Substituting Donkeys for Religion?: Testing the Homogeneity of Philanthropy

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Abstract

A substantial portion of the economic literature on giving has focused on estimating price and income elasticities of giving as the received wisdom suggests that a price elasticity greater than unity is indicative of the "treasury efficiency" of the tax deductibility of charitable contributions; that is the loss to tax revenue is less than the increase in giving. However, a major limitation of nearly all the previous studies has been the implicit assumption that charity is a homogenous good, meaning giving to one type of charity is a perfect substitute for any other and the responsiveness of giving to various causes to changes in price and income is equal across those causes. This paper tests this assumption by looking at giving across several different charitable causes.

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Introduction

Economists have long been interested in philanthropic behavior and its underlying determinants, producing dozens of papers looking at the effects of the tax-price, income, donor characteristics, government actions, interdependent preferences and recipient behavior on giving. Despite decades of research on giving, many issues remain unresolved and thus further work is required. Taking into consideration the popular revival of philanthropy[1], the contemporary emphasis on "effective" giving and the sheer magnitude of total donations one might argue that charitable behavior now warrants more attention from economists than ever before.

The economic literature on giving has largely focused on the individual's decision of how much to give. The question of to whom to give has largely been ignored. As a result, nearly all of the empirical work has been carried out with a rather strong implicit assumption; that charity is a homogenous good. This assumption requires that giving to one cause, or type of organization, say animal charities such as the Donkey Sanctuary, be a perfect substitute for giving to any other type, religious charities like the Catholic Church, say.

While the assumption of homogeneity is not necessarily invalid, it should be immediately apparent that it is questionable and at the very least should be verified. The identified motivations for giving are many and it is difficult to make a case for any one motivation or combination being the sole determinant of giving to all causes under all circumstances.[2] Differing motivations may indeed imply differing responsiveness to economic variables.

Further doubts as to the validity of modeling aggregate giving are raised by the composition of that giving given the stated motivations for past research. Since in the US charitable donations may be deducted from taxable income, a fundamental pursuit of economists in this field has been the identification of the tax-price elasticity of giving. A tax-price elasticity in excess of unity is indicative of the treasury efficiency of the tax deductibility of giving as then the foregone tax revenue is exceeded by the increase in aggregate giving.

The definition of unitary price elasticity as a benchmark for the treasury efficiency of the tax deduction is an artifact of Becker's early theoretical treatment of giving. If t is the marginal tax rate, and D is the deducted donation, then tax revenue is decreased by tD. The increase in contributions will then exceed tD if

1) $$\partial D/\partial t > t\left[\partial D/\partial t\right] + D$$

note that

2) $$\partial D/\partial t = -\partial D/\partial(1-t)$$

Then rearranging we get

[1] See: "The Power of Philanthropy," Fortune, September 18, 2006; "Rise of Competitive Philanthropists," Financial Times, November 15, 2006; "All Shall have Prizes," The Economist, March 1, 2007

[2] An appendix discussing the motivations for giving and is available from the author upon request.

3) $$\left[\partial D/\partial(1-t)\right]\left[(1-t)/D\right]=\left[\partial D/\partial T\right]T/D<-1$$

So, the loss in revenue is exceeded by the increase in contributions if and only if giving is price elastic.

Price elastic giving is not an indicator of treasury efficiency for all causes, however. The price-responsiveness of religious giving is irrelevant to the assessment of efficiency because the US government is constitutionally restricted from funding religious organizations, though this has been challenged to a degree over the last seven years.[3] Disaggregating giving into at least religious and secular giving is therefore an obvious place to start.

However, even conventional single equation models of secular giving will offer an incomplete picture of the decision to give if the implicit homogeneity assumption is invalid as the identification of the determinants of aggregate secular giving may hide different effects on giving to different secular causes. A constant elasticity specification, used in most of the research, for each recipient type is inconsistent with a constant elasticity specification for aggregate giving. This problem arises as the logarithmic specification is really an approximation of some non-linear relationship. While this problem exists anytime such an approximation is used, it is amplified if the homogeneity assumption is invalid as the aggregate and individual relationships are not identical.

While there is a large literature estimating the price and income effects on total giving using panel data and a number of studies which disaggregate giving to some degree, this paper is the first to estimate price and income elasticities using a correct dependent variable, giving to different causes, while mitigating omitted variables bias with use of panel data. The homogeneity assumption will be tested empirically by looking at donor behavior across a number of different charitable causes using micro-level data on donors and introduces unbalanced panel endogenous selection (double hurdle) models to the literature.

The initial analysis is comprised of two parts. The first follows the established convention of estimating price and income elasticities of giving, though in a cause specific framework and with models that more accurately capture the decision making process of donors. Advances are made in the construction of the price variable, a function of the marginal tax rate and thus income, as this is the first use of recent data on the proportion of non-cash gifts that are appreciated assets and thus subject to a unique tax deduction schedule.

The second part will use the estimated elasticities to construct cause specific indexes of altruism extending the work in Andreoni (1989, 1990). These indexes measure, in relative terms, how altruistic motives change as income varies and provide another mode of testing the implicit homogeneity assumption. The two approaches will be used to examine variation in the determinants over income quantiles and the consistency of policy implications of the two theoretical models over different causes are examined.

[3] See: 'Mr. Bush's 'Faith Based' Agenda," New York Times, July 8, 2001

The paper proceeds as follows. Section II provides a review of the relevant literature in this area and presents the theoretical underpinnings of the index of altruism. Features of the data employed and variable construction are described in section III. Section IV goes over some relevant econometric issues and model specification. Results and a discussion of the econometric approach are all discussed in section V. Section VI draws some conclusions.

Section II: Literature Review

Theoretical Foundations

The majority of the economic research done on giving has been of an applied nature. The theoretical literature has focused on explaining how seemingly selfless behavior can be reconciled with the classical conception of the self-interested economic agent with a well-behaved utility function.[4] There is a smaller theoretical literature that can be divided into three principal schools: Pure Altruism or Pure Public Goods (Becker (1961, 1974), Ribar and Wilhelm (2002), Roberts (1984), Sugden (1982), Bergstrom et al. (1986), Andreoni (1985)), Impure Altruism or Warm Glow (Andreoni (1989, 1990, 1993) Andreoni, Scholz and Gale (1996), Atkinson (2008)) and more recently behavioral models (Benebou and Tirole (2006), Cappellari, Ghinetti, and Turatti (2007).

Empirical Work

In 2006, Americans gave away over $295 billion, about 2.2% of GDP or roughly the gross domestic product of Sweden. About three-quarters of this was donated by individuals. Given the magnitude of American generosity, it is no wonder that economists have a long tradition of studying philanthropic behavior. While theoretical treatments are, relatively speaking, somewhat thin on the ground, the empirical literature is substantial indeed, dating back several decades. Much of this work has focused on the identification of price and income elasticities of charitable contributions.

Since Tausig's seminal 1967 paper major methodological advances made in this field have included Reece (1979), which introduced the use of a Tobit model to address the non-negative restriction on contributions; Reece and Zieschang (1985), which modeled the non-linear budget constraint generated by the relationship between price and income; Feldstein and Taylor (1976) which introduced the instrumentation of last-dollar price using the first-dollar price to reduce endogeneity; Feenberg (1987), which used inter-state variation in marginal tax rates in an instrumental variables framework to introduce income independent variation in price; and Kingma (1989), which examined problems that might arise from aggregating different types of contributions (appreciated assets vs. cash).

Despite decades of work on the question of the treasury efficiency of the tax deductibility of donations, no consensus has yet been reached. The very early

[4] This perhaps is not as difficult as it might first seem. While classical economics require agents to be utility maximizers, nothing in economic theory precludes welfare interdependence; an individual's welfare may well be a function of the welfare of others, a point, I think, that should be emphasized more in microeconomic courses.

papers (Tausig (1967), Schwartz (1970)) found giving to be price inelastic, supporting calls from within the Nixon administration for the abolition of the deduction. Then, through the 1970's, a number of studies (Feldstein (1975a, b), Feldstien and Clotfelter (1976), Boskin and Feldstien (1977), Dye (1978), Abrams and Schmitz (1978), Reece (1979)) found that giving was in fact price elastic and a general agreement seemed to be emerging.

This early consensus was then challenged with Feignebaum's 1980 paper, which used GLS estimation and identifies inelastic price effects. In the 1980's a great deal of work (Jones (1983), Auten and Rudney (1984, 1986), Schiff (1985), Brown (1987), Slemrod (1989), Reece and Zieschang (1989)) was done in this area, yet conclusions as to how responsive donors were to changes in the tax price seemed to vary from study to study. A general consensus of price elastic giving emerged from the research until formidably challenged in the late 1980's. At that time researchers in this field began in earnest to use panel data to identify inelastic price effects and the consensus seemed to shift towards giving as price inelastic.

Cause Specific Work

Only eight published papers (Feldstein (1975b), Dye (1978), Reece (1979), Schiff (1985), McClelland and Kokoski (1994), Andreoni, Scholz and Gale (1996), Gruber (2004) and Bradley et al. (2005)), one PhD chapter (Reinstein (2006)) and one mimeo (Steinberg et al. (2006)) looked at giving disaggregated to some extent. So, while there have been dozens of studies estimating the price and income elasticities of giving there are only a handful that decompose the giving by cause and of these only a few decompose giving beyond two causes.

Feldstein (1975b) found that price elasticities vary significantly over the causes under examination: religious, education, hospitals, health and social welfare, and other. Using IRS data from 1962 containing the value of itemized charitable contributions across 17 adjusted gross income cohorts, the author found that gifts to education institutions and hospitals are very sensitive to the cost of giving whereas giving to religious causes is found to be much less price sensitive. The identified price elasticity of aggregate giving is very close to one and, somewhat out of line with much of the other work, invariant over income cohorts. The author goes on to estimate the effects the elimination of the tax deductibility of donations, a possibility being discussed at the time, and finds that while aggregate giving would fall by 20%, giving to education and hospitals would fall by half.

One might have thought the authors' conclusion that "the sensitivity of charitable giving to potential tax changes differs substantially among the major types of donees" might have inspired further research along these lines but alas it was not to be. Table 1 presents the estimated price and income elasticities of giving to different causes from Feldstein (1975b).

The variation in these elasticities was the first identified indication that charity is not homogenous. Results suggest we might think of giving to religious causes as a necessity and giving to education is a luxury good.

Reece (1979) looked at giving to different causes using a subset of the 1972-1973 BLS CEX Survey containing data on 8 classifications of contributions, though

counted among these was alimony and inter-personal gifts (e.g. birthday gifts). It is one of the earliest papers to use survey data and the availability of demographic characteristics that can be used as controls is immediately appealing. A perhaps even more significant benefit of using survey data is that data on non-donors (non-itemizers) is available.

Reece provides two additional advancements. The first is the decomposition of income into permanent and transitory elements. While this is done quite crudely (using mean of the current and previous years' income) it motivates a number of later papers (Randolph (1995), Auten et al. (2002)). The second is an examination of the utility interdependence theory that a change in the mean donation minus individual *i* will affect the size of *i*'s donation. The theory receives little support, and Manski's reflection problem is not addressed at all, but the idea is returned to in later research (Andreoni and Scholz (1998), Carman (2002)).[5]

Using more sophisticated techniques, a Standard Tobit model, to account for the censoring of the data on contributions, Reece also found differing price effects across the different identified causes. Table 2 presents the estimated income and price elasticities. Note that the *All* category is designed to mimic the total contributions variable generally obtained from tax returns, though includes political donations which are not tax deductible. The variable *Deducted* category refers to charitable donations that are directly deducted from one's paycheck. Lastly *Charity* refers to charitable contributions not going to religious, education or political groups and not directly deducted from paychecks. The results are not entirely consistent with what Feldstein (1975b) had found a few years earlier, particularly with respect to contributions made to religious and educational institutions.

Despite Reece's lack of concern over the endogeneity of the price variable (he notes that it should not be too much of a problem as the correlation between price and income is -0.63), he does take the additional step of using predicted rather than actual itemization status to help further disentangle the price variable.[6] Note the large disparity in the estimated elasticities for giving to religious and education in Feldsetin (1975b) and Reece (1979). Throughout this somewhat disparate literature, similar variation can be observed.

The remainder of the literature on giving by cause tends to use very broad desegregations, such as "human welfare" or all non-religious. The important thing to note is the lack of consistent findings. Results display a sensitivity to the type of data and the model techniques used. A detailed review of this literatureis available in the full paper.

Section III: The Data

Studies of charitable donations have used data from three general sources: Tax records, general consumer surveys like the Family Expenditure Survey in the UK, and special surveys like the National Survey of Philanthropy in the US. American

[5] Manski's reflection problem is the problem that arises when trying infer whether the mean behavior of a group influences the behavior of the individuals that comprise the group.
[6] In the data employed here the correlation is -0.53.

tax data has been used most frequently and while this means that a very large number of observations are available, such data suffer from two major shortcomings. First, very little demographic data is available and, second, what data is available can only be used for those who have itemized their tax returns, thus making it evident if and how much they gave. Surveys can overcome both of these issues but, unfortunately, surveys containing questions about giving are few and far between.

The PSID started as an annual survey of a representative sample of U.S. individuals and the family units in which they live. The central focus of the data is economic and demographic, with substantial detail on income sources and amounts, employment, family composition changes, and residential location though a wide variety of information about both families and individuals is available. The PSID has been very successful at maintaining the integrity of the panel with very low attrition rates and the capacity to follow children as they leave one family unit to start their own has seen the sample size grow from 4,800 families at its inception in 1968 to more than 8,000 families in 2005.

The benefits of using longitudinal survey data are clear, though problems do exist. Despite the best efforts of PSID researchers, every survey will have issues of response accuracy given the fallible memories of respondents and potentially biased answers. Such issues may be exacerbated when asking about charities given the social as well as the financial benefit of over-reporting giving. The problem of over-reporting was examined in Slemrod (1989) where such inaccuracies are found generally not to exceed 7.2% of the actual contribution. Hall (2001) finds recall to be the more serious cause of measurement error. Wilhelm (2006) discusses in detail the problems of recall arising when people are asked to report charitable behavior noting that recalling such behavior might be more difficult given the somewhat passive nature of some giving. Discrepancies between the amount reported in one's tax return and in the survey may develop due to the financial incentive recall and document giving in the tax return. Wilhelm (2006) goes on to compare the PSID data to tax return data in the number of missing values and the amounts being reported and finds that the PSID survey data is of "high quality" comparable to that obtained from documentary analysis of tax returns.

The raw panel is constructed from three waves of the PSID (2001, 2003, 2005) containing 7406, 7822 and 8002 households respectively. The panel has 5851 households with the same head in all years and another 1703 households with the same head for at least two consecutive observed periods.[7]

Observations have been dropped according to the conventional practices in the literature. Reported estimates are based on a three year, unbalanced panel of 6917

[7] The PSID defines the "head" according to the following: The Head of the family unit must be at least 16 years old and the person with the most financial responsibility for the family unit. If this person is female and she has a husband in the family unit, then he is designated as Head. If she has a boyfriend with whom she has been living for at least one year, then he is Head. However, if the husband or boyfriend is incapacitated and unable to fulfill the functions of Head, then the family unit will have a female Head.

households that are present for at least two years giving 18799 observations.[8]

General descriptive demographic statistics are presented in Table 3.

The basic demographic sketch of the sample remains largely constant from year to year, suggesting that attrition and addition, while taking place, are not severely altering the composition of the sample.

Table 4 presents descriptive statistics on donor economic characteristics and donor behavior.

Donor participation in sample sits near 58% for the period.[9] As for year to year participation, of those 4974 households that are in the sample for all three years 2,127 donated something in all three. Another 924 gave in two of the years, 785 gave in at least one year and 1,138 did not give in any year. This pattern seems to suggest some temporal dependence for donors and needs to be modeled appropriately.

The conditional distribution (conditioned on being positive) of total donations is highly skewed with a small number of donors making very large donations. The distribution remains quite skewed even when restricting attention to those positive donations less than $10,000 (about 99%). Note the change in the tax-price of giving. Some of this increase is due to the exogenous decrease in the marginal tax rate over the period and thus provides variation in the tax-price of giving that is independent of variation in income, further untangling the two.

The Causes

The PSID section on giving includes a number of questions about which causes contributions were made to, the amounts contributed and a series of ranges given should the interviewee not recall the exact amount. In 2000, total donation could be decomposed into five separate causes, religious organizations, combination funds like the United Way, groups helping the needy, health and medical organizations and educational institutions. In addition to these five causes for which actual amounts are available, binary variables indicating positive donations made to five more causes (youth, arts, community and neighborhood, environment and international) are available with the total amounts given to these causes summed up in a single continuous variable. In 2002 and 2004, full data on the sums given to all ten identified causes are available. When comparing across all three years, the last five categories are aggregated into an "*other*" cause.

A major advantage to this particular data is that, while the survey provides a list of causes, it is the donor who determines to which cause she donated. We can thus ensure that any identified determinants of the distribution of donations over causes are actually determining to which causes the donor wishes to give. Quite

[8] Note that the PSID sample has been amended and adjusted over the years including the adding of a large immigrant over-sample. Unfortunately, no over-sample of the very wealthy is available. Given that the PSID is not a true representative sample, analytic weights are used in the analysis, though not the descriptive statistics.
[9] 2000: 57.9%, 2002: 57.8% and 2004: 57.5%

simply, it does not matter what the charitable organization thinks it does, nor what the government or researchers think it does. What matters is what the donor thinks it does. The problem with this is that an organization like UNICEF may well be regarded as an international charity by one person and as a youth or children's charity by another.

Another problem with donor assigned causes is that an individual may change how he or she classifies a charity or, if different people from the same household undertook the survey in different years, than the households classification may not be consistent.

Tables 5, 6, and 7 present and the participation rates, the mean contribution of donors and the proportion of total donations for each cause, respectively.

The importance of donations to religious organizations is immediately evident. The mean donation to religious organizations is three times the next largest cause and over half of all donations go to religious causes. This should not, perhaps, be surprising. Religious organizations generally make a weekly, personal appeal for donations. Fundraising on that scale and frequency is not observed among any of the other identified causes. Comparison of these numbers with those found in Micklewright and Schnepf (2008) suggest that substantial variation in donor behavior may exist from country to country. In their paper, they look at giving by cause in the UK and find that less than 10% of individuals made contributions to religious organizations.

Section IV: Econometric Analysis

In any development of an econometric analysis of charitable behavior, it is of critical importance to understand and produce a meaningful price variable. The Revenue Act of 1917 introduced the deductibility of charitable donations in the United States for those who itemize their tax returns. The immediate result is a decrease in tax revenue. Another, perhaps less obvious, result is the reduction in the cost of giving in terms of foregone consumption. If t_i is the marginal tax rate faced by i, a donation made D_i will reduce her tax burden by $t_i x D_i$. Thus, the effective cost of the donation in terms of foregone consumption (i.e. the price) is $1-t_i$. So, at a marginal tax rate of 20 percent, a \$1 donation 'costs' the donor \$0.80 if she itemizes and \$1 otherwise. There are a number of econometric issues surrounding the construction of the price variable and these are discussed in detail below.

The identification of price effects of giving in the literature on philanthropy hinges on two thresholds. The first is the standard threshold of a statistically significant difference from zero to answer the question of whether or not the price has any influence over the decision to give. The second important threshold is that of unitary elasticity, which was discussed extensively above.

The price variable used in economic studies of charity is somewhat particular. Prices are generally the product of interaction within a market. The price of giving, however, is a price in that it is a measure of the gift strictly in terms of foregone consumption. In the simplest terms, the price of giving is merely one minus the

marginal tax rate for those who itemize and one for everyone else. The price variable used throughout the current paper is somewhat more complicated than the one minus the marginal federal tax rate faced by each household.

Table 8 presents some selected definitions of the price variable from different papers to give an idea of how it has evolved.

This is just a small sample of the tax-price variable definitions used by economists over the years. As noted, above, the price variable used in the current paper is rudimentary, simply using the marginal federal tax rate attached to he income band in which the observation falls and a predicated itemization status. The price variable that will carry the research forward, however, is significantly more refined and represents another evolution in the definition of this rather tricky variable.

The first source of endogeneity comes out of an individual's decisions to itemize. This was (the decision to itemize) was addressed by employing a predicted itemization status rather than the actual status.[10] Endogenous itemizers, those who would not have itemized were it not for their donations, were also identified (about 5.4% of the sample) were also dropped.

The second source of endogeneity comes from the fact that, even taking one's itemization status as given, the price variable is still a function of taxable income which its self will be a function of donations made. This source of endogeneity (price is a function of donations and income) is addressed in line with previous work by using the mean of the marginal rate using a level of predicted giving and the marginal rate calculated without any charitable contributions. The inclusion of state income taxes further provides price variation that is independent of income and donations as the existence and magnitude of state income taxes varies as does the deductibility of charitable donations from state taxes. Moreover, the change in American tax law from 2000 to 2004 (significant reduction in the federal marginal rate and adjusted schedule) provides an added source of exogenous variation and establishes a sort of natural experiment element to the analysis. Table 9 presents the federal income tax brackets for a married couple filling jointly for the years observed.

The changing of the tax schedule and brackets provides an exogenous change in price that would otherwise not be available. The contemporaneous change in the tax rates and schedule results in some major swings in price for some households. Take those earning between $43,851 in 2000 and $46,700 in 2002. The marginal rate faced by these households falls thirteen percentage points over that period. An analysis of those households that experienced large, entirely exogenous shifts price might prove interesting as recent literature has started to focus on large shifts in price, though so far it has been based on changes in itemization status year on year. This issue of how donations are composed (cash, material goods or appreciable assets) is addressed using new data on the proportion of non-cash gifts that are in fact appreciated assets and thus subject to a different tax deduction schedule. As a

[10] The predicted itemization status was done by comparing individuals' standard deduction and their total itemized deductions with a linear regression predicted level of giving. This overestimated the number of itemizers (39% predicted vs. 36.5% reported) for the whole sample.

paper by Gerald Auten for the National Tax Association meeting shows[11], while many households make non-cash donations, the composition of those donations varies as income rise. The wealthy tend to give stock and real estate, while the middle class tends to claim deductions mostly for clothing and household items (which do not have any capital gain tax to be avoided as they have generally depreciated in value).[12] This is an important step and is the first use of this data in an empirical study. Using data from Auten's paper and data from the IRS archives, the percentage of donations likely to be appreciated property (i.e., stock and real estate) across seven broad income cohorts are calculated.

The final price variable to be used in here is defined as:

$$12) \qquad 1-\delta_D\left[\frac{(mtr_F\chi_C+(1-\chi_C)W_C\omega_{Ca})+mtr_S\delta_S-mtr_Fmtr_S\delta_F-mtr_Fmtr_S\delta_S}{1-mtr_Fmtr_S\delta_F}\right]=P$$

where δ_D is a dummy equal to one if *i* itemizes, mtr_F is the federal marginal tax rate faced by *i*, χ_C is the proportion of donations that are cash for *i*'s income cohort, W_c is a weighted mean of the long and short term capital gains tax rates in *i*'s income cohort times the proportion of donations that are non-cash, $(1-\chi_C)$, times the proportion of non-cash donations that are appreciated property in *i*'s income cohort, ω_C, mtr_S is the state marginal tax rate, δ_S is a dummy equal to one if donations can be deducted from state returns, and δ_F is a dummy if federal taxes can be deducted from state returns. This is an extension of the price variable used in McClelland and Kokoski (1994) and Ribar and Wilhelm (1995).

The marginal tax rates are calculated by Taxsim using a number of different measures of giving: regression predicted, one percent of mean income, first dollar of giving, and no giving. When combined with income cohort specific data on contributions of appreciated assets and the predicted itemization status will provide an expected price that is sufficiently independent of any individual taxpayer's actual decision to contribute and of their income.

A number of control variables are included in addition to price and income, however, the theoretical models outlined above do not provide a simple equation to be estimated. Rather, as is often the case, the theoretical models are used to inform what is essentially an *ad hoc* empirical specification. Given the long literature in this area there is a great deal for one to refer to when specifying the empirical model. Generally speaking, total giving has been expressed as a function of income, price, age, sex, education and family size. The general specification used here is:

$$4) \quad \ln DONATION_{it}=\alpha_i+\beta_1 \ln INCOME_{it}+\beta_2 \ln PRICE_{it}+\beta_3 WEALTH_{it}+\beta_5 EDUCATION1_{it}+\beta_6 EDUCATION2_{it}+\beta_7 AGE_{it}+\beta_8 SEX_{it}+\beta_9 CHILDREN_{it}+\beta_{10} MARRIED_{it}+\varepsilon_{it}$$

The dependent variable is either donations to individual causes or some composite. INCOME is the natural log of total taxable and transfer income of the head and wife, PRICE is the natural log of the above defined construction,

[11] In the Proceedings of the 98th Annual Conference of the National Tax Association.
[12] I am grateful to Gerald Auten for his suggestions concerning this point.

WEALTH is the natural log of household wealth excluding home equity, EDUCATION1 and EDUCATION2 are dummies indicating whether the head attended university and whether the head attended graduate school, AGE is the natural log of the head's age, SEX is a dummy equal to one if the head is a male, CHILDREN is a dummy equal to one for family units with at least one child, MARRIED is a dummy equal to one if the individual is married and cohabitating with their partner and RACE is a dummy equal to one if the head identifies as Caucasian.

Selection V: Econometrics and Model Selection

In much of the literature a simple log-log OLS estimation (or a least squares variant) is used (Tausig (1967), Feigenbaum (1980), Auten and Rudney (1984)). Given that most of the early studies were done using tax-data, the incidence of zero values for the dependent variable were limited. Crude measures were taken to deal with zeros when log transforming the variables, however, little was done to address the non-negative constraint on donations. As methods evolved, however, Tobit models became much more prevalent (Brown (1987), Kingma (1989), Jones and Posnett (1991), Lankford and Wycoff (1991)). Then in the early 1990's, advanced panel data techniques moved to the forefront. Some of the past econometric models are revisited here using the specification above. Table 10 presents the results from a pooled OLS, pooled GLS, One Way Fixed Effects Model and One Way Random Effects Model where total donations serves as the dependent variable.[13]

Both the OLS and GLS models fail Breusch-Pagan tests for constant variances and are reported here with robust standard errors. RESET tests indicate that omitted variable bias may also be a problem in these models as well. What can be seen is the very large price elasticities that are obtained form such estimation. A fixed-effects estimator is also obtained and preferred to the random-effects estimator (Hausman Test results: χ^2_9= 561.7). The estimated price elasticities from the fixed effects model are much smaller than those estimated via OLS, consistent with the findings of earlier work done with panel data.

When estimating such models as those above using tax data, the non-negative constraint on donations does not lead to a substantial censoring problem as the number of reported zero values tends to be a small proportion of the sample. With survey data, however, the censoring of donations at zero does lead to problems of bias with the estimation of models that do not account for such censoring.

Wooldridge (2003) cites the determination of charitable giving as a typical example of a corner solution model, generally treated in the same way as censored regression models. Kennedy (2003) notes that "if the dependent

[13] Total donations is the basis of the dependent variable but given the log transformation of the model and the high incidence of zeros a crude solution based on Feldstein (1975a, 1975b), Feldstein and Taylor (1976), Slemrod (1989) was implemented. A sum of one dollar was added to every observation. This allowed for logs to be taken with out resulting in a high number of missing values. This constructed dependent variable was used when estimating the OLS, GLS and panel models.

variable is limited in some way, the OLS estimates are usually biased, even asymptotically."

There are a number of methods for dealing with censored data, as we have in the case of charitable donations, though they involve varying assumptions about the way in which positive consumption is realized. If we know the decision to participate and the decision to consume a positive amount are determined in the same way, then a standard Tobit model, or a fixed-effects variant, may be appropriate. This approach further requires that once participation has been determined, consumption is strictly positive. Alternatively, if we know participation and consumption to be determined in different ways then a sample selection (Heckman) model may be more appropriate. However, as there exists no parametric fixed effect probit model, so there is no extension of the standard Heckman procedure to panel data.

As noted above, double-hurdle models allow participation and consumption to be determined by different processes relaxing a major restriction implicit on the Tobit models. The theoretical treatments of giving, however, do not supply a simple answer as to what those processes might be and how they might differ. When both decisions are modeled in exactly the same way, as in a Tobit, the identification of parameters can be difficult. To avoid this, certain explanatory variables tend to be excluded (Jones (1992), Dong et al. 2004)) on an informed, but ultimately *ad hoc*, basis.

An often-used assumption with double-hurdle models is that the participation decision is a function of non-economic factors and therefore variables such as income and price have been excluded from the participation equation. Such models were estimated, excluding price and income from the participation equation. However, given the stated aims of the research, exclusion of price from the participation equation is undesirable. To facilitate identification, two non-economic regressors were included in the participation equation. The first is a dummy variable equal to one if the head declares a religious faith (about 90% of the sample). The second is a dummy variable equal to one if the state of residence voted for a democrat in the previous presidential election (about 42% of the sample). Additionally, wealth is excluded from the participation equation. Wealth is consistently an insignificant determinant of participation

The principal models estimated here are pooled double-hurdle models allowing for dependence between the error terms of the participation and consumption equation and for heteroskadastic error terms. Table 11 presents the estimated price and income elasticities of total donations obtained via a pooled Tobit and pooled double hurdle model with dependence.

The coefficients presented here are the marginal effects and so can be interpreted as elasticities in the case of the consumption equation and as the effect on the probability of participation in the participation equation. So, for the tobit model a one percent increase in the price of giving (about a nine percentage point increase in the marginal tax rate, will decrease the probability of becoming a donor by 4.5 percentage points. Both models return highly significant coefficients for price and income in both equations. Note that the price elasticity identified by the Tobit model is statistically less than one, in absolute terms, and

so suggests that the deductibility of donations is treasury inefficient. [14] This rather low price elasticity is in line with previous uses of the Tobit model in this literature. The price elasticity identified with the double hurdle model is indistinguishable from one.

The selection of the double hurdle model over the standard Tobit model need not be based solely on assumptions about the decision making process being modeled as the double-hurdle model nests the Tobit model. A likelihood ratio test can be performed to verify the existence of the first hurdle. This test requires actual likelihood values which are unavailable when data is clustered, as it is in the pooled models. An alternative Hausman-type test is developed in Lin and Schmidt (1984) and can be regarded as a test of functional form. Results from this test, and from the LR-test carried out on unclustered data from a individual years, suggests that the double hurdle model is preferred, statistically, to the Tobit model.

Donations are decomposed by recipient cause and price and income effects estimated via pooled double hurdle models. The initial decomposition is to separate secular and religious giving. Table 12 presents the price and income elasticities for secular and religious giving.

The effects of price and income of both participation in and consumption of religious giving are smaller in absolute terms than for secular giving as one might expect given the motivations specific to religious giving. Most interestingly, is the absence of a significant price effect on the level of religious giving. The price elasticity for the unconditional mean of religious giving is not significantly different from zero. However, the price elasticity for the unconditional mean of secular giving is not only statistically significant but statistically greater than one.

This suggests that while the tax incentive for giving seems to motivate individuals to become donors to both religious and secular causes, once that decision is made, the size of the donation to religious organizations is not effected by the deductibility of donations. The deductibility of religious donations is therefore not treasury efficient. This further muddles the situation surrounding the validity, both economic and legal[15], of the deductibility of donations to religious organizations.

Secular giving was then further decomposed into four sub-categories: Combination, Needy, Health and Education. Pooled Tobit models and pooled double hurdle models were estimated for each cause. The models were then tested using the specification test discussed above. In each case the double hurdle model was preferred to the pooled Tobit.

Price and income are significant determinants of participation and of consumption for all sub-categories of secular giving. While this leaves religion a the only cause for which the size of contributions are not responsive to the tax

[14] A fixed-effects Tobit model produced results broadly similar to those obtained from the pooled Tobit and are available upon request from the author.
[15] See: Samansky (2004)

incentive, the decision to give to religion is influenced more by price than any other cause. The responsiveness of the size of donations was not uniform over the causes. Full results for health, combination funds, needy and education are presented in tables 13 to 16, respectively.

Conditional on the decision to give being made, the deductibility of giving for education or combination funds is treasury efficient with marginal price elasticities statistically different from one. On the same condition, it is less clear that giving to health or organizations working with the needy is sufficiently responsive to the tax incentive. This pattern holds for the price effect on the unconditional means as well.

These results suggests that the abolishment of the tax incentive for giving as currently constructed would lead to a decreased participation for each of the causes. The amounts given will fall as well. The average total donation might fall thirty percent. While mean contributions to religious organization may not experience any fall, secular giving could fall nearly fifty percent; mean donations for health a 37.5% fall, for the needy a 41% fall, giving to combination funds could fall over 50% and giving to education could fall by over 60%.

While the decrease given the abolition of the incentive is dramatic for each cause, it only exceeds the rise in tax revenue for combination funds and education. This implies the possible superiority of a cause specific deduction schedule.

Conclusions

Economists have long sought to adequately identify the impact of tax based incentives for charitable behavior. However, it was not until fairly recently that the data necessary for robust estimation of such effects became available. Even then, economists may have been inappropriately modeling the decisions to give and how much to give.

Using a short panel of household and individual level data, price and income elasticities were obtained using a number of control variables not conventionally available in this type of estimation. Commonly used econometric techniques were employed. The approach most commonly used to address issues of censoring, the Tobit, was found to be inferior to the more general double-hurdle approach. Though only pooled versions have been estimated to date, estimated price and income elasticities obtained from a double-hurdle model are similar in magnitude to those found in the literature.

Decomposing donations by recipient cause reveals that religious and secular giving differ in their responsiveness to variation in income and especially price. When properly modeling the decisions to give and how much to give as distinct processes, price is found to have no impact on the level of religious giving, though it does motivate one to become a donor. For secular giving, price and income are significant determinants of both the decision to give and of how much to give. Further decomposition into separate secular causes revealed some significant variation in the treasury efficiency of the tax incentive across causes. The evidence suggests that charity is not a homogenous good and that a cause

specific deduction schedule may be preferred to the current system of tax incentives for charitable giving.

While the pooled double-hurdle model is preferred to the pooled Tobit model, the above estimations should be taken with the proverbial grain of salt. The next step is the completion of the panel data double-hurdle model as developed in Dong et al. (2004) and, given the preference for the pooled double-hurdle model over the pooled Tobit, it is anticipated that the panel double hurdle will prove to be the preferred parametric model. The panel version exploits the discussed advantages of panel data and, furthermore, allows for temporal dependence, a feature already identified as potentially important.

This work will proceed along this line, though explore the use of non-parametric methods for dealing with censored data.

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