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CROWDING OUT AND CROWDING IN OF PRIVATE DONATIONS AND GOVERNMENT GRANTS

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ABSTRACT

A large literature examines the interaction of private and public funding of public goods and charities, much of it testing if public funding crowds out private funding. This paper makes two contributions to this literature. First, the crowding out effect could also occur in the opposite direction: in response to the level of private contributions, the government may alter its funding. I model how crowding out can manifest in both directions. Second, with asymmetric information about the quality of a public good, one source of funding may act as a signal about that quality and crowd in the other source of funding. I test for crowding out or crowding in either direction using a large panel data set gathered from nonprofit organizations' tax returns. I find strong evidence that government grants crowd in private donations, consistent with the signaling model. Regression point estimates indicate that private donations crowd out government grants, but they are not statistically significant.

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Public goods are often provided by both governments and individuals. Benevolent governments may provide public goods to overcome the market's failure; altruistic individuals may likewise do so. The interaction of these two sources of the provision of public goods ultimately affects the overall level of funding. In response to an increase in government spending on a public good or charity, altruistic individuals who care about the total level of the public good may reduce their contributions. Because of this "crowding out" effect, a government choosing to increase funding to a charity by a given amount may actually increase the charity's revenues by only a fraction of that amount. The same effect can occur in the opposite direction. If a government sees that private donations to a charity have risen, then it may reduce its support of that charity. Additionally, government funding may "crowd in" private donations if governments use grants as a signal of the quality of a public good. For both individuals and governments who are concerned about public goods, the impact of the potential crowding out and crowding in effects must be considered.

The literature on crowding out extends back at least to Warr (1982) and Roberts (1984), who show theoretically that an exogenous increase in government funding to charities can decrease private donations. In those models, crowding out is exactly one-for-one, since the altruistic individuals care only about the total funding to the charity and not the source of funding.[1] Empirical evidence, including Kingma (1989), finds that the crowding out effect is less than one-for-one. One explanation, provided by Andreoni (1989), is that individuals are "impure altruists" in that they receive a "warm glow" from their own giving, independent of the level of the public good.[2] Some studies find crowding *in* of government grants; Khanna and Sandler (2000) find this for charities in the UK, and Payne (2001) finds this for academic research institutions. Rose-Ackerman (1986) describes conditions under which government grants can crowd in private donations. For instance, matching grants are likely to spur an increase in donations. Grants may also come with mandated regulatory changes that make the charity more appealing to donors. If a charity exhibits economies of scale, then increased

[1] Early extensions of those theoretical models include Bergstrom et. al. (1986) and Bernheim (1986).

[2] More recently, Parker and Thurman (2008) find that government provision of open space can crowd out purchases from private land trusts, Brown and Finkelstein (2008) find that government provision of health insurance through Medicaid crowds out private provision of insurance, Dokko (2008) finds that changes in government donations to the National Endowment for the Arts after the 1994 Republican electoral victories crowded out private donations to arts groups, Gruber and Hungerman (2007) find that New Deal programs during the Great Depression crowded out church spending on social services, and Simmons and Emanuele (2004) find that government funding can crowd out individuals' donations of both money and time.

government revenue reduces the marginal cost of providing the service, making private donations more effective. Finally, grants may provide information, either explicitly through mandated reporting, or implicitly through the signal provided by the grant's acceptance. In a model of revenues of research universities, Payne (2001) shows that if government funding acts as a signal of institutional quality, then crowding in effects may dominate crowding out effects. A signaling model of contributions to charities is presented in Vesterlund (2003) and Andreoni (2006). There, "seed money" from large donors or announcements of previous donations increase others' donations by acting as a signal of the charity's quality. Evidence of this effect is found in a field experiment in List and Lucking-Reiley (2002).[3]

That literature focuses solely on how government spending affects individual giving. This paper also examines the opposite direction of causality: do private contributions to charities crowd out public funds? I use a model of the interaction of government and private contributions to a public good to show that government grants can crowd out private donations, or private donations, if set exogenously, can crowd out government grants. Adding asymmetric information about quality to the model yields the conclusion that one source of funding can act as a signal of quality and crowd in the other source of funding. I then empirically look for evidence of either crowding out or crowding in in both directions using data on private and public contributions to charities.

This paper makes two contributions to the literature on crowding out and crowding in of charitable giving. First, though numerous papers test whether government grants crowd out private donations to charities, none can be found that either model or empirically test, using a large panel dataset on diverse charities, for crowding out in the opposite direction.[4] In fact, a negative correlation between government and private funding of charities could be evidence for either type of crowding out. Here, I test for causality in both directions by using instrumental variables to control for the endogeneity of the other side's contribution. Second, I combine the crowding out literature with the literature on the signaling effects of large contributions.

[3] Landry et. al. (2006) also find some evidence that seed money increases others' contributions, but they find a stronger effect from being entered in a lottery for a cash prize when donating and from the physical attractiveness of the person asking for a contribution. Lange (2006) develops a model where the lottery prize money is provided by donors and thus acts similarly to seed money.

[4] Garrett and Rhine (2008) use time series data on total government and private contributions to charities to test for Granger causality in both directions. They find evidence that grants crowd out donations and that donations crowd out grants for some types of charities and some types of government funding, though their results are from aggregate time series data, not charity-level data.

Government grants can act like seed grants in that they convey information to other donors about charity quality. I use an extensive panel data set with financial data from almost 30,000 charities over six years to test the predictions of the models.

In a simple extension to the standard theoretical model with perfect information, I find that an exogenous increase in government funding to a public good causes a decrease in individuals' contributions, while an exogenous increase in individuals' contributions causes a decrease in government funding. This decrease in funding can be one-for-one under certain conditions. When both public and private funding are endogenous, the level of public good provision depends on the order in which the players move. When individuals are uncertain about the quality of the public good but governments are not, government grants can act as a signal to individuals of the quality. In this case, I show that the crowding out effect of increased funding can be countered by a crowding in effect from the signal. On net, either crowding out or crowding in of private donations is possible. Empirically, I look for evidence of crowding out or crowding in in both directions. I find strong evidence that government grants crowd *in* private donations and weak evidence that private donations crowd *out* government grants. The evidence that government grants crowd in private donations is robust to various specifications of the data sample.

The presence of crowding in of contributions to charities is of concern to both governments and individuals who make these contributions. A government might choose an optimal level of provision of a charity or public good and adjust its funding to reach that level. Without accounting for the crowding in response by private donors, funding may exceed the optimal level. Likewise, if the level of private donations affects government support, then an individual's optimal level of giving ought to account for the reaction of government grants. Many worry that recent large increases in private funding for global public health initiatives, including large grants from the Gates Foundation, are causing local governments to reduce health spending, evidence of crowding out of government grants.[5]

The next two sections present the theoretical models that provide the foundation for the empirical analysis. Section 1 shows how crowding out of government grants or of private donations is possible. In section 2, I add uncertainty about the quality of the public good to the

[5] See Cohen (2006) and Smith and MacKellar (2007).

model, and present a signaling model that can lead to crowding in. Section 3 describes the data, section 4 the estimation strategy, and section 5 presents the results. Section 6 concludes.

I. Crowding out of Private and Government Contributions

The model presented here is a simple static equilibrium model of the amount of private and public giving to a charity or public good. Consider an economy with N individuals indexed by i. Each individual has an exogenous income allocation y_i, is subject to a lump sum tax τ_i,[6] and chooses a voluntary contribution g_i to the public good. The individual gets utility from consumption, c_i, and from the level of the public good, G.[7] The utility function is thus $U_i = U(c_i, G)$. Suppose that $U_x > 0$, $U_{xx} < 0$ for $x = c, G$, and $U_{cG} > 0$, where U_x represents the derivative of the utility function with respect to the variable x. Also suppose that $U_x \rightarrow \infty$ as $x \rightarrow 0$, assuring an interior solution. The level of the public good is $G = \sum_{i=1}^{N} g_i + \tau_i$, so that private and public contributions to the public good are perfect substitutes in production.[8] The individual's budget constraint is $y_i \leq c_i + g_i + \tau_i$, and this constraint must bind. The individual thus makes a single choice of g_i to maximize $U(y_i - g_i - \tau_i, \sum_{i=1}^{N} (g_i + \tau_i))$.

The government is benevolent, maximizing a weighted utilitarian social welfare function: $W = \sum_{i=1}^{N} \gamma_i U(c_i, G)$. The coefficients γ_i represent the weight on each individual's utility in the social welfare function.[9] The government chooses the tax structure $\{\tau_i\}$ to maximize social welfare.

As previous literature on crowding out has considered government action (the tax schedule τ_i) exogenous, I start by considering that case in the following section. Later, I

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[6] The exogenous income and lump sum tax mean that issues of the distortionary effects of taxation are not addressed by this model. Saez (2004) considers optimal tax policy in the presence of crowd out and tax distortions. The model here could be amended to include proportional taxes rather than lump sum, or it could include a parameter to represent a marginal cost of public funds that captures tax distortions.

[7] The public good G may also incorporate private goods provided by a charity to individuals (e.g. food, clothing) as long as donors are altruistic. In other words, the fact that donors feel altruistic towards recipients of charitable services means that the private consumption of those services becomes a public good.

[8] In Ferris and West (2003), the cost of providing the public good differs for public and private contributions. They use this cost-side explanation rather than Andreoni's (1989) utility-based explanation for the partial crowding out of public contributions that is found empirically.

[9] For recent uses of utilitarian, or Benthamite, social welfare functions, see e.g. Armenter (2007) or Eichner and Pethig (2006).

consider how government responds to an exogenous change in the level of private donations, and in the Appendix how the two types of agents interact when both move endogenously.

Exogenous government action

First, suppose that the government sets its taxes exogenously and consider the response of individuals. Individual i's problem is: $\max_{g \geq 0_i} U(y_i - g_i - \tau_i, \sum_{j=1}^{N}(g_j + \tau_j))$. Individual i takes as given all other private contributions g_j. The first order condition for this maximization problem, assuming an interior solution, is $U_c = U_G$. The left hand side of the first order condition is the marginal cost of an additional unit of private contribution, which is the foregone consumption from that unit of wealth, U_c. This is equated with the marginal benefit of an additional unit of private contribution, equal to the additional amount from the public good that is created from the individual's contribution, U_G. At a corner solution, where the individual optimizes by giving nothing to the public good, $U_c > U_G$, since the cost of giving the first dollar outweighs the benefit.

Crowding out is analyzed by evaluating $dg_i/d\tau_i$, or the change in private contribution resulting from a change in the forced level of government contribution from individual i. (This is a comparative static result for an agent's best-response function, not for a Nash equilibrium contribution.) This derivative is evaluated using the implicit function theorem on the first order condition for the interior solution:

$$\frac{dg_i}{d\tau_i} = -\frac{U_{cc} - 2U_{cG} + U_{GG}}{U_{cc} - 2U_{cG} + U_{GG}} = -1.$$

Private contributions are perfectly crowded out by the government's contribution.[10] This result is intuitive; individuals only care about the level of the public good and not about the source of its funding, so they are indifferent whether it is funded through their voluntary contributions or through their taxes.[11] Since g_i and τ_i appear together always summed in the individual's utility

[10] This result is comparable Proposition 3 in Andreoni (1990). It can also be seen by incorporating taxes into the model of Cornes and Hartley (2007), which explicitly models individuals' decisions as a function of the total amount of the public good G.

[11] The Appendix shows that allowing a warm glow effect makes this derivative more complicated and not necessarily equal to –1. Bergstrom et. al. (1986) show how considering corner solutions can make the crowding out less than one-for-one: those individuals who contribute nothing cannot respond to a tax increase by contributing even less.

function, each individual can be seen as just maximizing this sum, so that any exogenous change in τ_i is offset perfectly by changing the choice of g_i.

Exogenous Individual Action

The previous section assumes that the taxes are set exogenously and considers the response of individuals to a change in those taxes. This structure of the problem is most commonly seen in the empirical literature on crowding out. However, one may just as easily consider the government's response to a change in private donations to public goods. A large increase in private donations to a charity, due to perhaps a fundraising drive or a high-profile event highlighting the charity's need, may cause the government to reduce its giving to that charity compared to what it otherwise would have given under the same conditions but without the increased private contributions.

To capture this other direction of crowding out, suppose that the actions of each individual are treated as exogenous by the government, who then sets the taxes $\{\tau_i\}$ to maximize social welfare. The government's problem is

$$\max_{\{\tau_i \geq 0\}_{i=1}^N} \sum_{i=1}^N \gamma_i U[y_i - g_i - \tau_i, \sum\nolimits_{j=1}^N (g_j + \tau_j)],$$

where private giving g_i is exogenous. Assume an interior solution for all τ_i. This yields N first order conditions $-\gamma_i U_c + \sum_{j=1}^N \gamma_j U_G = 0$ for $i = 1,\ldots,N$. The social marginal cost of increasing the tax on individual i is the foregone value of consumption for that person. This equals the marginal benefit of increasing the tax, which is the value of the increase in the public good. This benefit accrues to each person's utility function, and hence it is summed over each individual. To evaluate $d\tau_i/dg_i$ using the implicit function theorem, one must calculate the inverse of an $N \times N$ matrix (from the N first order conditions). Instead, one can look at the government's social welfare function and note that g_i and τ_i are perfect substitutes, appearing only as a sum, as they are in individual i's utility function in the section above. Thus the government can act as if maximizing their sum, and so any change in a g_i will be offset perfectly by a change in τ_i.

Formally, suppose at equilibrium the government chooses $\tau_1^*, \tau_2^*, \ldots, \tau_N^*$ in response to donations of $g_1^*, g_2^*, \ldots, g_N^*$ (all interior solutions). The value of social welfare is thus

$\sum_{i=1}^{N}\gamma_i U(y_i - g_i * - \tau_i *, \sum_{j=1}^{N}(g_j * - \tau_j *)) \equiv W *$. Consider an exogenous change in just one individual's donation level from g_k* to g_k**. By replacing $\tau_k** = \tau_k* - (g_k** - g_k*)$, and keeping all other tax levels the same, the government can achieve the same level of welfare $W*$. Can the government do any better in this case? Suppose it can, so that some $\hat{\tau}_1, \hat{\tau}_2, ..., \hat{\tau}_N$ exist such that

$$\gamma_k U(y_k - g_k ** - \hat{\tau}_k, \sum_{j \neq k}(g_j * + \hat{\tau}_j) + g_k ** + \hat{\tau}_k)$$
$$+ \sum_{i \neq k}\gamma_i U(y_i - g_i * - \hat{\tau}_i, \sum_{j}(g_j * + \hat{\tau}_j) + g_k ** + \hat{\tau}_k) > W * .$$

If this inequality holds, then, given each $g_i = g_i*$ (the initial equilibrium), the government can set all $\tau_i = \hat{\tau}_i$ except for $\tau_k = \hat{\tau}_k - (g_k ** - g_k *)$ and get the same level of welfare as in the left-hand side of the above inequality. But then $W*$ is not the maximum level of welfare achievable given the initial equilibrium. This contradicts the initial assumption. Thus, the government cannot do any better in response to a change from g_k* to g_k** than replacing $\tau_k** = \tau_k* - (g_k** - g_k*)$, and keeping all other tax levels the same. By replacing these changes with infinitesimal changes, it follows that $d\tau_i/dg_i = -1$ and $d\tau_i/dg_j = 0$ for $i \neq j$. The government thus perfectly crowds out any change in private donations through individually based taxes.

The previous two sections have each considered a case where one side of the market acts exogenously; in the first section I followed the literature by assuming the government sets the tax rates exogenously, and in the following section I assumed that private donations were set exogenously. The next logical extension is assuming both private donations and government grants are endogenous.[12] In the Appendix, I introduce this extension and briefly describe the multiple equilibria that can arise from the fact that the players can move in different orders.[13] I acknowledge that, without imposing functional forms or assuming homogeneity, not many results beyond first order conditions are attainable.

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[12] This is similar to the contribution made by Knight (2002) to the federalism literature. He departs from the assumption of exogenous federal grants to states by supposing that they are determined in a political process, so that federal spending may help determine state spending, and vice versa. However, he does not study charitable giving.

[13] In fact, the first order conditions in each of the previous two subsections, assuming either government or private behavior exogenous, are best response functions from the Nash equilibrium.

Additionally, the model makes two assumptions to yield perfect crowding out in both directions: lack of "impure altruism" or a warm-glow effect, and a benevolent government. Removing either of these two assumptions may result in crowding out being less than one-for-one. The assumption ignoring impure altruism is contrary to much empirical evidence suggesting that individuals do in fact experience a "warm glow" when giving; neurological evidence for a warm glow effect is documented in Harbaugh et. al. (2007). A benevolent government is perhaps an equally dubious assumption. The Appendix thus also extends the model to include warm glow and non-benevolent governments. Those extensions are relegated to the Appendix because they do not affect the qualitative nature of the results shown above (and in the following section). The key result, that of private donations crowding out government grants, can hold also without these two assumptions, although with a different magnitude.

A final extension that is also presented in the Appendix includes the behavior of charities in response to government grants or private donations. A growing literature examines charities' response, especially in their choices over fundraising expenditures (Andreoni and Payne 2003, 2009, Breman 2006). Empirically, I control for a charity's fundraising expenditures and allow that variable to be endogenously determined. In the Appendix, I provide an outline for extending the theory to allow for charitable fundraising expenditures.

II. Quality Signaling

In the model in the prior section, the government and all individuals have perfect information. It is likely, however, that some uncertainty exists about the quality of a public good and how it affects individuals' utility functions. Furthermore, asymmetries between the government and individuals may exist concerning this uncertainty. Governments may have access to more information about a charity or public good and consequently be more informed about its quality. Alternatively, some private donors, like large private foundations, may have more information about charity quality. I capture this information asymmetry in the model here and show that when the government has full information, it can use its tax policy to signal charity quality to individuals. This signaling can lead to a crowding in effect that works against the crowding out effect found earlier, if a higher tax rate signals a higher quality charity towards which individuals want to give more in donations. This model thus combines the crowding out literature with the literature on quality signaling of seed grants: government grants can provide the same quality signal as private seed grants.[14]

In the model that follows, I assume that it is the government that has the full information about charity quality and thus can use its tax policy to signal that quality. The prediction that government grants can crowd in private donations is based on this assumption about information asymmetry. What if the information asymmetry goes in the opposite direction; what if individuals observe the quality of the public good but the government does not? Clearly, the implication must be that crowding in can occur in the opposite direction. Although the model is not perfectly symmetric between individuals and the government, this result is attainable nonetheless, as long as the individuals are first movers (if the party that receives the private information does not move first, it cannot signal that information). Thus, a slightly extended model predicts that private donations may crowd in government grants, and the empirical work identifying the response of government grants to private donations is testing this prediction as well. I omit this extension, but it is straightforward. A justification for the assumption that governments have the private information is that governments tend to make large grants to organizations and so are likely to spend more time researching the effectiveness of the charity than individuals, who make smaller donations on average. This is true both absolutely and as a fraction of total government versus private expenditure.

To incorporate information asymmetries, suppose that the public good G can vary in quality, measured by the variable α. Following Andreoni (2006), let the individual's utility function be defined as $U(c_i,G;\alpha) = u(c_i) + v(G;\alpha)$ where, as before, utility is increasing in both consumption, c, and the level of the public good, G. Also suppose that $dv/d\alpha > 0$ and $d^2v/dGd\alpha > 0$; that is, both total utility and the marginal utility of the public good increase with α. The separability of the private and public good in utility ensures that, under full information (if the individual knows the level of α), an increase in α induces individuals to donate more to the public good.

Suppose that individuals do not know the value of α, but the government does. The government does not convey this information directly to individuals, but it sets taxes based on

[14] The model is thus quite similar to the models in Payne (2001), Vesterlund (2003), and Andreoni (2006). Of those, only Payne (2001) explicitly considers the government acting as the "seed" grant maker or the signaler of quality. However, that model avoids dealing with Bayesian equilibria by supposing a reduced-form function for the signal, where the level of government grants directly affects individuals' beliefs about the quality.

the value it observes. In the standard signaling model, the holder of private information is unable to directly convey that information, usually because such an announcement cannot be credible, and thus a signal is required. Why can the government in this case not merely announce the α it observes? First, this is not in fact observed; governments do not announce the quality of various charities. Second, the government will want to impose a tax and make contributions to the public good to overcome the free rider problem. Since the tax will end up acting as a signal, the value added of a direct announcement is zero, and none is made. Therefore, the government does not announce α because it does not need to after setting the tax rate.

For simplicity, assume that the government sets a single tax rate τ for all individuals.[15] Individuals choose their level of private donations, g_i, simultaneously in response to the government's tax level. Let the government be the first mover. The game can thus be characterized by the following steps:

1. Nature chooses a value of the quality of the public good, α.
2. Government observes α and sets a tax τ.
3. Individuals simultaneously choose their level of private donations to the charity, g_i, observing τ but not α.

This game lends itself to being analyzed in the framework of a perfect Bayesian equilibrium (PBE), in a manner similar to that of the signaling model of Spence (1973). A PBE is defined by a set of strategies of the individuals $g_i(\tau)$ and of the government $\tau(\alpha)$, and a belief function of the individuals $\mu(\alpha; \tau)$ that gives the individuals' common probability density function for α given τ, such that the government's strategy is optimal given the individuals' strategies, the belief function is derived from the government's strategy using Bayes's rule when possible, and individuals' strategies constitute a Nash equilibrium of the simultaneous-move game in which the probability of α is given by $\mu(\alpha; \tau)$.

The model can be solved backwards, starting with the individuals' responses to government policy. Individual i chooses a non-negative contribution level g_i to maximize his utility, given τ and all other contributions g_{-i}, such that $y_i \leq c_i + g_i + \tau$ and $G = g_i + g_{-i} + N\tau$. Define $\mu(\alpha; \tau)$ as the individual's density function of beliefs about the value of α upon observing the signal τ. The individual's problem is

[15] By making the tax rate identical, this ensures that the signal is a scalar. Otherwise, the government has an N dimensional vector with which to signal the quality of the good. This assumption simplifies the analysis of the separating equilibrium, where each value of α is associated with a unique value of τ.

$$\max_{g_i} u(y_i - g_i - \tau) + \int_A v(g_i + g_{-i} + N\tau; \alpha)\mu(\alpha;\tau)d\alpha ,$$

where A is the support of α. The first order condition, assuming an interior solution, is

$$-u'(y_i - g_i - \tau) + \int_A v_G(g_i + g_{-i} + N\tau; \alpha)\mu(\alpha;\tau)d\alpha = 0 .$$

The key results of the model are found in this condition. Suppose there is a strictly separating equilibrium, so that for any value of α observed, the government sets a unique tax $\tau(\alpha)$. Then this function must be invertible to $\alpha(\tau)$. Since individuals' beliefs must be derived from Bayes' rule, it follows that $\mu(\alpha;\tau) = 1(\alpha = \alpha(\tau))$, where $1(\cdot)$ is the indicator function equal to 1 if the argument is true and 0 otherwise. In a PBE with a separating equilibrium, individuals are certain about the true value of α after observing the signal. The integral then falls out of the first order condition, which becomes

$$-u'(y_i - g_i - \tau) + v_G(g_i + g_{-i} + N\tau; \alpha(\tau)) = 0 .$$

This condition can be used to find the effect of the tax on private donations via the implicit function theorem:

$$\frac{dg_i}{d\tau} = \frac{u''(c_i) + Nv_{GG}(G;\alpha(\tau)) + v_{G\alpha}(G;\alpha(\tau)) \cdot \alpha'(\tau)}{-u''(c_i) - v_{GG}(G;\alpha(\tau))} .$$

The denominator is strictly positive. The numerator can be divided into two parts. The first two terms are strictly negative, and they represent the crowding out effect found in the last section.[16] With no uncertainty about the quality of the public good, $\alpha'(\tau) = 0$ and the final term in the numerator vanishes. With uncertainty, this last term, the signaling effect, can either intensify or oppose the crowding out effect. The first part of it, $v_{G\alpha}$, is positive by assumption. Suppose that the second part, $\alpha'(\tau)$, is also positive, that is, a higher tax is used to signal a higher quality charity. Then the signaling effect is positive: a higher tax rate increases the level of private donations. The two effects oppose each other. When the tax increases, individuals want give to less because more of the public good is provided for by the government, and they want to give more because the tax increase signals that the public good is high quality.[17]

The two effects oppose each other only when $\alpha'(\tau) > 0$. Otherwise, they go in the same direction. If a higher tax signals a lower quality public good, then individuals want to donate

[16] The first two terms divided by the denominator do not equal -1, as in the prior section, since here the model has been simplified by assuming the government sets an identical tax on each individual.
[17] Compare this equation to Equation 3 in Payne (2001).

less to that good because of both the crowding out effect and the signaling effect. To find $\alpha(\tau)$, the government's problem must be solved. Upon observing α, the government maximizes social welfare, taking into account the individuals' responses to the tax it sets. It thus solves

$$\max_{\tau} \sum_{i=1}^{N} \gamma_i (u(y_i - g_i - \tau) + v(N\tau + \sum_{j=1}^{N} g_j; \alpha),$$

subject to the condition that g_i satisfies the individual's first order condition: $-u'(y_i - g_i - \tau) + v'(\sum_j g_j + N\tau; \alpha) = 0$. The government's first order condition for this problem, assuming an interior solution, is

$\sum_{i=1}^{N} \gamma_i (-u'(c_i) + Nv_G(G;\alpha)) + \sum_{i=1}^{N} \lambda_i (u''(c_i) + Nv_{GG}(G;\alpha)) = 0$, where λ_i is the Lagrange multiplier for the constraint from individual *i*'s optimization problem.

This first order condition implicitly defines $\tau(\alpha)$, though it is difficult to interpret without further assumptions. Two assumptions can separately be used to show that $d\tau/d\alpha > 0$. One is assuming that the third derivatives of both *u* and *v* are zero. Under that assumption, $\alpha'(\tau) > 0$, and the signaling effect opposes the crowding out effect.[18] A more intuitive assumption is the following. Assume that $v(G; 0) = 0$, so that when $\alpha = 0$ the public good provides no utility. Then, $\alpha'(\tau) > 0$.[19] However, even under either assumption the magnitudes of the two effects are unknown, as they depend on the utility function and parameters. It is possible that the signaling effect opposes and dominates the crowding out effect. In this case, government grants crowd in private donations. The conditions for that to hold are complex when the utility function is left this general, so this section merely demonstrates that crowding in is possible when government grants act as signals of charity quality.[20]

The above results hold under the assumption of interior solutions, for both the government's and the individuals' choices. At corner solutions, no interesting results are

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[18] This can be seen from using the implicit function theorem on the first order condition of the government's problem. Dropping all of the third derivatives from the result yields a strictly negative derivative.

[19] When $v(G;0) = 0$, the individuals' response will always be to contribute nothing, and the government's response will be to set the tax at zero. Since, in a separating equilibrium, the tax must be different for different each value of α, as α increases from zero so must $\tau(\alpha)$.

[20] When the utility function is specified as in Vesterlund (2003) and when there are only two values that the quality variable α can take, the conditions under which crowding in occurs can be found analytically. Intuitively, it is when the difference in charity quality is sufficiently greater than the difference in the tax signals. When imposing the same utility form but allowing a continuous level of charity quality α, it is not possible to find these conditions, since the signal function $\alpha(\tau)$ cannot be found.

possible, since individuals are contributing nothing, and marginal changes in the level of the tax have no effect on private contributions. More realistic is the case where the tax is set so that some individuals are at a corner solution contributing nothing and others are at the interior with positive contributions. In that case, the above results hold for the subset of individuals at interior solutions, while those contributing nothing have a zero crowding out effect and signaling effect. Thus in the aggregate, the above results hold, though the magnitude of the crowding out or crowding in is reduced insofar as some individuals are not donors. This follows from the analysis of Bergstrom et. al. (1986).

Charities typically advertise the grants they receive from both governments and private grant makers on their websites, in newsletters, and in press releases. If government grants crowded out private giving, it is unlikely that charities would make public the receipt of such grants. On the other hand, grants signaling quality and crowding in donations are more consistent with this observed behavior. In the empirical work below, I find robust evidence of government grants crowding in private donations, suggesting that the signaling effect dominates the crowding out effect.

III. Data

The data on nonprofit organizations come from IRS tax returns filed by eligible organizations. These data are collected and distributed by the National Center for Charitable Statistics (NCCS) at the Urban Institute.[21] They are based on the Forms 990 or 990EZ that must be filed by all 501(c)(3) nonprofit organizations except for religious organizations and any organization with less than $25,000 in gross receipts.[22] These data from 1998-2003 are contained in the Guidestar-NCCS National Nonprofit Research Database, which contains 1,388,480 observations from all public charities that filed within those fiscal years. The data set does not include 501(c)(3) private foundations, which receive most of their money from investments and endowments and use it primarily to make grants to organizations rather than directly for charitable services; private foundations file IRS Form 990-PF.

[21] http://nccs.urban.org.

[22] Religious organizations receive over half of all charitable giving in the United States (Ronsvalle and Ronsvalle, 2001). Religious organizations that receive the majority of their revenue from serving the general public are required to file Forms 990. These include the Sisters of Mercy hospital chain and Lutheran Social Services. About 15,000 such religious organizations were required to file in 2001. Examining donations to Presbyterian Church congregations, Hungerman (2005) finds that government provision of charitable services crowd out church donations by 20-38 cents on the dollar.

Organizations are classified according to the National Taxonomy of Exempt Entities (NTEE), a system developed by the NCCS. The NTEE divides charities into 645 centile level codes, collapsible into 26 major groups and 10 major categories. In order to make my results more comparable with prior research, I limit my scope to a particular set of charities. Most research in crowding out or crowding in of charitable donations has examined social service charities, and so I select organizations from the following NTEE categories: crime, employment, food and nutrition, housing, human services and community improvement.[23]

The large data set, containing entries from all 501(c)(3) nonprofit charities that filed with the IRS between 1998 and 2003, is useful for analysis but also presents problems with messy data. Froelich et. al. (2000) discuss the adequacy and reliability of the data from IRS Form 990. While it is believed that the IRS reporting requirements are not treated with much importance by charities, Froelich et. al. (2000) find that the reported data are fairly consistent with more detailed audit information, especially in the basic categories of contributions, programming, and fundraising. Still, I undertake measures to clean the data. The data set contains 339,716 observations on 76,725 charities. I drop observations for which there is clear evidence of reporting error. Some charities report revenues by category (e.g. private donations, government grants) that do not add up to the reported level of total revenues. Likewise, for some charities the expenditures do not add up correctly. I purge all of these observations from the data set, leaving 321,094 observations (95%) and 75,226 charities (98%). Though the data are a panel, it is a very unbalanced one. To compensate, I include in the base case regressions only those charities that appear for all six years, leaving 175,242 observations (55% of the previous total) and 29,207 charities (39%). Below, I consider how limiting the data set to a balanced panel affects both the summary statistics and the regression results. Finally, I eliminate charities that ever report a negative value for private donations, government grants, or program service revenue, eliminating an additional 69 charities (only 0.2%). Regressions are performed on this cleaned data sample as well as on a number of subsamples that eliminate certain types of charities or observations, as described below. In general, the results that I obtain in the base case are robust to these different sample specifications. This is especially important to note for this application, since previous

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[23] These are the organizations listed under the 1-digit NTEE codes of I, J, K, L, P and S. This is the same set of codes used by Andreoni and Payne (2003) for their set of social service organizations. Andreoni and Payne (2003) also exclude some organizations that they describe as not directly providing services, while I include all 501(c)(3) organizations in those categories (see their fn 15).

authors have found that when working with data from Form 990s the choice of sample matters greatly for the results.

Previous authors have found discrepancies or errors in similar data sets, especially in the identifier variables for the charity's type (NTEE code) and state. Among the charities in the balanced panel, none change their NTEE code over the six year period. Some charities (1,206, or 4.1%) do change states. This could be due to data error, which is problematic since many of my control variables and instruments are at the state-year level. Or, it could result in the charity actually relocating, in which case I want to take advantage of that variation. I identify the charities that are erroneously coded as changing states in the following way. Of the charities that are reported to change states, 830 of them (68.8%) have the same state listed for five out of the six years, and the year in which the state is listed differently is not the first or last year of the sample. As it is unlikely that a charity would relocate one year and then relocate back the following year, I interpret these observations as errors and replace the state variable with the state from the charity's other five observations. The remaining 376 charities either moved in the first or last years of the sample period or had more than one year in a different location, and I do not change the state variables for them. An inspection of the scans of the original 990 forms for several of these charities supports this distinction between those that actually moved and those that were inaccurately reported.[24]

The charities' revenue sources can be seen in Figure 1, which divides up the average source of funding into several categories.[25] The charities receive 14% of their revenue from direct public support, including individual donations. A larger fraction comes from government

[24] Simply dropping all charities that report moving states from the regression analysis results in coefficients of approximately the same value as in the base case.

[25] The first category is direct public support, which is the main category of donations from individuals. Second is indirect public support, comprised mainly of donations given to the charities collected by federated fundraising agencies, such as the United Way. The next category is government grants, which includes monies from federal, state, and local governments. Program service revenue is the money collected from the services that form the organizations' exemption from tax. For example, a hospital would count as program service revenue all of its charges from medical services. Dues collected includes only the amount of dues received that are not contributions, for example the dues that go towards a subscription to a newsletter or some other benefit. Investment income includes dividends and interest on savings and cash accounts; rents and sales include net revenue from rents and from sales of securities, inventory, or other assets. Finally, the last category includes all other revenue, including from special events such as dinners, raffles, or door-to-door sales of merchandise. Revenues are disaggregated into these categories only for charities that file Form 990, not Form 990-EZ. 87% of charities do so. Nonprofits with income less than $100,000 and total assets less than $250,000 may file Form 990-EZ instead of Form 990 if they prefer.

grants (26%). About half of their revenue comes from program services.[26] The remaining sources of revenues, including investment income, are small. Table 1 presents revenues aggregated into four main categories and compares summary statistics from the full, uncleaned data set to those from the smaller sample used in the analysis. As a measure of private donations, I combine direct public support and indirect public support. Government grants and program service revenue have their own categories, and the remaining revenues are classified as "other." I also present statistics on charities' reported fundraising expenditures. Table 1 shows that the mean values are all much higher than the median values, and even the 75th percentile values, suggesting a data set that is skewed towards high-revenue firms. The differences between corresponding statistics in the full data set and the cleaned sample are small; the mean values of all variables are smaller and the median and 75th percentiles are larger in the limited data compared to the full set. The limited data are slightly less skewed than the full data, and hence performing econometric analyses on this limited sample may overemphasize the effect from larger charities. This is investigated in the regression results below. Trends in these values from the cleaned data are presented in Figure 2. The values presented are the average per charity value of government grants and private donations in constant 2002 dollars. The presence of crowding out in either direction implies that spikes in government grants would be accompanied by dips in private donations, and vice versa. No such pattern emerges, since both values appear to be increasing. I turn to regression analysis to identify the presence of crowding out or crowding in.

IV. Econometrics

Two different empirical questions are investigated. First, do government grants crowd out or crowd in private donations to charities? Second, do private donations crowd out or crowd in government grants? While numerous papers have tested for causality in the first direction, no paper has examined causality in the opposite direction using panel data on a large number of charities. Because of these two questions, I run two separate regressions, one in which the level of private donations to a charity is the dependent variable and the level of government grants is an independent variable, and one with those two variables reversed. It should be noted that in

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[26] Segal and Weisbrod (1998) test for crowding out between all donations, including private and government grants, and program service revenue.

these initial regressions I am merely identifying whether crowding out or crowding in occurs in either direction, and I am not attempting to identify the signaling effect modeled in Section 2. The presence of crowding in is consistent with signaling but not sufficient to identify signaling as its source. Following these initial regressions, which find crowding in of government grants, I will test whether this is explained by signaling. I show that crowding in is stronger among those charities for which less information is known by donors, i.e. newer charities.

The level of private donations is defined as in Table 1 above: the sum of direct and indirect public support. I also add control variables to the regressions. At the charity level, these are the level of program service revenues and all other revenues. Furthermore, I gather a number of state-year or county-year level variables to control for economic, demographic, and political conditions. These are matched to the charity by the state or county where the charity is located. From the Bureau of Labor Statistics I obtain the county-year level unemployment rate, and from the Bureau of Economic Analysis the county-year level income-per-capita and total population. At the state-year level I include the fraction of the population 65 or older, the fraction of a state's US Congress and Senate delegations that are Democrats, and a dummy for whether the state governor is a Democrat. Political and economic variables may have important effects on the levels of both private and public contributions to charities. A state with a higher proportion of Democrats in power is likely to be composed of more liberal citizens who may be more willing to provide financial support for charities. Likewise, Democratic congresses may be more willing to approve higher levels of funding for these groups. If so, leaving out political proxies causes an upward bias on the coefficient of interest. Finally, because I have six years of data from thousands of organizations, I am able to control for organization-specific unobservable effects using panel data econometric methods. The Hausman specification test rejects the assumption that the unobservable effect is uncorrelated with the other regressors, so a fixed-effects model is employed rather than a random-effects model.

Estimates are likely to suffer from endogeneity bias. The amount of private donations and government grants are jointly determined. Unobservable effects may lead to an increase in both of these simultaneously, biasing the coefficient estimates upwards. For example, an exogenous event may increase the need (or perceived need) for a particular charity, which would increase that charity's private donations and government grants. Alternatively, endogeneity could bias the estimates downwards. A restructuring of the charity could cause it to reallocate its funding between donations and grants, which would create a negative correlation between these two values not due to crowding out. (Regressions in both directions without using instrumental variables are presented in Appendix Tables A1 and A2.)

Instrumental variables regression is used to correct the endogeneity bias. This requires two separate sets of instruments: one to instrument for the level of government grants in the determination of private donations and one for the level of private donations in the determination of government grants. As instruments for the level of government grants, I use state-level measures of government transfers to individuals from Supplemental Security Income (SSI) programs.[27] This represents the overall level of transfers and government giving in a state a particular year. Some states may be more "generous" in their giving, and these instruments should pick that up.[28] The generosity of government is determined in a political process, and thus it may be directly correlated with private donations and fail the exogeneity requirement: more generous donors elect more generous governments. This is controlled for by the inclusion of the political and economic variables described above. Whatever variance there is in a state's level of transfers to SSI that is not accounted for by political or economic variables ought to capture something about the government itself rather than about the underlying electorate, and thus these instruments ought to satisfy the exogeneity assumption.

As an instrument for private donations I exploit the fact that funding from individuals can come from two sources, listed separately on the Form 990: direct public support (donations) and dues. Though membership dues may seem like just another name for private contributions, the instructions for completion of the Form 990 specifically state that only payments that are not contributions should be listed under dues. For example, when dues received exceed the value of available membership benefits (e.g. subscriptions to publications or newsletters, reduced-rate admissions to events), the difference is to be listed under contributions, not dues. Dues are thus what members pay for the *private goods* consisting of membership benefits, not the *public good* that is the charity's primary purpose. The amount of dues that a charity receives is likely to be correlated with the amount of private donations received, since charities with higher membership bases may get more of both types of revenues. However, given that charities provide public

[27] Khanna and Sandler (2000), Andreoni and Payne (2003), and Payne (1998) use similar instruments. Data are available from the U.S. Social Security Administration website.
[28] Though the basic level of SSI benefits is set at the federal level, many states choose to supplement that value. I also used the level of OASDI benefits as instruments, but adding those had no effect on the results.

goods only using monies from their contributions and not using monies from dues, the level of government grants ought not to respond to the level of dues.[29]

An additional consideration involves the response of the charity itself to exogenous changes in receipt of grants and/or donations. A growing literature examines, in particular, how a charity's expenditures on fundraising for private donations change in response to changes in government grants (Andreoni and Payne 2003, 2009). Fundraising is thus included in the regression where private donations are the independent variable. Furthermore, this literature shows that fundraising expenditures are endogenously determined. Therefore, I add instrumental variables for fundraising. I use two different variables at the charity-level as instruments for fundraising expenditures. First, I use the amount of administrative expenditures reported by a charity on the Form 990.[30] Since the same personnel can be employed to do both administrative and fundraising tasks, the two types of expenditures may be correlated. In years when an organization has a higher level of management expenses, it is likely to be able to spend more effort and money on fundraising; the first stage regression results support this claim (see the Appendix tables). Furthermore, the level of private donations that a charity receives in a given year ought not to be affected by management expenses, since management expenses are expressly *not* those expenses used in soliciting funds (i.e., fundraising expenses).[31] Second, I use the total liabilities of the charity reported in the current year. The idea behind this instrument is that it measures the financial security of the organization, which will help determine its fundraising strategy independent of private or public funding. A charity that in a particular year faces a less secure financial status (as measured by higher total liabilities) may seek to increase its fundraising expenditures to compensate; this claim is verified in first stage regression results. A charity's financial security could directly affect its level of private donations if donors respond to this level of financial security (e.g. a donor does not want to give money to a charity that is on

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[29] An alternative instrument for private donations is a measure of the price of a dollar of charitable donation based on the state's income tax and rules for allowing deductions of those contributions. This, however, is a poor instrument because the donations to a charity in a particular state do not necessarily come from donors within that state, because tax rates are heterogeneous within a state, and because tax rates are likely to be directly correlated with government budgets and hence grants to charities.

[30] According to the instructions for the Form 990, administrative expenses, or "management and general" expenses, are a charity's "expenses for overall organization and management, rather than for its direct conduct of fundraising activities or program services."

[31] Breman (2006) uses the same variable to instrument for fundraising expenses in a data set from Swedish charities. She notes that in the Swedish data, some of the management expenses are used towards soliciting government grants. In the US data from the Form 990s used here, however, this is not the case. Thus, for my application, where fundraising expenses are an endogenous determinant of private donations, the exogeneity assumption is justified.

the verge of collapse). However, it is unlikely that donors have information on the contemporaneous financial conditions of a charity, at least not to the extent that a charity has. Donors may perceive an overall level of a charity's well being, but this is controlled for with a charity fixed effect. [32]

For all of these instrumental variables, I report the first stage regression results in the Appendix. In the main regression tables, I report the F-statistic in the instruments from the first stage regressions, the Hansen overidentification test J-statistic, and the Cragg-Donald F-statistic for weak instruments.

V. Results

The results for these instrumental variables, fixed effects model regressions are presented in Tables 2 and 3. Table 2 presents the results from regressions where private donations are the dependent variable and government grants are the regressor; Table 3 presents the results from regressions where these are reversed. In column 1 are the base case results, using the full sample of cleaned data. The tables report the F-statistic for the significance of the instruments in the first-stage of the regression; in almost all regressions, the instruments are highly significant. First stage results are reported in Appendix Tables A3, A4, and A5. The reported standard errors are robust to heteroskedasticity and autocorrelation, using a Newey-West kernel-based estimator of the variance matrix.[33]

The coefficient of interest in the regressions in Table 2 is that of government grants. The theory is indeterminate about the sign of this coefficient. Absent government signaling of charity quality, it should be negative, indicating crowding out. Signaling can cause crowding in, making the coefficient positive. In the first column, the coefficient is positive though not quite statistically significant (the p-value is 0.102). This is evidence for crowding in rather than crowding out, consistent with results found by Khanna and Sandler (2000) and Payne (2001), and consistent with the signaling effect dominating the crowding out effect, as in the model of Section 2. Program service revenue is positively correlated with private donations in most columns, and other revenues are negatively correlated with private donations, though neither is

[32] This same argument is made in Andreoni and Payne (2009), who use this variable as an instrument for fundraising along with another variable that is unavailable in my dataset: occupancy expenses.
[33] See Hayashi (2000), p. 408-410.

statistically significant. Fundraising expenditures increase private donations. The coefficients on the state- and county-year level controls are generally insignificant.

Columns 2 through 6 present robustness checks by contracting or expanding the data sample. The model of crowding out depends on either governments or individuals being able to respond to the level of giving from the other. Thus, an effect of timing might not be captured entirely in this static model. Therefore, I use lagged values for the endogenous regressor and instruments in column 2. This lowers the coefficient value, and it becomes insignificant. This suggests that the crowding in effect occurs within the fiscal year, rather than as a lagged effect.

It is possible that the effect of crowding out or crowding in as well as the other control variables and instruments are only applicable to a subset of the charities, for two reasons. First, while some of the controls and instruments are at the state-year level, not all of the charities operate only in the state where they are registered. Many are national organizations that accept donations and possibly government grants from other states. For these charities, the instruments are unlikely to be good predictors. Though I cannot know for certain which organizations are national and which are local, column 3 excludes those whose names begin with "National," "American," or "North American." I also exclude organizations classified as support organizations under the NTEE taxonomy.[34] These organizations do not directly provide services but support organizations or individuals who do provide services through management and technical assistance, fundraising, and public policy analysis. Second, many of the charities receive no government grants throughout the entire six-year sample period, and many receive no private donations throughout the period. Such charities are likely to receive no funding at all from one of these two sources, even in response to a change in the other funding source, and thus I also exclude them from the regressions in this column.[35] Limiting the sample in this way slightly increases the magnitude of the coefficient, and it maintains about the same level of significance.

Column 4 limits the dataset in another way. Some types of nonprofits in the dataset may not truly be providing public goods, though they are granted nonprofit status. For example, it is

[34] These are organizations whose last two digits of the NTEE centile code are less than 20.

[35] Instead of eliminating charities with no private donations or government grants, one could restrict the sample to include only charities whose revenues are not too imbalanced between public and private donations. Charities which receive a large majority of their funding from one source or the other may respond less to changes in revenues than charities whose revenues are more balanced. The results from regressions with this restriction are similar to results presented in Tables 2 and 3.

debatable whether arts organizations, such as theatre companies or symphony orchestras, provide output that can be categorized as a public good.[36] While the data set here does not contain arts organizations, it includes some types of charities whose claim to providing public goods may be similarly suspect. The organizations that I consider to fall into this category and that are dropped from the regressions reported in column 4 include low-income and subsidized rental housing, senior citizens' housing and retirement communities, residential care and adult day programs (including adult day care and hospice), and centers to support the independence of specific populations (including senior centers, developmentally disabled centers, and homeless centers). In this regression, the coefficient on government grants is again positive and is statistically significant at the 1% level.

Column 5 presents regression results when the data set is limited using a different criterion. Outliers are always problematic, and perhaps they are especially problematic for these data. I have already eliminated charities and observations for which there is clear evidence of accounting or reporting error, for example those whose summed categorical revenues do not add up to the reported total revenues. Even absent these obvious irregularities, though, one may worry about charities reporting unusually high levels of donations or grants. In column 5, I eliminate the influence of the largest charities by dropping from the sample those observations whose private donations are in the top 5% of the total distribution and those observations whose government grants are in the top 5%. This refinement does not substantially change the regression results. Finally, under data cleaning a large fraction of organizations were removed for not being in the panel for all six years. Column 6 thus replicates the regression results without removing charities based on the number of years in which they appear in the dataset. The coefficient of interest, on government grants, is larger by about a factor of two from the previous columns, but is no longer significant.

Overall, Table 2 suggests that a dollar increase in government grants to a charity increases the charity's private donations by about 15 to 30 cents. Though generally significant at only the 10% level, the results are robust to different specifications of the data sample. Table 2 presents the F-statistic for the joint significance of the instruments in the first-stage regression; they are strongly significant in all columns. Table 2 also presents the Hansen J test statistic from

[36] Although refer to the point made earlier in footnote 7, that private consumption of goods becomes a public good if donors are motivated by altruism for its recipients.

a test of overidentifying restrictions, possible because the number of instruments exceeds the number of endogenous regressors. The null hypothesis of this test is that the instruments are valid, so a rejection calls into question the validity of the instruments. The null hypothesis cannot be rejected in any columns. Table 2 also presents the value of the Cragg-Donald F-statistic from Stock and Yogo (2005), a test for weak instruments. It should be noted that, though the F-statistics on the instruments from the first stage regression are high, the Cragg-Donald F-statistics are quite low compared to their critical values.

Table 3 presents the regressions in the opposite direction, where the level of government grants is the dependent variable and the level of private donations is the endogenous regressor. Column 1 is the base case, column 2 is with lagged regressors and instruments, columns 3 through 5 limit the sample as described above, and column 6 includes the unbalanced panel. The coefficient of interest is on private donations and is negative in five out of the six columns, but it is not significantly different from zero in any of these columns. The magnitude of the point estimate is large; private donations crowd out government grants by 30% to 190%. Thus evidence exists for a large crowding out effect of private donations on government grants, but the evidence is weak. Furthermore, the regression results from column 5, which eliminate the top 5% of charities measured by government grants or private donations, give a positive coefficient that is significant at the 10% level. The results in this direction are thus both mixed and weak. Other regressors are more significant. Program service revenue is negatively correlated with government grants, as is the county unemployment rate. The F-statistics on the instrument in the first stage regression is lower, which in part leads to the imprecise second stage estimates of the coefficient on the endogenous regressor. The large Cragg-Donald statistics indicate that, though the instruments are somewhat weak, the 2SLS results are not misleading.

In addition to being robust to these alternative sample specifications, all results are robust to estimation by LIML instead of 2SLS and to tests of weak instruments based on the conditional likelihood ratio from Moreira (2003), though these regression results are not reported.[37] Results are also robust to estimating the equations simultaneously using 3SLS. [38]

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[37] Software for implementing the Moreira (2003) test of weak instruments is available on Moreira's website: http://www.economics.harvard.edu/faculty/moreira/softwaresimulations.html. In general, the weak instrument problem only appears with a large number of (weak) instruments (Bound et. al. 1995).

[38] Monte Carlo studies comparing system estimators to equation-by-equation estimators have found that the efficiency advantages of the former are modest in finite samples (see Greene 2003, p. 451).

Regression Results by Charity Type

One may be interested to test for differences in these results between types of charities, or one may worry that the results are being driven by only one particular type of charity. Tables 4 and 5 repeat the first columns of Table 2 and 3, respectively, but split up the data set into the six NTEE major groups represented in the full sample. The six types are listed in the top row of the tables. Table 4 shows that for three of the six types of charities, there is statistically significant crowding in of government grants: crime and legal-related, food, agriculture and nutrition, and human services. The highest rate of crowding in occurs in food, agriculture and nutrition charities, and the lowest statistically significant crowding in rate occurs in human services charities. Human services charities account for the majority of all charities (15,130 out of 29,138). Table 5 shows results for regressions in the opposite direction, where government grants are the dependent variable. Like the results from Table 3, these results are mixed and generally insignificant. Only for crime and legal-related charities is the coefficient on private donations significant, and it is positive. Three of the six charity groups show positive coefficients, and three show negative coefficients.

Crowding in by Charity Age

The analysis finds that government grants crowd *in* private donations for these charities. This is consistent with the signaling model but not exclusively. As mentioned above, Rose-Ackerman (1986) describes several competing theories for crowding in. The signaling explanation depends upon uncertainty among donors as to the quality of the charity that is cleared up after the grant provides a signal. Thus identifying a measure of uncertainty about the quality of a charity will be beneficial in supporting the signaling theory: charities about which individuals know less should experience larger crowding in effects than charities that are well known. How can the "uncertainty" about a charity be measured?

I use the age of the charity, as measured by the date that the IRS bestowed it nonprofit status. Older charities are likely to be better known by donors. If so, the signaling effect for older charities should be smaller than for younger charities. By interacting a charity's age with the value of government grants, I can determine if the crowding in from government grants depends on age.[39] The results for this exercise are presented in Table 6, which reports results from regressions where private donations are the dependent variable, government grants and fundraising expenditures are endogenous regressors, and the same instruments and controls are used as in Table 2 (though not reported). Additionally, charity age and an interaction of age with grants are included.[40] These results support the theory, with significant results everywhere except for column 2. The coefficient on government grants is positive and varies between about 0.8 to 1.3. The coefficient on age indicates that a charity aging by one year increases its donations by between $2,500 and $14,000, though the coefficient is not significant. Finally, the coefficient on the interaction term is strongly significant in all columns and indicates that the crowding in effect decreases by less than half a cent to four cents on the dollar per year the charity has been around. In the first four columns, the ratio of the coefficient on government grants and the coefficient on the interaction term indicates that grants crowd in private donations for charities younger than 40 years old and crowd out donations for charities older than 40. In the last column this figure is closer to 30 years old. This supports the theory that older charities receive less of a signal from receipt of grants, and so the value of crowding in is less.[41] However, in all of these regression results, like in those from Table 2, the Cragg-Donald F-statistics are quite low, suggesting weak instruments.

Contemporaneous and Cumulative Grants

The model and econometrics are both static. Though either the government or individuals can move first, after each party has moved one time the game ends. Since charities exist for many years, the effects from crowding out or from signaling are likely to last for more than just a single fiscal year. It thus seems appropriate to consider dynamic extensions of the effects that I have found theoretically and empirically. While I do not provide a rigorous

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[39] An alternative measure of charity uncertainty might be generated using publicly available ratings of charities from organizations such as Charity Navigator. These organizations only cover a very small fraction of charities and have not been around long enough to cover all years in the data set.

[40] The age variable is unavailable for 7.4% of organizations, and it is clearly inaccurate (i.e. shows an origination date later than 1998, when the charity was in existence and filing tax returns) for an additional 1.1%, thus the number of observations in these regressions is lower than in previous tables.

[41] Crowding in should also be expected if government funding comes in the form of matching grants. Unfortunately, no information about matching is available in the data. Some of the crowding in phenomenon may be explained by matching grants, though matching grants do not explain why crowding in is less for older charities (unless they receive a lower fraction of their government grants in the form of matching grants). Matching, in the context of intergovernmental grants, is studied in Baicker and Staigler (2005), Klor (2006), and Huber and Runkel (2006).

treatment of a dynamic model here, I offer the following observation. One would expect that the signaling effect described in section 2 is likely to be cumulative over time: a grant signaling high quality in period t will positively influence donations not just in period t but also in periods t+1, t+2, etc. This is because the quality of a public good is persistent over time. Whether or not the crowding out effect is cumulative or merely contemporaneous depends upon whether the utility from the public good is from a stock or a flow good. If a flow good, then the crowding out from government grants in period t will negatively affect private donations only in period t. If the public good is a stock good, then the government grants in period t will crowd out donations in future periods as well. Thus, the two effects of government grants found here, from both crowding out and signaling, are likely to be long lasting, and the duration of the effect for each may differ.

This is tested empirically in Table 7 by regressing private donations (in year t) on both contemporaneous government grants (from year t) and on cumulative government grants (the sum of grants to a charity in all years up to $t-1$). Each regression in Table 7 includes all of the same controls and instruments as in Table 2, though they are not reported. In all three columns, the coefficient on contemporaneous grants is significantly positive, ranging from 17 cents to 26 cents on the dollar. In none of the columns is the coefficient on cumulative government grants significant though it is always less than zero. This suggests that the crowding in effect is in fact contemporaneous; private donors respond to the current year's level of government grants and not lagged values. An alternative way to look dynamically at the data, to see if current values of donations, say, are affected by lagged values of government grants, is through a vector autoregression (VAR). However, testing for Granger causality in either direction using panel data VAR methods developed in Holtz-Eakin et. al. (1988) fails to find causality from lagged values of government grants or private donations. The data used are annual, limiting how much the effect of timing can be observed. If a grant early in one year affects donations later in the same fiscal year, then that dynamic response cannot be measured with annual data. There are certainly opportunities for extending the static empirical analysis presented here.[42]

VI. Conclusion

[42] Garrett and Rhine (2008) perform VARs on time series data of aggregate annual private donations and government grants to charities.

The effect of crowding out of private donations by government grants, proposed in Warr (1982) and Roberts (1984), and extended to include a warm glow effect in Andreoni (1989, 1990), has had numerous empirical investigations. Many studies, including Kingma (1989) and Payne (1998) find significant evidence of partial crowding out. Other papers, including Khanna and Sandler (2000) and Payne (2001), find some evidence of crowding in of private donations. Though their results differ, most of these papers have in common that they use a relatively small sample of charities, and they test for crowding out or crowding in only in one direction.

Here I extend that literature by looking at a large data set that includes most charities that file Form 990 with the IRS, which includes all non-religious charities with at least $25,000 in gross receipts. The first main contribution is the empirical examination of crowding out in the "opposite direction": private donations crowding out government grants. Theoretically, I show that the crowding out effect depends on whether the government or individuals make their contributions first. The second main contribution is showing that government grants can act as signals for charity quality, leading to crowding in. Empirically, I find evidence that government grants crowd in private donations, while private donations crowd out government grants.

Though the signaling model assumes that governments have the private information on charity quality initially, under the assumption that individuals have that information it can easily be shown that it would predict crowding in in the opposite direction, from private donations to government grants. The model could be further extended by supposing that the information is initially unknown to either the government or individuals, but that anyone can obtain the information at a cost. The cost may differ between individuals and governments.[43] An empirical extension to this paper is to test for private donations signaling information on charity quality by taking advantage of two types of private donations: those from individuals and those from private foundations. Foundations (or trusts, corporations, or estates) are likely to devote resources to researching charities and thus may have information about the charity quality. Their grants or donations to a charity may thus act as the quality signal in the same way that government grants do in this paper's model. In fact, charities typically advertise receipt of grants from both governments and private organizations, indicating that they expect these announcements to crowd in donations. Unfortunately, the data from the IRS Form 990s do not allow this level of disaggregating. Contributions from individuals, as well as trusts,

[43] This cost is modeled in Andreoni (2006), but with no distinction between private donors and government.

corporations, estates, and foundations, are all listed under the same category of "direct public support," according to the IRS instructions for completing the form. The category "indirect public support" includes only contributions collected from "federated fundraising agencies" such as the United Way (Figure 1 shows that this category represents only a small amount of total revenues). If private donations disaggregated into contributions from individuals and contributions from private foundations or trusts were available from another data source, then this extension may give empirical support to private donations acting as signals. Another extension would be to consider a model of multiple public goods, rather than the modeling here of a single public good, as is common in the literature.[44] How government and individuals respond to changes in contributions among different types of charities is a question worth exploring.[45] The regression results for different types of charities in Table 4 suggest that this may be a fruitful line of research.

What are the policy implications of these findings? Governments fund public goods, including but not limited to those provided by charities, and hopefully governments would do so to increase social welfare by overcoming the free rider problem inherent in public goods. The large prior literature on crowding out suggests that governments ought to acknowledge the effect that their giving has on private giving and set their level of grants appropriately. The signaling model and empirical results presented here buttress that suggestion and add that the government's grants can influence individuals' donations not only through their effect on the level of the public good provision but also through their effect on individuals' information about the quality of the public good. Governments should "worry" about the negative effect that their grants can have due to crowding out; they should also "worry" about how the signal value of their grants can have positive effects on giving. The paper's results are also relevant to private donors, especially large donors like foundations who may influence government grants or other private donations through the crowding in or crowding out effects of their contributions.

A number of additional questions, clarifying these effects and the appropriate policy responses for governments and private donors, may be answered in further research. I have

[44] Exceptions which do consider multiple public goods include Bergstrom et. al. (1986), Mutuswami and Winter (2004), and Ghosh et. al. (2007).

[45] Even among charities of similar types, there can be different crowding out or crowding in effects. Parker and Thurman (2008) find both crowding out and crowding in for two different government programs preserving open space, and Albers et. al. (2008) examine public provision of land reserves and find crowding in in California and crowding out in Illinois and Massachusetts. Payne (2001) finds crowding out of government grants to teaching colleges but crowding in for research universities.

identified that government grants crowd in private donations for the charities in this data set, and I have supplied some evidence that this crowding in arises from the signaling value of the government grants. Further research could verify that signaling is the true cause of crowding in or examine other potential reasons for crowding in, for example economies of scale in a charity's provision of public goods. This may be answered using similar data on actual contributions or in a controlled laboratory setting. Further research could also address the question of the disparity in results between the many papers that find crowding out of private donations and the many, including this one, that find crowding in. An extension using data from other charities besides social service charities would be useful. Finally, development of a thorough theoretical model to capture the many effects that could cause crowding in or crowding out in either direction, that may include charity fundraising, multiple public goods or charities, and dynamics, would be a helpful addition to the literature.

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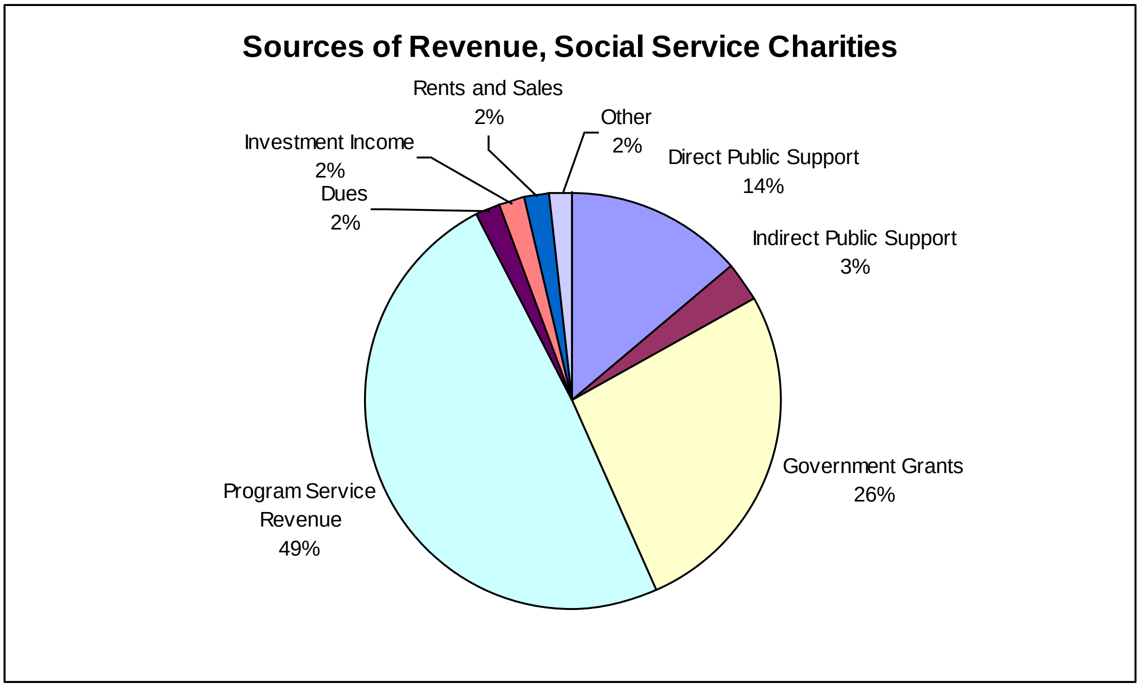
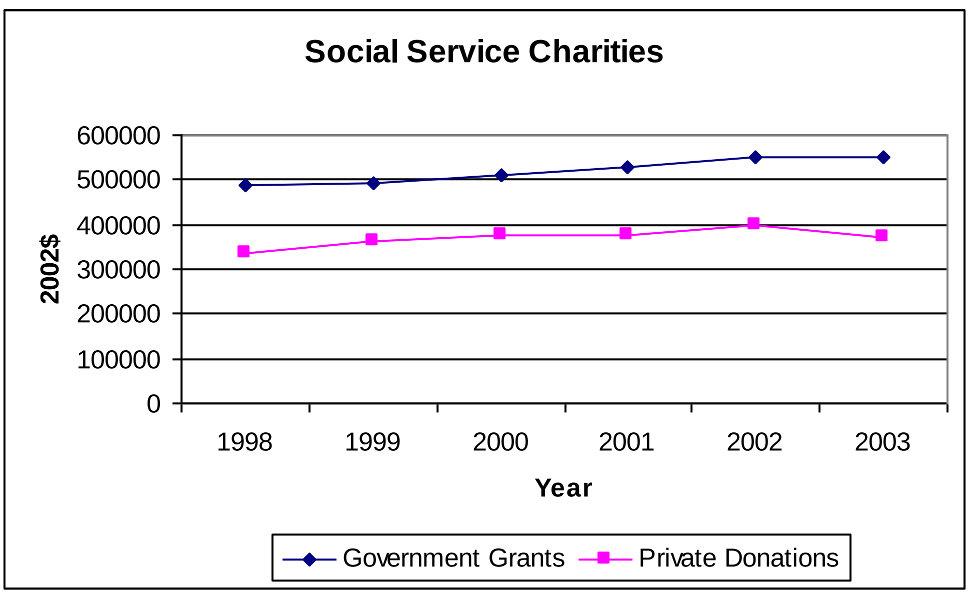
Figure 1



Notes: Investment income includes interest and dividends; rents and sales includes securities and inventory; other includes special events revenues.

Figure 2



Notes: All dollar values are deflated by CPI, and are mean (per nonprofit) values.

Table 1

Summary Statistics – Charity Revenues and Fundraising

	Number of Observations	Number of Organizations	Mean ($1,000s)	Standard deviation ($1,000s)	Median ($1,000s)	75th percentile ($1,000s)
Full Sample	339,716	76,725				
Private Donations			334	4790	44	165
Government Grants			521	3476	0	156
Program Service Revenue			972	9413	61	396
Other Revenue			111	1345	8	43
Fundraising Expenditures			25	510	0	2
Cleaned Sample	174,828	29,138				
Private Donations			267	799	41	206
Government Grants			431	1296	0	241
Program Service Revenue			755	1833	117	562
Other Revenue			89	384	12	56
Fundraising Expenditures			21	103	0	4

Notes: Data are averaged over 1998-2003 in constant 2002 dollars. Private donations include direct and indirect public support. Other revenue includes interest, rents and sales.

Table 2

The Determinants of Private Donations[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Government Grants	0.154	0.00208	0.165	0.283***	0.211*	0.482
	(0.0941)	(0.182)	(0.107)	(0.0751)	(0.111)	(0.407)
Fundraising Expenditures	6.698	1.542	4.477	2.892	5.670*	-4.888
	(5.585)	(9.164)	(7.437)	(4.143)	(3.332)	(16.93)
Program Service Revenue	0.00640	-0.0209	0.0525	0.0377	-0.00312	0.106
	(0.0349)	(0.0328)	(0.0579)	(0.0267)	(0.0112)	(0.132)
Other Revenues	-0.0165	-0.0123	-0.0183	-0.0181	-0.0190	-0.0108
	(0.0141)	(0.0283)	(0.0184)	(0.0240)	(0.0147)	(0.0111)
Population	0.00263	0.00116	0.00560	0.00252	-0.000555	-0.00132
	(0.00410)	(0.00750)	(0.00765)	(0.00529)	(0.00119)	(0.000996)
Income	0.317	-0.136	-0.0225	-0.360	0.306	5.074
	(0.867)	(1.471)	(1.671)	(1.076)	(0.208)	(3.789)
Unemployment Rate	-4665	-2014	-2984	-1224	-1473	5251
	(4580)	(5099)	(7978)	(4811)	(1417)	(4383)
Percent Population > 65	-80565	-1169434	-807630	-1943548	354411	-1591628
	(1.60e+06)	(1.91e+06)	(2.90e+06)	(1.63e+06)	(444321)	(2.32e+06)
Number Dem Senators	-3244	-5964	-8585	-1954	2553*	659.6
	(4379)	(8327)	(6313)	(5363)	(1490)	(5500)
Percent Congress members Dem	12746	21424	11020	-9720	3601	-1442
	(20715)	(19608)	(32663)	(26427)	(7289)	(28046)
Indicator for Democratic governor	-7895	2353	-18864***	-8447	-2505	-8960*
	(5081)	(4863)	(6641)	(6348)	(1644)	(4849)
Observations	174828	145690	85764	111474	158016	264494
Number of Organizations	29138	29138	14300	18579	27187	52570
F-statistic on instruments for government grants in first-stage regression[b]	23.74	15.77	15.66	11.53	19.01	29.36
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
F-statistic on instruments for fundraising expenditures in first-stage regression[c]	8.72	7.41	5.84	5.82	3.28	9.06

(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.011)	(0.000)
Hansen J-statistic	1.037	1.531	1.292	1.431	2.172	3.443
(p-value)	(0.595)	(0.465)	(0.524)	(0.489)	(0.338)	(0.179)
Cragg-Donald F-statistic	1.793	1.119	0.916	2.532	1.525	0.539
Lagged Endogenous Variable/Instrument?	No	Yes	No	No	No	No
Exclude Select Charities?[d]	No	No	Yes	Yes	Yes	No
Balanced Panel?	Yes	Yes	Yes	Yes	Yes	No

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.
[b] Instruments for government grants are the state-year total payments paid to individuals through SSI and the state-year payments paid to individuals through SSI for the aged.
[c] Instruments for fundraising expenditures are the charity's management expenditures and its total liabilities.
[d] Column 3 excludes charities that include "National" or "American" in their names, are classified as support organizations, or never have nonzero values for government grants or private donations. Column 4 excludes organizations classified as low-income and subsidized rental housing, senior citizens' housing and retirement communities, residential care and adult day programs, and centers to support the independence of specific populations. Column 5 excludes observations where the level of government grants or the level of private donations is in the top 5% among all observations.
*** p<0.01, ** p<0.05, * p<0.1

Table 3

The Determinants of Government Grants[a]						
	(1)	(2)	(3)	(4)	(5)	(6)
Private Donations	-0.700	-1.143	-1.931	-1.123	0.665*	-0.307
	(1.165)	(1.212)	(2.667)	(1.334)	(0.342)	(0.923)
Program Service Revenue	-0.279***	-0.279***	-0.498***	-0.289***	-0.0422***	-0.253***
	(0.0308)	(0.0304)	(0.0466)	(0.0522)	(0.00513)	(0.0234)
Other Revenues	-0.0327	-0.0197	-0.0468	-0.0143	-0.00427	-0.00526
	(0.0293)	(0.0231)	(0.0641)	(0.0287)	(0.00396)	(0.0134)
Population	0.00789	-0.000255	0.0258	0.0126	0.000182	0.00209***
	(0.00695)	(0.00554)	(0.0269)	(0.00945)	(0.00176)	(0.000796)
Income	-1.356	-1.127	-4.438	-1.879	-0.488**	-4.388*
	(0.938)	(1.186)	(4.416)	(1.834)	(0.230)	(2.550)
Unemployment Rate	-2276	1910	-3170	-4788	-1404*	-11528***
	(1921)	(5441)	(5064)	(3142)	(754.3)	(2611)
Percent Population > 65	-2171059	-3317986	-9332267	-2355580	-125400	-904656
	(2.45e+06)	(3.20e+06)	(8.83e+06)	(3.77e+06)	(277585)	(1.13e+06)
Number Dem Senators	4118	-1281	-10013	2025	-2201	4587
	(4682)	(14177)	(21595)	(7926)	(1549)	(3302)
Percent Congress members Dem	54497*	124182*	204517*	72447*	9239	20125
	(33102)	(73427)	(115870)	(40320)	(7931)	(18596)
Indicator for Dem governor	10200	20923***	7014	17028*	3959**	11030*
	(7092)	(7514)	(30070)	(8749)	(1987)	(6283)
Observations	174828	145690	85764	111474	158016	265105
Number of Organizations	29138	29138	14300	18579	27187	52689
F-statistic on instruments in first-stage regression[b]	4.88	4.30	2.10	4.60	8.99	5.92
(p-value)	(0.027)	(0.038)	(0.147)	(0.032)	(0.003)	(0.015)
Cragg-Donald F-statistic	60.78	33.86	33.08	55.61	29.70	63.41
Lagged Endogenous Variable/Instrument?	No	Yes	No	No	No	No
Exclude Select Charities?[c]	No	No	Yes	Yes	Yes	No
Balanced Panel?	Yes	Yes	Yes	Yes	Yes	No

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.
[b] Instrument for private donations is the level of dues collected by the charity.
[c] Column 3 excludes charities that include "National" or "American" in their names, are classified as support organizations, or never have nonzero values for government grants or private donations. Column 4 excludes organizations classified as low-income and subsidized rental housing, senior citizens' housing and retirement communities, residential care and adult day programs, and centers to support the independence of specific populations. Column 5 excludes observations where the level of government grants or the level of private donations is in the top 5% among all observations.
*** p<0.01, ** p<0.05, * p<0.1

Table 4

The Determinants of Private Donations, by Charity Type[a]

Type of Organization	(1) Crime and Legal-Related	(2) Employment	(3) Food, Agriculture, and Nutrition	(4) Housing and Shelter	(5) Human Services	(6) Community Improvement and Capacity Building
Government Grants	0.358***	-0.0549	0.583**	-0.0169	0.156**	0.0680
	(0.126)	(0.298)	(0.262)	(0.179)	(0.0661)	(0.269)
Fundraising Expenditures	8.757	36.41	1.613	7.481	5.556	10.08
	(5.346)	(25.50)	(4.336)	(7.157)	(4.172)	(12.58)
Program Service Revenue	0.0311	-0.0609	0.191	-0.0264	0.0129	-0.0147
	(0.0892)	(0.0914)	(0.143)	(0.0301)	(0.0327)	(0.0402)
Other Revenues	-0.229*	-0.00888	0.0763	-0.0217	-0.0115	-0.0347
	(0.127)	(0.0465)	(0.0704)	(0.0251)	(0.0182)	(0.0474)
Population	-0.0287*	0.0120	-0.0164	0.00409	0.00512	0.00873
	(0.0162)	(0.0268)	(0.0117)	(0.00638)	(0.00729)	(0.00680)
Income	8.110	2.291	0.542	0.622	0.883	-0.666
	(5.056)	(13.21)	(4.107)	(0.955)	(1.054)	(2.293)
Unemployment Rate	1055	-19402	33679***	-2421	-6941	-7482
	(12509)	(16939)	(12998)	(4384)	(4960)	(7067)
Percent Population > 65	337267	6.23e+06	573697	-17303	-177165	-734748
	(5.30e+06)	(1.15e+07)	(3.96e+06)	(754458)	(1.35e+06)	(7.32e+06)
Number Dem Senators	-65185**	3086	-61006	2534	2153	859.3
	(30336)	(29357)	(48021)	(5885)	(5364)	(15052)
Percent Congress members Dem	-73604	-51456	-52636	34049	34709	-69063
	(156417)	(129069)	(259774)	(25450)	(27369)	(73660)
Indicator for Democratic governor	-21159	-135863	-27991	42.13	-5109	9609
	(20187)	(88615)	(69216)	(9104)	(5941)	(19545)
Observations	10206	9678	4644	37956	90780	21564
Number of Organizations	1701	1613	774	6326	15130	3594
F-statistic on instruments for	16.32	8.31	11.03	6.40	44.72	2.78

government grants in first-stage regression[b]						
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
F-statistic on instruments for fundraising expenses in first-stage regression[c]	2.70	1.37	0.67	4.34	3.46	1.67
(p-value)	(0.029)	(0.240)	(0.614)	(0.002)	(0.001)	(0.153)
Hansen J-statistic	1.669	2.109	1.031	1.570	0.805	0.548
(p-value)	(0.434)	(0.348)	(0.597)	(0.456)	(0.669)	(0.760)
Cragg-Donald F-statistic	22.17	0.774	1.622	1.791	2.725	0.529

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.

[b] Instruments for government grants are the state-year total payments paid to individuals through SSI and the state-year payments paid to individuals through SSI for the aged.

[c] Instruments for fundraising expenditures are the charity's management expenditures and its total liabilities.

Table 5

The Determinants of Government Grants, by Charity Type[a]

Type of Organization	Crime and Legal-Related	Employment	Food, Agriculture, and Nutrition	Housing and Shelter	Human Services	Community Improvement and Capacity Building
Private Donations	1.825**	1.792	-1.528	1.178	-0.869	-0.148
	(0.925)	(1.422)	(1.544)	(1.255)	(1.425)	(0.543)
Program Service Revenue	-0.236*	-0.184***	-0.156*	-0.134***	-0.333***	-0.153**
	(0.121)	(0.0507)	(0.0869)	(0.0419)	(0.0270)	(0.0686)
Other Revenues	0.216	0.0475	-0.0801	-0.00879	-0.0449	0.0116
	(0.158)	(0.0908)	(0.0773)	(0.0315)	(0.0392)	(0.0227)
Population	0.0440*	-0.0270	-0.00167	-0.00329	0.0135	0.00286
	(0.0241)	(0.0323)	(0.0271)	(0.00929)	(0.0144)	(0.00503)
Income	-4.879	20.23	0.848	-3.243**	1.254	-1.194
	(5.326)	(21.09)	(5.916)	(1.540)	(1.734)	(0.979)
Unemployment Rate	-17843*	3373	45051	702.3	-2551	-3865
	(10713)	(13471)	(48445)	(4640)	(3105)	(4793)
Percent Population > 65	8.26e+06	-857914	-6648417	-508775	-4794988	5.94e+06
	(5.44e+06)	(4.60e+06)	(7.53e+06)	(1.43e+06)	(3.35e+06)	(4.38e+06)
Number Dem Senators	88831	19816	-66258	-887.8	3064	-1940
	(54106)	(32198)	(109008)	(9957)	(8280)	(15671)
Percent Congress members Dem	398321**	-51909	-372464	-13832	77615	34785
	(191056)	(165188)	(407575)	(55651)	(82715)	(55165)
Indicator for Democratic governor	80486**	16650	21644	19101	11411	8136
	(35479)	(52050)	(65074)	(13218)	(9092)	(15671)
Observations	10206	9678	4644	37956	90780	21564
Number of Organizations	1701	1613	774	6326	15130	3594
F-statistic on instruments in first-stage regression[b]	8.82	1.95	1.85	1.59	3.79	0.55

(p-value)	(0.003)	(0.163)	(0.174)	(0.208)	(0.052)	(0.459)
Cragg-Donald F-statistic	5.608	1.394	1.170	1.927	53.82	1.584

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.

[b] Instrument for private donations is the level of dues collected by the charity.

Table 6

The Effect of Age on Crowding In					
	(1)	(2)	(3)	(4)	(5)
Government Grants	0.959***	0.153	0.825**	1.283***	1.278***
	(0.366)	(0.211)	(0.345)	(0.375)	(0.334)
Charity Age	8461	2513	10137	13862	5609
	(9471)	(7762)	(13055)	(9782)	(4456)
Age*Grants	-0.0254***	-0.00359*	-0.0207***	-0.0320***	-0.0421***
	(0.00877)	(0.00215)	(0.00735)	(0.00961)	(0.0101)
Observations	159912	133260	78621	102024	144351
Number of Organizations	26652	26652	13108	17004	24837
F-statistic on instruments for government grants in first-stage regression	13.65	10.23	8.34	8.00	8.42
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen J-statistic	1.704	0.544	0.530	1.653	0.0650
(p-value)	(0.426)	(0.762)	(0.767)	(0.438)	(0.968)
Cragg-Donald F-statistic	0.912	1.174	0.847	2.552	0.578
Lagged Endogenous Variable/Instrument?	No	Yes	No	No	No
Exclude Select Charities?[b]	No	No	Yes	Yes	Yes

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Only those charities with a consistent value for age are included. Instruments and control variables from Table 2 all appear in these regressions, though not reported. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.

[b] Column 3 excludes charities that include "National" or "American" in their names, are classified as support organizations, or never have nonzero values for government grants or private donations. Column 4 excludes organizations classified as low-income and subsidized rental housing, senior citizens' housing and retirement communities, residential care and adult day programs, and centers to support the independence of specific populations. Column 5 excludes observations where the level of government grants or the level of private donations is in the top 5% among all observations.

*** p<0.01, ** p<0.05, * p<0.1

Table 7

Contemporaneous and Cumulative Grants[a]			
	(1)	(2)	(3)
Government Grants	0.208***	0.167***	0.263***
	(0.0400)	(0.0420)	(0.0594)
Cumulative Government Grants	-0.00224	-0.000931	-0.00429
	(0.00197)	(0.00230)	(0.00294)
Observations	145690	71472	92895
Number of Observations	29138	14300	18579
F-statistic on instruments in first-stage regression	36.63	43.03	22.04
(p-value)	(0.000)	(0.000)	(0.000)
Hansen J-statistic	6.625	11.96	7.487
(p-value)	(0.0848)	(0.00752)	(0.0579)
Cragg-Donald F-statistic	816.3	717.2	458.0
Exclude Select Charities?[b]	No	Yes	Yes

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Instruments and control variables from Table 2 all appear in these regressions, though not reported. Heteroskedasticity and autocorrelation consistent standard errors are in parentheses.

[b] Column 2 excludes charities that include "National" or "American" in their names, are classified as support organizations, or never have nonzero values for government grants or private donations. Column 3 excludes organizations classified as low-income and subsidized rental housing, senior citizens' housing and retirement communities, residential care and adult day programs, and centers to support the independence of specific populations.

*** p<0.01, ** p<0.05, * p<0.1

Appendix – Not for Publication

Consider the model from Section 1, without information asymmetry. First, suppose that all of the individuals and the government move simultaneously, resulting in a Nash equilibrium. Since both the government and each individual act as though the other's action is fixed at the equilibrium level, the maximization problems and the first order conditions for each party are identical to those in Section 1. Thus, the first order conditions for an interior solution are a system of $2N$ equations: $-\gamma_i U_c + \sum_{j=1}^{N} \gamma_j U_G = 0$ for $i = 1,\ldots,N$ for the government's problem and $U_c = U_G$ for each individual i. This is a large system of equations that is impossible to solve without parameterizing the utility function. By assuming homogeneity of individuals, though, an interesting result emerges. With identical individuals all making a contribution g, and the government setting an identical tax τ on each of them, the government's first order condition simplifies to $U_c = NU_G$. This is inconsistent with the individuals' first order condition for an interior solution. By considering corner solutions through the Kuhn-Tucker conditions, it can be shown that individuals give nothing in equilibrium: $g = 0$. The government sets a positive tax level to maximize social welfare. Why does this corner solution always hold? Under homogeneity of individuals, the same level of utility is achieved whether funding the public good through private donations g or through taxes τ. Thus, the government can set τ to achieve the first-best, totally compensating for the free rider problem. This is in general not possible when the two sources of funding for the public good are not perfect substitutes, for example, if a warm glow effect accrues from private donations.

A second equilibrium concept occurs when the government is the first mover, followed by all individuals moving simultaneously, resulting in a Stackelberg equilibrium.[46] The maximization problem and first order condition for each individual are the same as before, since individuals are second movers and take the government's and each other's actions as exogenous. The government, however, chooses both the tax and the individuals' private donations, subject to the individuals' maximizing behavior. The government's problem is thus

[46] This is similar to Varian's (1994) modeling of sequential private contributions to public goods. That model has no government, though, and only two individuals. He shows that the level of public good provision is weakly lower under sequential contributions than under simultaneous contributions. Here, I allow the government to move either before or after individuals, but all individuals move simultaneously with each other.

$$\max_{\tau\geq 0, g\geq 0_i} \sum_{i=1}^{N} \gamma_i U[y_i - g_i - \tau_i, \sum\nolimits_{j=1}^{N} (g_j + \tau_j)] \text{ such that } -U_c + U_G + \mu_i = 0 \ \ \forall i \, ,$$

where μ_i is individual i's constraint that $g_i \geq 0$, coming from the first order conditions of the individual's maximization problem. Because of the inequality constraints on both g and τ, the first order conditions for this problem are complicated.

Another Stackelberg equilibrium occurs when the government sets the tax *after* all of the individuals have chosen their level of private contributions. In the first stage, all N individuals move simultaneously, and in the second stage the government moves. The government's maximization problem and first order condition are the same as in the case where individuals' actions are exogenous, since those actions are given at the time of the government decisions. The individuals must each choose a level of private contribution, factoring in how their contribution affects the government's choice of tax, holding constant all other individuals' contributions. Individual i's maximization problem is

$$\max_{g_i\geq 0, \tau\geq 0} U(y_i - g_i - \tau_i, \sum_{j=1}^{N} (g_j + \tau_j)) \text{ such that } \sum_{j=1}^{N} \gamma_j (-U_c + NU_G) = 0 \, .$$

The constraint is the first order condition of the government's optimization problem, assuming an interior solution. Individual i chooses τ subject to the constraint but can only affect τ insofar as g_i is changed. Though the first order conditions are relatively easy to find, any further analysis of this equilibrium is impossible without assuming any form on the utility function.

Finally, I evaluate the social planner's problem, where each individual's level of private contribution and the tax are set simultaneously by one agent. The maximization problem is

$$\max_{\{g_i\}\geq 0, \tau\geq 0} \sum_{i=1}^{N} \gamma_i U(y_i - g_i - \tau, N\tau + \sum_{k=1}^{N} g_k) \, .$$

The first best solution thus depends on how each individual is weighted in the social welfare function, described by the γ_i parameters. In the special case where all individuals are identical, the problem becomes

$$\max_{g\geq 0, \tau\geq 0} U(y - g - \tau, N(\tau + g)) \, .$$

Again, here g and τ are perfect substitutes, so government need only choose the sum $\tau + g$, or each individual's total contribution to G. This leads to the first order condition $U_c = NU_G$. The marginal cost to each individual, U_c, is set to equal the social marginal benefit, which accrues to all N individuals, NU_G.

Next, consider extending individuals' preferences to allow for a warm glow effect, or impure altruism.[47] As in Andreoni (1990), this is done by amending the individual's utility function to include the individual's level of voluntary contribution as an argument. Thus, the utility function is $U(c_i, g_i, G)$. Given an exogenous tax schedule, the individual's first order condition is now $-U_c + U_g + U_G = 0$. The middle term accounts for the fact that the individual earns warm glow utility from the level of giving g_i, separate from the benefit directly received by the public good G. The individual does not receive this warm glow from mandatory contributions to the public good (taxes).

The first order condition can be used to find the effect of a change in the individual's tax rate τ_i:

$$\frac{dg_i}{d\tau_i} = \frac{-(U_{cc} - 2U_{cG} - U_{cg} + U_{gG} + U_{GG})}{U_{cc} - 2U_{cG} - 2U_{cg} + 2U_{gG} + +U_{gg} + U_{GG}}.$$

In general, this cannot be signed. The numerator is positive, and the denominator is equal to the negative of the numerator plus three additional terms: $U_{gg} + U_{gG} - U_{cg}$. If this additional sum is negative, then the total derivative above must be between -1 and 0. That is, crowding out exists but is less than one-for-one. The intuition is that government and private provision of the public good are no longer perfect substitutes in utility because of the warm glow effect, and thus we would not expect perfect crowding out. The sufficient condition for partial crowding out to hold is satisfied as long as U_{gG} is not too large (the other two terms are negative). That is, if U_{gG} is too big, then a decrease in government spending on the public good (G) reduces the marginal utility of the warm glow effect (U_g) enough so that the individual reduces his or her private giving.

Consider next the case where individuals' actions are exogenous and the government's tax structure is endogenous in the context of a warm glow effect. Suppose further that the government sets an identical tax τ on every individual.[48] The government's problem is

[47] An alternative extension, yet with similar effects, is to consider reputation effects, as in Benabou and Tirole (2006). See also Kotchen (2006).

[48] The most general form of the tax allows for the government to set a different tax for each individual. However, this generality makes the evaluation of derivatives difficult. To evaluate $d\tau_i/dg_i$ using the implicit function theorem, one must calculate the inverse of an $N \times N$ matrix (from the N first order conditions).

$\max_{\tau} \sum_{i=1}^{N} \gamma_i U[y_i - g_i - \tau, g_i, \sum_{j=1}^{N}(g_j + \tau)]$. Assume an interior solution for τ.[49] This yields the first order condition $\sum_{i=1}^{N} \gamma_i (-U_c + \sum_{j=1}^{N} U_G) = 0$. The social marginal cost of increasing the tax on individual i is the foregone value of consumption for that person. This equals the marginal benefit of increasing the tax, which is the value of the increase in the public good. This benefit accrues to each person's utility function, and hence it is summed over N. Use the implicit function theorem to calculate the change in the optimal tax in response to a change in private donations:

$$\frac{d\tau}{dg_i} = \frac{\gamma_i(-U_{cc} + U_{cg} + U_{cG} - U_{Gg}) + \sum_{j=1}^{N} \gamma_j (U_{cG} - U_{GG})}{\sum_{j=1}^{N} \gamma_j (U_{cc} - 2U_{cG} + U_{GG})}.$$

The denominator of this expression is strictly negative. With no warm glow effect, the numerator is strictly positive, which implies that private donations crowd out public spending.[50] In fact, as long as $U_{gG} < U_{cG}$, crowding out must occur. This condition is similar to that in the last section. Again, crowding out must occur as long as the marginal utility from the public good (U_G) does not increase too much in the level of the warm glow effect (g). If so, then a reduction in private giving by individual i may reduce everyone's utility from the public good by enough so that the optimal tax decreases as well.

I next consider the case of a non-benevolent government, that is, a government whose maximand is not the social welfare function of the weighted sum of individuals' utility functions. One way in which the government's utility function could differ from the socially optimal is if the government uses weights different than those that are socially optimal. If the true social welfare function is $W = \sum_{i=1}^{N} \gamma_i U(c_i, G)$, suppose that the government actually maximizes $\sum_{i=1}^{N} \mu_i U(c_i, G)$, where the new weights may represent a government corrupted by influence from

[49] The condition on the utility function, that $U_x \to \infty$ as $x \to 0$, ensures an interior solution for g_i in the individual's problem. This does not ensure an interior solution for τ, however, since τ is not an argument of the utility function.

[50] Finding conditions for when crowding out is one-for-one is not appropriate in this context, since the tax rate applies to each individual. If individual i increases his or her private contribution by one dollar, then a decrease of one dollar in the tax τ would actually decrease the total amount of the public good by $(N - 1)$ dollars.

some interest groups. However, note that all of the results found in the paper are independent of the weights γ_i. Thus, this particular deviation from a benevolent government has no effect on the model's implications.

Consider instead an alternative formulation of a non-benevolent government. Suppose that the government's maximand is $\sum_{i=1}^{N}[\gamma_i U(c_i, G) + \xi_i \tau_i]$, so that the government directly receives utility from their tax levels τ_i. This could represent the outcome from lobbying by firms who contract for government services and who prefer government funding of public goods to private funding. Note that this specification is analogous to the warm glow specification in household utility; here government can receive a warm glow from their tax expenditures on the public good. The proof used in Section I to show that private donations perfectly crowd out government funding no longer applies, since government and private contributions to the public good are no longer perfect substitutes. The first order condition for the government's choice of τ_i is $-\gamma_i U_c + \sum_{j=1}^{N} \gamma_j U_G + \xi_i = 0$. One could use the implicit function theorem on this series of first order conditions, but this would involved a large N by N matrix, for each of the τ_i. Alternatively, one could assume a unified tax rate τ, as was done above for the impure altruism case. If that assumption is taken, then the derivative above remains the same, except that all of the warm glow terms are dropped. As described above, this still results in crowding out of private donations, though perhaps not at a one-for-one level.

Finally, I consider the endogenous response of a charity to changes in government grants or private donations. Suppose that, in addition to a benevolent government and N private potential donors, there exists a charity who takes government grants and private donations and converts them into public goods. The charity has access to fundraising technology, and uses it to solicit donors. The charity can choose a level of fundraising effectiveness θ, which gives the fraction of individuals that are solicited by the charity. To reach this level of fundraising they must pay $F(\theta)$ in fundraising costs, where F is increasing and convex. A charity seeks to maximize the total payout to the public good less the amount that is being spent on fundraising; its maximand is $\sum_{i=1}^{N}(g_i + \tau_i) - F(\theta)$. An individual donor is not aware of the charity or the public good unless she is solicited by the charity. Let $z_i = 1$ if individual i is solicited and $z_i =$

0 if not. If $z_i = 0$, then $g_i = 0$. If $z_i = 1$, then individual i chooses g_i to maximize her utility given her tax rate τ_i as well as everyone else's tax rate and everyone else's level of contribution to the charity.

As shown in the models above, the order of movement among the government, the individuals, and here the charity is likely to matter. Suppose that the government sets its tax levels τ_i exogenously, and then the charity responds by choosing θ, followed by all N individuals simultaneously. A key difference between this model and the previous models is the stochastic element: the charity can choose θ, which gives the probability that any individual will be solicited. Once the charity chooses this probability, the actual solicitations are realized and individuals respond. Define the solicitation vector as $Z = (z_1, z_2, \ldots z_N)'$, where each z_i is defined as above. The value of θ gives the probability of any Z being drawn, let this be $\Pr(Z; \theta)$. Let the set of all possible solicitation vectors be Σ.

Begin by solving the individual's maximization problem, given the taxes, the solicitation vector Z, and all other individuals' levels of giving. As assumed, if $z_i = 0$, then $g_i = 0$. If $z_i = 1$, then individual i chooses g_i to maximize $U(y_i - g_i - \tau_i, \Sigma(g_i + \tau_i))$. The first order condition for this choice is $U_c = U_G$. Given a solicitation vector Z and a set of taxes $\{\tau_i\}$, each individual's choice of giving can be written as a deterministic function $g_i(y_i, \tau_i, \tau_{-i}, Z)$. It can be shown as in the text for the basic model in section 2 that $\delta g_i/\delta\tau_i = -1$ and $\delta g_i/\delta\tau_j = 0$ for $i \neq j$. These partial derivatives, though, are conditional on a fixed solicitation vector Z. In equilibrium, when the government's choice of taxes changes, the charity's choice of fundraising will change and thus so will Z.

The charity takes as given each individual's response to the tax levels and the solicitation vector and chooses θ to maximize its expected utility. For a given θ, its expected level of donations is

$$\sum_{Z \in \Sigma} \Pr(Z;\theta) \cdot \left(\sum_{i=1}^{N} g_i(y_i, \tau_i, \tau_{-i}, Z)\right).$$

The charity sets θ so that its marginal cost of increasing θ, $F'(\theta)$, is equal to the marginal benefit of increasing θ. The charity's first order condition is thus

$$F'(\theta) = \sum_{Z \in \Sigma} \frac{d \Pr(Z;\theta)}{d\theta} \cdot \left(\sum_{i=1}^{N} g_i(y_i, \tau_i, \tau_{-i}, Z)\right).$$

A charity cannot directly choose who it solicits for donations, it can only choose the probability that any individual is solicited. As it alters this probability, the probability of different draws of the solicitation vector is accordingly changed. To somewhat simplify the charity's first order condition, assume that individuals are homogeneous. Now, instead of dealing with a solicitation vector Z, the outcome of the random draw can be described with the number of individuals solicited z, where z is an integer between 0 and N. The binomial distribution gives $\Pr(z;\theta) = \binom{N}{z}\theta^z(1-\theta)^{N-z}$. Furthermore, use symmetry to reduce each individual's $g_i(y_i, \tau_i, \tau_{-i}, Z)$ to merely $g(\tau,z)$, where this is defined as the amount that each individual who solicits chooses to contribute ($g = 0$ for those who are not solicited).

Then, the charity's first order condition can be written as

$$F'(\theta) = \sum_{z=0}^{N} \frac{d}{d\theta}\binom{N}{z}\theta^z(1-\theta)^{N-z} \cdot z \cdot g(\tau,z) = \sum_{z=0}^{N}\binom{N}{z}\theta^{z-1}(1-\theta)^{N-z-1}(z-\theta N)\cdot z\cdot g(\tau,z)\,.$$

The derivative of the binomial probability expression with respect to θ is positive for values of z in the sum that are greater than θN, the expected value of z, and is negative for values lower. An higher θ makes it more likely that a higher value of z will be drawn and makes it less likely that a lower value of z will be drawn.

The right hand side of the first order condition above can be written in the form of an expectation over the binomial distribution. After simplifying, this becomes

$$F'(\theta) = E_\theta\left[\frac{1}{\theta(1-\theta)}(z-\theta N)\cdot z\cdot g(\tau,z)\right].$$

In general, this expectation cannot be evaluated without knowing the form of $g(\tau, z)$, and in particular how it depends on z. However, temporarily assume that g is independent of z. That is, the amount donated by an individual who is solicited is independent of the number of individuals solicited. For the charity, this means that the benefit of increasing θ lies only in its increasing the probability of soliciting a higher number of donors z, but not in changing the amount that each individual who donates will give g. This assumption is strong and unlikely to be true, but it is used here to make the charity's first order condition more interpretable. Under this assumption, $g(\tau, z)$ can be pulled out of the expectation operator. Thus,

$$F'(\theta) = \frac{1}{\theta(1-\theta)}g(\tau,z)E_\theta[(z-\theta N)\cdot z] = \frac{1}{\theta(1-\theta)}g(\tau,z)[E_\theta(z^2)-\theta N E_\theta(z)] = Ng(\tau,z)\,.$$

The marginal cost of increasing θ, $F'(\theta)$, equals the marginal benefit. This benefit consists only in the increased expected number of people donating, the final expression on the right of the above equation.

The first order condition implicitly gives the charity's choice of θ as a function of the government's tax choice τ. The implicit function theorem can be used to show how θ changes with τ. In general, this expression cannot be signed. Making the same assumption as earlier that the level of an individual's giving $g(\tau, z)$ is independent of z, the derivative can be shown to equal

$$\frac{d\theta}{d\tau} = \frac{\partial g / \partial \tau \, N}{F''(\theta)}.$$

The denominator of this expression is strictly positive. The entire expression, then, is of the same sign as $\delta g/\delta\tau$, the change in an individual's giving in response to a change in the tax level, for a fixed z. Since this partial derivative is negative, as shown in the main text, the entire derivative above is negative. That is, under the given assumption, an increase in the government's tax level leads to a decrease in the charity's fundraising expenditures. This mimics the main finding of the theory in Andreoni and Payne (2003), which is that government grants crowd out fundraising expenditures.

One can consider then how private donations to the charity are affected by government grants taking into account the charity's endogenous response to those grants. Let total private donations $G_p = \Sigma g_i$. Then, $E_\theta[G_p] = E_\theta[z \cdot g(\tau, z)] = \sum_{z=0}^{N} \binom{N}{z} \theta^z (1-\theta)^{N-z} \cdot z \cdot g(\tau, z)$. How this expected value changes with τ depends on how g and θ change with τ. Thus,

$$\frac{dE_\theta[G_p]}{d\tau} = \sum_{z=0}^{N} \binom{N}{z} \{\theta^{z-1}(1-\theta)^{N-z-1}(z-\theta N) \cdot z \cdot g(\tau, z) \cdot \frac{\partial\theta}{\partial\tau} + \theta^z (1-\theta)^{N-z} \cdot z \cdot \frac{\partial g(\tau, z)}{\partial\tau}\}.$$

Taking the expectations over the binomial distribution, this simplifies to

$$\frac{dE_\theta[G_p]}{d\tau} = E_\theta[\frac{(z-\theta N)}{\theta(1-\theta)} z \cdot g(\tau, z) \cdot \frac{\partial\theta}{\partial\tau} + z \cdot \frac{\partial g(\tau, z)}{\partial\tau}].$$

The final term inside the bracket of the expectation operator represents the "classic" crowd out that results from an increase in government funding of the public good; individuals will reduce their giving. The first term arises from the response of the charity. This endogenous response can thus change the magnitude of the crowding out of private donations.

Appendix Table A1

The Determinants of Private Donations, No IV[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Government Grants	-0.0618***	0.00326	-0.0715***	-0.0654***	-0.0177***	-0.0607***
	(0.0159)	(0.0101)	(0.0203)	(0.0201)	(0.00368)	(0.0131)
Fundraising Expenditures	1.494***	0.438**	1.593***	1.552***	0.617***	1.601***
	(0.202)	(0.180)	(0.375)	(0.280)	(0.0634)	(0.188)
Program Service Revenue	-0.0407***	-0.0188***	-0.0533***	-0.0492***	-0.00248**	-0.0392***
	(0.00955)	(0.00634)	(0.0150)	(0.0162)	(0.00104)	(0.00744)
Other Revenues	-0.0234*	-0.0155	-0.0201	-0.0152	0.00107	-0.0124
	(0.0133)	(0.0140)	(0.0213)	(0.0203)	(0.00262)	(0.00940)
Population	0.00518	0.00196	0.00946	0.00562	-7.75e-05	-0.000248
	(0.00387)	(0.00389)	(0.00686)	(0.00563)	(0.000970)	(0.000491)
Income	-0.213	-0.284	-0.919	-0.683	0.139	2.043*
	(0.881)	(0.905)	(1.712)	(1.236)	(0.156)	(1.242)
Unemployment Rate	-1569	-1390	-1787	-2071	-58.28	-1190
	(1452)	(1737)	(2119)	(2078)	(428.9)	(2359)
Percent Population > 65	-1792307***	-1395893**	-3031024***	-2283532***	-447337***	-995929***
	(525416)	(602294)	(1.02e+06)	(759465)	(149303)	(313287)
Number Dem Senators	43.43	-4909	-6060	-160.9	1106	795.0
	(3700)	(5214)	(5896)	(5446)	(991.4)	(3063)
Percent Congress members Dem	27393	22378	52106*	18813	6601	15948
	(18941)	(20563)	(31193)	(27529)	(5092)	(14359)
Indicator for Democratic governor	-674.9	2526	-5808	2325	-1643	-3246
	(3964)	(4310)	(5742)	(5616)	(1073)	(3147)
Constant	492061***	450588***	730831***	617962***	168046***	290625***
	(77929)	(85760)	(147615)	(111803)	(20569)	(58179)
Observations	174828	145690	85770	111474	158390	271436
Number of Organizations	29138	29138	14306	18579	27561	59020

Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity consistent standard errors are in parentheses. Column definitions are the same as in Table 2.
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A2

The Determinants of Government Grants, No IV[a]

	(1)	(2)	(3)	(4)	(5)	(6)
Private Donations	-0.0664***	0.00184	-0.110***	-0.0642***	-0.0343***	-0.0582***
	(0.0182)	(0.0103)	(0.0328)	(0.0208)	(0.00830)	(0.0137)
Program Service Revenue	-0.265***	-0.277***	-0.464***	-0.257***	-0.0425***	-0.247***
	(0.0321)	(0.0418)	(0.0283)	(0.0528)	(0.00742)	(0.0241)
Other Revenues	-0.0180	-0.0245	-0.0127	-0.00309	-0.00170	-0.00226
	(0.0123)	(0.0149)	(0.0248)	(0.0154)	(0.00482)	(0.00907)
Population	0.00484	-0.00132	0.00988	0.00751	9.90e-05	0.00218***
	(0.00374)	(0.00326)	(0.00750)	(0.00459)	(0.00184)	(0.000793)
Income	-1.137	-1.334*	-2.306	-1.020	-0.417*	-4.917**
	(0.839)	(0.754)	(1.783)	(1.162)	(0.218)	(1.936)
Unemployment Rate	-2336	-2582	-4166	-5048*	-1193	-11713***
	(2137)	(2126)	(3675)	(2929)	(869.2)	(2965)
Percent Population > 65	-917095	-435464	-3628034	462123	-454900*	-615543
	(983391)	(875084)	(2.62e+06)	(1.21e+06)	(253520)	(426132)
Number Dem Senators	4387	9658	1490	2808	-1618	4427
	(4855)	(6126)	(8984)	(6783)	(1613)	(3755)
Percent Congress members Dem	42882	64678**	143450***	66103*	12167	17649
	(26765)	(29477)	(49382)	(37025)	(8552)	(19079)
Indicator for Dem governor	13237***	19397***	27128***	19913***	2024	12529***
	(4993)	(5051)	(8993)	(6711)	(1758)	(3892)
Constant	701506***	643952***	1.41e+06***	495545***	273145***	698577***
	(135541)	(129385)	(344128)	(169543)	(35461)	(75814)
Observations	174828	145690	85770	111474	158390	271436
Number of Organizations	29138	29138	14306	18579	27561	59020

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity consistent standard errors are in parentheses. Column definitions are the same as in Table 3.

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A3

First Stage Regressions, Dependent Variable = Government Grants[a]						
	(1)	(2)	(3)	(4)	(5)	(6)
SSI payments, total	0.0234**	0.0210**	0.0356*	0.0243*	-0.00210	0.0234***
	(0.0106)	(0.0105)	(0.0191)	(0.0144)	(0.00377)	(0.00886)
SSI payments, elderly	-0.121***	-0.114**	-0.216***	-0.133**	-0.00972	-0.110***
	(0.0438)	(0.0445)	(0.0805)	(0.0605)	(0.0150)	(0.0365)
Management Expenses	0.450***	0.251***	0.691***	0.470***	0.0670***	0.430***
	(0.0850)	(0.0591)	(0.244)	(0.133)	(0.0179)	(0.0695)
Total Liabilities	0.0144***	0.0128***	0.0508***	0.0151**	0.00241***	0.0129***
	(0.00354)	(0.00326)	(0.0166)	(0.00595)	(0.000732)	(0.00245)
Program Service Revenue	-0.294***	-0.105***	-0.496***	-0.281***	-0.0487***	-0.276***
	(0.0355)	(0.0204)	(0.0290)	(0.0571)	(0.00889)	(0.0266)
Other Revenues	-0.0262**	-0.00553	-0.0376	-0.0209	-0.00408	-0.00745
	(0.0131)	(0.00933)	(0.0252)	(0.0165)	(0.00494)	(0.00978)
Population	0.00507	0.00175	0.00603	0.00738	0.000351	0.00214***
	(0.00391)	(0.00304)	(0.00663)	(0.00456)	(0.00183)	(0.000790)
Income	-1.215	-0.152	-2.290	-1.077	-0.435**	-5.162***
	(0.792)	(0.923)	(1.588)	(1.083)	(0.219)	(1.919)
Unemployment Rate	-2801	1114	-5230	-5748**	-1240	-11589***
	(2078)	(2254)	(3512)	(2841)	(867.6)	(2923)
Percent Population > 65	-646183	525829	-1986579	844927	-449688*	-445784
	(977083)	(1.38e+06)	(2.55e+06)	(1.21e+06)	(254037)	(424516)
Number Dem Senators	4774	15265**	5212	3267	-1608	4297
	(4761)	(7650)	(8758)	(6665)	(1606)	(3691)
Percent Congress members Dem	46399*	-12623	119137**	65057*	13512	19700
	(26218)	(28963)	(47847)	(36443)	(8513)	(18693)
Indicator for Dem governor	13640***	8380	28872***	19271***	2217	12809***
	(4881)	(6113)	(8590)	(6580)	(1757)	(3815)
Constant	585937***	317600*	1.05e+06***	369730**	261776***	619439***
	(133602)	(179197)	(337105)	(167043)	(35512)	(74692)
Observations	174828	145690	85770	111474	158390	271436
Number of Organizations	29138	29138	14306	18579	27561	59020

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity consistent standard errors are in parentheses. Column definitions are the same as in Table 2.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix Table A4

First Stage Regressions, Dependent Variable = Fundraising Expenditures[a]						
	(1)	(2)	(3)	(4)	(5)	(6)
SSI payments, total	0.00127	0.00123*	0.00100	0.00218**	0.000540	0.000940
	(0.000795)	(0.000722)	(0.00112)	(0.00107)	(0.000416)	(0.000664)
SSI payments, elderly	-0.00621*	-0.00607*	-0.00663	-0.0110**	-0.00252	-0.00470
	(0.00362)	(0.00329)	(0.00472)	(0.00461)	(0.00168)	(0.00297)
Management Expenses	0.00587***	0.00445**	0.00865**	0.00569**	0.00128	0.00700***
	(0.00207)	(0.00203)	(0.00384)	(0.00275)	(0.000886)	(0.00201)
Total Liabilities	0.000377***	0.000405***	0.000853**	0.000417**	0.000140**	0.000232***
	(0.000120)	(0.000123)	(0.000407)	(0.000212)	(6.89e-05)	(7.81e-05)
Program Service Revenue	0.00144**	0.00149*	0.000762	0.00129	0.00190***	0.00143**
	(0.000698)	(0.000784)	(0.00100)	(0.000874)	(0.000465)	(0.000588)
Other Revenues	-0.000840	-0.00295**	-0.000101	0.00234		-1.75e-05
	(0.00164)	(0.00139)	(0.00321)	(0.00178)		(0.000907)
Population	0.000279	0.000712**	0.000500	0.000334	8.15e-05	3.08e-05
	(0.000302)	(0.000340)	(0.000416)	(0.000389)	(0.000147)	(0.000127)
Income	-0.0688	-0.141*	-0.167	-0.0381	-0.0181	0.0458
	(0.0827)	(0.0739)	(0.126)	(0.106)	(0.0288)	(0.171)
Unemployment Rate	746.2***	558.4***	997.6***	1020***	360.2***	-54.08
	(199.9)	(198.4)	(290.2)	(261.1)	(86.75)	(324.2)
Percent Population > 65	-275745***	-179623**	-365227***	-334492***	-130579***	-134684***
	(70558)	(70507)	(137262)	(101258)	(35995)	(42336)
Number Dem Senators	365.5	1017	403.2	168.2	-259.3	364.1
	(467.6)	(869.8)	(590.5)	(565.4)	(217.8)	(382.4)
Percent Congress members Dem	251.8	-352.2	-597.2	-327.4	-225.1	-937.5
	(2743)	(2621)	(3421)	(3157)	(1328)	(2103)
Indicator for Dem governor	353.6	-271.2	462.9	467.0	-134.3	308.0
	(596.2)	(410.5)	(949.7)	(839.7)	(238.6)	(460.3)
Constant	47610***	38233***	63404***	55400***	23117***	27074***
	(9319)	(9352)	(17074)	(13395)	(4920)	(9036)
Observations	174828	145690	85770	111474	158390	271436
Number of ein	29138	29138	14306	18579	27561	59020

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity consistent standard errors are in parentheses. Column definitions are the same as in Table 2.
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table A5

First Stage Regressions, Dependent Variable = Private Donations[a]						
	(1)	(2)	(3)	(4)	(5)	(6)
Dues	-0.104*	-0.0963*	-0.101	-0.122	-0.0276***	0.211
	(0.0615)	(0.0564)	(0.0934)	(0.0745)	(0.0101)	(0.176)
Program Service Revenue	-0.0216***	-0.00109	-0.0184**	-0.0300**	-0.000473	0.347**
	(0.00671)	(0.00390)	(0.00898)	(0.0121)	(0.000965)	(0.169)
Other Revenues	-0.0234*	0.00394	-0.0189	-0.0109	0.00359	0.0791
	(0.0138)	(0.0163)	(0.0228)	(0.0210)	(0.00259)	(0.118)
Population	0.00506	0.00102	0.00932	0.00525	-0.000103	0.00611
	(0.00391)	(0.00392)	(0.00678)	(0.00567)	(0.000984)	(0.00479)
Income	-0.336	0.175	-1.147	-0.797	0.103	-3.943
	(0.900)	(0.855)	(1.733)	(1.264)	(0.157)	(5.477)
Unemployment Rate	169.4	3986**	630.9	391.6	310.2	-8315
	(1501)	(1699)	(2182)	(2123)	(438.7)	(6716)
Percent Population > 65	-2002259***	-2540077***	-3154811***	-2683993***	-477979***	1.98e+06
	(534664)	(663197)	(1.06e+06)	(766403)	(150673)	(4.66e+06)
Number Dem Senators	-415.4	-9551	-6184	-703.4	807.3	2269
	(3772)	(6037)	(6060)	(5557)	(1010)	(10903)
Percent Congress members Dem	18011	52334**	33689	5246	4128	-19560
	(19632)	(21413)	(31949)	(28036)	(5141)	(51476)
Indicator for Dem governor	-4704	1491	-10825*	-2480	-2739**	-10614
	(4104)	(4566)	(5705)	(5830)	(1101)	(10470)
Constant	508749***	494835***	715667***	659231***	172993***	-185785
	(78631)	(94731)	(151091)	(113007)	(20719)	(543422)
Observations	174828	145690	85770	111474	158390	391591
Number of Organizations	29138	29138	14306	18579	27561	89813

[a] Data are from 1998-2003 and only include those organizations that are in the panel for all six years (except column 6), whose reported categorical revenues sum up to reported total revenues, likewise for expenses, and who never report a negative amount in a revenue category. Year indicator variables are included in each regression. Heteroskedasticity consistent standard errors are in parentheses. Column definitions are the same as in Table 3.
*** p<0.01, ** p<0.05, * p<0.1