak, or their replacement value? In other words, should secondhand commodities be valued at the prices the owners would receive if they sold them or at prices the owners would have to pay to replace them? There are arguments in favor of both concepts. We favor replacement value.

[3] Most secondhand cars pass through dealers' hands.

d *The 'life' of consumer goods*

One distinguishing characteristic of consumer durables is that their replacement is postponable.[4] As is well known, automobile purchases, for example, were at a very low level during the early 'thirties but the number of cars in operation declined negligibly. Similarly, during the war automobile registrations remained remarkably close to the prewar level despite nearly three years without automobile production.[5] A coat or a sofa is seldom used until it is completely worn out; its useful life, in other words, is social, economic, or psychological rather than physical. During depressions or at the beginning of a downswing, goods continue to be used that would be replaced if persons were optimistic about income prospects. Many commodities become obsolete because of style changes long before they are worn out. In good times, therefore, the replacement rate is high. True, goods that are replaced remain part of the national stock if they are traded in and bought by others, but in general the scrappage rate rises in prosperity.

What measure of life then is most appropriate for estimating the value of commodities in consumers' hands at any given date? There appear to be three alternatives: the actual physical life, as measured in testing laboratories; the number of years during which it is economically efficient to use such goods, i.e., before the cost of repairs and maintenance become excessive; or the customary period of use before scrapping. The third, in part a function of the general level of income, seems the most appropriate for the purpose at hand. When times are bad the total stock of most goods is smaller and their average age higher than when times are good, but their life span is also longer. Hence, the residual use value of consumers' tangible assets may not actually be so much less in bad than in good times as would appear if the life span of consumer goods were assumed to be the same at all stages of business cycles.

[4] See E. B. George, 'Replacement Demand for Consumers' Durable Goods', *Journal of the American Statistical Association,* Vol. 34, No. 206, June 1939, pp. 239-60.

[5] Reduction in use due to gasoline rationing helped to prolong the physical life of cars.

Improvements in technology in the last twenty or thirty years have greatly lengthened the physical life of automobiles and many modern household appliances. Even though style changes kept replacement rates relatively high, technological improvements resulted in a larger total stock of such goods (as persons in the lower income groups have found efficient and relatively cheap used models available for purchase) and a higher average age of those in use. Additional improvements and the introduction of new consumer goods will undoubtedly affect any measures of length of life, so that a frequent check will be required.

Except for passenger automobiles, there are no satisfactory data from which to estimate how long consumer goods are used.[6] Estimates have been made by the Bureau of Internal Revenue for certain goods used by business establishments as well as in households, but there is every reason to believe that they are only roughly applicable when interest centers in the stock of such goods in the hands of consumers.[7]

A corollary to information on length of life in use is the rate at which goods depreciate, whether depreciation is constant or variable. Physical depreciation is generally less rapid during the early than the later part of the life of a durable, but the market value suggests that the reverse is true. Hence, there appears to be no alternative to an assumption of constant depreciation.

A subsidiary question is how long a commodity should be considered new. Ordinarily, a new commodity will not bring its cost price if resold within a few days of purchase. Since this markdown does not reflect true depreciation, we recommend valuing a commodity as new for the period during which the owner would consider a replacement equivalent in value only

[6] Solomon Fabricant, in his *Capital Consumption and Adjustment* (NBER, 1938), included the consumption of only the part of consumers' capital represented by houses and automobiles on the ground that "Owing to the unsatisfactory character of the data no attempt was made to estimate depreciation on furniture or other durable goods" (p. 139).

[7] Bulletin F (revised Jan. 1942), *Income Tax Depreciation and Obsolescence—Estimated Useful Lives and Depreciation Rates.*

if it were new. Again, therefore, an approximation must serve when valuing consumer goods.

2 *Type of Data Needed*

In essence, the requirements for estimating the value of consumers' tangible assets are three: a physical inventory of each good, i.e., the number owned and their age distribution; current prices of new goods, and, for those for which the second-hand market is reasonably active, current prices of goods of different ages; and the life span of each good. The total value is then the sum of the products of the number of commodities of various ages and the appropriate prices. Obviously, it is impracticable to make a comprehensive physical inventory of consumer goods, then to price all items, particularly those with a relatively short useful life. To evaluate such goods, information on expenditures during an appropriate number of years (converted to current price levels) must be substituted for physical inventory and item price data.

Since any estimate of life span is an average, there are always older commodities in use. The scrap value of such 'over-age' goods should of course be included when evaluating consumers' tangible assets. While it may be difficult to estimate scrap value, it is practicable to include it for goods inventoried and priced (assuming other prices are not obtained for 'over-age' goods), but not for goods evaluated by cumulating expenditures.

Inventory data should be obtained directly from families and single persons, the group whose capital we wish to measure. Expenditure data may be obtained either for consumers or for the nation as a whole, and for the business, governmental, and institutional sectors of the economy. It seems logical to adopt the direct approach whenever possible; if the other method is adopted, the consumers' share is obtained by subtracting the expenditures of these three sectors from the total for the nation. Price data may be collected from retail outlets or from consumers. There are arguments in favor of each method.

Figures on average life in use can be built up from con-

sumers' reports on the age of goods owned and the frequency of replacement. In Section C the methods of obtaining the data needed for evaluating consumers' tangible assets are discussed. These summary comments are designed to indicate the viewpoint from which previous estimates and presently available data are appraised.

B Evaluation

Kenneth E. Boulding recently contended that he knew "of no attempt to estimate the total value of consumers' capital".[8] This was of course an exaggeration, since estimates of the value of consumer goods as a component of national wealth have been made for various dates back to 1850. In general, however, less effort appears to have gone into its estimation than into the estimation of many other components, perhaps because of the obvious inadequacies of the data.

Broadly speaking, data used to evaluate consumers' tangible assets have been of three types: information on the flow of consumer commodities with assumed periods of usefulness and depreciation rates; questionnaires on the value of household goods, apparel, etc.; and in the case of passenger automobiles, information on the number of cars in operation, prices, and depreciation rates. Theoretically, personal property tax returns are a fourth source of information, but they have never been used as a basis of estimation, presumably because only some states levy such taxes and because methods of appraisal vary widely.[9]

1 *Methods and Limitations of Previous Estimates for Goods Other than Automobiles*

Since the early estimates are rough guesses at best,[10] to consider their derivation would contribute little to problems of

8 'The Consumption Concept in Economic Theory', *American Economic Review*, XXXV, 2, May 1945, p. 8.

9 For a discussion of the general problem of using taxation data to evaluate wealth, see Kuznets, *Studies in Income and Wealth, Vol. Two*, pp. 34-5.

10 W. I. King, *Wealth and Income of the People of the United States* (Macmillan, 1915), p. 47.

estimation. What is striking and disturbing is the slight advance in methodology in this area in the last 50 or 60 years. Table 1 brings together various estimates for selected dates, 1922-38.

Table 1

Various Estimates of the Values of Consumers' Tangible Assets Selected Years, December 31, 1922-1938

(millions of dollars)

Source	*1922*	*1925*	*1929*	*1930*	*1935*	*1938*
	CONSUMERS' TANGIBLE ASSETS OTHER THAN AUTOMOBILES					
Census	39,816	...	...	...	...	...
NICB	(Census)	47,899	56,857	44,315	30,778	...
Keller	(Census)	46,739	52,990	52,187	...	...
Ingalls	...	...	48,000	...	...	...
Doane	(Census)	...	...	59,000	...	39,488
NRPB	...	...	...	...	37,886	...
	PASSENGER AUTOMOBILES					
Census	3,942	...	...	...	...	...
Keller	4,239	6,292	7,763	6,988	...	...
Doane	...	...	...	...	...	4,707*
NRPB	...	...	...	...	8,308	...
	ALL MOTOR VEHICLES					
Census	4,567	...	...	...	...	...
NICB	4,794	6,674	7,643	6,921	4,540	...
Ingalls	...	...	5,300	...	...	...
Doane	(Census)	...	...	6,000	...	5,988*

For a summary of methods and specific references, see the text.

* Estimate by the Automobile Manufacturers Association for the year ended December 31, 1937.

a *Census estimates, 1922 and earlier*

The 1880 and 1890 Census estimates of the value of household goods, clothing, etc. were based on estimates of the average value of such goods owned per family. In the Census of 1880 the average value was estimated "as thoughtfully as possible", and the aggregate checked by estimating the total value of such goods from data on production and imports, an average life in use having been assigned to the goods of each class. Allowance was made also for the average quantity of food, fuel, and other supplies on hand for domestic use.[11] The Census of 1890 used in part the findings of a survey of insurance policies on the

[11] 10th Census, 1880: *Report on Valuation, Taxation and Public Indebtedness*, p. 11.

contents of houses outside large cities. To the average value of insured furniture was added an average amount estimated to represent the value of carriages and mechanics' tools.[12] For 1900, 1904, and 1912 the Census Bureau relied on data on expenditures as measured by the value of manufactures and imports adjusted to allow for the cost of distribution and on assumptions concerning the average life of such goods.[13]

In essence, the latter has remained the technique except in the 1922 Census. While data on consumers' expenditures have been vastly improved, information on the life of consumer goods is still fragmentary and rough. For 1922 the Census Bureau built up an estimate of the value of consumers' tangible assets (other than automobiles, which were listed separately for the first time) in large part from answers to questionnaires sent to a sample of individuals throughout the United States.[14]

The 1922 survey was the first and last of its kind, but the results served as a base point in three series of estimates of the national wealth published subsequently. The consumer sample approach seems highly desirable if interest attaches to a separate valuation of consumers' holdings. It is not clear, however, whether the Census Bureau chose the method for that reason, since it added to the expanded sample estimates the estimated value of horse-drawn vehicles and of books in public libraries, or whether it considered the holdings of consumer goods by business, government, and institutions of negligible value.

The Census estimate for 1922, aside from any bias due to the sampling design and the technique for projecting the sample returns (about 37,000 returns out of 100,000) to a national basis, had two serious limitations. As noted above, a mail questionnaire was used; it asked for the "total fair value of household equipment and wearing apparel, including furniture,

12 11th Census, 1890: *Report on Wealth, Debt and Taxation,* Part II, Valuation and Taxation (1895), p. 8.

13 *Wealth, Debt and Taxation, 1913* (1915), pp. 19-20.

14 *Wealth, Public Debt and Taxation: 1922, Estimated National Wealth* (1924), pp. 15-6.

books, pictures, musical instruments, silver plate, dishes, kitchen and bedroom furnishings, trunks, clothing, watches, jewelry ,etc.". Experience with field surveys of family incomes and expenditures has clearly demonstrated that most persons cannot even roughly estimate the total expense during a year for a particular broad category of goods and many will not attempt to do so, although they usually can and will give (in response to specific questions) the details necessary to build up such a total. Obviously, it would be much more difficult for the average person to estimate the value of all the clothing he owns, for example, than to estimate the amount he spent on clothing during the preceding year. Even if the respondent were willing and able to make an over-all estimate, however, there would be no assurance that he had included all the commodities assumed to be covered and no indication of how he valued them.

If subsequent surveys were conducted by personal interview rather than mail questionnaire, and a very detailed schedule used, the inclusion of all goods might be assured. This would not, however, solve the problem of valuation that results from the typical consumer's lack of knowledge about prices or values.[15] Regardless of the interviewer's instructions, some respondents would probably report original price, others the original price adjusted by some very personal notion of depreciation, and still others the current price they would have to pay to replace the goods. Many would probably be unable to give any estimate of the value of certain commodities. At best, a hybrid value aggregate would be the result, with consequent ambiguity concerning its meaning.

b *Two projections of the 1922 estimate*

The National Industrial Conference Board built up a series of estimates of "stocks of goods in the hands of consumers" for

15 The Federal Trade Commission, in *National Wealth and Income,* published in 1926, offered no revision of the Census estimates for 1922. However, it suggested (p. 49) that the figure on chattels was probably too close to costs, i.e., depreciation was not fully allowed for.

1922-37 by applying to the 1922 Census estimate an index of changes in production, exports, and imports of a large number of articles of personal consumption.[16]

Keller projected from the 1922 Census figure estimates for each subsequent year through 1933 by a slightly different method.[17] From the value of consumers' household goods, wearing apparel, etc., as shown by the Biennial Census of Manufactures for each Census year, he estimated the wholesale value of production for intercensal years by linear interpolation. A 33.3 percent mark-up was added to wholesale value to determine retail value. To estimate the net value of 'chattel' goods for a given year, he added the retail value of that year's output to the preceding year's stock and subtracted 20 percent of the value of that stock as a depreciation allowance.

Keller not only did not adjust for changes in business inventories, which he justifies by the absence of satisfactory data, but took no account of changes in imports and exports. Furthermore, he did not adjust for changes in the prices of goods comprising each year's inventory: consequently, the aggregate values for each year are a composite of prices that apply to different dates.

c *Ingalls' guess for 1929*

In his *Wealth and Income of the American People,* W. R. Ingalls attempted to estimate the national wealth in 1916 and 1920 in 1913 dollars. In 1931 he contrasted various estimates for later years and proposed to examine "the accounting in more detail, even if some of the important entries can be made only as intelligent guesses, to forget all about 1913 values, to reckon only in present terms, and to evade physical enumeration except in fragmentary ways".[18] In the case of chattels,

16 'New Estimates of the National Wealth and of Its State Distribution, 1922-1937', by R. P. Falkner, *Economic Record,* I, 11 (Oct. 5, 1939), pp. 120, 131.

17 *A Study of the Physical Assets, Sometimes Called Wealth, of the United States, 1922-1933* (University of Notre Dame, 1939), p. 137.

18 'Wealth of the American People in 1929—Values in Current Dollars', *The Annalist,* Vol. 38, No. 979, Oct. 23, 1931, pp. 667-8, 702.

"meaning furniture, musical instruments, clothing, jewelry, private libraries and personal effects generally", he maintained that there could be no real accounting. He noted that at the same rate per capita as reported by the Census for 1922, their aggregate value would have been about $44 billion in 1929. On the assumption that the per capita value had increased—"the people had more new things, radios, electric refrigerators, etc."—he guessed that the value in 1929 was $48 billion, pointing out as confirmation that the Chamber of Commerce estimated $49.6 billion for 1930.

d *Doane's two estimates*

In his *Measurement of American Wealth,* R. R. Doane presented a series of estimates of the value of chattels (including automobiles), for decennial dates 1860-1900, for 1904, and annually 1909-32, without explaining his method but merely acknowledging data from the Bureau of the Census, the Census of Manufactures, estimates of the United States Chamber of Commerce, and various trade journal studies.[19] His figure for 1921 is identical with the 1922 Census estimate of the value of consumers' tangible assets exclusive of automobiles; his 1922 estimate is nearly $3 billion smaller than the Census total.

In a later volume, *The Anatomy of American Wealth,* Doane based his estimates of the value of chattel goods other than automobiles in the possession of individuals in 1930 and 1938 on the 1922 Census figure.[20] He assumed that the per capita value of clothing was the same in 1930 as in 1922 and that the value of housefurnishings increased in the same proportion as that of new residential building. This yielded an estimate of $59 billion for chattel goods in 1930. For 1938 Doane used a different method, "due to the unprecedented situation existing between 1930 and 1938". First he divided the 1922 Census aggregate for chattel goods between clothing and personal articles, on the one hand, and furniture, etc., on the other, in accordance with the Census allocation for 1912.

[19] (Harper, 1933), pp. 10-1, 208.

[20] (Harper, 1940), pp. 238 and 256-7.

Then he applied indexes of changes in annual consumers' purchases of these goods (extrapolating NBER data) to the estimated per capita holdings of each class of such goods in 1922. From per capita holdings, so estimated, he arrived at $39.5 billion for chattel goods other than automobiles in 1938. This procedure yielded an estimate for 1930 of $54.6 billion including the value of passenger cars; the estimate he presented as his best approximation, excluding cars, was $59 billion.

e *NRPB estimate for 1935*

The National Resources Planning Board estimated the value of personal property as a component of national wealth in 1935 by cumulating expenditures for a period of years.[21] Its estimate was based on the annual data on commodity flow in Kuznets' *Commodity Flow and Capital Formation,* with assumed rates of depreciation, and adjusted for price movements. In the case of consumer durable goods other than automobiles, a constant annual rate of depreciation, 10 percent, was assumed. Thus, the value in 1935 was estimated by computing 10 percent of the 1926 value, 20 percent of the 1927 value, etc., adjusting these values to 1935 prices and adding the adjusted values, yielding $20.8 billion for 1935 in 1935 prices. For consumer semidurable goods (exclusive of dry goods and notions which Kuznets includes), cumulative survival rates were assumed: 30 percent of value lost (the report says "remains") after the first year, 50, 70, 90, and 100 percent after the second, third, fourth, and fifth years. This yielded $17.1 billion, or an estimate of $37.9 billion for consumer goods other than automobiles. The difference between it and the NICB estimate, $30.8 billion, reflects in part the fact that, by the nature of the source material, the NRPB estimate includes holdings of consumer goods by business, government, and private institutions, as well as households, while the NICB figures, extrapolated from the Census estimate, more nearly represent the holdings of consumers as defined in this paper. The inclusion of replace-

[21] *The Structure of the American Economy* (National Resources Committee, 1939), Part I, Basic Characteristics, p. 376.

ment tires and tubes and automobile parts and accessories among semidurable commodities in Kuznets' series also contributed to the difference.

f *Household equipment on farms*

The sole estimate of consumer durable goods for one segment of the population is the valuation of household furnishings and equipment on farms, prepared as part of the consolidated balance sheet of agriculture for each year since 1940.[22] The basic data were taken from two nationwide studies which furnished information on farm family expenditures in 1935-36 and 1941. The expenditure figures were projected with some adjustments by means of the Department of Commerce estimates of retail sales of various types of goods. On average annual expenditures 1936-40, taken to represent annual replacement or the amount necessary to maintain inventories at the level of that period, an inventory of furnishings and equipment in the possession of farm families during the period was estimated. Multiplying the average annual expenditures by the estimated number of years in use gave the inventory value on January 1, 1940; inventory values in subsequent years were estimated by adding expenditures, deducting depreciation (average 7 percent) on the preceding year's inventory, then adjusting for changes in the farm population.[23] The estimate overstates the value of household furnishings and equipment on farms in 1936-40 (and hence in subsequent years) because of the implicit assumption that holdings of goods bought earlier had not depreciated, i.e., that their unit value in the current year was the same as at the time of their purchase (in average 1936-40 prices). Failure to adjust each year's inventory to the prices of the next year, when estimating holdings for 1941 and later years, means that the estimates are subject

22 Bureau of Agricultural Economics, Miscellaneous Publications: No. 567, *Impact of the War on the Financial Structure of Agriculture,* pp. 66-7 and 183-5, and No. 583, *The Balance Sheet of Agriculture, 1945,* p. 24.

23 Population adjustments were required because aggregate farm family expenditures were extrapolated by national sales estimates.

to the same limitation as Keller's figures. At the same time, because of the sharp increases in prices after 1941, this served to counterbalance somewhat the overstatement of the war period inventories that would otherwise have resulted from the method of computing the base period inventory. Limitations due to the use of the sample survey data are discussed below.

2 *Methods of Previous Estimates for Automobiles*

The value of motor vehicles as a separate category of national wealth was first presented in 1922. No attempt was made to value separately passenger automobiles owned by consumers for personal use. However, in this as in most subsequent estimates of the value of motor vehicles, the general methodology is of interest because it approximates what we propose for evaluating consumer durable goods.

The Census based its estimate for 1922 on reported output during a period covering the estimated average life of automobiles, trucks, motorcycles, and trailers, and on statistics of registration, with allowance for depreciation, valued in terms of prices prevailing in 1922.[24] For passenger cars, for example, the average life was assumed to be seven years; hence cars that went into service in 1916 were regarded as out of use at the close of 1922, having lost one-seventh of their value each year. Those that went into use in 1915 were assigned a junk value of $25. On this basis, the number of cars available for use on December 31, 1922 was calculated to be equivalent to slightly more than 5 million new cars. The average price for new cars in 1922 was estimated to be $770, yielding a total value of $3,942,026,000 for passenger automobiles. For all motor vehicles, the estimated value was $4,567,407,000.

In the NICB estimates of wealth for 1922 the value of motor vehicles is a separate component, but passenger cars are combined with other vehicles.[25] The method is not outlined in detail, but apparently depreciated original cost rather than current price with allowance for depreciation was used: "From

[24] *Estimated National Wealth*, p. 11.

[25] Op. cit., pp. 120 and 130.

registration figures the number of vehicles in use was obtained; from production and mortality figures, the number of each age in each year; from the original price of each year's product and the amount of depreciation, the value of cars of each age in each year was determined, and the sum of the latter gave the total value of all cars in use." For 1922 the NICB estimate is slightly higher than the Census.

Keller presents in detail his procedure of estimating the value of passenger cars, which he treats as a separate category, for 1922-33.[26] Apparently very similar to that of the NICB, it likewise uses depreciated original cost. From American Petroleum Institute figures on the percentages of cars surviving each year Keller estimated the number of cars surviving in any given year. He applied its annual depreciation rates to the average retail price for each year to determine the average value in any given year of cars sold in preceding years. To get the average retail value of new cars in each year, he applied a standard 33.3 percent markup to the average wholesale value, calculated by dividing the value of product minus the value of exports by the total number of factory sales minus exports. These computations also yielded an aggregate slightly higher than the Census estimate for passenger automobiles for 1922.

Ingalls assumed an average price of $200 per registration at the end of 1929—26,500,000, of which about 3,500,000 were trucks—and so derived $5,300 million which, he comments, "is not unreasonable".[27] He cites in confirmation an estimate of $5,461 million for all motor vehicles in 1930 prepared by a committee of the American Automobile Association.

Doane, in his first study, did not estimate the value of passenger cars or of all motor vehicles separately. In the second, he derived a total for 1930 by applying an average value of $300 per car (derivation not explained) to the number of cars registered; for 1938 he took over an estimate of aggregate value prepared by the Automobile Manufacturers Association.[28]

The National Resources Planning Board used the same

[26] Op. cit., p. 135. [27] Op. cit., p. 668.

[28] *The Anatomy of American Wealth*, pp. 235 and 256.

method for estimating the value of passenger cars as for estimating the value of other consumer goods in 1935, i.e., cumulated annual expenditures, adjusted for price changes, with an assumed life of eight years.

3 *Description and Appraisal of Data Available for Evaluating Consumers' Tangible Assets*

None of the wealth estimators, least of all the Census whose 1922 survey served as the base for most subsequent estimates of consumers' tangible assets, claims any great merit or high degree of reliability for its estimates. There has been a serious dearth of reliable data with which to estimate the value of consumer goods other than automobiles and a notable lack of clarity in concept concerning the holders to be covered. Because of the inadequacy of data, greater clarity of concept would probably not have yielded much better estimates. The 1922 estimate (and by implication those extrapolated from it) would have applied to consumers' holdings had the value of books in public libraries not been added to the expanded survey aggregate and the value of horse-drawn vehicles been allocated between consumer and nonconsumer use. Only in the estimate of household furnishings and equipment on farms, which has other deficiencies, is the ownership unit clearly defined. Estimates of the value of automobiles (or all motor vehicles), which are more reliable, were intended to cover all in operation, not just those for personal use.

The present fund of information with which to evaluate the stock of consumer goods is considerably larger than that at the disposal of previous wealth estimators, but serious gaps remain, and some of the relatively new materials are limited in their applicability. On the side of information relating strictly to the civilian noninstitutional population, there are the findings of two nationwide surveys of family expenditures —the Consumer Purchases Study covering 1935-36 and the Survey of Family Spending and Saving in Wartime covering 1941 and the first three months of 1942—used in estimating the value of farm housefurnishings. Revised annual estimates of per-

sonal consumption expenditures by subgroups for 1929-46 were published by the Department of Commerce as part of the general revision of statistics on national income and national product.[29]

a *Basic data*

Materials on a nationwide basis (covering both urban and rural areas) from these and certain other sources are outlined below. Those yielded by the 1941 and 1935-36 surveys are not in every case available in the form described, but they could be developed by reworking the basic data.

SOURCE	OWNERSHIP UNIT	ITEM DESCRIPTION & DATE TO WHICH DATA APPLY
	INVENTORY DATA	
Family Surveys by Departments of Labor & of Agriculture	Civilian noninstitutional population[a]	Autos: No. owned by age, Dec. 1941
		Autos: No. owned, June 1936
		Piano, radio, phonograph, electric refrigerator, other mechanical refrigerator, ice box, pressure cooker, power washing machine, other washing machine, ironing machine, vacuum cleaner, electric sewing machine, other sewing machine: No. owning,[b] Dec. 1941 & June 1936
		Radio-phonograph, gas kitchen stove, electric kitchen stove, toaster, iron: No. owning, Dec. 1941
		Selected items of clothing (outerwear) & footwear: No. owned, Dec. 1941
Title Registration compiled by R. L. Polk & Co.	All operators of passenger cars	Autos: No. reg. by age, an. 1935-41, 1944, 1946
U.S. Public Roads Administration & Automobile Manufacturers Association	(Same)	Autos: Total registered an. since 1895
Census & Automobile Manufacturers Association	(Same)	Autos: Annual output, factory sales, & retail sales
Census	All households	Radios: No. owning, 1940[c]

[29] *Survey of Current Business,* Supplement, July 1947; the series first appeared in the April 1942 issue.

SOURCE	OWNERSHIP UNIT	ITEM DESCRIPTION & DATE TO WHICH DATA APPLY
	EXPENDITURE DATA	
Family Surveys by Departments of Labor & of Agriculture	Civilian noninstitutional population[a]	Commodities, with detailed item classification, at cost to consumers, 1941 & 1935-36
Department of Commerce	Consumers	Commodities by subgroups at cost to consumers, an. 1929-46
Simon Kuznets, National Bureau of Economic Research	Consumers & large ultimate consuming units	Commodities, by subgroups at wholesale prices; by 3 classes of durability, at cost to consumers, an. 1919-33
	PRICE DATA	
Family Surveys by Departments of Labor & of Agriculture	Civilian noninstitutional population[a]	Autos: Av. price by model year, 1941; av. price for new cars & for all used cars combined, 1935-36
		Household furniture & equipment, by item: Av. price for new & for all secondhand combined, 1941 (trade-in allowances, if any, deducted)
		Clothing, by item: Av. prices, 1941 & 1935-36[d]
Automobile Manufacturers Association		Autos: Av. price new, lowest priced 4-door, 5-passenger sedan, an. 1925-40
National Association of Automobile Dealers		Autos: Av. price secondhand cars by model year, an. 1934-41

[a] Most of the information on holdings in June 1936 and on expenditures and prices paid during 1935-36 is for families of two or more persons, whereas the data from the later study are for single persons as well as families.

[b] For 1941, schedule provides information on number of radios owned.

[c] Similar information on number having refrigerators, by type, and heating equipment is not listed since the enumeration covered all households; in many cases the equipment in rented units is owned by the landlord, not the occupant. It is assumed that radios are owned by occupants. Estimates are available also from trade sources of the number of houses equipped with electric refrigeration, washing machines, etc.

[d] Usable on the assumption that substantially all clothing is purchased at retail, new.

Information on the age distribution of goods in use is still lacking except in the case of automobiles, and even for automobiles it is available for consumers as distinguished from all automobile users for only one year, 1941. The 1941 and 1935-36 surveys furnish information on the proportion of families and

single persons buying various commodities during a year, but this yields merely a very rough measure of the frequency of replacement, as some purchases, especially of durable equipment, are first purchases.

The inventory data from the 1941 and 1935-36 surveys, of considerable interest in themselves, show that it is feasible to collect such information from families (see Table 2 for a summary of findings on selected items). As they were not collected with wealth estimates in mind, however, they do not give sufficient information on the age of commodities owned to be used for estimating the value of stocks even for the survey dates. At present, therefore, to approximate the value of stocks of

Table 2

Estimated Number of Families and Single Persons Owning Selected Items of Household Equipment at the End of 1941 (thousands)

Item	All types of community	Urban	Rural
Refrigerator, electric	16,985	11,684	5,301
other mechanical	1,117	786	331
ice	8,462	4,905	3,557
Kitchen stove, electric	3,562	2,033	1,529
gas	14,261	12,334	1,927
Washing machine, power	18,524	11,253	7,271
other	656	218	438
Ironing machine	1,985	1,686	299
Vacuum cleaner, electric & hand	16,926	12,577	4,349
Sewing machine, electric	5,588	4,435	1,153
other	17,120	8,066	9,054
Electric toaster	18,989	14,445	4,544
Electric iron	28,999	20,640	8,359
Electric mixer, juicer, whipper	5,751	4,221	1,530
Pressure cooker for canning	3,197	1,054	2,143
Piano	9,179	5,565	3,614

Estimates based on data from the survey of Spending and Saving in Wartime, conducted by the Department of Labor, Bureau of Labor Statistics, and the Department of Agriculture, Bureau of Home Economics. The number owning household equipment of the types listed is approximately equivalent to the number owned by consumers. In addition to those owned, many families (mostly in cities) had the use of stoves and refrigerators provided by the landlord and covered in the rent; in thousands they numbered: electric refrigerators, 2,145; other mechanical refrigerators, 478; ice refrigerators, 456; electric kitchen stove, 186; gas kitchen stove, 4,027.

goods other than automobiles in the hands of consumers it is necessary to rely on expenditure data.

Should chief reliance be placed on the survey data or on the Department of Commerce series? Each set has certain limitations and certain advantages, but on balance it appears that at present better estimates can be developed from the Department of Commerce data than from expanded survey aggregates. We shall consider briefly the limitations of the former and in greater detail those of the latter.

b *Department of Commerce series on expenditures*

There is no doubt that the annual data now available on consumers' expenditures, or commodity flow to consumers at cost to them, are a much better basis for estimating consumers' tangible assets than were the rough statistics on production, imports, and exports used by earlier students of national wealth. However, many problems remain, even with the refinements in commodity flow data introduced by Mr. Kuznets and the Department of Commerce after intensive study of changes in inventories, transportation charges, wholesale and retail markups, and the distribution of sales, and the information now collected on retail sales.

The first problem is the division of expenditures on consumer goods between consumer and nonconsumer purchases. In his estimates of commodity flow for 1919-33, Mr. Kuznets did not attempt such an allocation, except in the case of replacement tires, tubes, and automobile parts and accessories, arguing that in the absence of a reliable basis for allocation it is better to classify goods by preponderant use. Thus, he included with consumer durables some goods used by business, and with producer durables certain items used in the household or personally. This, he pointed out, probably caused a slight overestimate of the total value of consumer goods. For specific subgroups, however, the error may be in either direction. More serious, when estimating the value of tangible assets of consumers as defined in this paper, is the fact that Mr. Kuz-

nets defined consumers to include hospitals, charitable institutions, and hotels as well as households.[30]

The Department of Commerce series on personal consumption expenditures, on the contrary, is defined to exclude purchases by business and government. Expenditures by nonprofit institutions, used to measure their services, are shown as a separate component of total personal consumption expenditures. By definition, therefore, their expenditures for specific commodities are excluded from the expenditure series for those commodities. Purchases by military personnel and institutional inmates through regular trade channels are included; for the period since 1939, purchases of clothing, jewelry, food, and toilet articles, by military personnel in post exchanges are also included.

Commodities were allocated between purchases by individuals and households (consumers, by our definition), on the one hand, and purchases by business, government, and institutions (nonconsumers), on the other, by two means: for some commodities, estimates for 1929-39 were based on Census data on the distribution of sales by manufacturers and by wholesalers among different classes of purchasers; for other commodities, direct estimates—or guesses—were made of the magnitude of purchases by specific types of user, either because there was an obvious source of such information or because Census data could not be applied to the specific products. Admittedly, such allocations were rough. Moreover, for many commodities for which nonconsumer use was assumed to be relatively small, no division between consumer and nonconsumer purchases was attempted. Allocations on the basis of Census sales data are also subject to question. In the first place, there is considerable

30 See *Commodity Flow and Capital Formation,* p. 14, and also discussion in *Studies in Income and Wealth, Volume Three,* p. 388. In his *National Product since 1869* Mr. Kuznets presents estimates of the flow of commodities to consumers adjusted for business use of passenger cars. In the case of consumer durables the adjustment—a 30 percent allocation to the producer durable category, following the Department of Commerce procedure—was considerable, aggregating $0.9-1.1 billion in each year 1923-29 or roughly one-eighth of the adjusted total at cost to consumers.

doubt concerning the reliability of some of the sales distribution reports. More serious is the fact that it was necessary to use reports on industry sales by manufacturers and line of trade sales by wholesalers to allocate specific products. For the years since 1939 the consumption expenditure series were extrapolated by retail sales data, with some adjustments for larger purchases for business use during the war years, notably of automobiles.

A second limitation to the use of Department of Commerce data, for 1940-46, to estimate consumer wealth arises from this method of extending the series. While the division by commodities for earlier years is believed fairly reliable, retail trade data are not adapted to yield a commodity breakdown. Use of such data for extrapolation is unsatisfactory for a period when the classes of goods handled by many outlets, especially those that sold durable household goods in prewar years, changed substantially. While there was a reasonable check on the estimates of total consumption expenditure for these years, there was no control over the component group estimates.

A third limitation is the classification system for the recently revised series.[31] Expenditures on perishable and semidurable goods are not presented separately as they are in the preliminary series of estimates. This is unfortunate since we wish to include the value of semidurables in consumers' capital; the value of certain toilet articles, for example, which have a fairly long life, cannot be included because expenditures for them are combined with those for toilet preparations and less durable toilet articles. The combination into subgroups of durable commodities with widely different periods of usefulness is another aspect of the classification problem. Another defect, from our point of view, is the inclusion, in the appropriate commodity series, of landlords' expenditures on furniture, stoves and ranges, and refrigerators for rental dwellings. In other words, space rent is defined to exclude furniture and equip-

31 Obviously no system of classification can be precise or serve all purposes. This is a criticism of the Department of Commerce series only with respect to its usefulness for our purpose.

ment that are covered by the rental rate, and purchases of such products by landlords are included with purchases by householders for their own use. Because of the growing tendency to provide stoves and refrigerators in rental units, this is more serious when estimating the value of consumers' holdings for recent than for earlier years; the number of furnished units offered for rent increased considerably during the war. Expenditures for furnaces and other installed heating facilities, window screens, shades, etc., on the other hand, are included in space rent even though the facility or fixture belongs to the occupant.[32]

A final problem—of minor importance—is the crudity of the estimates designed to cover secondhand purchases, expenditures for which are included in the value of consumers' stocks. To avoid duplication the Department of Commerce records dealers' margins (the excess of consumers' purchases from secondhand dealers over sales to secondhand dealers) since expenditures for new goods are reported at the full retail price before trade-in allowance. In family surveys, on the contrary, it has been customary to record net rather than gross prices for goods when a trade-in is allowed. Total expenditures for new and used commodities together are thus the same, conceptually, as in the Department of Commerce series, but are probably more precise because expenditures are recorded in the same manner for secondhand goods as for new.

c *Family survey data*

The limitations to the use of the family survey data are of two types: those of general application and those peculiar to the two nationwide studies. First, any sample survey of family expenditures is likely to be somewhat biased by under-represen-

32 It would be desirable to have separate estimates of landlords' expenditures on household furnishings. Changes in the value of consumers' holdings of such goods could then be analyzed separately or in combination with changes in the value of landlords' holdings. Likewise, it would be useful to have space rent estimates confined to the rent of the structure proper and to have expenditures estimated for heating facilities and various household fixtures by landlords and occupants, respectively.

tation of high income families and consequently of the highest income families within the top group. Average expenditures yielded by a sample survey for the highest income group are therefore likely to be too low, and estimates of aggregate national expenditures for goods with a high income elasticity may be grossly understated. In other words, a moderate increase in the estimated average outlay of high income families on luxury goods may affect estimated aggregate expenditures considerably.

A second problem, less serious than the income bias, is that the sampling variance of expenditures by high income families is great. Statistical adjustments are possible, but at present cannot be carried through with any great assurance because of lack of knowledge regarding the consumption function at high income levels. Since the 1935-36 and 1941 studies (and the 1944 survey in urban areas) were the first in which information from families at all income levels was sought, there is not yet a sufficient body of information from which to determine the spending habits of high income families.

Income tax data, together with sample reports on the characteristics of families that refuse to furnish information, yield a reasonably satisfactory basis for adjusting the income distribution and the average income for the upper ranges of the distribution.[33] This does not, however, solve the problem of determining the appropriate adjustments to be made in the average expenditures to correspond with the income adjustment. In future surveys special effort might well be devoted to trying to improve the sample of high-income families; e.g., by enlisting the cooperation of trade and professional associations. Oversampling this group would, in addition, reduce the sampling variance.

Neither the income bias nor the high sampling variance of

[33] See BLS, Bulletin 822, pp. 22-8 and 41-53; National Resources Committee, *National Income in United States,* App. A, Sec. 7 and 8; *Studies in Income and Wealth, Volume Three,* Part 3, Enid Baird and Selma Fine, 'The Use of Income Tax Data in the National Resources Committee Estimate of the Distribution of Income by Size'.

averages for the highest income group are of great consequence if family surveys are planned mainly to yield inventory data or consumer price reports. The estimated number of most goods owned by consumers that it would be practical to inventory would not vary widely enough to be significantly modified by an alteration in the income distribution or in the average for the small proportion of families with high incomes. Only in dealing with expenditures, when wide variations in the prices paid and the frequency of purchase are possible, are these factors significant.

A third general problem concerns the inclusion of families that existed during only part of the period covered, particularly newly-weds, whose purchases comprise a sizeable proportion of all purchases of housefurnishings. Since the major interest in family expenditure surveys has been in patterns of expenditure at different income levels, the coverage of part-year families has been relatively little emphasized. They were included in the 1941 but not the 1935-36 survey. Families formed during the period under survey and those merged with other families are relatively easy to cover, but it is difficult and sometimes impossible to obtain information on the expenditures of some types of family that ceased to exist before the time of interview.[34] It might appear that expenditures should be included only for families that exist at the time, but durables purchased during the year are likely to continue in someone's possession even if the family that made the purchase no longer exists. Hence, the expenditures for such goods should be included if the value of stocks of goods is estimated from expenditures.

Since families formed during the year are relatively easy to sample, the problem is not important if the value of consumers' stocks is to be derived from inventory data, which must apply to a single point in time—ordinarily the end of the survey period. 'Loss' of certain types of family that ceased to exist be-

[34] As in the case of the death of a one-person family or induction into military service of a man or woman living as a single consumer before induction. The latter were estimated to number 1,060,000 year-equivalent persons in 1941.

fore the time of interview should not affect price distributions, for the proportion of purchases involved would be small.

A fourth but relatively minor general problem, one that leads to over- rather than understatement, is the inclusion of expenditures for purchases by one individual from another individual. This is frequent chiefly in the case of household durables, and probably would not lead to much overstatement. On the family's balance sheet the transaction appears as a reduction in personal assets for the seller, but the expenditure aggregates reflect a duplication.[35] This duplication could be eliminated if schedules were designed with the problem in mind. It has no bearing, of course, on the inventory estimates and is not sufficiently common to affect the price distributions.

In addition to these four general problems, three factors limit the usefulness of the expenditure data from the 1935-36 and 1941 surveys for estimating the value of consumers' stocks. The 1941 survey sample, designed to yield a quick national summary for administrative purposes, was so small that the average expenditure for any item has a high sampling variance. The Consumer Purchases Study sample, on the other hand, was very large, but was designed specifically to facilitate analysis of variations in expenditures that might be associated with family type, occupation, region, and size of community. For that reason the expenditure sample (though not the income sample) was confined to a population as homogeneous as possible with respect to all other factors: nonrelief families containing husband and wife, both native born and, except in the South and a few large northern cities, both white. To sharpen the contrast between communities of different sizes, families in suburban areas were excluded. No rural or urban families were sampled in the Southwest. The National Resources Planning Board estimates of expenditures by the nation's families were

[35] The Department of Commerce series, on the other hand, does not reflect the transaction. In secondhand purchases through dealers its series includes as a service the amount of the dealers' margin, but in transactions among consumers the equivalent of this margin (the difference between what the seller could get from a dealer and what he receives from another consumer) is not recorded.

therefore necessarily built up on the assumption that the spending of families of the types not surveyed was the same as that of families of the type covered, if they were of similar size, income, and occupation. Though there is no body of evidence on this subject, there is some reason to question the assumption. Expenditures of single persons were estimated from very meager data which furnished a basis only for broad category totals.

The treatment of gifts on the schedules used in these two surveys is the second problem. Gifts exchanged among family members are recorded as family purchases, but the outlay for gifts to outsiders is not itemized. (The value of certain types of gift received is recorded, but not itemized, as income in kind.) Consequently, consumers' expenditures for commodities such as jewelry, clothing, household textiles, tableware, and books are considerably understated. In the Survey of Prices Paid by Consumers in 1944, somewhat more detailed information was requested about gifts bought for friends and relatives. It was found that city families and single persons spent 3.4 percent as much for gifts of clothing and jewelry as for clothing and jewelry purchased for family members. The corresponding proportion for all housefurnishings was 3.9 percent, and for toys, games, sports equipment, and books, nearly 30 percent.

A final problem is the classification of items, i.e., the occasional combination under one heading of expenditures for goods and services and of commodities of varying degrees of durability. If survey expenditure data were collected for the purpose of estimating wealth, this could be taken into account in designing schedules.[36]

[36] The schedule prepared for use in a nationwide survey of family income and expenditures in 1943 was designed to yield totals by degree of durability. Since the survey was never carried through, it is impossible to judge what the collection difficulties would have been. In general, the problem is less serious when using expanded survey data, which are in great detail, than when using the Department of Commerce series.

4 *Tentative Estimates of the Value of Consumers' Tangible Assets, 1929, 1939, 1946*

The validity of estimates of the value of consumers' stocks, as previously indicated, is conditioned by the reliability of information on the length of useful life of the goods valued as much as on the precision of inventory and price or expenditure data. Hence, given a need for some estimate of the value of consumers' capital, that estimate must be looked upon as very tentative because of the guesses at length of life and rate of depreciation (Table 3).

Table 3

Estimated Value of Consumers' Tangible Assets, December 31, 1929, 1939, 1946; Current and 1939 Prices

(millions of dollars)

	TANGIBLE ASSETS OTHER THAN AUTOMOBILES		PASSENGER AUTOMOBILES *	
	Current prices	1939 prices	Current prices	1939 prices
1929	47,587	36,632	7,398	6,645
1939	35,468	35,468	5,972	5,972
1946	80,598	49,971	11,670	4,277

For the estimating procedures, see the text.

* Excludes the value of the portion of passenger automobiles owned by consumers that was devoted to business purposes.

a *Consumer goods other than automobiles*

To estimate the total value of tangible assets owned by consumers in 1929, 1939, and 1946, the estimated depreciated value in each of those years of goods purchased in preceding years at prices prevailing in the year to which the estimate applies was added to expenditures in that year. For example, for a group of commodities whose life is assumed to be six years, the value of holdings in 1939 was taken as the sum of expenditures in 1939 plus five-sixths of the 1938 expenditures in 1939 dollars, plus four-sixths of the 1937 expenditures in 1939 dollars, etc. In building up the estimates, each subgroup of durable commodities (other than automobiles, their parts, and accessories) presented in the Department of Commerce

series on personal consumption expenditures and each of four other commodity subgroups (clothing, footwear, semidurable housefurnishings, and toys, games and sports goods) was handled separately.[37]

The life span estimates were taken from various sources. For most durables the Bureau of Internal Revenue was the main source, although probably its estimates of the average life of consumer durables used in business are lower than would be found characteristic of the same goods used in households. For books and for monuments and tombstones, in the durable group, and for toys and sports goods a guess had to serve. For clothing, footwear, and semidurable housefurnishings (predominantly textiles), approximations were developed from survey information on the proportion of families purchasing such goods in a year and comparison of the replacement cost with the total cost in a year of the stock of goods the Heller Committee judged to be required by urban wage earner families.[38] For these three subgroups, cumulative depreciation rates were assumed because of the inclusion in each of many articles with a life span of a few months and others with a life of some years. For all other groups constant depreciation was assumed. The average length of life ranged from 3 to 20 years.

[37] To expenditures for furniture and clothing (exclusive of standard clothing issued to military personnel), we added expenditures for net purchases from secondhand furniture and antique dealers and from secondhand clothing dealers, respectively. Expenditures for collectors' net acquisitions of coins and stamp collections (a service item) were not included—although these and other collections are properly part of consumers' wealth—because it is impossible to build up a reasonable estimate of their aggregate value from this series. Since the series on personal consumption expenditures does not distinguish semidurable from perishable toys and sports supplies, a rough allocation was based on the value of product for these goods in biennial years, 1929-39, as shown in *Output of Manufactured Commodities* (Department of Commerce, Oct. 1942). Expenditures for tools in 1943-46, combined with miners' expenditures for explosives, lamps, and smithing, were estimated from the average ratio of the two groups of expenditures for 1929-42.

[38] Heller Committee for Research in Social Economics, University of California; see especially *Clothing and House Furnishings Allowances, Prices for San Francisco, March 1942: Supplement to Quality and Cost Budgets for Three Income Levels.*

ESTIMATED LIFE, VARIOUS CONSUMER GOODS

	Years	
Furniture	12	
Floor coverings	9	
Refrigerators & washing & sewing machines	16	
Miscellaneous electrical appliances except radios	8	13
Cooking & portable heating equipment	12	
China, glassware, tableware & utensils	11	
Durable housefurnishings Products of custom establishments Writing equipment	8	
Semidurable housefurnishings	5*	
Radios, phonographs, parts & records	9	10
Pianos & other musical instruments	16	
Shoes & other footwear	3*	
Clothing & accessories except footwear	4*	
Jewelry & watches	13	
Luggage	7	
Ophthalmic products & orthopedic appliances	4	
Books & maps	6	
Wheel goods, durable toys, sport equipment, semidurable toys & sports supplies	4	
Boats & pleasure aircraft	14	
Tools	6	
Monuments & tombstones	20	

* Assumed values remaining at the end of the designated number of years were:

	SEMIDURABLE HOUSEFURNISHINGS	SHOES & OTHER FOOTWEAR	CLOTHING & ACCESSORIES EXCEPT FOOTWEAR
1 year	95	75	90
2 years	70	40	50
3 years	50	10	25
4 years	30	0	10
5 years	10	0	0

Disagreement about the life estimates we used will probably be extensive. An estimate of the value of all consumers' tangible assets should nevertheless be closer to the 'true' value if built up from details than if all consumer durable and semidurable goods, respectively, are treated as a group, as by the NRPB, since the composition of these broad expenditure aggregates varied considerably over the years. Possibly the life estimates for mechanical appliances should have been less for the earlier than for the later years because of technological improvements, but lack of specific information made it impracticable to take account of this.

Expenditures for 1929-46 were converted to constant dollars with preliminary unpublished price indexes prepared by the Department of Commerce, National Income Division, and

generously made available to me.[39] Most of the indexes are recombinations of the relevant components of the Bureau of Labor Statistics index of consumer prices (cost of living) and of the Bureau of Agricultural Economics index of prices paid by farmers. Price quotations from these two sources for corresponding commodities were usually combined in accordance with the expenditures of urban and rural families, as shown by the 1935-36 study. For commodities not represented separately in these indexes, price data were taken from other sources when possible. When no specific price quotations could be had, the respective weights of such commodities were assigned to the prices of related or analogous commodities. The weights employed for the minor commodity group price indexes were the 1939 values of the individual commodities, as shown in the *Output of Manufactured Commodities* (Bureau of Foreign and Domestic Commerce, 1942). The series for 1942 through 1946, when many goods were unavailable, have a wide margin of error, and to that extent affect the reliability of our estimates of 1946 holdings.[40]

Annual personal consumption expenditures for 1919-28 were extrapolated by linking Mr. Kuznets' estimates of commodity flow to consumers at wholesale prices in 1929 dollars to the Department of Commerce series.[41] *Commodity Flow and Capital Formation* presents data for subgroups only at whole-

39 Henry Shavell presents retail price deflators for consumer commodities 1929-42 by commodity groups as they were classified before they were revised (*Survey of Current Business*, May 1943). He indicates the composition of the minor commodity group indexes with respect to the specific price data used and their sources, and discusses the general methodology by which the indexes for the later as well as the earlier years were constructed.

40 The series had been extended through 1946 for only a portion of the groups needed. We estimated the changes from 1945 to 1946 for other groups, following in general the methods used for earlier years.

41 The Department of Commerce and Kuznets' subgroup classifications correspond reasonably well. In a few cases, however, to obtain sufficient comparability for linking, a minor commodity series (*Commodity Flow and Capital Formation*, Table II-7 or II-5) was adjusted by means of detailed data on the output of finished commodities (ibid., Table I-4) or subgroups in one series or the other were combined. The Department of Commerce series on tools for personal busi-

sale prices; estimates at cost to consumers are presented for three broad durability categories. The link was made at the wholesale level in order to preserve the detail of the Department of Commerce estimates. Implicit in this procedure are the assumptions that an index based on wholesale prices would not differ significantly from one based on cost to consumers and that the consumers' share of the total was the same during the 11 years through 1929 as in 1929. Both assumptions are of course subject to considerable question. As previously noted, Mr. Kuznets defined consumers to include larger ultimate consuming units such as hospitals and hotels as well as households, and he classified durable goods on the basis of preponderant use.

For years before 1919 aggregate expenditures on the relatively few classes of durables estimated to have an average life of more than 11 years were based on W. L. Lough's expenditure figures in *High-Level Consumption* (McGraw-Hill, 1935) for 1909, 1914, 1919, and subsequent biennial Census periods.[41a] The relation between these expenditures and Isador Lubin's series of national income estimates was studied, and estimates for the appropriate years obtained by interpolation.[42] For most categories, the trend shifted sharply in 1921 or 1923; the estimates were therefore based on the 1909-19 relation, which was linear. The expenditures so derived were deflated by the most appropriate index available for those years.

Our estimates for each year are open to question both be-

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ness and household and garden use were extrapolated with Mr. Kuznets' series for carpenters' and mechanics' tools, which he classified as producer durables.

For deflating subgroups for which Mr. Kuznets found no specific price indexes, we used his derived price index for the major commodity group in which the subgroup was classified. This corresponds to his use of the derived index for deflating the residual parts of the major commodity group for which he had no specific indexes.

41a Had W. H. Shaw's *Value of Commodity Output since 1869* (NBER, 1947) been published when these estimates were prepared, we would not have had to link Lough's expenditure estimates to Kuznets'.

42 *Economic Trends,* Testimony before the Temporary National Economic Committee (1939), Appendix, Exhibit 5.

cause of the assumptions concerning length of life and because of deficiencies in the price data used for deflation.[43] They are subject also to all the limitations, as described above, due to the use of the Department of Commerce series on consumption expenditures and (particularly in the case of the estimate for 1929) the method of extrapolating this series for years prior to 1929. The inclusion, except for four groups of commodities, of the full amount of expenditures made during the years ended December 31, 1929, 1939, and 1946, respectively, means that commodities averaging 6 months in age were considered new, and implies some overestimate of their value. Implicit prices for the goods included are average prices during the year rather than those prevailing at the end. Since prices were relatively stable during 1929 and 1939, this does not appreciably affect the evaluations for those years. For 1946, however, the value of consumers' tangible assets as of December 31 is considerably understated because of the rapid rise in prices during the year.

The 1929 estimate—considerably less than the NICB and Keller's estimates—is probably low. The 1946 estimate is especially questionable because of the possible unreliability of the individual commodity series for 1940-46 and the special limitations of the price data for 1942-46. It may understate the value of holdings as of December 31 not only because of price advances during the year but also because it was based on prewar replacement rates which have a style element. There is every reason to believe that the life of refrigerators, stoves, washing machines, and other household durables was 'extended', as was the life of automobiles, by the absence of new models to tempt the public and the necessity for getting continued service from those in use. This is not to say, however, that the real value of consumers' tangible assets in 1946 approached the value that might have been expected at the 1946 level of

[43] The reliability of the deflators is important not only for the 1929 and 1946 estimates in 1939 prices, but also for the estimates in current prices since expenditures made during years prior to the ones to which the estimates apply were adjusted to the prices of that year to estimate the value of holdings at the end of the year.

national income had consumer durable goods been generally available. In 1939 dollars, on the other hand, the 1946 estimate is probably high to the degree that the price indexes used as deflators understated the real price increases due to wartime quality deterioration, which could not be fully measured.

b *Automobiles operated for personal use*

The information available for evaluating passenger automobiles owned by consumers and operated for nonbusiness purposes is relatively good, at least for 1939 and 1946, although several assumptions were required to project the 1941 survey data to those years. For 1929 rougher methods had to be adopted. Two types of data were needed: (a) a distribution by age of cars owned by consumers entirely for personal use and of cars owned partly for personal and partly for business purposes, and for the latter, the proportion of use that was personal; and (b) prices for cars of varying ages in each year.

The 1941 survey yielded data of the first type for the end of that year.[44] A few cars reported as not in operation were included on the assumption that they were usable; a few small trucks reported as operated entirely or predominantly for family use were included with passenger automobiles, although this involved some inconsistency in comparisons with total passenger car registrations (Table 4). The 1935-36 survey data on automobile ownership could not be used as a check on the 1941 findings because estimates of the number of cars owned by single persons are very poor; estimates of the number of cars owned by families formed during the year are not available; and information was not obtained on the model year of cars purchased secondhand.

[44] Since the survey data had not previously been processed in the form required, all survey schedules had to be retabulated to obtain the number of cars owned at the end of 1941 by age, by proportion of use for business, if any. Reports by families that were formed during 1941 were included. When the year of purchase for cars bought new differed from the model year, the former was used as a measure of age. Special tabulations of the rural survey data were generously made available by the Department of Agriculture, Bureau of Human Nutrition and Home Economics.

Table 4

Age and Number of Passenger Automobiles Owned by Consumers, Percentage Registered, and Percentage Used Partly for Business, 1941

AGE OF CAR	PASSENGER AUTOMOBILES OWNED BY CONSUMERS		
	Total (000)	As % of all passenger car registrations	% used partly for business
Under 1 year	3,248	87.0	32
1-2 years	3,268	93.5	31
2-3 years	2,413	98.0	27
3-4 years	1,873	94.0	26
4-5 years	3,351	90.0	25
5-6 years	2,862	84.0	25
6-7 years	1,672	80.0	25
7-8 years	1,277	78.0	25
8-9 years	983	77.5	26
9-10 years	778	76.0	28
10 years & older	3,222	70.0	35
Total	24,949	84.6	28

Estimates based on the Survey of Spending and Saving in Wartime. The figures in column 2 were rounded and do not add to the total. The percentages in columns 3 and 4 were derived from smoothed data.

Information on total passenger cars registered is available for the end of 1929, 1939, and 1946, and on the number of new cars registered in each of these years.[45] Information on the distribution by age of passenger cars registered has been compiled by R. L. Polk and Company (Detroit) as of July 1 for all years beginning with 1935 except 1942-45.[46] For December 31, 1941, the number of passenger cars of different ages was estimated by subtracting new car registrations from the total for

[45] According to C. F. Roos and Victor von Szeliski, 'Factors Governing Changes in Domestic Automobile Demand', *Dynamics of Automobile Demand* (General Motors Corporation, 1939), pp. 45-6, Bureau of Public Roads figures on registrations for the year-end contain duplications because in about half the states new license plates must be obtained when cars change ownership. Since, as they point out, the counts of titles registered as of July 1, compiled by the R. H. Donnelley Corporation for each year since 1933, reveal obvious inconsistencies, we used the Public Roads registration figures which extend back beyond 1933. Registrations (without duplication) do not represent the entire stock of cars, since some usable cars may be in storage or standing unused on back lots and, as Roos and von Szeliski suggest, enforcement of registration laws in some outlying districts may be lax, especially during depressions.

[46] *Automobile Facts and Figures, 1946* and *1947*, p. 21. Age was reported for 93-95 percent of all registrations.

that date and applying to the remainder the estimated age distribution as of July 1, 1941, of cars one or more years old.

The number of cars of different ages at the end of 1939 and 1946 was estimated similarly. An age distribution for July 1, 1940, as well as July 1, 1939, made greater precision possible for 1939. The age distributions of cars more than a year old on these two dates were averaged to yield a distribution for December 31, 1939. For 1946 it was assumed that the proportion of all cars produced before 1946 that were 4-10 years old was the same on December 31 as on July 1, and that the proportion ten years or older declined relative to the larger number of new cars sold during the six months. Since figures on registrations by age of car could not be obtained for 1929, a different procedure was required. New car registrations had been compiled for each year 1925-29, but for earlier years output statistics alone were available. The average ratio of new cars registered to cars produced 1925-29 was applied to annual output in the three preceding years to obtain an estimate of new car registrations in those years. From total registrations on December 31, 1929, we subtracted the sum of new car registrations in each year 1926-29 and decreasing proportions of estimated new car registrations in the three preceding years to obtain the estimated number of cars 8 or more years old.[47]

To estimate the number of passenger automobiles of different ages that were owned by consumers in the three years, we applied ratios developed by comparing the expanded 1941 survey aggregates with the estimated total of cars of different ages on December 31, 1941. The over-all ratio was about 85 percent; the different age groups, smoothed by three-point moving averages, showed a peak of consumer ownership for 2- to 3-year-old cars, followed by a decline with age, reflecting the large number of older cars used exclusively for farm business, then an

[47] Our estimates of the number surviving in the 4th through the 8th years (1925, 97 percent; 1924, 95 percent; 1923, 85 percent; and 1922, 75 percent) correspond closely to the survival estimates used by Keller. Some of the arbitrary element in his and other estimates that built up to a total by applying survival rates to production figures over a period of years is eliminated by tying the assumed age distribution to total registrations at the end of 1929.

upturn in the case of the jalopies 15 or more years old. In the absence of specific information to the contrary, these ratios were assumed to be applicable in 1939 and in 1929 and, with slight modification, in 1946.[48] The estimated number owned in each year was then apportioned between those owned exclusively for personal use and those owned and operated partly for business purposes on the basis of the 1941 survey findings.[49]

Since business use of passenger cars is much more common on farms than in nonfarm areas, both the ratio of cars owned by consumers to all cars registered and the proportion of con-

[48] For 1929 and 1939 the number obtained by applying the 1941 ratios for each age group were added and the total compared with the total obtained by taking 84.6 percent of all registrations. For 1939 the difference was less than 0.3 percent; for 1929 it was 4.3 percent. For these years the number in each age group was adjusted to equal the 84.6 percent of all registrations. For 1946 it was arbitrarily assumed that 75 percent of 1942 cars were owned by consumers. For older models the ratios used to estimate cars owned by consumers were the same as for the 1929 and 1939 estimates; e.g., 1941 cars were considered 1-2 years old, etc.

For new cars owned at the end of 1946 we made two estimates: one on the assumption that 50 percent of new cars registered—about .9 million—were owned by consumers; the other that 1.5 million 1946 cars were owned by consumers at the end of 1946. The 50 percent was arbitrarily selected on the ground that a large share of the first postwar cars were reserved for business fleets, etc; it is probably low. The 1.5 million represents the number of new cars estimated by the Survey of Consumer Finances to have been purchased by consumers in 1946 (*Federal Reserve Bulletin,* June 1947). This is believed too high as it represents a larger proportion of new car registrations than in 1941. The two assumptions yield estimated values of all automobiles owned by consumers at the end of 1946 (in millions) of $11,387 and $11,953, respectively, in current prices, and $4,093 and $4,461 in 1939 prices. The figures in Table 3 are averages of the two estimates.

[49] Families' reports on the proportion of car use chargeable to business are subject to a considerable margin of error. The survey schedules were therefore reviewed, and whenever business use was reported by persons whose occupation did not logically involve the use of an automobile, the report of business use was discounted on the assumption that it referred to transportation to work. A similar check was not possible, however, on the proportion of use chargeable to business when some charge was appropriate. When the distribution of cars by proportion of use chargeable to business in 1941 was analyzed, the modal report was found to be 75 percent, the median, 65 percent; there was no significant difference by age of car or between farm and nonfarm owners. Since there was a tendency to overestimate business use of cars because gasoline rationing was inaugurated while the survey was in process, the correct proportion was assumed to be 60 percent.

sumers' cars that were owned and operated partly for business purposes would vary with changes in the relative number of farm and nonfarm families. Hence, the proportion of all cars owned by consumers and the proportion of these operated exclusively for personal use was probably somewhat lower in 1929 and somewhat higher in 1946 than in 1941. No attempt was made to adjust for changes in the farm population by reweighting the survey findings for farm and nonfarm areas because it would have been necessary first to convert the Census population estimates for 1939 and 1946 to a consumer unit basis in accordance with the survey concept, and the information necessary for such a conversion was not available.

Independent estimates were available of average prices of new cars in 1929 and 1939 and of used cars by age in the latter year. Each related to prices during the year rather than at the end; prices as of the end of the year were not available. For consistency, we estimated average prices of used cars during 1929 and of cars of all ages during 1946. The new car average prices used for 1929 and 1939 were computed by the Automobile Manufacturers Association. Although they are for a single model, relatively inexpensive, they were used as more reliable than any rough estimate we could make of an average price for all models of all makes.[50] For 1929 the new car average price was $843; for 1939, $768. A comparable price, $1,183, for 1946 was estimated by applying to the 1940 average the percentage increase in the Bureau of Labor Statistics index of retail automobile prices from 1940 to the average for the last four months of 1946.[51] The $1,183 represents a considerable understate-

[50] *Automobile Facts and Figures, 1940*, p. 72. The averages for each year 1925-40 "are based on the delivered price at factory (including standard equipment and federal taxes) of the cheapest 4 or 5 passenger closed model of each make and are weighted by the relative total number of new car registrations of each make. Delivered price prior to 1936 computed from the ratio of factory list price to delivered price in 1936 and 1937."

[51] Prices for the index, based on 5-passenger sedan list prices of Fords, Chevrolets, and Plymouths, were not obtained for the earlier part of 1946. Since most of the sales took place in the latter part of the year, the average for the last four months of 1946 seems more appropriate than an average based on indexes for all 12 months.

ment because it does not reflect the large premiums new cars commanded in the used car market.

The prices in 1939 for cars of each model year 1930-38, compiled by the National Automobile Dealers Association,[52] were used to estimate the value of used cars in that year with an assumed value for all older cars of $60, or 75 percent of the price of cars 9-10 years old. Analysis of the relation between a new car price as presented by the Automobile Manufacturers Association and prices of used cars of different ages showed considerable similarity from year to year, 1935-41. On the basis of the relation during these years, prices in 1929 of cars 1-7 years old, respectively, in that year, were estimated from the new car price; for cars 8 or more years old, a price of $100 was assumed, or approximately 74 percent of the price of cars 7-8 years old. In the absence of summary information from trade sources on used car prices in 1946, they were estimated by applying to the 1941 averages compiled by the National Automobile Dealers Association the percentage increases between the 'sales value' in 1941 and the 'average retail value' in 1946 of identical models of Fords, Plymouths, and Chevrolets for 1934-40 models.[53] Applying to the estimated 1946 average price for 1940 cars the ratio of the 1946 average retail value of 1941 and 1942 Fords, Chevrolets, and Plymouths to the 1946 average retail value of 1940 cars of the same makes gave 1946 prices for 1941 and 1942 cars. A similar procedure yielded estimates for 1933 and 1932 car prices; a junk value of $90, or 74 percent of the 1932 car price, was assumed for all older cars.

The sum of the products of these prices and the number of

[52] *Automobile Facts and Figures, 1942,* p. 14. Figures read from chart.

[53] *Red Book National Used Car Market Report,* 130th ed., July-August 1941, and 149th through 153rd ed., effective January 1, April 1, July 1, October 1, 1946, and January 1, 1947.

The percentage change in prices was estimated by comparing the July-August 1941 price with the average 1946 price (the averages of prices in each of the 5 reports listed) for each model. The 'sales values' quoted for 1941 were defined to represent the average prices reconditiond used cars in the hands of dealers were selling for. Similarly, 'average retail values' quoted for 1946 were defined to "reflect actual average retail prices of used cars—reconditioned, ready for resale".

cars of different ages that were owned by consumers exclusively for personal use plus 40 percent of those of different ages owned partly for business purposes yielded the estimates of the value of such cars in 1929, 1939, and 1946, in current prices shown in Table 3. For 1929 and 1946, values in 1939 dollars were approximated by substituting for new car prices in each year the 1939 new car average price and by deflating the aggregate value of cars more than one year old by an index of average changes in used car prices.[54] This procedure undoubtedly leads to some overstatement of 1929 values in 1939 prices because of the improvement in quality, a factor that could not be measured. Identical cars were not available new at the three dates.

Our estimate for 1929 in current prices is high in comparison with the NICB and Keller estimates, since both included automobiles operated for business purposes, and the former included also motor vehicles other than passenger automobiles. The NICB provides insufficient information for an analysis of its methodology, but Keller outlines his method carefully. There are several differences between his and our valuation procedure: we valued cars less than a year old at new car prices, whereas he assumed a 21 percent depreciation by the end of the first year; for new cars we used the weighted average retail price for 4-door 5-passenger sedans, whereas he used the average wholesale value of all cars inflated one-third; and we estimated used car prices at 1929 price levels whereas he used depreciated original cost. Our method of valuing new cars would yield a higher figure than Keller's, while our method of

[54] The change in used car prices between 1939 and 1946 was estimated by comparing the estimated 1946 price of 1942 cars with the average price of cars 1-5 years old in 1939, the 1946 price of 1941 cars with the average price of cars 2-6 years old in 1939, etc. Seven such indexes were developed and averaged to yield an index of approximately 300. The increase was, of course, bigger than if 1942 and 1941 cars had been considered 1-2 and 2-3 years old, respectively, in 1946 (because of the lack of production during the war) and considerably less than if 1941 and 1942 cars had been treated as 4-5 and 5-6 years old. Although that was their actual age, they had undoubtedly had less wear because of gas rationing and as a group had received better care because of the general effort to prolong car life. Moreover, the cars produced in the years immediately before the war were better than those produced in the mid-thirties and earlier.

valuing used cars would yield a lower aggregate since automobile prices declined during the 'twenties.

The value of automobile tires and tubes, replacement parts and accessories (which could be estimated from annual expenditures) was not added to the value of automobiles derived as described above, because secondhand automobile prices presumably reflect the customary amount of replacement and the extent to which accessories such as radios and heaters had been installed. Hence, if the two aggregates were combined, there would be a duplication of the value of parts and accessories.[55]

C Recommendations for Data Collection

Our general recommendations concerning the type of data needed to value consumers' tangible assets have already been made. The mechanics of obtaining them and the frequency of collection that is at once both desirable and feasible remain to be considered.

As a general proposition we have argued the logic of obtaining information directly from consumers on a sample basis. We have discarded the possibility of requesting consumers to provide a reliable estimate of the value of the goods they own. In theory, therefore, a count should be obtained of all goods owned by consumers, down to sheets and towels, pots and pans, shirts and shorts, and an average price for each item by age; the product of the number and the prices would represent the aggregate value of consumers' stocks. The possibility of obtaining an almost complete enumeration of household goods, clothes in closets and bureau drawers, and knickknacks on table tops has been demonstrated by special surveys conducted by the John B. Pierce Foundation to measure housing space requirements.[56] Such surveys are time-consuming and rela-

[55] Even in the case of durables that are seldom sold secondhand, valuation on the basis of inventory data or annual expenditures cumulated over an appropriate period may be assumed to reflect customary servicing, which significantly lengthens the useful life of the commodity.

[56] *Family Living as the Basis for Dwelling Design,* IV: 'Family Behavior, Attitude and Possessions' (1944).

tively costly. Moreover, the usefulness of an inventory for every date for which the value of stocks is to be estimated depends upon the possibility of pricing it completely, and it would be unrealistic to contemplate pricing the almost infinite number of items that comprise consumers' stocks.

1 *Data on Stocks and Useful Life*

Valid estimates of the value of consumers' stocks of durable household appliances and other mechanical goods, as well as of automobiles and new types of durables entering the market, require frequent inventory studies and evaluation by pricing articles of different ages. The life expectancy of such goods has changed over the years because of economic conditions and changes in technology. Similar, if less striking, changes may be expected in the future. Hence, there is need for inventories, by age, at or near the dates for which estimates of the value of consumers' stocks of such goods are desired. Projections from one period to another when circumstances differed, as in the use of the 1941 automobile age distribution for 1946, are unsatisfactory.

If it is impossible to take a sample inventory applying to the date for which the value of consumers' stocks is to be estimated, life expectancy estimates must be constructed from data collected in inventory studies.[57] Account must be taken also of changes in both the number of ownership units and the age composition of the family population, since the age distribution of any durable is determined in part by the proportion of young and old families in existence at the time.

For the many smaller and less durable goods, on the other hand, evaluation by cumulating expenditures over an appropriate period would probably be more reliable than by pricing inventories on a sample basis. Furniture, floor coverings, pianos, etc. are in an intermediate position. It would not be unduly laborious or costly to count them and record informa-

[57] See O. L. Altman and C. G. Goor, 'Actuarial Analysis of the Operating Life of B-29 Aircraft Engines', *Journal of the American Statistical Association,* June 1946, and Roos and von Szeliski, op. cit.

tion on their age at regular intervals, but the determination of appropriate prices would be subject to so wide a margin of error that cumulation of expenditures would probably be equally, if not more, satisfactory. In both cases, the reliability of the value estimates would depend upon the accuracy and appropriateness of the expenditure data and of the estimates of useful life. The most pressing need is for good data to estimate life in use.

To estimate the average number of years that furniture, etc. is used in households, surveys should be made that would yield counts of such goods in a representative sample of households, together with information on their age. Since purchases of furniture, floor coverings, etc. are postponable, their apparent life in use is undoubtedly different in depression or inflation than in periods of high real incomes. Consequently, such studies should be replicated at different stages of business cycles. Then, if significant differences are found characteristic under different economic conditions, the life estimate to be used in evaluating consumers' stocks from expenditures on a particular date could be determined by the general level of income on that date.

A somewhat different approach would be more appropriate for estimating the life in use of household linens, apparel, footwear, kitchen utensils, tableware, clocks, the more durable types of toilet article, etc.: a survey, or preferably a series of surveys, that would yield a count of such items owned at the time, the number purchased for own use or received as a gift and the number discarded during the preceding year, and the amount spent on purchases. Discards as well as purchases would be necessary to derive the inventory at the beginning of the year from the year-end inventory. The ratio of the average number acquired during the year to the average number owned would yield an estimate of useful life; for example, if on the average 10 sheets were owned and 2 were purchased each year, it could be assumed that sheets last five years. Estimates derived in this fashion should be applicable for long periods unless general economic conditions change sharply. At the outset a

series of identical studies would be highly desirable, since the relation between several years' purchases and several inventories would yield more reliable estimates of useful life than comparison of purchases during a year with the year-end inventory or the average of the inventories at the beginning and end of the year. Collecting such information for several years from a representative panel of consumers would be cheaper than collecting inventory information by a series of studies. However, it is hard to maintain a continuing sample, both because consumers lose interest unless incentives to cooperation are offered (and a sample made up of persons who were attracted by rewards may be unrepresentative) and because families move and it is difficult to select appropriate replacements. The costlier technique, a series of inventory-purchase-discard studies, may therefore be more efficient in the long run. Estimates of life for groups of commodities could be derived by weighting together the various life estimates by the expenditures for items found to have that length of life.

For each type of study the sample must be representative of all types of community and all regions. In surveys of soft goods and semidurables, care must be taken to cover lodgers and servants in their proper proportion if the measure of the life of stocks of personal goods is to be accurate. The furniture survey, on the other hand, may be confined to families and single persons other than lodgers and servants. Since stocks are relatively more stable than purchases, a small sample of perhaps 3,000 to 5,000 should suffice. For any size of sample national estimates will be more reliable if urban and rural populations are sampled proportionately to their number, although with a small sample this might not yield accurate data for urban and rural segments separately.[58]

In addition to the data the survey is designed to yield, information should be collected from respondents on the general level of income, tenure, and perhaps rents, and on certain

[58] For a discussion of sampling variance with respect to income estimation, see BLS, Bulletin 822, pp. 57-9. Proportionate sampling reduces appreciably the cost of summarization.

family and personal characteristics, to provide a basis for checking the representativeness of the sample. As previously noted, however, some downward bias in income, more or less to be expected in a small survey, should not have a very significant effect on findings concerning inventory, or even the number of goods purchased. Fully as serious is the possibility that low income families and single persons with meager stocks will be reluctant to cooperate.[59]

Reports on the number of items purchased and owned and, in the case of soft goods and small durables, the number discarded should not be difficult to obtain if the schedule is sufficiently detailed and interviewers are properly trained.[60] Instructions must be clear on the method of recording goods owned but not used. As a general rule, they should be counted if in usable condition or temporarily out of order, but in the case of apparel, particularly women's, there may be borderline cases, e.g., dresses that will never be worn again and will end in the scrap bag. Approximations will undoubtedly have to be accepted in many cases on the age of durables, but a reasonable balance may be expected among those understating and those overstating age. If, as is likely in the case of secondhand purchases, the actual age is not known, the year of purchase and information on condition at time of purchase should be recorded; from it an approximate age may later be estimated.

Undoubtedly for some goods, for example, jewelry, books, and tombstones, it will be impracticable to develop meaningful life estimates. For such goods, which fortunately comprise a small segment of consumers' tangible assets, guesses will prob-

[59] In the Survey of Prices Paid by Consumers in 1944 refusers were about equal at very low and at high income levels. The apparent explanation for the low income refusals was a reluctance to reveal poverty at a time of general prosperity and, in some cases, resentment at the inadequacy of public provision for assistance.

[60] The lack of success in obtaining apparently reliable reports on clothing inventories in the Survey of Spending and Saving in Wartime must be charged to poor schedule design in this respect, the tremendous detail requested on other points, and a failure to emphasize the need for this information in the training of interviewers.

ably always have to serve. Some test studies might prove valuable, however, especially in the case of jewelry, which is a heterogeneous composite of almost imperishable 'good' jewels and costume jewelry with a high style element.

The value of antiques, personal art collections, coin, stamp, and similar collections could presumably never be approximated except by sample studies in which respondents were requested to estimate their value. Unless such studies are carried through successfully, it might be preferable to exclude this type of asset, confining the total to the measurable components.

2 *Annual Data on Expenditures*

Annual surveys of family incomes and expenditures would serve many useful purposes, but they are beyond the scope of private research agencies, and there is little likelihood that funds for them will be voted by Congress in the near future. Until they are made at frequent intervals, if not annually, the Department of Commerce personal consumption expenditure series provides the sole basis for estimating the value of consumers' stocks that are not inventoried regularly.[61] The advantages and limitations of both the Department of Commerce series and survey expenditure data have already been discussed. We merely call attention now to the desirability of special studies, repeated at intervals, of the sales of specific classes of consumer goods to institutions, hotels, restaurants, and other business establishments, in order to improve the division between consumer and nonconsumer use. Estimates of the value of consumers' tangible assets based on this series would be more accurate if certain subgroup classifications were narrowed and if the estimates of dealers' margins in the case of secondhand purchases could be improved. They would conform more closely to our definition of ownership units if land-

[61] Unless special provision is made for covering institutional residents and military personnel stationed on posts, their expenditures would not be included in expenditure aggregates derived from survey data. They are included in the Department of Commerce series, and cannot be excluded unless special surveys are conducted to ascertain their nature and magnitude.

lords' expenditures on furniture and equipment for rental dwellings were estimated separately.

If sample survey data should become available at more or less regular intervals and expanded survey aggregates used to estimate the value of consumers' stocks, careful measurement of changes in the number of ownership units would be necessary to ensure correct totals. When aggregate expenditures are based on commodity flow data this is not necessary because changes in the size of the population are properly reflected.

3 *Price Information*

Prices to evaluate stocks of household appliances, etc. could be obtained either from consumers or from retail outlets. To evaluate new goods, consumers' price reports would have an advantage in that they would represent the average price level of goods purchased by consumers for personal use, whereas retailers' quotations would reflect purchasing by nonconsumers when it was frequent. Except for this factor, average prices of volume sellers in a representative sample of retail outlets would be equally satisfactory. Moreover, until survey data are collected periodically on a nationwide basis there is no alternative to collecting volume-seller price reports from retailers. Pricing by specification, more cumbersome and costly, does not seem appropriate.[62]

Average prices for secondhand equipment of different ages could be computed from family surveys only if the samples were enormous, since purchases of secondhand goods are relatively infrequent. The secondhand market for household equipment, wheel goods, etc. is less active than the secondhand automobile market. It should be possible, however, to collect from dealers prices of selected household and personal goods of different ages. As noted above, for goods not generally sold secondhand, prices of equivalent new goods, adjusted as well as possible for the consumption that has taken place, must be

[62] In any case, specifications would have to be developed from detailed information on the goods owned, which most consumers would be unable or unwilling to provide.

substituted. This will be necessary in only a few cases, however, if expenditure rather than inventory data are used to evaluate soft goods and durables with a relatively short life.

Volume-seller price reports share one limitation with consumer price reports in the case of goods more than one year old, i.e., because of differences in economic conditions at the date under consideration from those prevailing when the stocks were purchased, they may apply to a different quality level than that of the total stock of goods of similar ages in the hands of consumers. There is no practicable procedure by which to correct for this. More serious, but also impracticable to correct for, is the fact that the value of secondhand models passing through dealers' hands is probably higher than that of the total stock of similar models in consumers' hands, because the former are customarily reconditioned to some extent before they are offered for sale.