Bequest taxes and capital gains realizations

Gerald Auten*, David Joulfaian

Office of Tax Analysis, US Department of the Treasury, 1500 Pennsylvania Ave., NW Washington, DC 20220, USA

Received 31 March 1999; received in revised form 31 October 1999; accepted 31 January 2000

Abstract

Contrary to popular view, capital gains do not escape taxation at death as they are subject to the estate tax. The presence of the step-up in basis increases the lock-in effect of capital gains taxes as individuals are induced to hold assets until death. This effect, however, is mitigated by the estate tax which applies to assets passed to heirs. Using a sample of matched income and estate tax records in a period that straddles significant changes in capital gains and estate tax rates, the estate tax is found to have an unlocking effect on capital gains realizations. The realization elasticity with respect to the estate tax rate is estimated at 0.36 in the basic model. Published by Elsevier Science B.V.

Keywords: Capital gains; Bequests; Estate tax

JEL classification: D19; G11; H24

1. Introduction

Economists have long argued that the step-up in basis at death is a major source of the lock-in effect of capital gains taxes, inducing investors to hold on to assets until death to avoid taxation.1 For the wealthy, however, the benefit of the step-up

*Corresponding author.
E-mail addresses: gerald.auten@do.treas.gov (G. Auten), david.joulfaian@do.treas.gov (D. Joulfaian).
1Under US tax law, the basis of appreciated assets is ‘stepped up’ to the market value at death. Thus, when the heirs sell these assets, gains accrued by the decedents are never subject to the capital gains tax.
may be partially offset by bequest taxes. Accrued gains on assets held at death are subject to the estate tax with a current maximum statutory rate of 55%, which is far more onerous than the current maximum capital gains tax rate of 20%. While the lock-in effect has been examined in many studies, little is known about the effects of bequest taxes on decisions to realize capital gains. Given the alternatives to realizations, and because individuals derive utility from their bequests (Becker, 1974), realizations of capital gains may be affected by bequest taxes as well as by capital gains taxes.

Previous studies of capital gains realization decisions have not considered the potential effects of estate taxes on lifetime decisions to sell assets. For example, several theoretical studies have explored the effects of capital gains taxes on decisions to sell or hold assets and the role of the step-up in basis at death. Holt and Shelton (1962) argued that the ability to avoid the capital gains tax altogether through the step-up in basis at death is the largest source of the lock-in effect of capital gains taxes. Stiglitz (1983) considered the step-up in basis as the final step in an investment strategy for avoiding capital gains taxes. Kovenock and Rothschild (1983) examined the effects of the step-up in basis as compared to the alternative policies of carryover basis or taxing gains at death. Kiefer (1990) incorporated the effects of the step-up in basis in a numerical simulation model of stock trading, while others considered its effects in deriving measures of the effective capital gains tax rate (King and Fullerton, 1984). None of these studies, however, explicitly considered bequest taxes.

Empirical studies of the effects of capital gains taxes on decisions to realize gains have employed cross-section and panel micro data, as well as aggregated time series data. The convention followed in these studies is also to focus on the income tax treatment of capital gains, and overlook the potential effects of estate taxes. In contrast, a number of studies have found evidence on the effects of estate taxes on other types of economic activity. For example, studies have found that the estate tax stimulates charitable bequests (Boskin, 1976; Clotfelter, 1985; Joulfaian, 1991) as well as lifetime charitable contributions (Auten and Joulfaian, 1996). Other studies argue that estate taxes create incentives for inter-vivos gifts or affect the timing of transfers (Bernheim, 1987; Poterba, 1998; Joulfaian, 2000) and may create disincentives for pension accumulation (Shoven and Wise, 1996).

This paper examines the effects of bequest taxes, specifically the US estate tax,
on capital gains realizations. We use a unique data set that matches the federal income tax returns of a sample of wealthy individuals with their estate tax returns during a period in which estate and capital gains tax provisions were changed. The income tax returns provide information on capital gains realizations and income tax rates, while the estate tax returns provide information on wealth and estate tax rates.

Section 2 discusses issues related to the realization decision in the context of income and estate taxes. Section 3 describes the data sources and the construction of variables. Empirical results, reported in Section 4, show that the estate tax plays an important role in determining the amount of capital gains realizations. Estate tax effects are found to be greatest in the case of individuals with children and those approaching or shortly after normal retirement years. Concluding comments are provided in Section 5.

2. Modeling realizations

There are a number of reasons for realizing capital gains. An individual, for example, may sell assets and realize capital gains to finance consumption. The amount of gains ($G$) that can be consumed are reduced by capital gains taxes. In other words, the individual will have to forego the tax on gains at rate $\tau$, and is able to consume $1 - \tau$ of each dollar of gains realized, in addition to the asset basis.\(^5\) Alternatively, if the individual decides to continue holding the asset for bequests to heirs, estate taxes will have to be paid on the gains at tax rate $e$. Effectively, the heirs would receive $1 - e$ of bequeathed gains. If the estate tax rate is sufficiently high, the individual may decide to realize gains and consume the proceeds, since little would be left for the heirs. At the current maximum statutory capital gains and estate tax rates of 0.20 and 0.55, respectively, an individual holding an asset valued at $100, say with a zero basis, could elect to consume $80, $100 \times (1 - 0.20)$, or bequeath to heirs only $45, $100 \times (1 - 0.55)$. Thus, ignoring discounting, bequests are more expensive than own consumption as long as $e > \tau$, and this should have a direct bearing on the amount of gains realized.\(^6\)

As an alternative to consumption, an individual may realize gains in the process

\(^5\)The analysis oversimplifies by ignoring the difference between gains and sales price. Although our data only reports the amount of capital gain, data from the Sales of Capital Assets study (Internal Revenue Service, 1981), show that gains are 68% of the sales price for the top 3% of income tax filers, a group comparable to our sample. Following Balcer and Judd (1987), we would expect an even higher ratio in the case of assets held at death.

\(^6\)Gifts can be an alternative to bequests, especially as they are taxed on a tax exclusive basis; the effective statutory gift tax rate is $e/(1 + e)$. However, they are likely to expose the beneficiaries to capital gains taxes on past and future gains accrued, as the donor’s basis is carried over (Adams, 1978; Kuehlwein, 1994; Joulfaian, 2000).
of trading assets and adjusting portfolios. In this case, the individual is assumed to maximize terminal wealth, and the capital gains tax, $\tau G$, is typically viewed as a transaction cost; the greater the cost, the less gains are realized. But because capital gains taxes reduce the size of the taxable estate, as in the case of deductible expenses, the true transaction cost is only $\tau G(1-e)$ with potentially smaller effects on realizations. Unlike the above scenario where estate taxes stimulate gains to be consumed, here the effect operates through a reduction in the transaction cost.

Taxes may affect investor behavior in other ways as well. When capital gains tax rates increase, the price of charitable contributions of appreciated property declines, thereby stimulating such transfers at the expense of consumption. Higher estate tax rates may have a similar effect on contributions (Auten and Joulfaian, 1996). In addition, individuals facing high capital gains tax rates may opt to borrow against their assets to finance consumption, rather than sell them.

While realizations are likely to be influenced by both capital gains and estate tax rates, these rates, in turn, are also likely to be affected by the amounts of realizations, especially in the presence of progressive tax rate schedules. In the case of the income tax, realizations increase the size of taxable income and push individuals into higher tax brackets, and this in turn may discourage additional realizations. In the case of the estate tax, realizations reduce the taxable estate by the amount of the income tax on gains, thereby moving individuals into lower tax brackets and reducing the price of bequests.

The simultaneous nature of these relationships can be demonstrated in the following system of equations for realizations that we empirically estimate:

\[
G = \gamma_1 e + \gamma_2 \tau + \gamma_3 X_1 + u_1 \quad \text{if } G^* > 0 \\
G = 0 \quad \text{otherwise} \tag{1}
\]

the estate tax rate,

\[
e = \theta_1 G + \theta_2 X_2 + u_2 \tag{2}
\]

and the capital gains tax rate,

\[
\tau = \beta_1 G + \beta_2 X_3 + u_3 \tag{3}
\]

where $X$ is a set of predetermined variables. Given the endogeneity of tax rates, one challenge in estimating (1) is to find instruments that are correlated with $e$ and $\tau$ and yet exogenous to realizations. Another challenge is to separately identify the effects of estate and capital gains tax rates since both are likely to be determined

---

\footnote{The attractiveness of this option depends on a number of factors including the interest rate at which the taxpayer could borrow, the deductibility of the interest expense, and the expected appreciation of the asset. During the period examined in this study, the deduction of investment interest expenses was limited to investment interest income plus $10,000.}
by other regressors such as wealth and non-gains income (Feenberg, 1987; Poterba, 1987). We overcome such identification problems by examining data on realizations that straddle major statutory changes in estate and capital gains tax rates.

3. Data sources and construction of variables

To investigate the effects of estate taxes on realizations, we use data from a special study by the Statistics of Income Division of the Internal Revenue Service. The data set consists of the federal estate tax returns and the 1980 and 1981 federal income tax returns for a sample of wealthy individuals who died in 1982. The combined estate and income tax data set contains information on income sources and deductions reported on income tax records, as well as information on the size and composition of terminal wealth as reported on estate tax returns. Demographic information is available on age, marital status, and number of children.8

While the primary objective of this study is to examine the effects of the estate tax on capital gains realizations, we also include other variables to control for their effects. These include the capital gains tax rate, wealth, non-gain income, age and other demographic variables. The following section describes these variables and their construction.

3.1. Tax rates

Under the Economic Recovery Tax Act of 1981 (ERTA), individual income tax rates were reduced, resulting in a reduction of the maximum rate on capital gains from 28% in 1980 to 20% in 1981. Capital gains tax rates are calculated under 1980 and 1981 laws using detailed income tax calculators that incorporate most features of the individual income tax that affect marginal tax rates.

The capital gains tax rate is computed by adding $1000 to realized gains and calculating the effective marginal tax rate over this interval. Because this actual or ‘last dollar’ capital gains tax rate is endogenous to the amount of gains realized, we also derive another measure of marginal tax rates purged of the most important endogenous influences. This instrument for the capital gains tax is computed by setting capital gains equal to zero, adding an increment of gains based on the sample mean ratio of gains to wealth, and calculating the effective tax rate over this range. The increment, which is exogenous to the capital gains tax rate, represents a proxy for potential permanent realizations and the tax rate reflects the full schedule of tax rates that the taxpayer would be likely to face.

---

8A more detailed description of the demographic data is provided in Joulfaian (1994).
For wealthy taxpayers such as those in this sample, the decision to realize capital gains may be related to decisions to donate appreciated property as well. An increase in the capital gains tax rate, for instance, lowers the price of charitable giving. This may stimulate such transfers, lowering the reported taxable income and moving individuals into lower tax brackets. To account for this endogeneity in the tax rate instrument, charitable contributions are set equal to the sample mean of 5.2% of non-gain income, where income is computed using predicted rather than actual capital gains.

ERTA also provided for substantial reductions in estate taxes. Estate tax rates were to be reduced over a period of 4 years, with the maximum rate scheduled to be reduced from 70 to 50% between 1982 and 1985. In addition, the unified credit was to rise so as to increase the size of exempted estates from $161,563 in 1980 to $600,000 for 1987 and later years. Finally, the marital deduction was increased from the greater of 50% of the estate and $250,000 to 100%, thereby allowing unlimited transfers between spouses without being subject to the estate tax.

The marginal estate tax rate is computed by calculating the effective tax rate over a $1000 increment to wealth. To account for the enacted changes, the estate tax rates in each year are based on the known or expected tax laws and the probability of death. That is, estate tax rates for 1980 realizations are based on 1981 law. The estate tax rate for realizations in 1981 is equal to the probability of dying in 1982 multiplied by the tax rate in effect in 1982, plus the probability of dying in 1983 multiplied by the tax rate in 1983, and so on. Because individuals in our sample represent top wealth holders, we follow Poterba (1997) and employ mortality rates from the Individual Annuitant Mortality Tables; these provide lower rates of mortality than those for the entire population.

Since those who realized capital gains in 1980 or 1981 would have smaller estates as a result of paying capital gains taxes, the actual estate tax rate is endogenous to realizations. Another measure of the estate tax rate which is

---

9Failure to account for the endogeneity of charitable contributions can have significant effects on estimated coefficients. For this sample of older and wealthier taxpayers who are more likely to be contributors of appreciated property, accounting for the endogeneity of contributions reduces the coefficient on the capital gains tax rate by about one-third.

10Under ERTA, the maximum tax rate was reduced from 70% in 1981 to 65% in 1982, 60% in 1983, 55% in 1984, and 50% in 1985 and subsequent years. In addition, the exempted amount of estate increased from $175,625 in 1981 to $225,000 in 1982, $275,000 in 1983, $325,000 in 1984, $400,000 in 1985, $500,000 in 1986, and $600,000 in 1987 and subsequent years.

11These law changes through 1987 reflect ERTA law as enacted in 1981. Some of the changes, such as lower rates, were altered in the Deficit Reduction Act of 1984 and subsequent legislation, well after the death of the individuals in our sample. See Joulfaian (1998) for a description of these subsequent changes.

12The estate tax rate is computed under the assumption that the marginal heir is someone other than a spouse; reported spousal bequests and other estate deductions are held constant.

13Tax rates are computed assuming that taxpayers expect constant future wealth, consistent with studies demonstrating that wealth does not seem to fall significantly with age (see Hurd (1990)).
exogenous to realizations is computed as an instrument for the estate tax rate. For 1980, this estate tax rate instrument is computed with any capital gains tax paid in that year or later added back to the estate tax base. For 1981, only taxes paid in that year are added back. Because of the potential endogeneity of lifetime charitable gifts, these gifts, net of the tax saved on the deduction, are also added to the tax base.

In general, the estate tax rate and capital gains tax rates are likely to be determined by wealth and income. The changes brought about by the 1981 Act introduce variation in tax rates independent of income and wealth, and allow for identifying the tax effects separately from the effects of income and wealth.

3.2. Income, wealth and other variables

Capital gains \( G \) are defined as net long-term realizations in excess of short-term losses. This is the amount of gain that qualified for the 60% exclusion in effect from 1979 to 1986 and corresponds to the calculated marginal tax rates. Non-capital gains income \( Y \) is defined as adjusted gross income less any included capital gains or losses.

The wealth \( W \) variable modifies the value of assets reported on estate tax returns to approximate lifetime wealth prior to the effects of decisions about capital gains and charitable contributions. The market value of farms and other small businesses eligible for special estate tax valuations is substituted for the estate tax value, the share of jointly owned assets excluded from the estate tax is added back, and life insurance policy proceeds in the estate are excluded. In addition, capital gains taxes paid and lifetime charitable contributions (net of the value of the income tax deduction) are added back, as discussed earlier. Because the basis of assets is not reported on estate tax returns, we use this measure of wealth as a proxy for the unobserved stock of accrued gains. Other variables include the age of the primary taxpayer, marital status and widow or widower status.

3.3. Summary statistics

The mean values for selected variables are reported in Table 1; all incomes and wealth measures are stated in 1981 dollars. The sample includes 9788 observations representing 4894 primary taxpayers, with mean wealth of $2.6 million. The average long-term capital gain realized in the sample is $52,611, and average non-capital gains income is $137,661. The average age is 75 years, with 24.7% over the age of 85. Approximately 53% of the sample report realizations of long-term capital gains. About 43% are married, and 46% widowed, with the remainder single, either never married or divorced. The mean last dollar capital gains tax rate is 19.2%, and the mean tax rate of the instrument is 18.8%. The corresponding marginal estate tax rates are 32.4 and 32.6%, respectively.
Table 1
Sample means of selected variables

<table>
<thead>
<tr>
<th>Item</th>
<th>All</th>
<th>Realizers</th>
<th>Non-realizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wealth ((W))</td>
<td>2,609,360</td>
<td>2,802,856</td>
<td>2,391,488</td>
</tr>
<tr>
<td>In Wealth</td>
<td>14.346</td>
<td>14.422</td>
<td>14.261</td>
</tr>
<tr>
<td>Realizations ((G))</td>
<td>52,611</td>
<td>99,337</td>
<td>0</td>
</tr>
<tr>
<td>ln Realizations</td>
<td>4.925</td>
<td>9.300</td>
<td>0.000</td>
</tr>
<tr>
<td>Realizations/wealth (\times 100)</td>
<td>1.630</td>
<td>3.078</td>
<td>0.000</td>
</tr>
<tr>
<td>Other income ((Y))</td>
<td>137,620</td>
<td>137,846</td>
<td>137,365</td>
</tr>
<tr>
<td>ln Other income</td>
<td>11.158</td>
<td>11.144</td>
<td>11.173</td>
</tr>
<tr>
<td>Age</td>
<td>74.968</td>
<td>74.697</td>
<td>75.272</td>
</tr>
<tr>
<td>Age under 45</td>
<td>0.022</td>
<td>0.016</td>
<td>0.028</td>
</tr>
<tr>
<td>Age 45 to 54</td>
<td>0.058</td>
<td>0.059</td>
<td>0.057</td>
</tr>
<tr>
<td>Age 55 to 64</td>
<td>0.118</td>
<td>0.126</td>
<td>0.109</td>
</tr>
<tr>
<td>Age 65 to 74</td>
<td>0.222</td>
<td>0.239</td>
<td>0.204</td>
</tr>
<tr>
<td>Age 75 to 84</td>
<td>0.332</td>
<td>0.325</td>
<td>0.341</td>
</tr>
<tr>
<td>Age 85 or over</td>
<td>0.247</td>
<td>0.235</td>
<td>0.262</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>0.429</td>
<td>0.465</td>
<td>0.389</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.459</td>
<td>0.426</td>
<td>0.496</td>
</tr>
<tr>
<td>Single</td>
<td>0.112</td>
<td>0.109</td>
<td>0.115</td>
</tr>
<tr>
<td>Dependents</td>
<td>0.223</td>
<td>0.229</td>
<td>0.217</td>
</tr>
<tr>
<td>Capital gains tax rate ((r))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last dollar rate</td>
<td>0.192</td>
<td>0.211</td>
<td>0.171</td>
</tr>
<tr>
<td>Instrument</td>
<td>0.188</td>
<td>0.187</td>
<td>0.189</td>
</tr>
<tr>
<td>Estate tax rate ((e))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last dollar rate</td>
<td>0.324</td>
<td>0.325</td>
<td>0.322</td>
</tr>
<tr>
<td>Instrument</td>
<td>0.326</td>
<td>0.328</td>
<td>0.324</td>
</tr>
<tr>
<td>Observations</td>
<td>9788</td>
<td>5184</td>
<td>4604</td>
</tr>
</tbody>
</table>

*Gains, income and wealth are in 1981 dollars.*

Columns two and three of Table 1 report mean values of select variable for the subsamples of realizers and non-realizers. Realizers are wealthier than non-realizers ($2.8 versus $2.4 million). In addition, they are more likely to be married, less likely to be widowed, and, as expected, have higher last dollar capital gains tax rates (21.1 versus 17.1%).

4. Empirical results

Given the censored nature of reported realizations, we provide Tobit estimates of Eq. (1) in modeling the determinants of realizations. The dependent variable is defined as the fraction of wealth realized, \(G/W\). In addition to the estate tax rate, \(e\),
and the capital gains tax rate, \( \tau \), we consider the effects of non-gain income, age, and other demographic variables on reported realizations.

While it is well-documented that the capital gains tax rate is endogenous to realizations, the endogeneity of the estate tax rate is yet to be empirically verified. Therefore, we first test for the exogeneity of the estate tax rate as well as the capital gains tax rate. We employ Wu’s (1973) test generalized to the limited dependent variable case (Rivers and Vuong, 1988), which leads us to reject the null hypothesis of exogeneity.\(^{14}\)

To correct for the endogeneity of both estate and capital gains tax rates, the coefficients on these tax rates are estimated using two-stage Tobit following Nelson and Olsen (1978), with corrected standard errors following Amemiya (1979). The results from the two-stage Tobit are reported in Table 2. The estimated coefficient on the capital gains tax rate is \(-19.1\) with a standard error of

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estate tax rate ((\epsilon))</td>
<td>4.533</td>
<td>0.756</td>
</tr>
<tr>
<td>Capital gains tax rate ((\tau))</td>
<td>(-19.077)</td>
<td>2.786</td>
</tr>
<tr>
<td>Constant</td>
<td>(-23.554)</td>
<td>2.488</td>
</tr>
<tr>
<td>In Non-gain income</td>
<td>0.044</td>
<td>0.094</td>
</tr>
<tr>
<td>In Wealth</td>
<td>1.381</td>
<td>0.170</td>
</tr>
<tr>
<td>Married</td>
<td>1.307</td>
<td>0.304</td>
</tr>
<tr>
<td>Widowed</td>
<td>(-1.247)</td>
<td>0.304</td>
</tr>
<tr>
<td>ln Non-gain income</td>
<td>0.051</td>
<td>0.187</td>
</tr>
<tr>
<td>ln Wealth</td>
<td>1.312</td>
<td>0.892</td>
</tr>
<tr>
<td>Married</td>
<td>3.132</td>
<td>0.892</td>
</tr>
<tr>
<td>Widowed</td>
<td>2.607</td>
<td>0.892</td>
</tr>
<tr>
<td>Dummy 1981</td>
<td>(9585)</td>
<td>0.222</td>
</tr>
<tr>
<td>(\sigma)</td>
<td>0.397</td>
<td></td>
</tr>
<tr>
<td>(\Phi(bX/\sigma))</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Estate tax elasticity ((\epsilon_\epsilon))</td>
<td>(-0.89)</td>
<td>1.336</td>
</tr>
<tr>
<td>Wealth elasticity ((\epsilon_w))</td>
<td>9788</td>
<td>0.098</td>
</tr>
<tr>
<td>Log-likelihood</td>
<td>(-21,738)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>9788</td>
</tr>
</tbody>
</table>

\(^{14}\)Specifically, the last dollar capital gains and estate tax rates are regressed on the exogenous variables and the two instrumental variables. The Tobit equation is then re-estimated including the residuals from these equations. The estimated coefficients on the residuals from both equations are highly significant, individually and jointly \((\chi^2 = 442)\). Detailed results are available from the authors upon request.
2.8. The implied elasticity is $-0.9$ evaluated at mean values, which is within the range of estimates reported in previous studies.\footnote{This elasticity is likely to capture both permanent and transitory tax rate effects. Given data limitations and the focus of our analysis, we do not attempt to differentiate permanent and transitory responses to capital gains taxes. The elasticity of gains with respect to tax rates is computed as $g^* W_t^* \Phi(z)$.}

The estimated coefficient on the estate tax rate, $e$, is positive and highly significant, with a value of 4.5 and standard error of 0.76. Evaluated at mean values, the implied elasticity is 0.36. Thus, in contrast to the effects of capital gains taxes, high estate tax rates seem to have an unlocking effect on realizations.\footnote{In an equation estimated without the estate tax rate, the elasticity for the capital gains tax rate decreases, but by only about 10%.}

The share of wealth realized decreases with non-gains income and increases with wealth. The estimated coefficient on wealth is 1.38 with a standard error of 0.17, for an implied elasticity of 1.3 at mean values.\footnote{The elasticity of long-term gains with respect to wealth is computed as $g^* W_t^* \Phi(z) + 1$.} Married individuals realize more gains than single individuals, who in turn realize more than their widowed counterparts. One possible explanation for the low level of realizations by widowed taxpayers is that the surviving spouse may, in part, be disposing of inherited assets already stepped up, following a strategy of selling assets with high basis (Balcer and Judd, 1987). Realizations have an inverted U-shaped relationship with age, peaking in the age 65 to 74 range. The decline in realizations for those age 75 and over is consistent with an increasing lock-in effect from the step-up in basis at death. But it may also reflect life cycle effects on realizations, and the possibility that desired portfolio adjustments and realizations have already been completed by the oldest taxpayers.\footnote{Because the sample includes many older taxpayers who might sell assets to pay medical expenses, we tested a dummy variable for high medical expenses in excess of 10% of positive income. This variable was not statistically significant in explaining realizations.}

The share of wealth realized decreases with non-gains income and increases with wealth. The estimated coefficient on wealth is 1.38 with a standard error of 0.17, for an implied elasticity of 1.3 at mean values.\footnote{The elasticit...}

Married individuals realize more gains than single individuals, who in turn realize more than their widowed counterparts. One possible explanation for the low level of realizations by widowed taxpayers is that the surviving spouse may, in part, be disposing of inherited assets already stepped up, following a strategy of selling assets with high basis (Balcer and Judd, 1987). Realizations have an inverted U-shaped relationship with age, peaking in the age 65 to 74 range. The decline in realizations for those age 75 and over is consistent with an increasing lock-in effect from the step-up in basis at death. But it may also reflect life cycle effects on realizations, and the possibility that desired portfolio adjustments and realizations have already been completed by the oldest taxpayers.\footnote{Because the sample includes many older taxpayers who might sell assets to pay medical expenses, we tested a dummy variable for high medical expenses in excess of 10% of positive income. This variable was not statistically significant in explaining realizations.}

The share of wealth realized decreases with non-gains income and increases with wealth. The estimated coefficient on wealth is 1.38 with a standard error of 0.17, for an implied elasticity of 1.3 at mean values.\footnote{The elasticity of long-term gains with respect to wealth is computed as $g^* W_t^* \Phi(z) + 1$.} Married individuals realize more gains than single individuals, who in turn realize more than their widowed counterparts. One possible explanation for the low level of realizations by widowed taxpayers is that the surviving spouse may, in part, be disposing of inherited assets already stepped up, following a strategy of selling assets with high basis (Balcer and Judd, 1987). Realizations have an inverted U-shaped relationship with age, peaking in the age 65 to 74 range. The decline in realizations for those age 75 and over is consistent with an increasing lock-in effect from the step-up in basis at death. But it may also reflect life cycle effects on realizations, and the possibility that desired portfolio adjustments and realizations have already been completed by the oldest taxpayers.\footnote{Because the sample includes many older taxpayers who might sell assets to pay medical expenses, we tested a dummy variable for high medical expenses in excess of 10% of positive income. This variable was not statistically significant in explaining realizations.}

The estimated specification in Table 2 is different from the semi-log specification commonly employed in the literature. In addition, this specification may not adequately capture portfolio balancing effects of taxes or capture the different behavior of specific groups; different age groups or parents may react differently to estate taxation. Consequently, we estimate a number of alternative specifications as sensitivity tests and report the results in Table 3.

4.1. Semi-log specification

Many previous studies of capital gains have employed a semi-log specification similar to that in Table 2, but which defines the dependent variable as the natural logarithm of capital gains. In addition, a potential shortcoming of the basic specification is that wealth may not represent a perfect proxy for the stock of
accrued gains, which could introduce noise in our basic dependent variable, the fraction of gains realized.

For these two reasons, it would be interesting to compare our earlier estimates to those obtained from a semi-log specification. Estimates using this specification are reported in panel 1 of Table 3. The estimated effects of estate taxes are similar to those reported earlier. The implied elasticity of realizations with respect to the estate tax rate is 0.34, almost identical in value to that reported in Table 2.  

4.2. Sample selection

Burman and Randolph (1994) highlight the importance of correcting for sample selection in their studies of capital gains realizations, and are critical of the

---

The estimated elasticity with respect to the capital gains tax rate is –0.91, virtually identical to the earlier estimate. As it is evaluated at mean values, this estimate will increase as the estate tax decreases, and vice versa.
restrictive assumptions imposed by the standard Tobit. Consequently, we estimate a generalized Tobit specification, following Lee et al. (1980). First, we estimate a two-stage Probit equation with corrected standard errors. Next, a two-stage least squares procedure, also with corrected standard errors, is estimated for the sample of realizers. The regressors are augmented with the inverse mill’s ratio obtained from the Probit equation.

Consistent with the standard Tobit results, the estimated coefficients from the level equation indicate that the estate (and capital gains) tax rate has significant effects on realizations. The results show that using the generalized Tobit procedure increases the estimated estate tax rate elasticity to 0.63, almost twice as large as that in Table 2.

4.3. Spousal transfers

Spousal bequests are reported in the data, and are held constant in computing estate tax rates across regimes. It is conceivable that these bequests, which became non-taxable in 1982, would have been different under prior law, potentially resulting in different measures of tax rates. The resulting errors in measurement may bias estimates of the effects of estate taxes.

While changes in estate tax laws may alter spousal bequests, however, bequest division is difficult to incorporate in our modeling of capital gains realizations. In order to test the robustness of our results, however, we exclude married individuals from our sample and eliminate this potential source of mis-measurement, if any, in the estate tax rate. The results from the sub-sample of 5585 observations are close to those reported in Table 2; the estimated elasticity is about 0.29, as compared to 0.36 for the entire sample.

4.4. Realizations by parents

Since the bequest motive is likely to be strongest in the case of parents (Hurd, 1990), it would be interesting to examine their responsiveness to estate taxes, and contrast it with that of the entire sample. Parents in our data are identified as individuals with child heirs, and account for 4988 observations, slightly more than half of the sample.

The basic model is replicated for the sub-sample of parents, and the results summarized in panel 4A of Table 3. The estimated elasticity for parents is 0.53, which is larger than that of the entire sample. When we further exclude married

---

20 In their generalized Tobit estimates, the estimated coefficient on the inverse mill’s ratio is negative, which is indicative of a negative correlation between the error terms of the criterion and level equations; the correlation is positive in case of the standard Tobit.

21 In contrast to Burman and Randolph (1994), the estimated coefficient on the inverse mill’s ratio is positive, but not precisely measured, with a value of 1.71 and S.E. = 3.26.
parents from the sample, and consistent with the above finding, the estimated elasticity changes very little; it is equal to 0.58 as shown in panel 4B. These findings suggest that those with bequest motives are more likely to exhibit stronger responses to estate taxation.

4.5. Portfolio balancing

The basic specification estimated in Table 2 may not adequately account for portfolio balancing as a motive for realizing gains. As discussed earlier, in the presence of estate taxes, the correct measure of the transaction cost is \( t(1 - e) \). This reduces to \( t \) when the estate tax rate is zero, as is traditionally assumed in the literature.

We re-estimate the basic model using this interaction term in place of the capital gains tax term. Evaluated at the mean values of the capital gains and estate tax rates, the estimated elasticity for realizations with respect to the estate tax rate is 0.36, identical to that of the basic model. The direct effects of the estate tax rate, however, are insignificant.

4.6. Treatment of personal residences

Personal residences, which account for a very small fraction of realized gains subject to tax, are different from other assets because of the services they provide and their income tax treatment. Thus, as a sensitivity test, the basic model is replicated by excluding such assets from wealth and their respective gains from the dependent variable. As shown in panel 6 of Table 3, the estimated effects of the estate tax rate are about the same as in the basic model.

4.7. Borrowing

The tax rate instruments employed thus far account for the endogeneity of charitable contributions, in addition to that of realizations. A similar reason can be advanced for controlling for borrowing. In order to avoid capital gains taxes, individuals may borrow against their assets to finance consumption. Greater borrowing, which may have been induced by higher capital gains tax rates, may result in lower taxable income and terminal wealth, thereby leading to lower tax rates. To control for its endogeneity, the capital gains tax rate is computed by setting interest expenses to 5% of gross income, roughly the sample average. A similar treatment is extended to computing the estate tax rate, where debts are set equal to 5% of assets. Using these revised tax rate instruments, the estimated elasticity is 0.41, slightly larger than in the basic model.
Table 4
Two-stage Tobit estimates of the effects of estate tax rates on capital gains realizations by age

<table>
<thead>
<tr>
<th>Equation and variable</th>
<th>Coefficient</th>
<th>S.E.</th>
<th>Elasticity (( \varepsilon ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age under 50 (n = 421)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estate tax rate (( e ))</td>
<td>1.670</td>
<td>3.476</td>
<td>0.10</td>
</tr>
<tr>
<td>Age 50 to 64 (n = 1514)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estate tax rate (( e ))</td>
<td>7.030</td>
<td>2.142</td>
<td>0.37</td>
</tr>
<tr>
<td>Age 65 to 74 (n = 2098)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estate tax rate (( e ))</td>
<td>5.303</td>
<td>1.547</td>
<td>0.37</td>
</tr>
<tr>
<td>Age 75 to 84 (n = 3254)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estate tax rate (( e ))</td>
<td>6.278</td>
<td>1.445</td>
<td>0.53</td>
</tr>
<tr>
<td>Age 85 and over (n = 2421)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estate tax rate (( e ))</td>
<td>0.385</td>
<td>1.169</td>
<td>0.04</td>
</tr>
</tbody>
</table>

4.8. Effects of estate taxes by age

Anecdotal evidence suggests that older individuals may be more likely to take estate taxes into account; they are more likely to engage in estate planning and have wills drawn. To examine this possibility, we allow the effects of the estate tax rate to vary by age by splitting the sample into five age groups; those under the age of 50, age 50 through 64, age 65 through 74, age 75 through 84, and those age 85 and over. Replicating the basic two-stage Tobit estimates for each of these five groups provides a flexible approach to modeling such differences by age without imposing specific assumptions about how estate taxes are discounted.

As shown in Table 4, estate taxes seem primarily to affect the behavior of individuals aged 50 through 84, with the effects peaking in the age 75 through 84 range.\textsuperscript{22} For the latter group, the estate tax elasticity is estimated at 0.53. Those age 50 through 74 are also responsive to the estate tax, with an estimated elasticity of 0.37. For younger taxpayers under the age of 50, the estate tax coefficient is small and insignificant. For the oldest taxpayers, those age 85 and over, the estate tax coefficient is even smaller and again not statistically significant.

5. Conclusion

This paper extends the analysis of the determinants of capital gains realizations to account for bequest taxes, which have generally been overlooked in previous

\textsuperscript{22}The estimated specification is identical to that of Table 2 except for the age dummies which are replaced by age and age-squared.
studies. Using income and estate tax records of a sample of affluent individuals, the paper investigates the effects of the estate tax on capital gains realizations.

The results show that bequest taxes are an important determinant of capital gains realizations, with effects offsetting those of capital gains taxes. These results are robust with respect to a number of specifications. Not surprisingly, estate taxes seem to have the largest effects on realizations in the case of parents and for individuals around the retirement age. The realizations of both young and the very oldest individuals appear to be less sensitive to the estate tax.

The results have implications both for tax policy considerations and for future research. For example, the results suggest that recent proposals to reduce or eliminate the Federal estate tax could result in lower lifetime capital gains realizations as a result of increased lock-in effects. Empirical and theoretical studies of the taxation of capital gains, and its effects, need to account for the effects of estate taxes, especially since tax planning by the wealthy is geared toward avoiding both capital gains and estate taxes.

Acknowledgements

The paper benefitted from comments of participants at the Labor Seminar at George Washington University, the Applied Micro Seminar at Duke University, Leonard Burman, Lowell Dworin, William Gentry, Roger Gordon, and two anonymous referees. The views expressed are those of the authors and do not necessarily reflect those of the US Department of the Treasury.

References


