U.S. capital gains and estate taxation:

a status report and directions for a reform

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Abstract

Recent changes in estate taxation significantly reduced its reach and revenue, although the tax continues to contribute to progressivity of the overall tax system and is likely to play a role in influencing the long term concentration of wealth. I discuss recent changes, empirical evidence and theory applying to this form of taxation. I then discuss directions for a reform of the tax. The interaction between estate taxation and other components of the tax system is most important in the context of capital gains, with step up in basis partially compensating for high marginal rates while at the same time creating very strong deferral incentives. Modifying this interaction is long overdue and experience from the temporary repeal of the tax in 2010 is helpful in understanding challenges. I discuss options for modifying this interaction, including implications both for estate tax design and for the great majority of taxpayers who are not subject to the estate tax. Eliminating the step-up in basis would allow for increasing the efficiency of the tax system, while the additional revenue could be used to either mitigate the consequences for the affected taxpayers by reducing the estate tax burden or increasing the overall progressivity. I note that any exemption for capital gains at death does retain deferral incentives for individuals with unrealized capital gains smaller than the exemption and suggest that a lifetime exemption would have better incentive properties. I also note that the treatment of spousal transfers under any capital gains at death approach is critical for the revenue implications.

1 Introduction

The U.S. estate taxation has undergone major changes since 2001 when a major volume devoted to economic research on the topic was published (Gale et al., eds, 2001). Much has happened on the research front as well, although there is certainly still room for further rethinking. The objective of this paper is to provide a policy-relevant overview of the current state of research on the topic and directions for a reform.

2 Policy landscape

The estate tax has evolved dramatically over the last 15 years as Figure 1 illustrates. As of 2001, the exemption stood at $675,000 and the top marginal tax rate was 55%, applying to estates over $3,000,000. As the result of changes introduced by the Economic Growth and Recovery Tax Act of 2001, the rate structure and exemption evolved over the next 9 years. By 2009, the exemption increased to $3,500,000 and the top rate declined to 45%. In 2010, the tax was temporarily repealed (as I will describe in a bit more detail below). The estate tax provisions of the 2001 Act were scheduled to "sunset" as of 2011, at which point the tax would have returned to its 2001 structure. Instead, initially the top rate was set at 35% in 2011 and 2012, and the exemption at $5,000,000. Starting with 2013, the top rate stands at 40% and exemption is automatically adjusted for inflation (it is $5,430,000 in 2015).

These changes resulted in a major decline of the number of tax returns filed, as well as in a sizable reduction in revenue. Figure 2 shows the overall number of tax returns filed and the overall number of taxable returns.[1] The decline in the reach of the tax has been dramatic — the number of returns by 2014 is only about 10% of that in 2001. Figure 3 shows the overall gross estate reported on tax returns and net tax liability (in current dollars). Here the decline was less pronounced, although still important. Consistently with rate reductions, the overall revenue declined more than gross estates reported on the tax returns. Finally, Figure 4 shows the number of estates (overall and

[1]Note that, because of data availability, these are year-of-filing numbers; the great majority of tax returns (over 80%) are filed between 9 and 18 months after taxpayer's death, so that tax returns filed in a given year primarily but not exclusively reflect deaths in the prior year.

taxable) with gross value of assets above $10 million (this is the largest group that is consistently taxable over the period that is broken down in the IRS Statistics of Income publications). Except for the 2011 dip that was due to the repeal, the number of returns appears to primarily change with the state of the economy.

The repeal of the tax in 2010 required specifying tax implications of the world without estate taxation. The key consideration here has to do with the step up in basis at death. Appreciated assets that were not sold before death of the taxpayer (and hence contain capital gains not realized before death) have their tax base reset to the date of death value and thus escape capital gains taxation (though they are naturally subject to the estate tax if the estate is taxable). As part of the repeal, the law in effect for 2010 specified an alternative approach to treating capital gains at death. Instead of allowing for step up, the approach was to implement the carryover basis: the basis for capital gains was not stepped up but instead the original basis carried over to the recipient (though with allowance for an increase in basis of $1,300,000 and an additional allowance of $3,000,000 for the spouse). This is the approach that mimics the current gift tax treatment of capital gains and an approach that was previously enacted in 1976 but repealed before it went into effect.

To complicate matters somewhat, this new treatment of capital gains at death in 2010 was made elective: taxpayers could opt into it or they could instead choose to be subject to the estate tax in its 2011 form. Even when all estate consisted of unrealized capital gains, marginal tax rate differences might seem to favor capital gains treatment. Still, some estate tax returns were filed in this new tax regime. Taxpayers that opted for carry-over capital gains tax treatment had to file information Form 8898. Just over 8,000 of such returns were filed (Office of Tax Analysis, 2014). For comparison, there were 7,510 estate tax returns filed for taxpayers with gross estates above $5 million who died in 2009 ($5 million was also the threshold for elective 2010 estate tax treatment) and 9,447 in 2011. While SOI makes year-of-death summary statistics only in some years (the data is available for 2009 and 2011 in particular, but not for 2010), Office of Tax Analysis (2014) reports based on unpublished data made available to them that 2,832 estate tax returns with gross values above $5 million were filed for 2010 decedents, so that there were about 11,000 of forms 8898 and over $5 million estate tax returns combined that were filed. Given the fairly flat stock market

in 2011, it suggests that there were some estates that would otherwise be nontaxable and whose executors selected the carryover treatment (though, perhaps, capital gains in these estates may have already been below the exempt capital gain allowance amount). On the other hand, the fact that some estate tax returns were filed indicates that in some cases the estate tax treatment was beneficial to taxpayers when compared to capital gains tax treatment. Only 352 of these estates had tax liability so, naturally, this preference is likely there only for relatively small estates, tax returns with a lot of deductions and those with relatively high share of capital gains. Finally, Office of Tax Analysis (2014) also reports that there were 4,559 estate tax returns filed for 2010 deaths that fell under the $5,000,000 threshold. While the IRS does not explicitly report tax returns under the filing threshold in its year-of-death summary statistics, it does so in the year-of-filing data — for 2011-2014, the number of such returns was between 1,000 and 1,500 (with a small number of them likely corresponding to deaths before 2010 when the threshold was lower) so that the number of such small filings for 2010 deaths appears unusually large. This is perhaps indicating that some small returns were filed unnecessarily to explicitly opt against carryover capital gains treatment.

The estate tax and gift taxes are naturally related and, since 1977, they have been directly connected through the existence of the unified tax credit that applies jointly to both estate and gift taxes. Changes in 2000s temporarily modified this link. While the unified credit had increased from $675,000 in 2001 to $3.5million between 1999 and 2009, the portion of it that could have been used toward gifts was only lifted to $1 million as of 2002 (in step with the estate tax) and kept at that level for the rest of 2000s. With the reinstatement of the estate tax in 2011, the joint unified credit feature has been brought back, so that again the full lifetime exemption can be used for either gifts or estates.

The rate structure under the gift tax has always been the same as for the estate tax. However, while the estate tax applies to the tax inclusive basis, the gift tax applies in a tax exclusive fashion. Hence, the marginal tax rate of t results in the taxpayer retaining $1-t$ net-of-tax in the case of estate, while the marginal tax rate for gifts as a share of gift-plus-tax basis is $\frac{t}{1+t}$. In particular, it implies that — despite nominal unification — the marginal tax rate on gifts is lower than the marginal tax rate on estates. Furthermore, small gifts are tax exempt — as of 2014, a taxpayer

may give up to $14,000 per donee tax free. On the other hand, the step up preferences for capital gains does not apply in the case of gifts reducing the gift tax treatment advantage for appreciated assets.

It is interesting to note that the gift tax was left in place in 2010 despite removal of the estate tax. While that might seem internally inconsistent, it is not necessarily so both from the short- and the long-run point of view. In the short-run, most of observers and — likely — the policy makers expected the repeal to be temporary so that lack of gift taxation would lead to an erosion of the future tax base. From the longer-term policy-design perspective, the gift tax plays an important role in reducing tax avoidance possibilities not just for the estate tax, but also in the case of the income tax where a transfer of an income-generating asset to another person (e.g., a child) in a lower tax bracket is a potential tax avoidance approach.

The final component of the estate tax system is the Generation Skipping Tax (GST) that applies to transfers that pass a generation and avoid corresponding layer of taxation (e.g. direct transfers to grandchildren). This tax has followed the same modifications as the basic estate tax: first, gradual increases in exemption and reductions of tax rates, then repeal, and — finally — reinstatement.

The estate tax has been in place in the United States since 1916.[2] The basic structure of the current system of estate/gift/GST taxes originated in the 1976 Act that overhauled the whole system. The main component of that reform was unification of the estate and gift tax systems via unified credit. There were other major tax provisions over the years that are of continuing interest and highlight various problems in implementing the effective estate tax regime. The introduction of the GST tax in 1976 was intended to eliminate a particular form tax avoidance where a child could benefit from an asset during lifetime but a grandchild would obtain the ownership at child's death — this strategy was intended to avoid the tax for an intermediate generation. The estate tax treatment of marital transfers had been controversial since the tax was introduced. One of the issues was effectively different treatment of taxpayers in community-property states where assets were split between spouses by default. Another one is a more general point about appropriateness of imposing a tax on individual rather than on household level. This issue was addressed in steps

[2]See Luckey (2008) for a much more comprehensive overview of the history of estate, gift and GST legislations.

over time: first, through an introduction of marital deduction in 1948, then its expansion in 1976, implementation of unlimited deduction in 1981 and finally introduction of portability of the unified credit between spouses in 2011. The 1976 reforms also attempted to address the capital gains exemption via step-up in basis but it was a shortly lived effort: the rule to introduce carryover basis was suspended in 1978 before it went into effect, and then it was repealed outright in 1980.

3 Theoretical landscape[3]

Modeling intergenerational transfers starts with assumptions about individual preferences and economic environment that result in a motive to leave a bequest. In principle, bequests may be intentional or not. Unintentional bequests may arise for a number of reasons: as the result of uncertainty about the lifespan ("accidental bequests"), when individuals have incorrect assessment of their mortality ("denial of death") or when wealth enters preferences directly (e.g., with wealth as a measure of status or proxy for control). Alternatively, an individual may directly value bequests (joy-of-giving) or benefit from consequences of bequests (increased utility of a child in the case of altruism, specific services in the case of exchange). The motivation for bequests matters both for predicted behavioral response to taxation and for its welfare implications. The literature on these topics is vast and has not settled on a single motive. Work on understanding the shape of the wealth distribution and on bequest patterns and behavioral responses to taxation informs it by indicating the need for a mixed motive: precautionary considerations and "accidental" bequests are important, but some form of bequest motivation is necessary to explain the top tail of the distribution. Responsiveness to taxation indicates intentional motives, although altruism is not powerful enough to explain the tail; there is also evidence that control over wealth during life is important. When considering taxation at the very top of the distribution, the key considerations simplify similarly as in the work on the top marginal tax rates (Diamond, 1998; Saez, 2001): with marginal utility converging to zero, behavioral elasticities are important for understanding revenue implications, while welfare consequences of the tax remain important only to the extent that bequests influence

[3]For a much more extensive overview of theoretical literature on estate taxation and additional references see Kopczuk (2013b).

overall welfare through channels other than utility of the wealthy donors or donees (in particular, when they generate externalities, including those of fiscal nature).

Theoretical analysis of desirability of estate taxation used to take as its departure point models of capital taxation. An estate tax is a form of a tax on capital, hence it is convenient to start with models of capital taxation more generally and extend them to consider specific features of the estate tax context: bequest motivations that may generate behavior different than that following from other reasons to save, interactions between parents and children and implications of wealth rather than capital income taxation. While this is an attractive line of thinking, the applicability of the long-standing Chamley-Judd theorem showing optimality of zero capital tax rate in the long run (Judd, 1985; Chamley, 1986) has recently been challenged by Straub and Werning (2015) who showed that it holds only under restrictive conditions. Furthermore, Chamley-Judd result has always been a somewhat unrealistic departure point, because of its unattractive assumptions about feasible instruments (no initial taxation) and, even with these assumptions, lack of robustness due to time inconsistency of the optimal policy. However, despite the unsettled status of capital income tax literature, recent research has illuminated a number of considerations that are relevant for thinking about estate taxation.

Farhi and Werning (2010) focused on implications of externality from giving: bequests benefit parents and children; even when parents internalize the effect on children, the policy maker may put stronger preference on child's welfare recognizing that it benefits altruistic parents as well. This has a natural implication of pushing in the direction of subsidies to bequests and, interestingly, does so in a "progressive" fashion by calling for subsidies to bequests at the bottom of the distribution and the marginal subsidy disappearing at the top. Building on this model, Kopczuk (2013a) additionally incorporates a fiscal externality from bequests: transfers discourage labor supply of children due to income effect (one can also think of it as incorporating the Carnegie-hypothesis effect) with corresponding revenue consequences when children's income is taxed. This extension gives rise to an appealing structure of taxation: subsidies to giving toward the bottom of the distribution (consistent, for example, with policies that encourage parental investment in human capital of their children) and taxes at the top where the motive for subsidy vanishes and only fiscal externality is

of relevance. An interesting aspect of these papers is that the responsiveness of bequests/estates to taxation is not a relevant parameter for designing the estate tax. This may seem counterintuitive since one would naturally expect that the distortionary effect on bequests determines the extent of deadweight loss. However, in these models the role of estate taxation is corrective: it is supposed to address externalities from giving and from fiscal consequences of transfers. As is the case with Pigouvian taxation more generally, the correction depends on the gap between private and socially desirable incentives rather than responsiveness. Excess burden does matter, but it is the marginal excess burden of the overall tax system (the Marginal Cost of Funds or, more technically, Lagrangian multiplier on the budget constraint) rather than that of the estate tax in isolation.

A different direction has been pursued by Piketty and Saez (2013) who explicitly incorporate imperfect correlation of abilities across generations in an infinite horizon model and study long-run optimal income and inheritance taxation. Their main conclusion is that optimal inheritance tax is non-zero in the steady state. The two main limitations of this analysis is the lack of modeling of the policy along the transition path to the steady state (so that it is potentially subject to caveats identified by Straub and Werning, 2015), and analysis of linear taxes only so that the results are not necessarily a guide for policy at the top of the distribution. The paper is also better thought of as modeling the overall lifetime capital income and estate tax rate, rather than the estate tax alone. The results are expressed in terms of behavioral elasticities that incorporate steady-state adjustments and, hence, are hard to relate to feasible empirical estimates: the required behavioral elasticities correspond to moving across long-run equilibria corresponding to different policies and estimating such elasticities is a daunting task.

Three other theoretical points are worth mentioning.

First, behavioral implications of taxation on bequests may influence aggregate capital stock. This point is part of the Chamley-Judd result, but by itself it does not necessarily imply that capital tax is undesirable. Aiyagari (1995) showed that capital tax may in fact be necessary to address dynamic inefficiency that naturally arises due to overaccumulation driven by precautionary saving. Saez (2002) makes an important point that increased rate of return caused by reduced accumulation of the rich due to progressive estate tax should stimulate saving by those unaffected

by the tax. In the special case that he considers, there is in fact no effect of progressive estate taxation on the aggregate capital stock.

Second, understanding the process and implications of wealth accumulation at the top of the distribution is bound to matter. A few recent papers have considered optimal income tax implications of superstar effects and rents; extension to the estate tax is of interest. Implications of the motive for control over wealth and relative status implications of wealth have not been analyzed, but are bound to interact with welfare implications of the tax and its revenue implications.

Finally, any potential externalities from wealth concentration are potentially important. This includes effects that might flow through political system or economic influence. It also includes any value that might be placed on equality of opportunities and would thus go beyond welfarist framework.

4 Empirical evidence

One of natural questions to ask regarding behavioral responses to estate taxation is about its effect on wealth accumulation. This is a question that is hard to compellingly answer empirically. A number of papers in the U.S. attempted to shed a light on it. Kopczuk and Slemrod (2001) relied on repeated cross-section of estate tax returns and variation over time and taxpayers' age at death (which corresponds to different tax regimes in place at any particular stage of life). Holtz-Eakin and Marples (2001) exploited cross-sectional wealth information and variation in state tax rates. Joulfaian (2006) resorted to using estate tax series. While none of these strategies is particularly appealing by the post-"credibility revolution" standards of what constitutes a convincing empirical design, interestingly they produce fairly similar estimates of the elasticity of estate to net-of-tax rate of between 0.1 and 0.2. Similarity of the estimates based on wealth during life and estate at death is also consistent with the responsiveness on the real rather than avoidance margin.

A recent paper by Goupille-Lebret and Infante (2015) uses unusual data from France to estimate responsiveness of wealth accumulation to tax considerations based on a much stronger research design. Life insurance in France is about a quarter of the overall bequest flows. Despite its name, it

need not necessarily have insurance features and instead is used as a vehicle for wealth accumulation (similarly to whole life insurance). Importantly, it is preferentially treated for both income tax and inheritance tax purposes (it is comparable to Roth IRA treatment over the lifetime coupled with preferential treatment at death). Changes over the years reduced the tax advantage (while grandfathering some old policies), and introduced discontinuous treatment of contributions made before turning 70. This context gives rise to age and time discontinuities and allows for identifying accumulation of assets intended for bequest as it accrues over lifetime rather than relying solely on observations at death. While the analysis has important limitations (most importantly, inability to observe other types of assets), it convincingly indicates the presence of important but relatively small response. The estimated magnitude of the tax effect is in line with that obtained from less compellingly identified U.S. studies discussed before.

The United States does not have an annual wealth tax, although there are occasional suggestions for it to be considered and Piketty (2014) has suggested an internationally coordinated wealth tax as a prescription for addressing wealth inequality (see Mintz, 1991; Auerbach, 2008, for an overview of different forms that wealth taxation can take). The evidence on the impact of wealth taxation is scant. An important recent exception is the paper by Seim (2015) who analyzes the response to the Swedish wealth tax and finds strong evidence of tax avoidance using bunching design — remarkable, given that one might think that wealth (stock) is harder to control than income (flow) and given that empirical studies of income responsiveness using bunching design usually yield very small behavioral elasticity. The presence of strong avoidance response in Sweden may reflect poor design of the tax that had trouble targeting a comprehensive measure of wealth. Underreporting of cars (that at the time were not observable to tax authorities) was the main empirically observable source of response and preferential treatment of business assets reflected difficulty in valuing these types of wealth holdings. However, poor design of wealth taxation is likely to be a norm rather than exception. Brown (1991) analyzed practical administrative difficulties in imposing wealth taxation and concluded that they are insurmountable.

Adam et al. (2011) also conclude that experience with attempts to implement wealth taxation has been discouraging in practice. They additionally make an important point that this form of

taxation falls disproportionately on normal return rather than excess return, and hence that it is unappealing on both efficiency and normative grounds. In the simplest context, wealth and capital income taxes may be equivalent: normalizing initial investment to \$1 and denoting the rate of return by r, the wealth tax is imposed on $1+r$, while a capital income tax is imposed on r. Ceteris paribus, a capital income tax at the rate of t would then collect as much revenue as the wealth tax of $t^w = t \cdot \frac{\mathrm{E}[r]}{1+\mathrm{E}[r]}$ where $\mathrm{E}[r]$ is the expected return. Naturally, $t^w \ll t$ because the wealth tax is imposed on a much broader base. This equivalence breaks though when considering different components of the return. One of the strongest argument for taxing wealth or capital income rests on the possibility of rents. Because the marginal increase in rate of return under wealth tax is taxed at a much lower rate than the marginal increase in capital income, wealth tax effectively taxes rents much more lightly than capital income tax does. Conversely, by taxing principal, wealth taxation effectively imposes heavy burden on the normal rate of return. This is most starkly visible in the (close to) zero interest rate world, $r \approx 0$. In that case, the tax-adjusted normal rate of return under the wealth tax is negative, while capital income tax does not have an effect. Hence, the wealth tax imposes burden precisely on the wrong components of the rate of return.[4]

A number of papers studies responsiveness of inter vivos gifts to changes in the gift tax rates. Joulfaian (2014) documents large temporal responses of large taxable gifts associated with changes and (possibly) expectations about future tax rates around 2010. In older work (Joulfaian, 2004), he also provides systematic evidence of responsiveness of aggregate gift flows over much of the 20th century, in particular very strong response in 1976 when unification of gift and estate taxation (and, hence, increased tax cost of making lifetime gifts due to offset of exemption on estate tax return) was announced. Ohlsson (2011) provides evidence of similar kind for Sweden. Time series evidence indicating strong tax sensitivity of large taxable gifts is very compelling.

Page (2003) and Bernheim et al. (2004) use data from the Survey of Consumer Finances (SCF) and show responsiveness of gifts to estate taxation using cross-sectional variation in state tax rates and difference-in-difference design leveraging estate tax exemption increases, respectively. This evidence applies to people with moderate wealth (effectively, those captured by the SCF and not

[4] A capital income tax is also in principle more amenable to exempting normal rate of return altogether.

far from the tax threshold in the 1990s; i.e. net worth in the neighborhood of $1 million). Arrondel and Laferrère (2001) provide similar evidence for France. A number of papers (McGarry, 2000, 2001; Poterba, 2001; Joulfaian and McGarry, 2004) focus on studying whether taxpayers take advantage of an annual gift tax exclusion ($14,000 as of 2015) that allows for tax-free transfers to anyone and is the simplest estate tax planning technique. They conclude that this strategy is underutilized, thereby suggesting that potential estate taxpayers do not act as tax minimizers (that does not mean that these gifts are not extensively used, just that they are not used sufficiently from tax minimization point of view). Joulfaian and McGarry (2004) further find that only about 1/3 of ultimate estate taxpayers make taxable gifts over their lifetime despite apparent significant tax advantage of inter vivos gifts. Part of the explanation here may be different tax treatment of capital gains under gift and estate regimes (carryover basis vs step-up). Joulfaian (2005) analyzes tax incentives while accounting for capital gains treatment, concludes that gifts are usually but not universally tax advantaged, and estimates tax responsiveness of gifts while properly accounting for these considerations. Kopczuk (2007) shows that large estates strongly decline following the onset of a terminal illness, with avoidance being the most plausible channel.

Overall, the empirical evidence suggests that bequests and gifts respond to taxation, with large gifts in particular exhibiting very strong temporal responsiveness around tax changes. At the same time, tax minimization does not appear to be the right approach to modeling taxpayer responsiveness both because lifetime gifts are too small to be consistent with it and because large responses shortly before death indicate insufficient planning before. The importance of retaining control over assets is a leading explanation allowing to reconcile these patterns (Schmalbeck, 2001; Kopczuk, 2007).

The responsiveness of gifts indicates some tax planning, but the overall extent of tax avoidance is harder to evaluate. One approach is to compare the actual estate tax liability to expected tax liability using cross-sectional survey-based information about wealth distribution and assumptions about mortality rates. Unfortunately, estimates using this approach are very sensitive to assumptions and the literature has not reached clear conclusions (Wolff, 1996; Poterba, 2000b; Eller et al., 2001). Audit based studies (Eller and Johnson, 1999; Erard, 1999; Eller et al., 2001) estimate the

extent of non-compliance at between 8 and 13 percent but, naturally, these estimates only reflect what is discovered during tax audits — either tax evasion or unsuccessful tax avoidance — and cannot be interpreted as the overall estimate of tax avoidance activity. An example of successful form of tax avoidance is the use of marketability and minority discounts (Johnson et al., 2001; Poterba and Weisbenner, 2003).

The direct evidence of implications of step up in basis is limited. Poterba (2001) provides evidence that the presence of unrealized capital gains discourage inter vivos gifts, because it would amount to foregoing the step-up benefit from which doesn't apply to gifts. On the other hand, Auten and Joulfaian (2001) show that in the presence of step up, higher estate tax weakens the lock-in effect by leading to earlier capital gains realizations. Poterba and Weisbenner (2001) estimate the effect of replacing the estate tax by constructive realization of capital gains and highlight distributional consequences of such a switch.

As discussed in the brief overview of theory above, the effect of bequests on labor supply or income of recipients is one of the key determinants of desirability of estate taxation (Kopczuk, 2013a). The early work on this topic framed the question as "Carnegie hypothesis" (Holtz-Eakin et al., 1993; Joulfaian and Wilhelm, 1994) and showed negative effect of inheritances on labor force participation using linked income and estate tax data and PSID. Brown et al. (2010) confirm this finding using older Health and Retirement Study (HRS) sample. They study the effect on retirement while further controlling for bequest expectations, so that the response is identified off the unexpected component of bequest. Using Swedish data Elinder et al. (2011) show that overall labor income declines following receipt of inheritance. Evidence from other shocks to wealth (Imbens et al., 2001; Kuhn et al., 2011; Poterba, 2000a) is somewhat mixed though on balance also supportive of the presence of labor supply response.

Evidence suggests that there is negative effect of inheritances on labor supply overall, but the effect on a particular class of donees — (actual or potential) entrepreneurs received separate attention. Holtz-Eakin et al. (1994a,b) find support for the hypothesis that inheritances matter for survival of small businesses, Brunetti (2006) finds suggestive evidence (using probate records and relying on repeal of inheritance tax in California for identification) that the estate tax increases

the likelihood of selling small businesses and Tsoutsoura (2011) finds that repeal of inheritance tax in Greece led to increased investment in transferred firms. All these papers therefore indicate potential importance of liquidity and financing constraints in inherited businesses. At the same time, a different strand of the literature (Pérez-González, 2006; Villalonga and Amit, 2006; Bloom and Van Reenen, 2007) finds that inheritance of control within family appears to be associated with reduced performance, so that the overall welfare implications of taxing transfers of business assets are mixed.

Finally, work of Piketty (2011, 2014) has recently revisited the question of the role of inheritances in overall wealth accumulation and wealth concentration in particular. Older literature (Kotlikoff and Summers, 1981; Modigliani, 1988) focused on the question of the aggregate contribution of bequests to wealth accumulation. See Davies and Shorrocks (2000) for a review, with the bottom-line conclusion that bequests are responsible for roughly a half of the stock of wealth, although recent work of Piketty (2014) suggests important heterogeneity both over time and across countries. Cagetti and De Nardi (2008) review work on modeling wealth distribution and conclude that explaining the upper tail requires an introduction of some form of a bequest motive (see also Gale and Scholz, 1994; Dynan et al., 2004, 2002; De Nardi, 2004). Two recent papers (Boserup et al., 2016; Elinder et al., 2015) explore administrative data from Denmark and Sweden that allows for linking wealth holdings across generations to trace direct implications of inheritances for determining the shape of wealth distribution and the extent of inequality.

5 Best practices and reform

The empirical evidence provides support for the notion that estate and gift taxation leads to behavioral responses, although it is certainly not precise enough to definitively pin down its magnitude. It also points to the importance of tax avoidance, although it does not necessarily indicate that tax avoidance is the main source of responsiveness on the margin. Recent theoretical work opens up the possibility that some form of inheritance taxation may be a part of the optimal tax system and it does so in a way that is broadly consistent with the current structure of taxation: a tax that

applies at the top of the distribution and potential arguments for preferences/subsidies elsewhere. In my view, the most convincing normative arguments for taxation of high estates have to do with their potential externalities — either reflecting fiscal effect due to reduced labor supply of recipients (with reasonable empirical support), or due to reduced equality of opportunities or potential externalities from wealth concentration (with speculative and anecdotal empirical support, in need of further work). There is also work that suggests the role of inheritance taxation as a redistributive instrument (Piketty and Saez, 2013) but it is based on linear taxation and steady-state comparative statics, so that it is difficult to relate to the actual structure of the tax system.

Overall, the general question of whether a limited estate tax of the kind currently in place in the United States should be a part of the tax system deserves the firm answer of "it depends" — it depends on the weight that one puts on labor supply impact on recipients (with a tax applying only at the very top, such effects are not likely to be too important quantitatively even if they justify positive taxation) and the presence of externalities from wealth concentration on which evidence is scant and reasonable people might disagree. A more practical consideration are revenue consequences of any modification in rate structure and past experience suggests that they are important enough to make it difficult to eliminate this instrument even by positively predisposed majority. It is also worth noting that in the past estate taxation has been introduced or expanded during times when major resource mobilization was necessary, war financing in particular (Scheve and Stasavage, 2012), so that there is an option value of having administration in place to use this form of taxation if necessary.

In what follows, I am going to focus on the design of the tax and its interaction with other components of the tax system.

Capital gains. As the 2010 experience demonstrated, a repeal of the tax is likely to be associated with a modification of treatment of capital gains at death both to address reduce revenue consequences and because it is difficult to simultaneously justify retaining taxation of realized capital gains during life and the lack of any tax liability if unrealized until death. Importantly though, it is difficult to find a rational argument for step up in the first place whether the estate tax is in

place or not. The presence of step up creates a strong incentive not to realize capital gains. While any realization-based tax has incentives for deferral built into it by design, the ability to avoid the tax by holding assets until death creates particularly strong incentive for an obvious tax avoidance strategy and generates distortions due to lock-in or due to any costly attempts to tap into assets without triggering realization. It also introduces inequity between life-cycle and bequest-motivated savers.

Constructive realization (taxing unrealized capital gains at death) is a natural approach to modify the current treatment of capital gains. This approach is in place in Canada (referred to there as "deemed disposition") and it was proposed by President Obama in the 2015 State of the Union address. It arguably imposes lower compliance costs than the carry-over basis which has been attempted in the U.S. in 1976 and 2010, because it limits record-keeping to the lifetime of a taxpayer. It also effectively "unlocks" the gain, while the carry-over basis perpetuates lock-in of gains past death of the taxpayer. Because deferral advantage grows with the expected holding period, introducing certain realization event at death of a taxpayer would encourage lifetime realizations. A comprehensive application of this approach to any transfers either through gifts or at death would lead to overall simplification of the tax system, increased efficiency due to reduction in lock-in, and interestingly (given fiscal pressure) acceleration of tax revenue.

Introducing carry-over approach at death would still be a significant improvement over the current system by eliminating the strong advantage of holding assets until death, although — naturally — it retains the standard lock-in incentive. The main advantage of carryover treatment over constructive realization regime has to do with liquidity constraints. This is usually not a concern with regular capital gains that are the result of arm's length transactions. It is a potential consideration though when transfer takes place without sale of the underlying asset (and, in particular, when there are plausible distortions that might be associated with sale — for example, due to thinness of the market or disruptions to a business). As discussed in the empirical section, there is empirical evidence both to support the notion that these effects are sometimes important and against treating preserving continuity of family ownership as a desirable policy objective. Nevertheless, one can certainly imagine a system of constructive realization with similar preference for transfers of

business assets as those existing under the estate tax (discounting value to reflect marketability or minority ownership, evaluating the value of a business at current rather than best use, paying tax in installments). One could also envision having a constructive realization system in general, but applying carryover basis for particular categories of assets where liquidity constraints are important. Another possibility would be to assess the tax at death and delay payment until the asset is sold.

The step up applies to all assets and not just to those that are subject to the estate tax. As the result, modification of tax treatment of capital gains at death has consequences for individuals across the distribution. For that reason, the 2010 repeal provided for allowance of $1,300,000 to increase basis in transferred assets (effectively, exempt part of the unrealized capital gain from taxation). Under the proposal outlined in the 2015 State of the Union, the exemption would be much lower at $100,000. Naturally, the 2010 approach effectively exempted great majority of estates from worrying about capital gains consequences, but at the same time it also retained the step-up advantage and hence incentives for deferral. While it seems like a logical continuation of a system in which small estates are not taxed, it is a puzzling approach from the point of view of thinking about the income tax. Certainly, small capital gains are not exempt if realized during the lifetime so why should they be exempt at death? Alternatively, if there is a reason to exempt them, why not extend that treatment to capital gains realized during the lifetime?

For example, imagine converting the $1,300,000 exemption at death to an "equivalent" annual exemption, say of $8,000 for concreteness.[5] A taxpayer could be offered an annual allowance in that amount to adjust basis, effectively exempting the first $8,000 of capital gains with the present value of the preference equivalent to exemption at death. Better yet, taxpayers could be allowed to either accumulate the unused allowances or be given lifetime allowance to be used as they wish. Alternatively, one could also consider income-related limits. The advantage of a system like this would be eliminating the deferral advantage by not introducing a point when capital gains are

[5]Consider annual exemption of E, lifespan of 60 (adult) years and rate of return $r = 0.03$. Annuitized exemption E in text is obtained to equate discounted value at the time of death to $1,300,000: $1300000 = \sum_{t=0}^{60}(1+r)^t E = E\frac{(1+r)^{60}-1}{r} = E\frac{1.03^{60}-1}{0.03}$ implying $E = \$7972.85$

forgiven. I do not see a good reason for having a generous capital gains exemption in the first place (which would be on top of already existing preferential tax treatment of capital gains relative to other forms of capital income). Should one decide to have such an exemption though, there is little economic case for having the exemption granted at death rather than designing it in a way that would be (closer to) neutral with regard to timing of realization.

A modification of the capital gains tax treatment at death has budgetary repercussions. In order to evaluate these consequences, I implement a revenue estimation procedure. My objective here is not to have a fully definitive statement about the revenue implications, but rather to have a realistic starting point that highlights the important (in terms of revenue consequences) trade-offs and issues. In particular, this is a static estimation procedure that does not incorporate any behavioral responses.

I rely on the 2013 Survey of Consumer Finances to obtain the data on the distribution of assets, debt and unrealized capital gains of households. Following Poterba and Weisbenner (2001), I apply mortality rates (adjusted for to reflect lower mortality of the wealthy household) to heads of households to obtain the distribution of decedents. The two difficult steps in comparison of the SCF to the actual estate tax data have to do with (1) comparing *household* information in the SCF with *individual* tax returns in the estate tax data and (2) accounting for the difference in assets during life and those that are observed on tax returns at death. I focus on taxable estate tax returns only and assume the use of marital deduction by married estate taxpayers by wealth category that matches that observed in aggregate estate tax statistics. I also apply an ad hoc 25% discount to assets observed in the SCF in order to incorporate the evidence of estate tax planning and avoidance discussed before. Complete details of this procedure are in the Appendix.

Table 1 compares the 2013 estate tax data and the outcome of the calibration procedure based on the SCF. The calibration matches the number of taxpayers and generates gross estate, net estate and tax revenue that are within 10% of the actual values. It is imperfect in terms of the distribution of taxpayers — it results in too many estate taxpayers with estates above $50 million, primarily reflecting the uncertain assumptions about the use of marital deduction. Since all the following counterfactual analysis relies on the same SCF data and the same baseline assumptions, I use the

SCF estimate of the $16.8 billions of revenue as my baseline.

The SCF contains information about capital gains at death. Evaluating tax treatment of those gains requires taking a stand on the treatment of marital couples: should capital gains transferred to a surviving spouse be subject to a tax or preferentially treated? I assume as my baseline that the treatment of capital gains at death is going to mimic the current estate tax treatment with unlimited spousal deduction and a portable exemption. As the result, I assume that the only taxable individuals are going to be the same categories that could be subject to the tax under the estate tax treatment: single individuals and married heads of households in the high net worth categories who choose not to utilize the full marital deduction. This procedure results (Table 2) in just over 800 thousand (potentially) taxable individuals who hold approximately $106 billion of unrealized capital gains, $59 billion of which are non-housing related. Naturally, these gains are highly skewed: the 4,300 individuals in the estate tax paying categories account for 45% of all unrealized gains and 75% of non-housing gains. I assume that primary residence capital gains retain their current exemption of $500,000 and apply the current maximum capital gains tax rate of 23.8% to everyone.

This approach results in almost $15 billion of revenue — $2 billion less than collected using the estate tax. Naturally, the burden of this tax is spread out over the full distribution; in particular $4 billion is paid by individuals who would otherwise not be subject to the estate tax. The natural approach discussed before is to introduce an exemption. The following three columns show the revenue consequences of exemptions of $500,000, $1 million and $2 million: higher exemption has small revenue impact for the over $10 million group but it dramatically reduces the revenue from lower categories. A $1 million exemption "loses" $4 billion of revenue, $3.3 of which is accounted for by non-estate taxpayers.

Recent analysis of Office of Tax Analysis (2014) and that of Gordon et al. (2015) concluded based on the 8939 filings for 2010 taxpayers that capital gains constituted about 40% of estates of the form 8939 filers. In my calculations, the unrealized capital gains tax share in 2013 SCF for the population that gives rise to taxable estates is 37% of their net worth and 48% of gross estates after allowing for 25% tax avoidance reduction. These numbers are not inconsistent, but there

are still many possible reasons for the difference between form 8939 filings and the SCF, including different definition of the sample (the 8939 data includes non-taxable taxpayers, in particular married ones who would otherwise claim marital deduction) and non-representativeness of the SCF. To rudimentarily evaluate consequences of a higher capital gains share in overall assets, I inflate all capital gains by 20%. The results are shown in the first two columns of Table 3. This scenario yields additional $3 billion of revenue when no exemption is allowed and $2.4 billion revenue when exemption is $1 million.

The additional revenue from eliminating the step up can be used to finance estate tax reduction. The third and fourth columns of Table 3 show the implications of increasing the estate tax threshold to $10 million or reducing the estate tax rate from 40% to 30%. Both of these scenarios lead to a loss of $4.8 and $4.2 billion respectively — still significantly less than the revenue collected from taxing step up in basis at death under any of the exemption scenarios considered in Table 2. In particular, an increase in the estate tax threshold to $10 million coupled with eliminating step-up in basis with a generous exemption (say of $2 million) would effectively shift the burden of the tax toward very high net worth individuals while benefiting individuals with currently taxable estates below $20 million. This suggests that there is room here for reforms that would eliminate the inefficiency of step-up, would not lose revenue, and could benefit smaller taxable estates at the expense of the large ones.

As an aside, to the extent that the estate tax remains and step up is eliminated, one might worry that it effectively increases tax burden of estate taxpayers. The solution that has been sometimes proposed is to provide credit for capital gains tax against estate tax liability. This is of course an approach with distributional consequences but it also has incentive effects. In particular, a credit for capital gains tax liability at death would retain the deferral realization incentive unless it is also available for capital gains taxes paid before death. As before, introducing capital gains exemption (to the extent that one wants to have one in the first place) that is not conditional on death — perhaps a lifetime one — is a preferred approach.

All this discussion of capital gains treatment assumed that the new capital gains tax regime would continue to preserve spousal preference. The tax expenditures calculations of the cost of

the step up in Office of Tax Analysis (2014) evaluate the revenue loss against the baseline of all capital gains being taxed at death and hence arrives at a much larger estimate than the $14.8 billion obtained from taxing capital gains with no exemption shown in column 4 of Table 2. In Table 3, I consider a somewhat different scenario where all capital gains held by heads of households are taxed at the time of their death. This scenario assumes no spousal preference and it also assumes that all capital gains are held by the head of household — while it is a strong assumption for married individuals, it allows me to abstract from the thorny issue of allocating ownership of assets to spouses. This approach makes a big difference: now the tax expenditure (imposing the tax with no exemption) is $36.4 billion — much larger than the previous estimate of $14.8 billion, reflecting the fact that most of the capital gains are held by married households. Correspondingly, the revenue losses from allowing for exemption are much larger too. I view these calculations primarily as an illustration of the importance of the spousal treatment — I expect that any reform of the step-up would allow for generous preference for spousal transfers so that the results in Table 2 are a much more realistic scenario to consider.

Concluding, it seems that the elimination of the step-up at death is not sufficient to replace the revenue from the estate tax unless one is willing to part (at least partially) with spousal preference. Still, the tax on capital gains at death would allow for a significant reduction in estate tax burden if this is what the extra revenue is earmarked for.

The role of estate taxation. This long discussion of capital gains taxation touched on the interaction between capital gains and estate tax. This interaction is an artifact of a problem with implementing capital gains taxes (they are based on realization rather than accrual). Capital gains taxation is a part of the system of taxing capital income. Estate tax is a tax on transfers. These two issues are conceptually separate — the design of the income tax and the appropriate burden on capital income within that system should govern decisions about capital gains taxation.

The estate tax, especially the type of tax that is in existence in the United States, serves a different objective. What is that objective? As discussed before, the case for taxing estates arises at the top of the distribution (there actually may be reasons to subsidize rather than tax transfers

at lower wealth levels) and has to do with addressing externalities through effects on behavior of the next generation, any aggregate implications of the concentration of wealth and its impact on equality of opportunities. From that point of view, the current estate tax is in a good place. It applies to a very small number of individuals with large net worth. When the exemption is at the current $5+ million level (and, with proper planning through the use of marital deduction and nontaxable gifts estates needn't be taxable way above that level), many of the considerations that were important in the past lost their bite. In particular, issues of small businesses being subject to taxation, liquidity constraints etc. are no longer an appealing argument when just about 5,000 of 2 million decedents are subject to the tax. Portability of marital deduction addressed the remaining concern about treatment of spouses. While reasonable people might disagree about the appropriate tax rate and exemption, economic evidence leaves enough room to accommodate a range of views. For the estate tax as such, the standard advice of simplification and base broadening (via addressing existing avoidance opportunities and curtailing some of the abusive valuation strategies) perhaps coupled with compensating rate reduction is prudent.

One of the arguments that has been used to justify the presence of estate taxation since its onset was its role as a backstop to avoidance of other forms of taxation. The discussion of interaction with capital gains tax suggests that this is the role that the estate tax plays in that case, although it is the self-inflicted damage resulting from granting step-up benefits. More generally though, in the world where income is hard to observe or where people do not realize their income, a tax on wealth or estates may serve as a substitute for income tax. This is not an unreasonable view of the US in the past. When much of wealth is held in a corporate form, with earnings retained rather than paid out as dividends or realized as capital gains (for example, because a closely held firm is retained until death of the taxpayer), individual income tax is effectively avoided for extended periods of time. Before 1986, when individual income tax rates were high, the incentives to realize income were weak. This pre-1986 incentive not to realize is visible in the influential Piketty and Saez (2003) series of top income shares that shows 4.1 percentage point increase (from the base of 9.1%) in the share of income going to the top 1% between 1986 and 1988 when the relative incentives for corporate vs pass-through treatment changed and motivated conversions from C- to

S-corporations (Gordon and Slemrod, 2000). My recent work using data from Norway (Alstadsæter et al., 2015) that allows to allocate business profits to shareholders as they accrue rather than when they are realized, documents that a tax reform that resulted in heavier taxation of capital gains and dividends led to an increase in retention of earnings within firms and massive decrease in visibility of income on individual income tax returns: top income shares are understated by 50% as the result (in contrast, accounting for accrual of business profits made little difference when taxation of dividends was light). While international tax avoidance issues remain important, it seems likely that as the result of a general shift toward pass-through entities, the US has gotten much better in taxing income after 1986 so that the backstop to avoidance role of estate taxation is no longer a first order argument.

Gift tax. Taxation of inter vivos gifts is necessary to support an effective system of estate taxation. Integration of gift and estate taxation via unified credit is imperfect though and leaves much room for tax planning. First, gift tax rates are effectively lower than estate rates due to the difference in tax exclusive vs tax inclusive base. The lower rate was apparently an intentional decision of the Congress at the time the gift tax was introduced in 1932 that was intended to stimulate pre-payment of tax liability by making gifts rather than bequests. Be as it may, this is not an appealing argument for this disparity. There is no clear reason why the tax should distort the decision whether to give inter vivos or at death, and there are good reason not to distort since it creates opportunities for tax planning. Furthermore, the unified credit itself encourages gifts because the value of past transfers is not adjusted to reflect inflation or the return on them so that giving an asset before it appreciates uses up smaller part of the credit. Accumulating transfers to reflect their present value using some assumed safe rate of return (e.g., on 10-year Treasuries) would reduce the magnitude of this distortion. In the discussion of capital gains above, it was noted that the current treatment of capital gains under gift and estate tax is different. Harmonizing this treatment would eliminate yet another margin of distortions (and it is pretty intuitive that granting step-up to inter vivos gifts is not an appealing approach so that harmonizing would need to go in the direction of some form of taxing capital gains at death).

Integration with income tax As mentioned before, Canada taxes capital gains at death and it does so by including them in the income tax base for the terminal return. The short-lived income-inheritance tax introduced in the U.S. in 1894 (and later deemed unconstitutional) included inheritance in the income tax base. Some countries include gifts in the income tax base. One can tax estates or inheritance separately or one can integrate this form of taxation with income tax (see Batchelder, 2009, for a discussion). The appealing feature of such an approach is that, if integration takes place on the donee side, it allows for employing the progressive income tax structure to adjust tax liability according to the ultimate recipient's circumstances. This would be a dramatic change from the current system but it is a coherent alternative possibility.

6 Conclusions

After years of changes, the estate tax is nowadays very different then it was 15 years ago. It applies to 1/10th of the population that it used to, although the decline in revenue has been somewhat less dramatic. The increase in exemption and the fact that it is now indexed for inflation, makes many of the concerns that were raised in the past much less relevant. For example, when a couple with just basic planning involving using available exemption and portable marital deduction can shelter $10 million from taxation, few small illiquid businesses are likely to be affected. Some of the preferences in the estate tax have been designed for a different population and could be reformed to broaden the base and possibly finance lower rates. Seen in isolation, this tax collects revenue in a way that does not appear grossly inefficient and plays, arguably useful, role of targeting wealth concentration. Its most glaring inefficiencies have to do with its interactions with other components of the tax system: capital gains most importantly but also to some extent with gift taxation. Elimination of step-up in basis at death should be high on policy agenda and preferred approach to replacing it is constructive realization rather than usually proposed carryover basis. There is no clear justification for exempting any capital gains at death and to the extent that this approach is pursued, it would again result in similar distortions as step up. The preferred approach to exempting some capital gains, if one needs to do that for distributional reasons, would be to introduce lifetime exemption.

Such an approach could be implemented in a similar way in which the unified credit integrates exemptions for gift and estate tax purposes.

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Procedure for constructing revenue estimates

In order to assess revenue consequences of taxing capital gains at death, I pursue a simple calibration exercise that relies on the 2013 Survey of Consumer Finances (SCF). The SCF collects information about wealth, income and demographic characteristics of a representative sample of the U.S. population, while oversampling the high income and net worth individuals, thereby making it the default choice for evaluating policies that apply to the top of the distribution. See Bricker et al. (2014) for a description of the dataset. Critically importantly for my purposes, the SCF includes questions about the unrealized capital gains. My starting point is to calibrate the SCF to the estate tax collections. This is not straightforward because (1) the SCF collects information about living individuals, while the estate tax applies to individuals who have died; (2) the unit of observation in the SCF is a household and the unit of observation in the estate tax data is an individual; (3) wealth reported in a survey need not be equal to assets reported on tax returns for a number of reasons, including inter-vivos giving, tax avoidance, different valuation approaches etc.; (4) the SCF explicitly excludes the Forbes 400 individuals (tiny number of deaths but large wealth); and (5) the most recent available estate tax statistics pertain to the 2014 year-of-filing data, which reflects not just 2013 tax returns but also returns from other years. Hence, one should not expect a perfect match between the two.

In order to compare to estate tax returns, I rely on the SOI 2014 year of filing tabulations (`https://www.irs.gov/pub/irs-soi/14es01fy.xls`, downloaded on 11/2/2015).

Following Poterba and Weisbenner (2001), I construct at-death distribution of wealth by applying mortality rates to the SCF sample. This is by itself not a trivial step, because the mortality rate of the wealthy is known to be higher than that of the general public. Hence, I proceed by applying different mortality rates to general public than to higher net worth individuals. Specifically, I apply 2013 (age and gender-specific) population mortality rates to everyone with net worth up to $1,000,000 and — lower — high-socioeconomic status rates to those above that level. The population mortality rates originate from the National Center for Health Statistics' Mortality Detail File, and I use the version disseminated by the Human Mortality Database

(http://www.mortality.org; The United States of America, Death rates (period 1x1), modified on 21-Jul-2015). For the high net worth group, I rely on the Society of Actuaries annuitant mortality tables, RP-2014. Society of Actuaries (2014b) provides the background and a detailed description of this data. These mortality tables are based on the mortality experience of private retirement plans in the United States from 2004 and 2008, with estimated mortality improvement factors provided to adjust the baseline-year rates (2006) to the following years. I use the headcount-weighted (rather than amount-weighted) mortality rates in my analysis (Society of Actuaries, 2014a). Annuitants are a diverse population and the age- and gender-specific mortality rates are available for a number of subgroups (everyone, white and blue collar workers, top and bottom quartiles of earnings distribution). I use white-collar worker specific mortality rates (the lowest mortality group) and blend the mortality series for "employees" (available up to age of 80) and "healthy annuitants" (available above age of 50) by using the employees series for younger individuals, weighted average of the two series between 65 and 80 (with weight linearly increasing from 0 to 1 over this age range) and the annuitant series for the older individuals. These socio-economic mortality adjustments are non-trivial but they are necessary to better approximate the mortality experience of the high net worth population. For example, the estimated number of 2013 head-of-household deaths with net worth above $1 million is about 205 thousand using population mortality rates and just 117 thousand using adjusted mortality rates.

The SCF reports household wealth, while the estate tax data is individual. There is no sufficient information in the SCF to directly evaluate how assets would be allocated among spouses for estate tax purposes. The precise marital status information of estate taxpayers is not available for 2014. However, the estate tax currently provides for the unlimited marital deduction and a portable exemption so that, for married individuals, use of marital deduction is close to universal. Out of 11,931 estate tax returns filed in 2014, 6773 were non-taxable and 5175 claimed marital deduction. Among 5198 taxable returns, just 726 claimed marital deduction. Hence, for the most part taxable estate tax returns correspond to single (widowed or divorced) filers with a relative small number corresponding to married individuals. I proceed by assuming that only death of a head of household could result in a taxable estate. A single individual is a head of household and if estate is sufficiently

large, it is taxable. For married individuals, I specify the likelihood of the estate being taxable as the sum of the probability of the other spouse also dying in the same year plus the conditional (on wealth) probability of the married-individual's estate being taxable if the spouse does not die. I obtain the conditional probability of the married-individual's estate being taxable by calculating the share of taxable tax returns among those claiming spousal deduction in available wealth categories. This yields 5.6% probability in the \$5-10 million category, 17.6% in the \$10-20 million category, 33.5% in the \$20-50 category and 48.1% in the \$50+ million category.

There is no hard information on the extent of mismatch of the levels of wealth observed in estate tax and the SCF data. I discuss the evidence of tax avoidance in Section 4. Furthermore, the SCF data pertains to 2013 while the estate tax data corresponds to returns filed in 2014 — since majority of returns (80%) is filed between 9 and 18 months after death of the taxpayer, most of the returns are for 2013 deaths but non-trivial minority is for 2014 deaths or for prior years. Without precise number to calibrate tax avoidance and timing mismatch to, I simply implement an ad hoc adjustment by reducing the value of SCF assets reported for estate tax purposes by 25%. This adjustments allows for (approximately) matching the number of estate taxpayers and aggregate gross estate figures.

Finally, to compare tax collections, I compute the share of deductions (other than debt or marital deduction) by gross estate size category from estate tax statistics and apply it to different categories in the estate tax data. I pursue a corresponding adjustment for marital deduction computed specifically for estate tax returns claiming marital deduction. Debt is observable in the SCF so that I subtract it directly.

In all tables, categories are defined in terms of assets rather than net worth (the difference is debt) to match the gross estate concept in the estate tax return data.

Table 1: Estates tax aggregates and revenue — comparison of IRS data and SCF calibration

Asset category	Estate tax (IRS)				Estate tax (SCF)			
	Number of returns	Gross estates	Estates after deductions	Tax liability	Number of returns	Gross estates	Estates after deductions	Tax liability
$5-10m	2,429	$17.290B	$15.452B	$2.021B	2,095	$13.932B	$12.875B	$0.749B
$10-20m	1.132	$15.500B	$12.554B	$3.261B	1,092	$14.122B	$12.031B	$2.519B
$20-50m	578	$17.295B	$11.902B	$4.022B	624	$16.545B	$12.279B	$3.600B
$50m+	223	$37.510B	$17.827B	$6.675B	526	$49.183B	$27.644B	$9.953B
Total	4,362	$87.597B	$57.735B	$15.981B	4,338	$93.783B	$64.830B	$16.823B

Notes: See the appendix for description of methodology. Comparison of the IRS estate tax information (based on taxable returns only) and the calibrated SCF data. All figures in billions of dollars.

Table 2: Taxation of capital gains at death — allowing for spousal preference

Asset category	Number of deaths	Total capital gains	Non-housing gains	Revenue no exemption	Revenue $500K exemption	Revenue $1 million exemption	Revenue $2 million exemption
$<1m	790,978	$48.509B	$7.861B	$2.007B	$0.017B	$0.000B	$0.000B
$1-5m	19,063	$10.763B	$7.751B	$2.028B	$1.099B	$0.698B	$0.394B
$5-10m	2,360	$4.284B	$3.366B	$0.858B	$0.613B	$0.506B	$0.332B
$10-20m	1,092	$6.470B	$5.745B	$1.464B	$1.347B	$1.232B	$1.020B
$20-50m	627	$10.388B	$9.783B	$2.437B	$2.371B	$2.299B	$2.157B
$50m+	526	$25.240B	$24.848B	$5.996B	$5.952B	$5.890B	$5.769B
Total	814,645	$105.657B	$59.357B	$14.793B	$11.400B	$10.628B	$9.674B

Notes: See the appendix for a description of methodology. The estimation procedure assumes the possibility of tax free capital gains transfers to a surviving spouse utilized at the same proportion and by the same groups as is the case with the estate tax. All figures in billions of dollars.

Table 3: Modified assumptions about capital gains and estate tax rate structure

Asset category	Capital gains ↑ 20%		Estate tax	
	No exemption	$1M exemption	Threshold at $10M	Rate to 30%
$<1m	$2.550B	$0.000B	$0.000B	$0.000B
$1-5m	$2.491B	$0.989B	$0.000B	$0.000B
$5-10m	$1.047B	$0.654B	$0.000B	$0.562B
$10-20m	$1.769B	$1.536B	$0.644B	$1.889B
$20-50m	$2.931B	$2.794B	$2.414B	$2.700B
$50m+	$7.199B	$7.096B	$8.954B	$7.464B
Total	$17.990B	$13.071B	$12.013B	$12.617B

Notes: See the appendix for a description of methodology. The two capital gains scenarios assume an increase in capital gains by 20%. The estate tax scenarios assume a change in the threshold to $10 million or a decline in rate to 30%. All figures in billions of dollars.

Table 4: Taxation of capital gains at death — disallowing spousal preference

Asset category	Number of deaths	Total capital gains	Non-housing gains	Revenue no exemption	Revenue $500K exemption	Revenue $1 million exemption	Revenue $2 million exemption
$<1m	1,461,069	$103.316B	$20.674B	$5.090B	$0.084B	$0.000B	$0.000B
$1-5m	74,607	$43.679B	$27.685B	$7.641B	$3.554B	$1.969B	$0.783B
$5-10m	10,908	$27.071B	$22.613B	$5.737B	$4.595B	$3.731B	$2.373B
$10-20m	4,048	$20.692B	$17.580B	$4.646B	$4.223B	$3.809B	$3.046B
$20-50m	1,327	$20.574B	$19.247B	$4.821B	$4.687B	$4.534B	$4.234B
$50m+	862	$35.551B	$34.958B	$8.443B	$8.377B	$8.277B	$8.080B
Total	1,552,821	$250.887B	$142.759B	$36.380B	$25.523B	$22.323B	$18.517B

Notes: See the appendix for a description of methodology. The estimation procedure assumes no tax preference for a surviving spouse. All figures in billions of dollars.

Figure 1: Top tax rate and exemption

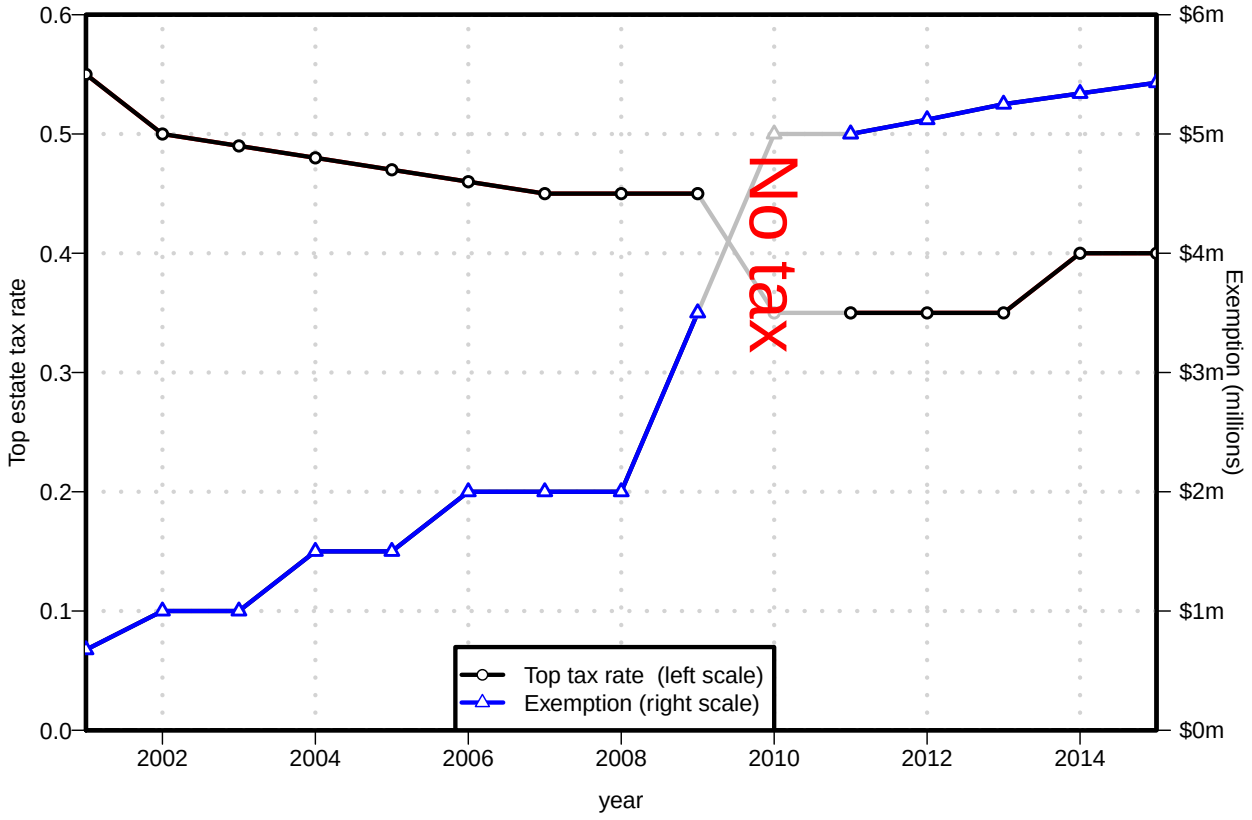

Figure 2: Number of tax returns

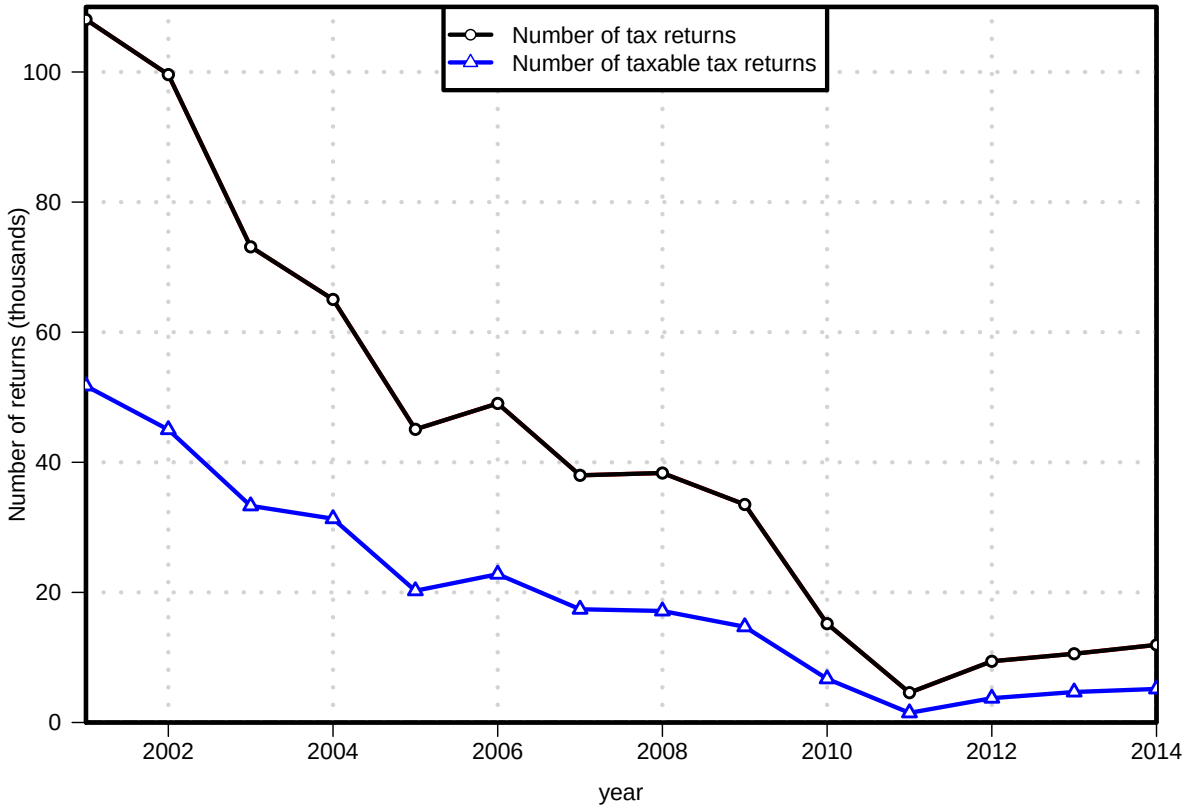

Figure 3: Total gross estate and revenue

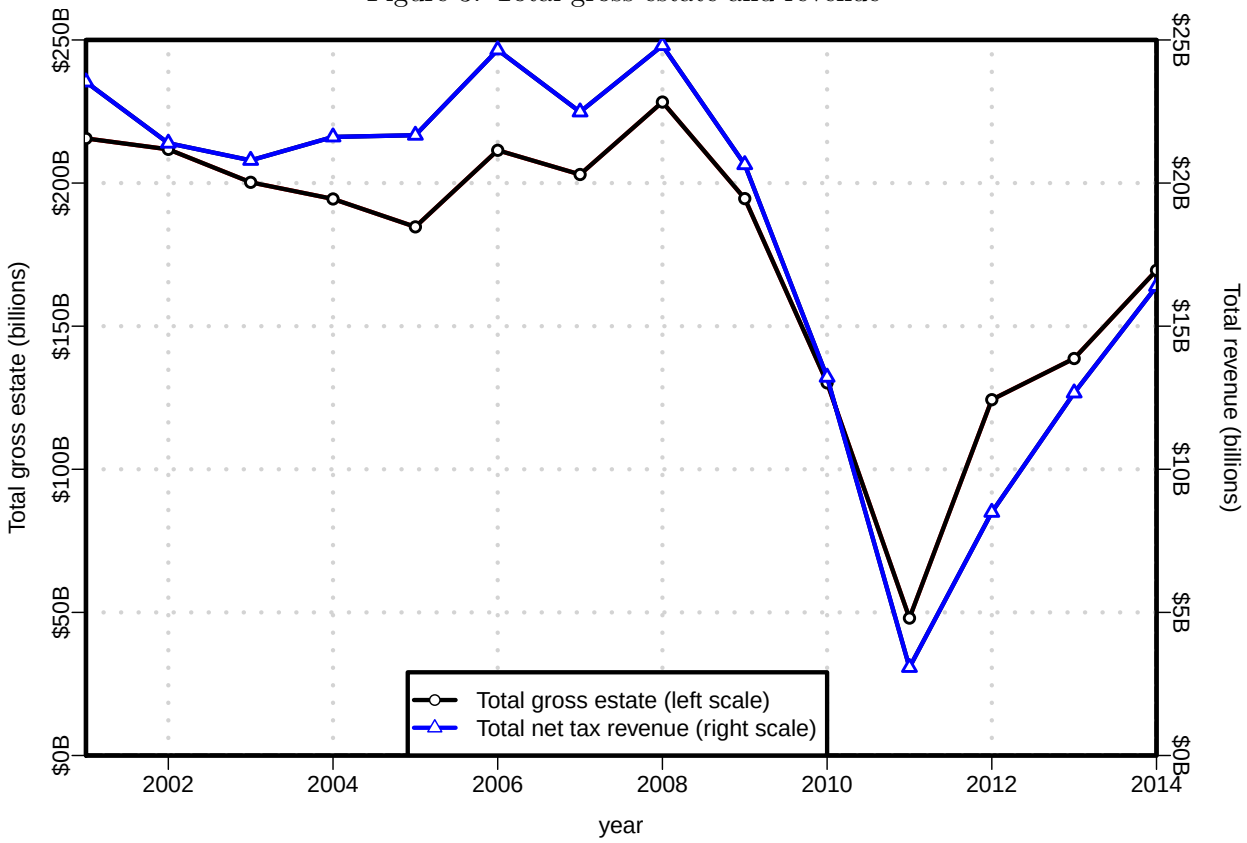

Figure 4: Number of tax returns above $10 million