New Evidence on the Effects of Taxes on Charitable Bequests

Jon Bakija
Williams College

William Gale
The Brookings Institution

Joel Slemrod
University of Michigan

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After years of neglect, the estate and gift tax recently became the center of a heated policy debate, culminating with provisions in the tax cut enacted in June 2001 that will reduce the estate tax gradually, repeal it in 2010, and then reinstate it in its pre-2001 form at the beginning of 2011. This patchwork treatment virtually guarantees that estate tax rules will be revisited soon.

One recurring issue in the estate tax debate is the impact of reform on the non-profit sector. The federal estate tax has allowed a deduction for charitable bequests since 1918 (Barry Johnson et al, 2001). With the top marginal rate of federal estate tax currently at 47 percent, abolishing the tax would approximately double the price of a charitable bequest relative to an ordinary bequest for the wealthiest estates. It would also, however, presumably raise the after-tax wealth of decedents, so the ultimate impact of any particular policy change depends in part on the relative sizes of the price and wealth elasticities.

Cross-sectional studies typically find that decedents with larger estates and therefore higher marginal federal estate tax rates make larger charitable bequests (see David Joulfaian, 2001, for an up-to-date example and literature review). The interpretation of this result is unclear, though, because the federal tax rate is an increasing, nonlinear function of estate size, and the true functional form of the relationship between wealth and charity is uncertain. If wealth has a non-linear effect on charitable bequests that is not accurately captured in the estimated functional form, the price elasticity estimate may suffer from omitted variable bias (Feenberg, 1987). Kopczuk and Slemrod (2003) use aggregate annual time-series analysis to show that several different summary measures of the marginal federal estate tax rate have a small but positive influence on aggregate reported charitable bequests. But it is difficult to adequately distinguish the impact of changing tax rates from other, possibly unobserved time-varying influences and trends in aggregate time-series analysis.

In an earlier paper (BGS 2003), we exploited the fact that federal and state tax rates on estates and inheritances have changed over time in different ways across states and real wealth levels, and estimated the effect of federal and state inheritance and estate taxes on charitable bequests using pooled cross-sectional data spanning several decades, based on aggregated information from federal estate tax returns. Under several different specifications, we found strong evidence of a strong incentive effect of estate and inheritance taxes on charitable bequests.

In this paper, we extend the research by examining whether the estimated relationship between charitable bequests and estate tax rates is robust to the inclusion of other tax rates that may influence bequest decisions in important ways. In the cross section and in the aggregate time series, marginal estate tax rates are highly correlated with marginal income tax rates applicable to *inter vivos* charitable deductions and capital gains realizations. Over a long time series, marginal estate tax rates on widowed decedents are negatively correlated with marginal tax rates imposed on spousal bequests made by the first spouse to die. For reasons we discuss below, these other taxes may cause substitution among charitable giving in life, charitable giving at death, consumption, gifts, and bequests in ways that could bias the estimated relationship between estate tax rates and charitable bequests. To take just one example, people who face a high marginal estate tax rate also tend to face a high marginal income tax rate, which reduces the price of giving during life relative to giving at death, and thus might lead to intertemporal substitution that reduces charitable bequests. In a cross section or an aggregate time series, the collinearity among the various relevant tax rates and wealth (including possibly nonlinear functions thereof) is such that there is little hope of disentangling them all.

In the present study, we are able to distinguish the effects of the various taxes and wealth because, over the course of the 20th century, the time path of each tax differed substantially across different states and wealth levels. We can take advantage of this superior source of identification because we have gathered detailed data on all federal and state inheritance, estate, and income tax laws in the U.S. since 1900, and developed tax calculator programs that apply this data in order to accurately compute tax rates for any individual. Our tax models and estimation technique are applied to pooled cross-sectional data spanning several decades, based on aggregated information from federal estate tax returns broken down by state, wealth class, year, and marital status. We find evidence that marginal income tax rates applying to *inter vivos* charitable giving and to long-term capital gains, as well as estate and inheritance tax rates imposed on a pre-deceased spouse, significantly affect charitable bequests, and that omission of these variables biases estimates of the price elasticity of charitable bequests. Nonetheless, we still find that the wealthy respond strongly to the incentive to increase charitable bequests that is created by estate and inheritance taxes.

Theory

The literature on charitable bequest behavior has typically modeled the decision as one made just before death, taking wealth at that point as given and assuming time-separable utility. An individual contemplating death is assumed to choose after-tax inheritance received by heirs (I) and bequests to charity (G), to maximize utility U:

(1) $\text{Max } U(I, G)$,

subject to the budget constraint:

(2) $I + G = W - E(I, G)$,

where W is gross-of-tax wealth available at death, and E is estate and inheritance tax liability which we assume can be approximated by a differentiable function of I and G. If we normalize the price of inheritance to 1, we can define the "price" of a charitable bequest in terms of the amount of inheritance given up as $P^G = (1\text{-}e)/(1\text{-}eg)$ where e is the marginal tax rate on the gross-of-tax bequest to heirs, and eg is the marginal tax rate on gross-of-tax bequest to charity. The latter (eg) is in almost all cases zero, because charity is deductible from estate taxes and exempt from inheritance taxes (so that holding bequest to taxable heirs constant, a change in charity has no effect on tax liability – which means that a re-allocation of bequests from taxable heirs to charity reduces tax liability). We include it here for generality because in our data, there were some rare examples of states that taxed bequests to charity for some period of time. Intuitively, if charity is not taxable (i.e., it is deductible), then achieving \$1 more of charity only requires forgoing \$(1-e) of inheritance received by heirs. If charity is taxable, then one must give \$1/(1-eg) in order to get \$1 to the charity after tax – the price of charity relative to inheritance is then the product of the two $(1\text{-}e)/(1\text{-}eg)$.

We can re-write the budget constraint in more conventional price × quantity = budget format by subtracting (1-P^G) from both sides of (2):

(3) $$I + P^G G = W - E(I, G) - (1\text{-}P^G)G$$

The right hand side, which we will call disposable wealth (w), represents the budget available to be spent on I and G when the prices are expressed in this way. Intuitively, we are defining the budget as after-tax wealth excluding the tax savings from charity -- which is essentially what $(1\text{-}P^G)G$ means -- and incorporating the tax saving from charity into its price. [1]

Our basic empirical specification is an equation for the demand for charitable bequests that is consistent with the budget constraint in (3). Following Randolph (1995) and Joulfaian (2001), we use the expenditure share demand system developed by Deaton and Muellbauer (1980), also known as the "almost ideal demand system." This is a flexible demand equation that is consistent with a broad class of reasonable utility functions and has been used widely in estimating consumer demand equations. An important advantage of the Deaton and Muellbauer specification for our appplication, which involves aggregated cell-mean data, is that individual demand equations aggregate up into a market demand equation of the same form. The demand for expenditures on charitable bequests is expressed as:

(4) $P^G G/w = \beta_0 + \beta_1 ln(P^G) + \beta_2 ln(w) + \varepsilon$

The main contribution of this paper is to adapt the analysis to allow for current levels of charitable bequest and wealth to depend partly on decisions made in the past. In particular, we are concerned that those decisions were influenced by other tax prices that are left out of the traditional analysis, and are correlated with P^G. First, the marginal utility of making a current charitable bequest may depend on the amount of previous *inter vivos* charitable donations, or on the amount of charitable bequests made previously by the first spouse to die. This would be true, for example, if charity is a "durable good" that continues to provide prestige and "warm glow" years after the gift is made. Similar considerations may apply, for example, to bequests made to heirs by a pre-deceased spouse, which may change the marginal utility of further such bequests. This could be thought of as generalizing the utility function to $U(I, G, I_L, G_L, D_L)$ where I_L, G_L, D_L are lagged values of inheritance received by heirs, charitable bequests by a previously deceased spouse, and *inter vivos* charitable donations, respectively. In essence, we want to allow for the possibility of substitution in response to differences in prices across time. Such substitution could affect either or both of charitable bequests and bequests to heirs (the sum of which are wealth at death), possibly in different ways.

There are several aspects of taxation that historically have created known differences in prices across time in a way that could influence bequest decisions. One consideration that applies especially with long-term historical data is that the taxation of bequests to a spouse has changed significantly over time, in a way that could induce substitution of bequests between spouses. Although our preliminary analysis focuses on a sample of widowed decedents, this substitution of giving across spouses could affect estimates even based on the second spouse to die. Prior to 1948, bequests to a spouse were fully taxable under the federal estate tax. From 1948 through 1981, bequests to a spouse of up to 50 percent of the estate were fully deductible from the federal estate tax, with amounts above that taxable.[2] Beginning in 1982, spousal bequests became 100 percent deductible at the federal level. Historically, most states also taxed spousal bequests, often with much smaller spousal deductions or exemptions than at the federal level, and then gradually moved to 100 percent spousal deductions after 1982. When bequests to a spouse were taxable, this would have discouraged making any kind of bequests, charitable or otherwise, at the death of the second spouse. For example, any funds of the first spouse that were intended to eventually be used for charity would trigger tax liability when they passed from the first to second spouse. This created an incentive to accelerate charitable bequests that would otherwise have been made at the death of the second spouse, and to make them instead at the death of the first spouse. It also created an incentive to shift bequests to heirs in the next generation to the death of the first spouse, which would reduce wealth reported on the estate tax return as well as charitable bequests among widowed decedents. So the net effect on estimation equation (4) is ambiguous.

Figures 1 through 3 illustrate how historical patterns of charitable bequests (as a share of after-tax wealth) have matched up with historical changes in federal tax rates. The large long-term increase in charitable giving by widowed decedents would be consistent with the large increase in the incentive to give created by the rising marginal tax rates in Figure 1. However, in Figure 3, we see that charitable bequests by the first spouse to die did not experience a similar long-term upward trend as federal marginal tax rates rose – rather, the top wealth class exhibited no clear pattern, whereas the moderately wealthy saw a *decline* in charitable bequests relative to wealth. This would be consistent with a situation where the larger deductions for spousal bequests that were adopted over time caused the first spouse to pass more assets on to the second spouse, rather than giving them away at to charities right away. If this is the case, then some of the long-term secular increase among widowed decedents in Figure 2 may represent shifting of giving from the first spouse to the second, rather than increases in overall giving. Year dummies might help avert bias here, but including lagged prices of spousal bequests might do a better job of this.

Second, it is well known that the income tax deduction for charitable donations creates a strong incentive to give to charity during life instead of at death. An *inter vivos* donation avoids estate tax liability, because the funds are no longer there at death to be included in the estate. So estate and inheritance taxes do not by themselves affect the relative price of giving in life versus at death. But only gifts made to charities before the date of death are eligible for deductibility on the final income tax return of the decedent. Thus, making a charitable bequest means forgoing the income tax savings of the *inter vivos* deduction. If *inter vivos* charitable donations and charitable bequests were perfect substitutes, then we would expect to see no charitable bequests at all. In fact, charitable bequests and *inter vivos* charitable donations are unlikely to be perfect substitutes, for example because imperfections in annuity markets cause individuals to want to hold onto assets for as long as possible, as a precaution against running out of funds due to an unexpectedly long life. Still, for rich people, the extra tax savings from the *inter vivos* donation can be quite large, suggesting that substitution is a concern in for empirical work. People who face high estate tax rates also tend to face high marginal income tax rates, so the estimated effect of P^G may be biased. The people with the lowest prices of charitable bequest might leave smaller charitable bequests because higher marginal income tax rates induced them to give more during life instead – this would bias estimates of the price elasticity downwards in absolute value. This is further complicated by the fact that other things equal, a higher *inter vivos* donation also reduces W.

On the other hand, charitable giving during life and death could be complements. If the income tax subsidy to charity induces more giving during life, it may get the donor into the habit of behaving charitably, it may develop relationships between the donor and non-profit organizations, and it may get the donor on mailing lists of fundraisers, all of which could lead to higher rather than lower charitable bequests. In addition, there are some exceptions to the rule that charitable bequests cannot benefit from an income tax deduction. Certain kinds of charitable trusts enable one to obtain an income tax deduction for the donation of an asset to a charity during life, while retaining some benefits from the asset (such as a stream of income), and not fully transferring it until death. Conceptually this is somewhere between a bequest and an *inter vivos* donation. Importantly for our purposes, the asset in the trust may end up getting included as part of the gross estate at death on the estate tax form and then deducted, so that it is counted as a charitable bequest in the estate tax return data that form the basis of our study. In those cases, a higher marginal income tax rate would lead to larger rather than smaller charitable bequest, biasing the bequest price elasticity upwards.

The marginal tax rate on capital gains realizations could also affect bequest behavior in ways that influence estimates in equation (4). Capital gains are only taxed when an asset is sold, and assets held until death and passed on to heirs benefit from a "step up in basis" that effectively exempts the accumulated unrealized capital gains from taxation forever. Thus, by acting as a toll charge on sales of appreciated assets, a high marginal rate of capital gains tax raises the price of consuming or making *inter vivos* gifts out of appreciated assets, relative to making bequests to heirs, and might lead to some substitution towards the latter. We would thus expect high capital gains tax rates to be associated with larger wealth reported on estate tax returns at death. A cost of avoiding the capital gains tax in this way is that it may subject more assets to estate tax. Auten and Joulfaian (2001) find evidence that people who face higher estate tax rates also realize more capital gains during life, suggesting bequest and gain realization decisions are related. Importantly for our purposes, the capital gains tax does not create a similar incentive to postpone charitable giving. Capital gains on *inter vivos* charitable donations of appreciated assets avoid the capital gains tax, as do charitable bequests.[3] Thus, in equation (4), people who face high marginal capital gains tax rates might be expected to have lower charitable bequests at each given level of wealth. To the extent that capital gains and estate tax rates are positively correlated, the lower than predicted level of charitable bequests might be falsely attributed to high estate and inheritance tax rates.

To address these concerns, we add to our empirical specification three additional tax prices. In each case, we are concerned with measuring the effects of lagged tax rates on current decisions. To account for this, these variables are calculated using lagged ten-year moving averages of the tax rates.[4] We define P^S as the price of leaving \$1 after tax to a surviving spouse at the death of the first spouse. $P^S = 1/(1-es)$, where *es* is the marginal estate and inheritance tax rate on the gross-of-tax bequest to spouse. Second, we define P^D as the price of an *inter vivos* charitable donation relative to a charitable bequest. $P^D = (1-t^D)$, where t^D is the marginal income tax rate applicable to charitable deductions (equal to zero if charity is not deductible). Third, we define P^K as the price of consuming \$1 out of capital gains on appreciated assets. $P^K = 1/(1-t^K)$, where t^K is the marginal income tax rate on capital gains realizations. Effectively, we define the price of charitable bequests relative to a bequest to heirs, and then define all other prices relative to a charitable bequest. This is desirable because it separates out each tax instrument into a separate price variable. For policy purposes, we are interested in knowing the effect of a change in *e*, the tax rate on bequests to heirs, holding all other tax rates constant. This is what would be relevant for estimating the effect of estate tax repeal, for example. Specifying the prices in this way accomplishes this.[5]

Data and Taxes

The preliminary empirical analysis for this paper uses for this study is the same data as was used in BGS 2003. It was provided by the Statistics of Income Division of the Internal Revenue Service (IRS) and drawn from a confidential IRS data set of federal estate tax returns. The underlying data set contains a nearly 100 percent sample of federal estate tax returns for deaths through 1945, and a stratified sample of returns for selected postwar years, with sampling weights (i.e., weights based on the inverse of the sampling probability) available. The tables provided to us aggregate returns into cells based on year / state / wealth level / marital status combinations, and include the sample-weighted average charitable bequests and wealth measures for each cell.

For our preliminary work, we focus on returns filed by a second-to-die spouse. In 1998, these widows and widowers accounted for 44% of federal estate returns filed, and 63% of the aggregate value of charitable bequest deductions (Kopczuk and Slemrod, 2003, Table 7).

Our analysis includes all years for which the IRS conducted a study that drew a substantial sample of decedents, and for which information on state of residence and marital status are available. This leaves us with 39 years: 1924 through 1945, 1969, 1976, 1982, and

1985 through 1998. Data are arranged into cells based on five wealth categories, expressed in 1996 dollars: $400,000 to $750,000; $750,000 to $1.25 million; $1.25 million to $2 million; $2 million to $5 million; and $5 million and above. To maintain comparable compositions of decedents in each cell over time, we omitted cells for which the real federal estate tax filing threshold was above the minimum bound for the cell. After removing cells with no decedents in the sample (or in many cases, in the population) we have 6,615 cells.

The main explanatory variables of interest are disposable wealth at death and various tax prices. These require accurate measures of combined federal and state tax rates, which are not directly available in the data set. To address this, we take advantage of detailed tax calculators we have developed that compute combined federal-state inheritance and estate tax and income tax rates and liabilities for any individual in any state and any year. These calculators are described in Bakija (2004a and 2004b).

Pre-tax wealth (W) is defined as the gross estate reported on the federal estate tax return, minus debts and mortgages, plus certain components of wealth that were excluded from the gross estate.[6] This is close to a comprehensive measure of net worth at death that is largely consistent across time for our sample of widows and widowers. Returns are sorted into cells based on pre-tax wealth. As noted above "disposable wealth" (w) equals $W - E - (1\text{-}P^G)G$, that is, pre-tax wealth, less combined federal and state inheritance and estate tax liability, less the tax savings from charitable deductions (calculated at the marginal rate).

All marginal tax rates discussed above include both federal and state taxes. All are calculated by adding a $0.10 increment to the item in question and then dividing the change in tax liability by $0.10.[7] State inheritance taxes typically imposed different rates and exemptions depending on how the estate was divided up among different types of heirs. The data do not provide information on the recipients of bequests, so we assume that the net estate (after bequests to charity) is divided equally between two adult children. Our data do not contain information on past income, past size of spousal bequest, or date of death for the previous spouse (except for a small number of years in this last case). Because these are necessary to calculate tax rates, we construct imputed values. Income is imputed based on a regression of log real income on a cubic in log real net worth, age, age squared, marital status, and a measure of the nominal interest rate, using the 1989 through 2001 waves of the Survey of Consumer Finances.[8] Estate size at the death of the first spouse is assumed to be the same in real terms as estate of the second spouse. Because of the highly non-linear nature of taxation of spousal bequests, we compute those twice, once assuming a spousal bequest of 40 percent of the estate, and once assuming an 80 percent spousal bequest, with the remainder equally divided between two children. Our value of P_S is based on the average of these two. Again, in all cases, for all of the lagged price variables, we used lagged ten-year moving averages of the tax rates.

Our ability to distinguish the effects of various taxes from each other and from other, possibly unobserved influences, requires that the time-series path of tax rates differ substantially across different groups of people in our sample. Fortunately, the 1924-1998 time period spanned by our sample contains plenty of independent variation in these tax variables. Figures 1 through 3 and Tables 1 and 2 illustrate the nature of variation in tax states at the federal and state levels during the sample period.[9] There is enough correlation across the tax rates in the cross section and in the aggregate time series to suggest that omitting any of these could cause bias. This motivates our efforts to construct proxies for tax rates that are usually omitted from the analysis. Yet there is enough independent variation that we should be able to separately identify the effects of each tax even after removing aggregate time-series influences through year dummies, and cross sectional variation in tax rates caused by their nonlinear relationship with wealth, by controlling for either wealth dummies or a cubic in age.

Econometric Specification

Our full estimation equation is:

(5) $P^G_{it}G_{it}/w_{it} = \beta_0 + \beta_1 \ln(P^G_{it}) + \beta_2 \ln(w_{it}) + \beta_3\ln(P^S_{\mathrm{it}}) + \beta_4\ln(P^D_{\mathrm{it}}) + \beta_5\ln(P^K_{\mathrm{it}})$

$+ \boldsymbol{\beta_6}'\mathbf{X_{it}} + \varepsilon_{\mathrm{it}},$

where *i* indexes state-wealth class cells, and *t* indexes years. P^G_{it} is the price of charitable bequest relative to a bequest to heirs, based on current law applying at the date of death, calculated at a constructed value of taxable estate equal to sample-weighted mean value of gross estate less debts and charitable deductions.[10] G_{it} is the sample-weighted cell-mean charitable bequest. Disposable wealth at death (w_{it}), is calculated as sample-weighted mean pre-tax wealth for the cell minus the tax liability that applies at the cell-mean value of constructed taxable estate. Both *G* and *W* are measured in constant 1996 dollars, using the CPI-U. $\mathbf{X_{it}}$ is a vector of control variables, consisting of sets of dummy variables for wealth class, year, and state, depending on the specification.

We use instrumental variables to address the familiar problem that P_G and *w* are endogenously related to charitable bequests, since a larger donation to charity reduces tax liability and can push a decedent into a lower marginal tax bracket. Our approach to constructing the instrumental variables will also be an important part of our strategy for addressing certain forms of omitted variable bias, which will be discussed further in the next section. As an instrument for $ln(P_G)$, we construct a measure of $ln(P_G)$ based on the marginal tax rate at the midpoint of the wealth category of which each cell is a member, and setting charity equal to zero in the tax calculation to avoid endogeneity. This midpoint is constant in real terms over time. Similarly, to construct an instrument for *ln(w)*, we calculate ATR_M, the average tax rate (defined as tax liability divided by pre-tax wealth) calculated at the midpoint wealth in the cell, again with charity set to zero. The instrument is $ln[W \times (1\text{-}ATR_M)]$. In both cases, for the top wealth category, in place of a midpoint, we use the median level of wealth among the pooled observations from that category, which is $12.7 million in 1996 dollars. We also calculate the other prices based on the imputed incomes and first-to-die-bequests at the midpoint of each wealth class. As a sensitivity analysis and also in our specification involving a cubic in log wealth, we also try using the more conventional approach of using the "first dollar" tax rate and disposable wealth (that is, the values calculated using actual mean wealth in the cell but still setting charity to zero) as instruments.

Our model is estimated by weighted linear two-stage least squares, where the weights are based on the number of returns sampled by the IRS that underlie each cell.[11] The proportion of cells with zero charitable bequests, weighted in this fashion, is 3.3 percent, so censoring is present but is unlikely to be a large problem.[12] We compute standard errors that are clustered by each state / wealth category combination, and are thus robust to arbitrary correlation of errors within each of these categories, and robust to arbitrary heteroskedasticity across such combinations.

Elasticities are of particular interest in this application. In the Deaton-Muellbauer functional form, elasticities vary across individuals, depending on the expenditure share of charity. The elasticity of charitable bequest with respect to price for an individual (cell) is $\eta_{Pit} = \beta_1(w_{it} / P_{Git}G_{it})-1$; the wealth elasticity of charity is $\eta_{Wit} = \beta_2(w_{it} / P_{Git}G_{it})+1$. When β_1 or β_2 equal zero, the elasticity is –1 or 1, respectively. Thus, a significance test of the coefficient value is really a significance test for whether the elasticity is one in absolute value. Elasticities for the other prices are $\beta_j(w_{it} / P_{Git}G_{it})$, where j indexes each of the three other prices. For ease of interpretation, in all cases we present the elasticity of aggregate charitable bequests with respect to a uniform percentage change in price or disposable wealth for all observations. For price, this is $[\Sigma_{it}(G_{it}\eta_{Pit})] / (\Sigma_{it}G_{it})$; for wealth, it is $[\Sigma_{it}(G_{it}\eta_{Wit})] / (\Sigma_{it}G_{it})$.[13]

Results

The first four rows of Table 4 present an analysis similar to that in BGS 2003. They show the results from estimating different versions of equation (5), all using instruments for P_G and w where the tax parts of the variables are calculated a the midpoint wealth of each cell. Each successive specification adds a set of dummy variables that removes certain forms of identification from the independent variation left in w and especially P^G, thereby removing potential biases caused by omitted influences that may be correlated with those sources of identification. The one important difference from BGS 2003 is that, both on the right hand side and in the denominator of the dependent variable, we now define w as $W–E–(1-P_G)G$ (that is, after-tax wealth less the tax savings from the charitable deduction evaluated at the marginal rate) whereas before it was defined as W-E (after tax wealth). As noted above, the first is the theoretically preferred specification, and it is also more consistent with the approaches used in Randolph (1995) and Joulfaian (2000). We find that this change increased the price elasticity estimates substantially.

Specification (1) includes no control variables in **X**, thus allowing all forms of variation -- aggregate time-series, cross-sectional differences across wealth levels, etc. -- to identify price and wealth effects. This results in a price elasticity of -1.93 and a wealth elasticity of 1.39, both very precisely estimated. The most comparable estimate in the recent literature comes from Joulfaian (2001, p. 755), who finds a price elasticity of -0.74 and wealth elasticity of 1.54 using a roughly similar specification, but on a cross-section of 1992 unmarried decedents.

In specification (2), we add year dummies to (1), which removes aggregate time-series variation from the independent variation in price and wealth, eliminating the potential for omitted variable bias caused by time-varying aggregate influences that affected everyone's expenditure share of charity in a similar way. This by itself has little impact on the results; the price elasticity rises slightly to -2.00 and wealth elasticity drops to 1.41.

Specification (3) replicates the preferred specification from our previous paper, albeit with the change in the definition of *w* noted above. In this equation, we add a set of wealth class dummy variables and state dummy variables to (2). This not only allows for a more flexible and arbitrary non-linear relationship between wealth and charity, but in conjunction with the cell midpoint-based instrument set, it purges the independent variation in price of all variation caused by its non-linear relationship with wealth. We also include state dummies to control for any time-invariant omitted characteristics of states. The remaining independent variation in price comes from differences in the time pattern of state tax rates, and from differences across wealth classes in the changes over time in federal tax rates at fixed real wealth levels caused by statutory changes and bracket creep. This eliminates any bias to the price coefficient that might otherwise be caused by omitted non-linear functions of real wealth. The price elasticity estimate becomes much larger in this specification, with a point estimate of -3.89. The wealth elasticity increases to 2.02.

In specification (4), we replace the separate wealth class and state dummies with a dummy for each state and wealth class combination (i.e., now the wealth dummies are interacted with the state dummies). This specification is the closest to fixed-effect type estimator, treating the data as a pseudo-panel where people at a particular wealth level in a particular state are treated as similar people over time, and we control for a separate dummy for each of these groups, who are likely to have similar time-constant omitted characteristics. Here the price elasticity estimate rises further to -4.27, and the wealth elasticity is 2.15, suggesting a very strong response to incentives indeed.

Thus far, it appears that the various sources of omitted variable bias that we have addressed must have been biasing the price elasticity downward (in absolute value) by a significant margin. However, there remains the possibility that other tax prices, which have so far been omitted, may be driving some of the results, since the other taxes also change in different ways over time for different wealth classes and states, in ways that are correlated with P^G.

Row 5 shows the estimates after adding the three additional tax prices. First, a one percent increase in the price of a bequest to a surviving spouse is estimated to reduce the subsequent charitable bequests of the surviving spouse by 2.44 percent. This would be consistent with substantial intertemporal substitution of charitable giving from the second spouse to the first spouse in response to the lower price of giving when the first spouse dies. A one percent increase in the price of *inter vivos* charitable donations is found to *reduce* subsequent charitable bequests by 0.81 percent, albeit with a large standard error of 0.53. In other words, controlling for other taxes and wealth, people with higher marginal income tax rates appear to give more to charity at death, despite the fact that it forgoes the tax savings from the income tax deduction. This seems to suggest that charitable giving during life and death are complements rather than substitutes, although it could to some extent reflect the use of trusts that would cause some charitable deductions listed on the estate tax return to also have benefited from income tax deductions earlier.

Finally, we find that a one percent increase in the price of realizing capital gains is associated with a large 3.19 percent decline in charitable bequests. This would be consistent with a strong "lock in" effect that causes people to retain appreciated assets and pass them on to heirs, increasing the total size of estate (and thus, increasing measured wealth in our data), but that does not cause people to switch from *inter vivos* donations to charitable bequests (as gains realized for purposes of charity escape tax either way). The negative coefficient would arise because high capital gains tax rates are associated with lower charitable bequests than would be predicted based on wealth.

The net effect of adding these variables is to reduce the price elasticity to -2.85 and increase the wealth elasticity slightly to 2.26. This suggests that, at least after removing cross-sectional and aggregate time series sources of identification, omission of these other tax prices had been biasing price elasticity estimates upwards in absolute value, which is consistent with our intuition. As noted above, the long-term time-series pictures in Figures 1 through 3 are consistent with the notion that part of the rise in giving among widowed decedents represents shifting of the same giving from first spouse to second as spousal deductions become more generous. Nonetheless, our estimate of the price elasticity remains quite large, and still larger than the wealth elasticity.

In Table 2, we try an alternative approach to addressing the functional form bias question raised by Feenberg (1987). In the specifications above, we attempt to address both that issue and unobserved heterogeneity by controlling for wealth class dummies. We do not use the coefficients on these dummies to contribute to our estimates of the wealth elasticity. Rather, they are treated as fixed effects, meant to control for time-invariant unobservables that influence giving and may be correlated with wealth. An alternative approach would be to focus on the problem that the price elasticities may be biased because of their association with omitted nonlinear functions of wealth that also influence giving, and specify a very flexible functional form. To this end, we estimate a model with a cubic polynomial in ln(w). First, in equation (6), we show the effects of removing the wealth dummies and switching from "midpoint" based tax instruments to "first dollar" tax rates (that is, calculated setting charity to zero), while retaining all of the price variables as well as year and state dummies. This is intended to help isolate the effect of introducing the more flexible form of wealth in equation (7). We find that the cubic in log wealth increases the price elasticity from -1.88 to -2.09, and reduces the wealth elasticity from 1.55 to 1.47. All of the tax prices, including the price of *inter vivos* giving, now have large negative estimated effects. In sum, this alternative approach does not differ greatly from the bottom line from Table 1 – both price and wealth elasticities are found to be large, with the price elasticity the larger of the two.

Finally, Table 3 shows how the wealth elasticities implied by equation (7) differ across wealth classes – these are evaluated at the aggregate giving share and mean wealth within each wealth class. The estimates suggest that the wealth elasticity is greater than 1 in all groups but that it decreases with wealth. In other words, the share of wealth given to charity is increasing in wealth, but at a decreasing rate. The top wealth class (estates over $5 million) is particularly interesting because it accounts for such a disproportionate share of giving, and estate tax exemption levels have been rising rapidly, excluding many in the lower groups already. The estimated wealth elasticity in the top wealth class is 1.27, as compared to a price elasticity of -2.09.

Conclusion

In sum, the conclusion that charitable bequests are highly elastic with respect to tax incentives remains robust to controlling for other tax rates that might also be expected to influence bequest decisions. When estimated on pooled cross-sectional data from 1924-1998, we find that high lagged spousal bequest tax rates and high lagged capital gains tax rates have a strong negative effect on subsequent charitable bequests. Including these variables reduces the magnitude of the estimated price elasticity, but the estimate remains large. To interpret what these results might suggest about the potential effects of repealing the estate tax altogether, bear in mind that because the tax is progressive, eliminating it would increase prices by a larger percentage than it would increase after-tax wealth. Thus, if the price and wealth elasticities were equal, we would still expect to see a decline in charitable bequests. In addition, the Deaton Muellbauer expenditure share equation that we use is not a constant elasticity specification – rather, the elasticity changes with the expenditure share. McClelland (2004) simulated the effects of estate tax repeal on micro data of year 2000 estate tax return filers based on the estimated coefficients from our preferred specification from BGS 2003. Calculated the implied change in charitable bequest for each individual and summing up into the implied aggregate change suggested that charitable bequests among those current estate tax return filers would have fallen by 22 percent. The elasticity estimates in that preferred estimate were -2.14 for price and 1.55 for wealth. Given that the gap between price and wealth elasticities remains similar in our current study, this is probably still in the right ballpark.

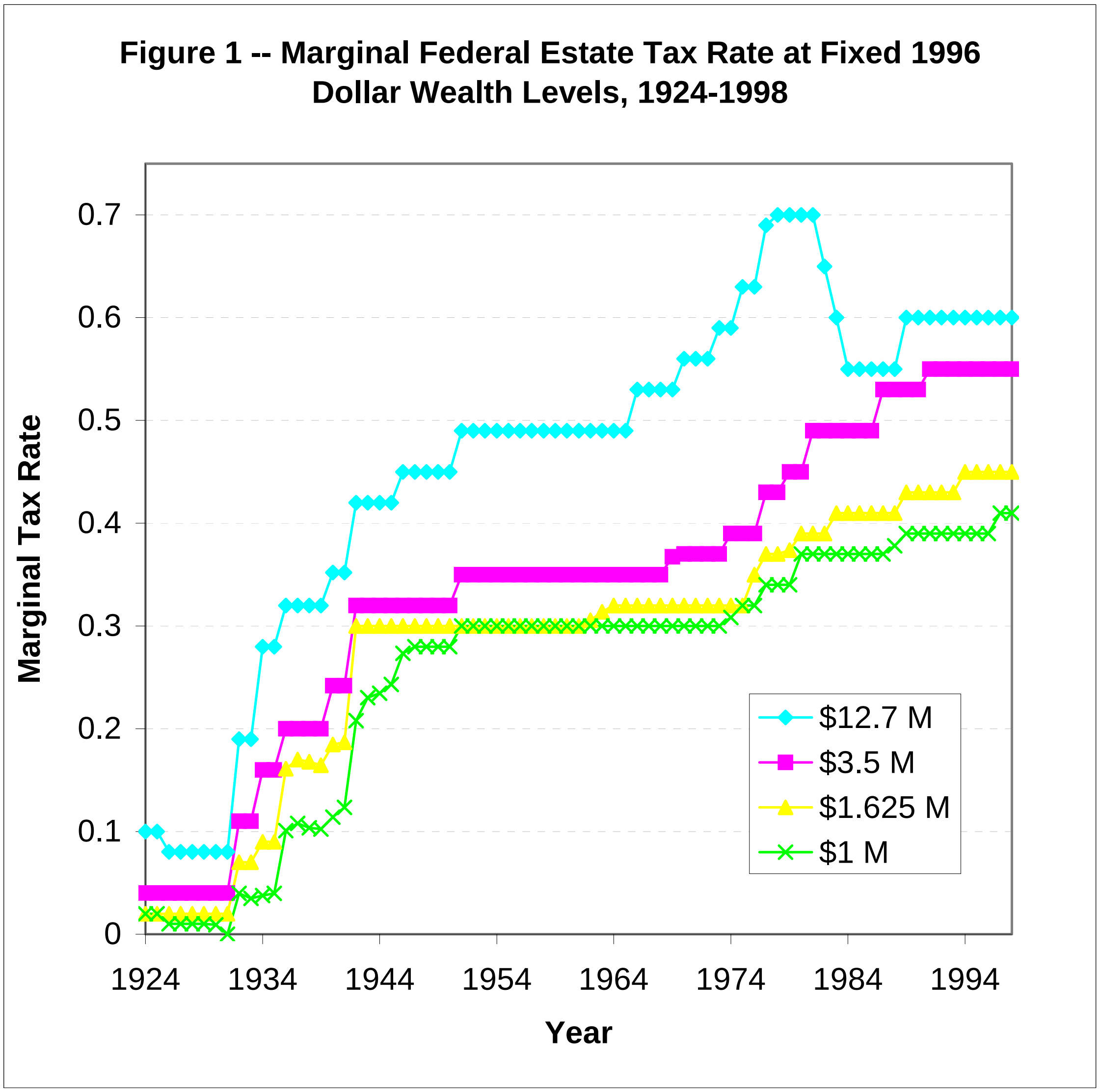


Figure 1 -- Marginal Federal Estate Tax Rate at Fixed 1996 Dollar Wealth Levels, 1924-1998
Marginal Tax Rate
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1924
1934
1944
1954
1964
1974
1984
1994
Year
$12.7 M
$3.5 M
$1.625 M
$1 M

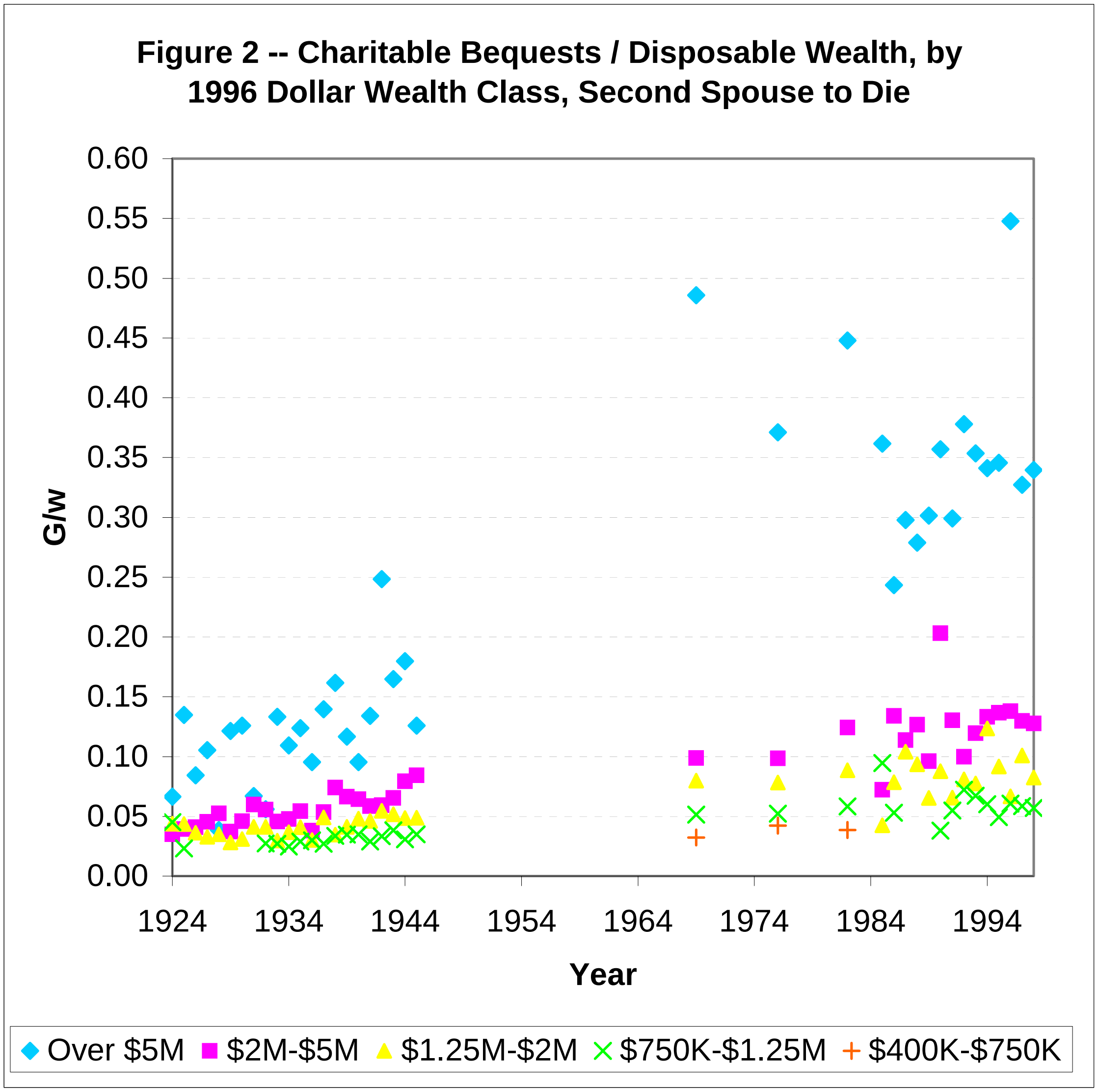


Figure 2 -- Charitable Bequests / Disposable Wealth, by
1996 Dollar Wealth Class, Second Spouse to Die
G/w
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1924
1934
1944
1954
1964
1974
1984
1994
Year
Over $5M
$2M-$5M
$1.25M-$2M
$750K-$1.25M
$400K-$750K

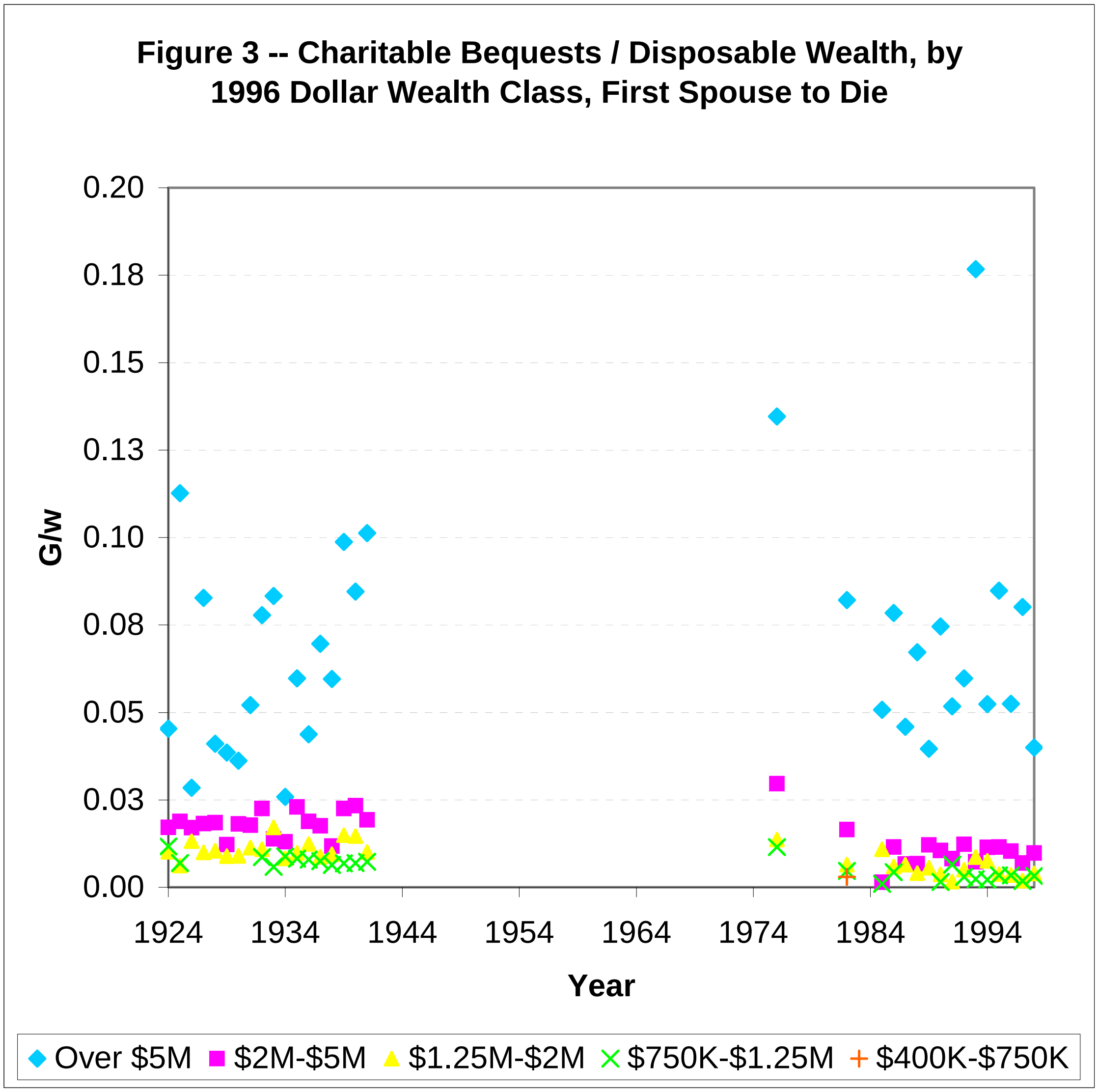
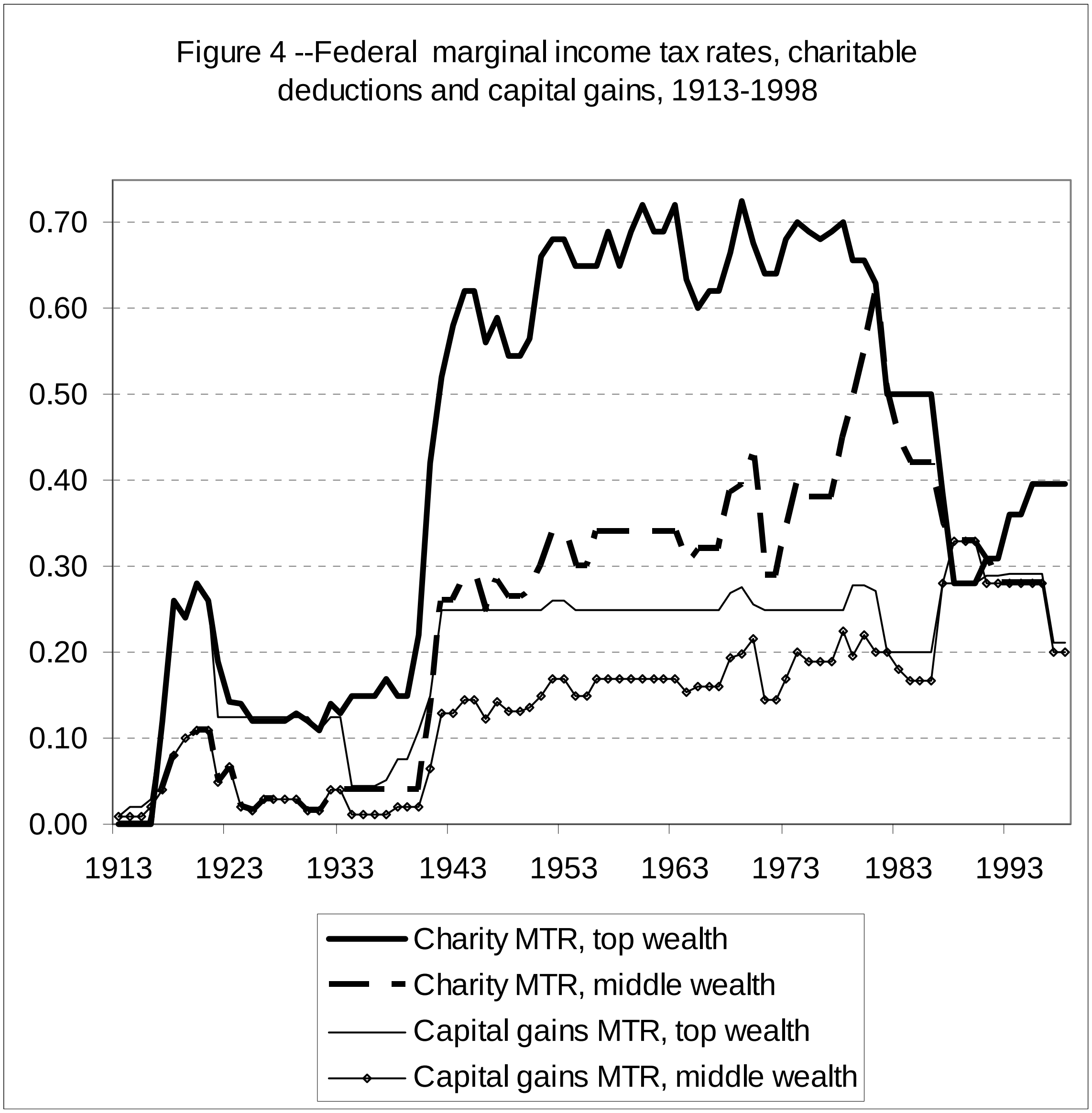


Figure 3 -- Charitable Bequests / Disposable Wealth, by 1996 Dollar Wealth Class, First Spouse to Die
G/w
0.20
0.18
0.15
0.13
0.10
0.08
0.05
0.03
0.00
1924
1934
1944
1954
1964
1974
1984
1994
Year
Over $5M
$2M-$5M
$1.25M-$2M
$750K-$1.25M
$400K-$750K



Note: marginal tax rates (MTRs) for "top wealth" and "middle wealth" are based on imputed income associated with median wealth in top category ($12.7 million) and midpoint of middle category ($1.625 million) in constant 1996 dollars.

Table 1 – Marginal state inheritance and estate tax rates, relative to a “soak up only” state, $1.625 million estate (in constant 1996 dollars)

Bequest split between two adult children						Bequest to spouse (average of rates at 40% and 80% spousal bequests)					
State	1924	1945	1969	1982	1998	State	1924	1945	1969	1982	1998
ak	2.5	0.6	-0.7			ak	2.7	0.8	2.8		
al						al					
ar	5.4					ar	5.4				
az	0.5					az	0.5				
ca	3.4	1.3	4.8			ca	4.9	2.5	3.1		
co	2.5	3.9	5.1			co	3.0	4.5	7.6		
ct	1.5		2.0	2.2		ct	2.0		5.5	7.8	
dc		-0.2				dc		0.3	2.4	5.5	
de	1.5	1.4	0.8	0.4	-1.2	de	2.0	0.9	3.1	4.0	
fl						fl					
ga	1.5					ga	1.8				
hi	2.0	0.2	1.1			hi	2.2	0.4	4.7	3.5	
ia	2.0	1.3	1.8	-0.3		ia	2.7	0.6	6.1	8.0	
id	1.5	2.7	2.5	1.1		id	1.7	3.6	7.9	0.3	
il	3.4	1.3	-0.4	1.1		il	3.5	0.6	5.9	11.9	
in	2.5	1.4	-0.2	-0.6		in	2.5	1.4	3.6		
ks	2.5	0.6	-0.4			ks	0.2		1.3	0.1	
ky	2.5	3.4	1.8	-0.3		ky	3.0	3.8	6.5	9.0	
la	2.5	1.4	-0.2			la	2.5	1.4	2.6	3.0	
ma	3.4	1.6	1.3	7.4		ma	3.4	2.1	6.0	13.0	
md		-0.9				md		-0.9	0.5	0.5	0.5
me	1.0	0.6	-0.4	-0.6		me	1.2	1.0	4.2	7.5	
mi	1.5	2.4	0.8	1.4		mi	1.5	2.4	4.1	7.5	
mn	2.5	0.9	1.8	1.7		mn	2.9	1.1	4.3		
mo	3.4	0.6	-0.4			mo	3.0	1.0	3.8		
ms	4.5	0.8				ms	4.5	0.8	2.8	5.6	
mt	2.5	2.7	2.5			mt	2.9	3.6	7.1		
nc	1.5	2.1	1.8	0.4		nc	2.0	2.6	5.1	6.5	
nd	2.0	4.1	3.9			nd	2.2	4.1	1.0		
ne	0.5	-0.9				ne	0.5	-0.9	0.5	0.5	
nh						nh					
nj	1.0	0.4	0.8	1.4		nj	1.0	0.9	4.6	8.0	
nm	0.5	-0.6				nm	0.5	-0.6	0.6		
nv	2.5					nv	3.0				
ny	1.5	0.4	1.8	2.4	2.8	ny	2.0	0.4	0.6	1.3	
oh	1.5	-0.2	2.8	1.4	-0.2	oh	2.0	0.2	5.6	7.0	
ok	2.5	4.4	3.3	1.9	0.8	ok	2.9	4.4	6.1		
or	2.5	3.4	3.8	6.4		or	2.5	3.4	6.6	12.0	
pa	1.5	0.4	2.8	0.4	-1.2	pa	1.5	0.4	5.6	6.0	1.0
ri	1.0	2.4	2.8	2.4		ri	1.0	2.4	6.1	8.0	
sc	3.4	0.6	2.8	1.4		sc	3.0	1.0	5.6	1.8	
sd	2.5	1.4	2.8	1.4	-0.2	sd	3.0	1.9	5.6		
tn	2.5	2.4	3.3	3.9	2.3	tn	2.5	2.4	6.1	1.9	
tx	1.5	0.4	-0.2			tx	2.0	0.9	3.1		
ut	4.5	8.4	6.8			ut	4.5	8.4	9.6		
va	1.5	-0.2				va	2.0	0.3	2.4		
vt	3.4	1.3	0.4			vt	3.4	1.4	4.7		
wa	1.5	1.3	3.8			wa	2.0	2.1	7.6		
wi	5.5	4.0	4.2	1.1		wi	6.5	5.1	9.3	0.4	
wv	3.4	2.0	0.4	0.4		wv	3.7	2.1	5.1	9.9	
wy	1.5	-0.2				wy	1.5	-0.2	1.5	1.0	

Blank indicates zero

Note: a “soak up only” state is a state that operates a tax exactly equal to the maximum available federal credit for state inheritance and estate taxes, and thus imposes no incremental burden. Note that state taxes can reduce the combined federal-state marginal tax rate below the federal rate due to complicated interactions with the credit, which explains the negative values in the table above.

Table 2 – Marginal state income tax rates on long-term capital gains and charitable deductions, relative to a state with no income tax, on imputed income associated with $1.625 million wealth (in constant 1996 dollars)

	Long-term capital gain						Charitable deduction				
State	1924	1945	1969	1982	1998	State	1924	1945	1969	1982	1998
ak			1.8			ak			3.7		
al		2.8	2.5	2.1	2.9	al		2.3	1.9	1.3	2.6
ar		1.2	2.4	3.5	4.3	ar		1.0	2.4	3.5	5.0
az		1.2	1.4	0.8	3.3	az		1.0	2.8	1.9	3.3
ca		0.2	2.7	3.7	6.7	ca		0.7	5.4	5.5	6.7
co		0.5	1.4	0.8	3.4	co		1.0	2.8	2.1	3.6
ct			1.8		3.2	ct					
dc			1.8	2.2	6.8	dc		0.7	3.6	5.5	6.8
de	2.0	1.2	4.8	2.7	5.0	de		1.0	4.8	6.8	5.0
fl						fl					
ga		1.8	1.8	1.2	4.1	ga		1.5	3.6	3.0	4.1
hi	2.3	-0.2	2.2	2.0	4.9	hi	-0.1	1.0	4.8	5.0	6.6
ia		-0.2	1.0	1.2	5.3	ia		1.0	2.0	2.9	4.8
id		3.1	1.7	1.5	5.9	id		2.6	3.4	3.8	5.9
il			0.8	1.3	2.2	il					
in		0.7	0.6	0.4	2.5	in					
ks		0.3	1.2	0.9	4.6	ks		1.3	2.4	2.4	4.6
ky		-0.3	1.2	0.6	3.9	ky		1.5	2.4	1.6	3.9
la		1.2	2.0	0.4	3.3	la		1.0	1.5	1.0	3.0
ma	2.9	2.4	4.7	2.2	2.2	ma	0.0				
md			1.5	1.0	3.5	md		0.7	3.0	2.5	3.5
me			0.3	2.0	6.1	me			1.2	5.0	6.1
mi			0.8	1.0	3.2	mi					
mn		1.3	1.9	1.9	6.1	mn		2.6	3.8	4.7	6.1
mo	1.0	1.5	0.7	0.6	4.3	mo	1.0	1.3	1.5	1.6	4.3
ms	2.9	1.4	2.4	1.9	3.6	ms	2.9	1.4	2.4	1.9	3.6
mt		1.2	1.5	1.1	5.9	mt		1.0	2.9	2.6	5.3
nc	2.0	3.6	4.2	3.5	5.6	nc	2.0	3.6	4.2	3.5	5.6
nd	2.9	0.5	1.9	0.7	1.9	nd	2.9	1.0	3.8	1.8	2.7
ne			1.2	1.6	4.9	ne			2.3	4.0	4.8
nh						nh					
nj				1.3	4.0	nj					
nm		0.6	2.1	1.1	5.5	nm		0.5	4.2	2.7	5.5
nv						nv					
ny	0.7	1.1	2.7	4.6	4.9	ny	0.7	1.4	5.4	7.0	
oh				0.9	3.9	oh					
ok	0.7	1.0	1.1	1.1	4.7	ok		2.0	2.1	2.8	4.7
or		3.7	2.0	2.2	6.5	or		3.1	4.0	5.4	6.5
pa				1.1	2.0	pa					
ri			5.1	2.0	3.6	ri				5.0	5.1
sc	0.7	2.8	2.1	1.8	2.8	sc	0.7	2.8	4.2	3.5	5.0
sd						sd					
tn						tn					
tx						tx					
ut		2.5	3.2	0.8	4.6	ut		2.0	2.4	2.0	4.4
va	2.0	1.8	3.0	1.2	4.1	va		1.8	3.0	2.9	4.1
vt			2.8	2.2	3.4	vt			5.6	5.5	4.7
wa						wa					
wi	2.7	2.3	5.5	4.0	2.0	wi	2.7	2.4	5.5	5.0	4.9
wv			0.8	1.6	4.7	wv			1.6	4.0	
wy						wy					

Blank indicates zero.

Table 3 – Elasticities of aggregate giving, specifications with midpoint-based tax instruments

	P_G Price of bequest to charity relative to bequest to child	w After-tax wealth	P_S Lagged price, spousal bequest	P_D Lagged price, inter-vivos charitable donation	P_K Lagged price, consumption out of capital gains
(1) No controls	-1.93 (0.12)	1.39 (0.03)			
(2) Add year dummies to (1)	-2.00 (0.47)	1.41 (0.06)			
(3) Add wealth class dummies and state dummies to (2)	-3.89 (0.64)	2.02 (0.19)			
(4) Add dummies for each state / wealth class combination to (2)	-4.27 (0.78)	2.15 (0.24)			
(5) Add other tax prices to (4)	-2.85 (0.40)	2.26 (0.24)	-2.44 (0.60)	-0.81 (0.53)	-3.19 (1.49)

Estimated by weighted least squares (weighted by the number of sampled returns underlying each cell mean). Robust standard errors with clustering by state / wealth class combination are included in parentheses.

Table 4 – Elasticities of aggregate giving, specifications with first-dollar-based tax instruments

	P_G Price of bequest to charity relative to bequest to child	w After-tax wealth	P_S Lagged price, spousal bequest	P_D Lagged price, inter-vivos charitable donation	P_K Lagged price, consumption out of capital gains
(6) Include year dummies, state dummies, and other tax prices	-1.88 (0.80)	1.55 (0.17)	-2.71 (0.68)	-1.08 (0.55)	-4.12 (1.26)
(7) Add $(\ln w)^2$ and $(\ln w)^3$ to (6)	-2.09 (0.72)	1.47 (0.22)	-3.74 (0.73)	-2.43 (0.62)	-6.17 (1.36)

Estimated by weighted least squares (weighted by the number of sampled returns underlying each cell mean). Robust standard errors with clustering by state / wealth class combination are included in parentheses.

Table 5 – Estimated elasticity of aggregate charitable bequests by wealth class, specification (7)

Wealth class (constant 1996 $)				
$400,000 – $750,000	$750,000 – $1,250,000	$1,250,000 – $2,500,000	$2,500,000 – $5,000,000	Over $5,000,000
5.05 (2.60)	2.20 (0.78)	1.74 (0.47)	1.48 (0.27)	1.27 (0.08)

Table A.1 – Estimated coefficients (dependent variable = $P_G G/w$)

	ln(P)	ln(w)	$[\ln(w)]^2$	$[\ln(w)]^3$	lnPs	lnPd	tk
Midpoint IV							
(1) No controls	-0.082 (0.01)	0.035 (0.000)					
(2) Add year dummies to (1)	-0.089 (0.041)	0.036 (0.005)					
(3) Add wealth class dummies and state dummies to (2)	-0.256 (0.056)	0.090 (0.017)					
(4) Add dummies for each state / wealth class combination to (2)	-0.290 (0.069)	0.102 (0.020)					
(5) Add other tax variables to (4)	-0.164 (0.035)	0.112 (0.020)			-0.216 (0.054)	-0.072 (0.047)	-0.283 (0.132)
First dollar IV							
(6) Include year dummies, state dummies, and other taxes	-0.078 (0.071)	0.048 (0.015)			-0.240 (0.061)	-0.096 (0.048)	-0.365 (0.111)
(7) Add $(\ln w)^2$ and $(\ln w)^3$ to (6)	-0.096 (0.063)	3.335 (1.657)	-0.232 (0.110)	0.005 (0.002)	-0.243 (0.064)	-0.127 (0.055)	-0.459 (0.121)

Estimated by weighted least squares (weighted by the number of sampled returns underlying the cell mean). Robust standard errors with clustering by state / wealth class combination are included in parentheses. Note that for ln(P) a coefficient of zero indicates an elasticity of -1. For ln(w), except equation (7), a coefficient of zero indicates an elasticity of 1.

REFERENCES

Auten, Gerald, and David Joulfain. 2001. “Bequest Taxes and Capital Gains Realizations.” *Journal of Public Economics.* Vol. 81. pp. 213–229.

Bakija, Jon, William Gale, and Joel Slemrod. 2003. "Charitable Bequests and Taxes on Inheritances and Estates: Aggregate Evidence from across States and Time." *American Economic Review*, (May).

Bakija, Jon. 2004a. “Documentation for a Federal-State Inheritance and Estate Tax Calculator Covering the Years 1900-2002.” Working paper, Williams College.

Bakija, Jon. 2004b. “Documentation for a Federal-State Personal Income Tax Calculator Covering the Years 1900-2002.” Working paper, Williams College.

Deaton, Angus S., Muellbauer, John. 1980. “An Almost Ideal Demand System." *American Economic Review*. 70(3), pp. 323-326.

Feenberg, Daniel. 1987. "Are Tax Price Models Really Identified: The Case of Charitable Giving." *National Tax Journal*. 40(4), pp. 629-633.

Johnson, Barry W. and Martha Britton Eller. 2001. “Elements of Federal Estate Taxation” in William G. Gale, James R. Hines Jr., and Joel Slemrod, eds., *Rethinking Estate and Gift Taxation.* Washington, DC: Brookings Institution Press.

Joulfaian, David. 2000. “Estate Taxes and Charitable Bequests by the Wealthy.” *National Tax Journal*. 53(3), Part 2, pp. 743-763.

Kopczuk, Wojciech and Joel Slemrod. "Tax Impacts on Wealth Accumulation and Transfers of the Rich," in Alicia Munnell and Annika Sunden, eds., *Death and Dollars: The Role of Gifts and Bequests in America*. Washington, DC: Brookings Institution Press, 2003.

McClelland, Robert. 2004. “Charitable Bequests and the Repeal of the Estate Tax.” Congressional Budget Office Technical Paper, July.

Randolph, William C. “Dynamic Income, Progressive Taxes, and the Timing of Charitable Contributions.” *Journal of Political Economy*, 1995, 103(4), pp. 709-738.

Endnotes

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[1] Note that the right hand side is essentially the same as "first dollar" disposable wealth, that is, wealth minus tax liability calculated at G = 0 – the two are identical if the tax function is linear, and only differ to the extent that charity pushes the taxpayer into a different marginal rate bracket. Joulfaian (2000) simply uses first dollar disposable wealth as the explanatory variable – we follow Randolph in using $W - E(I, G) - (1-P_G)G$ and instrumenting for it using a measure of after-tax wealth that does not depend on G. Not surprisingly we found it made little difference either way.

[2] The deduction was the greater of 50 percent of the estate and $250,000 between 1977 and 1981.

[3] Capital gains on donations of appreciated assets could be taxable at the federal level between 1987 and 1992 in cases where the taxpayer was subject to the alternative minimum tax (this treatment persisted at the state level in New York and California for a few years after 1992 as well). We do not yet take this into account in our analysis.

[4] Our data do not provide information on the date of death of the first spouse. The underlying micro-data of federal estate tax returns do have information on this, but only starting in 1986.

[5] Alternatively, one could define all prices relative to a single numeraire. Both are consistent with the expenditure share equation. It can be shown that the coefficients in one version are just a linear combination of the coefficients in the other. Our method of arranging the coefficients, however, is more useful for interpreting the policy implications of the estimates.

[6] Until 1942, up to $40,000 of life insurance owned by the decedent could be excluded from the gross estate. Starting in 1977, the difference between the market value of certain farm and small business property and its "special use" value in that capacity could be excluded. Each of these exclusions is added back in to our measure of wealth to maintain consistency over time.

[7] The small increment is selected to avoid "kinks" that produce large marginal tax rates, as these kinks tend to occur when one crosses an integer dollar boundary. If our calculator encounters such a kink that creates a marginal tax rate greater than 90 percent, it re-calculates the marginal rate based on a 10 cent reduction in item in question.

[8] In performing the income imputations with the aggregated data, we assume age is 70. Our tax calculators also require information on the composition of income and deductions. In order to approximate the typical composition of income deductions of wealthy elderly households, we assume that components of income and deductions are the same share of income as we found among tax returns with at least one taxpayer aged 65 or over who fall into the top 5 percent of the national income distribution among such elderly households in 1980. Data on this were obtained from the 1980 public use Statistics of Income cross-sectional file of individual income tax returns.

[9] Note that between 1948 and 1982, the incremental marginal rates of state inheritance and estate tax rates were often larger for spousal bequests than for bequests to adult children. This is largely because of an interaction with the federal deduction for

[10] The data do not provide direct information on taxable estate for all years. To maintain consistency over time, we use a constructed value equal to gross estate less debts and mortgages and the charitable deduction.

[11] Weighted regression is necessary for consistent estimation of standard errors and efficiency when the data represent means of the values for multiple individual observations. The variance of these means will be inversely proportional to the number of individuals contributing to the calculation of the mean for each cell, causing heteroskedasticity.

[12] We also tried estimating each equation with a Tobit model (results not shown), and found that the elasticity estimates were very similar.

[13] To compute the aggregate elasticity in this framework, first note that in general the aggregate elasticity = $(\Sigma\Delta G_{it} / \Sigma G_{it}) \times 100$ where ΔG is the change in charitable giving in response to a 1% change in P, and Σ is the sum over all i and t. The formula for an elasticity $\eta = (\Delta G / \Delta P^G) \times (P^G / G)$ implies $\Delta G = \eta G\ (\Delta P^G / P^G) = \eta G(.01)$. Canceling out the .01 and the 100 gives us an aggregate elasticity of: $(\Sigma \eta G_i / \Sigma G_{it})$

Substituting in the expenditure-share formula for a price elasticity (β) gives us $\Sigma\{[\beta(w_{it} / P^G{}_{it} G_{it})\text{-}1]\ G_i\ \} / \Sigma G_i$
$= \{\Sigma[\beta(w_{it} / P^G{}_{it} G_{it}) G_{it}] / \Sigma G_{it}\ \} - 1$
$= \beta[\Sigma(w_{it} / P^G{}_{it}) / \Sigma G_{it}\ ] - 1$
$= \beta / \omega_A - 1$

The aggregate elasticity can thus be computed by evaluating the elasticity formula at a particular expenditure share $\omega_A = \Sigma G_{it} / \Sigma(w_{it} / P^G{}_{it})$. This holds true for the other elasticities as well.

In the specification with the cubic in *ln(w)*, the wealth elasticity is $\{\beta_2 + 2\gamma_1[\ln(w_{it})] + 3\gamma_2[\ln(w_{it})]^2.\}/(P^G it G_{it}/w_{it}) + 1$, where γ_1 and γ_2 are the coefficients on $[\ln(w)]^2$ and $[\ln(w)]^3$, respectively. In this case, we calculate a separate elasticity for each wealth category, based on a value of ω_A specific to that category, as well as the mean value of *w* for the category. We report both the giving-weighted mean across those categories, as well as each wealth-class specific elasticity. The standard error is computed using the nlcom procedure in Stata.