Results from the household survey data (1962 SFCC and 1983 SCF) indicate a similar wealth distribution in the two years, 1962 and 1983, the only period for which reliable survey data are available in the United States. The original unadjusted survey estimates indicate a small increase in inequality, from a Gini coefficient of 0.77 in 1962 to one of 0.79 in 1983. Adjustments to the survey data negated this trend. Gini coefficients for 1962 and 1983 are quite close, 0.715 and 0.728, respectively, after adjustments for missing assets and alignment to national balance sheet totals. Adding retirement wealth to the adjusted traditional net worth, our W5* concept, results in a slight decline in inequality between 1962 and 1983, from a Gini coefficient of 0.59 to one of 0.57 (for $g = 0.02$). This decline is relatively modest given the rapid growth in social security wealth over the period. The apparent reason is that the growth in social security is offset by the rapid growth of pension wealth, which is distributed quite unequally.

As with the estate data, adjustments and imputations to the survey data have more effect on the level of inequality than the trend. However, for the 1962 and 1983 surveys, alignment to national balance sheet totals appears to make relatively little difference, a maximum change in the Gini coefficient of 0.04, while imputations for missing assets have a sizable effect on inequality. The inclusion of missing consumer durables causes a 0.05–0.07-point change in the Gini coefficient and the inclusion of household inventories an additional 0.01–0.02-point decline. The addition of pension and social security wealth causes an even sharper decrease in the Gini coefficient, of 0.13–0.16 points. Finally, if we exclude consumer durables, inventories, and retirement wealth, then inequality measures of "fungible net worth" are quite insensitive to adjustment procedures. Thus, the unadjusted 1962 and 1983 survey data provide reliable concentration estimates of this component of household wealth.

A last point of caution concerns the combining of inequality estimates from different sources. Preliminary comparisons in this paper suggest that estate tax data and household survey data can produce very different point estimates of wealth inequality for the same year. One possible conclusion is that the estate estimates are substantially underreported. Further comparisons of these two important sources of U.S. wealth information need to be done in order to ascertain the relative reliability of each data source.

Appendix A
Sources and Methods in the Construction of Aggregate Household Balance Sheets, 1900–1983

This appendix summarizes the procedures used to adjust the original sources of household balance sheet data to create our new set of estimates. The discussion is by asset type. A more detailed description, including tables comparing the different sources by asset category, is available in Wolff (1989).

The discussion is organized by asset and liability component. For our new series for selected years between 1900 and 1983 for wealth concept W2, see table 15.A.1.

Note on Sources

1. For brevity, we use the term "Goldsmith data" to refer to estimates from either Goldsmith, Brady, and Mendershausen (1956) or Goldsmith, Lipsey, and Mendelson (1963). All household balance sheet data except for trust accounts come from Goldsmith, Lipsey, and Mendelson (1963, 42–85, 118–19, under the "nonfarm household" and "agricultural headings"). Data for personal trusts for the pre-1945 years are from Goldsmith, Brady, and Mendershausen (1956, 42–53) and for the 1945–59 period from Goldsmith, Lipsey, and Mendelson (1963, 120).

2. FFA data are taken from Board of Governors (1986). We use data from the category "households, personal trusts and nonprofit organizations" (11–15) and also from the "farm business" and "nonfarm noncorporate business" sectors (16–20).

3. The "Musgrave data" are taken from his revised estimates of tangible wealth in Musgrave (1986, table 10, p. 65, and table 18, p. 73).

4. Data from Ruggles and Ruggles (1982) are taken from their table 2.40, which provides end-of-year values for household-sector capital accounts.

Notes on Methods

Assets

Tangible Assets

Real Estate: Owner-occupied Housing, Tenant-occupied Housing, and Residential Land. For the period 1925–83, the values for "owner-occupied housing" and "tenant-occupied housing" are taken from Musgrave's (1986) annual estimates of net structures. Musgrave's data cover the period 1925–84 and are the source for the FFA tangible assets.

Table 15.A.1 **National Balance Sheet Estimates for the Household Sector, 1900–1983, Based on Wealth Concept W2 (billions, current dollars)**

	1900	1912	1921	1922	1929	1933	1939	1945	1949	1953
Assets	81.4	159.7	286.4	315.5	475.8	325.5	382.2	652.6	866.8	1,159.4
Tangible assets	28.2	47.4	91.3	108.1	148.5	108.7	132.0	195.0	332.5	477.9
Real estate	22.2	33.8	63.2	78.6	109.7	81.7	101.9	148.8	245.9	334.9
Consumer durables	6.0	13.6	28.1	29.5	38.8	27.0	30.1	46.2	86.6	143.0
Fixed claim assets	11.7	25.0	64.6	69.0	91.8	83.4	79.9	183.0	200.9	244.9
Demand deposits and currency	1.5	2.6	8.0	9.4	7.8	10.4	13.9	47.8	52.7	62.5
Other deposits	3.5	8.7	18.6	19.6	32.1	26.8	30.1	53.9	63.9	86.8
Federal securities	.6	.4	5.3	10.5	4.4	4.9	6.7	54.6	55.0	57.9
State and local government securities	.4	1.1	3.5	3.6	5.4	6.8	5.2	8.6	4.1	7.3
Other securities	5.7	12.2	29.2	25.7	42.1	34.5	24.0	18.1	25.2	30.4
Equities held	41.6	87.3	130.4	138.5	235.4	130.9	170.3	274.6	333.4	436.6
Corporate stock	10.2	28.2	43.0	50.7	128.8	50.9	63.1	97.0	89.9	133.0
Unincorporated business equity	28.2	51.3	69.9	69.3	73.0	46.9	60.6	112.4	162.7	205.4
Trust fund equity	1.9	4.5	10.8	11.5	19.2	16.0	22.4	29.0	32.9	39.1
Insurance (CSV)	1.3	3.3	6.7	7.0	14.3	17.0	23.9	35.6	46.9	57.2
Pension (CSV)	.0	.0	.0	.0	.1	.1	.3	.6	1.0	1.9
Liabilities	4.1	7.7	N.A.	16.8	39.8	27.3	28.1	28.9	61.4	107.1
Mortgage debt	2.3	3.6	N.A.	7.5	16.6	13.1	14.1	17.2	35.3	62.5
Other debt	1.7	4.1	N.A.	9.3	23.2	14.2	14.0	11.7	26.1	44.6
Net worth (W2)	77.4	152.0	N.A.	298.7	436.0	298.2	354.1	623.8	805.4	1,052.3

(continued)

Table 15.A.1 (continued)

	1958	1962	1965	1969	1972	1976	1979	1981	1983
Assets	1,662.6	1,967.6	2,428.7	3,158.9	3,983.2	5,629.5	8,255.7	10,118.1	11,425.8
Tangible assets	629.3	736.4	846.7	1,211.5	1,570.8	2,526.1	4,016.6	4,971.2	5,390.1
Real estate	447.3	534.1	610.6	867.8	1,146.1	1,873.3	3,091.3	3,874.7	4,183.2
Consumer durables	182.0	202.3	236.1	343.7	424.7	652.8	925.3	1,096.5	1,206.9
Fixed claim assets	323.8	415.3	523.3	715.6	939.9	1,428.4	1,988.2	2,364.5	2,834.4
Demand deposits and currency	67.9	69.8	86.5	105.2	138.9	184.6	250.3	291.3	346.1
Other deposits	139.7	207.3	286.4	381.0	564.4	876.7	1,201.3	1,534.7	1,841.7
Federal securities	60.9	67.5	67.4	98.4	82.7	144.1	227.4	240.7	280.5
State and local government securities	14.8	18.3	24.9	35.5	32.7	48.5	49.5	62.9	106.6
Other securities	40.5	52.4	58.1	95.5	121.2	174.5	259.7	235.0	259.5
Equities held	709.5	815.9	1,058.7	1,231.8	1,472.5	1,675.0	2,250.9	2,782.4	3,201.2
Corporate stock	314.0	361.0	529.4	626.9	745.9	622.6	745.9	935.9	1,210.6
Unincorporated business equity	258.1	281.1	311.2	348.3	397.7	678.5	1,054.2	1,300.6	1,359.9
Trust fund equity	63.1	85.2	115.0	132.8	183.1	192.8	229.8	295.8	348.2
Insurance (CSV)	70.7	83.2	95.3	112.9	129.5	157.8	186.0	203.0	216.7
Pension (CSV)	3.6	5.5	7.7	10.9	16.3	23.4	35.0	47.1	65.8
Liabilities	178.6	256.0	342.0	454.9	592.9	862.3	1,336.3	1,573.8	1,849.5
Mortgage debt	112.9	163.8	214.5	276.3	358.0	540.1	856.8	1,024.0	1,179.5
Other debt	65.7	92.2	127.5	178.6	234.9	322.2	479.5	549.8	670.0
Net worth (W2)	1,484.0	1,711.6	2,086.7	2,704.0	3,390.3	4,767.2	6,919.4	8,544.3	9,576.3

Sources: Authors' computations.

Note: N.A. = not available.

The 1922 figures are based on extrapolating time trends estimated using regression analysis for the 1925–29 period. We used Goldsmith's data for residential structures only for 1900 and 1912. We preferred Musgrave's figures for the 1922–58 period over Goldsmith's both because we wished to maintain consistency with later years and because we believe Musgrave's estimates to be more reliable since the underlying worksheets have been considerably updated and revised since Goldsmith's work. As a result, the 1900 and 1912 estimates are not consistent with the rest of the series for tangible assets. Goldsmith's figures were significantly lower than Musgrave's, between 10 and 31 percent, for every year in which the two series overlapped.

There were some definitional differences between our real estate categories and those from Goldsmith, the FFAs, and Ruggles and Ruggles. Goldsmith included both residential structures and nonresidential structures in the real estate sector, and his land estimate included both types of property. We transferred his estimate of nonresidential structures to the "unincorporated business equity" category (below) for the years 1900–1945. On the other hand, Ruggles and Ruggles and the FFAs included tenant-occupied housing under unincorporated business, which we transferred to the "real estate" category.

Our "residential land" estimate includes both tenant and owner-occupied land. For the Goldsmith years, we first subtracted nonresidential land from his total land estimates and transferred it to "unincorporated business equity." We used Goldsmith's estimates of owner-occupied land and estimated tenant-occupied land by assuming that the proportion of tenant-occupied to owner-occupied land was the same as the ratio of tenant-occupied to owner-occupied structures. For the 1949–83 period, we used the FFA estimates for owner-occupied land. There were substantial differences between the Ruggles and Ruggles estimates and the FFA estimates for this category, with the ratio between the two ranging from 0.64 to 1.00 with no systematic trend. There is no apparent explanation for the differences. As for the Goldsmith years, we estimated tenant-occupied land for the 1949–83 period by assuming that the proportion of tenant-occupied to owner-occupied land in each year was the same as the ratio of tenant-occupied to owner-occupied structures. The amount of tenant-occupied land was then subtracted from the total for the "unincorporated business equity" category.

Consumer Durables: Motor Vehicles and Other Consumer Durables. For both the "motor vehicles" and the "other consumer durables" categories, we used Musgrave's data, which, like the residential structures series, are complete for the period from 1925 to 1984. For the 1922 value, we extrapolated from the estimated 1925–29 time trend.

Fixed Claim Assets:

Demand Deposits and Currency; Deposits in Other Financial Institutions; Federal Securities; State and Local Securities; and Corporate and Foreign Bonds, Mortgages, Open Market Paper, and Other Instruments.

For these categories, we used Goldsmith's data for the 1900–1945 period and the Ruggles and Ruggles series for the 1949–80 period. As noted above, the FFA data for the "household sector" include personal trusts and nonprofit organizations and thus could not be used for this period. Since the Ruggles and Ruggles data end in 1980, we had to estimate values for all five categories for 1981 and 1983. For the three bond and security categories ("federal securities," "state and local securities," and "corporate and foreign bonds, mortgages, open market paper, and other instruments"), we computed the average ratio of the Ruggles and Ruggles estimates to the FFA data over the 1946–80 period and multiplied the FFA figures for 1981 and 1983 to obtain estimates for the narrowly defined household sector. This ratio for federal securities and the corporate bond category showed an upward trend approaching 1.0 by the end of the period. This implied that trust and nonprofit organization holdings of these two categories were zero in 1980. Since this seemed unlikely, we decided to ignore the trend component in this ratio and relied, instead, on the average value of this ratio over the postwar period. For the two liquid asset categories ("demand deposits and currency" and "deposits in other financial institutions"), we used a trend regression of the ratio between the Ruggles and Ruggles figures and the corresponding FFA figures to estimate the 1981 and 1983 values.

There were no major definitional differences between the Goldsmith and the Ruggles and Ruggles fixed claim asset categories. In order to maintain consistency with our definition of farm assets held by the household sector, we shifted a small amount of assets from Goldsmith's farm equity estimates into the household-sector categories "deposits in other financial institutions," "federal securities," and "corporate and foreign bonds, mortgages, open market paper, and other instruments." These adjustments are explained in the "farm equity" section below. There are large percentage differences for "state and local securities" between Goldsmith and Ruggles and Ruggles. These are usually offset in absolute terms by the discrepancies in the corporate bond category. For the overlapping years (1949, 1953, and 1958), Goldsmith's estimates are higher for state and local securities, from $2 to $6 billion. Except for 1958, the Ruggles and Ruggles figures are higher for the corporate bond category. These differences are small relative to total assets, and, since we had no independent information, no correction

was made to either series. While Goldsmith's balance sheets are well documented, Ruggles and Ruggles do not provide detailed documentation on how they adjusted the FFA asset categories.

Equities

Corporate Stock. We used Goldsmith's and Ruggles and Ruggles' corporate stock estimates in our household balance sheet. While there are substantial differences for the overlapping years between the Goldsmith and the Ruggles and Ruggles estimates, there was no discernible trend in the percentage differences. Thus, we made no correction to either Ruggles and Ruggles' estimates or Goldsmith's numbers in this category. As noted above, the FFA household balance sheets include the nonprofit sector and personal trusts as well as households. As a result, the FFA values provide an upper bound to corporate stock holdings among households. Both the Goldsmith and the Ruggles and Ruggles estimates of household corporate stock are below the FFA values for all years. Our 1981 and 1983 values were estimated using a trend regression of the ratio of the Ruggles and Ruggles values to the corresponding FFA figures.

Farm Equity. We used Goldsmith's data for the 1900–1949 period and the FFA figures for the 1953–83 period. The Ruggles and Ruggles series and the FFA data are similar once adjustments are made for definitional differences. Before our adjustments, there were large differences, both in relation to total assets and in percentage terms, between the Goldsmith estimates and both the Ruggles and Ruggles and the FFA values for farm equity. Goldsmith's estimates are approximately one-third higher than the Ruggles and Ruggles figures for each year.

There are two reasons for this discrepancy. First, after examining the respective farm-sector balance sheets, it was apparent that Goldsmith included all the residential household assets of a farm family in the farm equity category. Ruggles and Ruggles included only those assets associated with the farm business, and all others owned by farm families were included in the household sector. In particular, Ruggles and Ruggles included the value of consumer durables, owner-occupied housing, and savings accounts owned by the farm family in the respective asset categories of the household sector instead of as part of farm equity. The FFA approach is closer to that of Ruggles and Ruggles, except that the FFA includes owner-occupied farm housing in farm equity. Second, Ruggles and Ruggles did not attribute all the farm sector's net worth to households but rather assigned part of it to the corporate sector, whereas Goldsmith assumed no corporate ownership of farms. In 1958, a year for which we have farm balance sheets from both sources, Ruggles and Ruggles transferred 92 percent of total farm

equity to the household sector and 8 percent to the corporate sector. We adjusted Goldsmith's farm equity estimates as well as the FFA data to be consistent with Ruggles and Ruggles' approach. After the above adjustments, the percentage differences between the Goldsmith, the FFA, and the Ruggles and Ruggles data were significantly reduced, between 0.0 and 8.0 percent for the overlapping years (1949–58) compared with over 30 percent for the unadjusted data.

Unincorporated Business Equity. For the 1900–1945 period, we used Goldsmith's data with adjustments for differences in definitions already mentioned above in the discussion of tenant-occupied housing and land. For subsequent years, we used the FFA series, under the assumption that the holdings of trust funds and nonprofit organizations of this asset were negligible. One reason that we did not use Ruggles and Ruggles' estimates for this category is that, even after correcting for differences in concept, Ruggles and Ruggles' numbers are still 6–15 percent lower than the FFA or the Goldsmith estimates for the 1949–58 period.

Trust Fund Equity, Wealth Definitions: W1 and W2. Trust funds are reported differently in Goldsmith's balance sheets than in they are in those of Ruggles and Ruggles. Goldsmith distributed trust funds across all financial categories, an approach similar to that of the FFA, although the estimates in Goldsmith, Brady, and Mendershausen (1956) include separate trust estimates for each asset category and Goldsmith, Lipsey, and Mendelson (1963) include a separate trust balance sheet for 1945–58. Ruggles and Ruggles recorded a separate category for trust funds. The FFA did not separate out this category from household assets and did not report on estimate for trusts in any year. We prefer the Ruggles and Ruggles approach of separating out trust funds because of the extreme concentration of this asset and our desire to separate out the actuarial concept from the full trust value. Thus, we subtracted from Goldsmith's categories an estimated amount for trust funds. The difference between Goldsmith's and Ruggles and Ruggles' estimates of total trust equity ranged from 1.0 to 13.0 percent for the years 1949–58. However, we have no information on the source for the Ruggles and Ruggles trust estimates, and no further correction was possible to increase consistency between Goldsmith's and Ruggles and Ruggles' trust estimates.

Our W1 wealth measure includes only the actuarial value of trusts (see table 15.1 for wealth definitions). The actuarial value of trust funds was obtained by reducing the aggregate trust values by the appropriate proportion. The percentage reduction was based on the analysis of Smith and Franklin (1974). For further explanation, see the first section

of Appendix B. Our W2 measure includes the full trust value reported by Goldsmith and Ruggles and Ruggles.

Insurance Equity. In the calculation of insurance equity, there were also substantial differences between the various sources in terms of concept. Insurance equity here refers to the combined value of government employee insurance and private insurance plans. Ruggles and Ruggles use a CSV concept, whereas the FFAs include the full reserves or equity of life insurance in the category. Ruggles and Ruggles estimated the CSV of life insurance as approximately 90 percent of the FFA total insurance reserves for every year. Goldsmith, like the FFAs, reported the full insurance reserves in his household estimates. In comparing the estimates from the different sources, we found that Goldsmith's private insurance reserves were substantially higher than the reserves of both the government and the private insurance systems reported in the FFAs. Between 1946 and 1958, the ratio of the FFA total reserves to Goldsmith's private reserves declined from 0.97 to 0.79. The higher Goldsmith numbers are due to the inclusion in his insurance category of both the insurance companies' pension funds and the total net assets of the insurance companies (Goldsmith et al. 1963, 5, 18). These items were not included in the FFA or the Ruggles and Ruggles estimates. These two additional components in the Goldsmith category increased over time, reaching 45 percent of the FFA private life insurance reserves in 1958. In our insurance category, we used the narrower FFA definition and included life insurance pension reserves in the pension category. We thus adjusted Goldsmith's figures by netting out these two extra components. In addition, we followed Ruggles and Ruggles' convention in including only the CSV of life insurance reserves in this category.

Pensions. Goldsmith differed from Ruggles and Ruggles and the FFAs also with respect to what should be included in the pension category. Ruggles and Ruggles and the FFAs include only pension reserves of the private and government pension systems. Goldsmith's concept was much broader and included such items as the reserves of the unemployment insurance system and those of the OASI system (see Goldsmith 1963, 7). Our first adjustment to the Goldsmith figures was to eliminate nonpension reserves from his category.

As with life insurance, Ruggles and Ruggles used a cash surrender concept. The CSV of pensions equaled about 5 percent of total pension reserves for any year. Goldsmith, on the other hand, included the full pension reserves in his household balance sheet. For our W1 and W2 wealth concepts, we follow Ruggles and Ruggles in using the CSV of

pensions. The W3 and W4 wealth measures use the full pension reserves reported in Goldsmith's data and the FFAs. The W5 definition includes the present value of pension benefits, which can be more or less than the total value of pension reserves.

The difference between these pension measures has increased in magnitude as pension wealth has increased. For example, in 1983, total pension reserves were $1,316.4 billion, representing 9.3 percent of net worth, while the CSV was $65.8 billion, or less than 1 percent of net worth. The present value of pension benefits was also calculated for 1983 on the basis of the SCF as part of our W5 measure. The aggregate value varied between $3,416 and $5,942 billion, depending on the assumptions used. The W5 wealth measure was not incorporated in the time-series estimates presented in sections 15.3 or 15.5 since the calculation requires microdata. However, the W5 measure is included in the household survey results reported in section 15.5.

Expected Social Security Payments, W4 and W5 only

Aggregate estimates of expected social security benefits are not available from any of the balance sheet sources. Feldstein (1974) calculated annual aggregate social security estimates for his analysis of U.S. saving over the period 1929–71. Feldstein's estimates were corrected and updated by Leimer and Lesnoy (1982). For our W4 estimates, we assume that expected social security benefits were zero before 1936, and, from 1936 through 1976, we use Leimer and Lesnoy's fixed ratio estimates, which end in 1977.[26] The fixed ratio assumption produced the smallest aggregate estimates among the alternative social security series calculated by Leimer and Lesnoy.

Our 1981 and 1983 social security estimates, for the W4 wealth definition, are from two sources: (1) a time trend extrapolation of the Leimer and Lesnoy series and (2) estimates calculated from the 1983 SCF survey. The aggregate social security estimates from the 1983 survey varied between $3,735 and $7,578 billion for real growth rates in mean social security benefits (g) of 0–3 percent. (The assumptions and methodology for the 1983 survey estimates of expected retirement benefits are explained in sec. 15.5 of the paper.) The time trend regression forecasts of expected social security benefits, based on Leimer and Lesnoy's series, are $6,000 billion for 1983 and $4,861 billion for 1981. In our W4 series, we use the survey estimate of $5,441.8 billion (for $g = 0.02$) for 1983 and the time trend regression forecast for 1981. We are currently calculating estimates for social security wealth for 1981–83 based on Leimer and Lesnoy's algorithms, but these estimates are not available yet.

Liabilities

Mortgages, Consumer Debt, and Other

There are no major differences in these categories between Goldsmith's work and that of Ruggles and Ruggles and the FFAs. We used Goldsmith's data for the 1900–1945 period and the FFA and the Ruggles and Ruggles estimates for 1949 and subsequent years. For the overlapping years, the difference between Goldsmith's and Ruggles and Ruggles' estimates is quite small, ranging between 1 and 5 percent.

Appendix B

Adjustment and Imputation Methods in the Construction Of Estimates of the Shares of Top Wealth Holders

This appendix discusses the assumptions used in deriving the estimates of both individual and household wealth concentration reported in section 15.4. It is divided into two parts. The first treats the adjustments and imputations made to the original estimates of Lampman, Smith, and Schwartz on the share of top wealth holders based on estate tax data. In addition, adjustments made to household survey data to obtain consistency with the estate tax estimates are also discussed. These results are reported in table 15.5. The second part of this Appendix explains the transformations to the estate tax data, the standardization of the concentration estimates for the top 0.5 and 1.0 percent of the population, and the conversion of the estate data from individual wealth estimates to household estimates.

Adjustments to Original Estate Tax and Household Survey Data

The original data sources used for the construction of our series on the share of top wealth holders reported in table 15.5 are Lampman (1962), Smith and Franklin (1974), and Smith (1984, 1987)—which we collectively refer to as the "Smith data"—and Schwartz (1983) for the estate data and the 1962 SFCC and 1983 SCF adjusted survey data described in section 15.5. Lampman's estimates of top wealth holders' wealth are for the years 1922, 1929, 1939, 1945, 1949, and 1953. Smith's data cover the years 1958, 1962, 1965, 1969, 1972, and 1976. Schwartz's wealth estimate is for 1981.

The adjustments described in this section were undertaken in order to provide a more consistent concentration series from the estate and survey data and to provide concentration estimates for our four wealth definitions, W1–W4. Our adjustments consisted of imputations for trusts, pensions, and, in the W4 wealth definition, social security. We made no adjustments for differences in the estimation of life insurance values among Lampman, Smith, and Schwartz.

Our adjustments to trusts, pensions, and social security are explained below under each asset category. For trusts and pensions, there is a brief description of the methodology used by Lampman and Smith in deriving their concentration estimates. This is followed by an explanation of our adjustments and imputations to the estate sources as well as any adjustments made to the survey data in order to increase comparability between the estate and survey estimates presented in table 15.5. A summary of the data sources and methods used by Lampman, Smith, and Schwartz in deriving their wealth estimates for the various asset categories is given in table 15.B.1.

Trusts

In the original estate data, trust holdings are distributed among the various asset categories (such as stocks, bonds, and real estate) rather than treated as a separate entry. As explained in the text, remainder trusts, which made up a large percentage of trusts, are valued in the estate files at their actuarial value rather than full market value.[27] On the other hand, the aggregate balance sheet data report trusts at full market value. We use both concepts in our estimates. The W1 wealth concept uses the estate actuarial approach, while the W2–W4 wealth measures are based on the full value of trusts.

Procedures Used by Lampman and Smith

Lampman and Smith used different approaches to reconcile the aggregate balance sheet figures with the estate file data. In what Lampman called his "basic version," no adjustments to the original estate data were made. For his so-called total wealth variant, Lampman augmented the reported trust values in the estate data to reflect the full market value of trusts. In order to derive concentration estimates for his total wealth variant, Lampman assumed that the actuarial amount of trusts included in the estate files was approximately 10 percent of their market value. He also made the following assumptions concerning the top wealth holders' percentage of the aggregate market value of trusts: in 1922, 1929, and 1933, the top wealth holders' share was 66 percent; in 1939, 75 percent; in 1949, 80 percent; and in 1953, 85 percent.[28] Smith's approach was the opposite. He used the actuarial concept for trust valuation and reduced the aggregate household balance sheet totals to

Table 15.B.1 Summary of Data Sources and Adjustments for Trusts, Pensions, and Social Security Wealth

Data Source and Years	Summary of Methodology by Asset Type		
	Trusts	Pensions	Social Security
Estate data:			
Lampman: 1922, 1929, 1939, 1945, 1949, 1953,	Basic wealth variant: no adjustment to estate data	Basic wealth variant: no adjustment to estate data	No estimate
	Total wealth variant: used market value of trusts concept. Top wealth holders' share of total trusts was imputed. Used Goldsmith's aggregate value of total pensions for concentration estimates	Total wealth variant: used full pension reserve concept. Top wealth holders' share of pension reserves was imputed. Used Goldsmith's aggregate value of total pensions for concentration estimates	

(*continued*)

Table 15.B.1 (continued)

Data Source and Years	Summary of Methodology by Asset Type		
	Trusts	Pensions	Social Security
Smith: 1958, 1962, 1965, 1969, 1972, 1976,	No adjustment to estate data; reduced Ruggles and Ruggles' aggregate values to reflect the lower actuarial value in the estate data	No adjustment to estate data; used Ruggles and Ruggles' aggregate CSV of pensions for concentration estimates	No estimate
Schwartz: 1981[a]	No adjustment to the estate data	No adjustment to the estate data	No estimate
Household survey data:			
SFCC: 1962; SFC: 1983	Used market value of trusts concept. For explanation of adjustments for underreporting and missing values, see sec. 15.5	Used the CSV concept and also imputed expected pension benefits (W5) Method is explained in sec. 15.5	Estimated expected social security benefits

Note: This table includes only the adjustment procedures used by the original sources in deriving their estimates of wealth inequality. Our adjustment procedures and assumptions used for trusts, pensions, and social security wealth in order to derive our own estimates of wealth concentration, reported in table 15.5, are explained in the first section of App. B.

[a]Schwartz also estimated the wealth of top shareholders for 1982 from the estate files. The 1982 results are not included here because they were not received in time to do the calculations.

be consistent with the lower actuarial value in the estate files. On the basis of his analysis of the 1965 estate file, Smith assumed that the actuarial value represented 54.3 percent of the aggregate market value of trusts and reduced the balance sheet aggregates by this percentage for each year.[29]

Our Adjustments and Imputations for Wealth Concepts W1–W4

Our concentration estimates for wealth version W1 were based on Lampman's "basic version" and Smith's and Schwartz's concentration estimates, all of which included only the actuarial value of trusts in the estate files. The corresponding household aggregate totals for trust funds were reduced by 40–55 percent, depending on the year, on the basis of Smith's analysis of the 1965 data.

Our wealth definitions W2–W4 incorporated the full balance sheet value of trusts. We adjusted the published estate wealth holdings of Lampman and Smith to be consistent with this broader trust definition. First, for each asset category in the balance sheet, we subtracted an estimate of the portion of that asset included in trust funds from the balance sheet total for that asset. For Lampman's data, we based our adjustments on the asset composition of trusts reported in Goldsmith, Lipsey, and Mendelson (1963). For the Smith data, we used the percentage composition of asset holdings by trust funds that he estimated to adjust Ruggles and Ruggles' aggregate trust fund totals. Table 15.B.2 lists the estimated percentage composition of trust funds used to adjust the aggregate household balance sheet totals for each asset.

Second, we estimated upper and lower bounds for the proportion of total trusts owned by the top wealth holders. To compute the upper bound, we assumed that the top 1 percent owned 100 percent of total trusts and that the top 0.5 percent owned 95 percent in every year.

Table 15.B.2 Composition of Trusts Used for Adjusting Top Wealth Holders' Shares for Wealth Concepts W2–W4 (percentages)

	Lampman Years (1922–53)	Smith Years (1958–76)
Real estate	3	2
Cash	2	3
Bonds	20	22
Stocks	70	71
Debt instruments	3	2
Miscellaneous assets	2	0

Sources: The percentage composition for the Lampman years is a weighted average of the yearly composition 1945–59 in Goldsmith, Lipsey, and Mendelson (1963, table III-1a, p. 120). The percentage composition for the Smith years is based on his own calculations from the 1965 Internal Revenue Estate tax file (Smith 1984, 428).

These assumptions were used in the construction of the concentration estimates for W2 reported in the text. The lower-bound assumption was that the top 1 percent owned 80 percent of total trusts and that the top 0.5 percent owned 75 percent in every year. Another alternative assumption that was made was that there was a decreasing trend in the percentage of trusts owned by the wealthy between 1922 and 1983. The lower-bound series and the decreasing-trend series both produced concentration results that fell between the W1 estimates and the upper-bound estimates reported for W2. Thus, the difference between the share estimates of W2 and those of W1 represents the sensitivity of the inequality estimates to alternative trust imputation assumptions. For the W3 and W4 wealth concepts, we assumed that the top 1 percent owned 90 percent and that the top 0.5 percent owned 85 percent of trusts in every year.

The concentration results based on the 1962 SFCC and the 1983 SCF for wealth concepts W1–W4, reported in tables 15.5 and 15.8, used the same assumptions about trusts as explained above for the reported estate series estimates for wealth concepts W1–W4 rather than the estimates based directly on the two surveys. Thus, for the W3 and W4 survey estimates, it was assumed that the top 1 percent owned 90 percent of trust wealth; for W2, it was assumed that they owned 100 percent; and, for W1, the lower actuarial value was used. The reason for this approach is to increase comparability between the survey and the estate tax estimates. The actual estimated trust share of the top 1 percent of wealth holders based on the survey data is 90 percent for the 1962 SFCC and 84 percent for the 1983 SCF.

Pensions

Procedures Used by Lampman and Smith

As was the case with trusts, Lampman and Smith used different valuation methods for pensions. Lampman used the full pension value, based on total pension reserves, and added a constant fraction of total pension reserves to the estimated wealth holdings of the top wealth holders in the estate file. In particular, he assumed that the top wealth holders' share of pensions was approximately 10 percent of total private holdings and 5 percent of total public pension funds in each year. Smith, on the other hand, used the CSV of pension funds, which was already included in the estate file, so that no imputation assumptions were needed.

Our Adjustments and Imputations for Wealth Concepts W1–W4

We used three different valuation techniques for pensions. In wealth concepts W1 and W2, we used, as Smith did, the CSV of pensions.

For W3 and W4, we used the full reserve value of pension funds. Our W5 concentration estimates, calculated for the household survey data and reported in section 15.5, used a different measure, the present value of expected future pension benefits.

For the estate data, we assumed that the CSV of pensions was already included in the estate files. For the household survey data estimates, the CSV of pensions was computed as a constant fraction of the full pension reserves assigned to the top percentiles (see below). The overall concentration shares were not very sensitive to alternative imputations of CSV of pensions because the total CSV value of pensions amounted to only a very small percentage of total household wealth.

We employed the same method in estimating the pension shares of the wealthy as we did for trusts. We calculated reasonable upper and lower bounds and checked the sensitivity of the estimates to the imputation assumptions. For three alternative scenarios, we assumed that the top 1 percent owned a declining proportion of total pension wealth over the 1922–83 period. We based this trend assumption on the growth of actual pension plans over the period and the results from the 1983 SCF. Based on the 1983 SCF and the definition of pension wealth used for wealth concept W5, we found that the share of total pension wealth held by the top wealth holders was very low, with the top 1 percent of households owning between 2.7 and 3.2 percent, depending on the assumed growth rate of future pension benefits.[30] On the basis of this, we assumed that, as a lower bound, the share of pension reserves held by the top 1 percent of wealth recipients declined from 5 to 3 percent over the 1922–83 period. For an upper bound, we assumed that the top 1 percent's share of pension wealth fell from 15 to 10 percent between 1922 and 1983. For our W3 and W4 concentration series, as reported in tables 15.5–15.8, we assumed that the top 1 percent's share declined from 9 to 5 percent over the 1922–83 period. We also estimated several constant proportion scenarios in which the top 1 percent owned either 5 or 3 percent of pension reserves in each year. Our alternative imputation assumptions resulted in, at most, a 1 percentage point difference in the share of total wealth held by the top 1 percent. The survey concentration results for W3 and W4 reported in tables 15.5 and 15.8 used the same assumptions as described above for the W3 and W4 estate estimates.

Social Security (W4 only)

The concentration estimates reported by Lampman, Smith, and Schwartz did not include any imputations for social security wealth. For our W4 series, we made such imputations. To be consistent with the aggregate social security wealth series that we used (see App. A), the top wealth holders' social security holdings should reflect their

expected discounted stream of future benefits. Such imputations were performed for 1962 and 1983, based on the household survey data for those years (see sec. 15.5). However, such direct imputations were not possible for the estate data and, as in case of the trust and pension imputations, certain assumptions were made about the share of total social security wealth held by the top wealth holders. The household survey estimates provide information on the social security shares of the top wealth holders. From the 1962 survey data, we calculated that the top 1 percent of households owned between 2.0 and 2.3 percent of total expected retirement benefits (pension and social security) and that the top 5.0 percent of households owned between 7.3 and 8.4 percent. Our 1983 calculations indicated that the top 1 percent owned between 2.2 and 2.8 percent of expected social security wealth.[31] For our W4 series, we assumed that the top 1 percent owned 5 percent of social security wealth over the 1939–58 period and that this percentage declined from 4 to 3 percent during the period from 1962 to 1983. These shares are slightly higher than the estimates from the two household surveys indicate.

Transformations of the Estate Data Series

As noted in the text, Lampman, Smith, and Schwartz reported concentration estimates for different sample sizes in computing the wealth of top wealth holders. Lampman reported the proportion of the population with gross assets above 60,000 dollars. Smith reported wealth concentration estimates for the top 0.5 and 1.0 percent in each year. Schwartz reported wealth for those with gross assets above $300,000 and $1,000,000. Lampman's population percentage varied from 0.3 to 1.0 percent over the 1922–53 period, while Schwartz's results for 1981 represented 0.8 and 2.0 percent of the population. In table 15.6, we standardized Lampman's and Schwartz's estimates to represent the top 0.5 and 1.0 percent of the population in order to compare their concentration estimates with those of Smith. This required an assumption concerning the functional form of the distribution of wealth.

In tables 15.7 and 15.8, we transformed the estate series from the individual to the household unit in order to estimate the effect of household composition on the concentration trends reported in tables 15.4–15.6 and to compare the estate estimates with the survey estimates. Our assumptions and procedures are explained below.

Extrapolation using the Pareto Distribution

We assumed that wealth above mean wealth followed a Pareto distribution. We fit the Pareto distribution to the estate data concentration

estimates for each year. We used the following cumulative density and mean wealth equation to estimate the parameters, α and β, for each year.

$$P(X > W_0) = \int_{W_0}^{\infty} f(X)dx, \tag{A1}$$

where $P(X > W_0)$ is the percentage of the population with wealth above W_0, $f(X) = r(X)\beta$, and $r(X)$ is the Pareto density function. The function $r(X)$ is given by

$$r(X) = \alpha \bar{W}^{\alpha} X^{-(\alpha+1)}, \quad X > \bar{W}, \ \alpha > 1,$$

where $\bar{W}$ is mean wealth, and $\beta = \text{prob}(X > W)$. The mean of the distribution above W_0 is then given by

$$E(X|X > W_0) = [\int_{W0}^{\infty} xf(x)dx] / [\int_{W0}^{\infty} f(x)dx]. \tag{A2}$$

For Lampman's sample, W_0 was \$60,000.

In order to test the sensitivity of the estimated parameters to the lower bound of the support of the Pareto distribution, we estimated α and β from frequency distributions derived from the 1962 SFCC and the 1983 SCF for the top percentiles. The estimated value of α varied from 1.37 to 1.60 as the lower bound increased. As a check on our point estimates for the Lampman years, we inserted different values for α. Varying α between 1.37 and 1.90 altered the estimated concentration shares of the top 1 percent of wealth holders less than 0.5 of a percentage point. This is due to the fact that the estimate of β shifts with changes in α.

Individual to Household Estimates

In tables 15.8 and 15.9, we report shares for the top 1 percent of households, which we estimated from the estate data on individual wealth holdings. These were calculated in two steps. We first estimated the number of households represented by the individual top wealth holders and then, using the Pareto distribution, standardized to the top 1 percent of households. The latter step was comparatively straightforward. The extrapolation technique to the top 1 percent of households was the same as the population standardization explained above except that for Smith's data we had to estimate the lower wealth bound (W_0) for his published results. The first step required assumptions concerning the number and wealth of households represented by Lampman's and Smith's individual top wealth holders. Since we had no information on the number or the wealth of the households represented, we made assumptions concerning the number of households represented, keeping the wealth level of these "households" the same as the estimated

wealth in Lampman's and Smith's individual samples. This was also done by Williamson and Lindert (1980). We tried two alternative assumptions concerning the number of households represented.

Assumption 1, which was used to calculate the concentration estimates reported in table 15.7, corresponds to the minimum number of households among the top individual wealth holders. We assumed that all married women had married men within the top wealth holders sample. The married women composed from 9 to 18 percent of the sample of top wealth holders, while married men accounted for over 50 percent. Assumption 1 yields a low estimate of the wealth concentration of households compared to individuals because it assumes that the remaining married men wed women with zero wealth. Part of the difference between the survey and our household concentration estimates (table 15.8) is due to the underestimation of married men's wealth in converting the individual estate series into household estimates.

Assumption 2 yields even lower concentration results and, as a result, seems less believable. For it, we assumed that each individual top wealth holder corresponds to a household. This is tantamount to assuming that every married wealthy individual wed a spouse with zero wealth, and this assumption thus runs the risk of overestimating the number of households represented in the sample. Both assumption 1 and assumption 2 result in wealth shares for the top 1 percent of households that are lower than the corresponding shares of the top 1 percent of individuals. Therefore, our conclusion that there is less of a downward trend in the household concentration series than in the individual series for the Lampman years holds, even if the level of the estimates is not reliable.

An alternative set of assumptions was also used in which both the number of households and the level of wealth held by the sample of top wealth holders are altered. For example, in a variant of assumption 1, we assumed that the remaining married men married women with positive wealth levels. These alternative assumptions yield higher levels of concentration than those reported in tables 15.7 and 15.8. However, there is no information on the amount of wealth to allocate to the spouses. An extension of the work in section 15.4 is to investigate the sensitivity of inequality estimates to changes in the unit of observation (household vs. individual) and to changes in household size. This is more accurately done with the survey data than with the estate data since information exists on household size and composition necessary to adjust the survey household estimates to individual wealth estimates.

A recent paper by Marley (1987) transforms the household distribution of wealth from the 1962 and 1983 surveys into individual wealth

distributions under alternative assumptions concerning the division of wealth among household members. Results indicate that wealth inequality estimates from the individual based survey distributions are higher than are estimates from the estate data.

Notes

1. MESP is an acronym for the Measurement of Economic and Social Performance, the name of the project in which the data set was created.
2. Our aggregate social security wealth measure is taken from Leimer and Lesnoy's (1982) revision of Feldstein's original series. We use their fixed ratio version since it yields the smallest value of social security wealth among the alternatives.
3. Also, for simplicity, we shall ignore pension wealth.
4. The assumptions are made to simplify the expression of W_{LC}. For example, if r^* does not equal d, then discounted net interest after age sixty-five must be included in the calculation of W_{LC}. Relaxing the assumptions does not change the result that AW_{LC} is greater than W4, provided that there is positive real income growth over the period from age a to age sixty-five.
5. A comparison of aggregate wealth totals for 1962 and 1983 from national balance sheet data and household survey data is also discussed in sec. 15.5 below, in which we use the aggregate balance sheet figures to adjust the survey estimates for missing values and underreporting.
6. The W4 measure uses the Leimer and Lesnoy (1982) total social security wealth series, which ends in 1978. Our 1981 figure for total social security wealth is estimated using regression analysis. The variables used are described in App. A. The 1983 figure is computed directly from the SCF. For details, see sec. 15.5.
7. The estate estimates provide information for only the top wealth holders. There is not an exact mapping between estimates of the share of top wealth holders and more inclusive inequality measures such as the Gini coefficient.
8. Although we tried several alternative groupings, we could not reproduce exactly Smith's reported aggregate numbers using Ruggles and Ruggles' published numbers. The largest discrepancy was in his miscellaneous asset category.
9. We used the end-year aggregates reported in sec. 15.3 because mid-year calculations were not possible for the 1922–45 period.
10. However, some trusts were not included at all in Smith's estate files. Thus, his numbers are below the "true" actuarial values. Lampman, on the other hand, assumed that there was extensive gift transfer to avoid taxes and adjusted the trust figures upward.
11. Table 15.6 reports concentration figures for total assets, whereas table 15.4 reports them for net worth.
12. It should be noted that the shares for W4 reported in tables 15.5 and 15.6 depend both on the net growth assumptions used in calculating aggregate social security wealth and on the assumed share of social security wealth held by the top 1 percent of wealth holders. The assumptions underlying the W4 concentration estimates are explained in Apps. A and B.

13. This result is based on a comparison of Lampman's 1953 results and Schwartz's 1976 and 1981 estimates. In 1953, married women represented 18 percent of the sample. In 1976, they composed 16.8 percent and, in 1981, 18 percent.

14. The 1979 ISDP results are from Radner and Vaughan (1987). The 1979 Pension Commission survey estimates are from Cartwright and Friedland (1985). The 1962 SFCC and 1983 SCF are from sec. 15.5 of this paper.

15. It should be noted that there were no missing value problems in our SFCC tape version since imputations for missing values had already been performed by the Federal Reserve Board.

16. It should be noted that the use of uniform adjustment factors (overall or by income class) leads to an understatement of the actual variance of these holdings within the population. However, in previous work, sensitivity analyses were conducted on the 1969 MESP file, in which a random error term was added to the average adjustment factor for each asset. The results showed that the inclusion of such an error term had very little effect on estimates of the Gini coefficient and other measures of overall wealth inequality in the population. For details, see Wolff (1982).

17. The source is U.S. Bureau of Labor Statistics (1978, table 127, p. 359). Household inventory items include (1) food purchased for home use, (2) tobacco, (3) alcoholic beverages, and (4) clothing and clothing materials.

18. Separate imputations were performed for husband and wife, and an adjustment in the social security benefit was made for the surviving spouse. The real discount rate i^* was estimated as the ten-year Treasury bill rate less the average annual rate of inflation (as measured by the consumer price index) over the previous ten years.

19. For simplicity, it is assumed that pension vesting is immediate.

20. We define a new measure of household wealth, W2*, as W2 plus household inventories. This is a more standard definition of traditional household wealth than is W2. Since household inventories are lacking in the estate data, we used W2 for this series.

21. Results are similar for W5, the sum of W2 and pension and social security wealth.

22. Indeed, the converse issue arises for some of these categories: namely, should their reported values be adjusted downward to align with the national balance sheet totals? We assumed, as we did for the 1962 SFCC, that there is no apparent incentive for respondents to overreport the value of their assets. Moreover, it is likely that respondent market value estimates of some items such as owner-occupied housing and other real estate would be better than aggregate estimates based on perpetual inventory techniques. Therefore, as in the case of the 1962 SFCC, we made no adjustment for these items.

23. The imputations for inventories were based on U.S. Bureau of Labor Statistics (1978).

24. It was not possible to compare either the distribution of financial securities between the two years since savings bonds were included in the 1962 category but excluded in the later year or the distribution of insurance CSV or pension CSV between the two years because these items were imputed in the 1962 data.

25. The effect of alignment is relatively modest for these two data bases because the degree of underreporting of wealth among the rich is not as significant as it is in other wealth surveys. For example, Curtin, Juster, and Morgan (chap. 10, in this vol.) report significant differences in coverage, particularly

of the upper wealth strata, between the 1983 SCF, on the one hand, and the 1984 Panel Study of Income Dynamics and the 1984 Wealth Supplement to the SIPP, on the other hand. Also, table 15.9 of this paper indicates large variations in the reliability of different wealth surveys. Thus, for those surveys with poor coverage of the upper wealth strata, alignment to aggregate national balance sheet totals is likely to alter estimated wealth inequality significantly.

26. The Leimer and Lesnoy series are in 1972 dollars and were converted to nominal values in our W4 estimates.

27. For a more detailed explanation, see Smith (1984).

28. Lampman's estimates of the percentage of trusts owned by the top wealth holders increased over time because the percentage of top wealth holders in the estate tax sample increased from 0.3 to 1 percent of the population over this period.

29. Smith and Franklin (1974) compared the capitalized income from trusts reported on the income tax returns filed for 1965 (the only year for which these data were available) to the aggregate household balance sheet total for trusts.

30. In this case, pension wealth was defined as the present value of future pension benefits. For the 1962 survey, it was not possible to separate out pension from social security benefits.

31. The percentage of retirement wealth held by the top wealth holders varies, depending on the growth rate assumption used for future social security benefits. The methodology used in calculating expected retirement wealth for the two household surveys is explained in sec. 15.5 of the paper.

References

Atkinson, A. B. 1975. The distribution of wealth in Britain in the 1960's—The estate duty method reexamined. In *The personal distribution of income and wealth*, ed. James D. Smith. NBER Studies in Income and Wealth, no. 39. New York: Columbia University Press.

Avery, Robert B., Gregory E. Elliehausen, and Arthur B. Kennickell. 1987. Measuring wealth with survey data: An evaluation of the 1983 Survey of Consumer Finances. Paper presented at the twentieth conference of the International Association for Research in Income and Wealth, Rocca di Papa, Italy, September.

Board of Governors of the Federal Reserve System. Flow of Funds Section. 1986. *Balance sheets for the U.S. economy, 1946–1985*. Washington, D.C.: Board of Governors of the Federal Reserve System.

Cartwright, William S., and Robert B. Friedland. 1985. The President's Commission on Pension Policy household survey 1979: Net wealth distribution by type and age for the United States. *Review of Income and Wealth*, ser. 31 (September): 285–308.

Feldstein, Martin S. 1974. Social security, induced retirement and aggregate capital accumulation. *Journal of Political Economy* 82 (October): 905–26.

Goldsmith, Raymond W. 1962. *The national wealth of the United States in the postwar period*. Princeton, N.J.: Princeton University Press.

Goldsmith, Raymond W., Dorothy S. Brady, and Horst Mendershausen. 1956. *A study of saving in the United States*. Princeton, N.J.: Princeton University Press.

Goldsmith, Raymond W., Robert E. Lipsey, and Morris Mendelson. 1963. *Studies in the national balance sheet of the United States*. Princeton, N.J.: Princeton University Press.

Greenwood, Daphne. 1983. An estimation of U.S. family wealth and its distribution from microdata, 1973. *Review of Income and Wealth*, ser. 29 (March): 23–43.

———. 1987. Age, income, and household size: Their relation to wealth distribution in the United States. In *International comparisons of the distribution of household wealth*, ed. Edward N. Wolff. New York: Oxford University Press.

Internal Revenue Service. 1965. *Statistics of Income, 1962: Individual Income Tax Returns*. Publication no. 79 (1-65). Washington, D.C.: U.S. Government Printing Office.

Kotlikoff, Laurence J., and Daniel E. Smith. 1983. *Pensions in the American economy*. Chicago: University of Chicago Press.

Lamas, Enrique J., and John M. McNeil. 1986. Factors associated with household net worth. Paper presented at the meeting of the American Economic Association, New Orleans, LA, December.

Lampman, Robert J. 1962. *The share of top wealthholders in national wealth, 1922–56*. Princeton, N.J.: Princeton University Press.

Leimer, Dean R., and Selig D. Lesnoy. 1982. Social security and private saving: New time-series evidence. *Journal of Political Economy* 90 (June): 606–21.

Marley, Marcia. 1987. Sensitivity of U.S. wealth inequality to population unit, data source and wealth definition. Paper presented at the meeting of the American Statistical Association, San Francisco, Calif., August.

Musgrave, John C. 1986. Fixed reproducible tangible wealth in the United States: Revised estimates. *Survey of Current Business* 66 (January): 51–75.

President's Commission on Pension Policy. 1980a. Pension coverage in the United States. Washington, D.C. Mimeo.

———. 1980b. Preliminary findings on a nationwide survey on retirement income issues. Washington, D.C. Mimeo.

Projector, Dorothy, and Gertrude Weiss. 1966. Survey of financial characteristics of consumers. Technical Papers. Washington, D.C.: Board of Governors of the Federal Reserve System.

Radner, Daniel B., and Denton R. Vaughan. 1987. Wealth, income and the economic status of aged households. In *International comparisons of the distribution of household wealth*, ed. Edward N. Wolff. New York: Oxford University Press.

Ruggles, Richard, and Nancy Ruggles. 1982. Integrated economic accounts for the United States, 1947–1980. *Survey of Current Business* 62 (May): 1–53.

Schwartz, Marvin. 1983. Trends in personal wealth, 1976–1981. *Statistics of Income Bulletin* 3 (Summer): 1–26.

Shorrocks, Anthony F. 1987. U.K. wealth distribution: Current evidence and future prospects. In *International comparisons of the distribution of household wealth*, ed. Edward N. Wolff. New York: Oxford University Press.

Skolnik, Alfred. 1976. Private pension plans, 1950–74. *Social Security Bulletin* 39 (June): 3–17.

Smith, James D. 1984. Trends in the concentration of personal wealth in the United States, 1958–1976. *Review of Income and Wealth*, ser. 30 (December): 419–28.

———. 1987. Recent trends in the distribution of wealth in the U.S.: Data research problems and prospects. In *International comparisons of the dis-*

tribution of household wealth, ed. Edward N. Wolff. New York: Oxford University Press.
Smith, James D., and Stephen D. Franklin. 1974. The concentration of personal wealth, 1922–1969. *American Economic Review* 64 (May): 162–67.
U.S. Bureau of Labor Statistics. 1978. *Consumer Expenditure Survey: Integrated diary and interview survey data, 1972–73*. Bulletin no. 1978. Washington, D.C.: U.S. Government Printing Office.
Williamson, Jeffrey G., and Peter A. Lindert. 1980. Long-term Trends in American wealth inequality. In *Modeling the distribution and intergenerational transmission of wealth*, ed. James D. Smith. Chicago: University of Chicago Press.
Wolff, Edward N. 1980. Estimates of the 1969 size distribution of household wealth in the U.S. from a synthetic database. In *Modeling the distribution and intergenerational transmission of wealth*, ed. James D. Smith. Chicago: University of Chicago Press.
———. 1982. Effect of alternative imputation techniques on estimates of household wealth in the U.S. in 1969. In *Accumulation et repartition des patrimoines*, ed. D. Kessler, A. Masson, and D. Strauss-Kahn. Paris: Economica.
———. 1983. The size distribution of household disposable wealth in the United States. *Review of Income and Wealth*, ser. 29 (June): 125–46.
———. 1987a. The effects of pensions and social security on the distribution of wealth in the United States. In International comparisons of the distribution of household wealth, ed. Edward N. Wolff. New York: Oxford University Press.
———. 1987b. Estimates of household wealth inequality in the U.S., 1962–1983. *Review of Income and Wealth*, ser. 33 (September): 231–56.
———. 1989. Trends in aggregate household wealth in the U.S., 1900–1983. *Review of Income and Wealth*, ser. 35 (March).

Comment

Robert B. Avery

Wolff and Marley have embarked on an ambitious enterprise: first, to align a number of sources to produce a historically consistent time series of aggregate U.S. household wealth from the 1920s to date and, second, to compare the evidence on wealth concentration over the same time period. Not surprisingly, their paper is quite long and cannot be easily evaluated in a few simple comments.

In my view, the primary contribution of their paper is their careful and painstaking attempt to build a set of consistent series of household wealth. Because these series depend critically on numerous small de-

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The opinions expressed here do not necessarily reflect those of the Board of Governors of the Federal Reserve System or its staff. Special thanks to Arthur Kennickell for helpful comments.

cisions, I have chosen to comment principally on some of the key decisions rather than the conclusions based on the series.

Four different measures of aggregate wealth are tabulated for twenty points in time ranging from 1900 to 1983. The four wealth measures differ according to their treatment of trust assets (cash surrender value [CSV] vs. full equity value), private pension assets (CSV vs. current value of pension reserves), and the inclusion of social security wealth (measured by the present value of future benefits). Most of the data for the authors' tabulations are drawn from Goldsmith, Lipsey, and Mendelson (1963) for prewar figures, and the Federal Reserve Board's flow-of-funds accounts (FFAs) and Ruggles and Ruggles (1982) for postwar data. Data on household durables are also taken from Musgrave (1986) and social security wealth estimates from Leimer and Lesnoy (1982).

Most of the adjustments the authors made involve resectoring of the published data—that is, changes in the classification of assets rather than changes in value totals. Some of these changes are substantial, as pointedly demonstrated by a comparison of values for 1949, 1953, and 1958, years for which data from Goldsmith, Lipsey, and Mendelson, Ruggles and Ruggles, and the FFAs are all available. The three sources differ in their projected totals for virtually every asset, and differences are not small, ranging from 3 to 47 percent. The magnitude of these differences—many of which can be only partially corrected through resectoring—suggests that great caution should be exercised in using specific asset series drawn from different sources. Moreover, although definitional problems will tend to be offsetting, they almost surely do affect net worth calculations.

Unfortunately, Wolff and Marley give little sense of either the precision of their calculations or the robustness of their estimates to the meshing rules that they use. The reader is given little feeling of how sensitive conclusions about such issues as the long-run trend in real per capita wealth are to these decisions.

Their treatment of social security wealth is a case in point. In their paper, Leimer and Lesnoy propose twenty different social security wealth series that range in value from $1.3 to $4 trillion in 1976. This range amounts to almost 50 percent of the total value of all other household wealth at that time. Wolff and Marley, apparently arbitrarily, select one measure. Moreover, they choose a measure of *gross* social security wealth, which some might argue is inconsistent with the concept of *net* worth. They also use a "time trend extrapolation" to extend the Leimer and Lesnoy series, which ends in 1977, to 1983. This procedure ignores the major overhaul of social security that took place in 1982, which surely affected social security wealth. Since Wolff and Marley attribute the majority of the increase in real per capita wealth in the last fifty years to social security, it would be very useful to know how sensitive their conclusions are to these decisions.

The second portion of the paper deals with wealth concentration. Wolff and Marley use data from the Internal Revenue Service (IRS) estate tax multiplier series to estimate the wealth holdings of the top 1 percent of the population for years ranging from 1922 to 1981. Since published data for the estate tax series are given for individual wealth holdings above certain dollar amounts (e.g., the wealth of individuals with gross assets of more than $60,000), Wolff and Marley have to make certain assumptions to convert these figures to percentages of total household wealth. They fit a Pareto distribution to the reported data and use the estimated distribution to determine the wealth holdings of the top 0.5 and the top 1 percent of households. Clearly, the estate tax series is virtually the only source that can be used to examine changes in concentration over a long period of time. However, as has been pointed out elsewhere, several concerns arise with its use. The estate tax series is defined for individuals, whereas some concept of a household is generally thought to be the relevant unit for measuring changes in society's well-being over time. Wolff and Marley acknowledge this problem and propose several different methods for combining individual estate tax filers into households. Their estimates, however, are lower bounds. Moreover, the authors do not allow for changes over time in the rules allocating wealth within households. Work that my colleagues and I have done with the 1983 Survey of Consumer Finances (SCF) and the 1962 Survey of Financial Characteristics of Consumers (SFCC) suggests that the effect of such assumptions can be large.[1] Working with household data, we have found that the percentage of wealth held by the top 1 percent of individuals can vary by more than 5 percentage points, depending on whether wealth within the household is allocated to maximize or minimize concentration. This range is almost as large as the computed change in the Wolff and Marley series from 1922 to 1972. While I am a strong supporter of the estate tax multiplier data, I believe that more work needs to be done on the allocation of taxable assets between household members (and between generations)—and changes in these allocations over time—before we can make definitive statements about long-run trends in concentration.[2]

The final portion of the paper looks at the issue of wealth concentration using household survey data. Most of their discussion focuses on the 1962 SFCC and 1983 SCF and parallels work that I have done with my colleagues Arthur Kennickell and Gregory Elliehausen (see Avery, Kennickell, and Elliehausen 1988). Not unexpectedly, we made some different assumptions from Wolff and Marley on which I would like to focus my remarks.

Although both the SCF and the SFCC were very complex surveys, they are not complete. In addition, there are missing values for many variables in both data sets. Several items, such as businesses and life insurance, were not fully imputed in the original public use tape of the

SFCC, and complete pension and social security data were not collected in that survey. The original SCF tape contained missing values for many variables. In the paper presented at the conference, Wolff and Marley used fairly simple algorithms to impute missing values. The most complicated of their procedures involved assigning the observed mean value by income class to missing items. Assets such as pensions or durable goods were assigned as mean predictions from very simple regressions based on demographic and employment variables.

Our own work suggests that, while variation in imputation procedures may not affect estimates of mean holdings of many assets and liabilities very much, this is not true for every asset category (or for income). Moreover, concentration measures are not invariant to the imputation procedures used. Most state-of-the-art imputation procedures attempt to estimate and preserve both the first and the second moments of variables with missing values. Filling in missing values with means reduces the variance of variables and reduces the density in the extreme tails. The holdings of the top 1 percent of the population, the group looked at by Wolff and Marley, are very likely to be biased downward by this procedure. In the present version of their paper, Wolff and Marley have recomputed their tables for the 1983 SCF using our imputations, which took full account of second moments. Nevertheless, simplistic imputations remain for a number of variables, such as durable goods, social security, and pensions. Their imputations for the 1962 SFCC also lack any adjustment for second moments.

A more serious problem with Wolff and Marley's methodology is their decision to align the household survey data with aggregate estimates, presumably to give a better measure of the overall wealth of each household. Survey-based totals are compared to aggregate estimates (FFAs, etc.) on a variable-by-variable basis. If the survey total exceeds the aggregate total by, say, 10 percent, then the holding of that variable for each survey respondent is reduced by 10 percent. Survey responses are inflated when survey totals are less than the aggregate.

Underlying the Wolff and Marley adjustment is the presumption that response bias affects every holder of an asset proportionately and is unrelated to bias in other answers. I believe that very few survey experts would agree with this view. It is clear that much of the "bias" in survey reporting involves missectoring—that is, respondents misclassify assets, calling a money-market account a checking account and so forth. Our detailed work in this area shows that survey-based estimates for bonds, for example, match FFA-based estimates quite closely in total but miss substantially in allocating bonds between federal, municipal, and other categories. This suggests that some respondents may not know what kind of bond they have but that they can report its value accurately. The Wolff and Marley procedure would probably

cause no great harm if sectoring problems were random. However, they probably are not. More sophisticated respondents may be less likely to misclassify assets; however, respondents with a lot of different holdings may have more opportunity to do so. If misclassifications are not random, the Wolff and Marley procedures could very likely bias concentration estimates. As an example, suppose that a narrowly held asset, Treasury bills, tends to be misclassified as a broadly held asset, U.S. savings bonds. The Wolff and Marley procedure would inflate the value of all reported Treasury bills and deflate the value of all reported savings bonds. The net worth of less wealthy households will be decreased, on the average, because they hold savings bonds but do not hold Treasury bills. Wealthy households will gain by the same reasoning, thus distorting the share of wealth estimated for the top wealth holders.

The Wolff and Marley alignment procedure also rests critically on the assumption that aggregate estimates of asset and liability categories are themselves measured accurately and that they measure the same things as the survey estimates. Our work suggests that neither of these assumptions may be realistic. The household-sector holdings of many assets are computed as the balancing residuals in the FFAs and thus are sensitive to measurement errors in every sector. Drawing the line between true households and small businesses, trusts, and nonprofits, for example, is inexact at best. Our work suggests that the survey estimates of deposit holdings and installment loans can be bought into much closer alignment than appears at first glance. Much of this adjustment, however, is to the FFA numbers, not just the survey estimates. At the very least, our work suggests that, if one wanted to align the survey data, the process would involve a much more complicated, variable-by-variable, analysis than that done by Wolff and Marley.

I fear that some of my comments may leave an overall view that I am negative about the Wolff and Marley paper. On the contrary, I believe that they have made a tremendous effort on a difficult and complex task. While I believe that much work remains for them, and for others, they have made a bold start.

Notes

1. See Avery, Elliehausen, and Kennickell (1988).

2. There are a number of other issues related to the estate tax multiplier series that I raised at the conference, particularly the "preaudit" nature of the series, differences between the value of assets at death and for the living, and the effect of the 1976 and 1981 tax law changes on returns filed for those years.

Subsequent work by Fritz Scheuren and Janet McCubbin at the IRS suggests that differences between pre- and postaudit figures may not be large. This effort, which is part of an ongoing project, shows great promise in shedding light on a number of issues related to the series.

References

Avery, Robert B., Gregory E. Elliehausen, and Arthur B. Kennickell. 1988. Measuring wealth with survey data: An evaluation of the 1983 Survey of Consumer Finances. *Review of Income and Wealth* ser. 34, no. 4 (December).

Goldsmith, Raymond W., Robert E. Lipsey, and Morris Mendelson. 1963. *Studies in the national balance sheet of the United States*. Princeton, N.J.: Princeton University Press.

Leimer, Dean R., and Selig D. Lesnoy. 1982. Social security and private saving: New time-series evidence. *Journal of Political Economy* 90 (June): 606–21.

Musgrave, John C. 1986. Fixed reproducible tangible wealth in the United States: Revised estimates. *Survey of Current Business* 66 (January): 51–75.

Ruggles, Richard, and Nancy Ruggles. 1982. Integrated economic accounts for the United States, 1947–1980. *Survey of Current Business* 62 (May): 1–53.