# UPDATING TECHNIQUES FOR ESTIMATING WEALTH FROM FEDERAL ESTATE TAX RETURNS

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The Statistics of Income Division (SOI) of the IRS, utilizing an estimation methodology first introduced ninety years ago in Great Britain, produces estimates of personal wealth for an important segment of the U.S. population from tax returns filed for wealthy decedents. Federal estate tax returns provide a rich source of financial and demographic data on the nation's wealthiest individuals. Using data from a sample of these returns to produce wealth estimates for the living population provides a unique opportunity to study, in detail, the characteristics of the most influential individuals in the United States. In this paper, I will focus on the design used to select a sample of estate tax returns and weighting techniques used to produce estimates of personal wealth for 1992 and 1995. Weights are derived from SOI sample weights, national mortality rates, and a factor reflecting the fact that the wealthy live longer than the general population. Weights at the extreme ends of the distribution are constrained, and other methods are used to reduce the sampling variance.

## Background

The first estimates of national wealth produced using death records date to the middle of the 19th century. However, early European practitioners tended to focus on developing a single weight that was applied to national totals. British Statistician Bernard Mallet [1908] was the first to use age-specific mortality rates to produce national estimates. In his 1908 estimates of wealth for 1905 and 1906, he created multipliers, within age categories, using national mortality tables and applied these to data from British Estate Duty records. Similar estimates were first produced for the U.S by Horst Mendershausen (1922-40) and later by Robert Lampman [1962] and James Smith [1994]. The Statistics of Income (SOI) Division has been using the estate multiplier technique to estimate the wealth of living individuals since 1962 (see Scheuren, 1994).

The personal wealth estimates presented in this article are based on data from Federal estate tax returns – Form 706. A decedent's estate has up to 9 months to file an estate tax return, and 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. In the recent past, SOI has combined returns filed over a 3-year period to produce estimates of wealth for any particular year. The estimates presented here for 1992 continue this practice. The preliminary estimates for 1995, however, are based on 2 filing years, adjusted for the remaining, unfiled returns. This was done in an attempt to provide more timely estimates; updated 1995 estimates will be published in the future. One of the strengths of the estate multiplier technique is the large sample upon which the estimates are based. The 1992 sample includes nearly 16,000 returns; the 1995 sample is made up of over 15,000 returns. Both samples are considerably larger than samples 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 [Lampman, 1962]. 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 [Menchik, 1991]. 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 [Smith, 1994, p. 336]. 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 [Scheuren, 1994, p. 358].

## 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 dying 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. This means that the estate tax return data for a 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, nonfocus 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, 40 < 65, 65 < 75, and 75 and 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, did not conform to SOI standards, or because the return data 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 masterfile 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 (under 40 years of age) or extremely wealthy (gross assets of \$5 million or more) decedents tends to vary from year to year and is relatively small in comparison to their representation in the living population. The limited number of returns filed each year for decedents who were young or very wealthy can make results for these categories subject to considerable variance [Smith, 1994, p. 335]. This may create significant short-term fluctuations in the estimates attributable solely to the 'sample variance' associated with these two groups. To lessen the effect of these variations, the sample is 'smoothed' by including all returns for individuals with these characteristics filed between 1992 and 1994 (for 1992 estimates) and 1995-1996 (for 1995 estimates), without regard to the year-of-death. These segments of the sample are then poststratified and re-weighted to represent the true decedent populations in 1992 and 1995, respectively. This technique reduces the effect of outliers on estimates of the type and amount of wealth held by the young and very wealthy.

**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 cycle is completed. For this reason, an adjustment, similar to a nonresponse adjustment, is computed for the focus year-of-death to account for those returns filed after year Y+2. The same type of adjustment is then computed so that year-of-death estimates can be computed using just the first 2 years in the 3-year study, allowing for more timely estimates.

Estate tax data collected by SOI for returns filed for the period 1986-1995 were used to compute the nonresponse adjustments. They were then validated using data from the IRS masterfile for the same calendar years. The adjustments were computed by first estimating the total population of filers for several years-of-death from the SOI data. These estimates were compared to population estimates based on 2 and 3 filing years and ratios then computed. The ratios were calculated 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 since 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 resulting ratios were then tested against both the RTF file and estimates using 2 and 3 year files with the SOI samples. Tax status was an important factor in determining when a return was filed. In addition, separate adjustments were necessary for estates with over \$10 million in gross assets. For 3-year files, ratio adjustments based on a decedent's age and tax status best approximated the estimates of the 'true' population totals for each focus year examined. For 2-year files, the adjustments based on the size of gross estate at death and tax status performed the best. The final ratios are given in Tables 1 and 2.

**Mortality Differentials**

One of Bernard Mallet's colleagues criticized using the national mortality rates for the wealth estimates. He suggested that mortality rates for

**Table 1: 2-Year Ratio Adjustments**

| Adjustment Cell | Adjustment Ratio |
|---|---|
| Age < 40 | |
| Taxable | 1.18777 |
| Nontaxable | 1.26316 |
| | |
| All age >= 40, Taxable | |
| $600,000 <= TGE < $1 Million | 1.06129 |
| $1 Million <= TGE <= $5 Million | 1.08177 |
| $5 Million <= TGE <= $10 Million | 1.12023 |
| TGE >= $10 Million | 1.14074 |
| | |
| All age >= 40, Nontaxable | |
| $600,000 <= TGE < $1 Million | 1.10993 |
| $1 Million <= TGE <= $5 Million | 1.15853 |
| $5 Million <= TGE <= $10 Million | 1.23245 |
| TGE >= $10 Million | 1.22710 |

**Table 2: 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 |

"families of the peerage," or mortality tables derived from life insurance data would be more appropriate. There have been a considerable number of attempts to quantify mortality differences between the general population and the 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 compute an adjustment factor that was then applied to the overall U.S. mortality rates. Similar data have been used by SOI for previous estimates. One drawback to this practice has been the inability to calculate sex-specific differentials from this data. Thus, an alternate data set, the National Longitudinal Mortality Study (NLMS), produced by the National Institutes of Health, is explored 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, had 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 compute the mortality differentials. 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 computation was, therefore, limited to NLMS respondents in those occupation categories. Income on the NLMS public-use file is categorized in 7 categories, with $50,000 or more as the top level. A preliminary file linking 706 decedents' data with income tax returns filed prior to death was used to choose appropriate levels of income for this analysis. Differentials were calculated within age and sex groups by comparing the mortality of all file decedents with those whose incomes and occupational characteristics were most similar to those of the estate tax decedents. The resulting mortality rate differentials are shown in Figures 1 and 2.

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

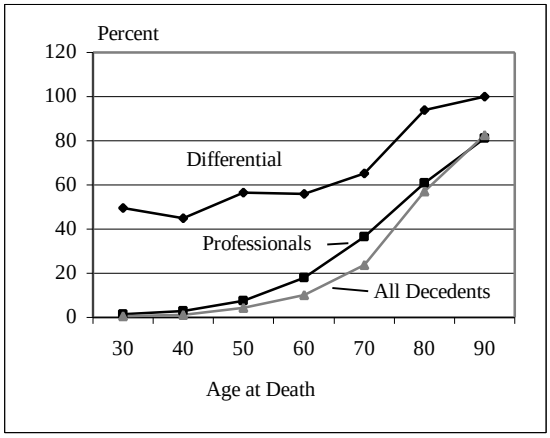
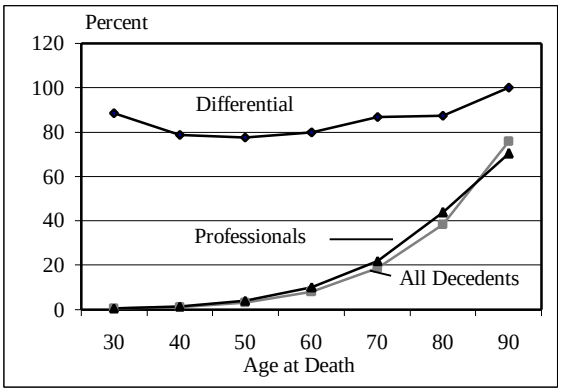


**Figure 2: Mortality Experience of Females, U.S. National Longitudinal Mortality Study**




The differences between the mortality of the general population and the mortality of individuals with characteristics similar to the estate tax decedent population are most pronounced for young decedents; these differences disappear entirely by age 85. Separate differentials for females were calculated for the first time and are notably smaller than those for males. The mortality differentials calculated for males are slightly larger than those derived from life insurance data, perhaps reflecting the dampening effect of the female differentials when using the aggregated life insurance data to estimate a single set of differentials for both sexes. The estimates for males seem to be in line with estimates by other researchers [see Menchik, 1991 or Wolfson Et al., 1990]. The results for both sexes are consistent with those published by the National Institutes of Health.

**Multipliers**

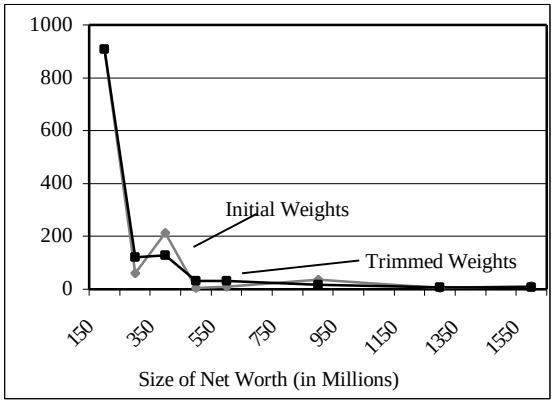
The final multipliers are calculated as:

$$MULT = \frac{\text{estate sample weight} * \text{nonresponse adjustment}}{\text{national mortality rate} * \text{mortality differential}}$$

The multipliers used in these estimates range between 1.8 and 1876.8 for the 1992 estimates and between 2.8 and 1660.8 for the 1995 estimates. 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 poststratify. However, the necessary control totals are not readily available. Thus, the strategy was to constrain the tails of the net worth distribution to resemble a Pareto distribution, which is often used in wealth and income models [Atkinson, 1975, p. 300-301].

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. The data approximated a Pareto with $\alpha = 1/2$. The SOI data for 1992 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 $\alpha = ½$, with each case assigned the mean value. The effects of these adjustments on the distribution are shown in Figure 3.

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



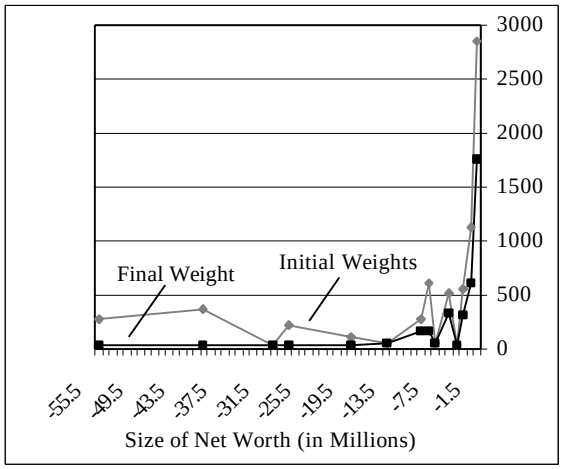

Similar adjustments were made for returns with extreme negative net worth (less than -$1 million). These cases were grouped into three categories: -$1 to -$5 million, -$5 to -$15 million, and less than -$15 million. A univariate distribution of the multipliers was computed and the multipliers trimmed 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 are shown in Figure 4.

**Future Plans**

Although much progress has been made since Mallot first estimated national wealth using estate duty records, several important areas for research remain. First, there is some wealth that, while not reported on Federal estate tax returns, constitutes a significant source of income for many. Life estates or 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 [Lampman,

1962]. As individuals shift to defined-contribution pension plans, such as 401K plans, the value of these missing assets will diminish. Even so, there would remain a significant portion of national wealth held in trusts to be explored.

**Figure 4: Preliminary and Final Distribution of Wealth for Individuals with Large Negative Net Worth.**




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 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 [McCubbin, 1994]. A nearly completed study of audit results will give us some insight into the scope and magnitude of valuation changes that result from audits. It may be possible to build in an adjustment to compensate for this 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," [Lampman, 1962]. 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 planned for death carefully.

Finally, 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. However, it may be possible to extend the coverage of these estimates if comparable data can be used to estimate the wealth of individuals with gross assets under the filing threshold.

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