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Voluntary Provision of Public Goods and Administrative Costs

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This article considers voluntary provision of public goods in the presence of administrative costs. Government collects taxes and provides grants to a charity. Using government grants and private donations, the charity provides a public good. Administrative costs are paid twice for the government and for the charity in the case of taxes, and less of a one dollar tax goes toward the public good than from a one dollar donation. Donations are thus more efficient in terms of administrative costs than taxes. Donors then wish to donate more than in the standard model without administrative costs, and donors decrease their donations less than one dollar in response to a one-dollar increase in taxes. This partial crowding out caused by administrative costs helps explain the coexistence of the public provision and private provision of public goods in a number of contexts.

Keywords: *donations; administrative costs; crowding out*

1. Introduction

The literature on the voluntary provision of public goods has demonstrated that an increase in taxes by one dollar reduces voluntary donations by one dollar. This result is dubbed "complete crowding out" (Barro 1974; Warr 1982; Roberts 1984; Bergstrom, Blume, and Varian 1986; Bernheim 1986). The reason for this result is that donors view their donations and taxes as perfect substitutes, as both of them fund the public good. This intriguing standard theoretical prediction, however, seems at odds with empirical findings. A number of studies show that the extent of crowding out is less than one for one (Clotfelter 1985; Schiff 1985; Kingma 1989). To reconcile these inconsistencies, the literature has developed a number of new models. These new models focus on the preferences of donors. For example, Cornes and Sandler (1984, 1994) and Andreoni (1990) argued that a donor derives utility not

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only from the level of a public good but also from her donation, known as a warm glow or impure altruism. In this type of model, taxes do not completely crowd out private donations, as donors have the additional incentive to donate. Glazer and Konrad (1996) considered the role of prestige and reputation in making donations such as the desire to signal donors' income through donations. In such a model, crowding out is again less than complete due to additional incentive to donate.

The present article considers administrative costs of the government and private charities in the standard model of voluntary provision of public goods. Both the government and charities spend resources on administration such as the salaries of employees and the cost of office space, and taxpayer-donors care about how much of their taxes and donations, net of administrative costs, actually goes toward the cause. Taxpayer-donors thus distinguish the amount of taxes and donations that they pay from the amount that is devoted to the cause. The importance of this distinction is that the public good level, an argument of a donor's utility function, does not equal the sum of the donations individuals pay to the charity and the taxes they pay to the government, as assumed in the literature. Rather, the public good level is the sum minus administrative costs of the government and the charity. As a result, donors consider the presence of administrative costs in making their donation decisions, as postulated in this article.[1]

In the model, government collects taxes and provides grants, net of administrative costs of the government, to a charity. The charity also receives voluntary donations. Using the revenues from government grants and donations net of administrative costs of the charity, the charity provides a public good. Due to administrative costs of the government and the charity, not all tax revenues and donations can be used for the public good that individuals care about. Since taxes have to go through the government while donations do not, less of a one-dollar tax goes toward the public good than a one-dollar donation does. That is, administrative costs are paid twice for the government and for the charity in the case of taxes, while they are paid only once for the charity in the case of donations. Donations are thus more efficient in terms of administrative costs than taxes. As a result, donors wish to donate more than in the standard model without administrative costs, so that when taxes increase by one dollar, donors reduce their donations less than one dollar, leading to partial crowding out.

This partial crowding out, caused by administrative costs, helps explain the coexistence of the public and private provision of public goods. First, the standard model of voluntary provision of public goods shows that if the government imposes the taxes equal to the donations individuals would make in the absence of taxes, individuals do not donate (Bergstrom, Blume, and

Varian 1986). This is because the government taxes simply replace the private donations and because individuals are indifferent between taxes and donations or equivalently because taxes and donations are perfect substitutes. This standard result means that private donations do not occur unless taxes are small. However, with administrative costs, individuals still donate even if the government imposes the taxes equal to the donations without taxes, because donations are more efficient than taxes. An implication is that private voluntary provision and public involuntary provision can coexist even if taxes are not small, as observed in practice. Second, it is known that in political equilibrium of public transfers financed by taxes that altruistic rich taxpayers pay, altruistic rich taxpayers do not donate (Roberts 1984). This occurs because public transfers and private donations are perfect substitutes to altruistic rich taxpayers in the standard model and public transfers completely crowd out private donations. However, this standard prediction seems counterfactual. With administrative costs, altruistic rich taxpayers still donate in political equilibrium of public transfers because of the efficiency of donations.

The plan of the article is as follows. The next section presents a simple model of administrative costs. Section 3 analyzes the extent of crowding out with administrative costs. Section 4 considers two examples in which the public provision and private provision of public goods coexist. Section 5 extends the basic analysis. The main argument that administrative costs may cause partial crowding out continues to hold even when the production of public services is considered. If donors are impure altruists and are motivated to give by warm glow, it reinforces the effect of administrative costs and further reduces the magnitude of crowding out. The last section concludes.

2. The Model

The economy consists of n individuals, indexed by subscripts $i = 1, 2, \ldots, n$. The utility of individual i depends on her private good consumption x_i and public good consumption z, and is written as $U_i(x_i, z)$. It is assumed that both goods x and z are normal. Individuals are not motivated to donate by warm glow, and are thus modeled as pure altruists, to demonstrate in the most transparent manner the role of administrative costs in determining the extent of crowding out. Section 5 considers impure altruists. Given her income m_i, individual i or donor i voluntarily contributes e_i to the charity under consideration in addition to paying lump sum taxes t_i to the government. The private good consumption of donor i is then

$$x_i = m_i - e_i - t_i. \tag{1}$$

As for the public good, the charity receives grants from the government and donations from individuals. Government grants are in turn funded by taxes individuals pay. Using its revenues from government grants and voluntary donations, the charity provides the public good z in the utility function that individuals care about.

The literature on voluntary provision of public goods typically assumes that all taxes and donations are used for the public good. That is, $z = T + E$ with $T = \Sigma_{i=1}^{n} t_i$ and $E = \Sigma_{i=1}^{n} e_i$ denoting total tax revenues and total donations, respectively. This article, however, assumes the presence of administrative costs, and the public good z is $T + E$ minus administrative costs. Let $G \in (0, 1)$ denote the fraction of tax revenues spent on administrative costs of the government, and let $C \in (0, 1)$ denote the fraction of the revenues of the charity spent on administrative costs. While G and C are constants, more general administrative cost functions will be discussed later. As a result of administrative costs, when individuals pay taxes T to the government, it can provide grants $(1 - G)T$ for the charity. The charity thus receives $(1 - G)T + E$ from the government and from donors. Since the charity spends the fraction C of its revenues on its administration, the amount that the charity devotes to the public good is

$$z = (1 - C)[(1 - G)T + E] = c(gT + E), \ \ 0 < c \equiv 1 - C < 1; 0 < g \equiv 1 - G < 1. \tag{2}$$

The public good z reduces to the one in the standard model in the absence of administrative costs, because $C = G = 0$ or $c = g = 1$ in the standard model, and because $z = T + E$.[2]

Of C and G, the latter plays an important role in the subsequent analyses. G represents various types of administrative costs of transforming tax revenues into grants to the charity. For example, a governmental unit administers the allocation of grants and supervises the use of grants. More broadly, it may also include certain strings the government attaches to the grants, which reduce the ability of the charity to provide the public good z. The nature of administrative costs G is complicated and warrants a more careful study. However, it is not the focus of this article. The reason is that the analyses and results below do not depend on the nature but on the fact that not all tax revenues are transformed into the grants and hence to the public good.

A few observations can be made about the model. First, equation (2) assumes that the level of the public good is the same as expenditures on the public good. As demonstrated below, the analyses and results below do not depend on this assumption, and extend to the case of standard concave production technologies for the public good z. Second, administrative costs above do not include the costs of collecting taxes for the government or donations for the charity. For example, the government must also pay additional administrative costs for its tax collection agency, the Internal Revenue Service, and the charity must pay additionally for its fund-raising. Thus, g should be interpreted as the net greater administrative cost of taxes.

3. Administrative Costs and Crowding Out

3.1. Partial Crowding Out

We begin with the donation decision. Donor i chooses e_i to maximize $U_i(x_i, z)$ subject to (1) and (2). As z includes $E = \Sigma_{i=1}^{n} e_i$, her decision to donate depends on the donations made by $n - 1$ other donors. Donations are thus jointly determined in equilibrium. As in the literature on the voluntary provision of public goods (Warr 1982; Bergstrom, Blume, and Varian 1986), the present article considers a Nash equilibrium in donations. Donor i then takes $E = \Sigma_{j \neq i} e_j$ donations made by $n - 1$ other donors, as given when choosing her donation e_i. The first-order condition for an interior maximum of $U_i(x_i, z)$ is

$$cU_{iz}(x_i, z) - U_{ix}(x_i, z) \equiv \phi_i(x_i, z) = 0, \; i = 1, 2, \ldots, n, \tag{3}$$

where $U_{iz} \equiv \partial U_i(x_i, z)/\partial z$ and $U_{ix} \equiv \partial U_i(x_i, z)/\partial x_i$.

Since the first-order condition in (3) holds for n donors, there are n first-order conditions. These conditions determine a Nash equilibrium in donations as functions of the taxes denoted by $e_i = e_i(t_1, t_2, \ldots, t_n)$, $i = 1, 2, \ldots, n$. It is possible that corner solutions may occur and e_i may be zero for some i. But we assume interior solutions. The reason is that if some contribute and others do not, crowding out may not be complete even in the standard model without administrative costs, as Bergstrom, Blume, and Varian (1986) showed. Thus, we consider a model where everyone donates and the first-order condition (3) is satisfied for every donor. This assumption does not affect the main argument of the article but enables us to discuss in the simplest manner the possibility that taxes do not completely crowd out private donations due to administrative costs. The second-order conditions are written as

$$\frac{d^2}{de_i^2} U_i(x_i, z) = c\phi_{iz}(x_i, z) - \phi_{ix}(x_i, z), \tag{4}$$

where $\phi_{ix} \equiv \partial\phi_i(x_i, z)/\partial x_i$ and $\phi_{iz} \equiv \partial\phi_i(x_i, z)/\partial z$. If goods x and z are normal, as assumed, then $\phi_{iz}(x_i, z) < 0$ and $\phi_{ix}(x_i, z) > 0$. Thus, $d^2 U_i / de_i^2 < 0$, and the second-order conditions are satisfied.

One of the most important propositions in the literature on the voluntary provision of public goods states that an increase in taxes completely crowds out private donations. To demonstrate the possibility that administrative costs cause partial crowding out, assume without loss of generality that only individual j's taxes increase by $dt_j > 0$, while other individuals' taxes remain the same so that $dt_i = 0$ for $i \neq j$.[3] Total differentiation of the first-order condition (3) for individual $i \neq j$ gives

$$-\phi_{ix} de_i + c\phi_{iz} dE + cg\phi_{iz} dT = 0,\ i = 1, 2, \ldots, j-1, j+1, \ldots, n. \tag{5}$$

In (5), the arguments of $\phi_i(x_i, z)$ are suppressed for simplicity. Dividing (5) by ϕ_{ix}, it can be rewritten as

$$-de_i + \frac{c\phi_{iz}}{\phi_{ix}} dE + \frac{cg\phi_{iz}}{\phi_{ix}} dT = 0, \qquad i = 1, 2, \ldots, j-1, j+1, \ldots, n. \tag{6}$$

In a manner analogous to (6), total differentiation of the first-order condition for individual j yields

$$-de_j - dt_j + \frac{c\phi_{jz}}{\phi_{jx}} dE + \frac{cg\phi_{jz}}{\phi_{jx}} dT = 0. \tag{7}$$

The extra term, $-dt_j$, appears in (7), as $dt_j > 0$ while $dt_i = 0$ for $i \neq j$ by construction. Adding the $(n-1)$ equations in (6) to (7), we have

$$-\sum_{i=1}^{n} de_i - dt_j + \sum_{i=1}^{n} \frac{c\phi_{iz}}{\phi_{ix}} dE + \sum_{i=1}^{n} \frac{cg\phi_{iz}}{\phi_{ix}} dT = 0. \tag{8}$$

By the definition of $E = \Sigma_{i=1}^{n} e_i$, $dE = \Sigma_{i=1}^{n} de_i$. Analogously, $dT = \Sigma_{i=1}^{n} dt_i = dt_j$. Substitution of these into (8) yields

$$\left(\sum_{i=1}^{n} \frac{c\phi_{iz}}{\phi_{ix}} - 1\right) dE + \left(\sum_{i=1}^{n} \frac{cg\phi_{iz}}{\phi_{ix}} - 1\right) dt_j = 0 \Rightarrow \frac{dE}{dt_j} = -\frac{\sum_{i=1}^{n} \frac{cg\phi_{iz}}{\phi_{ix}} - 1}{\sum_{i=1}^{n} \frac{c\phi_{iz}}{\phi_{ix}} - 1}. \tag{9}$$

Given that $\phi_{ix} > 0$ and $\phi_{iz} < 0$ by the normality assumption, both the denominator and the numerator of (9) are negative. Thus, considering a minus sign before the fraction, $dE/dt_j < 0$ and an increase in taxes crowds out private donations. In addition, $dE/dt_j > -1$, because the coefficient ϕ_{iz} is cg in the numerator of (9) while it is c in the denominator, and because $c > cg$ or $c(1 - g) > 0$ from (2). This result may be stated as follows:

Proposition 1. *With administrative costs,* $\mathrm{dE/dt_j} > -1$ *(an increase in taxes crowds out private donations less than one for one).*

The result in the proposition stands in contrast with the standard conclusion that taxes completely crowd out voluntary donations one for one (Warr 1982; Roberts 1984; Bergstrom, Blume, and Varian 1986; Bernheim 1986). To see the difference from the standard model, note that in the standard model, $c = g = 1$, and both the numerator and the denominator of (9) reduce to $(\Sigma\phi_{iz}/\phi_{ix} - 1)$, and $dE/dt_j = -1$. Intuitively, in the standard model, $x_j = m_j - (e_j + t_j)$ and $z = (e_j + t_j) + \Sigma_{i \neq j}(e_i + t_i)$. What matters to individual j is then the sum $e_j + t_j$, and she views e_j and t_j as perfect substitutes. Thus, if her taxes increase by one dollar, she decreases her donations by one dollar, because then $e_j + t_j$ remains the same, and $de_j/dt_j = -1$. Individual j can then restore the original equilibrium allocation (x_j, z). Other individuals $i \neq j$ do not have an incentive to change their donations, because the public good z remains the same. Therefore, $dE/dt_j = de_j/dt_j = -1$, and taxes completely crowd out donations if taxes are earmarked to support the public good on a dollar-for-dollar basis. That the public good z can be expressed as a function of the sum $e_i + t_i$ gets at the heart of complete crowding out. In the presence of administrative costs, $z = c(gT + E)$ cannot be a function of $e_i + t_i$. As a result, donors do not view private donations and taxes as perfect substitutes, and complete crowding out does not occur.

3.2. Discussion

The intuition of the result in the proposition may be gained as follows. If taxes on individual j increase, it decreases the incentive to donate. This is because ϕ_j in (3) can be thought of as the marginal net benefit of donations in terms of utility, and because an increase in t_j decreases ϕ_j so that $d\phi_j/dt_j = cg\phi_{jz} - \phi_{jx} < 0$ under the normality assumption. The question concerns if individual j and other individuals reduce their donations more than or less than dt_j when individual j's taxes go up by dt_j. Starting from the original equilibrium allocation (x_j, z), suppose that individual j decreases her donations exactly by dt_j and other individuals $i \neq j$ do not change their donations in response to the increase in individual j's taxes by dt_j so that $de_j = -dt_j$ and $de_i = 0$. This tax-donation change leaves private good consumption of all individuals, x_j and x_i, unaffected, and $\hat{x}_j = x_j$ and $\hat{x}_i = x_i$ with "hat" denoting the values of the variables after the tax-donation change with $de_j = -dt_j$ and $de_i = 0$. However, this tax-donation change decreases the public good level, because $\hat{z} = c[g(T + dt_j) + E - dt_j] = c(gT + E) + c(g - 1)dt_j < c(gT + E) = z$. Individual j's marginal net utility benefit of donations becomes then $\phi_j(x_j, \hat{z})$ at the new allocation after the tax-donation change. Since the public good is normal, this decrease in the public good level increases the marginal net utility benefit of donation, and $\phi_j(x_j, \hat{z}) > \phi_j(x_j, z)$. Given that $\phi_j(x_j, z) = 0$ at the original equilibrium allocation (x_j, z) in (3), the last inequality means $\phi_j(x_j, \hat{z}) > 0$. Individual j thus wishes to increase her donations starting from this new allocation until ϕ_j equals zero, implying $de_j > -dt_j$ or $de_j/dt_j > -1$.

Individual i's marginal net utility benefit of donations also increases from $\phi_i(x_i, z)$ to $\phi_i(x_i, \hat{z})$ for all $i \neq j$. Given that $\phi_i(x_i, z) = 0$ in (3), $\phi_i(x_i, \hat{z}) > 0$ and individual i wishes to increase her donation until $\phi_i(x_i, \hat{z}) = 0$. This implies that $de_i/dt_j > 0$ for $i \neq j$. Taken together, when j's taxes go up by dt_j, total donations of all individuals, E, will change by $dE/dt_j = de_j/dt_j + \Sigma_{i \neq j}(de_i/dt_j) > de_j/dt_j > -1$. As a consequence, an increase in taxes crowds out private donations less than one for one.

The simple reason for partial crowding out is that a one dollar increase in taxes accompanied by a one dollar decrease in donations reduces the public good level z. Why does the public good level decrease? Only cg of one-dollar tax goes toward the public good z that donors care about, because the government spends G on its administration and provides grants $(1 - G) = g$ to the charity, and because the charity spends Cg on its administration and spends the remaining $(1 - C)g = cg$ for the public good. However, c of one-dollar donation goes toward the public good, because donation does not go through the government. The net effect of an increase in taxes by one dollar and a decrease in donation by one dollar is then the decrease in the public good by $c - cg = c(1 - g)$. Private donations are thus more efficient (in terms of administrative costs) than taxes. The efficiency of private donations occurs, because taxes can be transformed into a public good by paying administrative costs twice for the government and for the charity while private donations require administrative costs once for the charity.[4] Why do people then pay taxes or choose an inefficient means of raising resources for the public good? As is well known, an answer is that government taxes alleviate another inefficiency created by the free-rider problem.

To see the free-rider problem and the justification for taxes in the simplest manner, assume that individuals are identical and individual subscripts are omitted. Without taxes, $z = cE$, and $U(x, z) = U(m - e, cE)$. Each individual chooses her utility-maximizing donation, e^*, so that $\phi \equiv cU_z - U_x = 0$. For our purpose, it suffices to consider the effect of a small increase in tax t on the utility of each individual starting from no taxes. The effect is $[dU(m - t - e^*, c(gnt + E^*))/dt]\big|_{t=0} = cgnU_z - U_x = cnU_z(g - 1/n)$, where the second equality uses $\phi = 0$ or $U_x = cU_z$. If $n = 1$ and there is only one individual, $(g - 1/n) = (g - 1) < 0$. No tax is optimal in this case, because taxes are less efficient in terms of administrative costs while no free-riding problem exists. As n grows, $1/n$ becomes smaller, reflecting the fact that private donations become less efficient due to the incentive to free ride while taxes do not suffer from the free-rider problem and become relatively more efficient. Thus, despite the disadvantage of taxes due to administrative costs, there will be some n that is not too small, for which $g - 1/n > 0$ and $(dU/dt)\big|_{t=0} > 0$. Some taxes are thus desirable for such n, because the benefit of alleviating the inefficiency caused by the incentive to free ride outweighs the inefficiency of paying administrative costs twice.

4. Coexistence of the Public Provision and Private Provision

This section considers two implications of the analyses above for the coexistence of the public provision and private provision of public goods.

4.1. Partial Replacement of Donations by Taxes

In the standard model, if the government imposes taxes equal to the donations that individuals would make in the absence of taxes, the taxes simply replace donations and individuals do not donate. This is because only the sum of taxes and donations matters to individuals. An implication is that only the public provision of a public good exists unless taxes are small. This standard argument does not hold with administrative costs, as taxes and donations affect the public good level differently.

Assume originally that all individuals donate and $e_i > 0$ for all i, and that all individuals pay taxes except individual j ($t_i > 0$ for $i \neq j$, and $t_j = 0$). At e_i, the first-order condition (3) is satisfied and $\phi_i(x_i, z) = 0$ for all i. Suppose that the government now imposes taxes on individual j equal to her donations without taxes so that $\hat{t}_j = e_j$, where "hat" again denotes the new allocation after the government imposes the taxes on individual j. The question concerns if the taxes completely replace donations so that individual j does not donate after the taxes. The answer to the question is yes in the standard model, as noted above. However, with administrative costs, taxes do not completely replace donations.

To see the argument, suppose that individuals $i \neq j$ continue to donate the same amount and $\hat{e}_i = e_i$ while individual j does not donate and $\hat{e}_j = 0$ after the government imposes taxes $\hat{t}_j = e_j$ on individual j. That is, suppose that individuals $i \neq j$ do not change their donations, but individual j decreases her donation from e_j to zero when her taxes go up from zero to e_j so that $(dt_j, de_i, de_j) = (e_j, 0, -e_j)$. This tax-donation change has no effect on private good consumption of all individuals, x_i and x_j. But it decreases the public good level, because $\hat{z} = c[g(T + dt_j) + E + de_j] = c[g(T + e_j) + E - e_j] = c(gT + E) + c(g - 1)e_j < z$. This tax-donation change thus increases the marginal net utility benefit of donations for all individuals i and j from $\phi_i(x_i, z) = 0$ to $\phi_i(x_i, \hat{z}) > 0$. All individuals thus wish to donate more than the assumed donation change above, implying that $\hat{e}_j > 0$ and $\hat{e}_i > e_i$ in a new equilibrium after the tax-donation change. As a result, government taxes equal to the donations without taxes do not completely replace donations, and individual j still donates. In addition, other individuals $i \neq j$ also increase donations. This result may be stated as follows:

Proposition 2. *Suppose that the government imposes taxes on individual* j *equal to her donations without taxes. With administrative costs, (1) individual* j *still donates, and (2) other donors* i ≠ j *increase their donations.*

An implication of the result in the proposition is that voluntary private donations can coexist with involuntary taxes even if taxes are not small. This result stands in contrast with the standard prediction that voluntary donations and involuntary taxes can coexist only when taxes are small enough not to completely crowd out private donations. However, the analysis in the article appears consistent with casual empiricism, as one observes the coexistence of voluntary provision and public provision of public goods in economies with sizable taxes.

4.2. Public Transfers and Private Charities

This section considers the coexistence of government transfers and private donations in political equilibrium of income redistribution. Roberts (1984) argued that public transfers reduce private charity to zero in political equilibrium. This argument directly follows from the fact that in the pure public good model, a one-dollar increase in public transfers crowds out one dollar in private donations. This argument, however, seems counterfactual, given the coexistence of public transfers and private charities that redistribute incomes. The analysis shows that administrative costs may provide an explanation for the coexistence observed in practice.

There are n rich altruists or altruistic rich taxpayers, and one poor nonaltruistic recipient. Altruists care about their incomes as well as the poor person's income, but the poor person cares only about her own income. Altruist i's utility is then $U_i(m_i - e_i - t_i, c(gT + E))$, and the poor person's utility is $V(c(gT + E))$ with $T = \Sigma_{i=1}^{n} t_i$ and $E = \Sigma_{i=1}^{n} e_i$. The public good z is then income redistribution toward the poor person. The level of public transfers $(t_1, t_2, \ldots, t_n)$, is determined by a political process, summarized by a function $P = \Sigma_{i=1}^{n} \gamma_i U_i + \gamma V$, where the magnitude of γs represents political power of each individual. That is, the equilibrium level of public transfers, denoted $(t_1^*, t_2^*, \ldots, t_n^*)$, maximizes P, and satisfies the first-order condition

$$\frac{dP}{dt_i} = cg\left(\sum_{i=1}^{n}\gamma_i U_{iz} + \gamma V'\right) - \gamma_i U_{ix} = 0, \qquad i = 1, 2, \ldots, n. \tag{10}$$

To see the incentive of altruists to donate in political equilibrium, we consider the effects of a small increase in donations starting from no donations. The effect is

$$\begin{aligned} \frac{d}{de_i} U_i(m_i - e_i - t_i^*, \ c(gT^* + E))\big|_{e_1 = e_2 = \ldots = e_n = 0} &= cU_{iz} - U_{ix} \\ = cU_{iz} - \frac{1}{\gamma_i} cg\left(\sum_{i=1}^{n}\gamma_i U_{iz} + \gamma V'\right) &= c(1-g)U_{iz} - \frac{1}{\gamma_i} cg\left(\sum_{j \neq i}^{n}\gamma_j U_{jz} + \gamma V'\right), \end{aligned} \tag{11}$$

where the second equality uses (10).

The sign of dU_i/de_i depends in part on the magnitude of g, and let $\Omega(g)$ denote the last expression of dU_i/de_i in (11). If no administrative costs exist and $g = 1$, as in the standard model, $\Omega(1) = -c(\Sigma_{j \neq i}\gamma_j U_{jz} + \gamma V')/\gamma_i < 0$ and hence $e_i = 0$ in equilibrium. Thus, altruists do not donate, and public transfers reduce private charity to zero in political equilibrium of income redistribution, as in Roberts (1984). However, if administrative costs are so large that G approaches unity or $g = 1 - G$ approaches zero, then $\lim_{g \to 0} \Omega(g) = cU_{iz} > 0$.[5] With such large administrative costs, taxes have little effects on the level of the public good, and public transfers approach zero. In this case, individuals desire to donate. These imply the following result:

Proposition 3. *With administrative costs, there is a range of* g *for which the altruistic rich donate to assist the poor at the political equilibrium level of public transfers.*

The intuition is that a one-dollar private donation increases the public good, income redistribution toward the poor person, more than a one-dollar tax does due to administrative costs involved in transforming taxes to grants to the charity. Public transfers thus do not eliminate the incentive of altruistic rich taxpayers to donate in political equilibrium for a range of administrative costs.

5. Extensions

5.1. Production of Public Goods

Suppose that the public good z is the quality of shelter for the poor recipients or homeless provided by a charity. The quality does not equal the amount of dollars that the charity receives from the government and from individuals. Assume that an increase in funding improves the quality of services at a nonincreasing rate. The public good z may then be written as

$$z = f(c(gT + E)), f'(.) > 0, f''(.) \leq 0. \tag{12}$$

The function $f(.)$ shows a technological relationship between the expenditure on a public good and the level of the public good. While the form of z differs between (2) and (12), the idea of the article does not depend on this difference. In other words, the argument of the article is not about the production of public goods. Whether taxes completely crowd out private donations does not depend on the typical assumption that a one dollar donation or government grant can be transformed into one unit of a public good. Rather, it depends on the presence or absence of administrative costs. Without administrative costs, the public good is written as $z = T + E$ or $z = f(T + E)$, and taxes reduce private donations one for one and complete crowding out occurs in either case. This is because $z = f(T + E) = f(t_j + e_j + \Sigma_{i \neq j}(t_i + e_i))$, and t_j and e_j are perfect substitutes. By contrast, in the presence of administrative costs, $z = c(gT + E)$ or $z = f(c(gT + E))$, and crowding out is not complete in either case, as demonstrated below. Thus, what causes partial crowding out is the presence of administrative costs, not the technological relationship between the dollar amount and the level of the public good.

The discussion above distinguishes administrative costs from the technological production of a public good. However, one might argue that administrative costs can be more broadly interpreted as a production technology in the sense that it relates a dollar amount spent on a public good to the level of the public good. This interpretation does not undermine the importance of administrative costs. The essence of administrative costs is the fact that two different organizations, the government and the charity, provide revenues for the public good with each organization spending revenues on its own administration. By contrast, the production of a public good is about how the charity produces public services after it receives funding from the government and individuals. Accordingly, with administrative costs, the public good z cannot be written as a function of the simple sum, $T + E$. Thus, the model of administrative costs is more than a technological relationship, and has a distinctive feature.

With z in (12), the first-order condition in (3) is modified as

$$f'(c(gT + E))cU_{iz}(x_i, z) - U_{ix}(x_i, z) \equiv \omega_i(x_i, z) = 0,\ i = 1, 2, \ldots, n. \tag{13}$$

Assume as before that $dt_j > 0$ and $dt_i = 0$ for $i \neq j$. Totally differentiating the conditions in (13) and applying the same steps in (5) through (9), it is straightforward to verify that

$$\frac{dE}{dt_j} = -\frac{\sum_{i=1}^{n} \frac{cg(f'\omega_{iz} + f''cU_{iz})}{\omega_{ix}} - 1}{\sum_{i=1}^{n} \frac{c(f'\omega_{iz} + f''cU_{iz})}{\omega_{ix}} - 1}. \tag{14}$$

Given that $f' > 0$ and $f'' \leq 0$, both the numerator and the denominator are negative, and $dE/dt_j < 0$. Since $cg < c$, $dE/dt_j > -1$. Thus, the production of the public good has no effect on the result that administrative costs cause partial crowding out.

5.2. Administrative Cost Functions

This section assumes administrative costs of the government and of the charity are, respectively,

$$G = G(T) : C = C(T - G(T) + E). \tag{15}$$

The public good then reads as

$$\begin{aligned} z = T - G(T) + E - C(T - G(T) + E) = g(T) + E - C(g(T) + E) = c(g(T) + E), \\ g(T) \equiv T - G(T) : c(g(T) + E) \equiv g(T) + E - C(g(T) + E). \end{aligned} \tag{16}$$

In words, the charity receives government grants $g(T)$ and donations E, and spends $C(g(T)+E)$ for its administration. The charity thus devotes $c(g(T) + E)$ to the public good. It is assumed that $g'(T) > 0$ and $c'(g(T) + E) > 0$ so that government grants increase with taxes and the public good level increases with the funding the charity receives.

The first-order condition for an interior maximum is

$$c'(g(T) + E)U_{iz}(x_i, z) - U_{ix}(x_i, z) \equiv \delta_i(x_i, z) = 0,\ i = 1, 2, \ldots n. \tag{17}$$

The second-order conditions are

$$\frac{d^2U_i}{de_i^2} = c'\delta_{iz} - \delta_{ix} + c''U_{iz}. \tag{18}$$

The normality assumption of x and z, $\delta_{ix} > 0$ and $\delta_{iz} < 0$, does not suffice to sign the second-order condition. The simplest sufficient condition for the satisfaction of the second-order condition is $c'' \leq 0$.

Assume as before that $dt_j > 0$ and $dt_i = 0$ for $i \neq j$. In a manner analogous to (5) through (9), total differentiation of (18) gives

$$\frac{DE}{dt_j} = -\frac{\sum_{i=1}^{n} \frac{g'(c'\delta_{iz} + c''U_{iz})}{\delta_{ix}} - 1}{\sum_{i=1}^{n} \frac{(c'\delta_{iz} + c''U_{iz})}{\delta_{ix}} - 1}. \tag{19}$$

The sign and magnitude of dE/dt_j depends on g' and c''. A sufficient condition for $dE/dt_j > -1$ is $g' < 1$ and $c'' \leq 0$. The first condition is reasonable, because as taxes increase by one dollar, government grants to the charity increase less than one dollar due to administrative costs of the government. The second condition means that the marginal administrative costs of the charity, C', increase with the funding it receives from the government and individuals, or equivalently that the marginal efficiency of the charity, c', decreases with the funding it receives. Whether administrative cost functions of the charity satisfy this condition is an empirical issue. Unfortunately, the data or empirical studies on the shape of administrative cost functions do not seem to exist.

5.3. Impure Altruism

This section considers administrative costs in a model with impure altruism. The utility of individual i is now written as $U_i(x_i, z, e_i)$. Individual i chooses e_i to maximize $U_i(x_i, z, e_i)$ subject to (1) and (2), taking $\Sigma_{j \neq i} e_j$ as given. The first-order condition for an interior maximum of her utility is

$$cU_{iz}(x_i, z, e_i) - U_{ix}(x_i, z, e_i) + U_{ie}(x_i, z, e_i) \equiv \theta_i(x_i, z, e_i) = 0,\ i = 1, 2, \ldots, n. \tag{20}$$

All three goods are assumed to be normal so that $\theta_{ix} > 0$, $\theta_{iz} < 0$, and $\theta_{ie} < 0$. The difference from the condition in (3) is that the additional term, $U_{ie}(.)$, appears in (20), because individual i derives utility additionally from giving.

The n conditions again determine a Nash equilibrium in donations made by n individuals, given lump sum taxes $(t_1, t_2, \ldots, t_n)$.

Assume again $dt_j > 0$ and $dt_i = 0$ for $i \neq j$. Total differentiation of the n first-order conditions in (20) gives

$$\frac{dE}{dt_j} = -\frac{\sum_{i=1}^{n} \frac{cg\theta_{iz}}{\theta_{ix} - \theta_{ie}} - 1 - \frac{\theta_{je}}{\theta_{jx} - \theta_{je}}}{\sum_{i=1}^{n} \frac{c\theta_{iz}}{\theta_{ix} - \theta_{ie}} - 1}. \tag{21}$$

Given the normality assumption, both the denominator and the numerator of (21) are negative.[6] Hence, $dE/dt_j < 0$, and an increase in taxes crowds out private donations. The main difference from (9) is the last term of the numerator, $-\theta_{je}/(\theta_{jx} - \theta_{je})$. This term is positive by the normality assumption, reflecting the additional incentive of individual j to donate due to warm glow. Consequently, impure altruism tends to make dE/dt_j larger and hence tends to weaken the crowding out effect, as in the literature (Andreoni 1990), reinforcing the effect of administrative costs.

6. Conclusion

The present article has analyzed the effects of taxes on private donations when administrative costs of the government and charities are taken into account. The analysis shows that taxes crowd out private donations only partially. This result contrasts with the standard theoretical result that government spending completely crowds out private donations, but is consistent with empirical findings.

There have been theoretical attempts to explain partial crowding out found in empirical studies. The most widely used argument is that a donor cares about the level of the public good and about giving as well. The rationale for this argument is that donors are motivated to give by warm glow in addition to altruism. This explanation based on the preferences of donors is certainly sensible and important. The explanation based on administrative costs presented in this article seems also sensible and realistic, as both the government and charities spend a considerable amount of resources on administration. The extent of crowding out will depend on both preferences and administrative costs, and possibly on other factors yet to be found. This article simply identifies administrative costs as one factor that may cause partial crowding out.

Administrative costs help explain not only partial crowding out but also a more fundamental question of why private provision and public provision of public services coexist. It may be argued that donations enable individuals to pay according to their preferences when taxes do not precisely reflect the willingness to pay for the public good perhaps because of the inability of the government or its policy to tax individuals' willingness to pay. This article may provide an additional argument. As private donations are more efficient in terms of administrative costs than taxes, donors wish to exploit this more efficient mechanism of delivering public services by making donations to charities.

The analyses and results of the article have empirical implications. Building a fifty-state cross-sectional data set that compares the administrative costs by state, one can test if and how private giving changes in response to changes in state administration costs after controlling for state demographic variables. Another way is to construct a data set for the revenue sources of charities, mainly government grants/subsidies and donations and fees. Based on the data set, one estimates the effects of a change in the proportion of government grants on private donations. This estimation indirectly tests the implications of the analyses, because taxes or government grants are less efficient in terms of administrative costs, and because charities that rely more on government grants are expected to be more expensive to donors. Such charities thus would receive less private giving.

Notes

1. Donors frequently attempt to obtain information about how much charities spend on administration, and some charity watchdog groups provide their guidelines and standards to help donors choose charities. For example, the American Institute of Philanthropy establishes the standard that fund-raising and general administration expenses do not exceed 40 percent of total expenses. The BBB Wise Giving Alliance and the United Way of the National Capital Area recommend the ratio of fund raising and general administration expenses to total expenses not to exceed 50 percent and 20 percent, respectively (see the National Center for Charitable Statistics Web site—Resources—Nonprofit Funding and Finances at http://nccsdataweb.urban.org). In addition, many states (the attorney general's office) also have their own guidelines. For example, Kentucky, Michigan, and Missouri post the suggestions to donors and detailed regulations of charities in their Web site.

2. It is possible to model the difference in administrative costs through the prices associated with alternative activities rather than through public good consumption z. Let $p_e = 1/c$ and $p_t = 1/cg$ denote the prices of donations and taxes, respectively, in the sense that $1/c$ dollar donation or $1/cg$ dollar tax results in one dollar public good. Private good consumption and public consumption are then modified as $x_i = m_i - p_e e_i - p_t t_i$ and $z = E + T$. This alternative specification, however, does not affect the results.

3. If taxes change for all individuals such that $dt = (dt_1, dt_2, \ldots, dt_i, dt_j, \ldots, dt_n)$, the expression for dE/dT remains the same as (9) below with $dT = \Sigma_{i=1}^{n} dt_i$.

4. Exactly speaking, administrative costs are paid three times to transform taxes to public goods while private donations require administrative costs twice if the additional administrative costs of collecting taxes and donations are taken into account, as mentioned in section 2.

5. In the expression $\lim_{g\to 0}\Omega(g) = cU_{iz}$, it is implicitly assumed that U_{iz} is finite. However, as $\Omega(g)$ is evaluated at $(e_1, e_2, \ldots, e_n) = 0$, the public good level $z = c(gT + E)$ approaches zero as g approaches zero. The marginal utility of the public good U_{iz} may then go infinity as z approaches zero, as is the case for a Cobb-Douglas utility function. In this case, the expression for $\Omega(g)$ becomes simply $dU_i/de_i = cU_{iz} - U_{ix}$, which goes infinity and hence is positive.

6. In the numerator, the second and the third terms reduce to $-1 - [\theta_{je}/(\theta_{jx} - \theta_{je})] = -\theta_{jx}/(\theta_{jx} - \theta_{je}) < 0$.

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