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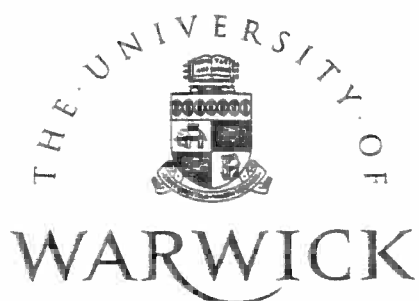
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VOTING FOR TAXES AND TAX INCENTIVES FOR GIVING

Kimberley Ann Scharf

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Kimberley Ann Scharf

University of Warwick, Coventry, UK  
&  
Institute of Fiscal Studies, London, UK

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# Voting for Taxes and Tax Incentives for Giving\*

Kimberley Ann Scharf

University of Warwick  
and  
Institute for Fiscal Studies

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## ABSTRACT

We describe a fiscal choice model where individuals vote over levels of proportional income taxation and over tax incentives for giving, and investigate how tax incentives for giving affect political equilibrium outcomes. We show that the availability of tax incentives can cause a regime switch and induce a low income policymaker to select a private provision regime over a pure public provision regime even when the median voter is a donor. Although such a switch involves a higher relative burden for high income individuals, this can be offset by induced changes in fiscal choices by policymakers, and improve welfare for both low and high income types.

**KEY WORDS:** Tax Incentives for Charitable Giving, Tax Expenditures, Private Provision of Public Goods.

**JEL CLASSIFICATION:** H2, H4.

Correspondence should be addressed to Kimberley Scharf, Department of Economics, University of Warwick, Coventry CV4 7AL, UK. E-mail: K.Scharf@warwick.ac.uk.

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## 1 Introduction

In recent years, increasing pressure on government budgets has forced governments to rely more and more on private provision as an alternative to public provision of public goods and services. This ‘voluntarism’ trend has been strongly encouraged by tax practice: many countries offer incentives for donations to charities, with most of them being built into the tax code.

What is the rationale for such tax incentives? The surprisingly sparse literature on this issue is rooted in normative analysis. The traditional argument in favour of tax expenditures is that if a government has a given budget that is insufficient to achieve the optimal level of provision, and if the ‘price elasticity of giving’ is sufficiently large, then using the available budget to provide incentives can be, on efficiency grounds, preferable to direct provision. The main argument here rests on the idea that the use of a dollar’s worth of public money to subsidize private giving can generate more than a dollar’s worth of private public good provision. Thus, if there are budgetary constraints, providing tax incentives to giving can actually raise public provision, moving it closer to optimal levels.

Where would such constraints come from? They could be political in nature or perhaps be associated with the fact that available tax instruments are distortionary. Either way, they are reducible to the idea that there is a premium attached to the social marginal cost of public funds. Before Feldstein’s (1980) analysis, earlier studies of the efficiency of tax expenditures for charitable deductions (e.g., Hochman and Rodgers, 1977) had yielded no unambiguous conclusions. Feldstein concretized the literature in this area by showing the conditions under which, with distortionary taxation, a government would find it more efficient to offer a subsidy to charitable giving instead of directly providing the desired good. Thus, if taxes are distortionary, they may lead to underprovision, and since direct provision would crowd-out private contributions, it may be more efficient to use tax revenues to offer a subsidy.

In this paper we take a very different route to attempt to rationalize the use of tax expenditures: we ask whether in an economy with heterogeneous individuals, incentives to charitable giving might arise as part of a political economy equilibrium, even when nondistortionary taxes are available. We cast our analysis of tax expenditures for charitable giving within a model where public supply of public goods can be supplemented by voluntary private contributions, and where individuals vote

over levels of income taxation and over tax incentives for giving. We focus purely on self-motivated voluntarism, arising as part of a non-cooperative equilibrium as in Bergstrom, Blume, and Varian (1986). In this framework we incorporate tax expenditures and endogenize the choice of regime by allowing the policymaker to choose tax and tax expenditure levels that may result in private provision only, public provision only, or a mix between the two.

In this setting, we investigate how tax incentives for giving affect political equilibrium outcomes. We find that the availability of tax incentives can induce a low income policy maker to switch from a private provision regime to a pure public provision regime even when the median voter is a donor.

Tax expenditures can be used strategically by the majority to affect the distribution of the burden of public good provision—effectively enabling the median voter to work around the distributional constraints embedded in the structure of the tax system. However, this adverse welfare effect on non-policymakers does not necessarily result in a welfare loss for high income individuals, as it can be offset by changes in the median voter’s fiscal choices. Thus, the availability of tax incentives, although it alters the distribution of the burden in favour of the majority, can ease the distributional tension underlying voting equilibria and bring about a Pareto improvement. This finding might help explain why tax expenditures for charitable donations receive broad support.

The plan of the paper is as follows. Section 2 reviews recent trends in voluntarism and in tax policies. Sections 3 and 4 present our model and results. Section 5 summarizes our argument and concludes with a discussion of possible extensions.

## 2 Voluntarism and Tax Policy Trends

Charitable giving has been slowly but steadily rising. A survey by the US Independent Sector (1996)<sup>1</sup> reports that US households contributed approximately 2.2 percent of

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<sup>1</sup>The Independent Sector is a non-profit organization which has commissioned five surveys on giving and volunteering in the US between 1987 and 1995. Information was obtained by in-home personal interviews conducted by the Gallup Organization. The sample consists of 2,719 Americans aged 18 years and over but does not include ‘very wealthy’ Americans, i.e., those with incomes over \$200,000.

their income in 1995 compared to 1.9 percent in 1987. The percentage of contributing households in the survey fell from 71.1 percent in 1987 to 68.5 percent in 1995, with the fraction of noncontributing households rising from 28.9 percent in 1987 to 31.5 percent in 1995. The survey also indicates that, while the number of high income individuals making charitable contributions is falling, high income individuals who contribute are making larger contributions, i.e., that there is a growing income gap for contributing versus noncontributing households.<sup>2</sup> Similar trends are also apparent in Canada and the UK,<sup>3</sup> and seem to indicate that charitable behaviour is markedly different across different income groups—with richer individuals contributing a larger fraction of their income than lower income individuals—and that this gap in giving patterns has become more pronounced as income inequality has increased.<sup>4</sup>

This upward trend in giving has been encouraged by government policies, mainly through tax incentives. These vary across countries. In the US, both individuals and corporations are allowed a federal income tax deduction for gifts and other donations of property to charitable organizations. For individuals, the gifts must not exceed fifty percent of taxable income when the donation is made to a public charity, and thirty percent of income when the gift is made to a private foundation; corporations are subject to a ceiling of ten percent of net income. As of the 1986 Tax Reform, the deduction for charitable donations is only allowed for those individuals who claim

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<sup>2</sup>There is also a downwards trend in the fraction of lower income filers that itemize and claim charitable deductions. Data obtained from the Internal Revenue Service on individual income tax returns for 1992 indicates that about seventy-seven percent of households with income below \$25,000 itemized and claimed the charitable deduction, but over ninety percent of itemizers with incomes above \$40,000 claimed. In 1994 however, the proportion of itemizers claiming the deduction as a percentage of all filers, fell for all income groups, but relatively more for low income groups than high income groups. The Independent Sector's survey results corroborate these trends over a longer time period.

<sup>3</sup>For the UK see Banks and Tanner (1997); for Canada see Day and Devlin (1997), or Cherniavsky, Hogg and Scharf (1997).

<sup>4</sup>In the US the share of aggregate household income controlled by the lowest income quintile has decreased from 4.2 percent in 1969 to 3.6 percent in 1994, while the share to the highest quintile increased from 43.0 percent to 49.1 percent. Over the same time period, the Gini index rose by seventeen percentage points to its 1994 level of 0.456.

itemized deductions. In Canada, the federal government and the provinces offer a two-tiered income tax credit to individuals and corporations against tax liabilities for donations made to charities. The credit for donations is two-tiered in the sense that for donations made below \$200, the federal basic credit rate is seventeen percent, while every dollar donated above \$200 is credited at a federal rate of twenty-nine percent, thus enabling middle income taxpayers that make large donations to claim at a rate in excess of their personal tax rate.<sup>5</sup> In the UK, companies and individuals can claim a deduction for contributions to charities made by firms which second employees to work temporarily for a charity; for business-related ‘sponsorship’ payments (such as for example, small donations to local charities which benefit the payer’s employees); and for payments above £250 made by companies and individuals to qualifying charities.<sup>6</sup> Under certain special schemes, income tax is deducted on payments made at the basic rate, but the charity can claim back the tax.

The adoption of these tax incentives has not been without controversies, with reference to both their effectiveness and their distributional implications. On the latter point, much debate has surrounded the choice between a deduction and a credit, specifically the so called ‘progression premium’ under a deduction against progressive income taxation, which results in higher effective tax preferences for individuals in higher income brackets. Although this may further encourage charitable behaviour by the rich, and thus—to the extent that charitable contributions involve redistribution in favour of the poor—reduce inequality, some observers have objected that such a provision is in fact regressive because it ‘favours’ donations made by high income individuals.<sup>7</sup> It has also been claimed that reliance on voluntarism gives rise to what

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<sup>5</sup>Currently, income in Canada is taxed at different combined federal/provincial rates which vary slightly with the actual province of residence. For example, some residents of British Columbia face a combined federal/provincial rate of 54.2 percent, which reflects the top marginal tax rate. For gifts of less than \$200, the effective federal/provincial credit rate is about twenty-five percent, and for gifts of over \$200 the total credit is often over fifty percent, as this varies by province and income level.

<sup>6</sup>This limit was previously £600 until 1992 and £400 in 1993.

<sup>7</sup>For a discussion of this issue, see Surrey (1973), and Clotfelter (1985).



has been called 'philanthropic paternalism',<sup>8</sup> whereby a minority of individuals, who are in a position to spend their time and money on a given cause, can effectively define a community's priorities. With respect to the effectiveness of tax incentives in promoting giving, some voices have recently risen against the use of tax preferences, claiming that there is little evidence that tax incentives affect behaviour, and that the reduction in taxes that could be made possible by their elimination could encourage economic growth and hence result in more giving.<sup>9</sup>

But, on the whole, these objections seem to have been politically marginalized, and government support for private giving through tax preferences shows no clear sign of abating. Some recent tax reform proposals in the US call for a reduction in tax preferences and tax expenditures; but the elimination or reduction of tax incentives for giving is the aspect that is stirring the most controversy, and appears poised to encounter strong opposition. In Canada government support of voluntary activities through tax incentives is becoming even more generous: in the last three years, income limitations for donations made by individuals and corporation have risen from twenty percent in 1995 to seventy-five percent in the 1997 federal budget, with calls for a move to a one-hundred percent limitation in the next two years. Thus, while income gaps have increased, generous provisions for charitable donations, which mainly affect rich individuals, have at the least survived (in the US) and been expanded (in Canada), encountering only weak opposition. It appears that not only is there majority support for tax expenditures for charitable contributions, but this support remains broad.<sup>10</sup>

Here we argue that a possible interpretation of these policy trends is one rooted in political economy. Who benefits and who loses from the availability of tax incentives for giving? Do there have to be losers? The remainder of our paper is devoted to examining these questions.

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<sup>8</sup>This term was coined by Clotfelter and Salamon (1982).

<sup>9</sup>This argument is articulated in a recent policy report by the Heritage Foundation (1996).

<sup>10</sup>A poll conducted by the American Institute of Certified Public Accountants in July 1997 found that more than three-quarters of US taxpayers favour retaining the charitable deduction.

### 3 A Political Economy Model of Private and Public Provision Choices

In the following we describe a positive model of tax and public good provision choices where both private and public provision can emerge as the result of strategic voting over taxes. We focus on an environment where taxes are income based, and begin, in this section, by examining fiscal choices when tax expenditures for voluntary contributions are not available. The effect of incorporating tax incentives for giving, and their welfare implications for both policy and non-policy makers, are examined in the next section.

#### 3.1 The Economic Environment

Consider an economy with  $n$  consumers, each consuming a private and a public good, and who can be differentiated by their endowment of income,  $\ell$ . For simplicity we will assume that  $\ell \in \{\bar{\ell}, \underline{\ell}\}$ , with  $\bar{\ell} > \underline{\ell}$ , and denote with  $\bar{\pi}$  and  $\underline{\pi}$  ( $\bar{\pi} + \underline{\pi} = 1$ ) the respective fractions of each type in the population.

Output is produced from labour, which is inelastically supplied. Let all labor be identical and the production technology be linear in total labor input, that is output  $Y$  is given by  $Y = L \equiv n(\bar{\pi}\bar{\ell} + \underline{\pi}\underline{\ell})$ . Output is used for both private consumption and the provision of the public good. Without loss of generality, we shall assume that the marginal cost of provision of the public good is unity (i.e., private consumption can be transformed into the public good at a rate of one-to-one).

Individuals of both types derive utility from private consumption,  $c$ , and from the level of public good available in the economy,  $g$ . Both  $c$  and  $g$  are assumed to be normal.<sup>11</sup> Preferences are identical across types and can be summarized by

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<sup>11</sup>Normality of  $c$  and  $g$  implies that individuals with higher disposable income value the public good more. Thus, we shall not consider situations where public goods are valued by the poor more than by the rich. This assumption also lies at the heart of other analyses of private provision of public goods (Bergstrom, Blume and Varian, 1986; Warr, 1982, 1983; among others). Although there is evidence that the poor rely on certain types of publicly provided private goods—such as health, education and social services—more than do the rich, there is less evidence that this is the case for pure public goods. Later on, we will also discuss possible implications of non-normality for our results.

continuous, twice-differentiable, quasi-concave utility functions:

$$u(c, g), \tag{1}$$

with the usual properties applying.

Public good provision is funded by a proportional income tax levied at rate  $t$  on both types, and by voluntary contributions. It is assumed that the income tax is the only revenue raising instrument available to the government and that the tax authority is able to perfectly observe all individuals' incomes.

In the absence of any tax expenditures, private consumption for each type is given by

$$\bar{c} = (1 - t)\bar{\ell} - \bar{v}, \tag{2}$$

$$\underline{c} = (1 - t)\underline{\ell} - \underline{v}, \tag{3}$$

where  $\bar{v} \geq 0$  and  $\underline{v} \geq 0$  denote voluntary contributions by the high and low income types respectively; public provision of the public good is

$$p = tY, \tag{4}$$

and total public good provision is

$$g = p + n(\bar{\pi}\bar{v} + \underline{\pi}\underline{v}). \tag{5}$$

We characterize a tax/voluntary contributions outcome as an equilibrium of a two-stage game: in the first stage the tax choice is determined by some political process; in the second stage individuals make their voluntary contributions in a decentralized manner, for a given tax rate. We model the political process by using a simple citizen-candidate assumption, whereby all individuals select by majority voting a candidate among them who then implements policies according to his own preferences (see Osborne and Slivinski, 1996; Besley and Coate, 1996).<sup>12</sup> In practice this means that the government is defined by an  $\bar{\ell}$ , or an  $\underline{\ell}$  type individual, depending on whether  $\bar{\pi} > \underline{\pi}$  or viceversa, and tax levels are chosen so as to maximize the utility of the governing type.

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<sup>12</sup>In the present context, where there exist only two types of individuals, this is equivalent to majority voting.

### 3.2 Stage 2: Voluntary Contribution Regimes with No Tax Expenditures

In the second stage individuals make their voluntary contributions in a decentralized manner for given taxes.<sup>13</sup> Given a population composition  $(\bar{\pi}, \underline{\pi})$ , and a tax rate  $t$ , the optimal voluntary contribution for individual  $i$ , given all the other individuals' contributions can be characterized as the solution to the problem of maximizing  $u(c^i, g)$ , subject to the budget constraint, equation (2) or (3) (depending on whether the individual is an  $\bar{\ell}$  or an  $\underline{\ell}$  type) and (5), taking the level of public good provision  $p$  as given. Solution to this problem yields the following first-order conditions:

$$\Omega^i \equiv \frac{U_g(c^i, g)}{U_c(c^i, g)} - 1 \leq 0; \quad (6)$$

$$v^i \geq 0; \quad (7)$$

$$v^i \Omega^i = 0. \quad (8)$$

A non-cooperative equilibrium in voluntary contributions is thus given by a combination  $(\bar{v}, \underline{v})$  that solves

$$\bar{\Omega} \equiv \frac{U_g(\bar{c}, g)}{U_c(\bar{c}, g)} - 1 \leq 0; \quad (9)$$

$$\bar{v} \geq 0; \quad (10)$$

$$\bar{v} \bar{\Omega} = 0; \quad (11)$$

$$\underline{\Omega} \equiv \frac{U_g(\underline{c}, g)}{U_c(\underline{c}, g)} - 1 \leq 0; \quad (12)$$

$$\underline{v} \geq 0; \quad (13)$$

$$\underline{v} \underline{\Omega} = 0; \quad (14)$$

in conjunction with (2)–(5). These conditions yield levels of voluntary contributions that are implicit functions of the tax rate. Public good provision and consumption for both types as implicit functions of  $t$ , can then be recovered. Four regimes can occur at this stage of the game: (i) *Complete voluntarism* –  $\bar{v} > 0$  and  $\underline{v} > 0$ ; (ii) *Incomplete voluntarism* – either  $\bar{v} > 0$  and  $\underline{v} = 0$ , or  $\bar{v} = 0$  and  $\underline{v} > 0$ ; (iii) *Zero*

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<sup>13</sup>We adopt a noncooperative approach to the voluntary contributions equilibrium, following the route that has gained the most currency in models of this type. See Bergstrom, Blume and Varian (1986) for a lucid and complete discussion of this and other possible specifications.

*voluntarism* – both  $\bar{v} = 0$  and  $\underline{v} = 0$ . Each of the private provision regimes, in turn, can be *pure* or *impure* depending on whether they are associated with positive levels of taxation and public provision of the public good.<sup>14</sup>

In a voluntarism equilibrium with no tax expenditures, the level of public good provision will be generally below its optimal level where  $\sum_i U_g(c^i, g)/U_c(c^i, g) = 1$ , so long as one individual is making private contributions which implies that as long as the other individuals' marginal rates of substitution between  $c$  and  $g$  are not zero, the Samuelson condition will be violated in a direction that implies underprovision.

For the voluntarism regimes (i) and (ii), which both involve non-zero private provision of the public good, we can establish the following:

**Lemma 1** *In a complete or incomplete voluntarism regime, the high income type volunteers more than the low income type, i.e.,  $\bar{v} > \underline{v}$ .*

PROOF: (a) If  $\bar{v} > 0$  and  $\underline{v} > 0$ , then since the marginal rate of substitution for both types is decreasing in income, satisfying (9) and (12) binding with equality for both types implies that the level of consumption for the  $\bar{\ell}$  type must be the same as for the  $\underline{\ell}$  type, i.e.,  $(\bar{\ell} - \underline{\ell})(1 - t) - (\bar{v} - \underline{v}) = 0$ , which implies  $\bar{v} > \underline{v}$ .

(b) Consider an incomplete voluntarism regime and suppose that  $\underline{v} > 0$  and  $\bar{v} = 0$ , i.e., condition (9) is not binding and condition (12) is binding. This would imply that  $\bar{c} < \underline{c}$  for the same level of  $g$ , which can only occur if  $(1 - t)(\underline{\ell} - \bar{\ell}) > \underline{v}$ . The left-hand side of the latter is negative which implies voluntary contributions of low income

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<sup>14</sup>A few remarks concerning the interpretation of the volunteering choice are in order here. Our non-cooperative specification predicts that when  $n$  is large—as it is in real-world economies—voluntary contributions will be negligible relative to public good requirements. To account for the observed volume of contributions, it is then necessary to invoke other determinants of charitable behaviour which can limit free-riding behaviour, such as altruism (Andreoni, 1988; Bernheim, 1986). Although we do not explicitly model altruism, our model could be re-interpreted in this light if individual decision-makers are viewed as representing households or broader groups that somehow—because of altruism or through some other mechanism—manage to internalize public goods spillovers amongst themselves (by for example, arranging intra-group transfers), and if  $n$  is interpreted as reflecting the number of such groups. This interpretation, however, could not capture the idea of altruism *across* income groups (i.e., the rich caring for the poor).

individuals must be negative, which is not possible. So an incomplete voluntarism outcome is only possible if  $\bar{v} > 0$  and  $\underline{v} = 0$  and  $\bar{c} > \underline{c}$ . Q.E.D.

**Lemma 2** *In a complete voluntarism regime, we have  $U(\bar{c}, g) = U(\underline{c}, g)$ ; in an incomplete voluntarism regime, we have  $U(\bar{c}, g) > U(\underline{c}, g)$ .*

PROOF: This follows trivially from the fact that  $\bar{c} = \underline{c}$  under full voluntarism and  $\bar{c} > \underline{c}$  under incomplete voluntarism (see proof of Lemma 1). Q.E.D.

The identity of private contributors, and indeed whether private contributions will occur at all, depend on the level of taxation as well as on the structural characteristics of the economy. In particular if income differentials are sufficiently large, complete voluntarism is ruled out as a possibility:

**Lemma 3** *A necessary condition for a complete voluntarism outcome to occur is  $U_c[\underline{\ell}, n\bar{\pi}(\bar{\ell} - \underline{\ell})]/U_g[\underline{\ell}, n\bar{\pi}(\bar{\ell} - \underline{\ell})] \geq 1$ .*

PROOF: In a complete voluntarism regime we must have  $\bar{v} = \underline{v} + (\bar{\ell} - \underline{\ell})(1 - t)$ . If, at  $g = tY + n\bar{\pi}(\bar{\ell} - \underline{\ell})(1 - t)$ , the marginal rate of substitution of low income individuals (which by normality is decreasing in  $g$ ) falls short of the marginal cost of provision, then a complete voluntarism outcome with  $\underline{v} > 0$  (implying a larger  $g$ ) will not be possible. Furthermore, since the expression  $tY + n\bar{\pi}(\underline{\ell} - \bar{\ell})(1 - t)$  is increasing in  $t$ , if complete voluntarism is not possible with  $t = 0$ , it will also not be possible for  $t > 0$ . Q.E.D.

Thus, whether or not complete voluntarism is possible depends both on the income distribution and on preferences: if income differentials are large and if the rate of change of the marginal rate of substitution is large in absolute value, then in a scenario where high income individuals make positive private contributions, the marginal valuation of low income individuals will be too low to induce private contributions from them.

So long as  $c$  and  $g$  are normal, it is easy to show that for an individual who is making positive voluntary contributions, public provision and private contributions

are perfect substitutes for one another; in turn this implies that, as long as there is any individual making positive private contributions (regimes (i) and (ii)), changes in  $t$  increase public good provision by less than the associated increment in tax revenue.

**Lemma 4** *In a complete voluntarism regime, we have  $\partial g/\partial t = 0$ , and  $\partial c/\partial t = 0$  for both consumer types. In an incomplete voluntarism regime, the change in  $g$  following and increase in  $t$  is greater than zero but less than the increase in tax revenues, i.e.,  $nY > \partial g/\partial t > 0$ .*

PROOF: (a) With complete voluntarism we have  $\bar{v} > 0$ ;  $\underline{v} > 0$ ;  $\bar{\Omega} = 0$ ; and  $\underline{\Omega} = 0$ . These conditions imply that  $\bar{c} = \underline{c}$  at the optimum, which in turn implies that  $\bar{v} = \underline{v} + (\bar{\ell} - \underline{\ell})$ . Substituting this into the expression for  $g$  yields  $g = tY + n\underline{v} + (\bar{\ell} - \underline{\ell})(1 - t)$ , which can then be substituted into  $\underline{\Omega}$  to give us a single equation in a single unknown. Differentiating  $\underline{\Omega}$  with respect to  $\underline{v}$  and  $t$  allows us to show that

$$\frac{\partial \underline{v}}{\partial t} = -\underline{\ell} < 0. \quad (15)$$

Differentiating  $g$  then gives

$$\frac{\partial g}{\partial t} = Y + n\bar{\pi} \frac{\partial \bar{v}}{\partial t} + n\underline{\pi} \frac{\partial \underline{v}}{\partial t}, \quad (16)$$

which is zero after substitution of  $\partial \underline{v}/\partial t$  and  $\partial \bar{v}/\partial t = \partial \underline{v}/\partial t - (\bar{\ell} - \underline{\ell})$ . (b) With incomplete voluntarism we have  $\bar{v} > 0$ ;  $\underline{v} = 0$ ;  $\bar{\Omega} = 0$ ;  $\underline{\Omega} < 0$ ;  $g = tY + n\bar{\pi}\bar{v}$ ; and  $\bar{c} = \bar{\ell}(1 - t) - \bar{v}$ . We can differentiate  $\bar{\Omega}$  with respect to  $\bar{v}$  and  $t$  to obtain

$$\frac{\partial \bar{v}}{\partial t} = -\bar{\ell} - \left(1 - \frac{1}{1 + A}\right), \quad (17)$$

where

$$A \equiv -\frac{\partial(u_g/u_{\bar{c}})/\partial \bar{c}}{n\bar{\pi} \partial(u_g/u_{\bar{c}})/\partial g}. \quad (18)$$

Since  $c$  and  $g$  are normal, we have  $A > 0$ , which implies  $\partial \bar{v}/\partial t < 0$ . We can employ the above to get

$$\frac{\partial g}{\partial t} = n\underline{\pi} \underline{\ell} \left(1 - \frac{1}{1 + A}\right) > 0, \quad (19)$$

The marginal change in tax revenues following an increase in  $t$  is simply  $nY$ ; it is easy to check that  $\partial g/\partial t$  is less than  $n\underline{\pi} \underline{\ell} < nY$  since  $A > 0$ . Q.E.D.

The above results are analogous to those derived by Bergstrom, Blume and Varian (1986). Here, as in their analysis, if the tax is collected from all private contributors (complete voluntarism), an increase in public provision ( $t$ ) fully crowds-out private contributions. If the tax is collected from both contributors and non-contributors (in an incomplete voluntarism regime), an increase in public provision acts as a transfer to contributors, allowing them to more than proportionately substitute away from private contributions, albeit with  $g$  still being larger, i.e., there is partial crowding out.

### 3.3 Stage 1: Taxing Equilibrium with No Tax Expenditures

In the first stage of the game, the policymaker chooses taxes so as to maximize his own utility subject to the noncooperative equilibrium conditions (9)–(14) and to (2)–(5). Four regimes could conceivably occur: a *public provision regime* where positive taxes are chosen so that the public good is provided solely through public contributions; a *private provision regime* where taxes are zero and there is complete or incomplete voluntarism; a *mixed regime* with positive taxes and complete or incomplete voluntarism; and a degenerate regime with zero taxes and zero voluntarism. We shall abstract from the latter and show that a mixed regime can be ruled out for an  $\bar{\ell}$  policymaker.

**Proposition 1** *If the policymaker is an  $\bar{\ell}$  type, then a public provision regime (characterized by  $t > 0$ ,  $\bar{v} = 0$  and  $\underline{v} = 0$ ) is always preferred to a private provision regime (characterized by  $t = 0$ ,  $\bar{v} > 0$  and  $\underline{v} \geq 0$ ).*

PROOF: (a) Suppose complete voluntarism is possible. Then in a private provision regime we have  $\bar{c}' = \underline{c}' \equiv c'$ . Any level  $g'$  which can be attained under such a regime could also be attained by taxes, but with  $\bar{c}'' > \underline{c}''$ . Since  $g' + n(\bar{\pi}\bar{c}'' + \underline{\pi}\underline{c}'') = g' + nc' = Y$  it must be  $\bar{c}'' > \bar{c}'$ .

(b) In an incomplete voluntarism regime we have  $\underline{v}' = 0$ , which implies

$$\frac{\bar{c}'}{\underline{c}'} = \frac{\bar{\ell}(1-t) - \bar{v}'}{\underline{\ell}(1-t)} < \frac{\bar{\ell}}{\underline{\ell}}. \quad (20)$$



Any level  $g'$  which can be attained under such a regime could also be attained by taxes, but with

$$\frac{\bar{c}''}{\underline{c}''} = \frac{\bar{\ell}(1-t)}{\underline{\ell}(1-t)} = \frac{\bar{\ell}}{\underline{\ell}} > \frac{\bar{c}'}{\underline{c}'}. \quad (21)$$

Since  $g' + n(\bar{\pi}\bar{c}'' + \underline{\pi}\underline{c}'') = g' + n(\bar{\pi}\bar{c}' + \underline{\pi}\underline{c}')$ , we must have  $\bar{c}'' > \bar{c}'$ . Q.E.D.

Thus, a high income policymaker will always choose taxes so that private contributions are zero. The intuition for this result is simple. Under private provision the share of the cost of public good provision borne by high income individuals will always be larger than their income share: under incomplete voluntarism, high income individuals will be the only ones to pay, and under complete voluntarism their burden will be such that consumption is equalized across individuals, hence larger than their share under taxation. So for any level of  $g$  taxation will always involve a lower cost share for high income individuals, and will therefore always be preferred by them.<sup>15</sup> Note that this conclusion would also be valid under progressive taxation, as long as this is nonconfiscatory, i.e., does not result in a lower after-tax income for an  $\bar{\ell}$  type individual than for an  $\underline{\ell}$  type individual.

However, if we use the same logic to examine the choice of a policymaker of type  $\underline{\ell}$ , we cannot rule out the possibility of any regime being chosen. Indeed, under incomplete voluntarism, we cannot even generally rule out an outcome involving a combination of taxes and voluntary contributions that leads to a mixed regime. This ambiguity arises because, while low income individuals will bear a smaller share of the cost of public good provision in a private provision regime, the level of public good provision attainable in the same regime may be too low. Thus a low income policymaker faces a trade-off between the gains from reducing his own share of the burden and the cost of free riding. The choice of regime will thus ultimately depend upon a comparison of these two factors.

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<sup>15</sup>This is consistent with the findings of Roberts (1987). Since the low income individuals do not have the opportunity to reduce their voluntary contributions below zero, their share of the costs of provision must increase with a tax (see proof of Lemma 4). This allows the high income individuals to reduce their voluntary contributions more than proportionately resulting in higher consumption levels with the tax than without it. As we stated previously, the tax acts to transfer income from the poor to the rich making the latter better off.

In this problem, because of regime changes, payoff functions are nonsmooth, non-monotonic, and can feature multiple local optima. Consequently, differential methods are ineffective for uncovering conditions characterizing the optimal policy choice by an  $\underline{\ell}$  type policymaker. But we can illustrate the ambiguity with the help of specific examples. Suppose that preferences can be represented by the following utility function:

$$U(c, g) \equiv c g. \quad (22)$$

Consider an incomplete voluntarism regime, where, as proved in Lemma 1, the rich are volunteering. For a given tax rate  $t$ , an equilibrium is identified by the condition

$$\frac{\bar{c}}{g} = \frac{\bar{\ell}(1-t) - \bar{v}}{tY + n\bar{\pi}\bar{v}} = 1. \quad (23)$$

Solving for  $\bar{v}$ , we obtain

$$\bar{v} = \frac{\bar{\ell}(1-t) - tY}{1 + n\bar{\pi}}. \quad (24)$$

Note that  $\bar{v} > 0$  if and only if  $\bar{\ell}(1-t) - tY > 0$ , i.e. if  $t < \tilde{t} \equiv \bar{\ell}/(Y + \bar{\ell})$ . One can verify that, in this example, for  $0 < t < \tilde{t}$  the payoff of a low income policymaker is monotonic in  $t$ , implying that there cannot be an interior optimum with  $0 < t < \tilde{t}$ . Thus, a low income policymaker will choose either a pure private provision regime, or a pure public provision regime. To find which of these two choices will be made we can focus on the optimal tax choice by a low income type under zero voluntarism and on a voluntary contribution equilibrium under zero taxes. We can then compare utility levels for the low income type under both scenarios to derive conditions under which a zero tax is preferred to a positive tax.

Let us first look at the optimal tax choice with zero voluntarism. The policymaker's problem is to maximize his own utility subject to  $\bar{v} = \underline{v} = 0$ . That is

$$\max_t (1-t)\underline{\ell}tY. \quad (25)$$

Solution to this problem yields  $t' = 1/2$ , which, after substitution into the objective, yields  $\underline{U}' = (1/4)\underline{\ell}Y$ . If there is incomplete voluntarism and zero taxes we get

$$\bar{v}'' = \frac{1}{1 + n\bar{\pi}}\bar{\ell}; \quad (26)$$

and

$$g'' = n\bar{\pi} \bar{v}'' = \frac{n\bar{\pi}}{1 + n\bar{\pi}} \bar{\ell}; \quad (27)$$

and the low income individual's utility level is

$$\underline{U}'' = \underline{\ell} \frac{n\bar{\pi}}{1 + n\bar{\pi}} \bar{\ell}. \quad (28)$$

One can verify that the comparison between  $\underline{U}'$  and  $\underline{U}''$  is ambiguous and depends on parameter values. Consider, for example, a scenario where  $n = 5$ ,  $\bar{\pi} = 2/5$  and  $\underline{\ell} = 1$ . Suppose that  $\bar{\ell} = 2$ ; then we have  $Y = 7$  and  $\underline{U}'' = 4/3 > \underline{U}' = 7/4$ . However, if  $\bar{\ell} = 10$ , then  $Y = 23$  and  $\underline{U}'' = 20/3 < \underline{U}' = 24/4$ .<sup>16</sup>

Comparing the expressions for  $\underline{U}'$  and  $\underline{U}''$  we can see that a choice of a pure private provision regime is more likely the larger is  $\bar{\ell}$  relative to  $\underline{\ell}$  and the larger is the number of high income individuals,  $n\bar{\pi}$ ; note however, that in order for a low income type to make policy, the  $\bar{\ell}$  type individuals must be less than half of the total population. Also, as  $n$  increases, so does the fraction  $n\bar{\pi}/(1 + n\bar{\pi})$ . Thus, for voluntarism to be an attractive alternative to public provision, the economy must be characterized by a small  $n$  and a large fraction of rich individuals (but not larger than 1/2). In the more general case, other factors will also come into play. In particular, the faster the rate of change of the marginal rate of substitution between  $c$  and  $g$  (which reflects the ease of substitution between public and private consumption), the easier it will be for a low income majority to rely on voluntary contributions by high income individuals.

## 4 Private and Public Provision Choices with Tax Expenditures

We shall next introduce tax expenditures for private contribution into our model. A tax expenditure is akin to a subsidy for voluntary contributions which results in lower tax revenues. Note that in this model, under proportional taxation, there is

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<sup>16</sup>For both scenarios, one can verify that with zero taxes low income individuals are in fact not volunteering, since their marginal rate of substitution between public goods and consumption is less than unity.

no difference between a tax deduction and a tax credit, as long as the credit rate is equal to the tax rate; for modelling purposes we will treat tax expenditures as a credit accorded, at rate  $s$ , on voluntary contributions, and differentiate between a credit and a deduction by imposing different constraints on the policymaker (more on this below). With such a scheme, consumption for an  $\ell$  type becomes

$$c = \ell(1 - t) - v(1 - s); \quad (29)$$

in order for the government budget to be balanced, the level of public provision of the public good must equal tax revenues less the cost of tax expenditures:

$$p = tY - n(\bar{\pi} \bar{v} + \underline{\pi} \underline{v})s; \quad (30)$$

and the level of public goods provision is

$$g = p + n(\bar{\pi} \bar{v} + \underline{\pi} \underline{v}). \quad (31)$$

#### 4.1 Stage 2: Voluntary Contribution Regimes with Tax Expenditures

The presence of the credit  $s$  affects the level of voluntarism by lowering the price of giving from 1 to  $1 - s$ . The individual maximization problem now consists of maximizing  $u(c^i, g)$ , subject to the budget constraint (equation (2) or (3)), and (31), taking the level of public good provision  $p$  as given. Since individuals take  $p$  as given, they cannot ‘see behind’ the government budget constraint (30); in turn, this implies that the subsidy  $s$  is not neutral in this game.<sup>17</sup>

Solution to the above problem yields the first-order conditions

$$\Omega_s^i \equiv \frac{U_g(c^i, g)}{U_c(c^i, g)} - (1 - s) \leq 0; \quad (32)$$

$$v^i \geq 0; \quad (33)$$

$$v^i \Omega_s^i = 0. \quad (34)$$

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<sup>17</sup>Our specification amounts to assuming that in the first stage of the game the policymaker chooses a certain combination of  $p$ ,  $t$  and  $s$ , and that the government budget constraint (30) only affects this choice. See Bergstrom and Andreoni (1996) for a discussion of alternative game specifications that lead to neutrality results.

The conditions for a non-cooperative equilibrium with balanced government budget become

$$\bar{\Omega}_s \equiv \frac{U_g(\bar{c}, g)}{U_c(\bar{c}, g)} - (1 - s) \leq 0; \quad (35)$$

$$\bar{v} \geq 0; \quad (36)$$

$$\bar{v} \bar{\Omega} = 0; \quad (37)$$

$$\underline{\Omega}_s \equiv \frac{U_g(\underline{c}, g)}{U_c(\underline{c}, g)} - (1 - s) \leq 0; \quad (38)$$

$$\underline{v} \geq 0; \quad (39)$$

$$\underline{v} \underline{\Omega} = 0. \quad (40)$$

For a given subsidy rate  $s$  and a tax rate  $t$ , a non-cooperative equilibrium in voluntary contributions, given by a combination  $(\bar{v}, \underline{v})$  that solves the above in conjunction with (29)–(31), will yield a level of public good provision and consumption levels as implicit functions of both  $t$  and  $s$ . As before, four regimes involving either complete or incomplete voluntarism (accompanied or not by public provision), or pure public provision with no voluntarism. Some care is required to interpret the notion of pure voluntarism here: this can now be thought of as a situation where all public good provision occurs through voluntarism, albeit subsidized by tax expenditures, i.e., where net tax revenues are zero.

The same line of reasoning that was used in proving Lemma 1 can be applied here to show that, even in the presence of tax expenditures, an  $\bar{\ell}$  type individual will always contribute more than an  $\underline{\ell}$  type individual. In turn this implies that if only one type is contributing, it will be the  $\bar{\ell}$  type. Furthermore, even with tax expenditures, it is the case that  $U(\bar{c}, g) = U(\underline{c}, g)$  under complete voluntarism and  $U(\bar{c}, g) > U(\underline{c}, g)$  under incomplete voluntarism or in a pure tax regime. One can also verify that the conditions under which a complete voluntarism outcome can be ruled out (Lemma 3) are also unaffected by the availability of a tax credit.

As in the analysis without tax expenditures, we can also show that for a given credit rate  $s$ , public good provision does not change with  $t$  in a complete voluntarism regime, and increases in  $t$  in an incomplete voluntarism regime. One can verify that, with the credit, the same reasoning applies, with the marginal cost of provision of unity being replaced by the lower value of  $(1 - s)$ .

With reference to the impact on public good provision of changes in  $s$ , we can establish the following result:

**Lemma 5** *In a regime with complete or incomplete voluntarism, for a given tax rate  $t$ , public good provision is increasing in  $s$ .*

PROOF: (a) Under complete voluntarism, we have  $\bar{v} > 0$ ,  $\underline{v} > 0$ ,  $\bar{\Omega}_s = \underline{\Omega}_s = 0$ , and

$$g = tY + n(\bar{\pi}\bar{v} + \underline{\pi}\underline{v})(1 - s); \quad (41)$$

$$\underline{c} = \bar{c}. \quad (42)$$

The latter implies

$$\bar{v} = \underline{v} + (\bar{\ell} - \underline{\ell}) \frac{(1 - t)}{(1 - s)}; \quad (43)$$

which can be substituted into (41) and  $\underline{\Omega}_s$  to give us a single equation  $\underline{\Omega}_s$  in a single unknown,  $\underline{v}$ . Differentiating  $\underline{\Omega}_s$  with respect to  $\underline{v}$  and  $s$  then gives

$$\frac{\partial \underline{\Omega}_s}{\partial s} = \frac{\underline{v}}{1 - s} - \frac{1}{\underline{\Delta}}; \quad (44)$$

where  $\underline{\Delta} \equiv \partial \underline{\Omega}_s / \partial \underline{v} < 0$ . Employing this and substituting (43) into (41), we can show that

$$\frac{\partial g}{\partial s} = -\frac{n(1 - s)}{\underline{\Delta}} > 0. \quad (45)$$

(b) We can proceed similarly for a regime with incomplete voluntarism. Here we have  $\bar{v} > 0$ ,  $\underline{v} = 0$ ,  $\bar{\Omega}_s = 0$ ,  $\underline{\Omega}_s < 0$ , and

$$g = tY + n\bar{\pi}\bar{v}(1 - s); \quad (46)$$

$$\bar{c} = \bar{\ell}(1 - t) - \bar{v}(1 - s); \quad (47)$$

$$\underline{c} = \underline{\ell}(1 - t). \quad (48)$$

Differentiating  $\bar{\Omega}_s$  with respect to  $\bar{v}$  and  $s$  then gives

$$\frac{\partial \bar{\Omega}_s}{\partial s} = \frac{\bar{v}}{1 - s} - \frac{1}{\bar{\Delta}}; \quad (49)$$

where  $\bar{\Delta} \equiv \partial \bar{\Omega}_s / \partial \bar{v} < 0$ . Employing this, we can show that

$$\frac{\partial g}{\partial s} = -\frac{n\bar{\pi}(1 - s)}{\bar{\Delta}} > 0. \quad (50)$$

Q.E.D.

Thus, in this model balanced-budget increases in  $s$  and  $t$  are not neutral. As mentioned earlier this result is a consequence of the assumption that individuals do not take the government budget constraint into account when choosing their contribution levels.<sup>18</sup> Nevertheless, since non-distortionary taxation is available in this model, there is no role to play for tax expenditures on efficiency grounds.

## 4.2 Stage 1: Taxing Equilibrium with Tax Expenditures

In the first stage of the game, the policymaker chooses a tax rate  $t$  and a credit rate  $s$  so as to maximize his own utility subject to the noncooperative equilibrium conditions (35)–(40) and to (29)–(31). In contrast with earlier analyses, which have focused on generic ‘subsidies’ to private contributions, here we shall also impose restrictions on the structure of the tax/credit scheme, and shall distinguish between a credit and a deduction scheme.

Since the credit is paid for by tax revenues, the total value of credits paid cannot exceed gross revenues, i.e., tax expenditures cannot be paid for from the voluntary contributions themselves:

$$n(\bar{\pi} \bar{v} + \underline{\pi} \underline{v})s \leq tY. \quad (51)$$

Furthermore under a deduction scheme, the credit rate cannot exceed the tax rate, implying the additional constraint

$$s \leq t. \quad (52)$$

(Note that in our model a deduction scenario with  $s = t$  is fully equivalent to a scenario where contributions are in-kind and escape taxation.) In contrast, we characterize a credit scheme as being compatible with a choice  $s > t$ , only requiring that each

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<sup>18</sup>This finding is line with those obtained by Roberts (1987) and Bergstrom and Andreoni (1996) for *marginal* changes in tax expenditures in different model specifications.

individual cannot receive a net refund:<sup>19, 20</sup>

$$vs \leq tl, \quad l \in \{\bar{l}, \underline{l}\}. \quad (53)$$

We shall begin by looking at the credit case, and then discuss the deduction. As before, four regimes could conceivably occur: a *public provision regime* where positive taxes are chosen and there is zero voluntarism; a *private provision regime* where taxes are just sufficient to pay for tax expenditures and there is complete or incomplete voluntarism; a *mixed regime* with taxes over and above those needed to pay for tax expenditures and with complete or incomplete voluntarism; and a degenerate regime with zero taxes and zero voluntarism.

Pure private provision regimes can be ruled out:

**Lemma 6** *A complete or incomplete voluntarism equilibrium with  $s > 0$  will always be accompanied by public provision of public goods, i.e. it will be a mixed regime.*

PROOF: (a) In an incomplete voluntarism regime we have  $\bar{v} > 0$  and  $\underline{v} = 0$ . Then constraint (51) becomes

$$n\bar{\pi}\bar{v}s \leq tY; \quad (54)$$

and constraint (53) can be re-written as

$$n\bar{\pi}\bar{v}s \leq tn\bar{\pi}\bar{l}. \quad (55)$$

Since  $n\bar{\pi}\bar{l} < Y$ , this implies that (54) will always be slack, which in turn means that tax revenues, net of tax expenditures, will always be positive.

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<sup>19</sup>It is analytically more convenient to model these as constraints on the policymaker's choice and not as features of the tax credit system. The two methodologies are equivalent, except where it may be possible to apply a higher effective rate of crediting for a consumer whose non-refund constraint is not binding when another consumer constraint is binding. This possibility would only arise under complete voluntarism, but we shall show that in that case the non-refund constraint will always be non-binding.

<sup>20</sup>Some countries, such as Canada, do allow crediting at a rate in excess of the rate of income taxation.



(b) In a complete voluntarism regime we have  $\bar{c} = \underline{c}$  which implies  $\bar{v} = \underline{v} + (\bar{\ell} - \underline{\ell})(1 - t)/(1 - s)$ . Using this, we can rewrite (53) for the two consumers as

$$\underline{v}s \leq t\underline{\ell}; \quad (56)$$

$$[\underline{v} + (\bar{\ell} - \underline{\ell})(1 - t)/(1 - s)]s \leq t\bar{\ell}. \quad (57)$$

Suppose that (56) is binding. If we solve the equality for  $\underline{v}$  and substitute into (57), after manipulation we can rewrite (57) as

$$\frac{s(1 - t)}{t(1 - s)} \leq 1; \quad (58)$$

which can be satisfied if and only if  $s \leq t$ . But, by assumption,  $\underline{v}s = t\underline{\ell}$ ; this implies  $\underline{v} \geq \underline{\ell}$ , which is not compatible with a positive consumption level  $\underline{c} > 0$ . Thus, the first constraint can never be binding. Now write (57) as

$$n\bar{\pi}[\underline{v} + (\bar{\ell} - \underline{\ell})(1 - t)/(1 - s)]s \leq tn\bar{\pi}\bar{\ell}; \quad (59)$$

and (51) as

$$n\bar{\pi}[\underline{v} + (\bar{\ell} - \underline{\ell})(1 - t)/(1 - s)]sn\pi\underline{v} \leq tn\bar{\pi}\bar{\ell} + tn\pi\underline{\ell}; \quad (60)$$

Since we have shown that  $\underline{v}s < t\underline{\ell}$  then as long as (59) is satisfied, the left hand side is strictly less than the right-hand side, implying that net tax revenues, and hence public provision of public goods, will be positive. Q.E.D.

The credit provides the policymaker with an additional instrument which can directly affect voluntary contributions. As shown in Lemma 5, increases in  $s$ , by lowering the price of giving, have a positive effect on voluntary contributions. Thus, the credit can be used in combination with taxes to induce private contributions, not just when public good provision is low but at any public good provision level:

**Lemma 7** *For any  $g'$  such that  $Y \geq g' > \bar{g}$ , where  $\bar{g}$  is the equilibrium level of public good provision if  $t = 0$ ,  $s = 0$ , it is always possible to induce positive levels of contributions by an appropriate choice of  $s$  and  $t$ .*

PROOF: Starting from  $s = 0$ , as long as the marginal rate of substitution for some consumers is not equal to zero, by raising  $s$ , it is always possible to choose a level of  $s \in [0, 1]$  which makes at least one of (35) and (38) binding, and therefore induces individuals to make positive contributions. If this involves complete voluntarism, then, since by Lemma 5  $g$  is monotonic in  $s$ , and since under complete voluntarism, changes in  $t$  have no effect on  $g$ , then any level of  $g$  above  $\tilde{g}$  and up to  $Y$  can be attained by an appropriate choice of  $s$  by adjusting  $t$  so as to cover the cost of the subsidy. Under incomplete voluntarism, the maximum level of  $g$  that could be conceivably attained through voluntarism is  $n\bar{\pi}\bar{\ell} < Y$ ; however, increases in  $t$  only partially crowd out private contributions, implying that any level of  $g$  above  $\tilde{g}$  and up to  $Y$  can be attained by an appropriate choice of  $t$  and  $s$ . Q.E.D.

As in the case with no tax expenditures, we can establish that an  $\bar{\ell}$  type policymaker will never choose voluntarism:

**Proposition 2** *If the policymaker is an  $\bar{\ell}$  type, he will always choose a pure public provision outcome over a private provision outcome supported by tax expenditures.*

PROOF: The proof is identical to the proof of Proposition 1, and is omitted.

On the other hand, we can now show that an  $\underline{\ell}$  policymaker will always choose a mixed outcome over a pure public provision outcome.

**Proposition 3** *An  $\underline{\ell}$  type policymaker will always choose a tax/credit combination that will support either a pure private provision outcome with  $t = 0$ ,  $s = 0$ , or a mixed public/private provision outcome with  $t > 0$ ,  $s > 0$ .*

PROOF: (a) Suppose that the preferred choice of public good provision level under pure public provision ( $t > 0$ ,  $\bar{v} = 0$ ,  $\underline{v} = 0$ ) is  $g'$ , with  $\bar{c}' > \underline{c}'$ . If a mixed regime supported by complete voluntarism and with the same level of public good provision can be achieved with the help of a tax credit (Lemma 7), then  $\bar{c}'' = \underline{c}''$ , with  $n(\bar{\pi}\bar{c}'' + \pi\underline{c}'') = n(\bar{\pi}\bar{c}' + \pi\underline{c}') = Y - g'$ ; which implies  $\underline{c}'' > \underline{c}'$ .

(b) Suppose a complete voluntarism outcome cannot be attained and let  $g'$  again be

the level of public good provision preferred under pure public provision. Then, by raising  $s$  and by an appropriate choice of  $t$ ,  $g'$  can also be attained in a mixed regime (Lemma 7) with incomplete voluntarism. In such an outcome, we have  $n(\bar{\pi}\bar{c}'' + \underline{\pi}\underline{c}'') = n(\bar{\pi}\bar{c}' + \underline{\pi}\underline{c}') = Y - g'$ . With pure public provision, we also have

$$\frac{\bar{c}'}{\underline{c}'} = \frac{\bar{\ell}(1-t)}{\underline{\ell}(1-t)} = \frac{\bar{\ell}}{\underline{\ell}}; \quad (61)$$

whereas in a mixed regime we have

$$\frac{\bar{c}''}{\underline{c}''} = \frac{\bar{\ell}(1-t) - \bar{v}''(1-s)}{\underline{\ell}(1-t)} < \frac{\bar{\ell}}{\underline{\ell}}; \quad (62)$$

which implies that  $\underline{c}'' > \underline{c}'$ .

(c) If the preferred choice of  $g$  with  $s = 0$  is one that can be supported with  $t = 0$  (private provision), then the policymaker may still choose a private provision outcome with  $s = 0$ , or he may prefer a mixed outcome with  $t > 0$ ,  $s > 0$ . Q.E.D.

Thus, if tax expenditures are available as a policy instrument, then a low income policymaker will always switch to a mixed regime by an appropriate combination of tax and credit rates. This finding is related to the idea that for a given level of public good provision, non-contributors would prefer a voluntarism outcome to a pure tax outcome as it shifts the burden of public good provision onto high income individuals, but it goes further in establishing that voluntarism is favoured by a low income policymaker even if he is a donor in the resulting equilibrium; and that this will always be the case even if subsidies are limited by a no-refund constraint.

With complete voluntarism, changes in  $t$  do not affect the outcome (Lemma 4). In turn this implies that it will be possible to raise  $s$  without the no-refund constraint ever becoming binding. In contrast, with incomplete voluntarism, the no-refund constraint for the high income individual will always be binding, implying that the resulting regime will be a mixed one:

**Proposition 4** *If an  $\underline{\ell}$  type policymaker chooses a tax/credit combination that results in a mixed regime supported by incomplete voluntarism, then the net tax paid by an  $\bar{\ell}$  type individual will be zero.*

PROOF: We have established in the proof of Lemma 6 that the no-refund constraint for high income individuals will be binding before the no-refund constraint for low income individuals or the overall constraint (51) will. Now, suppose we consider a fixed level of  $t$ ; using our previous comparative statics results, the effect of changes in  $s$  on the utility of the decision maker is

$$U_g(c, g) \frac{\partial g}{\partial s} > 0. \tag{63}$$

Since the left hand-side of the no-refund constraint is increasing in  $s$  we can conclude that the decision maker will increase  $s$  up to the point where the constraint becomes binding. Q.E.D.

In the deduction case where  $s$  is bound to lie below  $t$ , Proposition 2 still holds true: a high income policymaker will never choose a voluntarism outcome supported by a deduction. But with respect to a low income policymaker's choice, we can not establish an unambiguous result: the availability of the deduction may or may not induce a switch by policymaker from pure taxation to a voluntarism outcome. This is because, once  $s$  has been raised to equal  $t$ , further increases in  $s$ —which may be required to induce voluntarism—must go hand-in-hand with increases in  $t$ , and hence in public provision. An increase in public provision, in turn, may crowd out voluntary provisions, and make it impossible to attain a voluntarism outcome; and even if this can be attained, it may involve a level of public provision which is above the level favoured by the policymaker.

### 4.3 Welfare Implications

We are now in a position to ask the question we posed earlier. Who benefits from the presence of tax incentives? Or, more precisely, from their being available to policymakers?

Clearly an  $\underline{\ell}$  type policymaker will be better off if a credit is available (having more policy instruments available cannot hurt a decision maker). What is not immediately obvious is whether having a credit available will make  $\bar{\ell}$  type individuals better off or worse off. We know that in a mixed regime, for a given level of  $g$ , the share of the cost of public good provision borne by a high income policymaker is higher than in a pure public provision regime, which could result in high income individuals being made

worse off by the tax expenditures. The availability of tax expenditures, however, may induce changes in the overall level of  $g$  selected by the policymaker, which also have an impact on high income individuals' welfare.

The possibility that high income individuals could be hurt by the credit can be illustrated using the example described at the end of the previous section, with  $U(c, g) \equiv cg$ ,  $n = 5$ ,  $\bar{\pi} = 2/5$  and  $\underline{\ell} = 1$ ,  $\bar{\ell} = 2$ ,  $Y = 7$ . We have shown that, in the absence of a credit, a low income policymaker chooses a pure tax outcome with  $t^* = 1/2$ , which yields utility levels  $\bar{U}^* = 7/2$ ,  $\underline{U}^* = 7/4$ . To find the optimal choice for the low income policymaker when a credit is available we can focus on a mixed regime with incomplete voluntarism (we know by Lemma 3 and Proposition 3 that is where the optimum lies, since the marginal rate of substitution at  $c = \underline{\ell} \equiv 1$ ,  $g = n\bar{\pi}(\bar{\ell} - \underline{\ell}) \equiv 2$ , is less than unity); the maximization problem for an  $\underline{\ell}$  type policymaker is

$$\max_{t,s} \underline{c}g, \tag{64}$$

subject to

$$\underline{c} = (1 - t); \tag{65}$$

$$g = 7t + 2\bar{v}(1 - s); \tag{66}$$

$$\frac{2(1 - t) - \bar{v}(1 - s)}{g} = (1 - s); \tag{67}$$

$$2t \leq \bar{v}s. \tag{68}$$

Solution to this problem requires the use of numerical methods.<sup>21</sup> An optimum is characterized by  $s^{**} = 0.74$ ,  $t^{**} = 0.41$ ,  $\bar{v}^{**} = 1.11$ ,  $t^{**} = 3.45$ . It can be verified that the no-refund constraint is binding, and that voluntary contributions for low income individuals are indeed zero. If we compute the level of utility for low income individuals, we obtain  $\underline{U}^{**} = 2.03 > \underline{U}^* = 7/4$ , and  $\bar{U}^{**} = 3.08 < \bar{U}^* = 7/2$ . Thus, high income individuals are hurt by the presence of tax expenditures, even if, on the surface, they are the ones receiving the larger tax credit (since  $\bar{v} > \underline{v}$ ). Note that, in

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<sup>21</sup>All values reported are approximate solutions.

this scenario, a choice of  $t = 1/2$  is optimal for both a high income and a low income policymaker and is thus also an efficient choice. The outcome with tax expenditures, on the other hand, is not efficient. Thus, the availability of tax expenditures, not only has distributional consequences but also disrupts efficiency.

When the policymaker's choice of  $t$  with  $s = 0$  is Pareto efficient, as in the above scenario, we can also conclude that  $\bar{\ell}$  type individuals will always be hurt by the availability of a tax credit if this induces a regime switch from a pure public provision outcome to a mixed outcome supported by complete voluntarism: both outcomes are Pareto efficient and the latter cannot be Pareto dominated by the former; and since in a complete voluntarism outcome the two types' utility levels are the same and low income individuals are better off than under a pure public provision outcome (or else the switch would not have occurred), then high income individuals must be made worse off.

Generally, however, the policymaker's choice of  $t$  with  $s = 0$  will not result in an efficient outcome. In a pure public provision outcome with no tax expenditures, the first-order condition for an optimal choice of  $t$  by a low income policymaker is

$$-U_c[(1-t)\underline{\ell}, tY]\underline{\ell} + U_g[(1-t)\underline{\ell}, tY]Y = 0; \quad (69)$$

which can be re-written as

$$\frac{U_g[(1-t)\underline{\ell}, tY]}{U_c[(1-t)\underline{\ell}, tY]} = \frac{\underline{\ell}}{Y} = \frac{1 - n\bar{\pi}\bar{\ell}/Y}{n\bar{\pi}}. \quad (70)$$

The Samuelson condition for optimality of  $g$  can be re-written as

$$\frac{U_g[(1-t)\underline{\ell}, tY]}{U_c[(1-t)\underline{\ell}, tY]} = \frac{1 - n\bar{\pi}U_g[(1-t)\bar{\ell}, tY]/U_c[(1-t)\bar{\ell}, tY]}{n\bar{\pi}}. \quad (71)$$

A comparison of the right-hand sides of (69) and (70), yields an ambiguous conclusion, implying that the level chosen by a low income policymaker can be above or below the socially efficient level. What we can say is that, if the level of  $g$  favoured by a low income policymaker is above the optimal level, then the level favoured by a high income individual is lower—by the very definition of optimality the two individual types cannot both favour a higher or lower level.

The presence of tax expenditures can affect the level of  $g$  in a direction that is favoured by non-policymakers. Thus, although the credit enables a low income policymaker to lower his relative share in the cost of public good provision, it may

result in a more efficient choice of  $g$ , and the latter effect may dominate the former. One can find examples where, even if a regime switch occurs, high income individuals are made better off from the availability of the credit.

This occurs, for instance, if preferences are represented by the following nonhomothetic utility function:

$$U(c, g) \equiv (c - 1/2)g, \tag{72}$$

and if  $n = 100$ ,  $\bar{\pi} = 4/10$ ,  $\underline{\ell} = 1$ ,  $\bar{\ell} = 5$ . Solving for the optimal choice by an  $\underline{\ell}$  type policymaker without tax expenditures, we find that the policymaker chooses a pure public provision outcome with  $t^* = 1/4$  and  $g^* = 65$ , with  $\bar{U}^* = 211.12$ . The tax rate preferred by high income individuals is  $9/20$ , and the efficient choice of  $t$  for this economy is approximately  $8/20$  with a level of public good provision equal to 105. The chosen outcome with  $s > 0$ , supported by incomplete voluntarism, involves a level of public good provision of  $g^{**} = 65.74 > g^*$ , and a level of utility for high income individuals of  $\bar{U}^{**} = 211.79 > \bar{U}^*$ . In this example, with  $s = 0$  the private cost to income policymaker of increasing public provision through taxation are too high relative to the corresponding private benefits, and  $n$  is too large to rely on voluntarism from high income individuals. The tax credit can act as a coordinating device for high income contributors which is acceptable to low income voters as it reduces their burden share, but enables high income individuals to attain a higher level of public consumption. Such a scenario is likely to occur when income differentials are large.

High income individuals can also benefit from the subsidy in scenarios where  $n$  is small and, with  $s = 0$ , a low income policymaker chooses private provision. If, for example, the no-tax expenditures outcome is a pure private provision outcome with complete voluntarism, then the availability of tax expenditures will result in an efficient outcome that Pareto dominates the former (since utility levels are equalized across consumers in each case). Again, this type of scenario is more likely to occur the larger is the difference between  $\bar{\ell}$  and  $\underline{\ell}$ .

The above analysis has the somewhat paradoxical implication that tax expenditures are more likely to hurt donors the less unequal is the distribution of income. In other words, if  $(\bar{\ell} - \underline{\ell})$  is large, the choice of  $t$  of a low income policymaker with  $s = 0$  will be far from the choice favoured by high income individuals, and the presence of tax expenditures may help non-policymakers to get closer to their preferred choice. But if  $(\bar{\ell} - \underline{\ell})$  is small then tax expenditures provide a low income policymaker with

a weapon to use to alter the distribution of the burden in his favour, and thus hurt non-policymakers.

Finally, if only a deduction is available ( $s \leq t$ ), then whether or not it will produce a regime switch is ambiguous, and depends on the structural characteristics of the economy. Nevertheless, as with the credit, it is possible for a switch to occur which results in high income individuals being made worse off. Consider our earlier case with  $U(c, g) \equiv cg$ ,  $n = 5$ ,  $\bar{\pi} = 2/5$  and  $\underline{\ell} = 1$ ,  $\bar{\ell} = 2$ . Here, if  $s$  is restricted to lie below  $t$ , the policymaker always chooses a pure taxation outcome. If, however,  $n = 3$ ,  $\bar{\pi} = 1/3$  and  $\underline{\ell} = 1$ ,  $\bar{\ell} = 3/2$ , then, with  $s = 0$ , the policymaker will choose a pure taxation outcome with  $t = 1/2$ , involving a level of utility for high income individuals equal to  $\bar{U}^* = 1.146$ , whereas with the deduction available, the chosen policy will be  $s = t = 0.342$ , with  $\bar{U}^{**} = 1.168 < \bar{U}^*$ . And, as with a credit, in different scenarios, high income individuals could be made better off by the availability of tax expenditures even if a regime switch occurs.

## 5 Discussion and Extensions

Previous literature on tax expenditures for private contributions (Feldstein, 1980; Warr, 1982; Andreoni and Bergstrom, 1996) has examined the implications of these measures on the marginal incentives to donate. What our analysis adds to these earlier analyses is the incorporation of the changes induced by the presence of tax expenditures on the policymaker's fiscal choices. These changes involve adjustments not only on the 'intensive margin'—i.e., with respect to the decision of how much to contribute—but also on the 'extensive margin'—i.e., with respect to the decision of whether or not to become a contributor—which are at least as important.

The presence of tax expenditures can change the set of contributors leading to nonneutral distributional results. Effectively, a low income policymaker can use tax expenditures to work around the upper bound on progressivity implied by the proportionality of the tax. What may appear as generous tax provisions for donors may not be so generous after all; and, donors could actually benefit from the removal of tax preferences. Indeed, since a tax deduction for cash contributions is equivalent to contributions being in-kind, we can also conclude that the inclusion of 'imputed' income from in-kind contributions in taxable income could benefit volunteers. But high income individuals may benefit from the tax incentives if, without them, fiscal



choices are far from their preferred choices; this is more likely to occur the larger are income differentials. In such cases, the use of tax incentives would be favoured both by the majority and by the minority, and thus their inclusion in the fiscal constitution would be supported unanimously.

If, however, we accept the above political economy analysis to interpret recent voluntarism trends, we are still left with a puzzle: why should the median voter find it easier to manipulate the distributional properties of the tax system by resorting to tax preferences instead of trying to directly change the rate structure? After all, unless individuals are somehow myopic, a roundabout route should be equivalent to a direct one. There are a number of possible explanations for this preference. There may be more inertia in the legislative system with respect to tax changes than with respect to the introduction of tax preferences. Also, tax preferences may be used to manipulate voting agendas: targeted measures, if introduced in a piecemeal fashion, may be able to overcome political opposition, whereas a full-scale tax-reform with the same overall distributional impacts might be defeated. Examining this question would require the adoption of a dynamic voting analytical framework.

Our analysis could be extended in several other directions. We conclude our discussion by outlining possible avenues for further research.

### *Inferior Goods*

If the public good is an inferior good, then the expression  $U_g(c, g)/U_c(c, g)$  (the marginal rate of substitution between public and private consumption), is decreasing in  $c$ . This potentially creates two types of problem. First, the second-order conditions for (6)-(8) to identify a maximum may not be satisfied. Second, in a given scenario, there may exist multiple pure-strategy private contribution equilibria, one where only low income individuals are contributing and another one where both income types make positive contributions.

If we focus only on the first type of equilibrium, then the results that we have found in the normal case would go through but with a role reversal: a low income policymaker would never choose voluntarism over taxation, whereas a high income policymaker might do so; and the availability of a credit/deduction for private contribution may prompt a regime switch and may hurt private contributors.

We could thus imagine a scenario with multiple income types and multiple public goods, some of which are normal and some of which are inferior, and where a middle

income policymaker may take advantage of tax expenditures to switch to a voluntary regime where high income individuals make positive contributions for normal public goods and low income individuals make positive contributions for inferior public goods, and where both high and low income individuals are made worse off. Such a scenario may provide a more accurate picture of recent voluntarism trends.

### *Altruism*

Altruism has been invoked by several writers as an important explanatory factor of charitable behaviour (Andreoni, 1988; Bernheim, 1986; Ireland, 1990). As mentioned earlier, our analysis can be re-interpreted to apply to a scenario where groups of individuals of the same type are bound together by altruistic motives.

If altruism crosses over income boundaries, but is directed towards a group of individuals who are not ‘players’ in the policy game, then the conclusions of our analysis are still valid. Consider, for example, the case of altruistically motivated charitable transfers to the poor, in a setting where there exist three income classes—rich, middle-income, poor—and suppose that the poor do not pay taxes, and that there is a positive consumption-consumption externality flowing from the poor to both middle-income and rich individuals (the idea being that people care only if other individuals fall below a certain standard of well-being). Then donations would be analogous to a public good, to which our previous analysis would apply, i.e., it would be possible for a middle-income policymaker to take advantage of tax expenditures for charitable donations to switch from public to private support, making high income individuals worse off in the process.

But if altruism crosses income boundaries and relates to tax paying and contributing individuals, then the problem we have examined would be complicated by the presence of direct spillovers between the policymaker and other individuals, which would tend to ease the distributional tension that lies at the heart of our analysis.

### *Benefit Based Taxation*

It might appear from the previous discussion that the tension between taxation and voluntarism would arise only from a conflict between the way benefits from public goods accrue to different individuals and the ability-to-pay principle that is implicit in proportional income taxation. But we will show that this has a broader applicability;

indeed, the possibility that tax expenditures may prompt a switch to private provision arises even when taxes are benefit based.

We can illustrate this point with the help of an example. Consider an economy with  $n$  consumers of types  $A$  and  $B$ , all having an identical income of  $\ell$ , and whose preferences for private consumption and public goods are quasilinear:

$$u^i(c^i, g) \equiv c^i + z^i(g), \quad i \in \{A, B\}. \quad (73)$$

where

$$z^i(g) \equiv \gamma^i g - (1/2)\delta^i g^2, \quad i \in \{A, B\}, \quad (74)$$

with  $\gamma^i > 0$  and  $\delta^i > 0$  ( $i \in \{A, B\}$ ); for this specification, we have  $(z^i)'' = -\delta^i < 0$ , and  $(z^i)' = \gamma^i - \delta^i g$ , which is positive as long as  $g$  is less than  $\gamma^i/\delta^i$ . Analogously to our previous discussion, we denote with  $\pi^A$  and  $\pi^B$  ( $\pi^A + \pi^B = 1$ ) the proportions of each of the two types in the population. Public good provision is financed by type-specific lump-sum taxes  $t_A$  and  $t_B$ . Suppose also that there exist another public good, whose marginal cost of provision is unity and whose required amount is fixed at  $F$ . This benefits individuals equally and is paid for by a lump-sum tax  $\tau$  on all consumers.

The conditions for a noncooperative equilibrium with nonnegative contributions  $v^A$  and  $v^B$  for given taxes can be written as

$$\gamma^A - \delta^A g - 1 \leq 0; \quad (75)$$

$$\gamma^B - \delta^B g - 1 \leq 0; \quad (76)$$

$$v^A[\gamma^A - \delta^A g - 1] = 0; \quad (77)$$

$$v^B[\gamma^B - \delta^B g - 1] = 0; \quad (78)$$

$$g = n [\pi^A(t^A + v^A) + \pi^B(t^B + v^B)]. \quad (79)$$

As in our previous setup, we will assume that in the first stage of the game fiscal choices are made by majority voting, and that the choice of taxes is constrained by the requirement that they should reflect the marginal benefit received (benefit principle), i.e.,

$$\frac{t^A}{t^B} = \frac{\gamma^A - \delta^A g}{\gamma^B - \delta^B g}. \quad (80)$$

Because of the availability of benefit based taxes, it would seem that the deck is stacked in favour of taxation; yet it is possible that the majority will choose voluntarism over taxes.

Suppose for example that  $\ell = 15/10$ ,  $F = 5$ ,  $n = 10$ ,  $\pi^A = 6/10$ ,  $\pi^B = 4/10$ ,  $\gamma^A = 21/10$ ,  $\gamma^B = 31/10$ ,  $\delta^A = 1$ ,  $\delta^B = 3/2$ . One can verify that  $\tau = 1/2$ ,  $t^A = t^B = 1/5$ , constitutes a Lindahl equilibrium, where taxes are benefit based and the Samuelson condition is satisfied, and where  $(u^A)^L = 3$ , and  $(u^B)^L = 4$ . Since the median voter is not constrained to choose an optimal level of  $g$ , and tax expenditures are not available, he can do better by choosing  $t^A = 0.175$ ,  $t^B = 0.216$ , which yields  $(u^A)^T = 3.01$ , and  $(u^B)^T = 3.97$ . In a non-cooperative equilibrium with zero taxes, we have  $(u^A)^N = 2.96 < (u^A)^T$ . Thus, if  $A$  (the median voter) must choose between a pure tax equilibrium and a noncooperative equilibrium, he will choose the former.<sup>22</sup>

Now suppose that  $\gamma^B = 41/10$ ,  $\delta^B = 2$  (with all the other parameters as before). The Lindahl equilibrium still features  $t^A = t^B = 1/5$ . The optimal choice of taxes by an  $A$  type policymaker is  $t^A = 0.157$ ,  $t^B = 0.238$ , yielding  $(u^A)^T = 3.03$ . In a non-cooperative equilibrium with zero taxes, we have  $(u^A)^N = 3.05 > (u^A)^T$ , and  $(u^B)^N = 4.57$ , implying that the policymaker will select a pure private provision outcome.

Next, suppose that tax expenditures are available. Specifically, suppose that a credit at rate  $s$  against payment of  $\tau$  is given to individuals who make voluntary contributions for the provision of  $g$ . Effectively this means that tax expenditures are funded by increases in  $\tau$ , and that their cost is borne equally by the two consumer types. Then, in the scenario with  $\gamma^B = 31/10$ ,  $\delta^B = 3/2$ , the policymaker will select  $t^A = t^B = 0$ ,  $\tau = 0.6$ ,  $s = 0.57$ , which support an incomplete voluntarism outcome with  $(u^A)^S = 3.05$ , and  $(u^B)^S = 3.85 < (u^B)^T$ . In the scenario where  $\gamma^B = 41/10$ ,  $\delta^B = 2$ , the outcome is  $t^A = t^B = 0$ ,  $\tau = 0.56$ ,  $s = 0.34$ , yielding  $(u^A)^S = 3.07$ , and

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<sup>22</sup>An optimal interior solution with positive levels of taxation and voluntary contributions can be ruled out. The equilibrium conditions (75)-(75) can only be satisfied by  $v^A = 0$ ,  $v^B = 21/60$ ,  $g = 21/15$ , or  $v^A = 0$ ,  $v^B = 0$ , and  $g > 21/15$ . In this model, even under incomplete voluntarism,  $g$  is independent of the taxes (a marginal increase in public good provision through taxes fully crowds out private provision). Since the objective of the median voter is  $u^A = 1 - t^A + z^A(g)$ , which is decreasing in  $t_A$ , if the chosen level of  $g$  is  $21/15$  the median voter will choose  $t_A = 0$ ; if the chosen level of  $g$  is above  $21/15$ , then he will choose positive taxes and voluntary contributions will be zero.

$(u^B)^S = 4.75 > (u^B)^N$ . Thus, in the first scenario the availability of the credit hurts non-policymakers, whereas in the second scenario it benefits them.

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