The Personal Wealth of U. S. Top Wealth Holders, 1986-1995

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The Statistics of Income Division of IRS has a long history of producing estimates of personal wealth using data collected from Federal estate tax returns. These returns are a rich source of data on the demographic characteristics, portfolio composition, and debts of individuals with gross assets at or above the filing threshold in effect for the particular year examined. Using the estate multiplier technique, estimates of wealth for the living population can be derived from this unique data source. This paper focuses on changes in the demographic makeup and portfolio composition of America's top wealth holders between 1986 and 1995. Changes in the share of national wealth controlled by this group are also explored. The paper begins with a discussion of the methodology used to produce the estimates, including a description of the underlying sample of estate tax returns. The limitations of using tax data for wealth estimates are examined, and techniques that address some of these limitations are introduced. Finally, plans for future improvements in this ongoing series of estimates are discussed.

■ Background

The first estimates of national wealth produced using death records date to the middle of the 19th century. However, British statistician Bernard Mallet is credited with refining the methodology by developing what is now known as the Estate Multiplier Technique.[1] For his 1905-1906 estimates of wealth, he created multipliers, within age categories, using national mortality tables and applied these to data, grouped by age at death, from British Estate Duty records. Similar estimates were first produced for the U.S. by Horst Mendershausen and later by Robert Lampman and James Smith.[2,3] The Statistics of Income (SOI) Division has been using the estate multiplier technique to estimate the wealth of living individuals since 1962.[4]

The personal wealth estimates presented in this article are based on data from Federal estate tax returns (Form 706), and are, therefore, limited to individuals with gross assets of $600,000 or more, the filing threshold in effect for most of the period 1986-1995. The tax return contains a complete listing of a decedent's assets and debts, as well as a demographic profile of the decedent and information on the costs of administering the estate. A decedent's estate has up to 9 months to file an estate tax return, but use of a 6-month extension is not uncommon. It is, therefore, necessary to sample returns filed over a number of calendar years in order to capture data representative of all estate tax decedents dying in a single year. SOI has combined returns filed over 3-year periods to produce estimates of wealth for 1986, 1989, 1992, and 1995. One of the strengths of the estate multiplier technique is the large sample upon which the estimates are based. The 1986 sample includes over 17,000 returns; the 1989, 22,000 returns; the 1992, more than 16,000 returns; and the 1995, more than 19,000 returns. These samples are considerably larger than those selected for other studies at comparable levels of wealth.

While the sample size and richness of available data make this estimation technique attractive, there are limitations that must be recognized. The most important is that estate tax returns provide a presumably random sample, stratified by age, not of the total population, but of living persons with gross assets at or above the filing threshold, which was $600,000 for the period of these estimates.[5] Research has proven that individuals who are economically or socially better off live longer and are healthier than the general population. Factors such as access to better health services, better diet and nutrition, fewer risks on the job, and access to better housing all seem to contribute to this phenomenon.[6] Therefore, it is important to determine a mortality rate appropriate to this sample. If mortality and wealth are correlated, then biased estimates will result using mortality rates unadjusted for wealth level. Evidence suggests that there is an inverse relationship between these factors, meaning that the multipliers will be too low and thus undervalue wealth.[7] Further, it has been shown that, while patterns of wealth holding appear quite robust over a variety of reasonable alternate assumptions about the

magnitude of the multipliers, overall aggregate estimates are relatively sensitive to the selection of the mortality rates. This suggests that care should be taken not to give wealth concentration estimates undue emphasis.[8]

■ Estate Study Sample Design

The SOI Estate Study runs on a 3-year cycle. The sample is designed mainly to accommodate year of death estimates, with each study concentrating on decedents who died in the first year, the focus year, of the 3-year cycle. However, the sample is adequate for filing-year estimates as well. Year of death estimates are desirable because filing extensions and other filing delays mean that returns filed in any given calendar year can represent decedents who died in many different years. Thus, estate tax return data for a single filing year can reflect different economic and tax law conditions. By concentrating on a single year of death, these limitations can be overcome, making it possible to study the data in the context of a single time period.

The sample for the Estate Study is a stratified random sample with three stratifying variables. Since 1982, the stratifying variables have been year of death (focus year, non-focus year), total gross estate, and age at death. Gross estate is divided into 5 categories: $600,000 < $1 million, $1 million < $2.5 million, $2.5 million < $5 million, $5 million < $10 million, and $10 million or more. Age at death is divided into age < 40, 40 < 50, 50 < 65, 65 < 75, and 75 or older. Sample rates vary from 3 percent to 100 percent, with over half the strata selected with certainty. Returns are selected for the sample as they are processed for revenue purposes.

Weights for the estate sample are calculated in several steps. The first step is to adjust population and sample counts for returns that were selected into the sample but that, upon close examination, either did not conform to SOI standards, or did not fall within the parameters of the study. This occurs mainly when a return is not complete by the filing deadline. In such cases, a final return will be filed when all the required information has been compiled. There are also a small number of returns that are unavailable to SOI because they are under review by other areas of the IRS. Next, adjustments are made for misclassified returns, which arise primarily from taxpayer (or IRS processing) errors that result in returns being assigned to an incorrect strata at the time sampling took place. Finally, the data are poststratified, using auxiliary data from the IRS Master File that have been examined and corrected in an attempt to correct for large returns not originally available for sampling due to data transcription errors.

Although the overall sample of estate tax returns is large, the number of young (age less than 40) or extremely wealthy (gross assets of $5 million or more) decedents in any given year is small in comparison to their number in the living population. Accordingly, records for decedents with these characteristics would receive relatively large sample weights. The resulting estimates for these two categories of living individuals would be subject to significant fluctuations from period to period due solely to the relatively large 'sample variance' associated with these groups.[9] To reduce this variance, the sample is 'smoothed' by including all returns for young or wealthy decedents filed during the 3-year sample period without regard to the year of death. These segments of the sample are then post-stratified and re-weighted to represent the true decedent population for the year of interest. This technique reduces the effect of outliers on the estimates.

■ Adjustments for Missing Returns

One of the main objectives of the 3-year Estate Study sample design is to compute year of death estimates for the focus year of death. In general, most returns for year of death Y are filed in year Y+1. However, there are a number of returns that are filed after year Y+2 when the 3-year sampling cycle is completed. For this reason, an adjustment, like a nonresponse adjustment, is computed for the focus year of death to account for those returns filed after year Y+2.

Estate tax data collected by SOI for returns filed over 10 calendar years, 1986-1995, were used to compute the nonresponse adjustments. Adjustments were computed by first estimating the total population of estate tax decedents for several years of death using the 3-year sample files described above. Next, estimates of the total population of estate tax decedents for the same years of death were computed using the 10-year file.

Ratios of the 3-year file estimates to the 10-year file estimates were then calculated within categories created using the original stratifying variables, age and size of gross estate, as well as a variable indicating whether or not the estate incurred a tax liability. Tax status was considered because it seemed likely that returns for estates incurring a significant tax liability might take longer to prepare than those for estates that, for a variety of reasons, would not incur any tax liability. The adjustments were then validated using data from the IRS Master File for the same calendar years. The result was a set of ratio adjustments based on a decedent's age and tax status, with separate adjustments for estates with over $10 million in gross assets which, when used with 3-year sample files, approximate the total decedent population for the focus year of death (see Table 1).

Table 1: 3-Year Ratio Adjustments

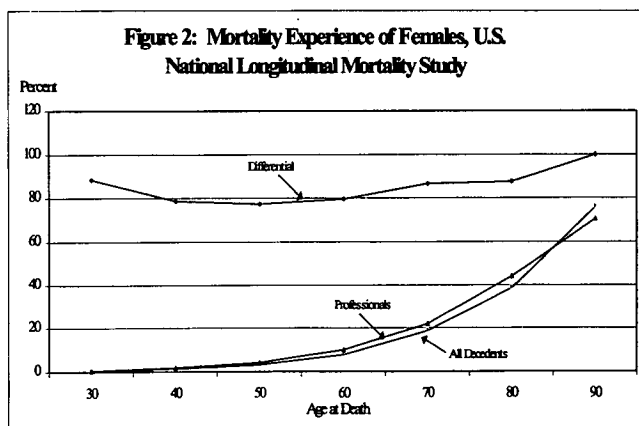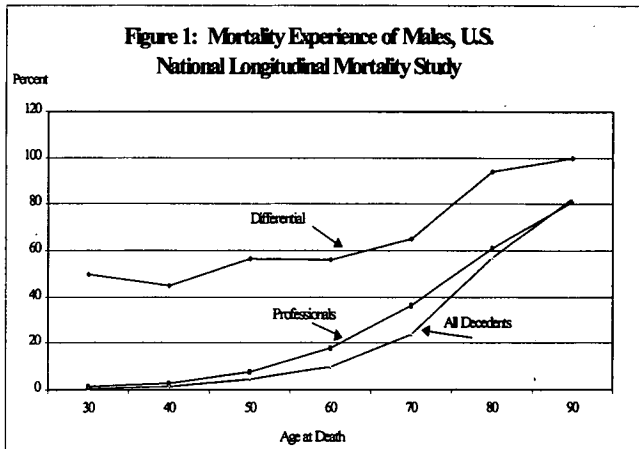| Adjustment Cell	Adjustment Ratio
Gross Estate > $10 Million, all ages	
Taxable	1.00178
Nontaxable	1.01414
Gross Estate < $10 Million, Taxable	
Age < 40	1.02443
40 <= Age <= 50	1.02061
50 <= Age <= 65	1.02281
65 <= Age <= 75	1.00753
Age >= 75	1.00543
Gross Estate < $10 Million, Nontaxable	
Age < 40	1.06146
40 <= Age <= 50	1.04868
50 <= Age <= 65	1.03069
65 <= Age <= 75	1.01877
Age >= 75	1.01629

■ Mortality Differentials

One of Bernard Mallet's colleagues criticized his use of national mortality rates for wealth estimates derived from death duty records that were filed for the relatively rich. The critic suggested that mortality rates for "families of the peerage" or mortality tables derived from life insurance data would be more appropriate to wealthy decedents.

There have been a considerable number of attempts to quantify differences between the mortality of the general population and that of the very wealthy, looking at factors such as education, income, and occupation, but focusing mainly on white males. In fact, very little research has focused on the effects of these factors on the mortality of women. The first U.S. estimates of personal wealth from estate tax returns used mortality data supplied by the Metropolitan Life Insurance Company for large, whole life insurance policies to adjust national mortality rates. This practice was used by SOI for subsequent estimates. One drawback has been the inability to calculate adjustments that were sex-specific from this data source.[10] Thus, an alternate data set, the National Longitudinal Mortality Study (NLMS), produced by the National Institutes of Health, was used here.

The NLMS is a random sample of 1.3 million Americans of all ages, races, and sexes, in the civilian, noninstitutionalized population. The sample was drawn mainly from the Census Bureau's Current Population Survey. Interviews, done by telephone, achieved a 96-percent response rate. Respondents were at least 14 years of age. Mortality was determined by linking the Census data to the National Death Index.

Because the NLMS did not contain information on a respondent's wealth, income and occupation were used to identify survey respondents with characteristics similar to estate tax decedents. Using occupation data coded from a sample of Federal estate tax returns, it was determined that a majority of decedents for whom an occupation was reported were employed as professionals, managers, sales persons, or farm owners/managers. The analysis, therefore, was limited to NLMS respondents in those occupation categories. Income on the NLMS public-use file is reported in 7 categories, with annual income of $50,000 or more as the top category. A preliminary file linking estate tax data with data from income tax returns filed for decedents in the year prior to death was used to choose appropriate levels of income for this analysis. Mortality differentials were produced within age and sex groups by calculating a simple ratio of the mortality rate for NMLS decedents whose incomes and occupations were similar to the incomes and occupations of estate tax decedents to the mortality rate for all individuals in the NMLS sample. The result-

ing ratios, or mortality rate differentials, are shown in Figures 1 and 2. National mortality rates, published by the National Center for Health Statistics, were then multiplied by the differential to obtain mortality rates appropriate for wealthy decedents.

Figure 1: Mortality Experience of Males, U.S. National Longitudinal Mortality Study

Figure 2: Mortality Experience of Females, U.S. National Longitudinal Mortality Study

The differences between the mortality rates of the general population and those of individuals with characteristics similar to the estate tax decedent population, captured in the magnitude of the mortality rate differentials, are most pronounced for young decedents; these differences disappear entirely by age 85. For example, the mortality rate for a wealthy male under the age of 40 is about half that of a male in the general population. However, for males over 85 years of age, the mortality rates are the same for both groups. The mortality differentials estimated here for wealthy males seem to be in line with estimates by other researchers.[11] Wealth seems to have had a much smaller effect on the mortality rates of females in the NMLS sample than for their

male counterparts. The mortality rate for wealthy females under age 40 was 89 percent of that for females in the general population. Again, for females over 85 years of age, the mortality rates are the same for both groups.
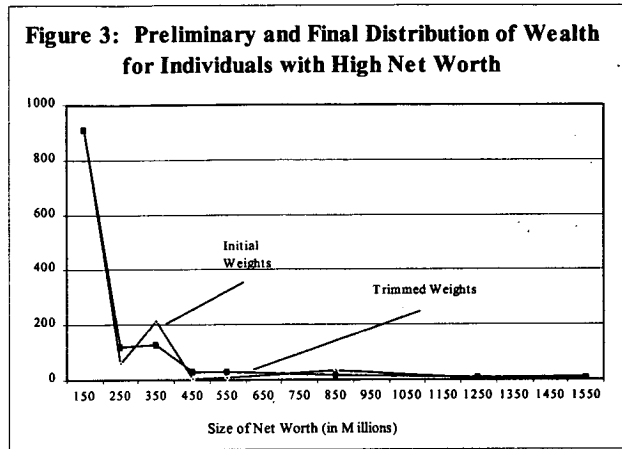
■ Multipliers

The final multipliers (or sample weights) are calculated as:

$$\frac{706 \text{ sample weight*nonresponse adjustment}}{U.S. \text{ mortality rate * mortality differential}}$$

The multipliers used in these estimates range from about 2 to about 2,000. The extremely skewed distribution of net worth is of particular interest to researchers. Because the underlying sample of estate tax returns was stratified by size of gross assets, which is not highly correlated with net worth, it would be appropriate to post-stratify.[12] However, the necessary control totals are not readily available. Still, there were some records with very large positive or large negative net worth that were assigned extremely large multipliers which did not seem representative of the actual, living population. Thus, it seemed inappropriate to do nothing. The multipliers for these records were constrained so that the tails of the net worth distribution resembled a Pareto distribution, which researchers have found to fit distributions of wealth and income fairly well.[13]

The upper tail of the net worth distribution was defined as those individuals with net worth of $250 million or more. In order to determine the parameters of the Pareto, the empirical distribution of net worth implied by the individuals in the Forbes 400 for the years 1982-1992 was examined.[14] The data approximated a Pareto with $\alpha=\frac{1}{2}$. The SOI data were then divided into the following net worth categories: $250 to $350 million; $350 to $550 million; and greater than $550 million. The estimate of 47 in the unbounded strata was preserved, with each case assigned the mean value for the multiplier. The multiplier values in the 2 bounded net worth categories were then fit to a Pareto with $\alpha=\frac{1}{2}$, with each case assigned the mean value. The effects of these adjustments on the distribution of 1992 wealth holders are shown in Figure 3.

Figure 3: Preliminary and Final Distribution of Wealth for Individuals with High Net Worth

Similar adjustments were made for returns with extreme negative net worth (less than -$1 million). These cases were grouped into three categories: -$1 to -$5 million; -$5 to -$15 million; and less than -$15 million. A univariate distribution of the multipliers was computed and the multipliers trimmed at the third quartile in each of the bounded categories. There were three cases in the unbounded category. Two of these had quite large multipliers that seem unrepresentative of the general population. It was decided to assign all three cases the value of the lowest multiplier. The effects of these adjustments on the net worth distribution of 1992 wealth holders are shown in Figure 4.

Figure 4: Preliminary and Final Distribution of Wealth for Individuals with Large Negative Net Worth
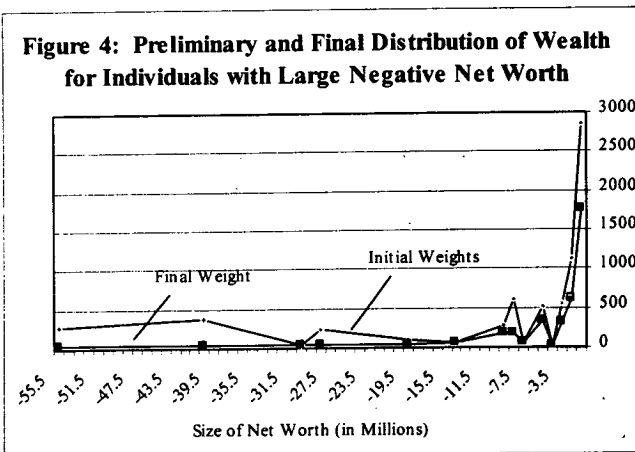
■ Top Wealth Holders, 1986-1995

The number of individuals with at least $750,000 in total assets increased from 1.7 million to almost 2.2 million between 1986 and 1995.[15,16] Figure 5 shows that

there was an increase in the number of top wealth holders between 1986 and 1989. This period marked the end of the longest peacetime economic expansion in U.S. history.[17] Gross Domestic Product (GDP) experienced real growth of more than 10 percent, while inflation averaged a modest 3.5 percent. The economy experienced a recession at the end of 1990, which, although officially over by March of 1991, had a subsequent recovery that was slow and uneven.[18] The effect of this recession is reflected in the slight decrease in the number of top wealth holders between 1989 and 1992. However, the growth in the number of top wealth holders between 1992 and 1995 is evidence of the economic recovery that occurred during this period. In fact, the increase in the number of top wealth holders between 1992 and 1995 more than made up for the losses of the prior period.

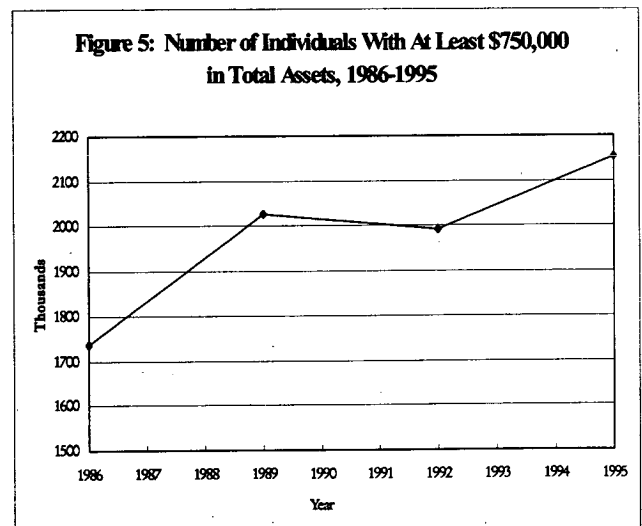**Figure 5: Number of Individuals With At Least $750,000 in Total Assets, 1986-1995**

Figure 6 shows a breakdown of top wealth holders by sex. Overall, males made up about two-thirds of this group, although they accounted for only 48.8 percent of the total U.S. population between 1986 and 1995.[19] However, the percentage of top wealth holders made up of males declined over the 10-year period. In contrast, the percentage of total top wealth holders who were female increased steadily between 1986 and 1995, despite the fact that the percentage of women in the overall U.S. population actually declined about 0.2 percent over the same period.

Figure 6: Top Wealthholders, by Sex, 1986-1995
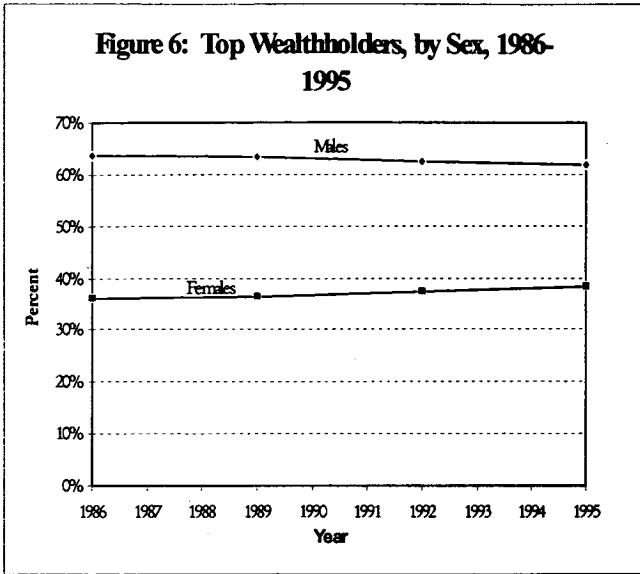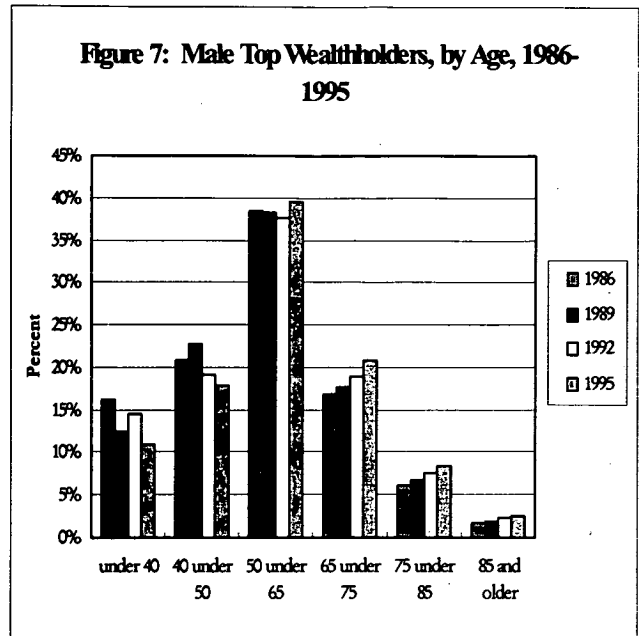

Figure 7: Male Top Wealthholders, by Age, 1986-1995

Figure 7 depicts changes in the age composition of the male top wealth holder group over time. The median age of male top wealth holders was relatively stable between 1986 and 1995, declining slightly from 68 years to 66 years. There was a decline in the percentage of this group made up of males age 40 and younger from 16 percent to 11 percent between 1986 and 1995. Likewise, there was a decline in the percentage of wealthy males who were between the ages of 40 and 50 over the ten-year period. However, the percentage of all male top wealth holders who were between the ages of 50 and 65 did not change between 1986 and 1995. In contrast, the percentage of male top wealth holders who were age 65 or older clearly increased over the 10-year period. This suggests an overall aging of the existing wealth holder population, with relatively fewer 'new' young male top wealth holders entering the population during the period.

Looking at female top wealth holders by age over the 10 years between 1986 and 1995 reveals a somewhat different picture (see Figure 8). While there was a decline in the percentage of all female top wealth holders in the youngest age category over the period, the trends in the remaining age categories are much less clear. The percentage of female top wealth holders who were age 65 or older increased between 1986 and 1995. While the percentage of wealthy females between the ages of 40 and 50 increased between 1986 and 1989, the relative size of this group remained unchanged be-

Figure 8: Female Top Wealthholders, by Age, 1986-1995
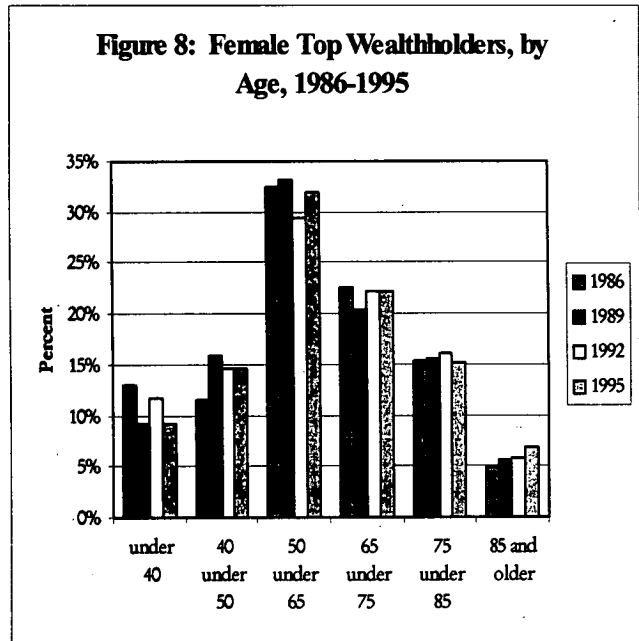
tween 1989 and 1995. There is no real change in the percentage of all female wealth holders who were between the ages of 50 and 65, as was evident among male top wealth holders in this age group. The relative stability in the percentage of wealthy females in each age category is evidence of steady growth in the number of female wealth holders of all ages between 1986 and 1995. Like their male counterparts, there was only a slight

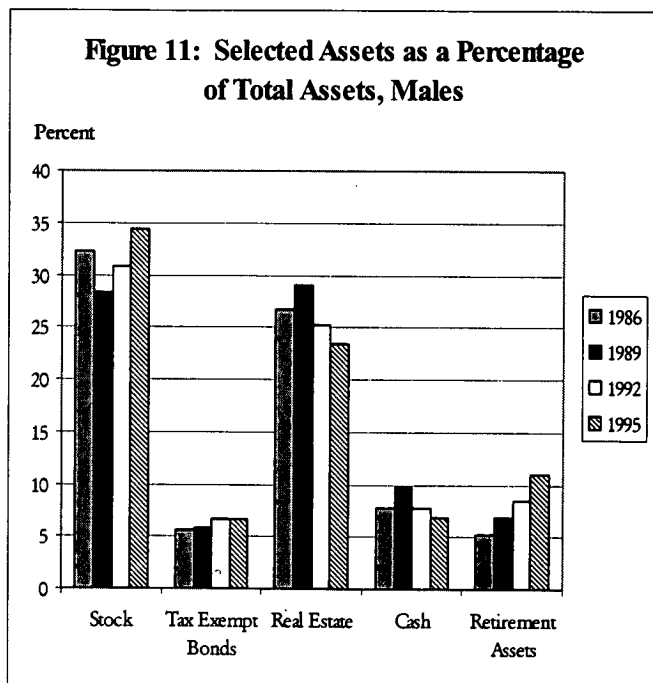decline in the median age for female top wealth holders between 1986 and 1995, from 78 years to 76 years.

Figure 9 shows that the majority of male top wealth holders, over 70 percent of all men with total assets of at least $750,000, were married, slightly higher than the average 65 percent of all males who were married in the general U.S. population over the same period.[20] Interestingly, the percentage of married male top wealth holders did not change over the 10-year period, while the percentage of married males in the general population had been declining over the past several decades. The percentage of wealthy males who were widowed, about 6 percent, is higher than the percentage of widowed men in the general population, which averaged about 3 percent of all males between 1986 and 1995. The category "Other" in Figure 7 includes mainly men who were separated or divorced. The percentage of divorced or separated males in the top wealth holder population was just over 6 percent. It is significant that the percentage of top wealth holders in this category did not change over time, while the percentage of divorced males in the general population rose from 6.6 percent in 1986 to 8.0 percent in 1995.

Figure 10 shows females with total assets of at least $750,000, classified by marital status. While just under 60 percent of the general female population were married, a significantly smaller proportion of female top wealth holders were married. On the other hand, a much larger portion of wealthy females, around 30 percent, were widowed, while only about 10 percent of females in the general population were surviving spouses. This disproportionate number of widows suggests that inheritance is an important source of female wealth. However, it is interesting to note both the declining proportion of widowed female top wealth holders and the concomitant increase in the proportion of married and single wealthy women. This suggests that the increase in the overall percentage of women in the top wealth holder group is attributable to such factors as the increasing number of female entrepreneurs and business executives. The percentage of divorced and separated female top wealth holders was about 8 percent and relatively stable compared to the increase in the percentage of divorced women in the general population from 8.9 percent in 1986 to 10.3 percent in 1995.

Figure 9: Male Top Wealthholders, by Marital Status, 1986-1995

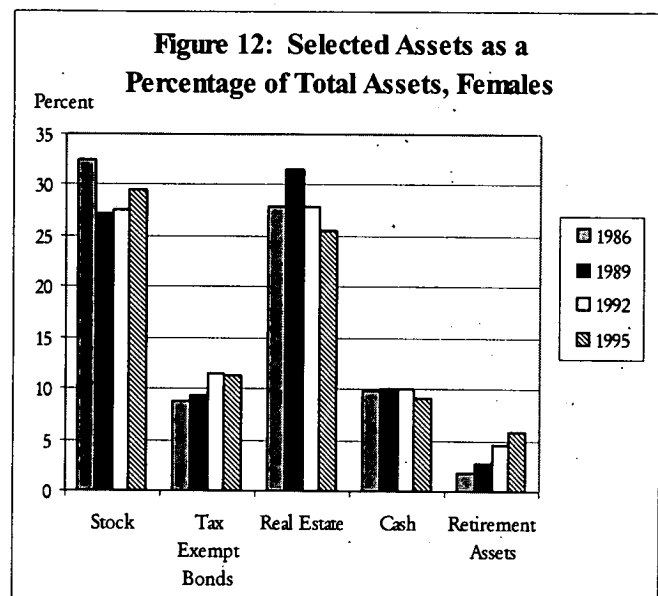Figure 10: Female Top Wealthholders, by Marital Status, 1986-1995
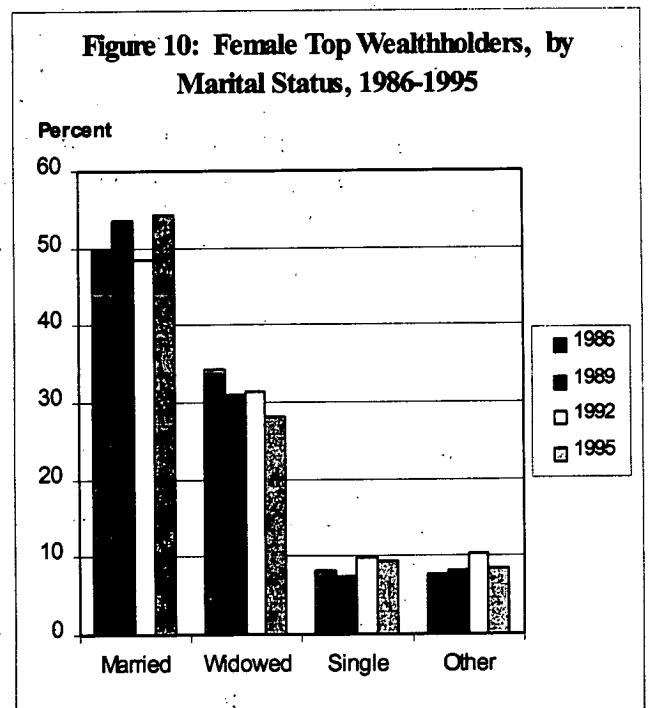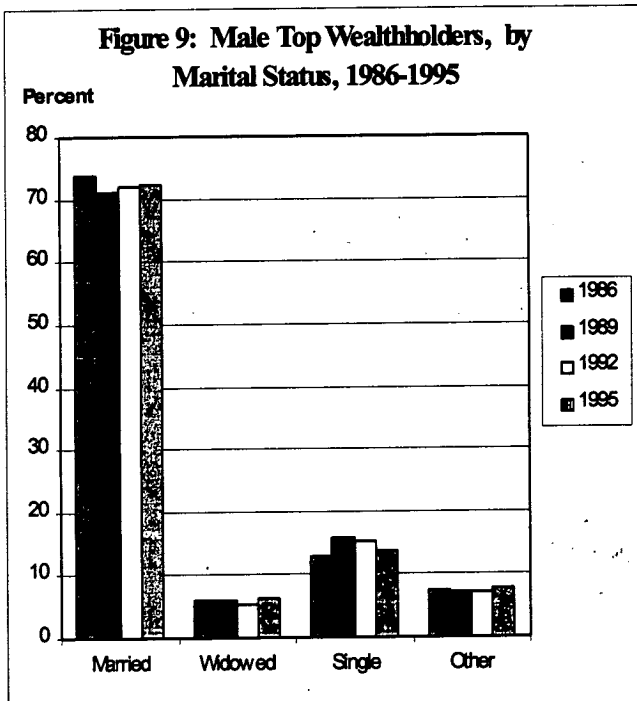
■ Portfolio Composition

Looking at the asset portfolios of top wealth holders, by sex, shows some important differences. For male top wealth holders, investments in stock accounted for the largest share of their portfolios (see Figure 11). A portion of this was invested in closely-held or untraded stock, usually issued by their own companies. Further, there is a clearly increasing trend in the share of total assets held as stock, reflecting the national trend. Standard and Poor's common stock index increased 130 percent between 1986 and 1995. This trend is mirrored in the steadily declining percentage of total assets held as real estate in the portfolios of male top wealth holders between 1986 and 1995. This trend coincides with the nationwide decline in the value of investment real estate in the late 1980's and into the 1990's. It is also interesting to note the declining portion of the portfolio held as cash, probably due to the increasing number of very liquid mutual funds that were introduced between 1986 and 1995. The increased share of total assets invested in retirement assets between 1986 and 1995, mainly IRA and KEOGH accounts, is due to the increased popularity of defined-contribution retirement plans. The proliferation of mutual funds, particularly no-load funds, introduced over the 10-year period has been fueled by this trend.

Figure 11: Selected Assets as a Percentage of Total Assets, Males

Percent

Stock | Tax Exempt Bonds | Real Estate | Cash | Retirement Assets

■ 1986
■ 1989
□ 1992
⊠ 1995

Female top wealth holders, like their male counterparts, invested the largest share of their total assets in stocks, although, in contrast to males, a larger share of their stock investments was invested in publicly traded equities rather than in stocks issued by closely held corporations (see Figure 12). Again, the portion of total assets invested in real estate declined over the 10-year period between 1986 and 1995, but, overall, females held a somewhat higher percentage of their assets in real estate than males. Females also held a significantly higher percentage of their portfolios in tax-exempt municipal bonds than male top wealth holders. This may be a reflection of the higher median age for female top wealth holders, since it is typical for older investors to favor the stable, tax-exempt income produced by municipal bonds over riskier equity or real estate investments.

Figure 12: Selected Assets as a Percentage of Total Assets, Females

Percent

Stock | Tax Exempt Bonds | Real Estate | Cash | Retirement Assets
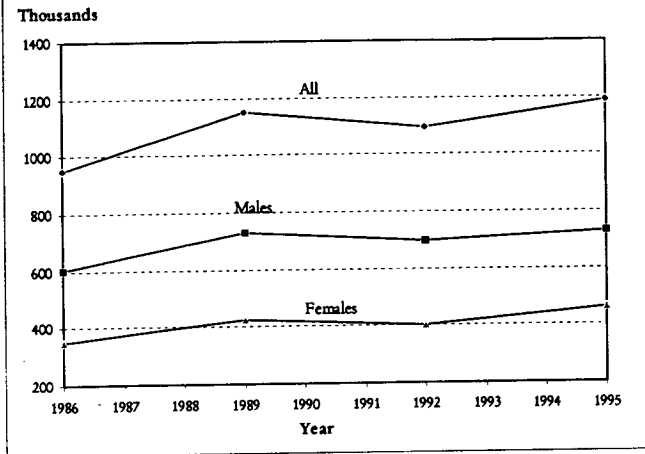
■ 1986
■ 1989
□ 1992
⊠ 1995

■ Millionaires

Although the purchasing power of a million dollars has declined over the years, most people still think of millionaires as the ultimate class of top wealth holders. For clarity, a millionaire in this discussion refers to an individual whose net worth (total assets – liabilities) was at least $1 million, measured in constant 1989 dollars. Figure 13 shows the number of individuals with at least $1 million in net worth, 1986-1995. Overall, for 1986-1995, there was an increase in the number of U.S. mil-
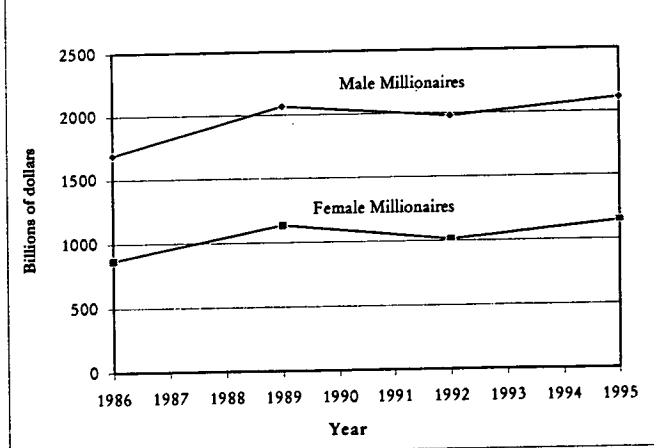
Figure 13: Number of Millionaires, by Sex, 1986-1995

Thousands

Concentration Estimates

Another way of looking at the year-to-year changes is to examine the share of total U.S. wealth held by a constant percentage of the population. Some estimates indicate that the share of wealth held by the top 1 percent of the population increased during the 1980's, making the distribution of wealth in the United States more unequal than that in much of Europe.[21] An increase in the inequality of wealth in America raises important concerns for policy planners and tax experts. Figure 15 shows the percentages of total U.S. personal wealth held by the top 1 percent and top 1/2 percent of the population, 1989-1995.[22] In 1995, individuals representing just 1 percent of the total U.S. adult population held 22.47 percent of total U.S. personal wealth, nearly the same as in 1992. While Figure 15 shows an increase in the share of wealth held by this group of about 1 percent from 1989 to 1995, this increase is not statistically significant, given the margin of error of these estimates. In fact, the percentage of wealth controlled by the top 1 percent of the population has remained relatively stable over the 6-year period 1989-1995. The same is true for the share of wealth held by the top 1/2 percent of the total U.S. adult population. The number of individuals in this elite group ranged from about 885,000 in 1989 to about 935,000 in 1995. They held about 17 percent of the nation's net worth over this period. These results suggest that, while the nominal wealth of the nation's

lionaires, but most of the increase came between 1986 and 1989. The number of millionaires actually declined between 1989 and 1992, and then rebounded between 1992 and 1995, with almost no net change over the 6-year interval. Growth in the number of both male and female millionaires exhibited this same pattern over the 10-year period. However, the number of male millionaires increased at a slightly higher rate than the increase in female millionaires between 1986 and 1989. The increase in the number of female millionaires outpaced that of males between 1992 and 1995. Figure 14 shows that the total amount of net worth held by U.S. millionaires increased between 1986 and 1995, with a decline between 1989 and 1992, and then an increase over the final 3 years of the period.
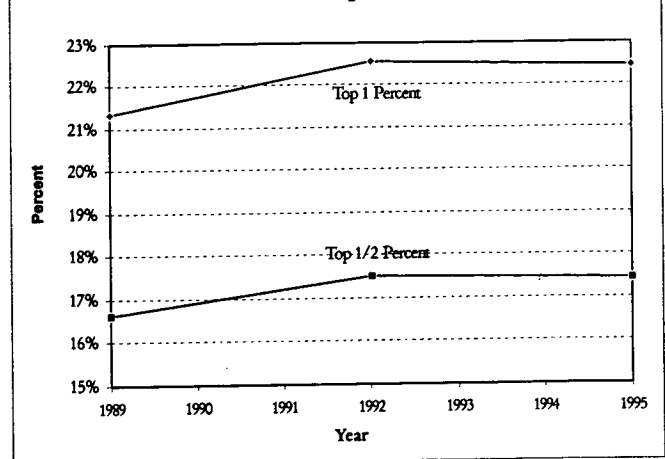
Figure 14: Total Net Worth of Millionaires, by Sex, 1986-1995

Figure 15: Percent of Total U.S. Net Worth Held by the Top 1 and Top 1/2 Percent of the U.S. Population

top wealth holders increased between 1989 and 1995, it did not do so at a rate that was significantly different from that of the general population. In other words, the rich did not get 'richer' at the expense of those on the lower rungs of the wealth distribution. These results are consistent with those derived from the 1989-1995 Surveys of Consumer Finances.[23]

■ Conclusion

Although there are significant limitations inherent in using the estate multiplier method for estimating wealth, the estimates provide interesting and valuable insight into the characteristics of the nation's wealthiest individuals. Estimates of wealth developed using these data provide important information on these individuals' assets and liabilities. Long-term trends can be used to evaluate economic and tax policy. These estimates can also be used as benchmarks for surveys that measure wealth.

While this methodology has evolved a great deal over the past 90 years, there remains much work to be done.[24] There is some wealth that, while not reported on Federal estate tax returns, constitutes a significant source of income for many. Life estates (income interests in assets held by a trust) and defined benefit pension plans are two important income sources that are not represented in these estimates.[25] As more and more individuals elect defined-contribution pension plans, such as 401K plans, for their retirement income, the importance of the latter will diminish. Even so, there remains a significant portion of national wealth held in trusts to be explored.

Second, although estate tax returns are generally prepared by professionals and are, therefore, likely to be more accurate in detail than survey responses, the values reported on administrative records are still likely to be somewhat downwardly biased, given that they are used for the purpose of assessing taxes. This is especially true for hard-to-value assets, such as businesses and certain types of real estate. It should also be noted that the estate tax data collected by SOI are all preaudit figures. Estimates based on the results of studies of IRS estate tax return audits suggest that undervaluation may

approach 5 percent of total assets, including 30 percent or more when valuing ownership interests of less than 50 percent in small companies or partnerships.[26] A recently completed study of audited returns will provide some insight into the scope and magnitude of these valuation issues. It should be possible to incorporate an adjustment in order to compensate for this source of bias.

Third, the wealth of individuals near death is likely to differ somewhat from that of the general population. For some, wealth will be reduced through expenses related to a final illness, while others will have made "property arrangements in anticipation of death or in recognition that an active life is over."[27] In an attempt to address this concern, data may be collected on the cause of a decedent's death. This would allow for comparisons between the portfolios of those who die suddenly and those who have carefully planned for death.

Fourth, estimates of wealth derived from estate tax records are limited by the estate tax filing threshold. This limitation will be exacerbated over the next few years as that threshold rises to $1 million. And, finally, variance estimates need to be developed for these data. The only way to accurately evaluate the trends reflected in these data is to present the estimates along with an appropriate measure of their standard error. Based on past work, it seems likely that resampling techniques, such as the Bootstrap or Jackknife, will provide a good measure of the variability of these data.

■ Acknowledgments

■ Footnotes

[1] Mallet, B. (1908), "A Method of Estimating Capital Wealth from the Estate Duty Statistics," *Journal of the Royal Statistical Society*, vol. LXXI, Part I, pp. 65-92.

2   Lampman, R. (1962), *The Share of Top Wealth Holders in National Wealth*, Princeton University Press, Princeton, NJ.

3   Smith, J. (1994), "Estimating the Wealth of Top Wealth-Holders from Estate Tax Returns," *Compendium of Federal Estate Tax Data and Personal Wealth Studies*, Department of the Treasury, IRS Publication 1773, pp. 335-354.

4   Scheuren, F. (1994), "Personal Wealth, 1962," *Compendium of Federal Estate Tax Data and Personal Wealth Studies*, Department of the Treasury, IRS Publication 1773, pp. 153-201.

5   Lampman, p. 36.

6   Menchik, P. (1991), "Economic Status as a Determinant of Mortality among Nonwhite and White Older Males: or, Does Poverty Kill?," Institute for Research on Poverty, Discussion Paper Number 93891.

7   Smith, p. 336.

8   Scheuren, F. (1994), "Historical Perspective on IRS Wealth Estimates With a View to Improvements," *Compendium of Federal Estate Tax Data and Personal Wealth Studies*, Department of the Treasury, IRS Publication 1773, p. 358.

9   Smith, p. 335.

10 Menchik, P. and Jianakoplos, N.A. (1992), "Discussion, The Estate Multiplier Technique, Recent Improvements for 1989," unpublished comments, 1992 annual meetings of the American Statistical Association.

11 See Menchik (1991) or Wolfson, M.; Rowe, G.; Gentleman, J.; and Tomiak, M., "Earnings and Death—Effects Over a Quarter Century," unpublished manuscript, 1990.

12 Stratification is used to decrease the variance of sample estimates by dividing a heterogeneous population into smaller, homogeneous subpopulations from which proportionate samples can be drawn. Post-stratification can be used to achieve similar results when the stratfying variable is not available for classifying *prior* to sampling. The weights can be adjusted within the desired strata *after* the sample has been drawn if the appropriate control totals are available for the population (see Kish, L. (1965), *Survey Sampling,* John Wiley and Sons, NY).

13 Atkinson, A.B. (1975), "The Distribution of Wealth in Britain in the 1960's—the Estate Duty Method Reexamined," in J.D. Smith (ed.), *The Personal Distribution of Wealth*, Columbia University Press, New York, NY, pp. 300-301.

14 The number of extremely wealthy individuals predicted by the Forbes Richest 400 listing was used as a guide and also to verify that the distribution of these very wealthy individuals approximated a Pareto distribution.

15 The estimates have been converted to constant 1989 dollars for consistency. In addition, the population examined is limited to those individuals with at least $750,000 in total assets (in 1989 dollars) so that there is complete coverage for all of the years examined.

16 To put the estimates in context, they would ideally be presented with estimates of the standard error. However, this is not at all straightforward, because the underlying sample of data consists, first of a subset of the living population and then of a sample of estate tax filers. In addition, assumptions regarding the mortality rates and appropriate adjustments also add uncertainty. In earlier research, estimates of variance were calculated using the Bootstrap resampling technique to simulate the many sources of variance inherent in the estimation process. The variance estimates ranged from about 1.4 percent for the number of top wealth holders to about 4.6 percent for the estimate of aggregate total assets. The variance of estimates presented in this paper should be in the same range. The estimates that follow should be examined with this level of uncertainty in mind.

[17] *Economic Report of the President*, United States Government Printing Office, Washington, DC, 1990.

[18] *Economic Report of the President*, United States Government Printing Office, Washington, DC, 1996.

[19] Population estimates taken from: U.S. Bureau of the Census (1996), *Statistical Abstract of the United States: 1996*, 116th edition, Washington, DC, Table 13.

[20] Marital status estimates for the general population, by sex, taken from: U.S. Bureau of the Census (1996), *Statistical Abstract of the United States: 1996*, 116th edition, Washington, DC, Table 58

[21] Wolf, E. (1995), *Top Heavy: a Study of the Increasing Inequality of Wealth in America*, Twentieth Century Fund Press, New York.

[22] Estimates of the total wealth of the U.S. are household estimates derived from the Survey of Consumer Finances (SCF) found in: Kennickell, A. and Woodburn, R.L. (1997), "Consistent Weight Design for the 1989, 1992, and 1995 SCF's and the Distribution of Wealth," working paper, pp. 27-29. This section is limited to the period 1989-1995 because there are no comparable estimates of total U.S. wealth for 1986. The Survey of Consumer Finances is a household survey, while the SOI figures are estimates of individual wealth. Although estimates of the total distribution of household wealth should be comparable to the distribution of individual wealth, estimates for specific points on the distributions will not be identical since some households are made up of more than one individual. For example, the number of households with assets of $1 million or more would include single individuals with at least $1 million, as well as two-person households where each of the individuals had assets of less than that threshold individually, but where the combined wealth was at or above $1 million. On the other hand, individuals in the first group would be included in the SOI estimates of individuals at that threshold, whereas individuals in the second type of household would not.

[23] Kennickell and Woodburn, pp. 21-22.

[24] Johnson, B.W. (1998), "Updating Techniques for Estimating Wealth From Federal Estate Tax Returns," *1998 Proceedings of the American Statistical Association* and Johnson, B.W. and Woodburn, R.L. (1994), "The Estate Multiplier Technique, Recent Improvements for 1989," *Compendium of Federal Estate Tax Data and Personal Wealth Studies*, Department of the Treasury, IRS Publication 1773, pp. 391-400.

[25] Lampman, p. 82.

[26] McCubbin, J. (1994), "Improving Estimates Derived From Estate Tax Data," *Compendium of Federal Estate Tax Data and Personal Wealth Studies*, Department of the Treasury, IRS Publication 1773, pp. 363-370 or Eller, M. B. and Johnson, B.W. (1999), "Using Federal Sample of Federal Estate Tax Returns to Examine the Effects of Audit Revaluation on Pre-Audit Estimates," *1999 Proceedings of the American Statistical Association Section on Government Statistics* (forthcoming).

[27] Lampman, p. 57. By this, he is not referring to property transferred informally, such as jewelry given to a daughter or granddaughter, although this certainly happens. More important to these estimates is conversion of assets from risky, high-growth assets, such as closely-held businesses and growth stocks, to tax-advantaged, income-producing assets. The portfolios of individuals who died unexpectedly should give a clearer economic profile of similar, healthy individuals than the portfolios of individuals who, faced with long illness, disposed of the assets which had been the source of their wealth.