Pay or pray? The impact of charitable subsidies on religious attendance

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Abstract

The economic argument for subsidizing charitable giving relies on the positive externalities of charitable activities, particularly from the religious institutions that are the largest recipients of giving. But the net external effects of subsidies to religious giving will also depend on a potentially important indirect effect as well: impacts on religious participation. Religious participation can be either a complement to, or a substitute with, the level of charitable giving. Understanding these spillover effects of charitable giving may be quite important, given the existing observational literature that suggests that religiosity is a major determinant of well-being among Americans. In this paper, I investigate the impact of charitable subsidies on a measure of religious participation, attendance at religious services. I do so by using data over three decades from the General Social Survey, as well as confirming the impact of such subsidies on religious giving using the Consumer Expenditure Survey. I find strong evidence that religious giving and religious attendance are substitutes: larger subsidies to charitable giving lead to more religious giving, but less religious attendance, with an implied elasticity of attendance with respect to religious giving of as much as − 1.1. These results have important implications for the debate over charitable subsidies. They also serve to validate economic models of religious participation.
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One of the largest tax expenditures of the United States government is the itemized deduction for charitable giving. In 2001, the federal government had $37 billion in

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foregone revenue arising from the ability of individuals who itemize their taxes to deduct their charitable giving from their taxable income (Joint Committee on Taxation, 2002). This deduction is a very popular one, and most current debate in this area is around proposals to expand the availability of charitable subsidies. For example, President Bush recently proposed allowing married couples who do not itemize their taxes to deduct up to $800 in charitable giving (Bumiller, 2002).

The economic argument for subsidizing charitable giving is clear. To the extent that charitable giving has positive externalities, it will be underprovided by the private sector. Subsidizing its provision through the tax code can mitigate this problem. Moreover, there is a large econometric literature which shows that charitable giving is very responsive to these tax subsidies. While the magnitudes vary, most estimates suggest that the overall elasticity of charitable giving with respect to its after-tax price is in the range of minus one or larger (in absolute value).

One source of perceived positive externalities from increased charitable giving is through giving to religious institutions. Such giving can expand the access to religious worship and education, and religious institutions also provide valuable social and welfare services to the community as well. But the net external effects of subsidies to religious giving will also depend on a potentially important indirect effect as well: impacts on religious participation.

Religious participation can be either a complement to, or a substitute with, the level of charitable giving. On the one hand, if giving can only occur in a religious setting ("passing the plate"), if individuals wish to monitor the impact of increased levels of giving, or if the "warm glow" of giving is only operative when participating, then religious participation and religious giving could be complementary; therefore, higher subsidies to charitable giving would lead to more religious attendance. On the other hand, in the standard economic model of religiosity (e.g. Azzi and Ehrenberg, 1975), giving and religiosity are substitutes. In this model, individuals trade off the costs of religious devotion against the perceived gains of being more devoted. These costs include both the money contributed to religious causes and the time spent on those causes, so that cash giving is viewed as a substitute for time spent on religious endeavors.

If religious participation is either a complement to or a substitute with religious giving, then charitable subsidies to giving can have spillover effects on participation. Understanding these spillover effects may be quite important, given the existing observational literature that suggests that religiosity is a major determinant of well-being among Americans. Of course, disentangling true effects of religiosity from other factors correlated with both religiosity and outcomes is a daunting task; but this literature is at least suggestive of the importance of understanding the determinants of religious participation.

In this paper, I investigate the impact of charitable subsidies on religious participation by using the longest-running continuous survey on religiosity in the U.S.: the General Social Survey. In every year since 1972, this survey has asked a sample of 1500–2500 respondents about their frequency of religious attendance. This long time frame, in a nationally representative sample, allows me to exploit the dramatic variation in the subsidization of charitable giving in the U.S. over time, across income groups, and across states. I also use this same variation to confirm that charitable subsidies affect religious

giving in the Consumer Expenditure Survey (CEX), which since 1980 has collected data for a nationally representative sample on their giving activity.

I find very strong evidence in these data that religious giving and religious attendance are substitutes. Larger subsidies to charitable giving increase religious donations in the CEX data, although religious giving is less elastic than overall charity. But they also lead to a highly significant reduction in frequency of religious attendance. These GSS attendance results are very robust to a wide variety of specification checks. Taken together, these two sets of results for an implicit instrumental variables estimate that suggests that there is very strong substitutability between giving and attending. Thus, proposals to expand the subsidy to charitable giving may spur religious giving, but that they will also result in a decline in religious attendance in the U.S.

The paper proceeds as follows. Section 1 provides background on: the theoretical determinants of religiosity and existing evidence on the relationship between giving and religious participation; the theory of charitable deductions and the normative implications of substitutability or complementarity between giving and religious participation; and the existing evidence on the impact of the charitable deduction on giving. Section 2 discusses the data sources, the GSS and CEX, and the empirical strategy. Section 3 presents the results, and Section 4 presents a set of specification checks. Section 5 concludes.

1. Background

1.1. Charitable subsidies and religiosity

There is a sizeable literature on the determinants of religiosity which inform the analysis of this paper. The canonical model is Azzi and Ehrenberg's (1975) household production model of religiosity, as summarized by Iannaccone (1998). In this model, individuals allocate their time and goods among religious and secular commodities so as to maximize lifetime and "afterlife" utility. As individuals allocate more of their time and money to religious endeavors, it lowers consumption today, but increases consumption in the afterlife.

In its standard form, as Iannaccone notes, this model predicts substitution between time and money devoted to religion. This is because afterlife consumption is jointly produced by time and money, so as more money is contributed, the marginal utility of time falls for afterlife consumption relative to current consumption. Substitution between giving and time could also be generated from Iannaccone's (1992) club model of religions, in which case money and time would jointly produce standing within a particular religious community.

But this model could straightforwardly be extended to generate complementarities between time and money devoted to religion. Most simply, if religious contributions occur at the church (through "passing the plate"), then there may be a natural link between more time spent at church and more money contributed. Alternatively, if individuals wish to monitor the spending of their increases in contributions, then more giving could be positively correlated with more religious attendance. It is even possible that the "warm glow" of religious giving operates through being in the environment to which that giving

is targeted, for example, through being exposed to other congregation members who may praise the giver. Complementarities may also be generated through the supply side. For example, religious institutions may endeavor to avoid "financial free riding" among participants through social sanctions or other mechanisms. This would insure at least a minimal level of giving among that those who attend, generating a complementarity between giving and attending.

There are to date only a few studies which have explicitly investigated the relationship between giving and attendance at the individual level. Olson and Caddell (1994), Forbes and Zampelli (1997), Iannaccone (1997), and Dahl and Ransom (1999) include religious attendance in a religious contributions model and find a positive association between attendance and contributions, suggesting complementarity between giving and religiosity. But it seems likely that there are a host of omitted factors correlated with both attendance and contributions, making such relationships difficult to interpret. Those who are "more religious" (who, in terms of the Azzi and Ehrenberg model, have a larger value on afterlife relative to current life consumption) will both give and participate more. But this type of complementarity does not speak to the marginal effect of changing incentives for giving on participation.

Sullivan (1985) and Clain and Zech (1999) attempt to address this concern by estimating reduced forms of simultaneous equations models which include predicted contributions in attendance models and vice versa. Both of these studies continue to find a strong positive correlation between giving and religiosity. But these identification strategy are quite suspect since it is hard to conceive of exogenous factors (other than tax laws) which impact contributions but not attendance or vice versa. For example, Sullivan assumes that whether one "considers sacramental participation necessary for salvation" affects attendance but not contributions and that church size and whether one "considers tithing necessary for salvation" affect contributions but not attendance. Clain and Zech assume that the square of income, home ownership, the square of age, and wife's education affect contributions but not attendance, and that own education, number of children, and religious preference affect attendance but not contributions. But it is clear that all of these variables will in all likelihood impact both attendance and contributions, so this does not provide a fruitful empirical framework for disentangling their relationship. For example, beliefs about salvation may reflect underlying tastes for religion which drive both giving and religiosity; similarly, education can (and does quite strongly in the regressions below) be correlated with both outcomes.

At a more aggregated level, two studies discussed in Olson (2002) find evidence of substitutability between giving and religiosity. Olson and Caddell (1994) find that among United Church of Christ congregations, the congregations with the highest per capita financial giving were the congregations that were losing members most rapidly. Moreover, Olson cites his own unpublished analysis of data from the Yearbook of American and Canadian churches suggesting that the denominations showing the greatest increases in per member giving (adjusted for inflation) in the latter half of 20th century were the same denominations that lost members most rapidly over this same time period. These results are intriguing, but once again, it is hard to distinguish true substitutability from other omitted factors that determine congregational and denominational growth. For example, it

may be that as congregations or denominations shrink for natural reasons, the remaining adherents are those who are most committed, and therefore those who contribute the most; indeed, Olson and Caddell (1994) suggest that this is the most likely explanation for their finding.

1.2. Theory of optimal charitable deductions

There is a small theoretical literature which discusses the optimal level of charitable deductions. This literature is comprehensively reviewed and extended in Saez (2000), whose analysis suggests that the optimal level of subsidies depends on four factors. The first is the size of the external effect of the subsidized good. For goods where the government cannot directly contribute, such as contributions to religious organizations, then the unsubsidized private optimum may be particularly far from the social optimum, heightening the potential role of subsidies. The second is the price elasticity of the contribution good; the optimal subsidy should rise with the price elasticity. Third, the larger is the ''crowding out'' of private contributions by public contributions, the higher should be the subsidy since more private donations are required to achieve a given net level of contribution. Finally, contributions which are concentrated at the bottom of the income distribution should be subsidized more heavily than those concentrated at the top since contributions have some consumption value so the government can use this as a redistributive tool.

These considerations suggest that there is a strong argument for some subsidization of religious giving. The fact that the government cannot directly contribute to such organizations suggests that the unsubsidized level of contributions might be suboptimal. In addition, religious giving is the major source of contribution among low-income groups, consistent with the final motivation for subsidization. At the same time, past research suggests (and I confirm below) that religious giving is less price sensitive than other forms of giving, which reduces the optimal level of subsidization.

But the optimal level of subsidy will also depend critically on any other responses to charitable subsidies. One potentially important source of response is religious participation.

Over two-thirds of Americans belong to a church or other religious organization, and this has risen substantially over time. Two-fifths of Americans attend church in a typical week (Iannaccone, 1998).[1] Moreover, religious participation is not confined to particular income groups, racial groups, or locations in the U.S.: religious adherence and participation is widespread among all demographic groups. If charitable subsidization has an additional effect on religious participation, then this can amplify or reduce the optimal subsidy level. The key question is the net external effect of religious giving, net of any potential impacts on religious participation.

Measuring the externalities of giving is very difficult, and there is little work which actually quantifies the benefits of religious giving. Presumably, a major benefit of giving is

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[1] Chaves and Stephens (2001) argue that statistics on church attendance are significantly inflated in surveys such as those cited by Iannaccone and used in this paper, but even at a participation rate half as high the U.S. would remain one of the most religious nations in the world.

maintaining general access to religious services for others who cannot afford to give. Casual evidence that this is the case is found in Olson and Caddell (1994), who show that giving is lower when churches have more income from other sources or the income of other members is higher. There may be other externalities arising from the role of churches as a direct provider of charity or welfare services. This is at least ostensibly the motivation for policy-makers supporting the "faith-based initiatives" that would expand the role of religious institutions in providing welfare-like services to low income and other populations (Bumiller, 2002).

On the other hand, if there are also impacts of charitable subsidies on religious participation, then there may be very large additive or offsetting externalities through this margin. A vast series of studies documents a strong association between religious participation, and religiosity more generally, and "a wide range of economically important social behavior, such as criminal activity, drug and alcohol consumption, physical and mental health, and marriage, fertility and divorce" (Iannaccone, 1998). Of course, this literature is hard to interpret because of issues of heterogeneity, but the results are nevertheless suggestive.

Thus, the net externalities of subsidizing charitable giving may very well depend on spillover effects on religious participation, if those spillover effects are sizeable. The purpose of the empirical work in this paper is to measure the size of these spillover effects.

1.3. Evidence on charitable deductions and charitable giving

There is also a sizeable literature devoted to assessing the elasticity of charitable giving with respect to its after-tax price. A series of cross-sectional studies in the 1970s and 1980s estimated elasticities of charitable giving with respect to its after-tax price of greater than minus one in absolute value (see Clotfelter, 1985 and Steinberg 1990 for reviews). In the 1990s, some began to question the size of these estimated elasticities. In particular, Randolph (1995) and Barrett et al. (1997) found that much of the elasticity attributed to taxes in the previous literature was due to transitory tax changes, and that the permanent price elasticity was lower than previously reported. A recent study by Auten et al. (2002) questions these conclusions, however, and in particular, the parameterization of permanent income and price effects by simple multiyear averages. Using a more sophisticated decomposition of permanent and transitory effects, they estimate that there is in fact a very sizeable permanent price elasticity in the range of − 0.8 to − 1.26, quite similar to the earlier cross-sectional literature.

There has been relatively little attention in this literature to the decomposition of this elasticity into the sensitivity of different types of religious giving. Notable exceptions are McClelland and Kokoski (1994) and Bradley et al. (1999); the former paper models religious giving explicitly, while the latter models total and nonreligious giving, so that religious giving is a residual. Both papers find that religious giving is much less price-elastic than nonreligious giving, using CEX data from the early 1980s.

But a key issue with all of the existing literature is identification. The typical approach to estimating "first dollar" charitable subsidies is to compute the reduction in taxes for an individual based on their income, but assuming no existing charitable giving. But, as

highlighted by Feenberg (1987), differences in charitable subsidies across individuals therefore are correlated with other factors that may determine tastes for giving, such as income. Feenberg suggested using state tax rates as an instrument for charitable giving to overcome this bias, but in a cross section, this raises the difficulty that there may be other secular differences across states correlated with both their tax rates and giving propensities. In the empirical work below, I rely on the extensive variation over time within income groups and within states to control for both income levels and fixed state differences in identifying charitable subsidy effects.

2. Data and empirical strategy

2.1. Data

I rely on two primary sources of data for this analysis. Data on charitable contributions come from the Consumer Expenditure Survey. The CEX collects data for a nationally representative set of households on an inventory of their consumption expenditures, including charitable contributions. Charitable contributions are divided into contributions to religious organizations, educational organizations, political organizations, charitable organizations (e.g. the United Way), and other organizations. The CEX data are collected quarterly, but contributions information is only collected in the last interview, and respondents are asked about their charitable giving over the past year. I use these CEX data for the period from 1980 through 1998.

Data on religious participation come from the General Social Survey. The GSS has, since 1972, asked a nationally representative sample of respondents about the frequency of their religious attendance. There are nine possible responses to this question: never, less than once per year, about once or twice a year, several times a year, about once a month, two to three times a month, nearly every week; every week, and several times a week. For the basic analysis below, I simply use the linear index formed by these responses (with values 0 through 8), thereby implicitly assuming that there are equal impacts of each unit change in the attendance index. But I show as well the effects of alternative formulations below. I use data from the GSS from 1977 (the first year for which the tax calculator described below includes information on state tax rates) through 2000.

Both the GSS and the CEX also contain information on family income and other characteristics that are necessary to form a measure of the subsidy to charitable giving. In the CEX, income values are directly reported. The GSS, however, only collects categorical data on income, in fine gradations until the top of the income distribution, then in larger intervals and finally a top code. In order to create a smooth income measure, I have used data from each year's Current Population Survey to impute values to each of these larger ranges and the top-coded range.

Charitable subsidies are computed using the NBER's internet TAXSIM model (available at http://www.nber.org/taxsim). This model inputs information on taxpayer income, state of residence, marital status, number of children, and itemized deductions, and it outputs tax liabilities and marginal tax rates. Information on all of these attributes except itemized deductions, and whether the taxpayer itemizes, is available in both the

CEX and GSS.[2] I imputed the odds of itemizing and the amount of itemized deductions (aside from charitable contributions) to each taxpayer using data from the Statistics of Income (SOI) files for each year. These data contain information on all of the elements of taxable income, and taxes paid, for a sample of taxpayers. I use these data to form a predicted odds of itemizing and noncharitable amount itemized by income level and state of residence and impute these onto the families in the CEX and GSS.

I then use these data to estimate tax rates and charitable subsidies twice for each family, once as an itemizer and once as a non-itemizer. In each case, the charitable subsidy is computed as the difference between taxable income at the baseline imputed level of (noncharity) itemized deductions and taxable income when itemized deductions are incremented by $1000, divided by 1000.[3] When a non-itemizer, charitable subsidies are zero except for the small numbers of years in the early 1980s when charitable deductions were allowed for non-itemizers, and the small number of states and years where non-itemizers can deduct charitable contributions on state taxes.[4] I then compute the average charitable subsidy to an individual as a weighted average of their subsidy as a non-itemizer and their subsidy as an itemizer, where the weights are the odds of itemizing, imputed from the SOI data.

The resulting charitable subsidies vary for a number of reasons. The first is income: higher income taxpayers will have higher marginal tax rates, and thus a more sizeable reduction in their tax burden from deductions to taxable income. But this relationship is highly nonlinear, following the bracket structure in the tax code. The second is time. The schedule of tax rates changes over time, and it changes differentially throughout the income distribution (e.g. the tax reforms of the 1980s reduced tax burdens much more at the top of the income distribution than at the bottom; the tax reform of 1993 had the opposite effect). Moreover, the treatment of charitable contributions relative to income changes somewhat over time as well due to factors such as the "claw-back" in itemized deductions at upper income levels that has been in place since 1987, or the Alternative Minimum Tax (AMT) which limits the amount of charitable deduction that can be taken. The third is state tax law. Tax subsidies to charity vary across states because (a) some states have no state income tax system, (b) tax rates vary across the states that do have income taxes, both on average and in terms of the progressivity of

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[2] TAXSIM allows one to enter separately wage and other income; however, this breakdown in income sources is not available in the GSS, so all income is treated as wage income. For most years in our sample, there was little distinction in the tax treatment of these sources of income, so this should not much affect the computations.

[3] The average level of contributions to religious charities in the CEX is $281 in 1998 dollars. But a large increment is suggested to be used with TAXSIM to avoid strange "notches" that can arise in effective tax rates (and in particular in effective state tax rates) when income moves by small amounts. I have replicated all results in this paper using an increment of $100 instead, and the results are very similar.

[4] In 1985, non-itemizers could deduct 50% of their charitable contributions from their federal taxes; in 1986, this rose to 100%. In addition, California, Hawaii, Idaho, Iowa, Kentucky, and North Carolina have at some point (generally in the mid-1980s) provided charitable deductions on state taxes for non-itemizers. In addition, in 1982–1984, there was a 25% federal credit for giving up to $250, and some states have capped credits as well. I estimated my subsidy rates both including and excluding these capped credits, and the results were almost identical; I exclude the capped subsidies for the results presented here.

tax rate schedules, and (c) states differ in their treatment of charitable contributions. In terms of the last factor, a number of states follow the federal definition of income, so that charitable contributions are fully deductible for itemizers; others ask the taxpayer to explicitly report (and deduct) their federally itemized amounts from their state taxable income; and a final set of states does not allow a deduction for charitable contributions.

Each of these factors, income, time, and state, may be independently correlated with both charitable contributions and with attendance. So a simple correlation of charitable subsidies and either attendance or charitable giving may not be well identified. But the rich variation in charitable subsidies along all of these dimensions allows me to control for each of them independently in the regression models, so that identification is achieved only from interactions of income, time, and state. I discuss this issue further below.

Sample means for both data sets are presented in Table 1. For the CEX, I censor total and religious giving at the 99th percentile of the conditional giving distribution. I do so because the linear giving regressions are very sensitive to a small number of outliers. I also report results for log giving and the odds of giving that involve no censoring. I find that the

Table 1
Sample means

	CEX	GSS
Total contributions	536 (1294)	
Religious giving	392 (1076)	
Give to religion	0.38 (0.48)	
Religious giving, conditional on giving	1036 (1548)	
Attendance index		3.86 (2.68)
Do not attend		0.15 (0.36)
Attend less than once per year		0.08 (0.27)
Attend once or twice per year		0.13 (0.34)
Attend several times a year		0.13 (0.34)
Attend about once a month		0.07 (0.26)
Attend two to three times per month		0.09 (0.29)
Attend nearly every week		0.05 (0.23)
Attend every week		0.20 (0.40)
Attend several times a week		0.08 (0.27)
Tax subsidy to giving	0.094 (0.012)	0.10 (0.11)
Real income	35,680 (35,121)	39,506 (29,465)
Age	47.0 (17.7)	44.7 (17.2)
Female	0.36 (0.48)	0.56 (0.50)
White	0.84 (0.37)	0.83 (0.38)
Black	0.12 (0.33)	0.14 (0.34)
Married	0.56 (0.50)	0.54 (0.50)
HS dropout	0.21 (0.40)	0.24 (0.42)
HS graduate	0.32 (0.46)	0.32 (0.46)
Some college	0.22 (0.42)	0.23 (0.42)
College graduate	0.26 (0.44)	0.21 (0.41)
Number of observations	79,036	29,743

Authors tabulations from Consumer Expenditure Survey (first column) and General Social Survey (second column). Standard deviations in parentheses. Demographic characteristics refer to survey respondent for GSS and to head of household for CEX. All dollar figures in 1998 dollars.

typical household contributes $536 (1998 dollars) to charity overall and $392 to religious giving. Thirty-eight percent of households contribute some money to religious causes, and the average giving is over $1000 for those who do contribute. In the GSS, I see that there is a fairly broad distribution of the frequency of attendance at religious institutions: 15% of the sample does not attend at all, 20% attends every week, and the other options are chosen by between 8% and 13% of the sample.

The average tax subsidy to charitable giving, factoring in the odds of itemization by income as described above, is 9.4% in the CEX and 10% in the GSS. The slightly higher subsidy rates on average in the GSS reflect the higher levels of average income in that data set. The individual demographic characteristics across the two data sets are not directly comparable, as they refer to the respondent in the GSS, but to the head of household in the CEX. Nevertheless, the characteristics are almost identical, except for gender, reflecting survey bias towards males being labeled head of household in the CEX.

2.2. Regression framework

In both the CEX and the GSS, I estimate regression models of the form:

$$Y_i = \alpha + \beta_1 \text{SUBS}_i + \beta_2 X_i + \beta_3 \text{INC}_i + \delta_j + \tau_t + \epsilon$$

where Y is one of the dependent variables (contributions or religious attendance) for individual i; SUBS is the subsidy rate to charitable giving; X is a set of demographic control variables; INC is a set of 10 dummy variables for the deciles of the income distribution to control nonparametrically for income distribution effects on giving/religiosity; and δ_j and τ_t are a full set of state and year fixed effects, respectively.

This model controls for direct effects of income, state, and year on charitable giving or on religious attendance. Thus, the only sources of identification are interactions of income, state, and year, i.e., changes in the progressivity of taxation or in state tax rates over time, differences in the progressivity of taxation across states at a point in time, or differential changes in state progressivity over time. These are unlikely to be correlated with attendance or charitable giving other than through the impact on charitable subsidies. But I pursue a host of specification checks below to confirm this identification assumption.

3. Basic results

3.1. CEX results

The results for the impact of charitable subsidies on charitable giving are reported in Table 2. The first column reports the effects on total religious giving, the second column reports the effects on log religious giving (which is obviously conditional on any giving), and the third column reports the effects on any religious giving at all; this last regression is estimated as a probit, and marginal probabilities are reported. The second set of three columns reports analogous results for total charitable giving, for comparison.

Table 2
Impact of charitable subsidies on charitable giving in CEX

	Religious giving			Total giving		
	Level	Log	Giving>0	Level	Log	Giving>0
Subsidy	204	0.502	0.001	519	0.878	0.143
	(87)	(0.176)	(0.042)	(102)	(0.162)	(0.046)
Elasticity wrt after-tax price	− 0.47	− 0.47	0	− 0.88	− 0.80	− 0.24
White	114	.296	0.009	185	0.253	0.052
	(21.3)	(.049)	(0.011)	(24.9)	(0.044)	(0.011)
Black	175	0.384	0.067	224	0.423	0.051
	(23.9)	(0.054)	(0.012)	(28.0)	(0.050)	(0.012)
Married	− 249	− 0.146	− 0.056	− 420	− 0.288	− 0.108
	(33.1)	(.074)	(0.016)	(38.7)	(0.069)	(0.017)
HS graduate	105	0.288	0.049	147	0.267	0.077
	(11.2)	(0.025)	(0.006)	(13.2)	(0.024)	(0.006)
Some college	171	0.375	0.107	240	0.444	0.142
	(12.6)	(0.028)	(0.006)	(14.8)	(0.026)	(0.006)
College graduate	274	0.536	0.147	446	0.760	0.186
	(13.2)	(0.029)	(0.007)	(15.5)	(0.027)	(0.006)
Income category 2	45.3	− 0.478	0.143	30.5	− 0.496	0.136
	(16.9)	(0.046)	(0.009)	(19.8)	(0.044)	(0.008)
Income category 3	26.5	− 0.522	0.159	− 5.32	− 0.658	0.156
	(17.2)	(0.046)	(0.010)	(20.1)	(0.044)	(0.008)
Income category 4	62.9	− 0.351	0.209	36.1	− 0.528	0.222
	(16.9)	(0.045)	(0.009)	(19.8)	(0.042)	(0.007)
Income category 5	113	− 0.246	0.246	92.0	− 0.429	0.273
	(17.0)	(0.044)	(0.009)	(19.9)	(0.041)	(0.007)
Income category 6	172	− 0.134	0.274	165	− 0.302	0.312
	(17.5)	(0.044)	(0.009)	(20.5)	(0.041)	(0.006)
Income category 7	206	− 0.099	0.302	208	− 0.240	0.342
	(18.9)	(0.046)	(0.010)	(22.1)	(0.043)	(0.007)
Income category 8	255	− 0.077	0.317	264	− 0.183	0.357
	(21.5)	(0.050)	(0.011)	(25.2)	(0.046)	(0.007)
Income category 9	326	− 0.031	0.339	356	− 0.086	0.377
	(26.8)	(0.059)	(0.013)	(31.4)	(0.055)	(0.008)
Income category 10	432	0.101	0.328	704	0.179	0.376
	(32.1)	(0.069)	(0.015)	(37.6)	(0.064)	(0.010)
Number of observations	79,036	79,036	79,036	79,036	79,036	79,036

Standard errors in parentheses. Regressions also include controls for: age and sex of head and spouse; education of spouse; number of children; and state, year, and month fixed effects. First three columns show results for religious contributions; second three columns show results for total contributions. Within each set, first column shows results for dollars of giving; second column shows results for log dollars; and third column shows results for a dummy for any giving. First two columns are estimated by OLS; third by probit, where I show marginal probability effects. Elasticity computed with respect to after-tax price of giving.

I find that there is a large and statistically significant effect of charitable subsidies on religious giving. Overall, the results imply that each percentage point increase in the charitable subsidy raises religious giving by almost $2. The implied elasticity of religious giving with respect to its after-tax price (one minus the subsidy, the common price term

used in the charitable giving literature) is -0.48. This effect is comprised of a significant impact on the log of conditional giving, with an implied elasticity of -0.48, and a precisely estimated zero effect on the odds of giving.

For total charitable giving, we find that each percentage increase in the charitable subsidy raises giving by almost $5.25. The estimated elasticity of overall giving is -0.89. This is comprised of a significant impact on log of conditional giving, with an elasticity of -0.81, and a small but statistically significant impact on the odds of giving, with an elasticity of -0.24. These do not sum to the overall elasticity because the composition of the pool of givers is changing somewhat as the charitable subsidy impacts who gives to charity.

Thus, the results here roughly confirm the conclusions of the earlier literature on charitable giving. Overall, charitable giving is very sensitive to subsidization by the tax code, although I estimate a price elasticity somewhat below previous studies and less than one in absolute value. Religious giving is much less price-elastic, although still significantly so. These results imply, for example, that doubling the average level of charitable subsidy from its 1998 level would lead to a rise in total charitable giving of 6.5% and a rise in religious giving of 3.5%.

Table 2 also shows a subset of the control variables used in the regression; the remaining set of controls is listed in the legend to that table. Whites and blacks are both found to contribute more to charity relative to other racial groups, while those who are Hispanic contribute less. Married couples also contribute less, conditional on the other included covariates; the unconditional correlation with marital status is strongly positive. There is a strong positive impact of both more education and more income on giving.

3.2. GSS results

Table 3 turns to an analysis of the impact of charitable subsidies on religious attendance in the GSS. As the results show, there is a very significant and sizeable *negative* coefficient on the charitable subsidy here, implying that giving and attendance are substitutes. The coefficient shows that the attendance index falls by 0.023 units for each one percentage point subsidy to charitable giving. The implied elasticity of attendance with respect to the after-tax price of giving is 0.47.

The impact of charitable subsidies on giving in the CEX, and on attendance in the GSS, can be compared to compute an implicit instrumental variables estimate of the substitutability between giving and religiosity. Doing so, I find that each 1% rise in charitable giving leads to a 1.1% decline in attendance. This implies very strong substitutability between these activities.

It is important to note, however, that the interpretation of this implicit IV coefficient depends on the underlying model of substitution. Under the Azzi–Ehrenberg model, it is possible that individuals view *any* giving to charity as a substitute for religious participation in terms of producing afterlife consumption, as opposed to only religious giving. If we use the overall charitable giving elasticity to compute an IV estimate of substitutability, we find that each 1% rise in charitable giving leads to a 0.6% decline in attendance. Under the Iannaccone model, on the other hand, it is only giving to one's religious group that would substitute for attendance, so that this would imply that the substitutability should be defined relative solely to religious giving. In the absence of

Table 3
Impact of charitable subsidies on religious participation in GSS

Subsidy	− 2.265 (0.354)
Elasticity wrt after-tax price	0.52
White	− 0.640 (0.082)
Black	0.206 (0.091)
Married	0.467 (0.036)
HS graduate	0.508 (0.043)
Some college	0.729 (0.048)
College graduate	1.044 (0.051)
Income category 2	0.159 (0.067)
Income category 3	0.349 (0.068)
Income category 4	0.331 (0.071)
Income category 5	0.381 (0.073)
Income category 6	0.468 (0.078)
Income category 7	0.643 (0.087)
Income category 8	0.698 (0.093)
Income category 9	0.881 (0.116)
Income category 10	0.856 (0.134)
Number of observations	29,429

Standard errors in parentheses. Dependent variable is attendance index. Regressions also include controls for: age and sex of respondent; education of mother and father; number of children; and state and year fixed effects. Elasticity computed with respect to after-tax price of giving.

evidence on the appropriate model, I can only conclude that the degree of substitutability lies between 0.6 and 1.1.

Table 3 also shows the coefficients on some of the other control variables in this religious participation regression. Whites have significantly lower levels of religious participation, and blacks have significantly higher levels, relative to other racial groups. Those who are married have more religious participation, and this effect is stronger for men than for women, consistent with arguments that marriage promotes "more responsible" behaviors in particular among males. There is a strong positive correlation between both education and income and religious participation.

Thus, these findings imply a very strong level of substitutability between charitable giving and religious participation. Larger subsidies to charitable giving produce higher levels of religious giving, as expected, but also produce almost correspondingly large declines in reported attendance. The results imply that doubling of the current level of charitable subsidies to religious giving would lead to a fall in religious attendance of as much as 3.6% from its 2000 level. Given this striking results, the next section runs through a battery of specification checks designed to assess its validity.

4. Specification checks

4.1. Linearity of attendance index

The results in the GSS thus far have considered only an aggregated linear religious attendance index. This linearity assumption may not be valid. In addition, a question of

particular interest is whether these findings reflect changes in behavior throughout the distribution of attendance choices, or only at one or two particular points. That is, do we see a shift from frequent to infrequent attendance, or from infrequent attendance to no attendance, or both?

I investigate this issue in the first column of Table 4. Here I show the coefficient on the charitable subsidy rate from nine separate regressions that use as dependent variables dummies for each of the nine possible responses to the religious attendance question. I show only the coefficients of interest from regressions that include the full set of covariates shown in Table 3 and discussed in the legend to that table. Once again, these regressions are estimated as probits, and marginal probabilities are reported.

It is clear from these results that charitable subsidies have an impact throughout the distribution of attendance. There is a very sizeable rise in the odds of not attending at all and a sizeable decline in the odds of frequent attendance. The impact on attending most frequently is somewhat weaker than the impact of attending only once a week, which suggests perhaps that there is less sensitivity among the most devoted. But, overall, there is a rise in the categories indicating infrequent attendance and a decline in the categories indicating frequent attendance.

Another way to parameterize this index is to weight each value according to the actual time associated with attendance, rather than having the index be linear in the categories.[5] I do so in the next row of column (1) of Table 4. Unsurprisingly, the results are also robust to this transformation.[6]

4.2. Income endogeneity

One potential concern with the approach pursued above is the endogeneity of incomes to religiosity. If the large literature which suggests positive benefits from religiosity is valid, then more religiosity may cause higher incomes, raising the tax subsidy to charitable giving and imposing a positive bias to the relationship estimated in Table 3. Alternatively, if more time spent at religious worship reduces the time available to generate income, this could reduce the subsidy to charitable giving, imposing a negative bias to this relationship. Similarly concerns arise from omitted variables that impact both tax rates and attendance frequency; for example, short run fluctuations in wages would have independent effects on wage rates and also could affect frequency of attendance through labor supply effects.

To address this concern, I have re-estimated the religious participation model using *predicted* income to compute tax subsidies, not actual income. That is, I first predict family income based on the exogenous characteristics included in the regression: age, sex, race, marital status, family size, education, and parental education. I then use this predicted income to compute tax subsidies in the same fashion as with actual income. Moreover, I control for predicted income deciles in the regression, rather than actual income deciles.

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[5] That is, I convert the values as follows: no attendance = 0; less than annual attendance = 1; once or twice a year = 2; several times a year = 4; monthly = 12; two or three times per month = 30; almost every week = 40; weekly = 52; two or three times per week = 130.

[6] I also consider an alternative functional form, using an ordered probit specification in place of the linear specification, and the inference is unchanged; there is a very highly significant negative effect on attendance.

Table 4
Specification checks

	Attend category	Predict income	Add other interacts	Labor supply control	Member dep. vars.	Interact with religion
Do not attend	0.193 (0.048)					
Attend less than once per year	0.088 (0.038)					
Attend once or twice per year	0.055 (0.047)					
Attend several times a year	0.036 (0.046)					
Attend about once a month	0.038 (0.036)					
Attend two to three times per month	− 0.110 (0.038)					
Attend nearly every week	− 0.059 (0.030)					
Attend every week	− 0.198 (0.055)					
Attend several times a week	− 0.064 (0.036)					
Time-weighted attendance index	− 22.33 (4.837)					
Predicted income		− 3.47 (0.46)				
Income*year			− 2.56 (0.45)			
State*year			− 2.20 (0.37)			
Income*state			− 2.35 (0.37)			
Subsidy rate				− 2.26 (0.35)		
Hours work per week (/100)				− 0.197 (0.078)		
Church-affiliated group member					− 0.368 (0.104)	
Any other group member					0.051 (0.102)	
Number of other group memberships					0.232 (0.354)	
Subsidy*Liberal Protestant						− 2.03 (0.52)
Subsidy*Moderate Protestant						− 2.27 (0.42)
Subsidy*Black Protestant						− 2.62 (0.61)
Subsidy*Conservative Protestant						− 0.93 (0.51)

Table 4 (*continued*)

	Attend category	Pred. income	Add interacts	Labor supply control	Member dep. vars.	Interact with religion
Subsidy*Catholic						− 1.38
						(0.41)
Subsidy*Jewish						− 3.07
						(0.77)
Subsidy*Other religion						− 3.07
						(0.59)
Subsidy*No religion						− 1.84
						(0.76)
Subsidy*Religion missing						− 1.26
						(2.32)
Number of observations	29,429	29,429	29,429	29,429	14,857	29,429

The table shows coefficients of interest from regressions that include all covariates shown in Table 3 and described in notes to that table. Standard errors in parentheses. First column shows marginal probability effect from nine separate probit regressions of attendance categories, as well as from linear regression with time-weighted attendance index as dependent variable. Second column shows results from using predicted income to compute tax subsidy. Third column shows results from including additional interactions described in table. Fourth column shows results from including control for hours of work per week. Fifth column shows results of replacing attendance dependent variable with measures of: church group membership; any other group membership; and number of other group memberships. Final column shows results from interacting charitable subsidy variable with dummies for categories of religious preference at age 16.

The results of this alternative approach are shown in the second column of Table 4; once again, I only show the coefficient of interest. I then show the impact of computing subsidies based on predicted income. In fact, we find that using predicted income significantly *increases* the estimated negative impacts of charitable subsidies on religiosity. The coefficient rises by roughly 50% relative to the values in Table 3. Thus, endogeneity of incomes does not appear to be driving the findings reported thus far.

4.3. Omitted factors

The other major identification concern is that there are omitted factors which are correlated with both subsidies and religious participation. As highlighted earlier, the sources of identifying variation for these models is interactions of income, state, and year. While these interactions seem to be legitimately excluded from a model of religious participation, it is possible that there could be omitted factors correlated with some of the interactions. For example, the subsidy to charitable giving is declining more for higher income groups than for lower income groups over the 1980s due to tax reforms which reduce income tax rates at the top of the income scale. If religious participation is changing for some other reason for the rich relative to the poor during this time period, it could bias the estimates. Similarly, if for some reason those states that reduce tax rates (and therefore the charitable subsidy) are the ones where religious participation is rising for other reasons, it could lead to the estimated findings.

I address these concerns in three ways here. First, I include additional controls in the models to account for these alternative explanations. The third column of Table 4 shows the effects of including interactions between each of the income decile dummies and the set of year dummies, absorbing any national changes by income group over time. I then show the effects of including interactions between each state dummy and each year dummy, absorbing any changes in states over time that are common to all income groups. I then show the effects of including interactions between each state dummy and each income group dummy, capturing any differential religious participation by income group across states.

In fact, including these additional second-order interactions does not change the key coefficient much at all; the estimated effect of charitable subsidies on religious participation is remarkably constant throughout this set of variations in controls. Thus, omitted variables that vary jointly by income group and year, jointly by state and year, and jointly by state and income group cannot explain this finding. Indeed, if I include all three second-order interactions, so that the model is identified only by interactions of state, year, and income, the result is very similar.

The clarity of the relationship that is estimated here is most simply illustrated graphically by showing how changes across income groups in the subsidy over time relate to both giving and to religiosity. To do this, I have collapsed the GSS database into income deciles*year cells (e.g. 10 cells for each year), computing the mean values for each cell of both religious attendance and the charitable subsidy. I then regress the mean of religious attendance on a full set of income and year dummies, so that the residual measures variation in religious participation within income groups over time. I do the same thing with the mean of the subsidy rate. Finally, I graph these two residuals against each other in Fig. 1. The points in each figure are weighted by the number of observations in that income group/year cell.

This figure clearly illustrates the robust relationship estimated here. There is a strong negative relationship between attendance and subsidies, after conditioning on income and year effects. The fitted regression line has a coefficient of −2.25 (0.58), which is almost identical to the result in Table 3.[7] That is, the negative effect of charitable subsidies on religiosity is remarkably robust to model specification; regardless of the variation used to estimate this relationship, it is strongly negative.

Finally, a particular concern is that these tax effects may operate through some other channel. A natural candidate is labor supply: if taxes impact labor supply, then this could indirectly affect church attendance. Of course, the natural bias would be *against* the findings uncovered thus far, as lower taxes, which are associated with more churchgoing, would also be associated with more labor supply. Nevertheless, in the next column of Table 4, we show the effects of including hours of work per week in the model, where hours take on a value of zero for those who are not working. This coefficient has, as expected, a negative coefficient; those who work more attend church less. But there is no

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[7] Given that these two series are residuals from a regression on income and year dummies, this is akin to regressing participation on subsidy rates, controlling for income and year dummies. There are a few outlying observations in this graph with high residual subsidy rates and low residual attendance (for the highest income group in the late 1970s and early 1980s), but deleting these observations only lowers the coefficient by 12% and it remains highly significant.
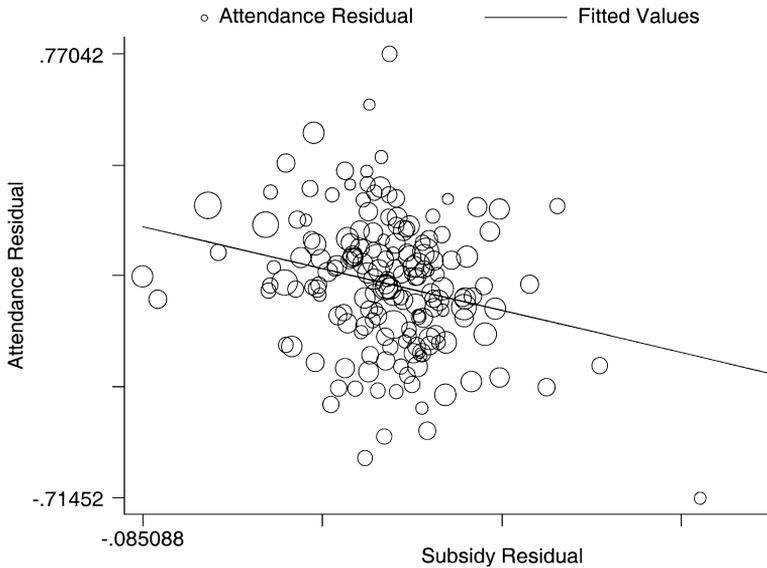
Fig. 1. Attendance vs. subsidies at income/year level.

impact on the estimated coefficient on the tax subsidy variable, suggesting no bias through effects on labor supply.

More generally, there may be a concern that this coefficient is picking up some other response of civic behavior with respect to tax changes. Perhaps, it is the case that changing charitable subsidies impacts not only religious behavior, but also the nature of time spent in voluntary activities. Such a result would be of interest but would also change significantly the interpretation of the findings here.

To test this view, I use data from the GSS on membership in various organizations. I separate out membership in church-affiliated groups (not affiliation with a church per se, but participation in church-related activities) from all other memberships. I then estimate models of church-affiliated group membership, a dummy for membership in any other group, and the number of nonchurch groups to which the person belongs as a function of the tax subsidy and the other variables included thus far. The next three rows in Table 4 show the findings from using these three alternative dependent variables.

The results of doing so are striking. There is a negative and significant impact of the subsidy on church-affiliated group membership, which is very consistent with our findings thus far. That is, it appears that subsidizing charitable giving crowds out not only religious attendance, but also participation in the church in other ways. This is also consistent with the notion of a trade-off between money and time devoted to charitable causes.

On the other hand, there is no effect on either the odds of belonging to another group or the net number of memberships in other groups. Both coefficients are actually positive, suggesting that higher tax subsidies lead to more participation on net in other groups, but

neither is statistically significant. Thus, it does not appear that the charitable subsidy in general is affecting group membership; the effects that we find here appear to arise solely through impacts on religious participation.

4.4. Interactions with religious preference

One additional exercise of interest here is to assess whether the response to charitable subsidies varies by religious denomination. Of particular interest is the question of whether those who are more conservative, and therefore potentially more ''attached'' to their religion, are less responsive to the incentives embedded in charitable subsidies. To address this issue, I include in the GSS regressions a set of dummies to capture religious preference at age 16. The GSS contains a very detailed categorization of religious denominations. Besides information on major denomination (Jewish, Catholic, Protestant), there is also information on over 150 Protestant denominations. This richness of detail immediately raises the question of the most useful way to classify religious denominations. I follow the classification suggested by Roof and McKinney (1987), which organizes this rich set of denominational information into eight categories: Liberal Protestants, Moderate Protestants, Black Protestants, Conservative Protestants, Catholics, Jews, others, and no religious preference. Including these dummies in the basic attendance regression, I find that attendance is highest for Catholics, next highest for Conservative Protestants, and then for Black Protestants; attendance is lowest for those with no religion and for Jews.

The remaining rows of Table 4, in the last column of the table, show the impacts by religious preference category. In fact, the only noticeable impact is a much lower effect of charitable subsidies on the religiosity measures for Conservative Protestants and, to a lesser extent, for Catholics. For Conservative Protestants, the attendance effect is less than one-half of the basic result, and it is marginally significantly different than the estimate for the other groups combined. For Catholics, the attendance effect is about two-thirds of the basic finding. There is also a smaller attendance effect for those with no religious preference, but this is to be expected given the low base levels of attendance for this group.

Thus, it does appear that the impact of charitable subsidies operates least strongly for those who are in the most ''conservative'' or ''committed'' religions. Of course, this could in part reflect less responsiveness of these groups in terms of giving as well, but unfortunately, the CEX data do not contain information on religion with which this proposition can be tested. That is, it is impossible to place an instrumental variables interpretation on these results given the exclusion of key variables (religion) from the CEX first stage. So these findings are simply suggestive.

5. Conclusions

One of the most significant tax policies of the U.S. government is the deductibility of charitable giving. This tax expenditure has typically been justified through the positive externalities associated with charitable activities. Most charitable giving by individuals in the U.S. goes to religious sources, and there is strong reason to believe that there are

positive externalities associated with the uses of these funds. But, at the same time, there may be offsetting costs to subsidizing charity if giving to religious causes substitutes for religious participation itself, as would be suggested by the typical economic model of religiosity. Previous studies have not found such substitutability, but they have also been unable to control for the heterogeneity bias which would tend to induce a positive correlation between giving and religiosity.

In this paper, I have proposed a new approach to this problem, which is to examine the impact of tax subsidies to charitable giving on religious giving and on religiosity. Tax subsidies have the advantage, I argue, that they vary in ways that are exogenous to both giving and religiosity, providing an independent instrument for identifying the substitutability or complementarity of these two behaviors. Moreover, in fact, I find using this approach that giving and religious participation are strong substitutes. Larger tax subsidies to charitable giving lead both to more giving and to less religious participation. Indeed, my estimates imply that each 1% rise in religious giving leads to as much as a 1.1% decline in religious attendance.

These results have two implications. First, they serve to validate the economic model of religion and suggest the utility of further investigations into the determinants of religiosity. Despite innovative studies by a handful of economists, the study of religion remains almost the exclusive purview of other fields such as sociology. But, as Iannaccone (1998) forcefully argues, the tools which have served economists so well in other "nontraditional" disciplines can also provide real insights into the analysis of religion as well. In addition, there is a strong case to be made based on the available evidence that religion and religiosity may be one of the most important aspects of individuals' lives and a key determinant of outcomes ranging from pursuit of illegal activities to self-assessed well-being.

Second, they suggest that further expansions in the subsidy to charitable giving would increase the level of giving, but would also lower the level of religious participation in the U.S. A key question is the welfare implications of this change in religious participation. Naively applying the existing literature would suggest that such a reduction in religiosity could have large negative impacts on well-being, significantly offsetting the external benefits of more charitable giving. But these conclusions are tempered by the lack of definitive causal evidence on the impacts of religiosity and by the fact that the marginal changes in religiosity measured here may not monotonically translate to differences in religiosity that arise from other sources (e.g. from parental influences). Future work on these topics would help further our understanding of religiosity; in particular, methods which could causally distinguish the impacts of religiosity on outcomes would be of tremendous value.

Acknowledgements

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