

Modeling the Distribution of Estate Tax Burdens¹

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ABSTRACT

When Congress decided to phase down the estate tax through 2009, repeal it in 2010, and restore it in 2011, it was clear that the fate of the estate tax is yet to be determined. One of the key factors that policy makers will consider in any effort to permanently repeal or reform the estate tax is the distribution of tax burdens that would result. This paper develops an estate tax model based on the 1998 and 2001 Surveys of Consumer Finances, the 1999 individual income tax microdata file produced by the IRS, and aggregate statistics on the estate tax published by the IRS. Preliminary estimates of the impact of repeal and several reform options are presented.

JEL Codes C15, H20, H24

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The estate tax became a red-hot political issue in the late 1990's. Opponents called it the "death tax"—a complex, unfair and inefficient levy that violated every norm of good tax policy. Supporters saw it is an essential component of a progressive tax system, one that had the added virtues of plugging income tax loopholes and encouraging charitable contributions.

Paying heed to these divergent views, politicians debated three estate tax options: live with it, reform it, or throw it out. Remarkably, they chose all three! Under the Economic Growth and Tax Relief Reconciliation Act (EGTRRA) of 2001, the estate tax will be modified and reduced between 2002 and 2009. It will be repealed in 2010, though the gift tax will be retained and capital gains on inherited assets will be taxed for the first time. In 2011, all of those changes will be eliminated, and the tax will be reinstated.

Few if any political observers expect events to unfold that way. The President and Congressional leadership would like to eliminate the estate tax permanently, but the bleak budget situation makes that outcome unlikely, at least in the short run. A substantial majority in both Houses of Congress favor scaling back the estate tax, and in particular, protecting family-owned farms and small businesses from its impact. Thus, Congress will surely be considering options short of full repeal in the next few years.

An important factor in the debate is how the burden of the estate tax is distributed. This paper develops a prototype model of the distribution of estate tax liabilities. Following Cronin (1999) and Poterba and Weisbenner (2001), we assume that the estate tax is borne by the individuals who accumulate the estate (rather than by heirs, all capital, or labor). We impute estate assets and liabilities based on the 1998 and 2001 Surveys of Consumer Finances onto a large dataset of individual income tax returns filed in 1999, produced by the IRS Statistics on Income (SOI) Division, and calibrate the resulting imputations to match estate tax return

tabulations published by SOI. Using that model, we can examine the effects of changes in estate taxation and compare the distribution of those changes to changes in income taxation. A special focus of the modeling is to adequately represent the effect of the estate tax on family owned farms and small businesses.

The plan of the paper is as follows. This paper reviews current estate tax rules and the changes introduced in 2001. It then develops a strategy for imputing assets and liabilities from SCF onto the SOI, validating that match, and modeling estate tax liability. A final section shows some preliminary results of the model and compares them to other published estimates.

I. Estate tax rules before EGTRRA (and after 2010)²

Under EGTRRA, estate tax rules change every year between 2001 and 2011. To start, we summarize the rules that were in place before EGTRRA, which are also scheduled to become law again in 2011 after the EGTRRA changes expire.

Estates have been subject to taxation since 1916, shortly after the modern income tax was enacted. Since 1976, federal law has imposed a linked set of taxes on estates, gifts and generation-skipping transfers.³ The executor of an estate must file a federal estate tax return within nine months of a person's death if the gross estate exceeds an exempt amount—\$675,000 in 2001. Generally, the gross estate includes all of the decedent's assets, his or her share of

² For a more detailed summary of the rules in effect before 2001 and a discussion of the estate tax data, see Johnson, Mikow, and Eller (2001).

³ The generation skipping transfer (GST) tax was designed to close a loophole. Without a GST tax, a family could avoid one or two layers of estate tax by making gifts or bequests directly to a grandchild or great-grandchild, rather than making the bequest to the child first, who would later bequeath the remainder to the grandchild. To close this avoidance mechanism, generation-skipping transfers in excess of \$1 million per donor generate a separate tax at rates up to the top estate tax rate, above and beyond any applicable estate and gift tax. The GST tax raises virtually no revenue directly because it discourages generation-skipping transfers so effectively, but it prevents a revenue loss by closing what would otherwise be an easily exploitable loophole in transfer taxation.

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jointly owned assets, life insurance proceeds from policies owned by the decedent, and some gifts and gift tax paid within 3 years of death. Through careful tax planning, however, the valuation of assets can often be discounted for purposes of the estate tax, so the effective exemption far exceeds the statutory amount for many estates. (Schmalbeck 2002)

The estate tax allows deductions for transfers to a surviving spouse, charitable gifts, debts, funeral expenses, and administrative fees. A unified credit exempted taxes on the first \$675,000 of taxable transfers in 2001 (including both gifts made during life and transfers at death), a figure that was scheduled to rise to \$1 million by 2006 under pre-EGTRRA law.

Family-owned farms and closely held businesses benefit from a number of special provisions.⁴ Farmers and small business owners may value their real estate using a special use formula so long as the heirs keep it in use as a family-owned farm or business for at least 10 years and it is not sold to a nonrelative in that time span.⁵ According to Durst, Monke, and Maxwell (2002), for most farms, special use valuation can reduce value of the real property portion of the estate by 40 to 70 percent compared to the market value. In addition, farmers and small businesses (defined as estates where such assets comprise at least 35 percent of the gross estate), may pay their estate tax liability over 14 years at reduced interest rates. Interest only is due for the first five years. In 2002, the interest rate on the first \$435,000 of estate tax was 2 percent; the interest rate on amounts above that is 45 percent of the interest rate that applies to underpayment of tax (which is 4 percent for the fourth quarter of 2003). Finally, farms and small businesses may qualify for a qualified family owned business interest (QFOBI) exclusion of up

⁴ See Durst, Monke, and Maxwell (2002) for a detailed summary of rules that affect farmers (most of which also apply to family owned businesses as well).

⁵ The special use valuation is a gross up of rental value of the property in its current use—5-year average market rent divided by the Federal Land Bank interest rate on new loans.

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to \$1.3 million. The exclusion is defined in terms of both the unified credit and the QFOBI deduction, so the effective value of the QFOBI deduction was \$625,000 in 2001.⁶ Heirs must agree to keep the farm or small business going to qualify for the QFOBI deduction.

For estates above the exempt amounts, the tax rate began at 37 percent and rose to 55 percent on taxable transfers above \$3 million. A 5-percent surtax applied to estates with taxable wealth between \$10 million and \$17.184 million. This surtax eliminated the benefit of a graduated rate structure for very large estates and raised the effective marginal rate to 60 percent. Estate tax rates represent combined federal and state tax rates, since the federal estate tax includes a credit for state death taxes. Basically, the credit refunds the state taxes at rates up to 16 percent of the taxable estate. Almost all states levy death taxes large enough to qualify for the maximum federal credit.

Federal transfer taxes raised about \$29 billion in 1999—less than 2 percent of total federal tax receipts. Under pre-EGTRRA law, the Congressional Budget Office projected that transfer taxes would have raised about \$400 billion between 2001 and 2010. Nearly all OECD countries levy some kind of wealth-transfer tax. But the United Kingdom is the only such country besides the United States that levies a “pure” estate tax. The others have an inheritance tax or a mixture of inheritance and estate taxes. In 1997, the United States ranked third highest among OECD countries in terms of transfer taxes as a share of total revenues. But many OECD countries have annual wealth taxes, which the United States does not.

Although not an estate tax, the capital gains tax is a critical part of estate planning. Under pre-EGTRRA law, capital gains on appreciated assets are not subject to income tax at death and heirs must pay tax only on gains earned since they inherited the asset. This loophole

⁶ Since the current unified credit excludes \$1 million, the maximum QFOBI deduction is \$300,000.

(called "step-up in basis") gives people a strong incentive to convert income from taxable forms into capital gains and to hold capital gains assets until death. The estate tax dampens that incentive somewhat since assets held at death are subject to the estate tax. EGTRRA would take an alternative approach to limiting this loophole, as described below.

II. Transfer tax changes in EGTRRA

Table 1 summarizes changes in transfer taxes under EGTRRA.⁷ The effective estate tax exemption rises from \$675,000 in 2001 to \$1 million in 2002, and then rises in stages to \$3.5 million by 2009. The highest effective marginal tax rate fell from 60 percent in 2001 to 50 percent in 2002. The rate then drops gradually to 45 percent by 2007.⁸ The credit for state-level estate taxes is phased out between 2002 and 2005, the year when it is replaced by a deduction for state taxes.⁹ In 2004, the special deduction for family-owned businesses and farms (QFOBI) is repealed. In 2010, the estate and generation-skipping transfer taxes are repealed, and the gift tax rate is set equal to the top individual income tax rate (35 percent). The step-up in basis for inherited assets that have capital gains is repealed, subject to a very large exemption.¹⁰ As noted, the law reverts to its pre-EGTRRA form in 2011 (exempting \$1 million of assets and a top marginal effective tax rate of 60 percent).

⁷ For a more detailed discussion of the estate tax changes effected in 2001, see Kaufman (2001).

⁸ As under current law, the marginal tax rate in the GST is the highest statutory transfer tax rate prevailing in that year.

⁹ At this point, some taxpayers could actually face higher combined federal and state taxes if state death taxes are not eliminated. See Beth Kaufman, "The Estate and Gift Tax: Implications of the 2001 Tax Act," Tax Notes, August 13, 2001, 949-53.

¹⁰ An estate can erase \$1.3 million of capital gains on bequeathed assets. In addition, there is a \$3 million exemption for capital gains on transfers to a spouse. Thus, with careful planning, a couple could eliminate capital gains tax liability on \$5.6 million of gains (\$1.3 million for each spouse, plus \$3 million for the transfer from the first decedent to the second).

<p align="center">Table 1 Changes in Transfer Tax Exemptions and Rates Due to EGTRRA, 2002-2011</p>		
Calendar Year	Estate and GST Tax Transfer Exemption	Highest Estate and Gift Tax Rates
2001*	\$675,000	60%
2002	\$1 million	50%
2003	\$1 million	49%
2004	\$1.5 million	48%
2005	\$1.5 million	47%
2006	\$2 million	46%
2007	\$2 million	45%
2008	\$2 million	45%
2009	\$ 3.5 million	45%
2010	N/A (taxes repealed)	35% (gift tax only)
2011	\$1 million	60%

* Pre-EGTRRA law

III. Measuring the Distribution of Burdens Under the Estate and Gift Tax

Estimating the distribution of burdens under the estate tax is complicated for several reasons. First, the incidence of the tax is unclear. Does it fall on the owner of the estate, or on his or her heirs? In theory, the tax could be borne in part by capital or labor, through its effect on saving, but there is scant evidence to support such an effect. Gale and Perozek (2001) point out that the tax is unlikely to affect the saving of individuals for whom bequests are basically accidental—simply a consequence of failing to exhaust one’s assets during lifetime. Even among those who plan to leave a bequest, the theoretical effect on saving is ambiguous because there is an income effect as well as the substitution effect. In the presence of an estate tax, some people may choose to save more so as to leave an after-tax bequest of a certain size, whereas others would save less because the substitution effect dominates. Moreover, there is evidence

that heirs work and save less if they expect to receive a larger bequest, so the overall effect on work and saving is highly uncertain. Typically, the tax is assumed to be borne by decedents, because there is little evidence of incidence on capital or labor, and there is no reasonable basis upon which to measure the effect on heirs.

The second problem is that estate tax data are only publicly available in very aggregate form, and not tied to the income of decedents before they died. This is unlike data on income taxation, for which a large micro-data set of individual income tax returns is publicly available. As a result, measurements of estate tax liability must be inferred indirectly from data on wealth.

The U.S. Treasury Department (Cronin 1999) and Poterba and Weisbenner (2001) have published methodologies for estimating the distribution of estate tax burdens by income.¹¹ The Treasury Department calculates expected estate tax liability on its large microsimulation model of the individual income tax. They estimate the estate tax that each household on the tax model file would owe if they died in the current year and then multiply that estimate by the probability of death to calculate expected estate tax liability. Treasury assumes that estate size is proportional to a broad measure of capital income, including taxable and tax-exempt interest, accrued capital gains, earnings on retirement accounts and life insurance, rental income including the imputed rental value of owner-occupied housing, and the capital component of sole proprietor, partnership and subchapter S corporation income.¹² Married people are assumed to pass all of their estates to their spouses tax-free so only singles pay estate tax.

Poterba and Weisbenner (2001) develop a somewhat more sophisticated model of estate tax based on data from the 1998 Survey of Consumer Finances (SCF), produced by the Federal

¹¹ Citizens for Tax Justice (2001) also published estimates of the distribution of estate tax liability, but they have not documented their methodology for those estimates.

¹² Treasury grosses up these income flows assuming a 7 percent rate of return. Note that Treasury ceased estimating the distribution of estate taxes in 2001 and thus has not updated this estimate (at least publicly).

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Reserve Board. The SCF is stratified sample of more than 4,000 households with rich data on assets and liabilities. Although using a different data set, the basic approach is similar to Treasury's. Poterba and Weisbenner use the SCF data to estimate gross estate for each person on the file assuming that he or she were to die in 1998. Because the SCF excludes the wealthiest 400 people from its database (to protect confidentiality), Poterba and Weisbenner estimate the wealth for the missing people based on the Forbes 400 list. They then make adjustments to account for valuation discounts and spousal deductions, impute an average amount of deductions and credits to each person based on the SOI's published averages for each gross estate size, and estimate the taxable estate and estate tax. Finally, expected estate tax liability is calculated by multiplying the estimates for each person by mortality probability for a person of the same age.

Our approach shares elements in common with each of these methods. The Tax Policy Center has a large microsimulation model of the federal individual income tax system that is similar to the U.S. Treasury's, and based on a public-use version of the same underlying database. Thus, we would like to be able to calculate the distribution of estate tax liabilities on the same model that calculates income tax liabilities, both for comparability, and to be able to simulate the effects of policies that change both income and estate tax rules. However, the income tax data contain no direct information about wealth holding. Our approach is to use information from the Survey of Consumer Finances to make richer and more detailed imputations of assets and liabilities than those employed by Treasury.

In a nutshell, our model is similar to Poterba and Weisbenner's, but it is applied to the income tax data, rather than directly to the SCF. We impute asset items and liabilities to each record in the income-tax file based on regressions of those wealth components against variables that exist on both the SCF and SOI datasets. To mitigate the problem of the small sample size on

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the SCF (only about 4,400 observations in 2001), we pool data from the 1998 and 2001 surveys. In addition to roughly doubling the sample size, this approach has the added advantage of smoothing out some of the temporal variation in asset values. The imputed number of individuals owning each type of asset (and liability) and the aggregate values of each asset (and liability) are calibrated to match the totals on the SCF. The imputed distribution of aggregate net worth by income class is also adjusted to more closely resemble the distribution reported in the SCF. In addition to the imputations, the values of most deductions and credits are estimated based on averages calculated on the SOI estate tax data. An estate tax calculator then determines estate tax liability for each record based on the record's gross estate, deductions, credits and the relevant estate tax rates and brackets. Finally, each record's expected value of gross estate and estate tax are calculated by applying appropriate mortality probabilities.

A. Overview of the Model

Here is a simplified representation of the estate tax computation (the actual 2002 estate tax form 706 including attached schedules is 44 pages long), which is done for every individual in the tax model database:

1. **Gross Estate = à Assets - à Liabilities**
2. **Taxable Estate = Gross Estate - à Deductions**
3. **Tentative Tax = f(Taxable Estate)**
4. **Tax = Tentative Tax - à Credits**

A return is filed if Gross Estate exceeds the tax-free threshold, which is \$1 million in 2003. For unmarried individuals, the expected number of estate tax returns is then

$$5. \text{ Expected returns} = \sum w_i p(\text{Age}_i) [\text{Gross Estate}_i > \text{threshold}],$$

Where i represents the i -th individual in the tax model database, w_i is the sample weight for individual i , $p(\text{Age}_i)$ is the probability of mortality for an individual of age Age_i , and the expression in brackets equals 1 if the gross estate exceeds the filing threshold, 0 otherwise.

Note that for a married couple, we must account for the probability that either one of the spouses dies and the small probability that both spouses die. Assuming independence of the mortality rates for husband and wife, the probability that both spouses die is simply the product of the separate mortality rates for each spouse or

$$p(\text{both die}) = p(\text{husband dies}) * p(\text{wife dies}).$$

The probability that either one of the two spouses die (but not both) is given by

$$p(\text{one dies}) = p(\text{husband dies}) * [1 - p(\text{wife dies})] + [1 - p(\text{husband dies})] * p(\text{wife dies}).$$

As above, the probability that each spouse dies is assumed to be a function only that spouse's age.¹³

Since the gross estate is potentially different when just one spouse dies than when both spouses die (due to the rules for joint and community property), for married records in the income-tax file we have:

$$\begin{aligned} \text{Expected married returns} &= \sum w_i p(\text{one dies},i) [\text{Gross Estate}(\text{one dies},i) > \text{threshold}] \\ &+ \sum w_i p(\text{both die},i) [\text{Gross Estate}(\text{both die},i) > \text{threshold}]. \end{aligned}$$

¹³ There is some evidence that widows and widowers have a higher probability of mortality than married people. (Hurd et al, 200x) We may reflect this in later versions of the model.

The dollar amounts are estimated similarly. For example, for unmarried individuals,

6. Aggregate Gross Estate = \hat{a}_i Gross Estate_i w_i p(Age_i) [Gross Estate_i > threshold].

To do the calculations in steps 1-6, we need to estimate assets, liabilities, deductions, and credits for each record in the tax model database, and estimate the probability of death. These calculations are described in detail below.

IV. Model Methodology

A. Wealth Imputation and Preliminary Validation

Wealth items are imputed based on the 1998 and 2001 Survey of Consumer Finances (SCF). The pooled 1998 and 2001 SCF samples contain wealth and income data for 8,747 households, 4,442 from 2001 and 4,305 from 1998.¹⁴ In each subsample, wealth is measured in the current year (e.g., 2001) and income from the prior year. The SCF survey is a stratified sample, which oversamples high-income families. However, by design, it excludes the extremely wealthy (the Fortune 400).

1. Estimation of Asset and Liability Equations

¹⁴ We originally based our estimates on 2001 data alone, but were concerned about the quality of the imputations for at least two reasons. First, because of the stock market bubble, 2001 is likely to represent some anomalous relationships between income and wealth. Second, the number of observations of certain kinds of assets and liabilities was very small. For example, only 44 respondents reported any farm assets in 2001.

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We impute each asset and liability item in two steps: (1) Does the household have any of the item? (2) For those who have nonzero amounts of the item, what is the level? We use probit maximum likelihood to estimate the likelihood of having each item, and ordinary least squares to estimate the amount. The procedure is similar to the Heckman two-step estimator, but without the Mills ratio correction in the second stage. This may yield biased coefficient estimates in the second stage, but that is not relevant here because we have no interest in the point estimates. All we care about is producing the best fit, conditional on the explanatory variables.

We estimate the probability of having the income items using probit maximum likelihood. The model is: the item is observed iff $X_1 * \beta_1 + \epsilon_1 > 0$, where ϵ_1 is assumed to be a standard normal random variable (mean 0, variance 1). Conditional on having a particular item, we estimate the amount of the item as a function of a similar set of variables. Using ordinary least squares, for each item w , we estimate an equation of the form $\ln(w) = X_2 * \beta_2 + \epsilon_2$, where ϵ_2 is assumed to be normal with mean 0 and variance σ^2 .

The specific items that we imputed are listed in Table 2.

The list of exogenous variables for each probit/regression is designed to be an exhaustive set of relevant variables that exist on both the SCF and the tax model dataset. These variables include number of dependents, age (included as 10-year bracket dummies), income (as defined for purposes of the SCF), the following components of income — income from a farm or business, tax-exempt interest income, taxable interest income, rental income from schedule E, pension income, taxable dividends, and realized capital gains (all defined as the natural logarithm of the income item plus one). We also include dummies for zero values of all income items; dummies for negative overall income, negative income from a business or farm, and negative capital income; as well as interactions between the negative income dummies and the

appropriate negative income amount (defined as the natural logarithm of the absolute value of the income item plus one). In addition we include dummies for whether the individual itemizes deductions on his or her federal tax return, and dummies for whether certain federal tax schedules are filed (C for business income, E for rental income, and F for farm income). In order to allow the relation between the wealth components and the explanatory variables to differ by marital status, we run separate probits and OLS regressions for married couples and for unmarried individuals.¹⁵

¹⁵ The SCF is a household-based survey that records only total income and wealth items for all individuals in the "primary economic unit" (PEU); it does not attribute shares of those amounts to individuals within the PEU. This provides a slight complication for those PEUs that consist of two unmarried individuals living together (with or without other financially interdependent members of the PEU). These individuals will show up in the income tax file as two single tax returns but will show up in the SCF as one unit. We assume that an unmarried couple living together with shared finances behaves like a married couple and thus include them in the married category when running the regressions. The results do not change significantly if these individuals are dropped from the analysis.

Table 2. Assets and Liabilities Imputed from the SCF

Assets

Cash
 Tax-exempt bonds
 Taxable bonds
 Stock
 Retirement assets
 Face value of life insurance
 Other financial assets
 Vehicles
 Personal residences
 Other real estate
 Farm assets including land
 Actively managed business assets (e.g., a family-owned business)
 Passively owned business assets (e.g., partnership shares)
 Other nonfinancial assets

Liabilities

Mortgage and home equity line of credit
 Real estate debt
 Farm debt
 Credit card balances
 All other debt

It is not appropriate in the SCF to simply run regressions or probits on the entire dataset because of its approach to missing variables. The SCF imputes missing values for a number of fields. To reflect the variance introduced by that process, the SCF database includes 5 replicates of each observation. Missing values are drawn randomly for each replicate from the estimated probability distribution of the imputed value, whereas nonmissing values are simply repeated. We estimate coefficients by computing each estimate separately for each sample replicate and then averaging the coefficient estimates. We also correct the standard errors using the procedure supplied by the Federal Reserve Board, but it is not a particularly important adjustment given that we are not interested in the parameter estimates. The corrected estimates and standard errors from that procedure, as well as a measure of goodness-of-fit from the first replicate, are available in Appendix A (attached as a separate file; note it is 92 pages long).

2. *Creating imputed values on the tax model dataset*

We impute values for the assets and liabilities in Table 2 based on the estimation results. In a later stage, we calibrate the results to match SCF aggregates for each item as well as the overall distribution of net worth by income.

Initial imputation on the individual income tax model is done in 2 steps.

1) simulate whether the taxpayer has the item:

- For each asset and liability item, using the coefficients from the probit estimation (β_1) and values of explanatory variables in the tax model database, calculate $X*\beta_1$
- Calculate the threshold probability, $z=F^{-1}(X_1*\beta_1)$, where F is the cumulative standard normal probability distribution
- Draw a uniform random number, p, between 0 and 1
- If $z < p$, then assign a nonzero value for the wealth item¹⁶
- For some assets and liabilities, we adjust the probabilities so that the proportion of the population with that item more closely matches that reported on the SCF. We employ separate adjustment factors for married and unmarried records.

2) Estimate the wealth/liability item for taxpayers with $z < p$:

- Using the coefficients from the level equation (β_2) and values for explanatory variables in the tax model database, calculate $X*\beta_2$

¹⁶ There are two assets for which we do not follow this method. We assume that anyone who reports tax-exempt interest income has tax-exempt bonds; similarly we assume anyone who files a schedule F (farm income) or Form 4835 (farm rental income and expenses) has farm assets.

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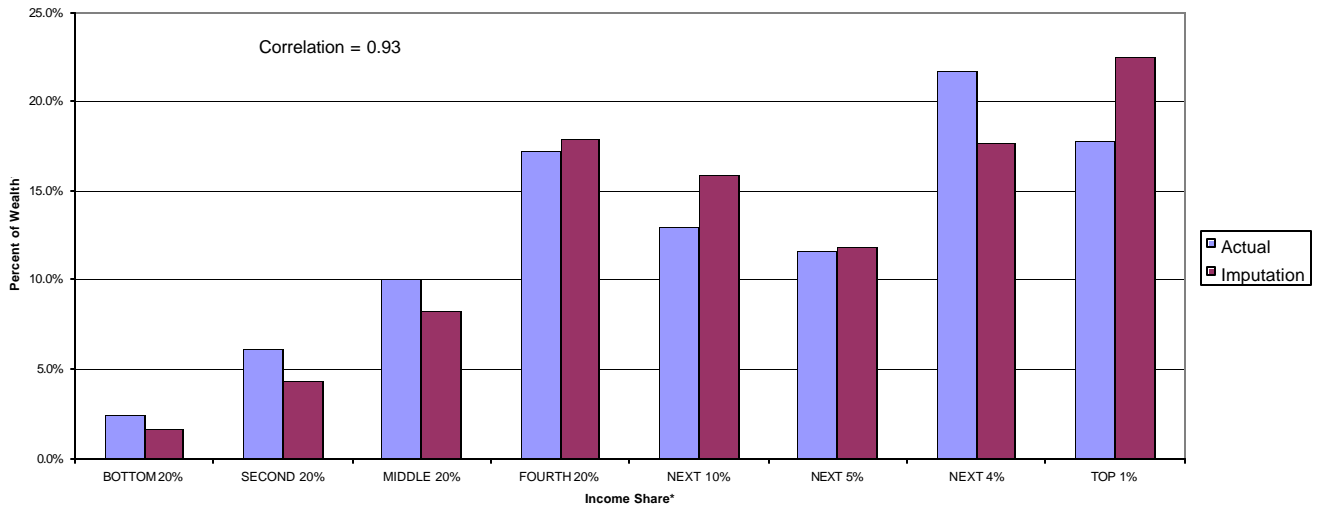
- Calculate the expected value for the item, y . In the limit, $E(y) = \exp(X*\beta_2 + \sigma^2/2)$, where σ is the estimated standard error for the level regression. However, in finite samples, $\exp(X*\beta_2 + \sigma^2/2)$ can be a biased estimator, and the biases can be large if the errors are in fact nonnormal. We follow Duan (1983) and instead use a robust empirical “Smearing adjustment” to match the sample means of predicted values with the sample mean of the actual SCF data. The adjustment basically amounts to multiplying $\exp(X*\beta_2)$ by a constant chosen to align the sample means. Again, as with the probability adjustments, we employ separate factors by marital status in order to hit the sample means for both married and unmarried individuals.

Figure 1 shows the imputed distribution of wealth by prior-year income compared with the distribution on the 2001 SCF. [Note: we will be updating these numbers.] The correlation is reasonably high—0.93. Wealth is underestimated for those with low income and the 95-98 percentiles, and overestimated for the moderately wealthy and the top 1 percent. By design, total estimated wealth matches almost exactly (this is a direct consequence of the empirical smearing adjustment). Note that we include in assets term life insurance because that would be an estate asset if the taxpayer were to die.

The figure shows that the share of assets held by the top 1 percent is significantly larger after our imputation procedure than in the SCF, but this is probably not a problem with the tax model database. The SCF lacks the wealthiest 400 households and is pretty thin at the top. As a result, top incomes on the SOI are much higher than top incomes on the SCF and it is appropriate to attribute higher wealth to those taxpayers than may be observed in the SCF.

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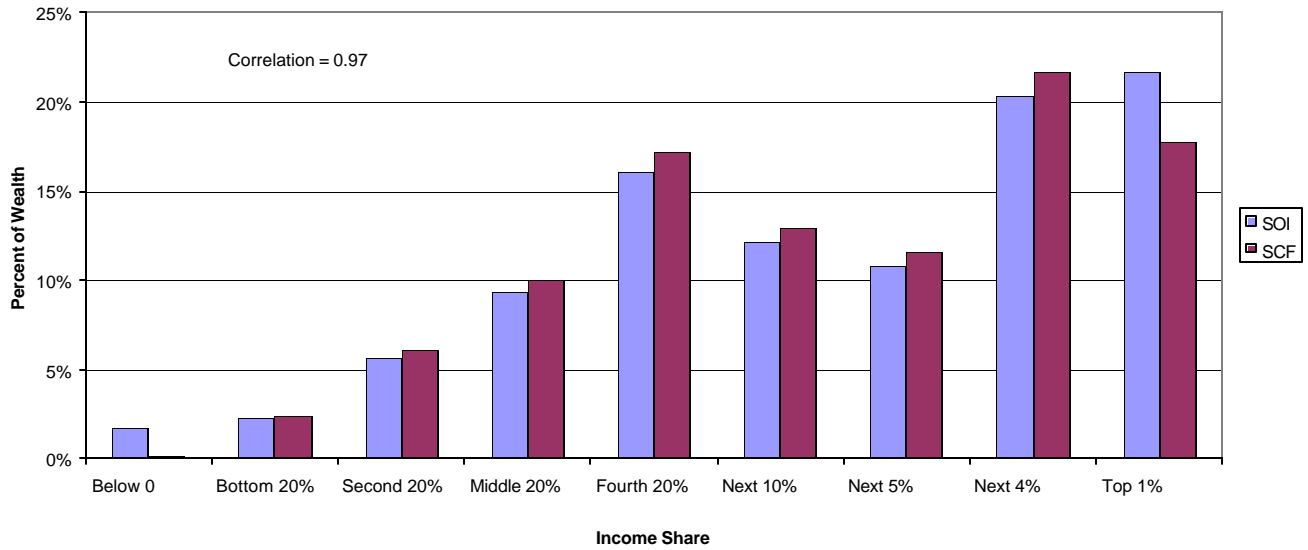
Figure 1. Actual Versus Predicted Wealth Distribution by Income*



* Excludes returns with negative incomes. Total wealth equals \$59 trillion (including face value of term life insurance).

Next we adjust wealth by fixed percentages within all but the top income class and those with negative incomes (not shown) to match the distribution in the SCF. Figure 2 shows the “corrected” distribution. The correlation is 0.97. By construction, the correlation is 1.0 for the subsample excluding the top 1 percent and those with negative incomes.

Figure 2. Wealth Distribution by Income, SCF Versus Adjusted SOI



B. Generate Gross Estate and Recalibrate

Once we have imputed values for each asset and liability on all records in the income tax file, we need to calculate each record's gross estate. For single individuals this simply involves adding up the imputed value of all assets and subtracting the imputed value of all liabilities. For married couples, we must first impute the amount of joint and/or community property. In the case in which one of the two spouses dies, only 50-percent of qualifying joint and community property must be included in the decedent's estate.

The income tax file does not include an indicator of state-of-residence for any record with an adjusted gross income of more than \$200,000 in 1999. Therefore we do not have an indicator of whether a couple lives in a community property state. Instead, based on a random number draw, we assign records to community-property states based on the proportion of individuals living in community property states in 2001. Johnson, Mikow, and Ellers (2001) report the number of returns with community property and the amount of community property reported on estate tax returns filed in 1995. We then assign, again using random draws, community property to records in order to match these data. A similar procedure is used to impute joint property to

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married records. As explained above, the allowance for the inclusion of only 50-percent of joint and community property is not relevant if both spouses die. Thus for each married record, we calculate gross estate twice: once assuming only one spouse dies and employing the imputations for joint and community property; and second assuming that both spouses die and including all imputed wealth in the gross estate.

We then need to predict the distribution and aggregate amounts of the components of gross estate, and gross estate itself, that will show up on estate tax returns. Following Poterba and Weisbenner (2001), and Cronin (1999) we predict the aggregate amounts of the components of gross estate by weighting each record's gross estate in the event of death with the probability of death. Like Poterba and Weisbenner, we assume probability of death follows the annuitant mortality tables, which are appropriate to higher-income individuals, who also tend to be healthier than average.¹⁷ This assumption will result in weights that are too high for lower-income people, but they would not owe estate tax anyway, so it is immaterial to our estimates.

Expected gross estate is then equal to the gross estate held by individuals times the probability of death. An issue is that our estimates are technically for decedents in 2001, since we base our imputations on 2000 income data (in order to be able to compare to the SCF), and the SCF connects lagged income with current estate. But the most current estate tax information is for tax year 2001, which generally refers to decedents in 2000 (estates have 18 months from the date of death to file an estate tax return). (Internal Revenue Service 2003) Thus, we set targets for stocks and retirement assets lower than what was reported for 2000 decedents.

¹⁷ We use the 1996 U.S. Annuity Basic Tables for males and females available on the website of the Society of Actuaries (<http://www.soa.org>). Since we do not have gender identified on the income tax file, we create a mortality table for all individuals by weighting the mortality rates of males and females at each age by the proportion of the population of that age that is male and female as reported by the Bureau of the Census.

[Discuss estimates when they are available.]

1. Significant Discrepancies

Three asset classes do not match well between the SCF and the SOI published data: personal residences, life insurance, and farms.

Personal residences. The SCF has many more personal residences than appear on estate tax returns. This could reflect planning—such as selling a home to a child while remaining in it until death. In that case, the home should not be considered owned by the survey respondent, but she may either be confused or unwilling to acknowledge that she no longer owns her home. A more serious issue is that older people near death are more likely to move into a senior community, assisted living facility, or nursing home, but the SCF has no data from nursing homes. Unfortunately, we have no way of identifying those especially close to death, other than by age.

Life insurance. SCF has about 5 times as much life insurance as shows up on estate tax returns. Insurance may be actually owned by children or others, with the donor paying the premiums (free from gift tax if the premium is no greater than \$10,000 per year). This is one of the most common ways to avoid estate tax and also assist heirs with liquidity problems that might arise at death. See Schmalbeck (2001). Some insurance may also be owned by companies or other entities.

Farms. SOI data have about twice as many estates with some farm assets as appear on SCF. To try to correct for this, we assign farm assets to everyone who files a schedule F tax return, which would account for all households with active farming income. We also assign farm assets to

anyone who files a Form 4835 (Farm Rental Income and Expenses). The remainder unaccounted for may be people who live on farmland but do not farm it. However, it is not clear these are the people farm activists care about.

Although we understate the number of farms, we overstate the amount of farm assets by about 100 percent. This imputation is likely to have a high variance because there are only about 100 people in the pooled 1998 and 2001 SCFs who report any farm assets.

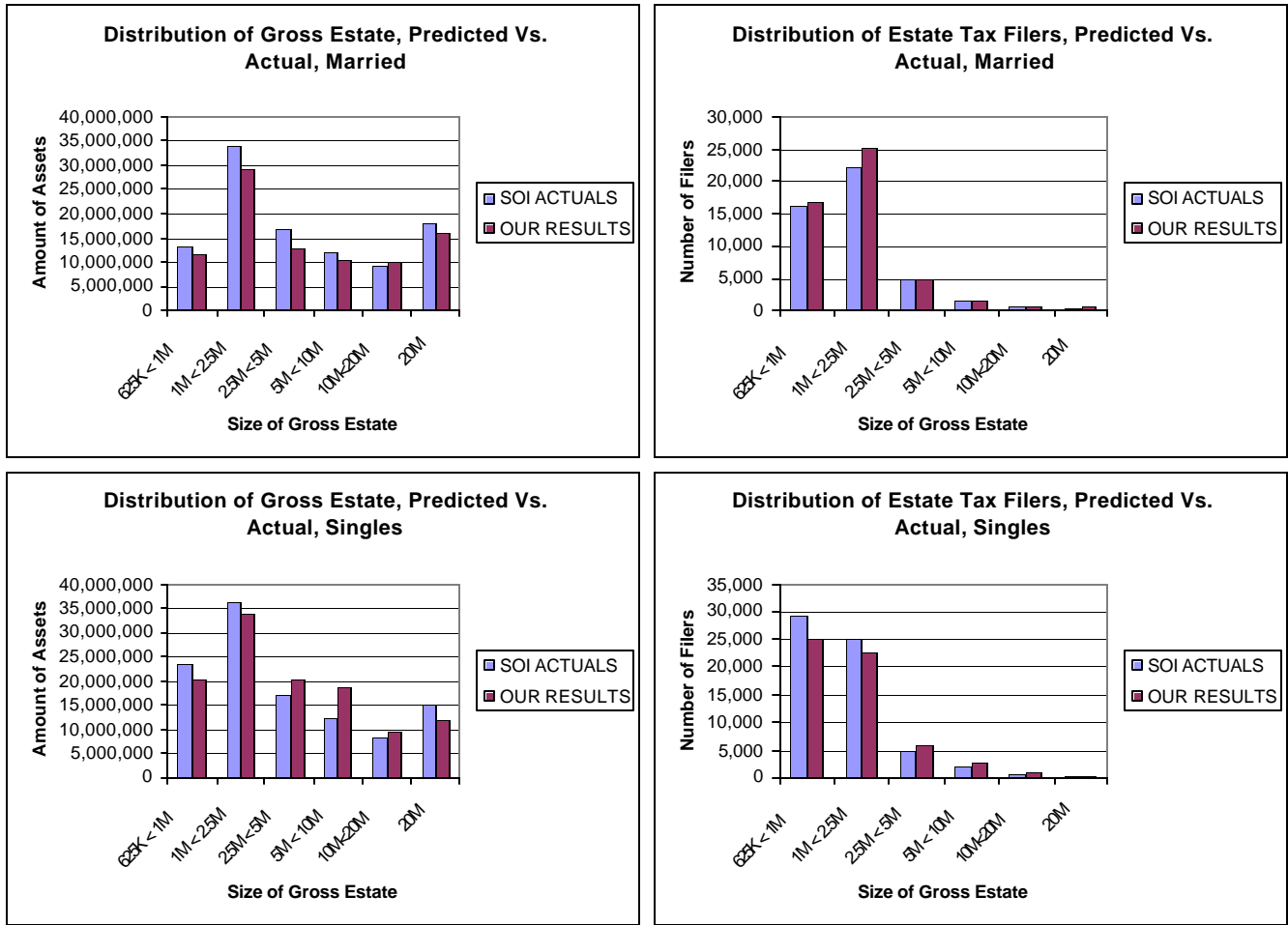
We calibrate our totals for both number of farmers and farm assets to match data produced by the Economic Research Service of the USDA based on their Agricultural Resource Management Survey.¹⁸

3. Comparison of tax model imputation with published totals

Figure 3 shows the distribution of gross estate and tax filers by size of gross estate for both singles and marrieds after all adjustments have been made. Overall, the match is pretty close. The total for our predicted estates is smaller than the SOI published data since our predictions technically refer to 2001—after the decline in the stock market—whereas the SOI data are mostly from 2000. We tend to understate at the top and bottom of distribution, and overstate in the middle.

¹⁸ We used the table generator on the USDA's website, at <http://www.ers.usda.gov/data/farmfinancialmgmt/>.

Figure 3. Comparison of Actual and Predicted Distribution of Estate Tax Filers and Amount of Gross Estate



C. Calculate Taxable Estate and Estate Tax

The next step is to impute deductions from gross estate allowed in determining the taxable estate.

1. Imputation of deductions other than the marital deduction and gifts

To estimate most deductions, including charitable contributions, funeral expenses, executor's commissions, attorney's fees, and other expenses/losses, we randomly assign the

deduction to returns to match the distribution by gross estate class and marital status.¹⁹ Those randomly selected were then assigned the average amount for their gross estate class. This is similar to the method used by Poterba and Weisbenner (2001), although they do not vary their imputations by marital status. We also added in adjusted taxable gifts and subtracted out gift tax paid in the same manner.

2. Marital deduction

For the marital deduction, most returns claim a 100 percent marital deduction. We randomly select returns within each gross estate class and assign them a 100 percent marital deduction (i.e., they eliminate their estate tax liability) to match the percentage taking the full deduction within each gross estate class. For the other returns, we assume that the marital deduction equals the average percentage of gross estate for each class.

For the next version of the model, we hope to get data on average marital deduction as a percentage of net estate (after other deductions) and use that for the imputation. We also plan to look at alternative methods to allocate the marital deduction. For example, we might assume that: (1) households with taxable estate (before marital deduction) less than \$20 million will split the estate—that is, give half to the surviving spouse and the other half to other heirs; (2) households with taxable estate above this amount will make bequests of \$10 million and pass the remainder onto the surviving spouse. Assuming that the estate does not grow or fall after the first spouse's death and assuming a discount rate of zero, this is the optimal strategy because it takes maximum advantage of the progressive rates (minimizes undiscounted estate tax liability for the two spouses).

¹⁹ We are grateful to Barry Johnson and his staff of the SOI division of the IRS for supplying these estimates.

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However, since married taxpayers are such a small part of taxable estates, the overall distribution is not very sensitive to these assumptions.

3. Qualified Family Owned Business Interest (QFOBI) deduction

For QFOBI, we estimate that about 4,800 estates were potentially eligible in 2001, because farm assets or business assets account for at least half of the value of the gross estate. The SOI estimates that only about 1,000 estates actually used the QFOBI deduction. We randomly select estate tax returns in each gross estate class to match the SOI estimates—that is, only about 20 percent of those potentially eligible actually claim the deduction.

In the future, we plan to test different assumptions about the QFOBI deduction. For example, we will assume that the probability of taking the QFOBI deduction depends on how much could be saved in estate taxes. Instead of eliminating a random fraction of QFOBI eligible households in each gross estate category, we will keep the returns that would save the most in tax by taking the deduction. Alternatively, we will order taxpayers in the same way, but only keep half of the returns until we reach the target amount (under the assumption that, even if the estate can save a lot of money, it doesn't work if the heirs are not willing or able to keep the farm or business going). In each case, we will store the calculated threshold and hold that fixed in simulations where the QFOBI deduction changes.

Once we have calculated the taxable estate for each record, we apply the estate tax rate and bracket structure in order to calculate estate tax liability.

D. Calculate credits against the estate tax and other adjustments

There are two main credits against the estate tax—the unified credit and the state death tax credit. First, the unified credit effects the current \$1 million exemption level. Note that the

exemption is implemented as a credit rather than a deduction, because a credit is worth the same for those with relatively small estates as for those with quite large ones. The value of a deduction, however, depends on the estates marginal tax rate and would be worth most to estates in the highest estate tax brackets. For the same reason, a credit that exempts \$1 million from the estate tax costs significantly less in lost revenues than a \$1 million deduction. Implementing the unified credit is a simple matter of subtracting the fixed credit from tentative estate tax liability and calculating the positive balance or zero (if negative) as the estate tax.

The state death tax credit is larger than the unified credit for very large estates. Almost all states assess an estate tax at least as large as the state death tax credit, because such a tax is fully credited against the federal estate tax. We assume that every decedent claims the maximum state death tax credit.

Other small credits and adjustments will be randomly assigned based on published averages. These include credits for foreign death taxes, credits for tax on prior transfers and pre-1977 gift taxes, and generation-skipping transfer taxes.

E. Extrapolation of Estimates to Later Years

Our imputation technique produces values for assets and liabilities held by individuals in the 2001 calendar year. In order to estimate the revenue and distributional implications of various estate tax reform options, it is necessary to project values for the components of net worth for future years through the end of the budget window (currently 2013).

We assume that the relation between our explanatory variables and the components of net worth is stable across time and so we use the same coefficients from our probit and regression analysis for each future year. The fact that our estimates are based on a pooled dataset of the

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1998 and 2001 SCFs helps to ensure that any temporal variation in the relation between the wealth items and our explanatory variables has been smoothed out.

Our methodology implies that the predicted amounts for the assets and liabilities on each individual record in the tax model database will change over time as the underlying explanatory variables – such as the various components of income – change for that record. The way in which we adjust the income variables on our tax file is described in detail below. The aggregate number of returns reporting each component of net worth and the aggregate amount for each item will change over time for two reasons: (1) the amounts on the individual records will change; and (2) the weights on the individual records will change over time reflecting projected growth in the number of tax returns for that particular demographic group.

Background on Tax Model Database

The tax model database on to which we impute the values for assets and liabilities is an enhanced version of the 1999 public-use file (PUF) produced by the Statistics of Income (SOI) Division of the Internal Revenue Service (IRS). The PUF contains 132,108 records with detailed information from federal individual income tax returns filed in the 1999 calendar year.

Additional information on demographics and sources of income that are not reported on tax returns is obtained through a constrained statistical match of the public-use file with the March 2000 Current Population Survey (CPS) of the U.S. Census Bureau. The statistical match with the CPS also generates a sample of individuals who do not file income tax returns ("non-filers").

For the years from 2000 to 2013, we "age" the data based on forecasts and projections for the growth in various types of income from the Congressional Budget Office (CBO), the growth in the number of tax returns from the IRS, and the demographic composition of the population

from the Bureau of the Census. We use actual 2000 and 2001 data when they are available. A two-step process produces a representative sample of the filing and non-filing population in years beyond 1999. First, the dollar amounts for income, adjustments, deductions and credits on each record are inflated by their appropriate per capita forecasted growth rates. For the major income sources such as wages, capital gains, and various types of non-wage income such as interest, dividends, social security income and others, we have specific forecasts for per capita growth. Most other items are assumed to grow at CBO's projected per capita personal income growth rate. In the second stage of the extrapolation process, the weights on each record are adjusted using a linear programming algorithm to ensure that the major income items, adjustments, and deductions match aggregate targets. For years beyond 1999 we do not target distributions for any item; wages and salaries, for example, grow at the same per capita rate regardless of income.

For the purposes of projecting assets and liabilities, we then rely on this two-state aging and extrapolation process to predict our explanatory variables for future years.

F. Create expanded measure of income

One of the advantages of this exercise is that we now have a wealth imputation on every record of the tax model.²⁰ We use this wealth measure to create a broader measure of income, which better reflects economic status. The new income qualifier (which is very preliminary) equals labor income plus transfers, alimony, and child support, plus the normal rate of return on

²⁰ The net worth measure used in our income classifier differs slightly from that used for estate tax purposes. Here, we include only the cash value of whole life insurance. For estate tax purposes, the relevant measure of life insurance is the face value of both whole life and term life insurance.

wealth. The normal rate of return represents a risk-free return on capital. For the tables shown below, the rate is 5%.

This income measure is preferable to AGI for several reasons. AGI is highly volatile, because capital gains and business income and losses can vary wildly from year to year. The broader measure reduces the problem that people who are quite wealthy can appear to have low or even negative incomes because they have a big loss in a year. The broader income measure is also more closely related to permanent income and addresses some of the criticisms of distributional analysis raised by the President's Council of Economic Advisers in its 2003 Economic Report of the President and Penner (forthcoming).

It is similar to Treasury's family economic income measure, which is widely recognized by economists to be a better measure of income, but has also been deliberately mischaracterized by critics of distributional analysis. This raises concerns about the political viability of the measure.

In the future, we plan to add employer contributions to health insurance to the income measure (after we have developed that imputation). We will also develop an income measure that is similar to Treasury's cash income.

V. Baseline Distribution of Estate Tax Liability

Table 3 shows the baseline distribution of estate tax liability in 2003. We project that 61 thousand estate tax returns will be filed in 2003, representing about 0.04 percent of tax filing units. Of these, about 28 thousand (0.02 percent) will owe estate tax. The estate tax will raise \$21.6 billion. (Note that these estimates do not include the gift tax.) The average tax per tax unit is \$156. The average per taxable estate tax return is \$778,000.

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The estate tax is highly progressive: About 99 percent of the tax is paid by tax units in the top quintile, 45 percent is paid by tax units in the top 1 percent, and almost 80 percent by the top 5 percent. This distribution is similar to that produced by Poterba and Weisbenner (2001), but less skewed than the Treasury's estimate (Cronin 1999) or Citizens for Tax Justice (2001).

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Table 3.

Current Law
Distribution of Estate Tax Burden By Percentile, 2003¹

Income Class ²	Tax Units (thousands)	Estate Tax Returns				Estate Tax			
		All (thousands)	Percent of Total	Taxable (thousands)	Percent of Total	Amount (\$ millions)	Average		Percent of Total
						Estate Taxpayers (\$ thousands)	All Returns (\$)		
Lowest Quintile	26,229	0.0	0.0	0.0	0.0	0	0	0	0.0
Second Quintile	27,793	0.0	0.0	0.0	0.0	1	711	0	0.0
Middle Quintile	27,791	0.0	0.1	0.0	0.1	3	117	0	0.0
Fourth Quintile	27,792	9.2	15.0	4.7	16.8	245	52	9	1.1
Next 10 Percent	13,897	9.1	14.8	8.1	29.0	1,568	195	113	7.3
Next 5 Percent	6,947	11.5	18.8	5.4	19.3	2,579	480	371	11.9
Next 4 Percent	5,558	20.5	33.4	6.6	23.8	7,493	1,131	1,348	34.7
Top 1 Percent	1,390	10.9	17.8	3.0	10.8	9,715	3,224	6,987	45.0
All	138,959	61.3	100.0	27.8	100.0	21,609	778	156	100.0

Source: Tax Policy Center Microsimulation Estate Tax Model (version 0803-1).

(1) Calendar year.

(2) Tax units with negative income are excluded from the lowest income class but are included in the totals. Includes both filing and nonfiling units. Tax units that are dependents of other taxpayers are excluded from the analysis.

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