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The Magnitude and Determinants of Federal Estate Tax Noncompliance

by

Martha Britton Eller
Internal Revenue Service

Brian Erard
B. Erard & Associates

Chih-Chin Ho
Internal Revenue Service

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LEADING IN THOUGHT AND ACTION

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Martha Britton Eller
Internal Revenue Service

Brian Erard
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Martha Eller,

Brian Erard,

and

Chih-Chin Ho

ABSTRACT

The federal estate tax represents an interesting case study in noncompliance. The base for the tax is concentrated among a small number of very wealthy estates, with marginal tax rates reaching as high as 60 percent. Furthermore, the base is inherently difficult to measure, requiring complex valuations of a variety of different types of assets. From an enforcement perspective, the scope for third-party information reporting and document matching is rather limited, making examinations one of the few effective tools for enforcing compliance. In this paper, we attempt to assess the magnitude and determinants of estate tax noncompliance. We find that it is difficult to measure the overall magnitude of noncompliance using data from the Survey of Consumer Finances. The results appear to be very sensitive to the treatment of married individuals, the choice of mortality probabilities, and the allocation of deductions and credits among individuals. We present an alternative estimate, which suggests that estate tax noncompliance, as a percentage of tax liability, is likely to be higher than noncompliance with the individual income tax.

We also perform an econometric analysis of the determinants of estate tax noncompliance, examining both the likelihood and magnitude of a positive audit assessment using operational audit data. Our framework controls for non-random audit selection, and it permits an analysis of the relationship between noncompliance and the chance of being audited. We find that the probability of a positive assessment (but not the magnitude of the assessment) actually tends to be increasing with the likelihood of an audit. We also find that, contrary to popular belief, noncompliance is not limited to the estates of widowed and other unmarried decedents. Controlling for wealth and other factors, our results suggest that a married decedent's return has a similar likelihood of a positive audit assessment to a widowed decedent's return and that the expected magnitude of noncompliance is actually larger.

1. Introduction

The federal estate tax is levied on the fortunes of America's wealthiest decedents. With average tax burdens in the hundreds of thousands of dollars and marginal rates as high as 60 percent, the tax creates powerful incentives for both legal avoidance and evasion. In this paper, we provide an empirical analysis of the magnitude and determinants of federal estate tax noncompliance.[1] We begin in section 2 by discussing certain unique features of the estate tax that create special compliance and enforcement problems. Then, in section 3, we critically review simulations by Wolff (1994) and Poterba (1996) that produce conflicting measures of the overall magnitude of estate tax noncompliance from the Survey of Consumer Finances (SCF). We find that the results from the SCF are very sensitive to the treatment of married individuals, the choice of mortality probabilities, and the allocation of deductions and credits among individuals. As an alternative measure of aggregate noncompliance, we summarize the findings of Erard (1999), who performed an econometric extrapolation from audited estate tax returns. We describe and summarize the data used in our analysis in section 4. In section 5, we develop an econometric methodology for analyzing the determinants of estate tax noncompliance using micro-level tax return and audit information. We present and interpret our estimation results in section 6. Section 7 concludes.

2. Unique Features of Estate Taxation

Most of the literature on tax compliance is based on the income tax.[2] The estate tax, however, has a number of unique features that potentially impact on compliance and enforcement. First, and foremost, the individual who may have known the most about the estate (the decedent) is not available to assist with the return's preparation. Second, the tax is narrowly focused on a small number of very wealthy estates, which are potentially subject to very high marginal rates. Third, valuation of assets plays a much more important role in estate taxation than in income taxation, and many assets in an estate can be difficult to properly value. Fourth, while a substantial portion of the income tax base is subject to information reporting, withholding, and document matching, relatively little of the estate tax base is covered by these forms of independent verification.[3] Together, these features of the estate tax will tend to magnify compliance and enforcement problems, resulting in a greater potential for both understatement and overstatement of tax liability. On the other hand, legal estate tax avoidance strategies abound, providing an

alternative to outright evasion. To the extent that they serve as a substitute for evasion, one might expect legitimate tax planning activities to reduce the incidence of tax compliance problems.[4] Finally, the estate tax return is financially relevant to a potentially large number of beneficiaries. Noncompliance may therefore require some degree of collusion among a number of individuals.[5] We observe that similar strategic interactions may be present in other compliance settings. In the case of the income tax, for example, married couples may negotiate over what is to be reported on their joint return.[6] Similarly, evasion of the value-added tax may involve collusion among a chain of buyers and sellers. In our empirical analysis, we investigate whether the number of beneficiaries is related to the frequency and magnitude of audit assessments.

3. Simulations of Overall Estate Tax Noncompliance

As part of his commentary on an estate taxation article by another author, Wolff (1995) reports on a simulation of estate tax liability he performed using the 1992 SCF. His results indicate a very large gap between simulated estate tax collections ($44 billion) and actual 1993 collections ($10.3 billion), which he interprets as evidence of substantial noncompliance. Poterba performs a different set of simulations using the 1995 SCF, obtaining a much closer correspondence between simulated and actual collections. Using his preferred simulation based on the Annuitant Life Table, he reports estimated collections of $15.7 billion. This is within 10 percent of the $14.3 billion in taxes actually reported on returns for 1995 decedents.[7] In this section, we attempt to reconcile these conflicting results and assess the likely extent of aggregate estate tax noncompliance.

3.1 Simulation Methodologies

The simulation methodologies employed by the two authors are similar. Each begins by assigning mortality probabilities to individuals in the SCF on the basis of age, gender, and (in the case of Wolff) race. The estate tax that would be due (if any) in the event of an individual's death is then computed by applying the appropriate tax rate schedule to a measure of the taxable estate. For each individual, the computed estate tax liability is weighted by the mortality probability, and the results are aggregated to simulate expected total estate tax receipts.

Although Wolff and Poterba employ similar approaches, the details of the simulations carried out by the authors differ in several important respects. First, Wolff relies on

a mortality table for the general population.[8] A difficulty with this table is that mortality rates are not provided for ages above 80, between 66 and 69, between 71 and 74, and between 76 and 79. To fill in probabilities for these ages, he performs a straight line interpolation (extrapolation, in the case of ages above 80) using the probabilities for the nearest available ages. In his preferred approach, Poterba employs a very different mortality table (the Annuitant Life Table) which is designed for individuals who purchase single-premium annuities from life insurance companies.[9] Since such individuals tend to be quite wealthy, Poterba argues that the Annuitant Life Table may provide a more appropriate set of mortality rates for high net-worth households. The mortality rates for wealthy individuals are uniformly lower than the corresponding rates for the general population; therefore, the use of the Annuitant Life Table will tend to generate lower estimates of the number of taxable estates and expected estate tax receipts than an ordinary life table. Poterba also performs an alternative simulation using the Population Life Table produced by the Social Security Administration Office of the Actuary. This latter table is similar to the one employed by Wolff, and has the advantage that separate mortality probabilities are available for all ages.

A second difference between the simulations of Wolff and Poterba concerns the treatment of married individuals. Wolff applies separate mortality probabilities for each spouse and computes the tax that would be due in the event of either spouse's death on the basis of household wealth. In computing the tax, he allows a deduction equal to the average spousal bequest reported on estate returns for the household's total gross estate class. Poterba employs an alternative treatment of married individuals that tends to result in fewer taxable returns and less aggregate tax liability. Effectively, he assumes that a married decedent would leave a sufficient bequest to his or her spouse to completely eliminate any estate tax liability. Thus, he only applies an estate tax in his simulations in the relatively unusual case that both spouses die in the same year. In that event, tax liability is computed on the basis of household wealth, with no adjustment for a spousal bequest.

The authors also apply somewhat different deductions and credits in their calculation of tax. Wolff allows a deduction for charitable bequests, based on the average donation on returns in the decedent's total gross estate class. Poterba allows a similar deduction; however, he also makes certain other allowances that tend to further reduce aggregate tax liability. In particular, he accounts for a state death tax credit and a deduction for funeral expenses, in both cases relying on average return values for the decedent's total

gross estate class.

Finally, the authors rely on surveys from different years: 1992 in the case of Wolff, and 1995 in the case of Poterba.

3.2 Replication Exercises

We begin by attempting to replicate the results of the two authors. Table 1 compares the results of our replication exercise for the Wolff study with Wolff's original results. We obtain a fairly similar number of taxable returns, but a much lower aggregate tax liability. We believe the major reason for the tax liability discrepancy is that Wolff employed a re-weighted version of the SCF, whereas we employed the standard public-use version; Poterba observes that the weights employed by Wolff produce a larger wealth stock than the public use weights, particularly among high net-worth households.[10] Nonetheless, our simulated aggregate tax liability ($21.3 billion) is still over twice as large as the amount reported on estate tax returns in 1993 ($10.3 billion), and the simulated number of taxable returns is about 50% larger than the number of taxable returns filed in 1993.

[Insert Table 1 about here]

In Table 2, we compare the results of our replication exercise for the Poterba study with Poterba's original results. Our simulation using the Annuitant Life Table produces an estimate of $16.9 billion in aggregate estate taxes, which is fairly close to Poterba's original estimate of $15.7 billion.[11] Our estimates also show a consistent distribution of estate tax liabilities by age category. Estate tax returns filed for 1995 decedents voluntarily reported $14.3 billion in taxes, which is within 10 percent of the amount originally estimated by Poterba. This would appear to indicate that compliance problems with the estate tax are relatively modest.

Table 2 also compares the results of our simulation based on the 1995 SCF using the Population Life Table with Poterba's original simulation. In this case, our results show an even closer match with his earlier estimates ($23.8 billion in aggregate estate tax liability compared to Poterba's original estimate of $23 billion). Based on these results, the problem with estate tax compliance would appear to be much more severe. As first observed by Poterba, the choice of mortality table has a profound effect on the magnitude

of simulated estate tax liability.

[Insert Table 2 about here]

3.3 Looking Behind the Simulations

Although the choice of mortality table partly explains the divergence between Wolff's simulation results and those of Poterba, it isn't the entire story. Observe that our simulation based on Poterba's methodology with the Population Life Table yields an estimated aggregate tax liability of $23.8 billion for 1995 decedents, which is approximately 66 percent larger than actual voluntary estate tax collections for that year's decedents. In contrast, our application of Wolff's methodology to the 1992 SCF yields an estimated aggregate tax liability of $21.4 billion, which is over twice as large as actual voluntary estate tax collections in 1993. Given that the life table used by Wolff is rather similar to the Population Life table, what causes the much more substantial gap between simulated and actual tax collections under Wolff's methodology? The divergence in results is largely due to differing treatments of married individuals by the two authors. Since Poterba imposes a tax on married households in his simulations only in the event that both spouses die within the same year, relatively few married decedent's are found to be taxable. The total simulated tax liability for married decedents is only $1.1 billion, or less than half the reported liability of $2.5 billion on estate returns for married 1995 decedents. When the Annuitant Mortality Table is employed, taxes for married decedents are even more substantially understated. Our replication of Poterba's analysis using this table yields an aggregate tax liability for married decedents of only $550 million. The assumption that no estate tax liability is incurred when a decedent is survived by his spouse would be appropriate if married decedents always passed the vast majority of their estate onto their spouses as a marital bequest. In fact, however, there are several reasons why such a practice might not be followed. First, from a tax planning perspective, it may make good sense to spread some of the estate tax liability to the first decedent's estate rather than to have all of the household's wealth subject to taxation when his or her spouse passes on. Given the graduated rate structure, such a strategy might result in a significant reduction in total estate tax liability, depending on the longevity of the decedent's spouse. Second, an individual may be concerned that his or her spouse may not share the same wishes for how the estate should be divided upon the spouse's subsequent death. Finally, if the spouse is not the

decedent's first husband or wife, (s)he may prefer to bequeath a substantial portion of the estate to members of his or her first family.

As discussed previously, Wolff employs a different approach to simulating estate tax liability for married individuals. He applies the estate tax to the household's entire estate (less an allowance for a spousal bequest) whenever either spouse dies. He therefore obtains a much larger number of taxable estates for married decedents and simulates a much higher aggregate tax liability for them. In our replication of Wolff's simulation analysis, married decedents account for 60 percent of all taxable returns and 47 percent of aggregate total tax liability. Among estate tax returns filed in 1992, however, married decedents accounted only for 16 percent of all taxable returns and 23 percent of aggregate total tax liability.

Thus, while Poterba's methodology tends to understate the estate tax bill for married decedents, Wolff's methodology tends to substantially overstate it. It is, in fact, very difficult to properly simulate potential estate tax liability for married decedents, because it is not clear what proportion of total household net worth should be assigned to the estate in the event that one of the spouses dies. It therefore seems reasonable to focus simulation efforts on unmarried individuals, whose estate tax situation is somewhat more straightforward to model.

On the surface, at least, it seems appealing to apply the Annuitant Mortality Table to unmarried individuals in the SCF, because this table is designed to account for the mortality risk of wealthy individuals. However, our simulation based on Poterba's methodology with this table yields only 23,638 taxable estates for unmarried decedents. In contrast, there were actually 31,383 taxable returns filed for unmarried 1995 decedents, or about one third more than the simulations predicted. Moreover, this substantial understatement problem would be greatly exacerbated if we were to account for the fact that unmarried decedents within any given gross estate class tend to have substantially larger charitable bequests and state death tax credits than their married counterparts. Our simulation based on Poterba's methodology using the Population Life Table seems more reasonable in this regard. It yields 33,655 taxable returns for unmarried decedents, or about 7 percent more than the actual number filed.

The above findings raise an important question. If the Annuitant Mortality Table better reflects the mortality risk for wealthy individuals, why does its use result in such a dramatic understatement of the number of taxable returns even among unmarried decedents? A major part of the answer is found by considering the interaction between marital

status and mortality. While it is true that wealthy individuals tend to have a lower mortality risk than others in a given age group, it is equally true that unmarried individuals tend to have a higher mortality risk than married individuals of the same age. For example, Hoyert, Kochanek, and Murphy (1999, p. 11) report that married individuals age 75 and over have an annual mortality rate of 6,165 deaths per hundred thousand, compared to the much higher rates of 8,653, 9,497, and 10,685 per hundred thousand for divorced, widowed, and never-married individuals in this age group, respectively. This same pattern of significantly lower death rates among married individuals is observed across age, gender, and racial groups. Thus, the effects of wealth and marital status on mortality rates appear to be offsetting for unmarried individuals, raising the possibility that the Population Life Table is actually better suited for simulating estate tax liabilities – at least among the unmarried population.[12] This same reasoning may help to explain why our simulation based on Wolff's methodology yields far too many taxable estates for married decedents. We suspect that the life table used by Wolff assigns too high a mortality probability to married individuals in the SCF, because it accounts neither for marital status nor wealth, which both work to reduce the mortality risk for married individuals.[13]

In Table 3, we attempt to simulate the number of taxable returns and aggregate tax liability for unmarried decedents by applying the Population Life Table to the 1995 SCF. In this simulation, we employ Poterba's methodology, except that we allow charitable bequest deductions and state death tax credits based on the much larger average figures for unmarried decedents within the individual's total gross estate class. Our simulation rather substantially understates the number of taxable returns with gross estate values under $2.5 million. It appears that the reason for this understatement is the assignment of average deduction (and credit) figures to all unmarried households. Particularly among the lower gross estate categories, deductions for charitable bequests are highly concentrated among a relatively small number of returns. For example, only 23.8 percent of returns for unmarried 1995 decedents in the $600K to $1M class actually claimed a charitable bequest deduction. Given the $600,000 threshold for the application of the estate tax in 1995 and the graduated rate structure of the tax, the methodology for assigning deductions and credits plays a crucial role in the analysis.[14]

[Insert Table 3 about here]

As an illustration, we repeat our simulation with an alternative assignment scheme

for charitable bequest deductions. We begin by computing the average deduction among unmarried 1995 decedent returns actually claiming a charitable bequest deduction within each gross estate category. We then randomly assign the average deduction to a subset of all unmarried individuals within the relevant gross estate category of the 1995 SCF. The probability that a given return within a gross estate category will receive the deduction is set equal to the percentage of 1995 unmarried decedent returns within that category that actually claimed a charitable bequest deduction. Thus, whereas our original simulation assigned the same deduction to all individuals within a gross estate category, our new simulation assigns some individuals no deduction and others a very large deduction. The results of our new simulation are presented in Table 4. The estimated number taxable returns in the lower gross estate classes is now much higher, and the estimated overall number of taxable returns is now slightly larger than the number of taxable returns actually filed for unmarried 1995 decedents. However, the gap between the simulated and actual aggregate tax liability has increased from 13.6 percent under the previous simulation to over 70 percent under the current simulation.

[Insert Table 4 about here]

It is clear from the above analysis that the results of SCF simulations, even for unmarried individuals, are quite sensitive to the method one employs to assign key deductions and credits. At a minimum, it appears that a very careful set of imputations would need to be performed before attempting to draw any firm conclusions about estate tax compliance from the SCF.

3.4 Evidence from the Estate Post-Audit Study

Given the difficulties associated with measuring aggregate estate tax underreporting using the SCF, is there an alternative way to address this question? One approach is to rely on operational estate tax audit data. Erard (1999) performed an analysis of estate tax underreporting based on a preliminary version of the data (described below in section 4) we use in our current study of the determinants of estate tax noncompliance. His model is similar in structure to the specification laid out in section 5.[15] The model accounts for the likelihood of an audit as well as the probability and magnitude of an audit assessment. In contrast to our current study, however, all regressors are based on the information originally reported on the estate tax return, not the corrected amount determined during

examination.[16] The parameter estimates of the model are used to predict for each unaudited return the expected magnitude of noncompliance; in the case of audited returns, the actual audit assessment serves as the measure of noncompliance. Aggregating over all returns, Erard estimates that the overall reporting tax gap – the difference between estate taxes owed and estate taxes voluntarily reported – is $1.5 billion dollars (or approximately 13 percent of aggregate estate tax liability) on calendar year 1992 returns. This figure likely understates the true tax gap, both because the audit assessment figures reflect the amount actually assessed the taxpayer after any appeals or litigation, and because the estimates do not account for any noncompliance that the IRS examiner was unable to detect. To put this figure into perspective, IRS' estimated underreporting gap for tax year 1992 individual income tax returns amounted to approximately $72 billion dollars, or about the same percentage of true tax liability (13 percent) found for estate tax returns. However, the latter estimate is based on the examiner-recommended assessments from very comprehensive audits (not the potentially smaller amount the case was settled for after any appeals or litigation), and it incorporates a rather substantial adjustment for undetected noncompliance. Thus, it seems likely that the degree of estate tax noncompliance is at least somewhat larger than the degree of individual income tax noncompliance.

4. Data Description

The data used in our econometric analysis were derived from the 1992 Estate Post-Audit Study conducted by the Statistics of Income (SOI) division of the IRS. SOI initiated this study to examine the extent to which accounting for audit revaluations modifies pre-audit estimates of federal estate tax return population characteristics. The federal estate tax returns included in the study represent a stratified random sample from the overall population of returns filed in 1992. Among other objectives, the strata were designed to heavily oversample returns that were likely to have been audited. SOI has developed a set of sample weights that make the sample of approximately 4,200 returns broadly representative of the overall 1992 estate tax return population.[17] The sample includes detailed line item information from the federal estate tax return. In addition, an indicator is included with the data that identifies whether a return was audited. Supplementary information is available for audited returns concerning the overall magnitude of the eventual audit assessment as well as specific line item changes that resulted from the examination. The assessment amount represents the final value of the assessment after the case was closed,

subsequent to any appeals or litigation.[18] Tax examinations represent a complex and sometimes lengthy negotiation between the IRS tax examiner and the estate, as represented by a fiduciary, usually an attorney. The audit assessment data employed in our analysis therefore represents the outcome of a negotiation between two parties, each with his own agenda and legal constraints. Even after a tentative agreement is reached between the parties, the appellate court system may be called upon by the estate to impose a final decision. We employ the audit assessment as a measure of "noncompliance"; however, it is perhaps better thought of as an imperfect indicator of the degree of noncompliance with the estate tax laws rather than a precise dollar estimate. For the subsample of returns in our data file with total gross estates exceeding $5 million, we have matched information on the number of beneficiaries listed on the estate tax return. As discussed in Section 6, we perform a separate analysis on this subsample of returns that includes dummies for the number of beneficiaries as additional regressors in the audit and compliance equations of our model.

Below, we describe some of the most salient characteristics of estate tax auditing and compliance using summary tables and figures based on our data. The sample weights are employed to make the results broadly representative of the overall 1992 estate tax filing population. Table 5 summarizes estate tax auditing by size of total gross estate. IRS estate tax examiners audited an estimated 11,338 federal estate tax returns filed in 1992, representing 19.2 percent of the 59,178 returns filed in that year. However, the audit rate for returns varied substantially by size of the reported gross estate. As one might expect, returns filed for very large gross estates had a relatively high rate of audit coverage. In fact, nearly half of all returns with gross assets exceeding $5 million were examined, compared to only 11 percent of returns with assets under $1 million.

[Insert Table 5 about here]

As a whole, audits have only a fairly minor impact on total estate tax revenue. Aggregate net estate tax liability for filing year 1992 increased by $560 million (see Table 6) as a result of examinations, or by about 5.5 percent. The pre-audit value of total gross estate, $100.0 billion, increased by only 1.2 percent, creating a post-audit value of total gross estate that just exceeded $101.2 billion. And, in a somewhat unexpected result, total allowable deductions, available against gross estate, also increased as a result of operational audits. The pre-audit value of total allowable deductions, $43.5 billion, increased by 0.2

percent, or $117.0 million, to $43.6 billion.

[Insert Table 6 about here]

While the overall net estate tax liability for filing year 1992 increased as a result of audit, and while the majority of audits were closed with additional tax owed, a nontrivial share of examinations actually closed with a reduction in net estate tax liability. In fact, a surprisingly low percentage of returns, only 60.1 percent, were closed with additional tax assessed (see Figure 1), while 21.0 percent were closed with a tax reduction, and 18.9 percent were closed with no change in original net estate tax.

[Insert Figure 1 about here]

Table 7 indicates that estates with a positive audit assessment were charged $676.6 million in additional taxes, or $99,395 on average per return. Estates with a negative audit assessment received an aggregate rebate of more than $116.7 million, or $48,986 on average per return.

[Insert Table 7 about here]

Estate tax attorneys nationwide, interviewed by SOI economists in response to post-audit findings, suggest that the surprisingly high percentage of returns closed with a reduction in tax liability may be explained by a number of factors. For instance, during the course of audit, a property included in gross estate may be sold at a price less than its original, reported value. The possibility of an overstated basis points to an inherent difficulty in asset valuation. In some cases, the examination process itself actually generates a reduction in estate tax liability. This can occur, for example, because the fees charged by executors and attorneys to deal with an audit are deductible against the estate. Also, sometimes when an examination is initiated, an estate's fiduciary will elect to shift certain deductible expenses from the federal income tax return for trusts and estates to the federal estate tax return, because the marginal rates are higher on the latter. Such a shift increases the value of total allowable deductions on the estate return, thereby reducing the value of the taxable estate.

While estate tax examiners suggest that the size of gross estate does not necessarily indicate a return's potential for additional tax, estate post-audit data reveal that, on average, returns with total gross estate in excess of $5 million yield about $240,000 in

additional tax per return. Returns with smaller gross estates yield, on average, far less in additional net tax revenue. Estates with less than $1 million in gross estate owed an average of $13,230 in additional tax. while estates with between $1 million and $5 million owed an average of $37,081.

The gender composition of the 1992 audited population differs markedly from the composition of the 1992 estate tax filing population as a whole. While the filing population is comprised of 55.5 percent male decedents and 44.5 percent female decedents, the audited population is characterized by a female majority, with 52.9 percent female decedents and only 47.1 percent male decedents (see Figure 2). The overriding presence of widowed decedents, most often female, in the audited population explains the prevalence of females and is a result of an audit selection process that favors non-married decedents.

[Insert Figure 2 about here]

Married decedents comprise the largest percentage of returns in the filing population, with 46.6 percent of all decedents married at death, while the second largest marital status category is widowed decedents, with 40.6 percent of all decedents widowed at death (see Figure 3). However, the audited population is overwhelmingly comprised of widowed decedents. An estimated 61.2 percent of all decedents in the audited population are widowed, while only 23.1 percent are married.

[Insert Figure 3 about here]

These figures reflect an intended bias in the audit selection process. For much of the recent past, according to IRS estate tax attorneys, examiners were discouraged from auditing the estates of married decedents, since those estates could use the marital deduction to transfer unlimited properties to the surviving spouses. The potential for additional tax on first estates was considered negligible, and, further, the estates of both spouses could be examined following the death of the second spouse. However, the evidence suggests that the estates of decedents with a surviving spouses may very well owe additional net estate tax as a result of an audit, despite the availability of a marital deduction that can be used to "soak-up" any increase in total gross assets. In fact, about half of all such estates in the audited population were assessed additional tax (see Figure 4). While estates for decedents with no surviving spouse were certainly more likely to receive an additional tax assessment (about 63.0 percent of returns in this category were assessed more taxes), the

difference between the two groups is less than what might be expected.

[Insert Figure 4 about here]

Several explanations are possible for the relatively large percentage of married decedents whose estates owed additional tax, according to IRS attorneys. First, as noted previously, some wealthy married couples arrange their wills so that taxes are paid on both spouses' estates, thereby achieving potentially lower marginal rates. Second, they point to the increasing occurrence of second marriages. Because individuals may not leave their entire estates to second spouses and second families, it is likely that the spousal bequest in such cases will not be fully utilized to offset additional taxable wealth discovered during an audit. Finally, the marital deduction or the value of qualified terminable interest property for which the marital deduction is available, is sometimes incorrectly calculated on returns as originally filed. Such a miscalculation also can lead to additional estate tax liability.

Examination results vary by asset category. Table 8 indicates that real estate other than a personal residence, closely held stock, and cash are the most frequently revalued assets during an audit; the rate of adjustment for each is well in excess of 30 percent. The lowest adjustment rates are observed for annuities (6 percent), insurance (8.5 percent), unclassified mutual funds (10.4 percent), and bonds (11.6 percent). Table 8 also displays the average change per revalued return for different assets (computed as the average change in the asset value among returns receiving a revaluation of that asset). By this measure, mortgages and notes ($500,796), closely held stock ($387,034), depletables and intangibles ($193,577), and farm assets ($191,611) had the largest adjustments. At the other end of the spectrum, unclassified mutual funds were actually revalued downwards on average. When revaluations are measured as a percentage of the amount originally reported on revalued returns, mortgages and notes (170.2 percent) and insurance (116.9 percent) show by far the largest percent changes. The mortgages and notes category includes proceeds from lawsuits, which, according to estate tax attorneys, are often understated on the original estate tax return. Several types of life insurance transfers must be reported in the decedent's gross estate, including revocable transfers and transfers with retained life interests. Estate tax attorneys indicate that these items are sometimes erroneously excluded from

reported estate values.

[Insert Table 8 about here]

5. Econometric Methodology

In this section, we develop an econometric model for analyzing the determinants of estate tax noncompliance with ordinary operational audit data. Although one typically expects an examination to result in either an additional tax assessment or no additional assessment, a nontrivial percentage of estate tax examinations actually lead to a reduction in assessed tax liability. We therefore develop a framework that allows for all three possible outcomes. Further, since audits are targeted towards returns deemed likely to have compliance problems, it is important to control for the role of audit selection in observed compliance outcomes. We therefore model audit selection jointly with compliance behavior.

Our econometric framework consists of four equations. The first is a (reduced form) probit specification of the decision whether to audit a given return:

$$A^* = \beta_A' X_A + \epsilon_A. \tag{1}$$

The term A^* represents an index of the likelihood that a return with observed characteristics X_A will be audited. The term ϵ_A represents a standard normal random disturbance, and β_A is a vector of coefficients to be estimated. From the data, we can deduce whether A^* is greater than zero (indicated by whether an audit has been performed).

The second equation is also a probit specification. However, rather than describing the likelihood that a return will be audited, it concerns the likelihood that the assessment (of additional net wealth) would be positive should an audit take place. The equation is specified as follows:

$$P^* = \beta_P' X_P + \gamma_P \Phi(\beta_A' X_A) + \epsilon_P, \tag{2}$$

where P^* is an index of the likelihood that the assessment would be positive, X_P is a vector of explanatory variables, β_P is a vector of coefficients to be estimated, and ϵ_P is a standard normal random disturbance. From the data, we can deduce whether P^* is greater than zero (indicated by whether the audit assessment is positive). Observe that the probability of an audit – $\Phi(\beta_A' X_A)$ – is included as a regressor. (The symbol $\Phi(\bullet)$ refers

to the cumulative standard normal distribution.) We hypothesize that the risk of audit serves as a deterrent to noncompliance, in which case the sign of γ_P should be negative.

Should the audit assessment turn out to be positive (indicating that net wealth has been understated), it is necessary to describe the magnitude of the additional assessment. As is typical of audit results, estate tax assessments tend to be very skewed, with a small number of audited returns receiving extremely large assessments. To account for this feature of the assessment distribution, a lognormal specification is employed:

$$ln(R) = \beta_R' X_R + \gamma_R \Phi(\beta_A' X_A) + \epsilon_R, \tag{3}$$

where $ln(R)$ represents the natural log of the audit assessment, X_R is a vector of explanatory variables, β_R is a vector of coefficients to be estimated, and ϵ_R is a normally distributed random disturbance. Again, we include the probability of an audit as a regressor, hypothesizing that the extent of noncompliance is negatively associated with the audit risk (i.e., that γ_R is negative).

Should the audit assessment turn out to be non-positive, a specification that accounts for whether the assessment is negative (indicating an overstatement of net wealth) or zero (indicating that net wealth was properly reported) is in order. For this purpose, we employ the following equation:

$$ln(M^* + D) = \beta_M' X_M + \epsilon_M, \tag{4}$$

where M^* is an index of the likelihood that the assessment is negative, X_M is a vector of explanatory variables, β_M is a vector of coefficients to be estimated, and ϵ_M is a random normal disturbance term. The term D (also estimated) is the displacement parameter, which indicates how far the lower bound of the log-normal distribution is shifted below zero. We observe an overstatement in the amount of M^* only if M^* is greater than zero. When M^* falls between $-D$ and zero, the assessment equals zero. Thus, our specification is similar to a tobit structure, except that we employ the displaced lognormal distribution in place of the normal to better account for the inherent skewness of the data. Observe that we do not include a measure of the risk of audit as a regressor in this equation. We assume that overstatements of wealth are largely unintentional, and are therefore not responsive to the likelihood of an audit.

We allow free correlations (ρ_{AP}, ρ_{AR}, and ρ_{PR}) in our framework among the disturbances ϵ_A, ϵ_P, and ϵ_R.[19] These correlations admit the possibilities that unobserved factors which influence one equation may also impact on another equation. For example, if IRS

classifiers base their decision to examine a return partly on information beyond what is reported on the estate tax return, we may expect that ρ_{AP} is greater than zero. (i.e., that the non-return information which leads to an examination tends to be positively correlated with non-compliance.) Similarly, it would not be surprising if returns that have a high probability of requiring an adjustment also tend to have large assessments when an adjustment is required. This might be indicated by a positive value for ρ_{PR}.

We estimate our model using the method of maximum likelihood. The likelihood function is presented in the Appendix.

6. Estimation Results

In this section we present the results of our econometric analysis. We begin by describing the regressors employed in our analysis, and we then present and interpret our findings.

6.1 Variable Specification

The measure of noncompliance used in our econometric analysis is the difference between the assessed value of the adjusted taxable estate and the reported value. We define the adjusted taxable estate as the value of the total gross estate less allowable deductions plus adjusted taxable gifts. However, we exclude administrative expenses from our definition of allowable deductions. We do this because an examination typically results in additional administrative expenses that are deductible against the estate. Thus, examinations frequently result in the assessment of additional administrative expenses even when administrative expenses were properly reported on the original return. As a normalization, our noncompliance measure is specified in hundreds of thousands of dollars.

Our econometric framework includes three noncompliance equations (equations (2), (3), and (4)) and an audit selection equation (equation (1)). The noncompliance equations specify the probability that an assessment is positive, the magnitude of the assessment if it is positive, and the magnitude of the assessment if it is non-positive, respectively. The regressors X_P, X_R, and X_M in these equations are identically specified in our analysis. They include a set of demographic control variables, a measure of gross wealth, and the marginal tax rate. In addition, dummies for the presence of certain types of assets and the share of gross wealth accounted for by various assets are included to investigate whether noncompliance tends to be concentrated among assets that are difficult to value (e.g.,

closely held stock). Dummy variables are specified for certain variables that may signify tax planning, such as the presence of a will, the payment of attorney's fees or executor's expenses, the presence of adjusted taxable gifts or transfers during the decedent's life, a deduction for charitable bequests, and the presence of QTIP property. We define most of our regressors using the post-audit figures for the underlying estate tax return line items rather than the amounts originally reported on the return. We believe that the post-audit figures are likely to represent a closer approximation of the true estate characteristics than the originally reported amounts. However, we base the dummy variables for the presence of attorney's fees and executor's fees on the per return values, as we are interested in identifying whether an attorney or an executor was paid for work on the original return.

1. **Constant:** Unit vector for estimating the constant term.
2. **Male:** Dummy equal to 1 if the decedent is male; 0 otherwise.
3. **Single:** Dummy equal to 1 if the decedent was single; 0 otherwise.
4. **Separated or Divorced:** Dummy variable equal to 1 if the decedent was separated or divorced; 0 otherwise.
5. **Widowed** Dummy variable equal to 1 if the decedent was widowed.
6. **Will Present:** Dummy variable equal to 1 for the presence of a will; 0 otherwise.
7. **1990 or Earlier Decedent:** Dummy variable equal to 1 if the decedent's year of death was 1990 or earlier; 0 otherwise.
8. **1992 Decedent:** Dummy variable equal to 1 if the decedent's year of death was 1992.
9. **Age:** Age of decedent divided by 100.
10. **Marginal Tax Rate:** Federal marginal tax rate at the reported value of the adjusted taxable estate.
11. **Natural Log of TGE:** Natural log of total gross estate.
12. **Personal Residence/TGE:** Ratio of value of personal residence to TGE.
13. **Other Real Estate/TGE:** Ratio of value of other real estate to TGE.
14. **Bonds/TGE:** Ratio of value of bonds to TGE.
15. **Closely Held Stock/TGE:** Ratio of value of closely held stock to TGE.
16. **Other Corporate Stock/TGE:** Ratio of value of other corporate stock to TGE.
17. **Mutual Funds/TGE:** Ratio of value of mutual funds to TGE.
18. **Cash Assets/TGE:** Ratio of value of cash assets to TGE.

19. **Non-Corp. Business Assets/TGE:** Ratio of value of non-corporate business assets to TGE.
20. **Mortgages & Notes/TGE:** Ratio of value of mortgages and notes to TGE.
21. **Annuities/TGE:** Ratio of annuities to TGE.
22. **Farm Assets Dummy:** Dummy variable equal to 1 if any farm assets were owned by the estate; 0 otherwise.
23. **Limited Partnerships Dummy:** Dummy variable equal to 1 if the estate owned any limited partnerships; 0 otherwise.
24. **Art Assets Dummy:** Dummy variable equal to 1 if the estate owned any art assets; 0 otherwise.
25. **Depletable/Intangible Dummy:** Dummy variable equal to 1 if the estate owned any depletable or intangible assets.
26. **Other Non-Corp. Assets Dummy:** Dummy variable equal to 1 if the estate owned any non-corporate assets; 0 otherwise.
27. **Closely Held Stock Dummy:** Dummy variable equal to 1 if the estate owned any closely held stock; 0 otherwise.
28. **Community Property Dummy:** Dummy variable equal to 1 if the decedent owned community property with his/her spouse; 0 otherwise.
29. **Attorney's Fees Dummy:** Dummy variable equal to 1 if any attorney's fees were deducted against the estate; 0 otherwise.
30. **Executor's Fees Dummy:** Dummy variable equal to 1 if any executor's fees were deducted against the estate; 0 otherwise.
31. **Charitable Bequest Dummy:** Dummy variable equal to 1 if any charitable bequests were deducted against the estate; 0 otherwise.
32. **Power of Appointment Dummy:** Dummy variable equal to 1 if the decedent had the power of appointment over any property (reportable on Schedule H); 0 otherwise.
33. **Schedule G Dummy:** Dummy variable equal to 1 if the decedent's estate was required to complete Schedule G ("Transfers During Decedent's Life").
34. **Adjusted Taxable Gifts Dummy:** Dummy variable equal to 1 if the estate was required to report any adjusted taxable gifts; 0 otherwise.
35. **State Death Tax Credit Dummy:** Dummy variable equal to 1 if the estate was entitled to a state death tax credit; 0 otherwise.
36. **QTIP Property Dummy:** Dummy variable equal to 1 if the decedent's estate

includes any QTIP property (Qualified Terminable Interest Property); 0 otherwise. This is property that the decedent transferred to trust for the income benefit of the surviving spouse; the surviving spouse has no power to appoint beneficiaries at his or her death. The decedent's estate may claim the marital deduction for such property.

The weighted mean values of the above regressors are presented in Table 9, along with the average value of the change in the adjusted taxable estate. For returns in our data file with gross estates exceeding $5 million, we have been able to match information on the number of beneficiaries reported on the estate tax return. We have repeated our analysis on this subsample, including dummies for the number of beneficiaries as additional regressors. However, a likelihood ratio test indicates that the dummies are jointly insignificant. In future research it would be useful to explore alternative specifications involving the number of beneficiaries with a more complete sample of data.

[Insert Table 9 about here]

A similar set of regressors is specified for the audit equation (X_A in equation (1)), although dummy variables for the presence of an asset are used in place of the ratio of the value of the asset to the value of the total gross estate. Since the audit equation is estimated using both examined and unexamined returns, it is necessary for the regressors in this equation to be based on the values originally reported for the relevant line items of the estate tax return. We have elected not to employ asset ratio variables, because they are potentially endogenous.[20] We anticipate that a simple dummy variable for the presence of any reported closely held stock is less likely to be endogenous. For the same reason, we replace the natural log of TGE with dummy variables for the reported value of TGE falling into the ranges $5M-10M, $10M-25M, and greater than $25M. Our audit equation also includes three additional regressors:

1. **Audit Coverage Rate for TGE Class:** The actual audit coverage rate (i.e., the ratio of the number of returns examined to the number of returns filed) for the estate's TGE class (TGE < $1M, $1M <= TGE < $5M, and TGE >= $5M).
2. **State Audit Coverage Rate:** The actual audit coverage rate for the decedent's state of residence.
3. **Audit Coverage Rate Interaction:** Interaction between the above two audit coverage rates.

Our reasoning is that the likelihood that an individual return will be audited depends

in part on the fraction of returns that are audited in the estate's TGE class and in the decedent's state of residence. For example, if the decedent resided in a state where the audit coverage rate was low, his estate's chance of audit may very well be lower than an estate filing a similar return in a high audit coverage rate state. By providing a source of independent variation in the audit equation, these variables aid in the identification of the parameters of the noncompliance equations.

6.2 Parameter Estimates

As a matter of policy, audit selection criteria are not publicly disclosed by the IRS. Indeed, in specifying our model, we had no detailed knowledge of the return variables or procedures used to select estate tax returns for examination. To maintain the confidentiality of estate tax audit selection criteria, we suppress the portion of our estimation results pertaining to our audit selection equation. The parameter estimates for the remaining equations are presented below.

Probability of a Positive Assessment

Table 10 presents the parameter estimates for equation (2), which describes the probability of a positive audit assessment. The results indicate that the estates of male decedents are relatively less likely to have a positive assessment, controlling for other factors. However, no significant difference is observed across different marital statuses or ages of decedents. The year of death is a significant factor, with a trend towards a greater likelihood of a positive assessment for more recent decedents. The probability of noncompliance is found to be increasing in gross wealth, but decreasing in terms of the marginal tax rate.[21]

[Insert Table 10 about here]

The results indicate that the probability of a positive assessment depends on the kinds and relative amounts of different assets in the estate. The probability of a positive assessment is lower the greater the shares of cash assets and annuities in the total gross estate. Estates with limited partnership assets and art assets are also relatively less likely to have a positive assessment. The presence of depletable and intangible assets has no significant relationship to the incidence of positive assessments. The results for art assets and for depletable and intangible assets are somewhat surprising, given that one might

expect valuation to be a problem for such assets. In this regard, the findings for estates with farm assets and closely held stock are more in line with expectations. The presence of either type of asset makes a positive assessment relatively more likely. Although the presence of closely held stock is associated with a greater incidence of positive assessments, the effect is actually declining with the share of assets in the total gross estate.

Estates that made adjusted taxable gifts or which have deductions for attorney's fees or charitable bequests are relatively more likely to have a positive assessment, all else equal. This may be an indication that tax planning activities are associated with a higher incidence of noncompliance.

Perhaps most surprisingly, the results indicate that estates are relatively more likely to understate taxes the *greater* the probability of an audit. One interpretation of this finding is that estates tend to take relatively aggressive positions if the fiduciary believes an audit is likely, perhaps in an effort to create bargaining room.[22]

The correlation between the error term of the equation describing the likelihood of a positive assessment with the error term of the audit equation is positive, but statistically insignificant.

Magnitude of a Positive Assessment

When the audit assessment is positive, equation (3) describes its magnitude. The parameter estimates for equation (3) are presented in Table 11. The results for the magnitude of a positive assessment are somewhat different than those for the likelihood of a positive assessment. Previously, we found that estates of male decedents were relatively less likely to have a positive assessment, but that marital status was an insignificant factor. However, our results for the magnitude of the assessment indicate that gender is an insignificant factor, while marital status matters. In particular, the magnitude of the audit assessment for widowed decedents' estates is lower than the magnitude of the assessment for married decedents' estates. This is an important finding, given the past tendency for IRS to devote a disproportionate share of its audit resources to the estates of unmarried decedents.

[Insert Table 11 about here]

Both the probability and magnitude of a positive assessment are positively associated with the natural log of TGE, but the marginal tax rate is not significantly related to the

magnitude of the assessment. Estates with a large share of wealth in the form of bonds or other corporate stock tend to have relatively small audit assessments, while estates with large shares of closely held stock or real estate other than a personal residence tend to have relatively large assessments. Estates containing assets over which the decedent had a power of appointment also tend to have relatively large assessments. Somewhat surprisingly, although estates with farm assets tend to have a greater likelihood of a positive assessment, the magnitude of the assessment tends to be relatively small. Estates with a deduction for executor's fees and those reporting adjusted taxable gifts tend to have relatively large audit assessments.

The probability of audit is of the expected sign (negative), but it is statistically insignificant. However, the correlation between the errors of the magnitude of positive assessment equation and the audit equation is positive and significant, indicating that unobservable factors that result in an audit tend to be associated with relatively large positive assessments. The correlation between the errors of the equations describing the probability and the magnitude of a positive assessment is also positive, suggesting that the incidence and magnitude of assessments are positively associated.

Magnitude of a Non-Positive Assessment

As noted previously, a non-trivial fraction of estates actually are found to have overstated their adjusted taxable wealth during examination. Table 12 presents the results from estimating equation (4), which describes the magnitude of non-positive assessments. All else equal, the magnitude of the overstatement tends to be smaller for the estates of single and widowed decedents than for those of married decedents. Estates for decedents who had wills also tend to be associated with smaller overstatements. It seems plausible that the presence of a will is an indication that the decedent's affairs are in good order relative to that of a decedent with no will. The magnitude of overstatements is also associated with the year of death, with more recent decedents' estates having relatively smaller re-assessments. Overstatements are negatively associated with the natural log of TGE, perhaps indicating that tax returns for wealthier estates are more carefully prepared. Somewhat surprisingly, though, the magnitude of the overstatement is positively

associated with the marginal tax rate.[23]

[Insert Table 12 about here]

The size of overstatements also depends on the asset composition of the estate. Estates with a high share of wealth in the form of cash assets, bonds, mortgages and notes, or other corporate stock tend to make relatively small overstatements. On the other hand, estates with art assets or other non-corporate assets tend to make relatively large overstatements. The magnitude of overstatements tends to be relatively low for estates with depletable or intangible assets and those with limited partnership assets.

Estates with a deduction for attorney's fees tend to have relatively small overstatements, consistent with the notion that expert assistance can help to reduce errors. Estates subject to state death taxes also tend to overstate wealth by less.

7. Conclusion

The federal estate tax represents an interesting case study in noncompliance. The base for the tax is concentrated among a small number of very wealthy estates, with marginal tax rates reaching as high as 60 percent. Furthermore, the base is inherently difficult to measure, requiring complex valuations of a variety of different types of assets. From an enforcement perspective, the scope for third-party information reporting and document matching is rather limited, making examinations one of the few effective tools for enforcing compliance. Consequently, audit rates tend to be quite substantial, reaching 50 percent for the highest wealth class.

In this paper, we have attempted to assess the magnitude and determinants of estate tax noncompliance. We have found that it is difficult to measure the overall magnitude of noncompliance using SCF data. The results appear to be very sensitive to the treatment of married individuals, the choice of mortality probabilities, and the allocation of deductions and credits among individuals. Nor is it obvious which choices are the most appropriate in many circumstances. Estimates based on a preliminary version of the audit and tax return data used in this paper suggest that the estate tax underreporting gap may be on the order of 13 percent. However, this figure may substantially understate the true magnitude of the gap, both because it is based on the final closing examination assessment following any appeals or litigation, and because it does not account for any noncompliance that might have escaped detection during the examination.

Our econometric analysis of the determinants of estate tax noncompliance indicates that somewhat different factors are associated with the probability of a positive audit assessment and the magnitude of the assessment. The presence of farm assets or closely held stock is associated with a relatively high probability of a positive assessment. This may be a reflection of the difficulty in properly valuing such assets. Indeed, cash assets and annuities, which tend to be less difficult to value, are associated with a relatively low probability of a positive assessment. However, art assets (which can be difficult to value) also are associated with a reduced chance of a positive assessment. Not surprisingly, the likelihood of a positive assessment tends to be increasing in wealth. Like the probability, the magnitude of a positive assessment also increases with wealth, and it tends to be relatively large when there is closely held stock in the estate's portfolio. However, while the probability of a positive assessment tends to be higher when the estate contains farm assets, the magnitude of the assessment tends to be lower. The magnitude of an assessment also tends to be reduced when bonds and other corporate stocks form a substantial portion of the estate's portfolio. Finally, the likelihood of a positive assessment, but not the magnitude, actually tends to increase with the probability of audit.

Our econometric analysis also investigates the determinants of wealth overreporting. Unlike understatements, overstatements of the taxable estate tend to be decreasing in wealth. They also are smaller when the decedent has left a will, and when cash, bonds, corporate stock and certain other assets form an important part of the estates portfolio. Estates with substantial non-corporate assets and those with art assets tend to have relatively higher overstatements.

A question left unanswered in our analysis is who is responsible for estate tax noncompliance. If noncompliance is a collusive decision among beneficiaries, we might expect to find that noncompliance is most pervasive in settings where there are relatively few beneficiaries. However, our preliminary analysis did not uncover such a relationship. We did find that noncompliance is relatively more likely when an attorney has been employed to assist in the preparation of the return; however, presumably attorneys would not take aggressive tax positions if there wasn't a demand for such positions on the part of their clients. Of course, the presence of significant overstatements of tax liability suggests that some forms of noncompliance reflect unintentional behavior rather than deliberate reporting strategies.

In the past, estate tax examiners have focused most of their audit efforts on the

estates of widowed and other unmarried decedents. This decision stemmed at least partly from a belief that examinations of married decedents' estates would tend to be unproductive. In this regard, an important finding of our analysis is that the estates of married decedents have a similar likelihood of a positive assessment, and a larger relative magnitude of assessment, than the estates of widowed decedents after controlling for wealth and other factors.

Appendix: Likelihood Function

We estimate our model using the method of maximum likelihood. We incorporate the sample weights in estimation to make the results broadly representative of the overall population of estate tax returns filed in 1992. The observations in our sample can be constructively divided into 5 categories, according to whether an audit took place and the outcome of the audit. We specify the likelihood value associated with each case below.

Case 1: No audit

The first category contains those returns that were not subjected to an audit. For a return in this category, only the audit equation applies, and the likelihood value (L_1) simply represents the probability that the return would not be audited:

$$L_1 = 1 - \Phi(\beta_A' X_A), \tag{5}$$

Case 2: Audit, negative assessment

The second category contains audited returns that received a negative assessment. For a return in this category, the likelihood value (L_2) is computed as the probability density function (pdf) for the observed tax overstatement (M) times the joint probability of the return being audited and the assessment being non-positive.

$$L_2 = \frac{1}{(M+D)\sigma_M}\phi\left(\frac{ln(M+D) - \beta_M' X_M}{\sigma_M}\right) BN[-\beta_P' XP - \gamma_P \Phi(\beta_A' X_A), \beta_A' X_A, (-)\rho_{AP}], \tag{6}$$

where $\phi(\bullet)$ represents the standard normal pdf, and $BN[\bullet, \bullet, \rho]$ represents the standard bivariate normal cdf for correlation ρ.

Case 3: Audit, no assessment

The third category contains audited returns that received no additional tax assessment. For a return in this category, the likelihood value (L_3) represents the probability of no assessment times the joint probability of the return being audited and the assessment being non-positive:

$$L_3 = \Phi\left(\frac{ln(D) - \beta_M' X_M}{\sigma_M}\right) BN[-\beta_P' X_P - \gamma_P \Phi(\beta_A' X_A), \beta_A' X_A, (-)\rho_{AP}]. \tag{7}$$

Case 4: Audit, positive assessment

The fourth category contains audited returns that received a positive assessment. For a return in this category, the likelihood value (L_4) represents the pdf for the observed tax understatement times the conditional joint probability of the return being audited and the assessment being positive given the observed understatement:

$$L_4 = \phi\left(\frac{ln(R) - \beta_R' X_R - \gamma_R \Phi(\beta_A' X_A)}{\sigma_R}\right) BN\left[\frac{\beta_A' X_A + \rho_{AR}\left(\frac{ln(R)-\beta_R' X_R - \gamma_R \Phi(\beta_A' X_A)}{\sigma_R}\right)}{\sqrt{(1-\rho_{AR}^2)}}, \right.$$
$$\left. \frac{\beta_P' X_P + \gamma_P \Phi(\beta_A' X_A) + \rho_{PR}\left(\frac{ln(R)-\beta_R' X_R - \gamma_R \Phi(\beta_A' X_A)}{\sigma_R}\right)}{\sqrt{(1-\rho_{PR}^2)}}, \frac{\rho_{AP} - \rho_{AR}\rho_{PR}}{\sqrt{(1-\rho_{AR}^2)}\sqrt{(1-\rho_{PR}^2)}}\right]. \quad (8)$$

Case 5: Audit, no assessment information

No assessment information is available for a small number of the audited returns in the sample. Although these returns consequently provide no useful information concerning the distribution of audit assessments, the do contain valuable information concerning the likelihood of an audit. Therefore, these returns have been included within the fifth and final category. The likelihood value (L_5) for a return in this category is simply the probability of the return being audited:

$$L_5 = \Phi(\beta_A' X_A). \quad (9)$$

Endnotes

1. Our analysis is focused on federal estate tax noncompliance. For an analysis of noncompliance with the federal gift tax, refer to Feinstein and Ho (1999).

2. See Andreoni, Erard, and Feinstein (1997) for a review of this literature.

3. Also observe that unlike income taxes, which are filed annually in the U.S., estate tax returns are filed only upon the death of an individual, so the IRS has relatively little history about the characteristics of the decedent's estate (although it may have some information in the case of decedents who outlived their spouses.) On the other hand, the probate process itself may to some extent serve as a form of wealth verification.

4. Of course, there are many grey areas in estate taxation that some tax planning strategies may attempt to exploit. In some cases, such strategies might exacerbate rather than lessen compliance problems.

5. We thank Joel Slemrod for raising this point.

6. Indeed, it is plausible that some married couples file separate returns precisely because they cannot agree on what to report.

7. The figures we present in this paper for 1995 decedents are from Johnson and Mikow (1999).

8. The table is provided in U.S. Census Bureau (1995).

9. This table is described in Mitchell, Poterba, and Warshawsky (1997). We thank Jim Poterba for providing us with copies of the 1983 and 2000 versions of the table, from which we interpolated mortality probabilities for 1995.

10. The difference also may partly reflect somewhat different approaches to carrying out the necessary extrapolation of mortality probabilities beyond age 80 from the mortality table; however, we have found that raising the mortality probabilities for the upper age groups tends to increase estimated aggregate tax liability primarily by dramatically increasing the estimated number of taxable returns.

11. We note that the generation of 1995 mortality probabilities requires an interpolation of the 1983 and 2000 versions of the Annuitant Life Table. We suspect that our interpolation methodology may have differed slightly from the one employed by Poterba. We also observe that we worked with a more recent version of the 1995 SCF in our analysis, and that the sample weights have been updated from those originally used by Poterba.

12. Ideally, one would want to employ a mortality table that accounted for wealth, mar-

ital status, and age. See Feinstein and Ho (2000) for an empirical analysis of mortality probabilities for individuals over 70 years of age that accounts for both marital status and wealth.

13. A second reason for the overestimate of the number of taxable married decedents is his apparent assignment of all household wealth to the estate of a married decedent with a surviving spouse. Often, a nontrivial share of the household assets are not attributable to the decedent's estate.

14. The unified credit in 1995 offset completely offset the tax that would be due on a taxable estate valued at $600,000 or less.

15. The main difference is that a measure of the likelihood of an audit does not enter as a regressor in the equations describing noncompliance.

16. Since the post-audit corrected figures used in the current analysis are only available for examined returns, regressors based on such figures could not be used to simulate noncompliance on unaudited returns.

17. For a more detailed description of the Estate Post-Audit Study, refer to Eller and Johnson (2000).

18. In a very small number of cases, the assessment figures were based on figures generated before the appeals process was completed.

19. To keep the model tractable, we assume that the disturbance ϵ_M of equation (4) is independent of the other disturbances of the model.

20. For example, individuals might tend to report closely held stock more accurately if the likelihood of audit were to rise. If so, the ratio of reported closely held stock to reported total gross estate might also rise.

21. Although the marginal tax rate depends in part of the level of wealth, a regression of the marginal rate on the natural log of TGE and the other regressors indicates that there is a fair amount of independent variation in the marginal tax rate. This is so even when additional terms involving TGE are included as regressors. A potential problem with our measure of the marginal rate is that it will tend to vary with the level of noncompliance, which could bias the sign of the marginal rate coefficient in the negative direction.

22. Slemrod, Blumenthal, and Christian (2000) obtain a similar result and come to this same interpretation in the context of income tax noncompliance.

23. Again, this finding may be the result of our computation of the marginal tax rate based on the reported level of adjusted taxable wealth.

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Figure 1
Audited Estate Tax Returns: Change in Assessment as a Percentage of the Number of Returns Audited

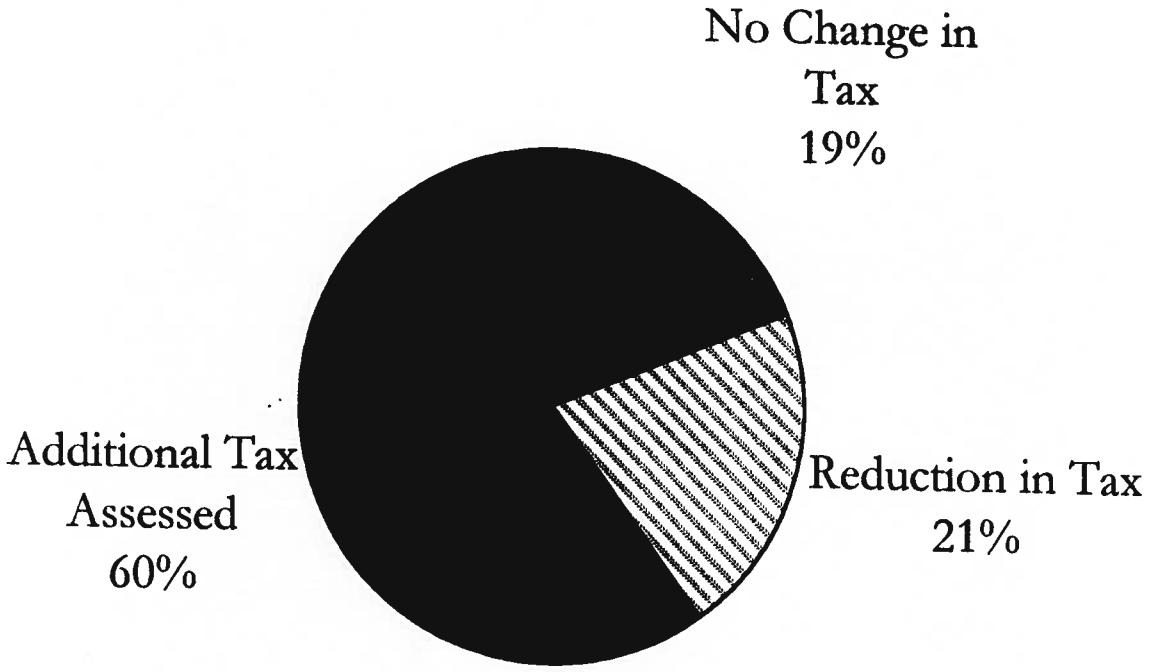

Figure 2
Estate Tax Returns Filed in 1992: Filing Population and Audited Population, by Sex

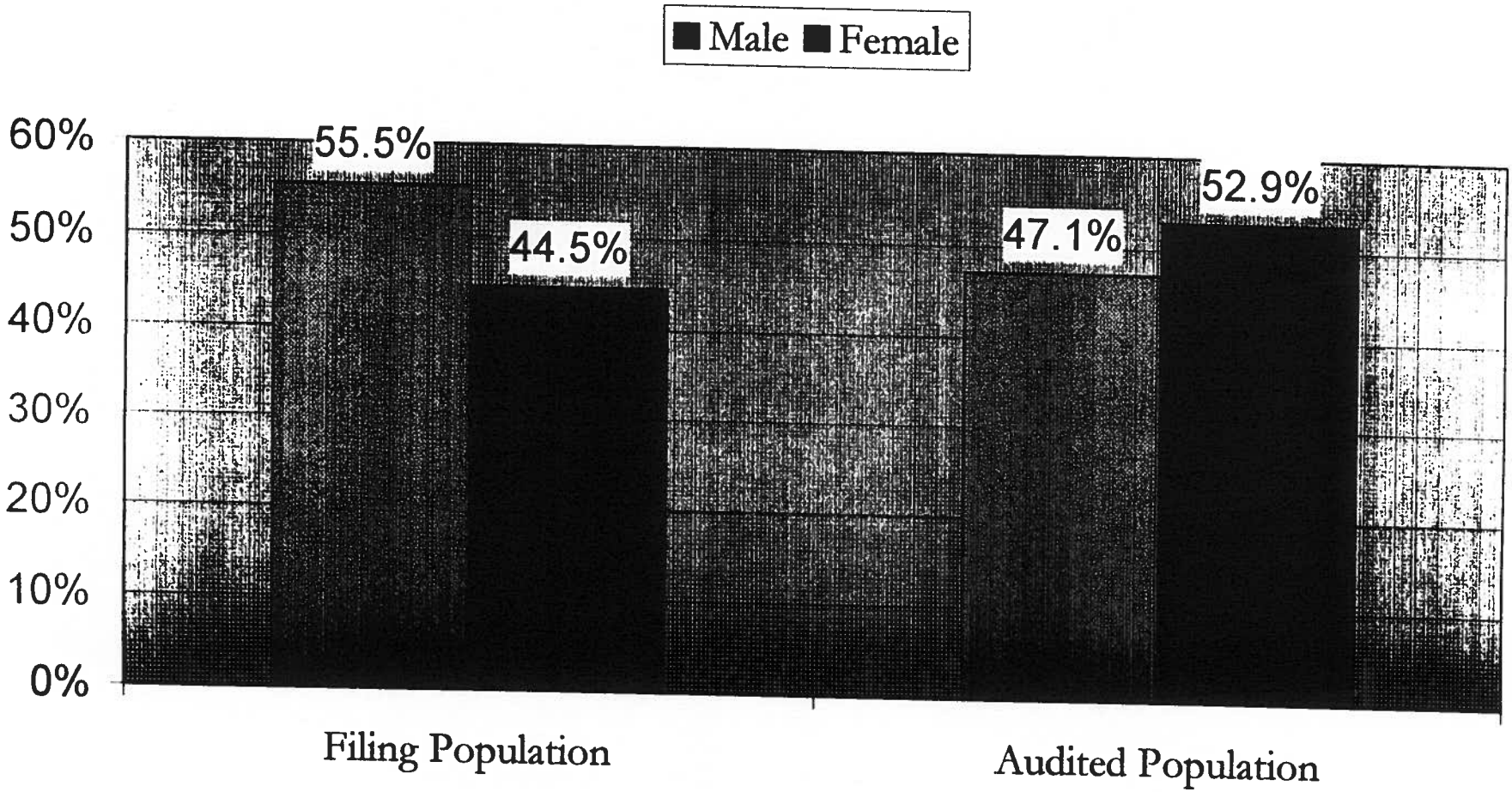

Figure 3
Estate Tax Returns Filed in 1992 and Audited Returns, by Marital Status

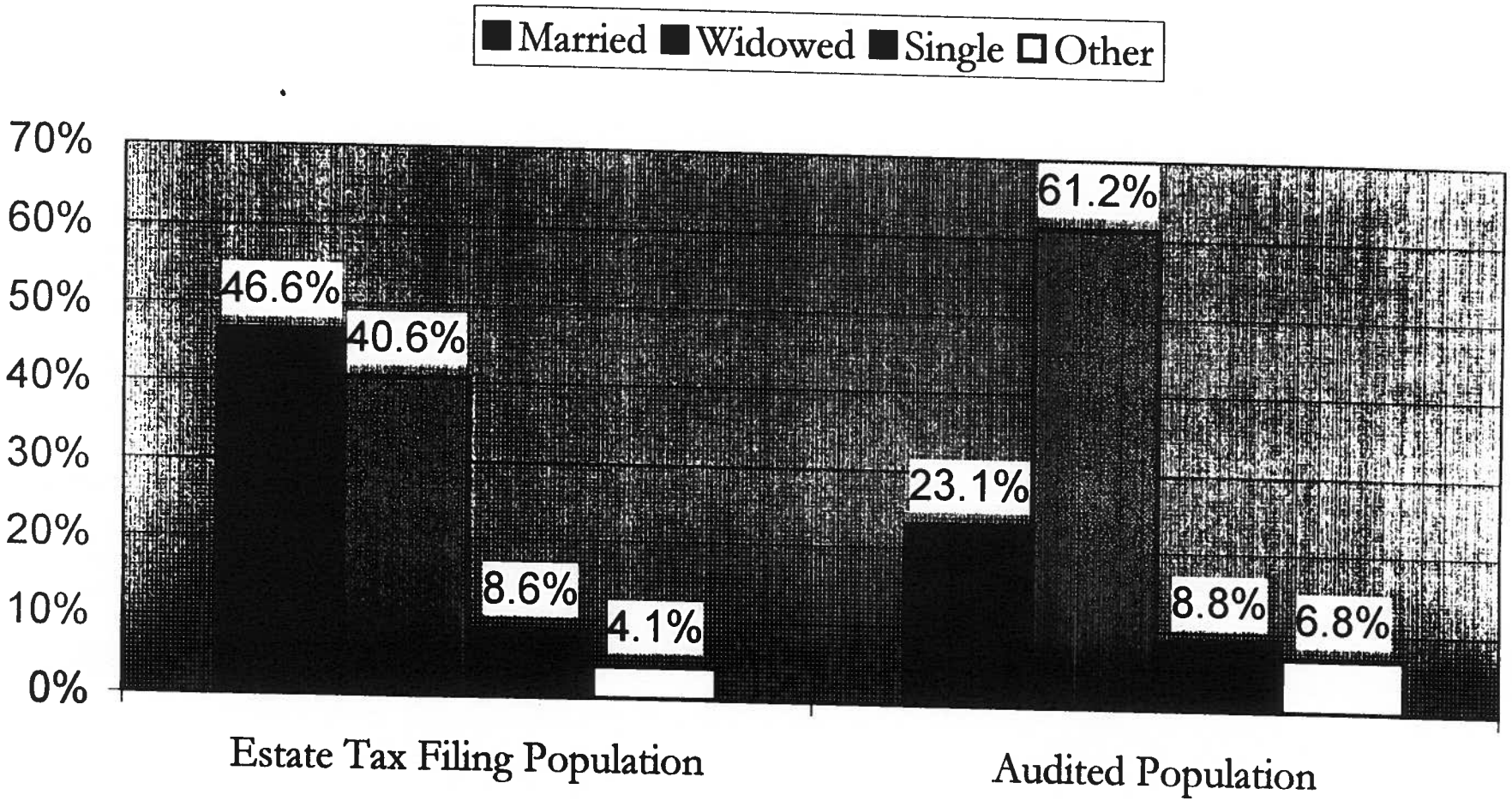

Figure 4
Change in Tax Assessment as a Percentage of the
Number of Returns Audited, by Marital Status

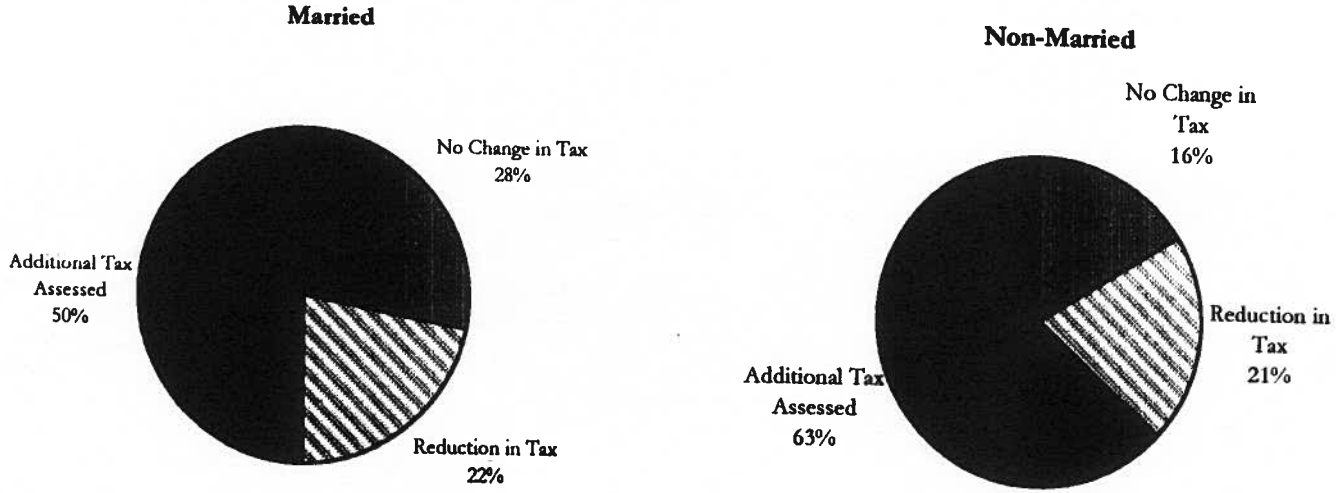

Table 1
Attempted Replication of Wolff's 1992 SCF Simulation

Size of Gross Estate	Number of Taxable Returns (1,000s)		Total Estate Collections ($Billions)	
	Wolff	Replication	Wolff	Replication
$600,000-$999,999	13.0	9.3	0.6	0.5
$1,000,000-$2,499,999	24.9	26.0	5.3	4.7
$2,500,000-$4,999,999	12.5	9.4	15.3	5.7
$5,000,000-$9,999,999	3.5	2.9	7.9	3.1
$10,000,000-$20,000,000	1.7	1.0	8.5	2.7
$20,000,000 and over	0.6	0.2	6.9	4.6
Total	56.2	48.7	44.5	21.4

Table 2
Attempted Replication of Poterba's 1995 SCF Simulations

Age of Decedent	Total Estate Collections ($Billions)			
	Annuitant Mortality Table		Population Life Table	
	Poterba	Replication	Poterba	Replication
< 50	0.2	0.3	0.4	0.6
50-59	0.5	0.8	0.9	1.2
60-69	1.5	1.6	2.8	2.8
70-79	3.3	3.4	5.1	5.0
> 80	10.2	10.8	13.8	14.1
Total	15.7	16.9	23.0	23.8

Table 3
1995 SCF Simulation for Unmarried Individuals
Based on Population Life Table

Size of Gross Estate	Number of Taxable Returns (1,000s)		Total Estate Collections ($Billions)	
	Simulation	Actual	Simulation	Actual
$600,000-$999,999	12.0	15.0	0.5	0.8
$1,000,000-$2,499,999	6.4	12.6	1.6	3.1
$2,500,000-$4,999,999	2.6	2.6	3.0	2.6
$5,000,000-$9,999,999	1.5	0.79	3.5	1.8
$10,000,000-$20,000,000	0.56	0.27	3.6	1.2
$20,000,000 and over	0.06	0.15	1.2	2.3
Total	23.3	31.3	13.4	11.8

Table 4
1995 SCF Simulation for Unmarried Individuals
Based on Population Life Table With an
Alternative Treatment of Charitable Deductions

Size of Gross Estate	Number of Taxable Returns (1,000s)		Total Estate Collections ($Billions)	
	Simulation	Actual	Simulation	Actual
$600,000-$999,999	15.3	15.0	0.8	0.8
$1,000,000-$2,499,999	9.4	12.6	2.4	3.1
$2,500,000-$4,999,999	3.7	2.6	4.8	2.6
$5,000,000-$9,999,999	2.2	0.79	5.0	1.8
$10,000,000-$20,000,000	0.86	0.27	3.8	1.2
$20,000,000 and over	0.16	0.15	2.6	2.3
Total	31.6	31.3	20.1	11.8

Table 5
Number and Percentage of Returns Audited, by Size of Total Gross Estate,
Filing Year 1992

Size of Total Gross Estate	Returns Filed	Returns Audited	Percent Audited
Under $1 million	31,376	3,475	11.1%
$1 million under $5 million	25,542	6,760	26.5%
$5 million or more	2,260	1,098	48.6%
Total	**59,178**	**11,338**	**19.2%**

Table 6
Change in Value of Total Gross Estate,
Allowable Deductions and Net Tax As a Result of Audit,
Filing Year 1992

	Total gross estate	Total allowable deductions	Net estate tax
Pre-audit value	100,017	43,530	10,199
Audit revaluation amount	1,222	117	560
Percent change due to audit	1.2%	0.2%	5.5%
Post-audit value	101,239	43,647	10,759

Note: Numbers are in millions of dollars.

Table 7
Average Size of Additional Tax Owed and Tax Reductions,
by Assessment Change and Total Gross Estate,
Filing Year 1992

	Size of total gross estate	Number	Amount	Average
All	All	11,338	559,774,617	49,372
	Under $1 million	3,475	45,974,200	13,230
	$1 million under $5 million	6,760	250,667,364	37,081
	$5 million or more	1,098	263,133,054	239,648
Additional tax	All	6,807	676,564,145	99,392
	Under $1 million	2,172	50,436,806	23,221
	$1 million under $5 million	3,985	311,026,677	78,049
	$5 million or more	650	315,100,662	484,770
Tax reduction	All	2,384	(116,789,520)	(48,989)
	Under $1 million	439	(4,462,600)	(10,165)
	$1 million under $5 million	1,722	(60,359,312)	(35,052)
	$5 million or more	224	(51,967,608)	(231,998)

Table 8

Asset Revaluations For Audited Returns Filed in 1992, by Asset Type

Asset Type	Audited Returns		Percent of Audited Returns with Asset Revaluation	Change in Asset Value	Average Change Per Revalued Return	Percent Change in Revalued Asset
	Number	Amount				
Personal Residence	6,251	1,717,199,287	15.9%	13,720,129	13,789	4.5%
Other Real Estate	7,611	4,335,051,498	38.0%	140,142,057	48,509	9.4%
Closely Held Stock	2,234	4,155,033,484	37.0%	319,689,764	387,034	28.8%
Other Stock	8,879	8,687,221,836	21.8%	113,406,228	58,487	5.4%
Bonds	8,295	6,301,791,305	11.6%	28,991,250	30,168	17.2%
Unclassified Mutual Funds	2,242	301,332,782	10.4%	-4,362,642	-18,724	-3.6%
Cash	11,234	3,717,282,372	34.0%	77,693,621	20,371	26.9%
Insurance	5,569	568,572,557	8.5%	41,170,651	86,675	116.9%
Farm Assets	1,042	102,287,640	22.9%	45,794,993	191,611	39.5%
Limited Partnerships	1,498	520,072,214	14.0%	19,733,013	94,416	33.0%
Other Non-Corp. Bus. Assets	1,943	696,284,538	16.7%	48,536,881	149,344	44.5%
Mortgages & Notes	4,219	931,794,868	12.7%	268,927,346	500,796	170.2%
Annuities	3,421	773,034,691	6.0%	3,241,130	15,810	6.6%
Depletables/Intangibles	1,160	156,666,051	14.1%	31,746,604	193,577	49.0%
Art	425	663,691,995	23.3%	1,464,218	14,790	3.3%

Table 9
Mean Values of Variables

Variable	All Audited Returns	Returns with A Positive Assessment	Returns with A Non-Positive Assessment
Change in Adjusted Taxable Estate	$142,080	$232,800	($88,886)
MALE	0.4704	0.4248	0.5863
SINGLE	0.0913	0.0807	0.1184
SEPARATED OR DIVORCED	0.0608	0.0612	0.0598
WIDOWED	0.6140	0.6387	0.5511
WILL PRESENT	0.9122	0.9219	0.8876
1990 OR EARLIER DECEDENT	0.0976	0.0756	0.1535
1992 DECEDENT	0.1522	0.1766	0.0901
AGE	0.7925	0.7950	0.7862
MARGINAL TAX RATE	0.3892	0.3862	0.3967
NATURAL LOG OF TGE	14.3228	14.3108	14.3534
PERSONAL RESIDENCE/TGE	0.0803	0.0812	0.0778
OTHER REAL ESTATE/TGE	0.1682	0.1788	0.1410
BONDS/TGE	0.1563	0.1552	0.1591
CLOSELY HELD STOCK/TGE	0.0579	0.0600	0.0527
OTHER CORPORATE STOCK/TGE	0.1617	0.1643	0.1552
MUTUAL FUNDS/TGE	0.0133	0.0127	0.0151
CASH ASSETS/TGE	0.1240	0.1126	0.1529
NON-CORP. BUSINESS ASSETS/TGE	0.0155	0.0157	0.0149
MORTGAGES & NOTES/TGE	0.0251	0.0234	0.0294
ANNUITIES/TGE	0.0290	0.0265	0.0353
FARM ASSETS DUMMY	0.0960	0.1097	0.0612
LIMITED PARTNERSHIP ASSETS DUMMY	0.1347	0.1198	0.1728
ART ASSETS DUMMY	0.0421	0.0382	0.0522
DEPLETABLE/INTANG. ASSETS DUMMY	0.1105	0.1077	0.1175
OTHER NON-CORP. ASSETS DUMMY	0.1756	0.1612	0.2123
CLOSELY HELD STOCK DUMMY	0.2235	0.2363	0.1910
COMMUNITY PROPERTY DUMMY	0.0414	0.0325	0.0641
ATTORNEY'S FEES DUMMY	0.8728	0.8945	0.8174
EXECUTOR'S FEES DUMMY	0.6270	0.6434	0.5853
CHARITABLE BEQUEST DUMMY	0.2814	0.2974	0.2405
POWER OF ATTORNEY DUMMY	0.0486	0.0532	0.0370
SCHEDULE G DUMMY	0.3291	0.3455	0.2875
ADJ. TAXABLE GIFTS DUMMY	0.3184	0.3589	0.2154
STATE DEATH TAX CREDIT DUMMY	0.9545	0.9675	0.9212
QTIP DUMMY	0.0342	0.0327	0.0379
WEIGHTED NUMBER OF RETURNS	10,215	7,334	952
UNWEIGHTED NUMBER OF RETURNS	1,206	866	340

Table 10
Parameter Estimates for Probability of Positive Assessment Equation

Variable	Parameter	t-Statistic
CONSTANT	-3.346	-3.17
MALE	-0.348	-3.61
SINGLE	-0.046	-0.27
SEPARATED OR DIVORCED	-0.020	-0.12
WIDOWED	0.009	0.06
WILL PRESENT	0.067	0.43
1990 OR EARLIER DECEDENT	-0.381	-2.79
1992 DECEDENT	0.274	2.31
AGE	-0.203	-0.58
MARGINAL TAX RATE	-2.482	-3.43
NATURAL LOG OF TGE	0.150	2.65
PERSONAL RESIDENCE/TGE	-0.209	-0.60
OTHER REAL ESTATE/TGE	0.314	1.40
BONDS/TGE	-0.007	-0.03
CLOSELY HELD STOCK/TGE	-0.589	-2.00
OTHER CORPORATE STOCK/TGE	-0.174	-0.88
MUTUAL FUNDS/TGE	-0.583	-1.00
CASH ASSETS/TGE	-0.986	-2.85
NON-CORP. BUSINESS ASSETS/TGE	0.150	0.28
MORTGAGES & NOTES/TGE	-0.134	-0.18
ANNUITIES/TGE	-0.823	-1.82
FARM ASSETS DUMMY	0.467	2.84
LIMITED PARTNERSHIP ASSETS DUMMY	-0.217	-2.15
ART ASSETS DUMMY	-0.348	-2.64
DEPLETABLE/INTANG. ASSETS DUMMY	-0.072	-0.57
OTHER NON-CORP. ASSETS DUMMY	-0.107	-1.00
CLOSELY HELD STOCK DUMMY	0.489	3.82
COMMUNITY PROPERTY DUMMY	-0.003	-0.01
ATTORNEY'S FEES DUMMY	0.450	3.25
EXECUTOR'S FEES DUMMY	0.108	1.10
CHARITABLE BEQUEST DUMMY	0.283	2.84
POWER OF ATTORNEY DUMMY	0.052	0.32
SCHEDULE G DUMMY	0.081	0.92
ADJ. TAXABLE GIFTS DUMMY	0.534	5.59
STATE DEATH TAX CREDIT DUMMY	1.790	5.80
QTIP DUMMY	-0.252	-1.18
PROBABILITY OF AUDIT	0.673	4.05
ρ_{AP}	0.203	0.36

Table 11
Parameter Estimates for Magnitude of Positive Assessment Equation

Variable	Parameter	t-Statistic
CONSTANT	-17.234	-7.19
MALE	-0.220	-0.94
SINGLE	-0.300	-1.02
SEPARATED OR DIVORCED	-0.385	-1.29
WIDOWED	-0.522	-2.14
WILL PRESENT	-0.361	-1.20
1990 OR EARLIER DECEDENT	0.229	0.81
1992 DECEDENT	-0.122	-0.62
AGE	0.091	0.16
MARGINAL TAX RATE	-1.165	-0.79
NATURAL LOG OF TGE	1.110	12.36
PERSONAL RESIDENCE/TGE	0.354	0.52
OTHER REAL ESTATE/TGE	0.988	2.41
BONDS/TGE	-1.039	-2.85
CLOSELY HELD STOCK/TGE	0.984	2.14
OTHER CORPORATE STOCK/TGE	-0.669	-2.24
MUTUAL FUNDS/TGE	0.276	0.15
CASH ASSETS/TGE	0.856	1.07
NON-CORP. BUSINESS ASSETS/TGE	0.111	0.14
MORTGAGES & NOTES/TGE	-0.316	-0.41
ANNUITIES/TGE	-0.507	-0.46
FARM ASSETS DUMMY	-0.596	-1.91
LIMITED PARTNERSHIP ASSETS DUMMY	0.102	0.54
ART ASSETS DUMMY	-0.371	-1.38
DEPLETABLE/INTANG. ASSETS DUMMY	0.311	1.55
OTHER NON-CORP. ASSETS DUMMY	0.176	1.02
CLOSELY HELD STOCK DUMMY	0.326	1.09
COMMUNITY PROPERTY DUMMY	-0.991	-2.50
ATTORNEY'S FEES DUMMY	0.059	0.17
EXECUTOR'S FEES DUMMY	0.289	1.90
CHARITABLE BEQUEST DUMMY	0.060	0.29
POWER OF ATTORNEY DUMMY	0.544	2.38
SCHEDULE G DUMMY	-0.035	-0.25
ADJ. TAXABLE GIFTS DUMMY	0.859	2.98
STATE DEATH TAX CREDIT DUMMY	0.601	0.62
QTIP DUMMY	-0.201	-0.50
PROBABILITY OF AUDIT	-0.589	-1.36
σ_R	1.733	14.70
ρ_{PR}	0.346	1.77
ρ_{AR}	0.345	2.07

Table 12
Parameter Estimates for Magnitude of Non-Positive Assessment Equation

Variable	Parameter	t-Statistic
CONSTANT	2.735	1.45
MALE	-0.077	-0.39
SINGLE	-1.304	-3.35
SEPARATED OR DIVORCED	-0.121	-0.34
WIDOWED	-1.043	-3.48
WILL PRESENT	-0.861	-2.66
1990 OR EARLIER DECEDENT	0.557	2.31
1992 DECEDENT	-0.480	-1.79
AGE	0.838	1.13
MARGINAL TAX RATE	7.825	5.58
NATURAL LOG OF TGE	-0.304	-2.44
PERSONAL RESIDENCE/TGE	-0.416	-0.57
OTHER REAL ESTATE/TGE	0.608	1.73
BONDS/TGE	-1.273	-2.52
CLOSELY HELD STOCK/TGE	-0.829	-1.27
OTHER CORPORATE STOCK/TGE	-0.785	-1.87
MUTUAL FUNDS/TGE	1.549	0.75
CASH ASSETS/TGE	-1.757	-2.67
NON-CORP. BUSINESS ASSETS/TGE	-2.843	-2.03
MORTGAGES & NOTES/TGE	-2.344	-1.66
ANNUITIES/TGE	0.766	0.56
FARM ASSETS DUMMY	-0.375	-1.04
LIMITED PARTNERSHIP ASSETS DUMMY	-0.365	-1.72
ART ASSETS DUMMY	0.527	1.89
DEPLETABLE/INTANG. ASSETS DUMMY	-0.483	-1.78
OTHER NON-CORP. ASSETS DUMMY	0.441	2.00
CLOSELY HELD STOCK DUMMY	0.109	0.38
COMMUNITY PROPERTY DUMMY	0.893	1.40
ATTORNEY'S FEES DUMMY	-0.611	-2.04
EXECUTOR'S FEES DUMMY	0.556	2.51
CHARITABLE BEQUEST DUMMY	-0.154	-0.66
POWER OF ATTORNEY DUMMY	0.283	0.75
SCHEDULE G DUMMY	0.204	1.08
ADJ. TAXABLE GIFTS DUMMY	-0.162	-0.81
STATE DEATH TAX CREDIT DUMMY	-1.623	-2.42
QTIP DUMMY	-0.294	-0.67
D	0.086	4.25
σ_{ν}	1.544	12.85