Estate vs. Capital Gains Taxation: An Evaluation of Prospective Policies for Taxing Wealth at the Time of Death

Robert B. Avery, Daniel Grodzicki, and Kevin B. Moore

Estate vs. Capital Gains Taxation: An Evaluation of Prospective Policies for Taxing Wealth at the Time of Death

Robert Avery*, Daniel Grodzicki**, and Kevin Moore***

April 1, 2013

Opinions expressed in this paper are those of the authors alone, and they do not necessarily reflect the views of the Board of Governors of the Federal Reserve System, The Federal Housing Finance Agency or their staffs.

_____

* Federal Housing Finance Agency, robert.avery@fhfa.gov

**Department of Economics, Stanford University, danielg3@stanford.edu

***Board of Governors of the Federal Reserve System, Kevin.B.Moore@frb.gov

Abstract

Debate over the U.S. federal estate tax has intensified recently as a result of the sunset provisions in the Economic Growth and Tax Relief Reconciliation Act (EGTRRA) of 2001 and changes in law passed in conjunction with the "fiscal cliff" at the end of 2012. Despite recent changes in the law, there remains an open debate regarding the extent to which prospective estates comprise assets that have been taxed previously. Using wealth data on U.S. households, we forecast changes in household wealth in the coming decade and calculate the importance of untaxed wealth in bequeathed estates. Connecting further to the debate, we investigate the impact of various policies on U.S. households. In particular, we compare policies in which the entire estate is taxed at death (estate tax) to those in which only the unrealized capital gains portion is subject to tax (capital gains tax). We estimate that the average unrealized capital gains in estates monotonically increases with the size of the estate, ranging from 13% for estates under $2 million to 55% for estates over $100 million. We also find that policies aimed at taxing the entire estate raise more revenue than those aimed at taxing unrealized gains. However, policies that tax only gains concentrate a larger portion of the tax burden on high wealth households.

Keywords: estate tax, capital gains, tax policy, household wealth

JEL Codes: H22, H24, K34

1. Introduction

Fueled by the expiration of the so-called "Bush tax cuts" at the end of 2012 there has been a renewed debate regarding the economic impact of various U.S. estate tax policies. In the latest chapter of this saga, the U.S. Congress passed changes to the estate tax law in response to the much-discussed fiscal cliff.[1] With few alterations, these changes make permanent the estate tax law in effect for 2011-2012. Although the passage of the recent estate tax law may appear to put the issue to rest, we believe the debate is not over and that studying the impact of estate tax and other alternative approaches to taxing wealth at death is still important. In particular, there remains a persistent, and as yet unresolved, debate regarding the degree to which prospective estates will comprise wealth that has already been taxed. Thus, the estate tax amounts to double taxation, and might be considered inherently unfair. On the other hand, in the absence of any wealth transfer tax, there is scope for households to avoid capital gains on wealth altogether through inter-generational transfers. Failure to tax capital income transferred across generation raises questions of fairness as it could substantially alter the progressivity of the tax schedule. Moreover, the discrepancy between capital gains and wealth transfer taxes may result in behavioral distortions and potential dead weight loss.[2]

---

[1] Often the debate has focused on the revenue potential of differing policies as well as how the burden of their collection might be distributed across U.S. households. Most notably, there has been a concern regarding how the estate tax impacts farms and small businesses. For example, on November 4, 2009 the U.S. House committee on small business held a hearing title "Full Committee Hearing on Small Business and the Estate Tax: Identifying Reforms to Meet the Needs of Small Firms and Family Farmers." This meeting focused on how the estate tax burdens small businesses and family farmers. In addition to stressing how the estate tax impacts these groups financially, it also discussed the overall fairness of this tax with regards to these groups.

[2] For example, these issues are discussed in the context of overall tax reform in a hearing of the United States Senate Committee on Finance that took place on September 20, 2012 title "Tax Reform and the Tax Treatment of Capital Gains."

In this paper, we explore the importance of unrealized capital gains (untaxed income) in bequeathed estates over the next decade. Connecting this to the larger debate, we investigate how different approaches to taxing wealth at death affect the distribution of the tax burden across households as well as the revenue generated by the tax. To this end we compare scenarios in which the entire estate is taxed to scenarios in which only unrealized capital gains face any tax. Specifically, we compare two estate tax law scenarios, which we call the "2001 tax law" and "2009 tax law,"[3] to two scenarios for applying a capital gains tax at death. In the first scenario, which we call "no step-up basis," all unrealized capital gains in the estate are taxed at death. In the second scenario, which we call "step-up basis," all unrealized capital gains above an exemption level are taxed at death.

For this analysis, we develop an empirical model of wealth accumulation using household survey data that predicts the evolution of wealth of U.S. households over the next decade. We combine this with data on individual mortality from the U.S. census bureau and the Society of Actuaries to calculate estimates of decedents' gross estates in each. Using data from the Statistics of Income (SOI) division of the Internal Revenue Service (IRS) we estimate how gross estates are likely to be apportioned at death and the subsequent tax liability for each estate under the various tax rules. Previous models of wealth accumulation used in this context have been estimated using aggregated data and/or used imputed measures of wealth.[4] Our methodology differs from that of previous work in that it uses household-level micro data on measured household wealth. Specifically, we use the Federal Reserve Board's Survey of

---

[3] We choose these scenarios because they represent different ends of the estate tax law spectrum. The 2001 tax law has an exemption level that is one-fifth of the current law, but has significantly higher marginal tax rates. The 2009 law is much more similar to the current law, but with a somewhat lower exemption and slightly higher marginal tax rate. See below for more information.

[4] Estate tax projection models for the Congressional Budget Office (CBO) use aggregate data to project U.S. wealth while the Tax Policy Center models use micro-data on income taxes from the IRS and imputed wealth based on income using data from the Survey of Consumer Finances to construct the mapping.

Consumer Finances (SCF).[5] Because we estimate the evolution of wealth at the household level, we can infer, under certain assumptions, both bequeather's demographics as well as the likely composition of their wealth at the time of death. Most importantly, because the SCF collects information on unrealized capital gains we can forecast the likely impacts of a capital gains tax at death. Going beyond previous work, which has focused mainly on aggregate revenue forecasts, we look at how these different tax regimes change the proportion of households subject to any tax, the average tax payments, and the distribution of tax paid across various demographic categories.

We find that, if death is treated as a capital gains realization with no step-up basis and other estate taxes are eliminated, the amount of tax revenue generated between 2013 and 2023 is $561 billion. This is similar to that generated by the 2009 estate tax law scenario ($529 billion) but less than that generated by the 2001 law scenario ($1.2 trillion) over the same period. However, about 75 percent of the deceased households in our sample[6] would be subject to the capital gains tax, compared to 2.9 percent under the 2009 law and 15.4 percent under the 2001 law. This would represent a fundamental shift in notion of who faces a tax on wealth at the time of death. Under the step-up basis scenario, revenue decreases to $200 billion, but the proportion of households subject to the tax falls to 3 percent. Moreover, under the step up basis scenario 91.6 percent of the tax is paid by the top 1 percent of wealth holders, an increase of 10 percentage points over the 2009 law, and a still larger increase over the other scenarios

---

[5] The SCF is the premier source of survey data on the wealth of U.S. households. Moreover, as it is designed to provide an accurate picture of the distribution of wealth among U.S. households, it uses a dual-frame design that over-samples high wealth households. Consequently it provides comprehensive coverage of households likely to be subject to the estate tax.

[6] In this paper, we restrict the sample to include only households likely to be subject to any estate tax in the near future. For this we only consider households in the top quintile of wealth and in which the head of household is over the age of 45. Percentages are based on this population. See below for more details.

considered. As such, a tax on capital gains reduces overall liabilities, but concentrates the remaining burden more among high wealth holders.

The remainder of the paper is organized as follows. Section 2 contextualizes the contribution of this paper within the large literature on estate taxation. Section 3 discusses the history of estate tax law and describes the alternative regimes we consider. Section 4 presents the data and details our empirical methodology. Results of our estimation of various scenarios are presented in section 5. Section 6 concludes.

2. Relevant Literature

There has been a large amount of academic research on the economic effects of the estate tax.[7] Most relevant to this paper is work investigating the relationship between the estate and capital gains taxes. However, our work also relates to two other strands of the literature. The first of these has sought to build predictive empirical models that produce estimates of future revenue generated by the existing and proposed estate tax laws. The second has studied the potential distributive impact of estate tax liabilities across households.

The tax code allows an individual to avoid paying tax on capital gains by holding assets until death. This may make individuals less likely to sell some assets (such as businesses) during their lifetime (the lock-in effect) and prevent the healthy transfer of assets to more productive owners. When appreciated assets are passed on to heirs, their tax basis is set at the value at death (step-up basis). Consequently, taxes on the gains prior to death are eliminated. However, the lock-in effect is offset by the fact that the full value of the asset, including the cost basis, is

---

[7] Some of the issues include the effects of the estate tax on consumption and savings, entrepreneurship, charitable contributions, bequest behavior and capital gains realizations. For a through overview of these issues see Gale, Hines and Slemrod (2001) and Kopczuk (2012).

included in the value of the estate at death and is taxed at estate tax rates. This raises two concerns. First, an estate tax that is separate from a capital gains tax and that considers current wealth in its entirety may be perceived as unfair because it potentially taxes some portion of wealth twice. Second, the decision to realize wealth may be distorted by the differential between estate and capital gains tax rates.[8]

To date, there has been relatively little work done on these issues. Still, Auten and Joulfaian (2001) document a positive elasticity between of capital gains realizations to the estate tax rate. They find that a 1 percent increase in the tax rate increases realizations prior to death by .36 percent. This suggests that a low estate tax rate exacerbates the lock-in effect, and that large differentials between the capital gains and estate tax rates may result in substantial distortions. Poterba and Weisbenner (2001), whose work this paper most closely resembles, examine the impact on tax liabilities and potential revenue from replacing the estate tax with a capital gains tax at death. Using data from the 1998 SCF, they estimate estate tax and capital gains tax liabilities for households predicted to die in the next year. They find that a capital gains tax imposed at death raises less total revenue than the estate tax. Households with estates under $1 million would pay more under a capital gains tax, while households with larger estates would be more likely to experience a substantial reduction in tax liability under a capital gains tax. Our analysis extends theirs by modeling wealth dynamics over a longer time horizon and comparing the effects on a broad set of demographic groups across a wider range of alternative tax scenarios.

Estimates of prospective estate tax revenues have been produced by several institutions dedicated to informing researchers and policy makers on issues related to this tax. The most important of these are the Congressional Budget Office (CBO) and The Urban-Brookings Tax

---

[8] Note that this includes the case with a zero estate tax rate and positive capital gains tax rate.

Policy Center (TPC).[9] CBO estimates (CBO 2009, 2011) are derived from a model that uses data on estate tax filings combined with estimated rates of return on assets to predict aggregate future wealth flows. As this macro-based methodology is designed to predict only aggregate revenues, it cannot produce household level liabilities or differentiate between realized and unrealized portions of household wealth. In contrast to the CBO model, TPC estimates (TPC 2011) are derived using individual income tax data combined with wealth estimates that are imputed from the SCF. Since the model is derived mainly from tax data, which are rich in financial variables but poor in demographic detail, there is little scope for studying how predicted liabilities may vary across demographic groups. Much like with the CBO models, these cannot differentiate between types of wealth, and thus can only consider a limited set of potential tax regimes. Lastly, SOI as the statistical branch of the IRS is a key source for the actual data on estate tax filings. IRS-SOI also provides some projections on estate tax filing, but their main focus in on the actual data from filings (IRS 2000-2011).

Work investigating the distribution of estate tax liabilities has been largely limited to looking at how liabilities are distributed across various income groups or types of income (AGI, cash income, etc.). Similarly to the work on revenue prediction, these studies almost all based on actual tax data. Consequently they are constrained by the limited number of demographic variables available, making some measure of income a natural choice. Still, some work using tax data has been able to estimate the burden on business owners given their special status in the estate tax debate (see Gravelle and Maguire, 2008; Marples and Gravelle, 2009; Burman, Lim, and Rohaly, 2008; CBO 2005). Because our model is built directly using survey data on

---

[9] The Congressional Research Service (CRS) and the Joint Committee on Taxation (JCT) also produce some estate tax predictions.

household wealth, we can, in addition to these limited demographic groups, examine how the tax burden is distributed by wealth, age, education, race, and marital status.

3. Alternative Estate Tax Laws

The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) began phasing out the U.S. federal estate tax by increasing the exemption amount and reducing the top marginal rate. Under EGTRAA, the exemption amount increased from $675,000 in 2001 to $3.5 million in 2009, with the top marginal rate falling from 55 percent to 45 percent. In 2010, it appeared the estate tax would be repealed, but the Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010 retroactively resurrected the estate tax and set an exemption limit of $5 million with a top marginal rate of 35 percent for 2010 through 2012. One twist for 2010 was that filers had the option of filing under the estate tax law or under a modified carryover basis rules for inherited property (similar to a capital gains tax).[10]

Under the 2010 act the estate tax would have reverted back to the 2001 exemption level ($1 million) and top marginal rate (55 percent) in 2013 had the Congress not acted. However, in early 2013, in response to the "fiscal cliff" the Congress adopted estate tax rules similar to what applied during the 2011-2012 period--an exemption level of $5.12 million indexed for inflation and a top marginal rate of 40 percent.

We consider two estate tax proposals. The first, "2001 tax law," is a more aggressive estate tax alternative—the law that would have applied had the Congress not reacted to the fiscal cliff. Here, the exemption for 2013 onward is set at $1 million dollars without indexation and

---

[10] For 2010, heirs opting to file the modified carryover basis must have filed IRS Form 8939, *Allocation of Increase in Basis for Property Acquired from a Decedent* instead of the IRS Form 706, *United States Estate and Generation-Skipping Transfer Tax Return*.

the top marginal tax rate is 55 percent. The second, "2009 law," is based on the 2009 estate tax exemption level and top marginal rate, which comes very close to current law. The proposal sets the exemption level at $3.5 million (somewhat lower than current law) and has a top marginal rate of 45 percent (somewhat higher). The exemption level indexed for inflation (as adopted in current law).

We compare these two estate tax scenarios with two scenarios based on replacing the estate tax with a capital gains tax imposed at death. The two scenarios differ by the amount of unrealized gains they exempt from the tax. For the "no step-up basis" scenario, the exemption is zero and all unrealized capital gains are taxed at a 20 percent rate. For the "step-up basis" scenario, the first $1.3 million of unrealized capital gain is exempt, with an addition $3 million exempt if there is a surviving spouse, and all remaining unrealized capital gains are taxed at a 20 percent rate. The exemption amounts are based on 2010 IRS Form 8939, *Allocation of Increase in Basis for Property Acquired from a Decedent,* and the choice of the 20 percent rate on capital gains is a middle ground between short and long-term capital gains rates, since there would likely be a mix of holding periods in the portfolio of unrealized gains.[11]

We first explore the estate tax and capital gains scenarios independently for our full bequeather sample. We then investigate how the estate tax paying population might have fared under a capital gains tax at death. More specifically, we allow wealth and apportionment to evolve as though households faced one of the estate tax scenarios discussed above. Then, for each bequeathed estate subject to the tax, we calculate its proportion of unrealized capital gains and subsequently its capital gains tax liability. Holding this estate tax payer population constant

---

[11] Starting in 2013, the long-term capital gains rate is zero for filers in the 10 or 15 percent brackets and 15 percent for all higher tax brackets. Short-term capital gains are taxed at ordinary income rates.

allows us to directly examine how particular bequeathed estates' liabilities compare across these different tax regimes.

4. Empirical Setup

The empirical approach followed in this paper can be briefly summarized as follows. We start with a representative sample of households in 2007 that are potentially eligible for estate taxation under at least one of the scenarios we consider. Our sample includes self-reported wealth for each household and sampling weights that can be used to project to the whole U.S. population. We age this population year-by-year until 2021, generating estates probabilistically using special mortality tables and model-based estimates of future wealth. For each future estate we apply tax rules reflecting our different scenarios, separating each estate into taxes, expenses and charitable bequests, family bequests, and a surviving portion which remains in the system and is passed on to a surviving spouse for those households initially consisting of a married couple. The specific details of our approach are described in the next two subsections.

4.1 Data

Data for this study are taken from the 2007 Survey of Consumer Finances (SCF).[12] This is the ninth in a series of recent tri-annual surveys of household wealth conducted by the Federal Reserve Board. The SCF was selected for several reasons. First, although many other national surveys have collected wealth data, the SCF is specifically designed for this purpose. Particular attention has been paid toward soliciting detailed information on all components of wealth, including unrealized capital gains. Secondly, evidence suggests that household wealth is highly

---

[12] See Bucks, Kennickell, Mach and Moore (2009) for a more extensive discussion of the survey.

concentrated, even more so than income. Consequently, the SCF attempts to provide an accurate representation of the entire wealth distribution by using a dual sampling frame. For the 2007 survey, 2,915 families were selected for inclusion by standard multi-stage area probability methods.   Another 1,507 families were selected from tax files to over-sample wealthier families.[13] Analysis suggests that the dual frame provides a much better coverage of total U.S. household wealth than conventional designs (see Avery, Elliehausen, and Kennickell, 1988).

Data for the 2007 SCF were collected largely between May and December 2007. Detailed wealth and demographic information was collected for the primary "families" in each household, with summary information collection for any secondary "families."[14] All statistics reported in this paper use design-based weights reflecting the dual sampling frame. The weight assigned to each sample household is its "blow-up" factor. That is, the number of U.S. households that it represents.

We use only a portion (deemed the bequeather sample) of the full SCF sample in our analysis. First we restrict the analysis to households with a head aged 45 and older (the likelihood of leaving a taxable estate in the near future for those below this age is de-minimis). We also restrict our sample to primary families in the SCF in the top 20 percent of the wealth distribution (2007 wealth of more than $462,000) under the realistic assumption that secondary family members or those with wealth below $462,000 are unlikely to leave estates which would be taxable under any of the scenarios we are considering.

---

[13] Persons listed by *Forbes* magazine as being among the wealthiest 400 people in the United States are excluded from the sample.

[14] Separate information was collected for "financially independent" relatives living with the primary family, referred to here as "secondary families." In addition some elderly persons were living with children and other relatives and were reported as "financially dependent." These persons were also treated as secondary families, but were assumed to have no wealth.

Descriptive statistics for the bequeather sample (and the full 2007 SCF) are given in table 1. All household characteristics are as of 2007. Not surprisingly, the bequeather sample has higher wealth and income and is older than the full sample. The bequeather sample also has fewer minorities, more households whose head holds a college degree, and more married couples. Households in the bequeather sample are also more likely to own a farm or some other privately held business.

4.2 Estate Forecasting

The comprehensive forecasting of estates would necessarily involve the modeling of a complex set of economic and demographic dynamics that go far beyond the scope of the present study. We use instead the simplest of micro-level, economic-demographic forecasting methods, dynamically modeling only wealth and death. Initially, the sample population is described by starting wealth, age and marital status. Initial estate-eligible wealth includes all accounts, stocks, bonds, IRAs, cash-value life insurance, defined contribution retirement accounts, trusts, property, businesses, and vehicles. All debts are subtracted to arrive at net worth.[15] We model wealth changes as an annual percent change depending only on age, marital status and age of retirement.[16] Death (including of one's spouse if married) is modeled probabilistically as depending only on age, year of death, race and sex. The number of forecasted estates for a sample of bequeathers is then converted to a year-by-year estimate by multiplying the probability of death in each year by the blow-up factor for each sample household. Rules about non-taxable bequests and expenses are used to convert wealth into estates and to produce year-by-year

---

[15] Missing from this measure of net worth are personal assets, such as furniture and jewelry, and defined benefit retirement funds (which are likely to have some estate value even if taken as an annuity).

[16] For those households who reported term insurance we probabilistically terminated it each year, based on the declining incidence reported by age in the SCF. Generally term life insurance benefits are not subject to estate taxes.

estimates of net estates and estate taxes. Estimates both of the estate time series and of the distribution of eventual estates are produced for each bequeather household.

In the year and one-half that it took to process and clean the 2007 SCF the shock of the Great Recession had hit the U.S. economy. It was decided that the wealth depletion created by this shock was sufficiently large that we couldn't ignore it in our analysis. Consequently, we adjusted the 2007 wealth reported in the SCF to estimated December 31st 2008 values. Housing, property, non-publically traded business, and publically traded equities were adjusted for each household. Housing and property values were adjusted using the Federal Housing Finance Agency weighted repeat-sales national index for residential housing, using the September 2007 to December 2008 change. Similarly the Wilshire 5000 equity index change over the same period was used to adjust business and equity values. All household individuals were aged one year and their birthday was assumed to be December 31st. We assumed no one died between their interview in 2007 and the end of 2007. However, we applied the mortality tables described below to create estates in 2008. All persons dying during this year (and in subsequent years in the analysis) were assumed to die on December 31st.[17] For each year subsequent to 2008 we used an estimated wealth change equation to model changes in wealth.

To estimate the wealth-change parameters, we split our bequeather sample into three groups: (1) married couples; (2) widowed individuals; and (3) single individuals (separated, divorced, and never married). We then fit a cross-sectional model of estimated December 31st 2008 log-wealth as a function of age controlling only for marital status, education, race, and

---

[17] The date of the SCF interview is not available in the public data file, so it is not possible to deal with age on a more granular basis. More relevant for our purpose is that the SCF does not cover individuals who are in nursing homes. These are the wealthy individuals most likely to die in the upcoming year and likely represent a significant portion of the actual U.S. estates. However, time in the nursing home is likely to be short. Thus, though the 2007 SCF frame may undercount 2007 wealthy deaths, it should do a much better job in 2008 or later, as these people are less likely to be in nursing homes at the time of the survey.

number of children for each sample. For the single samples, additional controls are made for sex and for the widowed sample, the number of years since the death or the spouse. Age coefficients from these regressions are used to predict the changes in log-wealth. Note that we deliberately leave out control variables related to age such as health from this regression, so that the coefficients on age come closer to total time derivatives.

Estimating the effect of marital status changes on wealth presents a particular problem, since the cross-sectional nature of the data permits no direct measures of marital status changes. It was decided with some reluctance, therefore, to permit only the marital status change of married to widowed in the forecasting model---we do not allow for married couples to divorce or for single persons to (re) marry. We do allow the time derivatives for widows to depend upon the length of time since widowhood.

Estimates of the log-wealth regressions are presented in table 2. The key coefficients are those for age. Since age is measured as a linear spline, age effects have to be added up. For example, for a married couple with head age 65, an additional year is predicted to increase real wealth by 4.5 percent; but for those aged 75, wealth is predicted to increase at an annual rate of only 1 percent. The age effect is used as an estimate of the expected wealth change in period t. Using December 31st 2008 wealth as a starting point (t=1), future household log wealth is estimated by adding successive estimated age effects. In each future year, log-wealth is converted to dollar wealth as:

$$E\big(W_{i,t}\big) = e^{lnE(W_{i,t-1} + \Delta lnW_{i,t})}$$

where the change in wealth depends on the factors cited above.

Perforce, our wealth-change forecasts are real forecasts since all dollar data in the regressions are measured in 2008 dollars. Since estate tax schedules are denominated in nominal

dollars we have to convert real wealth into nominal wealth. To accomplish this we use the 10-year year-by-year inflation estimates employed by CBO. These estimates are also assumed in representing the 2009 estate tax law with indexing proposal.

Forecasting death also presents challenges. We started with The U.S. Bureau of the Census' male and female single-year age-specific survival probabilities forecasted for the year 2005 (middle series). The advantage of this series is that it forecasts future declines in mortality and adjusts for race. On the other hand, it takes no account of the known fact that mortality rates are lower for wealthier individuals. To adjust for this fact we obtained mortality tables used by insurance actuaries for wealthy annuity products (Johansen, 1996). Unfortunately this series makes no adjustment for race and declines in future mortality. Both mortality series, however, contain estimates of year 2000 mortality by age and sex. We used both series to estimate male and female deaths in year 2000 for the bequeather sample (assuming it was measured as of December 31st 1999). The difference in the two estimates was used to adjust the Census mortality figures by a single proportionality factor for all years by gender. These mortality estimates were used for all of our analysis. For each year, the number of estimated deaths represented by a bequeather household individual was computed as the sample weight multiplied by the probability of death. For a married couple their death was assumed to be independent, thus the probability of both dying in the same year was the product of the individual death probabilities. Although death surely takes place at a more uniform pace, we assumed for the purposes of simplicity that all deaths in a given year take place on December 31st after whatever annual wealth change forecast for that household had taken place.

The final step in the analysis is the estimation of year-by-year estates, bequests, unrealized capital gains in estates, and estate taxes. Rules regarding four issues needed to be

16

specified: first, rules governing the portion of wealth lost to "costs or death" and other expenses; second, rules for non-taxable bequests to charities and other entities; and third, for married couples at the death of the first spouse, rules governing the portion of household wealth (or estate) passing on (or bequeathed) to the surviving spouse. Lastly, to determine unrealized capital gains in estates, we specify rules governing changes in decedents' portfolio allocation. Once these rules are specified, computing taxable estates is a straightforward matter.

We address the specification of the first three rules for the estate tax scenarios by fitting "linear apportionment" models on data from estate tax filings from 2000 to 2010 disaggregated by sex, age, marital status, and size of gross estate.[18] This data is used to estimate the percent of estate that is taxable and the percent of estate bequeathed to the surviving spouse (for decedents married at time of death). The estimated percent of the estate that is taxable addresses the first two issues related to cost of death expenses and bequests to charities and other entities, while the estimated percent of the estate that is bequeathed to a spouse addresses the third issue related to the portion of the estate bequeathed to the surviving spouse. Table 3 shows the results from the apportionment regressions. For the percent of the estate that is taxable regressions, being male, married, or having a larger estate all imply a lower fraction of the estate that is taxable, while older decedents tend to have a higher fraction of the estate that is taxable. The regressions for the percent of the estate that is bequeathed to the spouse reveal being male or having a larger estate imply a larger fraction of the estate bequeathed to the spousal, while older decedents tend to a bequeath a smaller fraction.

With no data to help determine changes in households' portfolio allocation, we assume that asset portfolios remain constant over time (e.g. the proportion of assets held as unrealized

---

[18] Special thanks go to Brian Raub and Joe Newcombe at SOI for providing the data used to estimate the linear apportionments.

capital gains does not change). Consequently, we use the household's portfolio allocation in 2007 to estimate unrealized capital gains at death. Moreover, for the capital gains scenarios we also lack data to help us set rules for apportioning wealth at death when there is a surviving spouse. As a result we assume that wealth is split equally between the household head and the spouse,[19] and that no part of a decedent's net of tax portion of wealth is passed on to the surviving spouse.

5. Results

5.1 Estate and Capital Gains Tax Scenarios

We begin by examining the role of unrealized gains in decedents' gross estate over the next decade. Figure 1 shows the share of unrealized capital gains in all gross estates (not just those subjected to an estate tax) from 2013 to 2023. In our data, unrealized capital gains include unrealized gains on real estate, privately held businesses, and directly held stocks and mutual funds.[20] The figure reveals that the share of unrealized capital gains in the gross estate increases with the size of the gross estate, ranging from about 12 percent of the smallest estates to 55 percent for gross estates over $100 million. Note that the share of capital gains in the gross estate is basically unchanged across the two estate tax law scenarios. Importantly, for large estates (those valued at $50 million or more), the majority of assets are held as unrealized capital gains (e.g. capital income which has not yet been subject to tax).

Figure 2 shows the projected revenue from the two estate tax and two capital gains tax scenarios over 2013-2023. For the estate tax, the 2001 tax law scenario generates revenue of just over $1.2 trillion over the period, but the 2009 law generates less than half as much revenue.

---

[19] A casual look at the estate tax filings from 2000 to 2010 suggests that this might be the case.
[20] Unrealized capital gains in account-type pension plans or IRA/Keoghs are not included in our measure.

Raising the exemption level and lowering the maximum tax rate has the expected effect on projected revenue when compared to the 2001 tax law. For the capital gains tax, the no step-up basis scenario generates about the same amount of revenue as the 2009 estate tax law, while the step-up basis scenario only generates about $200 billion over the period. The decrease in revenue in the step-up basis scenario is driven by the generous exemption for unrealized gains.

Table 4 presents results for the incidence of the estate and capital gains tax across the four scenarios and by various household demographic characteristics. Although the projection period for the results is 2013-2023, the demographic characteristics are defined as of 2007, not at the time of death. As shown in the first column, slightly more than 17 percent of the bequeather sample died over the ten-year period of the projections.

Under the 2001 tax law estate tax scenario, about 15 percent of the deceased pay some estate tax, with this fraction increasing with wealth and income. Not surprisingly, the top wealth and income groups are the most likely to face the estate tax, with incidence rates of 92 and 79 percent. Slightly more than 42 percent of owners of large non-farm businesses paid estate tax, with about 25 percent of owners of small non-farm business subject to taxation. Incidence of the estate tax increases with age and education, but is lower for minorities and for households with children.

In contrast, as shown in the second column of table 4, the 2009 law estate tax scenario leads to a drastic decline in the fraction of the deceased subject to the estate tax. Around 3 percent of deceased households are taxed under this scenario, an 80 percent decline from the 2001 tax law scenario. The incidence across demographic groups fell at least 70 percent for all groups but the lowest education group. The lack of change in the incidence of the estate tax for the lowest education group may appear puzzling at first glance. However, further examination of

the data reveals the result is driven by the small number of households in this group (2 percent of the bequeather sample) and their relatively old age compared to other education groups.[21] The incidence among business owners, a particularly notable group in the estate tax debate, is significantly lower under the 2009 law than under the 2001 tax law, regardless of the size or type of business. For example, the incidence among households with a farm business is roughly equal to the incidence among non-business owning households.

The third and fourth columns of table 4 reveal how different the incidence of the tax is under the two capital gains tax scenarios. Under the no step-up basis proposal, 75 percent of bequeather households that die over the ten-year period would pay tax on unrealized capital gains. As expected, over 90 percent of households in the top wealth and income groups, and over 85 percent of business owners would have some tax liability. Even for the demographic group with the lowest incidence, non-married females, over 50 percent would have some tax liability.

As shown in column 4 of table 4, the step-up basis scenario presents a drastically different picture. Due to the potential $4.3 million exemption level, the incidence of the tax among deceased households plummets to only 3.1 percent. Note that unlike the estate tax, the exemption is not applied to gross assets, but only applied to unrealized capital gains, which leads to more households paying no taxes at all. The groups with the highest incidence of the tax are the top wealth and income groups, and the large non-farm business owners. Even among the top wealth group, only 34.5 percent of households pay the capital gains tax. For all other groups, less than 7 percent of households in each group are subject to the capital gains tax.

---

[21] The average age of household head for households among this subgroup is 74. For households in which the head holds a high school diploma, has some college experience, or holds a bachelor's degree average ages are 66, 62, and 60 respectively.

Table 5 shows how the burden of the estate and capital gains tax liability changes under the different scenarios. Under the 2001 tax law scenario, the mean tax liability is $1.3 million, but this value more than doubles under the 2009 law scenario to $3.1 million. In contrast, the mean tax liability under the no step-up basis scenario is only $128,000 and increases almost tenfold to $1.1 million under the step-up basis scenario.

Under the 2001 estate tax law and the no step-up basis scenarios, the top wealth group accounts for roughly 60 percent of total tax liability, although mean tax liability under the capital gains tax is less than half of the mean liability under the estate tax. The much narrower focus of the 2009 estate tax law and the step-up basis scenario is revealed in the concentration of tax liability in the top wealth group, which account for 82.1 and 92.3 percent of total tax liability, respectively. However, the mean tax liability for this group under the step-up basis is only one-third of the mean tax liability under the 2009 estate tax law.

For the income groups, tax liability is much less concentrated under any of the scenarios than by wealth group, with the top income group accounting for a maximum of 69.9 percent of the tax liability under the step-up basis scenario. As with the top wealth group, mean tax liability for the top income group increases substantially when moving to the 2009 estate tax law or the step-up basis capital gains tax. A result that reveals the less than perfect correlation between income and wealth is that under the 2009 tax law scenario the lowest income group has a higher mean tax liability than the middle two income groups. Clearly, households in this group have large holdings of assets that generate minimal or zero income flows. This result is similar to results found in Johnson, Moore, and Rosenmerkel (2009), which show that income in the years prior to death is not a strong predictor of end-of-life wealth for estate tax filers with more than $20 million in gross assets.

The effects of the four scenarios vary across the different types of business owners. For farm business owners, mean tax liability is higher under the 2009 estate tax law and step-up basis proposals, but the share of tax liability is highest under the no step-up basis proposal.[22] Similar results hold for the small non-farm business owners, but the share of tax liability is highest under the step-up basis scenario. Large non-farm business owners have the highest mean tax liability of any group under the 2009 estate tax law and the step-up basis proposal, but the share of tax liability accounted for by this group is higher under the capital gains scenarios, reflecting the large share of unrealized gains in their gross estate.

For other demographic characteristics, such as age, race, education, and marital status the differences in mean tax liability between the estate tax scenarios and the capital gains tax proposals are more pronounced than differences in the distribution of tax liability. All groups have higher mean tax liability under the 2009 estate tax law and the step-up basis scenario, which reflects the narrow incidence of the tax under those two scenarios.

Overall, imposing a capital gains tax at death would generate less revenue than the 2001 tax law estate tax scenario, although revenue generated by the no step-up version is similar the 2009 law estate tax proposal (which is similar to the just-enacted estate tax law). However, the only way to generate this level of revenue is to impose the tax on a much greater proportion of deceased households. In contrast, the traditional estate tax, as represented by the 2009 law, generates a similar level of revenue by taxing many fewer deceased households. Although adopting the capital gains tax would allay concerns over double taxation, to generate similar revenue it would require a fundamental shift in the idea that taxing wealth at death is a method for limiting intergenerational transfer of wealth for the highest wealth households, thus acting as a tool to limit wealth inequality.

---

[22] A small non-farm business is defined as a non-farm business with less than 25 employees.

5.2 Comparison for Households with Estate Tax Liability

The previous analysis of the estate and capital gains tax alternatives applied each tax scenario to the entire bequeather population during the projection period. This was done to show the impact of imposing a capital gains tax at death regardless of whether a household would be subject to the estate tax. In this section we compare the estate tax and capital gains tax alternative only for the subset of deceased households subject to the estate tax. This comparison is meant to analyze the impact of the change on households likely to be subject to some estate tax. In other words, we ask: "how would estate tax paying households fare under a capital gains tax at death?" As shown in figure 3, and similar to figure 1, unrealized capital gains are an important component in the portfolio of households subject to the estate tax. The fraction of unrealized gains in the gross estate increases with the size of the gross estate, with the share ranging from 8 percent of the smallest estates to 55 percent of gross estates with a value over $100 million.

Table 6a presents a comparison of how switching from the 2001 tax law (the most aggressive traditional estate tax scenario we consider) to either of the capital gains tax alternatives would affect households projected to have estate tax liability. The first panel of the table reproduces results from tables 4 and 5 for the 2001 tax law estate tax scenario. As noted previously, 17.4 percent of deceased households would pay the estate tax under the 2001 tax law. The second panel of table 6a shows that under the no step-up capital gains proposal, 94.1 percent of households facing the estate tax would pay capital gains tax. However, the mean tax paid declines by nearly 60 percent from $1.3 million to $569,000, reflecting the lower capital gains tax rate and that only unrealized gains are subject to the tax.

The high incidence rate for the capital gains tax is found across all demographics groups, with at least 75 percent of households in each group subject to the tax. As one might expect, incidence rates are near 100 percent for the top wealth and income groups, and for all types of business owners. The capital gains tax liability is more concentrated than estate tax liability, with the top wealth group accounting for 74.9 percent of the tax liability, compared to 61.8 percent under the 2001 tax law. Non-farm business owners and the top income group also account for a larger share of the tax liability under the capital gains tax. Mean tax liability under the capital gains tax falls by at least one-third for all demographic groups, except for the youngest age group and minority households.

The final panel of table 6a applies the step-up basis with indexation capital gains tax scenario to households that paid the estate tax under the 2001 tax law. Adding an exemption to the capital gains tax reduces the share of estate tax households subject to the capital gains tax to 26.7 percent. However, the mean capital gains tax liability is now only about 20 percent lower than the mean estate tax liability. Across demographic groups, the incidence is less than 50 percent for almost all groups, with the top wealth group, minority households, the lowest education group, and business owners having the highest incidence rates. The high incidence rate among the top wealth group and business owners is expected, as these groups are more likely to have unrealized capital gains in businesses. For minority households and the lowest education group, the high fraction subject to the capital gains tax indicates that the portfolios of this small segment of deceased households is heavily weighted toward unrealized capital gains. Although those groups have a relatively high incidence rate, the mean tax liability for minority and low education households are some of the lowest values of all the demographic groups.

Unlike the no step-up basis scenario, the mean capital gains tax liability under the step-up basis proposal is not always less than the mean Bush law estate tax liability. For the top income group, the some college education group, and married households mean tax liability differs very little under the estate tax or the capital gains tax. One group that would see an increase in their average tax liability under the step-up basis capital gains tax scenario is households with a head under the age of 50. The mean tax liability for this group would increase by at least 30 percent, compared to under the estate tax. Again, a small segment of these households have large portfolios heavily weighted toward unrealized capital gains consisting of business assets. For all other demographic groups, the mean tax liability is lower under the capital gains tax than the estate tax. As expected, tax liability under the step-up basis proposal is even more highly concentrated among the top wealth and income groups and business owners than under the no step-up proposal or the estate tax.

Table 6b presents a similar comparison to table 6a, but the estate tax scenario is now the 2009 law (the closest scenario to 2013 estate tax law that we consider). As noted previously in table 4, and reproduced in the first panel of table 6b, under the 2009 law only 2.9 percent of deceased households would be subject to the estate tax. The second panel of table 6b reveals that under the no step-up capital gains tax scenario over 98 percent of estate tax households would be subject to the capital gains tax. However, the mean tax liability falls by 50 percent from $3.1 million under the estate tax to $1.5 million the capital gains tax.

Across demographics groups, the incidence of the capital gains tax is above 90 percent for all groups but minority households. In fact, the incidence is close to 100 percent for most groups, which is not surprising given $3.5 million exemption under the 2009 estate tax proposal.

The distribution of tax liability under the no step-up basis proposal is somewhat more concentrated than under the estate tax. The top wealth group accounts for 86.8 percent of the tax liability, compared to 82.1 percent under the estate tax. For the top income group and large non-farm business owners, their share of the tax liability under the capital gains tax is 10 to 15 percentage points higher than under the estate tax.

Although the concentration of tax liability is higher under the capital gains tax, mean tax liability declines for all demographic groups except the youngest households. Not only does the mean tax liability fall, it decreases by at least 30 percent for most demographic groups. Farm business owners and large non-farm business owners would experience smaller declines in their tax liability of 14 and 24 percent, respectively. The much lower mean tax liability under the capital gains tax reflects both the lower capital gains tax rate (20 percent versus 45 percent) and the fact that only unrealized gains, not the gross estate are taxed.

The final panel of table 6b presents results for applying the step-up basis capital gains proposal to deceased households with estate tax liability. Adding the exemption of up to $4.3 million further reduces the fraction of estate tax households subject to the capital gains tax to 71.4 percent. Mean tax liability is slightly higher than under the no step-up basis scenario, but still nearly 50 percent lower than under the 2009 estate tax scenario.

For the top wealth and income groups, about 80 percent of deceased estate tax households would face the capital gains tax. Some of the highest incidence rates occur among business owners, with 90.8 percent of larger non-farm business owners and 98.4 percent of farm business owners subject to the capital gains tax. Although nearly all farm business owners that are subject to the estate tax are subject to the capital gains tax, their mean tax liability declines 31

percent under the capital gains tax and is the lowest mean tax liability of all types of business owners.

As expected, the concentration of tax liability increases under the step-up basis capital gains proposal. The top wealth group accounts for 91.6 percent, the top income group accounts for 67.9 percent and all types of business owners account for 83.4 percent of total tax liability. Compared to the estate tax, the mean tax liability under the capital gains taxes falls by at least 20 percent for all demographic groups, except the youngest households.

The comparison of mean tax liability is less clear across the two capital gains tax scenarios. For the top wealth and income groups, mean tax liability is slightly higher under the step-up basis scenario, but mean tax liability for business owners is lower under the step-up basis scenario. Farm business owners experience one of the largest declines in mean tax liability when comparing the two capital gains tax scenarios. For the other demographic groups that experienced large changes in the mean tax liability, these changes appear to be driven by large changes in the fraction of deceased estate tax households subject to the capital gains tax under the two proposals.

Overall, tables 6a and 6b show that almost all households subject to the estate tax (under either scenario) would be subject to the capital gains tax under the no step-up basis proposal, but mean tax liability would be considerably lower. Under the step-up basis proposal, a substantial fraction of deceased households subject to the estate tax would have no tax liability. Even for those households subject to the capital gains tax, their mean tax liability would fall by at least 20 percent. Switching to a capital gains tax would also increase the concentration of tax liability among the top wealth and income groups beyond the levels seen under the estate tax.

6. Conclusion

In this paper we have looked at the how alternative regimes for taxing wealth at death are likely to impact households' tax burden over the next ten years. Specifically, we have calculated the importance of unrealized capital gains in prospective estates and then compared and contrasted a traditional estate tax with taxing unrealized capital gains at death. For this purpose, we have constructed a model of household wealth accumulation using data from the SCF. Because our model estimates wealth accumulation at the household level, we have been able to investigate the heterogeneous impact of these alternative tax regimes across different types of households.

We show that a large share of households subject to the estate tax would also be subject to a capital gains tax. This finding is due to the substantial amount of unrealized capital gains in most gross estates, especially for the wealthiest households. However, the tax liability for these households would be lower than under the estate tax. In addition, we have shown that the revenue generated by alternative regimes differs significantly and that there is no "silver bullet." Adopting a capital gains tax alternative would eliminate the "unfairness" of double taxation. However to raise the same revenue as the least aggressive traditional estate taxes we consider (close to the law just adopted), it would have to cover a much larger percentage of deceased individuals, thus raising other concerns about fairness and inequality.

References

Auten, Gerald and David Joulfaian, 2001. "Bequest taxes and capital gains realizations." *Journal of Public Economics* 81(2), 213-229.

Avery, Robert B., Gregory Elliehausen and Arthur B. Kennickell, 1988. "Measuring Wealth with Survey Data: An Evaluation of the 1983 Survey of Consumer Finances." *Review of Income and Wealth* 34 (4), 339-369.

Avery, Robert B., and Michael S. Rendall, 2002. "Lifetime inheritances of three generations of whites and blacks." *American Journal of Sociology* 107(5),1300-1346.

Avery, Robert B., and Michael S. Rendall, 1993. "Estimating the size and distribution of baby boomers prospective inheritances." In *Proceedings of the American Statistical Association, Section on Social Statistics*, 11-19.

Bucks, Brian K., Arthur B. Kennickell, Traci L. Mach, and Kevin B. Moore, 2009. "Changes in US family finances from 2004 to 2007: Evidence from the Survey of Consumer Finances." *Fed. Res. Bull. A1* 95.

Burman, Leonard E, Katherine Lim, and Jeff Rohaly. 2008. "Back from the Grave: Revenue and Distributional Effects of Reforming the Federal Estate Tax."

Congressional Budget Office, 2011. "The Budget and Economic Outlook: Fiscal Years 2011 to 2021."

Congressional Budget Office, 2009. "Federal Estate and Gift Taxes."

Congressional Budget Office, 2005. "Effects of Federal Estate Tax on Farms and Small Businesses."

Davies, James B. and Anthony F. Shorrocks, 2000. "The distribution of wealth." *Handbook of Income Distribution*, 1 (1), 605-675.

Gale, William,G., James,R. Hines Jr., and Joel Slemrod eds., 2001. *Rethinking Estate and Gift Taxation.* Washington: Brookings Institution Press.

Gravelle, Jane G. and Steven Maguire, 2008. "Estate Taxes and Family Businesses: Economic Issues." Congressional Research Service Report RL33070.

Internal Revenue Service Statistics of Income 2000-2011. "Tables for Estate Tax Returns By Tax Status and Size of Gross Estate." http://www.irs.gov/uac/SOI-Tax-Stats-Estate-Tax-Statistics-Filing-Year-Table-1.

Jacobson, Darien, Barry Johnson and Brian Raub, 2007 "The Estate Tax: Ninety Years and Counting." *Compendium of Federal Estate Tax and Personal Wealth Studies* (2).

Johansen, R. 1996. "Review of Adequacy of 1983 Individual Annuity Mortality Table." *Transactions of the Society of Actuaries* 47, 101-23.

Johnson, Barry, Kevin B. Moore, and Lisa Schrieber Rosenmerkel, 2009 "The Income-Wealth Paradox: Connections Between Realized Income and Wealth Among America's Aging Top Wealth-Holders." *Compendium of Federal Estate Tax and Personal Wealth Studies* (2).

Joulfaian, David, 2005. "Choosing between gifts and bequests: How taxes affect the timing of wealth transfers." *Journal of Public Economics* 89(11-12), 2069-2091.

Joulfaian, David, 2000. "Estate Taxes and Charitable Bequests by the Wealthy," NBER Working Papers 7663.

Joulfaian, David and Kathleen M. McGarry, "Estate and Gift Tax Incentives and Inter Vivos Giving." National Tax Journal 57(2), 429-444.

Kopczuk, Wojciech, 2012 "Taxation and Intergenerational Transfers and Wealth." NBER Working Papers 18584.

Marples, Donald J. and Jane G. Gravelle, 2009. "Estate and Gift Taxes: Economic Issues." CRS Report RL30600.

Poterba, James, 2001. "Estate and gift taxes and incentives for inter vivos giving in the US," *Journal of Public Economics* 79(1), 237-264.

Poterba, James and Scott Weisbenner, 2001. "The Distributional Burden of Taxing Estates and Unrealized Capital Gains at the Time of Death." in *Rethinking Estate and Gift Taxation.* Washington: Brookings Institution Press, 216-247.

Raub, Brian G, 2008. "Federal Estate Tax Returns Filed for 2004 Decedents." *Statistics of Income Bulletin, Spring 2008*.

Tax Policy Center, 2011. "Table T11-0156, Estate Tax Returns and Liability Under Current Law and Various Reform Proposals." 2011-2021.
http://www.taxpolicycenter.org/numbers/displayatab.cfm?Docid=3037&DocTypeID=7

Figure 1. Percent of Unrealized Capital Gains in Gross Estate for Deceased Households (2013-2023)
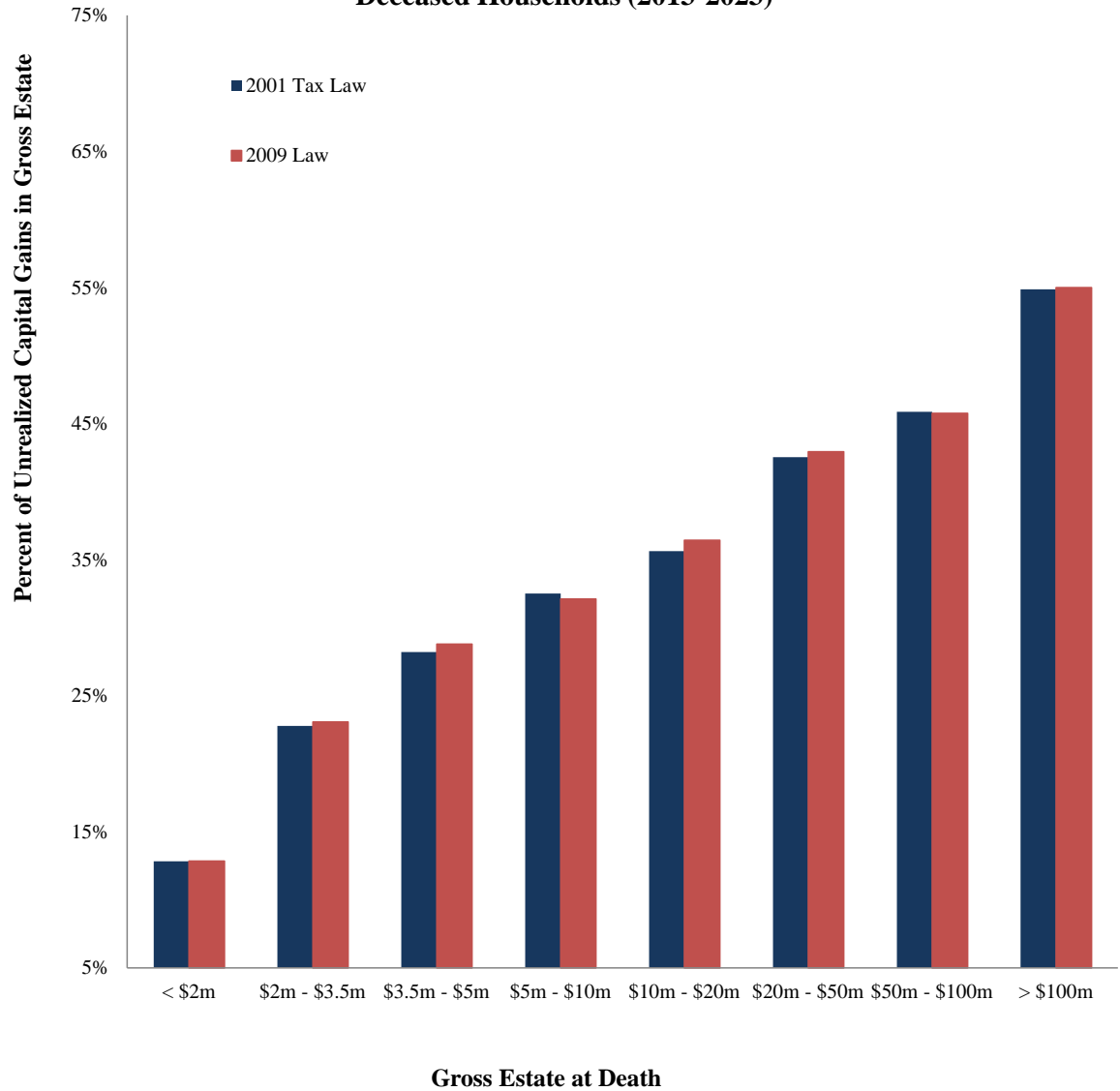
Figure 2. Estate Tax and Capital Gains Tax Revenue Projections, 2013-2023

Total Revenue, 2013-2023

Legend	
2001 Tax Law	$1233
2009 Law	$529
No Step-Up	$561
Step-Up Basis	$199

Estate Tax Revenues ($ Billions, Nominal)

Year of Filing
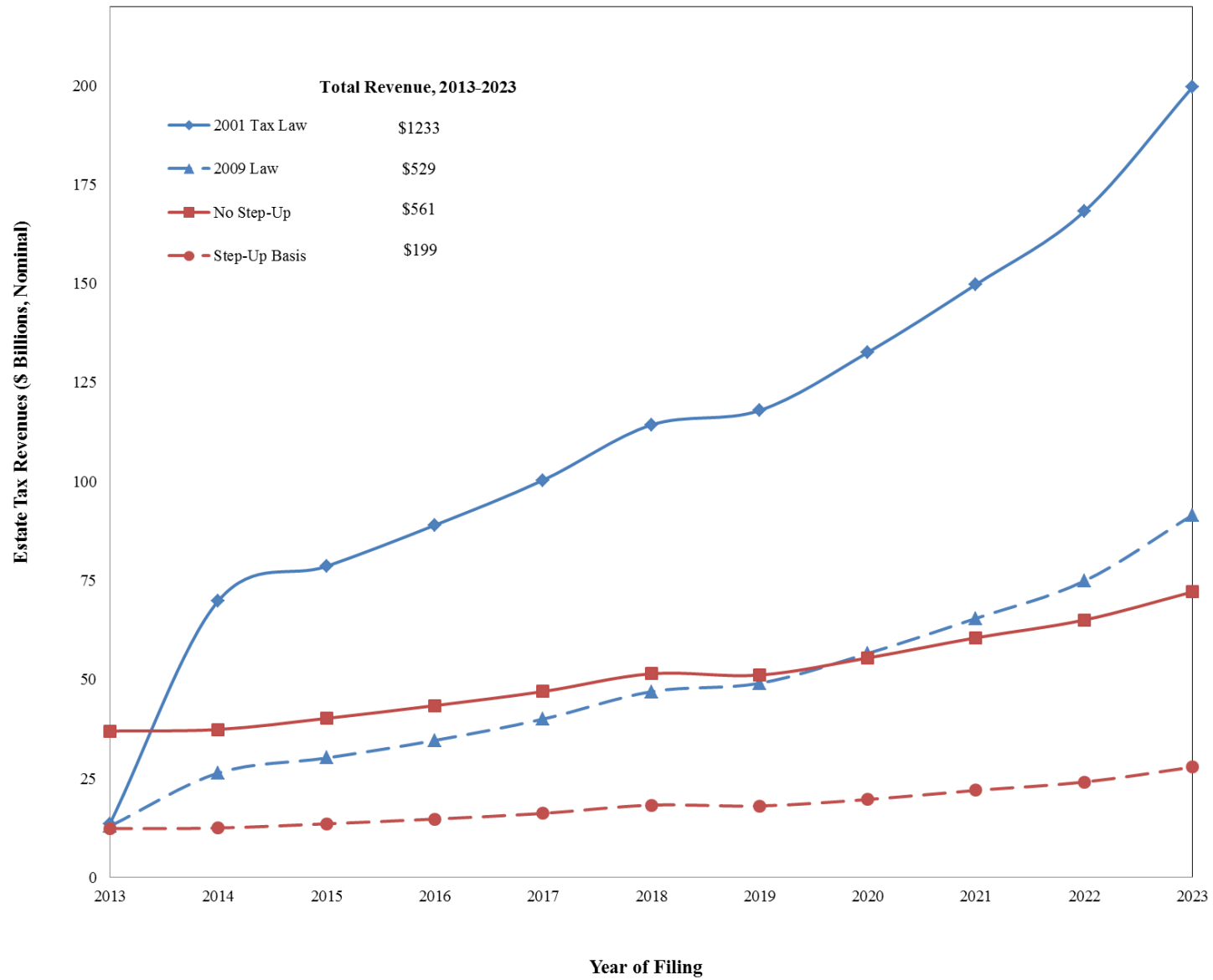
Figure 3. Percent of Unrealized Capital Gains in Gross Estate for Taxed Households (2013-2023)

Legend:
- 2001 Tax Law
- 2009 Law

X-axis (Gross Estate at Death): < $2m, $2m - $3.5m, $3.5m - $5m, $5m - $10m, $10m - $20m, $20m - $50m, $50m - $100m, > $100m

Y-axis (Percent of Unrealized Capital Gains in Gross Estate): 5%, 15%, 25%, 35%, 45%, 55%, 65%, 75%
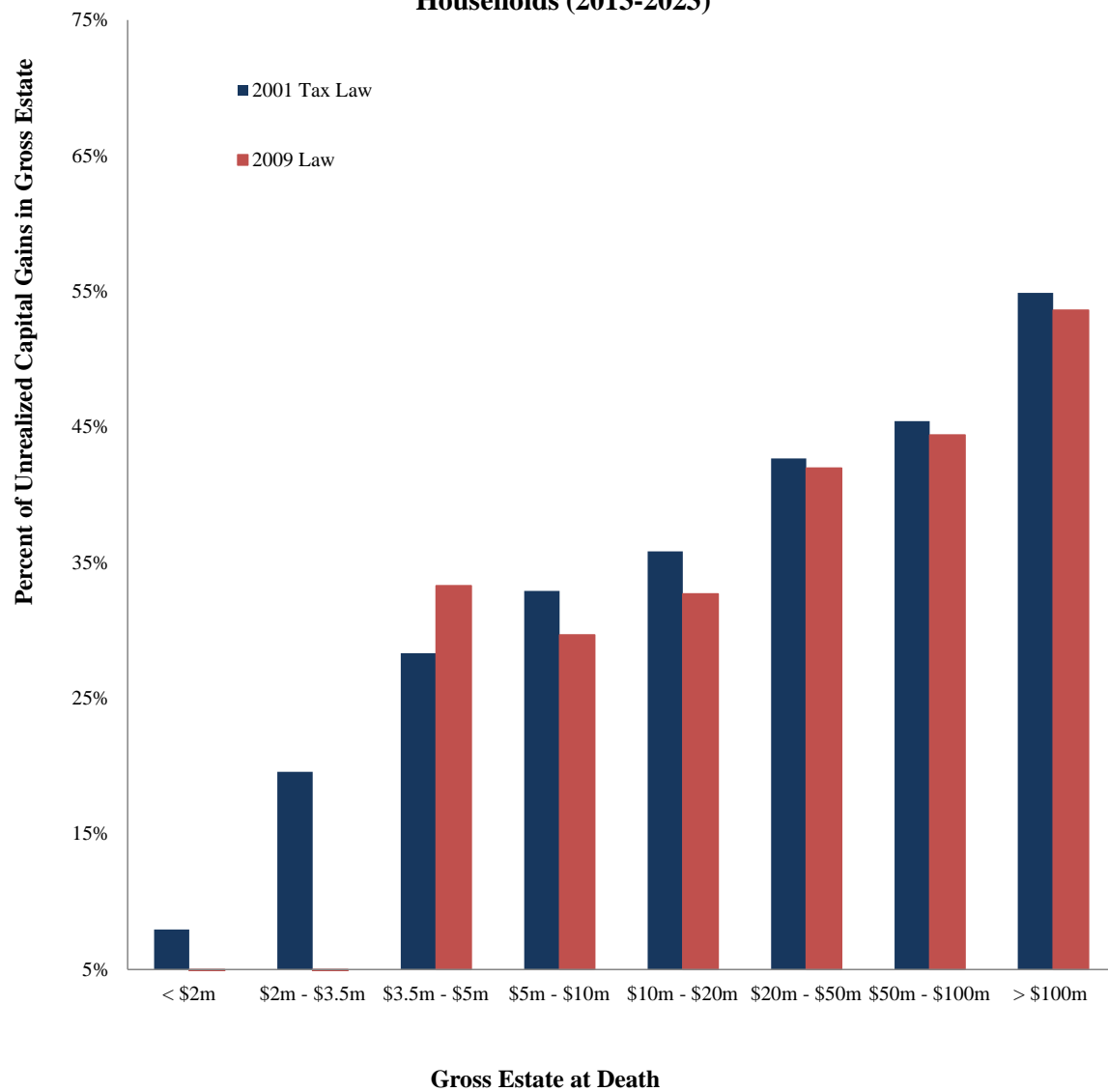
Table 1. Full and Bequeather Household Characteristics

Percent Distribution, except as noted

Characteristic in 2007	Full Sample	Bequeather Sample[1]	Percent of Full Sample in Bequeather Sample
All	100	100	17
Percentile of Wealth			
0-74.9	75	0	0
75-89.9	15	49	55
90-98.9	9	45	84
99-100	1	5	89
Percentile of Income			
0-74.9	75	42	9
75-89.9	15	24	26
90-98.9	9	30	55
99-100	1	5	82
Age of Head			
< 50	52	15	5
50 to 64	27	50	31
65 +	21	36	28
Race of Head			
White	74	89	20
Nonwhite or Hispanic	26	11	7
Education of Head			
No high school diploma	10	2	3
High schol diploma	29	15	9
Some college	25	19	13
College degree	36	64	29
Self-employment Status			
Own a farm business	1	2	59
Owns a small non-farm business[2]	12	25	36
Owns a large non-farm business	1	5	56
Owns neither	86	68	13
Marital Status			
Married	59	73	21
Non-married male	14	11	14
Non-married female	27	15	9

1. Bequeather sample includes households with wealth above the 80th percentile with a head of household at least 45 years of age , as of 2007.

2. A small non-farm business is defined as a non-farm business with less than 25 employees.

Table 2. Wealth Accumulation Model, Bequeather Sample

Dependent Varriable = Log(Wealth)	COUPLES		WIDOWS		SINGLES/DIVORCED	
	Parameter	S.E.	Parameter	S.E.	Parameter	S.E.
Constant	5.7270	0.4409	-0.7135	3.2793	6.1679	0.9557
Head of houshold age (years)	0.0236	0.0062	0.0647	0.0569	0.0270	0.0149
Spline at 55	0.0408	0.0162	-0.0570	0.0869	-0.0288	0.0386
Spline at 65	-0.0181	0.0226	-0.0027	0.0727	0.0822	0.0736
Spline at 75	-0.0359	0.0296	0.0372	0.0517	-0.0809	0.1340
Age difference between head of household and spouse	0.0000	0.0082				
Spline at 10 years	0.0550	0.0186				
Log(Income)	0.5854	0.0201	0.9576	0.0874	0.5261	0.0428
Log(Income) × Head of Housold is Retired (dummy)	-0.0833	0.0386	-0.2303	0.1098	0.1125	0.1189
Log(Income) × Spouse is Retired (dummy)	0.0574	0.0471				
Head of household is retired (dummy)	0.9175	0.5108	2.7770	1.3738	-1.5264	1.4371
Spouse is retired (dummy)	-0.6643	0.6258				
Household receives a pension (dummy)	-0.2355	0.1063	-0.2005	0.3070	-0.0198	0.2816
Head of household has defined-benefit Plan (dummy)	-0.4562	0.0724	-0.2828	0.1778	-0.5584	0.1866
Spouse has defined-benefit plan (dummy)	-0.3543	0.0910				
Years since worked full time (head of household)	0.1606	0.0710	0.1857	0.2181	0.0763	0.1934
Spline at 2 Years	-0.1889	0.0767	-0.1937	0.2208	-0.0970	0.2048
Years Since Worked Full Time (spouse)	-0.0401	0.0925				
Spline at 2 Years	0.0424	0.0943				
Children (≤2 is base group)						
More than 2 Children (dummy)	0.1876	0.0593	0.2935	0.1671	0.2120	0.1843
Education (< high school is base group)						
Head of Household:						
High school diploma or more (dummy)	0.2832	0.2158	-0.2971	0.4306	0.7421	0.5499
Some college or more (dummy)	0.0672	0.1257	0.3039	0.2659	0.0497	0.2920
Bachelor's or more (dummy)	0.1001	0.1044	0.0815	0.2257	0.1462	0.2251
Masters degree or more (dummy)	0.0384	0.0690	-0.0032	0.2231	-0.1660	0.1871
Spouse:						
High school diploma or more (dummy)	0.0979	0.2371				
Some college or more (dummy)	0.0556	0.0996				
Bachelor's or more (dummy)	0.3073	0.0848				
Masters degree or more (dummy)	-0.2344	0.0745				
Years since widowed			0.2169	0.1750		
Spline at 2 years			-0.2259	0.1798		
Head of houshold is male (dummy)			-0.0312	0.1831		
Observations	N ≈1580		N ≈100		N ≈ 200	

Source : 2007 Survey of Consumer Finances

Notes : Bequeather sample includes households with wealth in the top 20th percentile and households head 45 years or older in 2007.

Table 3. Model of Estate Apportionment at Death

	Dependent Variable			
	Percent of Estate that is Taxable		Percent of Estate Bequested to Spouse**	
	Parameter	S.E.	Parameter	S.E.
Constant	2.7773	0.3246	-0.2098	0.2594
Top Marginal Tax Rate faced by Decedent (Top Rate)				
Top Rate	-2.3490	0.4514	1.4028	0.3648
Top Rate * Gross Estate between $5 and $10 million	3.1171	1.0642	-2.1144	0.7869
Top Rate * Gross Estate more than $10 million	3.7275	0.6821	-1.5099	0.5149
Decedent is Male (dummy)	-0.0580	0.0143	0.0544	0.0104
Decedent is Married (dummy)	-0.4628	0.0143	n.a	n.a
Age of Decedent (younger than 60 is base group)				
Between 60 and 70 years old	0.0121	0.0200	0.0189	0.0142
Between 70 and 80 years old	0.0436	0.0199	-0.0124	0.0142
More than 80 years of age	0.0741	0.0199	-0.0800	0.0144
Size of Decedent's Gross Estate (<$5 million is base group)				
Between $5 and $10 million	-2.4863	0.6478	1.4314	0.4821
More than $10 million	-2.8920	0.4290	0.9889	0.3278
Exemption as a Proportion of Gross Estate (EPGE)				
EPGE	-1.2766	0.2078	0.0007	0.1634
EPGE * Gross Estate between $5 and $10 Million	1.8513	0.5031	-1.0604	0.3705
EPGE * Gross Estate more than $10 Million	3.6343	0.8278	0.0693	0.5985
Adjusted R^2	0.7072		0.6996	
Number of Observations	513		261	

Source : Statistics of Income data on IRS estate tax filings from 2000-2010

** Coefficients estimated only on the sample of married decedents

Table 4. Incidence of Estate and Capital Gains Tax, by Demographic Characteristics (2013-2023)

Characteristic in 2007	Percent Deceased	Percent of Deceased that are Taxed			
		2001 Tax Law	2009 Law	No Step-Up Basis	Step-Up Basis
All	17.4	15.4	2.9	75.0	3.1
Percentile of Wealth					
75-89.9	17.5	0.0	0.0	63.8	0.0
90-98.9	17.4	21.7	2.8	83.9	2.3
99-100	17.0	92.1	28.1	97.1	34.5
Percentile of Income					
0-74.9	24.3	5.4	0.5	67.8	1.0
75-89.9	14.6	12.6	2.1	75.7	1.6
90-98.9	12.1	29.4	5.9	88.1	5.4
99-100	12.9	79.4	21.9	92.5	24.7
Age of Head					
< 50	3.9	8.8	0.8	74.6	1.8
50 to 64	9.7	15.5	1.7	73.4	3.1
65 +	34.6	15.6	3.5	75.7	3.1
Race of Head					
White	18.1	15.9	3.1	75.6	3.1
Nonwhite or Hispanic	11.8	8.2	0.6	67.7	2.6
Education of Head					
No high school diploma	37.1	7.2	5.4	77.5	3.7
High schol diploma	22.4	6.5	1.7	66.6	1.1
Some college	18.2	8.0	1.1	70.4	1.8
College degree	15.6	21.1	3.8	79.1	4.1
Self-employment Status					
Own a farm business	14.2	14.0	2.2	98.6	6.1
Owns a small non-farm business	13.6	25.1	4.9	85.9	6.0
Owns a large non-farm business	11.9	42.4	8.3	95.8	16.8
Owns neither	19.6	10.9	2.0	70.1	1.2
Marital Status					
Married	16.2	14.6	2.4	78.7	2.8
Non-married male	22.0	18.7	3.7	76.6	4.0
Non-married female	25.7	18.1	5.4	51.5	4.0

Table 5. Distribution of Estate Tax and Capital Gains Tax Burden on Taxed Bequeathers, by Demographic Characteristics (2013-2023)

Characteristic in 2007	Estate Tax Scenarios				Capital Gains Tax Scenarios			
	2001 Tax Law		2009 Law		No Step-Up		Step-Up Basis	
	Mean Tax Paid (thous $)	Distribution of Total Tax Paid	Mean Tax Paid (thous $)	Distribution of Total Tax Paid	Mean Tax Paid (thous $)	Distribution of Total Tax Paid	Mean Tax Paid (thous $)	Distribution of Total Tax Paid
All	1,377	100.0	3,123	100.0	128	100.0	1,117	100.0
Percentile of Wealth								
75-89.9	3,923	0.0	6,321	0.1	15	4.9	185	0.0
90-98.9	806	38.2	1,247	17.8	89	36.0	246	7.7
99-100	2,450	61.8	4,634	82.1	1,011	59.1	1,584	92.3
Percentile of Income								
0-74.9	1,216	16.7	4,508	12.8	47	17.6	524	8.0
75-89.9	1,075	13.0	1,479	7.0	52	8.2	295	2.8
90-98.9	1,041	32.6	2,106	30.7	164	34.0	550	19.4
99-100	2,430	37.7	5,013	49.5	1,010	40.2	2,357	69.9
Age of Head								
< 50	709	1.0	1,297	0.4	109	2.8	1,225	2.1
50 to 64	1,058	21.9	3,875	19.9	176	38.0	1,482	37.6
65 +	1,526	77.1	2,997	79.7	110	59.1	965	60.3
Race of Head								
White	1,395	97.4	3,103	98.0	128	93.1	1,147	96.5
Nonwhite or Hispanic	915	2.6	4,584	2.0	135	6.9	644	3.5
Education of Head								
No high school diploma	1,871	2.2	1,340	2.8	81	2.2	330	1.2
High schol diploma	1,479	8.5	2,660	9.1	68	8.7	716	4.1
Some college	1,347	10.1	3,901	9.6	82	11.7	1,219	12.7
College degree	1,360	79.2	3,262	78.6	161	77.4	1,177	81.9
Self-employment Status								
Own a farm business	972	1.1	1,821	0.8	169	3.0	519	1.6
Owns a small non-farm business	1,457	31.7	3,501	34.1	206	33.9	985	52.0
Owns a large non-farm business	2,098	24.2	5,416	28.3	644	37.1	4,509	33.4
Owns neither	1,125	42.9	2,214	36.8	48	26.1	494	13.0
Marital Status								
Married	1,373	74.3	3,561	74.4	133	85.7	1,307	84.5
Non-married male	1,361	10.0	2,727	9.3	110	7.3	870	8.5
Non-married female	1,405	15.6	2,112	16.3	100	7.0	460	7.0

Table 6a. Distribution of Tax Burden Using Capital Gains Tax Counterfactual for Population Facing Estate Tax under the 2001 Tax Law, by Demographic Characteristics (2013-2023)

	Estate Tax			Capital Gains Tax					
	2001 Tax Law			No Step-Up Basis			Step-Up Basis with Indexation		
	Percent of Taxed Paying Estate Tax	Taxed Bequeathers Paying EstateTax		Percent of Taxed Paying Capital Gains Tax	Taxed Bequeathers Paying Capital Gains Tax		Percent of Taxed Paying Capital Gains Tax	Taxed Bequeathers Paying Capital Gains Tax	
Characteristic in 2007		Mean Tax Paid (thous $)	Distribution of Total Tax Paid		Mean Tax Paid (thous $)	Distribution of Total Tax Paid		Mean Tax Paid (thous $)	Distribution of Total Tax Paid
All	17.4	1,377	100.0	94.1	569	100.0	26.7	1,096	100.0
Percentile of Wealth									
75-89.9	17.5	3,923	0.0	83.9	109	0.0	0.5	3,609	0.0
90-98.9	17.4	806	38.2	91.6	225	25.1	19.0	265	11.2
99-100	17.0	2,450	61.8	98.7	1,169	74.9	41.3	1,816	88.8
Percentile of Income									
0-74.9	24.3	1,216	16.7	82.4	369	10.7	23.3	765	11.4
75-89.9	14.6	1,075	13.0	94.3	205	6.0	23.3	249	3.3
90-98.9	12.1	1,041	32.6	97.2	419	32.8	25.3	559	20.8
99-100	12.9	2,430	37.7	97.9	1,290	50.5	35.3	2,502	64.4
Age of Head									
< 50	3.9	709	1.0	99.3	639	2.3	25.3	1,089	1.8
50 to 64	9.7	1,058	21.9	97.3	717	37.2	25.3	1,400	34.5
65 +	34.6	1,526	77.1	92.6	503	60.5	27.3	981	63.7
Race of Head									
White	18.1	1,395	97.4	94.2	560	94.7	26.0	1,129	96.4
Nonwhite or Hispanic	11.8	915	2.6	91.4	796	5.3	44.5	608	3.6
Education of Head									
No high school diploma	37.1	1,871	2.2	95.1	452	1.3	51.6	401	1.1
High school diploma	22.4	1,479	8.5	98.1	431	6.3	31.3	545	4.6
Some college	18.2	1,347	10.1	94.5	563	10.2	23.1	1,415	11.5
College degree	15.6	1,360	79.2	93.6	586	82.2	26.2	1,152	82.8
Self-employment Status									
Own a farm business	14.2	972	1.1	99.9	647	1.9	47.8	661	1.7
Owns a small non-farm business	13.6	1,457	31.7	97.9	622	34.1	32.2	927	30.5
Owns a large non-farm business	11.9	2,098	24.2	99.5	1,453	42.9	43.2	2,256	52.8
Owns neither	19.6	1,125	42.9	90.1	238	21.1	18.0	463	15.0
Marital Status									
Married	16.2	1,373	74.3	96.7	653	88.0	27.1	1,270	87.5
Non-married male	22.0	1,361	10.0	99.8	321	6.1	25.4	768	6.8
Non-married female	25.7	1,405	15.6	77.3	266	5.9	25.9	423	5.7

1. This is the step up basis option allowed by the IRS in 2010. It is $1.3 million with an additional $3 million for a surviving spouse

Table 6b. Distribution of Tax Burden Using Capital Gains Tax Counterfactual for Population Facing Estate Tax under the 2009 Law, by Demographic Characteristics (2013-2023)

Characteristic in 2007	Estate Tax			Capital Gains Tax					
	2009 Law			No Step-Up Basis			Step-Up Basis with Indexation		
	Percent of Taxed Paying Estate Tax	Taxed Bequeathers Paying Estate Tax		Percent of Taxed Paying Capital Gains Tax	Taxed Bequeathers Paying Capital Gains Tax		Percent of Taxed Paying Capital Gains Tax	Taxed Bequeathers Paying Capital Gains Tax	
		Mean Tax Paid (thous $)	Distribution of Total Tax Paid		Mean Tax Paid (thous $)	Distribution of Total Tax Paid		Mean Tax Paid (thous $)	Distribution of Total Tax Paid
All	2.9	3,123	100.0	98.5	1,468	100.0	71.4	1,613	100.0
Percentile of Wealth									
75-89.9	0.0	6,321	0.1	99.2	55	0.0	0.7	4,841	0.0
90-98.9	2.8	1,247	17.8	97.6	439	13.2	62.5	348	8.4
99-100	28.1	4,634	82.1	99.2	2,285	86.8	78.5	2,425	91.6
Percentile of Income									
0-74.9	0.5	4,508	12.8	98.8	1,570	9.5	52.5	2,529	10.2
75-89.9	2.1	1,479	7.0	99.7	461	4.7	79.7	281	2.9
90-98.9	5.9	2,106	30.7	97.7	722	22.2	66.1	728	19.0
99-100	21.9	5,013	49.5	99.0	3,010	63.6	80.7	3,138	67.9
Age of Head									
< 50	0.8	1,297	0.4	98.8	1,748	1.1	72.5	1,722	1.0
50 to 64	1.7	3,875	19.9	97.6	2,614	28.3	75.1	2,825	29.6
65 +	3.5	2,997	79.7	98.7	1,245	70.6	70.7	1,363	69.4
Race of Head									
White	3.1	3,103	98.0	98.9	1,457	98.3	71.4	1,607	98.3
Nonwhite or Hispanic	0.6	4,584	2.0	72.8	2,481	1.7	69.9	2,128	1.7
Education of Head									
No high school diploma	5.4	1,340	2.8	93.5	484	2.0	67.5	394	1.5
High school diploma	1.7	2,660	9.1	99.7	800	5.9	51.8	1,105	5.3
Some college	1.1	3,901	9.6	99.8	2,190	11.6	87.8	2,137	12.5
College degree	3.8	3,262	78.6	98.6	1,569	80.5	72.9	1,697	80.8
Self-employment Status									
Own a farm business	2.2	1,821	0.8	100.0	1,575	1.4	98.4	1,255	1.4
Owns a small non-farm business	4.9	3,501	34.1	98.1	1,526	31.5	81.9	1,428	30.9
Owns a large non-farm business	8.3	5,416	28.3	99.7	4,104	46.2	90.8	3,964	51.1
Owns neither	2.0	2,214	36.8	98.3	591	20.9	58.3	630	16.6
Marital Status									
Married	2.4	3,561	74.4	98.7	1,858	82.8	74.3	2,009	84.6
Non-married male	3.7	2,727	9.3	99.5	1,106	8.1	76.8	1,136	8.0
Non-married female	5.4	2,112	16.3	97.4	559	9.1	61.0	572	7.3

1. This is the step up basis option allowed by the IRS in 2010. It is $1.3 million with an additional $3 million for a surviving spouse

40

Appendix A

A.1 Model Validation

Table A1 presents a comparison of the model predictions and actual filings (from SOI tables) for estate tax filings in 2010. The model predictions are pure out of sample predictions based upon the model described earlier in the paper. We compare the number of returns, taxable returns, and the net estate tax from the model predictions to actual data from the SOI tables (reference to SOI tables). Overall, the model predicts about one-third more taxable returns and net estate tax about 20 percent higher than SOI figures. The model also predicts twice the number of gross returns filed when compared to the actual number of filings. One explanation for these discrepancies is that we assume all decedents with a gross estate above the exemption level (prior to any deductions) file a return even if no tax is owed, something that might not always happen in practice.

When estates are categorized by the size of the gross estate, the model over predicts the number of taxable returns and slightly under predicts net estate tax for gross estates of $20 million or more. One possible reason for the under prediction is that the covariates in the model cannot generate the growth in wealth over time that actually occurs among some high-wealth households. Basically, there is too much heterogeneity in these households that is difficult to model, even with a data set that contains households at the top of the distribution. In contrast, the model over predicts both the number of taxable returns and net estate tax for gross estates valued between $5 to $10 million. One possible reason for the over prediction is a high fraction of estates with business assets in this group. Estate tax law allows for devaluation of closely held businesses under certain circumstances, but we make no such adjustments to our estimates gross estates (see Raub, 2008 for more details).

A.2 Projections of Estate Tax Alternatives

Table A2 presents the models base predictions for 2011 to 2021 under various scenarios. The top panel of the table shows the number of returns, number of taxable returns, and estate liability for our model and estimates from the TPC and CBO under the Bush estate tax law scenario. The first result to note is the large increase in taxable returns and estate tax liability that occurs between 2013 and 2014.[23] This is driven by the reversion to the $1 million exemption and 55 percent top marginal rate which was scheduled to occur at the end of 2012. After 2014, our model predicts a steady increase in the number of taxable returns and estate tax liability under the Bus tax law driven by a non-indexed exemption level and an aging population. Over the 2011 to 2021 periods, our model predicts a higher number of taxable returns and a higher estate tax liability than TPC or CBO. The total estate tax liability over the period from our model is 56 percent larger than TPC projections and 78 percent larger than CBO projections. Although the model estimates of total net estate tax is much higher than the TPC or CBO projections, the projected number of returns and taxable returns from the model and TPC are strikingly similar. The main driver of the difference in total estate tax liability between our model and the others appears to be the much larger increase in number of taxable returns and estate tax liability triggered by the reversion to the $1 million exemption and 55 percent maximum rate in 2013.

The middle panel of table A2 presents similar projects based on the alternative assumption that the 2009 law is made permanent without indexation. This would include a $3.5 million exemption amount and a top marginal rate of 45 percent. Under this scenario our model shows a steady increase in taxable returns and estate tax liability, with projected total estate tax

---

[23] The large jump in filers and estate tax liability occurs between 2012 and 2013 in the TPC estimates, which use year of death to categorize filers. In our model we assume the decedent's return is filed in the next calendar, as do the CBO predictions.

liability over the period equal to about 44 percent of the revenue projected under the 2001 tax law. Projections of total estate tax liability from the model are about 25 percent larger than from the TPC model, but TPC revenue estimates are higher in the first three years of the period and then fall below our model starting in 2014.

The final panel of table A2 presents projections based on the assumption that the 2009 law is made permanent with indexation. The model projections show the expected decline in number of taxable returns and estate tax revenue, but the changes are fairly small. Estimates from the TPC models reveal almost a 30 percent drop in the number of returns, but only an 8 percent drop in estate tax revenue.

Overall, the model predictions match up well with the TPC projections for the 2009 estate law alternatives, but do not track the TPC or CBO projections for the 2001 tax law as closely. The mostly likely reason for the divergence between the model and TPC and CBO 2001 tax law projections is differences in the wealth generation process used in each projection combined with the low exemption level and lack of indexation under the 2001 tax law.

Table A1. Model Predicted Estates vs. Realized Filings

Date of Filing[1]	Gross Estate	Model Prediction			Actual Filings (SOI Tables)		
		Returns	Taxable Returns	Net Estate Tax[2]	Returns	Taxable Returns	Net Estate Tax[2]
2010	All returns	29,541	8,911	15,850,763	14,738	6,711	13,216,723
	Under $3.5 million	185	1	263	3,157	1,325	267,354
	$3.5 to $5 million	2,113	160	22,939	4,884	1,912	718,859
	$5 to $10 million	14,903	5,314	6,614,906	4,323	2,106	2,681,793
	$10 to $20 million	8,052	925	3,287,952	1,493	825	2,871,395
	$20 million or more	4,289	2,511	5,924,702	882	543	6,677,322

1. Filing date is one year after the date at which the estate is created.

2. 1000s of nominal dollars

Table A2. Model Predicted Filings vs. TPC and CBO Projections[1]

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2012-2021 Total
2001 Tax Law [2]												
Model	Number of Returns (thousands)	29.5	22.7	153.3	164.6	168.8	178.2	185.9	183.0	191.9	200.6	1478.6
	Number of Taxable Returns (thousands)	8.8	9.4	70.7	76.3	80.8	85.8	90.9	88.2	93.4	98.2	702.5
	Estate Tax Liability ($ billions)	11.5	13.6	69.8	78.6	89.0	100.3	114.3	117.9	132.6	149.8	877.3
TPC	Number of Returns (thousands)	8.8	114.6	121.4	140.9	153.1	159.6	167.8	176.2	191.0	199.9	1433.3
	Number of Taxable Returns (thousands)	3.3	52.5	54.1	65.5	71.4	73.7	83.2	90.1	95.9	97.5	687.2
	Estate Tax Liability ($ billions)	12.0	40.5	43.0	48.7	53.5	59.7	65.9	72.7	80.1	86.5	562.5
CBO	Estate Tax Liability ($ billions) (dated January 2011)	12	14	41	48	53	57	61	65	69	73	493.0
Make 2009 Law Permanent (Obama Proposal) [3]												
Model	Number of Returns (thousands)	21.0	22.2	40.1	42.9	47.3	51.4	55.9	55.9	61.2	65.3	463.2
	Number of Taxable Returns (thousands)	8.4	8.9	11.7	12.7	14.0	15.5	17.7	17.1	18.9	21.3	146.1
	Estate Tax Liability ($ billions)	11.2	12.9	26.6	30.5	35.2	40.8	48.1	50.4	58.4	67.9	382.0
TPC	Number of Returns (thousands)	15.5	17.4	18.8	22.6	25.3	27.3	29.5	32.4	38.0	40.4	267.2
	Number of Taxable Returns (thousands)	6.4	7.5	8.0	9.0	10.7	12.0	13.4	14.2	16.6	18.2	116.0
	Estate Tax Liability ($ billions)	19.2	21.8	23.3	24.6	26.8	30.7	33.6	37.5	41.5	45.2	304.3
Make 2009 Law Permanent With Indexation [4]												
Model	Number of Returns (thousands)	21.0	22.2	38.3	40.9	44.9	46.2	49.4	48.6	49.7	51.8	413.0
	Number of Taxable Returns (thousands)	8.4	8.9	11.1	12.0	12.9	14.0	15.9	15.5	17.5	18.9	135.2
	Estate Tax Liability ($ billions)	11.2	13.0	26.4	30.2	34.6	40.0	46.9	49.0	56.6	65.4	373.3
TPC	Number of Returns (thousands)	14.7	16.4	17.2	19.0	20.6	22.5	24.3	25.8	27.5	28.6	216.6
	Number of Taxable Returns (thousands)	6.1	7.0	7.4	8.0	8.5	9.4	10.5	11.0	11.5	12.5	91.9
	Estate Tax Liability ($ billions)	18.9	21.3	22.6	23.5	25.2	28.6	30.8	33.9	37.0	39.6	281.2

(1) Calendar year. Change in estate tax liability from the current law baseline does not include any behavioral response.

(2) Under the Bush tax law, 2011 and 2012 exemption is $5 million, indexed, with a rate of 35 percent. Beginning in 2013, the exemption is $1 million with a top rate of 55 percent, and the

(3) Proposal imposes an exemption of $3.5 million, unindexed, with a top rate of 45 percent. The deduction for state-level wealth transfer taxes paid is extended.

(4) Proposal imposes an exemption of $3.5 million, indexed for inflation from 2009 value with a top rate of 45 percent. The deduction for state-level wealth transfer taxes paid is extended.