AN EMPIRICAL EXAMINATION OF THE FACTORS THAT INFLUENCE THE MIX OF CASH AND NONCASH GIVING TO CHARITY

DAVID H. EATON
MARTIN I. MILKMAN
Murray State University

Taxpayers are able to deduct from taxable income charitable contributions made in either cash or noncash forms. This study examines how the different tax prices of cash and noncash charitable gifts affect the mix of cash and noncash charity, using data from a balanced panel of taxpayers that allows panel data estimation techniques to account for any individual specific effects that may influence the mix of contributions. The article finds that taxpayers are quite responsive in their charitable giving mix to changes in the tax prices. An increase in the relative price of noncash to cash gifts leads to a significant decrease in the proportion of gifts in the noncash form, with an elasticity that often exceeds –1.0.

Keywords: *charitable contributions; noncash donations; cash donations; taxation*

There is an extensive literature that has examined how changes in income and changes in the tax treatment of charitable giving have influenced the *amount* of charitable giving. However, the effect of taxation on the *form* of charitable giving has received only limited attention. This is an issue of some importance, especially because a growing number of taxpayers now hold securities with unrealized capital gains and may consider donating appreciated securities to charity. In this article, we examine the effects of taxation on the form of charitable giving, using data from the Internal Revenue Service Individual Tax Model File Panel.

The tax code allows taxpayers who itemize deductions to deduct the amount of their charitable contributions from their taxable income (subject to certain limitations). In addition, taxpayers who donate an appreciated asset to charity are allowed to deduct the full value of the

PUBLIC FINANCE REVIEW, Vol. 32 No. 6, November 2004 610-630
DOI: 10.1177/1091142104264302

asset from their taxable income; these taxpayers are also not required to pay capital gains taxes on the appreciated portion of the donated asset. Therefore, the tax price of the charitable donation of an appreciated asset is lower than the tax price of a charitable cash donation. This article explores how the form of charitable contributions responds to these tax incentives.

The remainder of this article is organized as follows. First, a basic review of the literature is presented, followed by an illustration of how the price of charity is determined and how the differences in tax prices between forms of charity are calculated. After a description of the data, estimation results are presented. The results indicate that the form of charitable giving is responsive to differences in tax prices; that is, we find across a wide variety of specifications that individuals are very sensitive in the form of giving that they choose to the relative price of noncash to cash gifts. An increase in this price leads to a significant decrease in the proportion of gifts in the noncash form, with an elasticity that often exceeds –1.0. The final section summarizes the main results.

PREVIOUS LITERATURE

Many researchers have examined how changes in the tax treatment of charitable giving have affected the amount of charitable giving.[1] Most of this research has focused on how changes in earned income tax rates affect charitable giving. Tracing these impacts can be quite complicated because, as Clotfelter (1985, 19-20) notes,

> the tax-defined net price of giving created by the charitable deduction typically varies over time and among income classes. In addition, taxes affect the amount of disposable income available after taxes. Indeed, one of the principle objectives of the econometric analysis of charitable contributions has been to determine the independent effect of taxes.

One key finding on which almost all researchers agree is that the distribution of giving varies by income level. This is not surprising because charitable contributions seem likely to be a normal good. In addition, because marginal tax rates rise with income, the price (after

taxes) of charitable giving is reduced as income rises. However, estimates of the income elasticity vary significantly. Feldstein and Clotfelter (1976), Feldstein and Taylor (1976), and Boskin and Feldstein (1977) report estimates in the 0.70 to 0.90 range. However, other studies report various estimates ranging from 0.23 (Long and Settle 1979) to 1.31 (Reece and Zieschang 1985).

More recent studies have highlighted the problem that the standard cross-section model, used in most of the earlier studies cited above, cannot distinguish between permanent and transitory income. As Brown (1996, 155-56) notes,

> In a progressive tax system, people experiencing transitory negative shocks to their income face a temporarily low income and temporarily high tax price of giving . . . the consumption smoothing that we expect makes people give more than they would if the downturn in their income were permanent; this makes the income elasticity look smaller than it would if we considered only the permanent income effect.

To correct for this problem, it is necessary to use panel data. For example, Randolph (1995) finds statistically significant differences between permanent and transitory income elasticities with respect to charitable giving. His estimates of permanent income elasticity range from 1.13 to 1.30, and his estimates of transitory income elasticities range from 0.09 to 0.58.

A more recent paper by Barrett, McGuirk, and Steinberg (1997), also using panel data, reports a much smaller long-run income elasticity of 0.495. They speculate that

> perhaps the explanation for this difference is that the individual specific effects we include implicitly control for an individual's permanent income, so the estimated coefficient on income is largely picking up the impact of transitory income, which has a smaller effect on giving. (P. 328)

The wide range of econometric estimates of the income elasticity is mirrored by a wide range of econometric estimates of the price elasticity of charitable giving. Some of this variation may be a result of aggregation problems. Clotfelter (1985, 61) notes that "econometric estimates based on analyses of aggregate tax return data appear to be less

reliable, being subject to considerable variation associated with changes in sample and model specification." However, even those studies based on individual tax return data report wide variations in estimates of the price elasticity that vary from a low of 0.42 (Dennis, Rudney, and Wyscarver 1983) to a high of 2.54 (Boskin and Feldstein 1977), with most of the early estimates based on cross-section data reporting elasticities greater than 1. One additional interesting finding is that the price elasticity of giving varies based on the type of organization. For example, McClelland and Kokoski (1994, 513) report that the "price elasticity of giving to service organizations is substantially higher than that of all giving." They also find that the price elasticity of giving to religious organizations is substantially lower than giving to all organizations.

Just as there are problems in using cross-section data to estimate income elasticities, there are also problems with using cross-section data to estimate price elasticities. The cross-section models do not allow the researcher the ability to

> distinguish between permanent and transitory responses to changes in tax prices; the identification problem that arises in a single year's data when tax rates are statutorily determined as a function of income is resolved when a panel spans years in which tax reforms provide variation in the relationship between income and marginal tax rates. Panel data can capture the phenomenon of donation shifting across years when one year offers a lower tax price than another, a phenomenon that is clear in the data from the 1980s but which cannot be addressed in the static model. (Brown 1996, 155)

Empirical estimates of "permanent" tax price elasticities by Randolph (1995) range from 0.08 to 0.51, and Barrett, McGuirk, and Steinberg (1997) report a long-run price elasticity of 0.471. Another more recent study using panel data by Bradley, Holden, and McClelland (1999) reports an estimate of 0.78 for the long-run price elasticity. Estimates using panel data indicate that the price elasticity is not elastic.

Most all of the research that focuses on estimating the price and income elasticity of charitable giving has examined the tax impacts on the *amount* of charitable giving. However, taxes also seem likely to affect the *form* (or the composition) of giving. For example, the tax sys-

tem treats differently corporate equity that has earned capital gains, but the existing literature has tended to obscure the differential tax treatment of giving corporate equity with capital gains. Most researchers calculate an average after-tax price of giving for different adjusted gross income (AGI) levels. Typically, at each AGI level, the mean ratios of noncash giving to total giving and cash giving to total giving are computed. These ratios are then used as weighted averages to calculate the average after-tax price of giving. Some of the more detailed research in this area modifies this procedure by only using the weighted average approach for returns when there is some evidence of the possibility of giving noncash contributions; for example, one popular approach that has been used in some of Feldstein's (1975) work is to only use the weighted average calculation for returns that report some income in the form of dividends. The weighted average approach seems acceptable when the focus of the research is to gain an aggregate estimate of the impact of changes in tax policy on charitable giving. However, the mixing together of noncash giving and cash giving obscures both the individual decision of how much to give and the related, though separate, decision of how much giving should be noncash and how much should be cash. It is this issue that is discussed next.

HOW THE FORM OF CHARITY AFFECTS THE COST OF GIVING

When individuals donate corporate equity or other appreciated assets to charity, they can (under most circumstances) claim a deduction for the full market value of the equity that they donate. Consider a taxpayer in the 28% tax bracket who also faces a 28% capital gains tax in 1997. Suppose this person owns stock purchased 20 years ago for $1,000 that presently has a market value of $10,000. If the person chooses to donate this stock to charity, then the after-tax cost to this individual would be $4,680.

This is calculated as follows. If the individual were to sell this stock for consumption, he or she would receive $\$10{,}000 - 0.28 \times \$9{,}000$, or $7,480 after taxes. Thus, the individual saves $2,520 in avoided capi-

tal gains taxes by donating the asset. In addition, the taxpayer may deduct the full $10,000 contribution, thereby lowering the tax burden by an additional $2,800. Thus, $10,000 – $2,520 – $2,800 = $4,680 is the amount of consumption that the individual would need to forego to make this $10,000 contribution.

By 1998, the long-term capital gains tax rate had been reduced to 20%. This increases the after-tax cost of donating this stock to charity to $5,400 due to the avoided capital gains taxes falling to $1,800. Clearly, a change in the capital gains tax rate changes the after-tax price of giving appreciated corporate equity.

Perhaps even more significant is the gap in the after-tax price of giving appreciated assets and the after-tax price of giving earned income. Suppose that the above taxpayer chose instead to donate $10,000 in cash to a charity. In this case, the price of the cash contribution would be $7,200 (or $10,000 – 0.28 × $10,000) instead of the $4,680 cost of appreciated property. This differential clearly provides an incentive for a taxpayer to donate appreciated assets rather than cash.

One recent study by Auten, Cilke, and Randolph (1992) attempts to examine the influence of giving "noncash" contributions to charity. They find that, due to changes in the relative tax prices of giving cash and giving noncash gifts that occurred as a result of the Tax Reform Act of 1986, high-income taxpayers increased the proportion of cash giving. Despite this finding, Auten, Cilke, and Randolph still use the weighted average approach to calculate the after-tax price of giving, and they also use this single price method in the equation used to estimate the income and price elasticities.

To make these observations more precise, it is important to understand how the "price" of each type of contribution—or the amount of consumption that must be foregone to make a charitable contribution—is determined. Consider a simple theoretical model in which these prices emerge.

For a cash donation, calculating the price of the donation is straightforward. If a consumer itemizes deductions, then he or she is able to reduce taxable income by the amount of a charitable contribution. Thus, part of the contribution is made up of tax savings. The price of a $1 donation in this case would be $(1 - \tau)$, where τ is the first dollar

marginal tax rate, so that the price P_C is simply $(1 - \tau)$.[2] For a consumer who does not itemize deductions, the price of a dollar's worth of cash charity is simply $1. Noncash contributions may be in the form of appreciated assets (such as art, real estate, or equity) or gifts in kind (such as clothing or cars). The taxpayer is able to avoid paying taxes on any appreciation on the assets if they are donated to charity. In addition, the consumer may deduct the full market value of the donated asset. To determine the price, consider the consumption the consumer could have by selling the asset. The consumer would be able to spend the market value V, minus the amount of capital gains taxes $(V - B)\tau_c$, where B is the basis and τ_c is the tax rate on capital income. The consumer would also reduce taxes by $V\tau$ by deducting the amount of the contribution. Thus, the price of giving an appreciated asset can be written as $P_A = [V - (V - B)\tau_c - V\tau]/V$. Here, $[V - (V - B)\tau_c]$ represents the consumption that the consumer gives up by not selling the asset and spending the proceeds. This amount is reduced by $V\tau$, which represents the tax deduction for donating the asset.[3]

This perspective predicts that we should observe "corner" solutions in the data; that is, if a taxpayer has appreciated assets and desires to give to charity, we should observe the taxpayer donating assets before cash. Furthermore, we should not observe individuals giving large amounts of cash to charity while at the same time taking capital gains. The next section discusses the data we use to test these predictions.

DATA

This study uses data from the Internal Revenue Service Individual Tax Model File Panel, maintained by the Office of Tax Policy Research at the University of Michigan. The "Tax Model File" is a yearly stratified random sample of individual tax returns covering the years 1979 to 1990. The "Tax Model File Panel" is a random sample of each year's Tax Model File and allows the researcher to link individuals over time. These panel data provide information directly from the tax returns of more than 20,000 taxpayers in 1990. An advantage of using tax data is that tax data provide the exact amount claimed in charitable

contributions broken down by cash and noncash contributions. In addition, tax data allow for accurate measures of marginal tax rates and other tax-related factors that are needed to compute the prices of charitable contributions, such as itemizing status, the amount of taxes owed, and whether the taxpayer was subject to the alternative minimum tax.

It is also important to note that tax data have several disadvantages for this particular work. First, because these are tax return data, there is very little information on the tax return that is not needed for computing tax liability. Thus, there is no information on the financial assets of the givers. Second, because the amount of charitable contributions is categorized only as "cash" or "noncash," there is no way to determine the type of noncash contributions. Thus, a noncash gift could describe gifts of clothing and used cars or gifts of artwork and corporate equity; that is, the IRS Statistics of Income cross-section samples do not distinguish between the giving of corporate equity and other types of noncash donations. This failure can be a significant problem because the IRS requires only limited documentation of noncash gifts of less than $500, but taxpayers with noncash contributions greater than $500 are required to file Form 8283. In addition, there is no requirement for the taxpayer to indicate the portion of the donated asset that represents appreciation. This may lead to the situation whereby many taxpayers report "goodwill" contributions, or gifts of clothing, toys, or other household goods to nonprofit agencies. The data used in this article do not allow for the identification of this type of giving. This study reports results intended to illuminate the amount of this type of giving captured by the noncash gifts.

Finally, to protect taxpayer confidentiality, certain variables are amended for high-income (above $200,000 AGI) returns.[4] Examples of this are the lack of age and blindness exemptions and the modification of certain demographic information (e.g., exemptions for children living at home are capped at three). Some dollar amounts have also been averaged with other high-income returns, something known as *blurring*.[5] Even with these drawbacks, these data provide useful insight into charitable behavior.

SOME INITIAL EVIDENCE ON GIVING

As noted earlier, the theory predicts that we should observe a taxpayer with appreciated assets donating assets before cash and also that we should not observe individuals giving large amounts of cash to charity while taking capital gains.

We do not expect that the data will have true corner solutions as there are certainly plausible reasons why an individual may make cash donations over asset donations. These would include such things as transactions' costs (to either the donor or the donee), social custom (i.e., money given to religious organizations may always be cash), "mental accounting" (Thaler 1990), or ignorance of the tax advantages of giving appreciated assets.

An initial examination of giving by those claiming capital gains in panel year 1985 provides some insight here. If we define a corner as consisting of more than 90% of giving in either cash or noncash forms, we find that only 5.7% of taxpayers in our data set gave less than 10% of contributions in cash, whereas 65.4% had cash giving to total giving ratios of more than 90%. Relaxing the corner definition to at least 25% of giving in cash or noncash forms increases the proportion of taxpayers giving less than 25% in cash to 10.4%, whereas increasing the proportion giving more than 75% in cash increases the proportion to 74.1%. Of those filers who claimed more in taxable capital gains in 1985 than in noncash giving, 78.1% gave less than 25% of their charity in noncash forms.

These statistics illustrate that many taxpayers do not choose a corner solution. The remainder of this article estimates various models to better understand giving behavior.

ESTIMATION RESULTS

Most estimates of charitable contributions use a measure of charity as the dependent variable and a series of independent variables, including the tax price, income, and demographic characteristics. In this article, the dependent variable is the ratio of noncash charity to total charity, which allows us to focus on how various right-hand-side vari-

ables affect the mix of cash and noncash gifts. Of special interest as a determinant of giving is the ratio of the price of a noncash gift to the price of a cash gift; other explanatory variables include several measures of income and demographic characteristics. Thus, the model estimated here is

$$\frac{Noncash\ Gifts}{Total\ Gifts} = f\left(\frac{Price\ of\ Noncash\ Gifts}{Price\ of\ Cash\ Gifts}, Income, Demographics\right).$$

We estimate several econometric specifications of this basic equation. In all models, the ratio of noncash giving to total giving is the dependent variable.

The first model is a standard ordinary least squares (OLS) model that pools observations from all individuals across years. The second model is a one-way effects model of the following form:

$$\left(\frac{Noncash\ Gifts}{Total\ Gifts}\right)_{i,t} = \beta' X_{i,t} + \varepsilon_{i,t},$$

$$\varepsilon_{it} = \alpha_i + \eta_{i,t},$$

where β is the vector of estimate coefficient, $X_{i,t}$ is the vector of explanatory variables for individual i in period t (including the ratio of the price of noncash to cash giving), $\varepsilon_{i,t}$ is the error term for individual i in period t, α_i is the individual-specific error term, and $\eta_{i,t}$ is the time-specific error term. This one-way model can take the form of either a fixed-effects model, in which the α_i is correlated with an independent variable, or a random-effects model, in which α_i is uncorrelated. This model eliminates the role of things, such as custom, in determining how the ratio of giving responds to changes in relative prices; custom includes such things as always giving money to religious organizations in the form of cash. The fixed-effects model assumes that the individual-specific differences can be captured with individual-specific intercept terms. The random-effects model assumes that there are individual-specific components in the error term. We estimate both a fixed-effects model and a random-effects model.

To estimate the models, the 1985 and 1988 Individual Tax Model File Panels were merged. This results in a data set that contains 2

years' worth of tax returns for each taxpayer. Several other refinements were made to the data. First, only taxpayers who itemized deductions in both 1985 and 1988 were included in the data; of this group, only taxpayers who would have itemized if their charity had been zero were included. This technique is standard in the literature and eliminates those taxpayers who would have faced a first-dollar tax price of 1. Second, only taxpayers who contributed a positive amount to charity in both 1985 and 1988 were included. Third, only taxpayers who filed a single or married joint return were included. Finally, following Clotfelter (1985), any other taxpayers who would have faced a first-dollar tax price of 1 for charity were eliminated. After adjusting the data in this way, the final data set includes 3,502 taxpayers.

The tax prices are determined as follows. The price of a cash contribution is defined to be 1 minus the first-dollar marginal tax rate. The first-dollar marginal tax rate is determined by adding charitable gifts back into taxable income and then computing the tax rate from the tax tables. A similar procedure is used to calculate the price of donating assets. Following previous literature (Feldstein 1975), we have assumed that 50% of an asset donation represented appreciation.

We include three income measures: adjusted gross income (less dividends and reported capital gains), dividend income, and actual capital gains. Because we are concerned with gifts of assets, dividends and capital gains income are included separately. Clearly, those individuals with dividends and capital gains have equity assets available for giving. Higher amounts in these two categories also indicate greater ability to give noncash assets.

Because demographic information from the tax form is limited, we include only variables that reflect marital status, the presence of age exemptions (which indicate that someone in the tax household is age 65 or older), and the number of dependents. Also included on the right-hand side is the amount of charity given. This formalizes an implicit assumption of this study that the decision on the form of charity is distinct from the decision on how much to give.[6]

Table 1 and Table 2 provide descriptive statistics for several of the variables. The information in Table 1 is provided to illustrate the comparability of the data set used in the estimation ("Amended Data") to the data set consisting of all itemizing taxpayers in the years 1985 and

TABLE 1: Summary Statistics for Data

Variable	*Mean*	*Standard Deviation*
Amended data		
AGI		
1985	52,665	92,379
1988	77,396	251,848
Capital gains		
1985	4,291	73,050
1988	6,497	117,473
Dividends		
1985	1,538	14,510
1988	2,277	18,008
Ratio of noncash to total		
1985	0.125	0.233
1988	0.137	0.235
Charitable gifts		
1985	1,699	8,281
1988	2,745	48,685
Noncash charity		
1985	198	1,792
1988	909	40,948
All itemizers		
AGI		
1985	51,990	91,695
1988	76,945	249,728
Capital gains		
1985	4,248	72,397
1988	6,474	116,430
Dividends		
1985	1,522	14,383
1988	2,272	17,903
Ratio of noncash to total		
1985	0.124	0.232
1988	0.137	0.235
Charitable gifts		
1985	1,682	8,208
1988	2,731	48,250
Noncash charity		
1985	195	1,737
1988	895	40,580

NOTE: The amended data set includes only those itemizers for whom the tax price of a charitable contribution (asset or cash) is less than 1. AGI = adjusted gross income.

1988 ("All Itemizers"). The taxpayers in the amended data set used in this study not only have higher income but also seem to have more

TABLE 2: Summary Statistics for Pooled Data

Variable	*Mean*	*Standard Deviation*
Ratio of noncash to total gifts	0.1314	0.2341
Income ($)	59,368	120,508
Dividend income ($)	1,907	16,356
Capital gains ($)	5,393	97,816
Price of asset gifts (basis = .5 • value)	0.6485	0.1028
Price of cash gifts	0.7361	0.0824
Ratio of cash price to asset price	0.8775	0.0589
Charitable contributions	2,222	34,921

wealth as represented in higher dividend and capital gains income. This is important as these taxpayers would presumably have more opportunity to contribute assets. The ratios of noncash to total cash gifts indicate that the group of taxpayers in the amended data set do indeed contribute more in noncash forms than do all itemizers. Medians were computed for the AGI variables. Median AGI was 21% lower than the mean in 1985 and 33% lower in 1988.

Most studies of charity estimate a double-log specification of a contribution equation to estimate price and income elasticities. In our specification, this procedure yields an interesting elasticity. Taking logs of the dependent variable and the first term on the right-hand side gives a measure that approximates a substitution elasticity between noncash charity and cash charity. This will provide an additional measure of how taxpayers substitute one type of charity for another in response to changes in the tax prices. The log of income is also included as an explanatory variable. Also included is the log of charity, which gives an estimate of the elasticity of the ratio of noncash charity to total charity with respect to the amount of charity given. To avoid taking the log of zero, the log of the ratio variable was calculated as the log of the actual ratio plus 0.0001. Capital gains and dividend income enter the equation in dollar amounts.[7]

The results of the log-linear estimation are presented in Table 3. The substitution elasticity is significant and negative in the OLS and random-effects specifications with values in the –2.2 to –2.4 range. These results imply that taxpayers are quite sensitive to changes in the relative tax price of charity. The fixed-effects model has a smaller

TABLE 3: Double-Log Estimation Results

Variable	*Ordinary Least Squares*	*Fixed Effects*	*Random Effects*
Price elasticity	–2.380*	–1.202	–2.216*
	(2.72)	(1.46)	(3.03)
Income elasticity	–0.097	–0.404**	–0.186**
	(0.94)	(2.40)	(1.80)
Charitable contributions elasticity	0.537*	1.15*	0.646*
	(13.76)	(14.9)	(15.4)
Dividend income (000)	$-0.42E^{-2}$	$-0.90E^{-2}$	$-0.52E^{-2}$
	(1.46)	(1.00)	(1.59)
Capital gains (000)	$0.41E^{-3}$	$0.78E^{-3}$	$0.57E^{-3}$
	(0.88)	(1.42)	(1.28)
Age (dummy)	–0.411**	0.141	–0.42**
	(2.24)	(0.03)	(2.07)
Marital status (1 if married)	0.481*	0.89**	0.54*
	(3.62)	(2.49)	(3.64)
Constant	–9.93*	—	–9.77*
	(10.6)		(10.0)
R^2	0.04	0.72	0.04
Log-likelihood	–19,183.9	–14,833.1	

NOTE: Absolute *t* ratios in parentheses. LM test statistic value (*df* = 1): 642.94; Hausman test statistic (*df* = 7): 65.83.
*Significant at the 1% level, one-tailed. **Significant at the 5% level, one-tailed.

elasticity of –1.2, with a *t* statistic just below the 10% level of significance. The income elasticity is negative and significant in the fixed-effects and random-effects specifications. This indicates that higher income taxpayers contribute more in the form of cash than do lower income taxpayers, holding the amount of charity constant. This result is unsurprising if we consider that for any level of charity, lower income taxpayers may be more likely to contribute mainly items such as clothing, cars, and other household items to charitable organizations rather than appreciated assets. The magnitude of this elasticity is small.

The elasticity with respect to charitable giving is positive and significant, though relatively small, in the OLS and random-effects models. The results imply that a 10% increase in giving leads to roughly a 5% to 7% increase in the ratio of assets given. The fixed-effects model gives a much larger, positive, and significant elasticity. Of the other variables included, only marital status is significant and positive in all

specifications. The dummy variable for a taxpayer older than age 65 is negative and significant in the OLS and random-effects models.

Specification tests on the double-log model find that a panel model is superior to the OLS specification. Specification tests further prefer the fixed-effects model to the random-effects model. Although the results of the two models are qualitatively similar, the price term loses significance ($p = .15$) in the fixed-effects model.

We also estimate these models after changing the amount of the appreciation in asset value to see how sensitive our results are to changes in asset prices. We vary the basis between 30% and 70% of the asset value upon donation. These changes affect the magnitude of the substitution elasticity, with estimates ranging from –1.44 to –3.91 in the random-effects specifications. For the fixed-effects specification, substitution elasticity estimates range from –0.78 to –2.12 as the amount of asset appreciation is varied. Although the magnitude of the results changes, it is still clear that the form of charitable giving is very sensitive to changes in tax prices.[8]

There may be a concern that, because of the lack of information on the nature of noncash charity, the results might be unduly affected by taxpayers giving "goodwill"-type charity. In an attempt to reduce the influence of goodwill-type gifts, we reestimate the model for households with no dependents living at home because families with children might be more likely to generate used items that are given to charity (see Table 4), as well as for households above the 90th percentile in AGI for 1985 (see Table 5).

Table 4 presents the results of the estimation on those households that did not claim a deduction for children living at home in either of the years of the panel. We once again see that the price elasticity is large and statistically significant in the OLS and the random-effects model but not statistically significant in the fixed-effects model. Test statistics indicate that the fixed-effects model is to be preferred for this estimation. The income elasticity is statistically significant in all specifications of this model, and the magnitude of the elasticity is greater than that for the full sample. Coefficients are still negative, indicating that higher income taxpayers give less in noncash forms, ceteris paribus. Charity elasticities are all positive and significant but of smaller magnitude than those found in Table 3.

TABLE 4: Double-Log Estimation Results: Taxpayers With No Deduction for Children at Home in Either Panel Year

Variable	*Ordinary Least Squares*	*Fixed Effects*	*Random Effects*
Price elasticity	–2.468**	–0.454	–2.224*
	(2.49)	(0.48)	(2.70)
Income elasticity	–0.267*	–0.508*	–0.340*
	(2.60)	(3.02)	(3.31)
Charitable contributions elasticity	0.378*	1.00*	0.480*
	(8.51)	(11.23)	(10.1)
Dividend income (000)	$-0.62E^{-2}$***	$-0.80E^{-2}$	$-0.75E^{-2}$
	(1.82)	(1.10)	(2.05)
Capital gains (000)	$0.62E^{-3}$	$0.70E^{-3}$	$0.68E^{-3}$***
	(1.50)	(1.52)	(1.80)
Age (dummy)	–0.121***	0.070	–0.131***
	(1.73)	(0.45)	(1.71)
Marital status (1 if married)	0.406*	1.525*	0.472*
	(3.37)	(4.02)	(3.49)
Constant	–5.52*	—	–5.48*
	(5.98)		(5.76)
R^2	0.04	0.72	0.04
Log-likelihood	–6,101.7	–4,524.7	

NOTE: Absolute *t* ratios in parentheses. LM test statistic value (*df* = 1): 218.39; Hausman test statistic (*df* = 7): 58.61.
*Significant at the 1% level, one-tailed. **Significant at the 5% level, one-tailed. ***Significant at the 10% level, one-tailed.

Table 5 reports the results of estimation done on only those taxpayers with AGI above the 90th percentile for 1985. For this group of 526 taxpayers, the price elasticity term is not statistically significant. Of interest, however, is the fact that the income elasticity is significant and negative and that the charity elasticity is positive and significant. The lack of statistical significance of the price elasticity term may provide some evidence that our earlier results are dependent on "goodwill"-type giving. The income and charity elasticities retain statistical significance. There may also be some concern that a large number of "zero" observations in the data set may cause statistical problems for the econometric model. A common solution to the problem of a large number of zeros is the use of a Tobit estimator. Maddala (1992), however, suggests that this is not the proper approach for this problem. He argues that when a large number of zero observations come from the free choice of consumers, we do not have the censoring or truncation

TABLE 5: Double-Log Estimation Results: Taxpayers With 1985 Adjusted Gross Income in Top 10% of Income Distribution

Variable	*Ordinary Least Squares*	*Fixed Effects*	*Random Effects*
Price elasticity	–2.118	–1.977	–2.250
	(0.96)	(1.02)	(1.27)
Income elasticity	–0.416*	–0.490**	–0.434**
	(2.93)	(2.28)	(3.00)
Charitable contributions elasticity	0.286*	0.528*	0.318*
	(4.15)	(3.96)	(4.27)
Dividend income (000)	$-0.66E^{-3}$	$-0.37E^{-2}$	$-0.12E^{-2}$
	(0.31)	(0.62)	(0.51)
Capital gains (000)	$0.68E^{-3}$**	$0.81E^{-3}$**	$0.73E^{-3}$**
	(2.01)	(2.10)	(2.33)
Age (dummy)	–0.298**	0.181	–0.233
	(2.03)	(0.59)	(1.45)
Marital status (1 if married)	1.051*	0.757	1.046*
	(3.32)	(0.72)	(2.88)
Constant	–4.37*	—	–4.43*
	(2.99)		(2.84)
R^2	0.03	0.73	0.03
Log-likelihood	–2,453.4	–1,790.5	

NOTE: Absolute *t* ratios in parentheses. LM test statistic value (*df* = 1): 102.54; Hausman test statistic (*df* = 1): 6.12.
*Significant at the 1% level, one-tailed. **Significant at the 5% level, one-tailed.

problems for which a Tobit-type estimator is appropriate. As a result, we feel that the use of a Tobit is not needed in this model.

Instead of using Tobit estimation to help understand the impact of the zeros on the outcome, and to examine whether the tax price ratio affects the decision to give noncash charity, we estimate a two-step procedure for noncash contributions. In the first step, a logit model is used to estimate the likelihood that an individual contributed noncash charity in a given year; the dependent variable is equal to 1 if the taxpayer contributed noncash charity in a given year and zero otherwise. We estimate both a pooled cross-section and a panel logit model. The results of this estimation are found in Table 6.

We find that an increase in the price ratio of noncash gifts to cash gifts significantly reduces the likelihood of a noncash gift, holding the amount of charity equal. Of the other variables, only marital status and the amount of charity significantly affect the probability of giving a

TABLE 6: Logit Regression Results

Variable	*Cross-Section Logit*	*Fixed-Effects Logit*
Price ratio	–3.492*	–3.703*
	(7.95)	(4.76)
Income (000)	$-0.41e^{-3}$	$-0.23e^{-2}$**
	(1.23)	(1.88)
Charitable contributions (000)	$0.74e^{-2}$**	–0.12*
	(1.84)	(3.18)
Dividends (000)	$0.36e^{-3}$	–0.018
	(0.21)	(0.71)
Capital gains (000)	$0.36e^{-3}$	$-0.13e^{-3}$
	(0.83)	(0.22)
Age (dummy)	–0.018	–0.055
	(0.37)	(0.28)
Marital status (1 if married)	0.448*	0.982*
	(6.26)	(2.64)
Constant	1.752*	—
	(4.31)	
Log-likelihood	–4,593	–662

NOTE: Absolute *t* ratios in parentheses. Hausman test statistic, H_0: no fixed effects = 12.08.
*Significant at the 1% level, one-tailed. **Significant at the 5% level, one-tailed.

noncash gift. It should be noted that the marginal effect for the amount of charity is very small. The results are qualitatively similar in both the cross-section logit and the fixed-effects logit, with the exception that income is significant in the fixed-effects model. Income enters the fixed-effects model with a very small coefficient, and the marginal effect is small. A Hausman test indicates that fixed effects are present and that the panel model is appropriate.

In the second step of this procedure, we then estimate the model from the first step but using only those taxpayers who contributed a noncash gift in at least 1 of the 2 years. Once again, a cross-section OLS model and fixed- and random-effects specifications are estimated. These results are found in Table 7. The price elasticity is significant and large in both the OLS model and the random-effects models, but these models have little explanatory power. The price elasticity is insignificant in the fixed-effects model, but the null hypothesis cannot be rejected in an *F* test for joint significance. The charity elasticity is large and positive in all specifications of the model, whereas the income elasticity is negative and significant.

TABLE 7: Regression Results for Occasional Noncash Givers

Variable	*Ordinary Least Squares*	*Fixed Effects*	*Random Effects*
Price elasticity	–4.008*	–1.114	–3.898*
	(4.86)	(1.03)	(4.06)
Income elasticity	–0.354*	–0.602*	–0.529*
	(3.53)	(2.66)	(3.71)
Charitable contributions elasticity	0.126*	1.67*	1.449*
	(3.01)	(15.5)	(7.16)
Dividend income (000)	$-0.13e^{-2}$	$-0.53e^{-2}$	$-0.38e^{-2}$
	(0.62)	(0.39)	(1.06)
Capital gains (000)	$0.30e^{-3}$	$0.38e^{-3}$	$0.42e^{-3}$
	(0.91)	(0.70)	(0.96)
Age (dummy)	–0.154	0.252	–0.325
	(0.86)	(0.46)	(1.18)
Marital status (1 if married)	0.396*	1.027**	0.462**
	(2.96)	(2.09)	(2.18)
Constant	–1.240	—	–1.666
	(1.35)		(1.23)
R^2	0.01	0.45	0.00

NOTE: Absolute *t* ratios in parentheses. LM test statistic value (*df* = 1): 90.54; Hausman test statistic (*df* = 1): 205.25.
*Significant at the 1% level, one-tailed. **Significant at the 5% level, one-tailed.

CONCLUSIONS

This study estimates the impacts of changes in the relative tax prices of cash and noncash charity on the form of charitable contributions. We find that changes in the relative prices of different forms of charity have a significant impact on the form of a charitable contribution, holding the level of charity constant. Across a wide variety of specifications, our estimation results indicate that individuals are very sensitive to the relative price of noncash to cash gifts. An increase in this price typically leads to a significant decrease in the proportion of gifts in the form of noncash gifts, with an elasticity that is generally well in excess of –1.0.

We believe that this is an important result for public policy toward charity. Donors are clearly price sensitive in the form of the charity that they give. Thus, changes in the tax law that change the price ratio between cash gifts and noncash gifts have a large impact on the form of charitable giving. In particular, reductions in capital gains taxes, changes in holding periods that affect the amount of appreciation of an

asset, and changes in appreciation rates for assets that would serve to increase the price of donating an asset to charity would lead taxpayers to shift more of their giving to cash forms. In addition, as a larger number of taxpayers accumulate appreciated assets through activities such as mutual fund participation, the amount of tax arbitrage may be expected to increase.

More work is clearly needed to understand the extent to which these changes affect the amount of charity. However, this study clearly shows that the relative tax prices are significant determinants of the form of charitable giving.

NOTES

1. For example, see Clotfelter (1985), Brown (1996), or Greene and McClelland (2001).
2. The first-dollar tax rate is the rate that would apply if the taxpayer had no charitable deductions. The first-dollar rate is used to mitigate possible endogeneity problems that can arise because the tax rate is itself dependent on the level of deductions.
3. If all donations are of the goodwill variety, then for practical purposes, $V = B$, and the tax price is identical to giving cash.
4. It should be noted that this only affects work that relies on individual tax returns. It does not affect aggregate amounts.
5. The blurring procedure sorts returns by the deduction for "State and Local Income Taxes" and averages every three returns.
6. There may be some concern that the charitable contributions variable is endogenous in our particular specifications. However, a Hausman test suggests that endogeneity is in fact not present. In addition, we have estimated the same basic specifications with charitable contributions excluded, and our estimation results are largely unaffected.
7. Because it is possible to claim capital losses, the log of capital gains cannot be taken.
8. If all the noncash gifts were goodwill-type donations, then the tax price ratio variable would be unity, and thus there would be no variation in that right-hand-side variable. If all noncash giving were goodwill-type giving, then price elasticity estimates from a model of charitable giving would be appropriate because the tax price of goodwill donations is equivalent to the tax price of cash donations.

REFERENCES

Auten, Gerald E., James Cilke, and William C. Randolph. 1992. The effects of tax reform on charitable contributions. *National Tax Journal* 45:267-90.

Barrett, Kevin Stanton, Anya M. McGuirk, and Richard Steinberg. 1997. Further evidence on the dynamic impact of taxes on charitable giving. *National Tax Journal* 50:321-34.

Boskin, Michael J., and Martin S. Feldstein. 1977. Effects of the charitable deduction on contributions by low income and middle income households. *Review of Economics and Statistics* 59:351-54.

Bradley, Ralph, Steven Holden, and Robert McClelland. 1999. A robust estimation of the effects of taxation on charitable contributions. Unpublished manuscript.

Brown, Eleanor. 1996. Taxes and charitable giving: Is there a new conventional wisdom? In *Proceedings of the 89th Annual National Tax Association Conference on Taxation*, 153-59. Washington, DC: National Tax Association—Tax Institute of America.

Clotfelter, Charles T. 1985. *Federal tax policy and charitable giving*. Chicago: University of Chicago Press.

Dennis, Barry, Gabriel Rudney, and Roy Wyscarver. 1983. *Charitable contributions: The discretionary income hypothesis.* Working paper no. 63, Program on Nonprofit Organizations, Institute for Social and Policy Studies, Yale University.

Feldstein, Martin S. 1975. The income tax and charitable contributions: Part I. Aggregate and distributional effects. *National Tax Journal* 28:81-100.

Feldstein, Martin S., and Charles T. Clotfelter. 1976. Tax incentives and charitable contributions in the United States. *Journal of Public Economics* 5:1-26.

Feldstein, Martin S., and Amy Taylor. 1976. The income tax and charitable contributions. *Econometrica* 44:1201-22.

Greene, Pamela, and Robert McClelland. 2001. Taxes and charitable giving. *National Tax Journal* 54:433-53.

Maddala, G. S. 1992. *Introduction to econometrics*. 2nd ed. Englewood Cliffs, NJ: Prentice Hall.

McClelland, Robert, and Mary F. Kokoski. 1994. Econometric issues in the analysis of charitable giving. *Public Finance Quarterly* 22:498-517.

Randolph, William C. 1995. Dynamic income, progressive taxes, and the timing of charitable contributions. *Journal of Political Economy* 103:709-38.

Reece, William S., and Kimberly D. Zieschang. 1985. Consistent estimation of the impact of tax deductibility on the level of charitable contributions. *Econometrica* 53:271-93.

Thaler, Richard H. 1990. Savings, fungibility, and mental accounts. *Journal of Economic Perspectives* 4:193-205.

David H. Eaton is an associate professor of economics in the Department of Economics and Finance at Murray State University, Murray, Kentucky.

Martin I. Milkman is a professor of economics in the Department of Economics and Finance at Murray State University, Murray, Kentucky.