Political Economy.doc
1998-06-15

THE POLITICAL ECONOMY OF PUBLICLY PROVIDED PRIVATE GOODS

by

Sören Blomquist* [1]

and

Vidar Christiansen* [2]

Abstract

A large share of public funds is spent on private goods (education, health care, day care, etc.). This paper integrates two different approaches to the analysis of public provision of private goods. While normative public economics has established an efficiency case for such provision, the commonly held political economy view has been that it is an economically inefficient phenomenon generated by the political process. The present paper argues that the central mechanism studied in the normative approach is equally relevant to voting models of decisions on public provision. It is shown that under plausible information constraints economically efficient public provision of private goods will be part of politically rational decisions emerging from a median voter process or a representative democracy of political parties.

Keywords: political economy, public provision, private goods, in-kind transfers
JEL classification: D72, H21, H42, I38

[1] Department of Economics, Uppsala University, Box 513, SE-751 20 Uppsala, Sweden.
E-mail: Soren.Blomquist@nek.uu.se
[2] Department of Economics, University of Oslo

* We are grateful for comments from participants in the workshop in public economics in Uppsala and a seminar at the University of Helsinki.

1. Introduction

Public provision of private goods, like education, health care and day care, is quantitatively important in all developed countries, amounting to as much as 15-20% of GNP in some countries. In, for example, the Nordic countries education and health care are almost exclusively publicly provided, whereas in other countries, like US, there is a mix of private and public provision. Standard textbooks in public economics provide no explanation for this type of public expenditures and there is an ongoing public debate both in North America and Europe to what extent the public sector should provide private goods. Particularly in US there is also a debate on whether individuals should be allowed to top up publicly provided goods. Especially with respect to education voucher systems have been discussed (Epple and Romano (1998)).

There is an emerging, fast growing, literature attempting to explain the role of public provision of private goods. The major part of this literature develops normative theories that show how public provision of private goods under certain conditions can be beneficial and improve efficiency.[1] The normative theories distinguish two basic functions of public provision of a private good. One is to mitigate an informational constraint that restricts the redistribution that can be accomplished by an optimal nonlinear income tax. Another function is to mitigate a time inconsistency problem. There also exists a literature with positive theory. These theories usually build on the median voter theorem and impose highly restrictive assumptions on the available tax and transfer instruments.[2]

The normative theories all point to an important function for the publicly provided private good in improving the efficiency of the economy. With one or two exceptions, this role for the publicly provided good is absent from the positive papers. In the articles with positive theory the admissible tax instruments are severely restricted. This has as consequence that the publicly provided private goods in these models more or less serve as a substitute for a demogrant.[3] The reason why there in these models exists a voting equilibrium

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[1] Nichols and Zeckhauser (1982), Guesnerie and Roberts (1984), Blackorby and Donaldson (1988), Besley and Coate (1991), Bruce and Waldman (1991), Blomquist and Christiansen (1995, 1998a), Boadway and Marchand (1995), Coate (1995), and Cremer and Gahvari (1997) are a few interesting examples of this literature.

[2] Meltzer and Richard (1985), Bergstrom and Blomquist (1996), Epple and Romano (1996a,1996b), Gouveia (1996,1997) are examples of articles developing positive theories. The focus of Besley and Coate (1997) is not on public provision of private goods. However, one of their examples provide a political economy model of public provision of private goods.

[3] Hence the scheme is basically the same as that of Roberts (1977) which provides a political economy explanation for the choice of income tax rate and a lump-sum transfer in cash.

with public provision of private goods is that the possibility for redistribution via taxes is a priori excluded. Our purpose is to make a synthesis of the two strands of literature. We want to construct a positive theory of public provision of private goods where we allow the tax instruments to be as flexible as possible, and where we as an essential part of the model include one of the mechanisms for improved efficiency that are described in the normative literature. We want to investigate if there will be a voting equilibrium with publicly provided private goods in models where publicly provided private goods do not serve as a substitute for tax instruments.

The questions we want to study are. Under what conditions will the voting equilibrium be such that there is public provision of a private good? Are the voting equilibria with public provision of private goods in some sense better or worse than the equilibria obtained if the possibility of public provison of private goods is a priori excluded? Are the voting equilibria with public provision of a private good Pareto efficient? We will study these issues for two political processes. We start by studying direct democracy simple majority voting. In the following we denote this as simple majority voting. We also study a model with representative democracy with two political parties.

Epple and Romano (1996a) is a recent article presenting a positive theory of publicly provided private goods. They study and characterize the equilibrium in a median voter model where individuals are allowed to supplement the publicly provided private good. Epple and Romano denote this good as health care. The political process they study determines the quantity of the good provided but not what good it is that should be provided. In Epple and Romano (1996a) there is something outside the model that determines which good should be publicly provided. Hence, the Epple and Romano paper does not provide an explanation why the good in question, and not some other good, is publicly provided. Also, given the model they present there is nothing in the model that suggests that it is health care. It might as well be haircuts or sausages. Epple and Romano use the median voter framework and assume that the publicly provided good is financed by a proportional income tax. The fact that there in the Epple and Romano model exists a voting equilibrium with a positive provision of a private good is entirely due to the fact that redistribution in their model is hampered by the restrictive form of the tax function. The raison d'etre for public provision in their model is that it serves

as a substitute for a demogrant. If the model allowed a linear tax, there would not exist a voting equilibrium with public provision of "health care".[4] [5]

Meltzer and Richard (1985) use a model where public provision of a private good is not due to restrictions on tax instruments. The reason why there in their model exists a voting equilibrium with a publicly provided private good is that public provision of the good affects the size of the tax base. Bergstrom and Blomquist (1996) study a similar mechanism. In their model the labor force participation of mothers increase if day care is publicly provided. Under certain conditions this can lead to such a large increase in the tax base that the income tax can be lowered as the level of publicly provided day care increases. This means that all individuals would vote for some public provision of day care.[6]

The rest of the paper is organized as follows. In section two we describe the efficiency enhancing role publicly provided private goods can serve. This mechanism is studied in, for example, Blomquist and Christiansen (1995) and Boadway and Marchand (1995). There are two types of individuals. One group with low skill persons and one group with high skill persons. The basic problem is how to design a transfer from the high skill to the low skill persons when type of person is private information not available to the goverment. Using taxes a certain amount of redistribution can be achieved. However, the transfer is restricted by the condition that the combination of gross and net income intended for the low skill person should not be so attractive to the high skill person that he is induced to mimic the low skill person. Giving part of the transfer to the low skill person in the form of public provision of a private good can alleviate the mimicking constraint. In section three we embed this mechanism in a very simple political economy model. We assume the low skill group is the larger one and that the choice of economic policy is determined by simple majority voting. The Condorcet voting equilibrium will be such that the preferred policy of individuals in the low skill group wins.[7] Epple and Romano (1996a) find that public provision

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[4] This is also pointed out in footnote 15 in Epple and Romano (1996a).

[5] We have taken the article by Epple and Romano as an example of a median voter model that obtain results on existence of publicly provided private goods mainly because of serious restrictions on the policy instruments available. The same type of critique can be raised against, for example, Gouveia (1997) and Gradstein and Justman (1996).

[6] Lundholm and Ohlsson (1998) also study a tax base effect mechanism. However, in their model wages are endogenous and part of the benefits of publicly provided day care is due to wage effects.

[7] A Condorcet winning policy is one that will win in majority voting against any other feasible policy that may be proposed.

of a private good like health is inefficient.[8] In our model we find that public provision of a private good can be Pareto improving.

In section 4 we develop a median voter model. As in section 3 we still consider the case with two types of individuals. However, individuals are now also characterized by preferences for how much redistribution they would like. Policy making is rarely decided through simple majority voting. In section 5 we therefore model a more realistic political process. Instead of simple majority voting we study a political process with representative democracy. There are two political parties who compete for votes. Section 6 concludes.

2. Publicly provided private goods as a skill screening device

In the political economy models we study below public provision of private goods serves as a skill screening device, allowing redistribution to take place with less distortions than if only taxes and cash transfers were used. This mechanism has been studied by, for example, Blomquist and Christiansen (1995, 1998a), Boadway and Marchand (1995) and Cremer and Gahvari (1997). As a background for the rest of the paper we will summarize the most important aspects of the normative model studied in these articles.

Consider an economy with two types of individuals, one group of low productivity and one group of high productivity individuals. Skill levels are reflected in wage rates. Information about individual skills (wage rates) is private information not available to the government. Let h be hours of work, $Y = wh$ before tax labor income and B after tax income. Let c denote the quantity of a tradable good and x the quantity of a good that can be bought on the market, but also can be publicly provided. For convenience we normalize the producer prices of c and x to one. Individual preferences are represented by a strictly quasi concave utility function $U(c,x,h)$. We consider the case in which the marginal valuation of x is increasing in labor supply: $\partial MRS_{cx} / \partial h \geq 0$. Blomquist and Christiansen (1998a) show that, given this assumption holds with strict inequality, the best public provision scheme is the one

[8] Epple and Romano argue that the public provision level is inefficient at the political equilibrium, but they do not elaborate on the sense in which the provision is inefficient. What they do show is that the provision is inefficient by first best standards (the marginal rate of substitution for some consumers deviate from the marginal rate of transformation). However, the public provision is clearly Pareto efficient taking as given the restrictions on the set of policy instruments that are imposed in the model. In other words, given the instruments available for redistribution, there is no way that one can eliminate the public provision to make some consumers better off without making others worse off. The public provision is second best efficient relative to the set of feasible policies. Thus, the lack of first best efficiency must be blamed on the exogenously given limitations on the availability of instruments rather than on the competition for votes as such.

that allows the consumers to top up the public quantity at their own expense. Assuming that the consumer chooses utility maximizing quantities of *c* and *x* subject to his budget constraint for a given labour supply, the demand for *x* can be expressed by the conditional demand function *x(B,h).* We shall assume that *x* is a normal good: $\partial x / \partial B > 0$. The assumption above that $\partial MRS_{cx} / \partial h \geq 0$ is equivalent to $\partial x(B,h) / \partial h \geq 0.$ The conditional demand is increasing in labour (and consequently decreasing in leisure).

The instruments available to the government are income taxes and public provision of *x*. We denote the publicly provided quantity by $\bar{x}$. No restrictions are imposed directly on the shape of tax schedules that can be used. However, the asymmetric information implies that the policy must be designed subject to an information constraint. The income/consumption bundle intended for a person must be designed subject to being unattractive to the other person. Let $V(\bar{x}, B, Y / w)$ denote the indirect utility function conditional on the labour supply $h=Y/w$ and the public provision $\bar{x}$. We use a superscript to indicate type of individual. N^i denotes the number of individuals of type $i \in \{1,2\}$. The problem of designing a Pareto optimal income tax and public provision structure is then given by :

$$\underset{B^1,Y^1,B^2,Y^2,\bar{x}}{Max} \quad V(\bar{x}, B^1, Y^1 / w^1) \tag{1}$$

$$s.t. \quad V(\bar{x}, B^2, Y^2 / w^2) \geq \bar{V}^2 \tag{2}$$

$$V(\bar{x}, B^2, Y^2 / w^2) \geq V(\bar{x}, B^1, Y^1 / w^2) \tag{3}$$

$$V(\bar{x}, B^1, Y^1 / w^1) \geq V(\bar{x}, B^2, Y^2 / w^1) \tag{4}$$

$$N^2(Y^2 - B^2) + N^1(Y^1 - B^1) - (N^1 + N^2)\bar{x} \geq 0 \tag{5}$$

The constraint (2) assigns a given utility level to person two. The constraint (3) is the self-selection constraint imposing that the taxes must be set in such a way that person two does not gain by mimicking person one. Equation (4) is the corresponding constraint that person one does not gain by mimicking person two. One can show that at most one self-selection constraint is binding. The most studied case (often called the normal case) is the one where redistribution is from the high skill group to the low skill group to the extent that constraint (3) is binding. This constraint causes the optimal taxation to be such that there is a distortion imposed on the low skill person. He is induced to substitute leisure for market consumption so

that the before tax/after tax income is too low as compared with the first best. Inequality (5) is the government's budget constraint.

Let us first consider the problem above with the added restriction that $\bar{x} = 0$. We then have the standard optimal income tax problem as formulated by Stiglitz (1982) and Stern (1982). For levels of $\bar{V}^2$ sufficiently close to the laissez faire level, indicated by point A in figure 1, redistribution can take place without the self-selection constraint binding. However, for more ambitious redistribution the self-selection constraint will bind. Using the optimal income tax instruments the Pareto frontier is given by the solid curve in figure 1.

As shown in detail in Blomquist and Christiansen (1995, 1998a), if leisure is nonseparable from goods, public provision of a suitable private good can alleviate the self-selection constraint.[9] Qualitatively, using public provision, the Pareto frontier moves outward. In figure 1 we illustrate this with the dotted line. To the left of point *B* and to the right of point *C* public provision is part of the Pareto efficient policy.

If $\bar{x} = 0$, we have the pure OT solution. One can show that the optimization problem then has a unique solution. This implies that to each point on the Pareto frontier there exists a unique policy point $\{Y^1, B^1, Y^2, B^2\}$. For $\bar{x} > 0$ there might exist multiple solutions to the optimization problem, i.e., each point on the Pareto frontier might be implemented by alternative policies. This does not create any problems for the following analysis except that it complicates notation. For notational simplicity we therefore in the following write *as if* the solution to the problem defined by eqs. (1)-(5) always is unique.

Blomquist and Christiansen (1995) give a characterization of goods suitable for public provision:

i. The good should be such that it is impossible (or at least very hard) to resell the publicly provided quantity.

ii. Leisure should not be weakly separable from goods.

iii. The demand for the publicly provided good should vary much as leisure varies.

iv. There should not be any close market substitutes to the good in question.

To get some intuition for the role of public provision, consider the case in which there is redistribution from high-skill to low-skill individuals and constraint (3) is strictly binding. Note that if the high-skill type mimics the low-skill type, the former has more leisure as less

work effort is required to obtain a given income when the wage-rate is high. With the assumption that has been made about the demand for *x*, the mimicker has a lower demand than person one. This means that it is possible to give the low-skill person a transfer in terms of *x* that is at the same time within the consumption level desired by person one and beyond the level desired by the mimicker. Then for the low-skill person the transfer is equivalent to a transfer in cash, while from the perspective of the mimicker it is inferior. The advantage is that the transfer is achieved with less inducement for person two to mimic. The self-selection constraint is softened and it is possible to achieve a more favourable optimum.

Blomquist and Christiansen (1995) discuss how public provision of education, day care and health care can be fitted into this framework. To be concrete we could exemplify with day care. If low skill women working full time require, say, 1800 hours of day care a year we could leave their position unchanged by introducing a system of free day care and at the same time increase their tax burden with an amount equal to the cost of the publicly provided day care. High skill women who might be thinking of working half time instead of full time will now find it less attractive to work half time instead of full time.

The normative theory of taxation and public provision described above derives a number of results. Confining our attention to the so-called normal case, we may draw attention to the following results:

Result 1: Suppose $\partial x / \partial h = 0$, then no Pareto-improvement can be obtained by public provision of *x*. See Blomquist and Christiansen (1995, Proposition 1), Boadway and Marchand (1995, Proposition 1), Blomquist and Christiansen (1998a, Proposition 2a) and Cremer and Gahvari (1997, Proposition 2).

Result 2: Suppose that $\partial x / \partial h > 0$, and individuals are allowed to supplement the public provision on the market, then a policy with optimal taxation and optimal public provision strictly Pareto dominates the pure tax optimum. See Blomquist and Christiansen (1998a, Lemma 2).

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[9] Given the assumption that $\partial x / \partial h > 0$ a commodity subsidy on x can also be used to alleviate the self-selection constraint (see Edwards et al. (1994) and Blomquist and Christiansen (1998b)).

3. A two class economy with simple majority voting

We will now take the model described in section two and embed it in a voting context. In this section we assume that individuals only differ with respect to skill level. All individuals within a group are identical. The group of low productivity individuals is the larger one. This means that in simple majority voting, the policy that individuals in the low productivity group prefers will win. Suppose further that the low productivity individuals want to redistribute from the high productivity to the low productivity group in such a way that their own utility is maximized. However, there can be various kinds of limits to how hard the high productivity group can be taxed. We can make two alternative assumptions. One is that the high productivity individuals are mobile and must be guaranteed a minimum utility level in order not to move to another country. The alternative assumption is that individuals in the high productivity group are immobile, but other constraints must be observed.

If the high-skill class is immobile, there are two ways in which the utility of the low skill class can be constrained. First, it may be necessary to leave sufficient resources for the high- skill people to make sure they do not fall below the subsistence level. Second, it may be that it is not in the interest of group one to push the utility of group two below a certain level (above subsistence level). A further reduction in the utility level of group two may not be feasible without also lowering group one's own utility level. The reason is that even if more resources are transferred from the high-skill group, the self-selection constraint becomes more acute.[10] And at some point the former effect may cease to dominate. The effects are elaborated in an appendix. Thus starting by maximising V^1 for an arbitrarily given value of V^2 and then lowering V^2 may take us to a point beyond which we fail to increase V^1 any further. One reaches the endpoint of the Pareto frontier.

To sum up, there are three ways in which a minimum utility requirement for high-skilled types can be imposed, that is, as a reservation utility for a mobile type, as a subsistence level, or as a utility level below which it will not pay for the low-skill type to push the utility level of the high-skilled type[11]. If we for the moment disregard public provision of private goods a low productivity person then faces the standard optimal taxation problem as described in for example Stiglitz (1987). If there is voting over different tax systems, the one that is the solution to this optimal income tax problem will win over all other candidates. As is well

[10] It seems that mimicking cannot be avoided if *only* the high skill group is close to the subsistence level.

[11] We may note that in the last case the utility requirement for the high-skilled types is not a binding constraint in the selfish optimisation of the low-skilled class.

known this tax system must be designed in such a way that high productivity individuals do not mimic the low productivity individuals. This self-selection constraint will limit the utility level obtainable for the low productivity individuals. If a publicly provided private good that slackens the self-selection constraint is introduced, the utility for low productivity individuals can be raised. If the optimal tax system and the tax system combined with public provision were alternatives in voting, the public provision scheme would win. We formalize this as:

Proposition 1. The preferred policy of the low skill individuals will be a Condorcet winner. This policy will be Pareto efficient. This implies that results 1 and 2 in section 2 apply.

4. A median voter model

As in section 2 we consider a model where there are only two skill classes. Hence the Pareto frontier is defined in the same way as in section 2. However, we now assume that individuals differ in respect to how much redistribution they want. Each individual is characterized by a parameter a, where a has a continuous distribution. As before, let N^1 be the number of individuals in the low skill group and N^2 the number of individuals in the high skill group. Let $f^1(a)$ be the density of a in group 1 and $f^2(a)$ the corresponding density in group 2.

Individuals' voting behavior

A policy consists of a constellation of before and after tax incomes intended for the high and low skill groups $\{Y^1,B^1,Y^2,B^2\}$ and a value $\bar{x}$ of the public provision. Let Z be the set of combinations of $\{\bar{x},Y^1,B^1,Y^2,B^2\}$ that achieves budget balance, and let z be a policy within this set. We assume the policy is determined by majority voting.

When deciding on his consumption/leisure choice an individual acts so as to maximize the utility $V(\bar{x},B^i,Y^i)$. However, when voting on an economic policy, individuals also take into account how different policies affect other individuals. Hence, when voting, an individual attaches a weight to the utility of his own group, but also gives a weight to the utility of the other group. (We elaborate on the nature of the preferences in section 5 below.) The policy preference function is given by:

$$W = a\,N^1V^1(B^1,Y^1,\bar{x}) + (1-a)N^2V^2(B^2,Y^2,\bar{x}); \qquad 0 \le a \le 1 \qquad (6)$$

How an individual ranks different policies only depends on how the policies affect V^1 and V^2. When studying how an individual ranks different policies we can therefore study how he ranks different combinations of V^1 and V^2. Since all individuals within a skill class are treated equally we can draw the Pareto frontier as in figure 1.

Definition: We denote the median a as a_m and define the median voter as the voter characterized by a_m.

Proposition 2: The median voter's preferred policy will be a Condorcet winner. This policy is Pareto efficient, and Results 1 and 2 are valid.

Proof: Let us consider two policies z_m and z_a, where the former is the policy preferred by the median voter and the latter is a feasible, but otherwise arbitrary alternative policy. The policy z_m implies the utility levels V_m^1 and V_m^2 for the respective skill types. Since the median voter assigns positive weights to the utilities of both skill types his preferred policy is obviously Pareto efficient. The utility levels corresponding to z_a are V_a^1 and V_a^2. Let us define D(a) as the difference between the welfare level resulting from z_m and the welfare level obtained from z_a as perceived by a voter of type a. $D(a) = [aV_m^1 + (1-a)V_m^2] - [aV_a^1 + (1-a)V_a^2] = a[(V_m^1 - V_a^1) + (V_a^2 - V_m^2)] + V_m^2 - V_a^2$ and $D'(a) = [(V_m^1 - V_a^1) + (V_a^2 - V_m^2)]$. There are three cases to consider. i. Assume first that $V_m^1 - V_a^1 < 0$, $V_a^2 - V_m^2 < 0$, i.e. the alternative policy is more generous to type one and less generous to type two. Then $D'(a) < 0$. Since z_m is the preferred policy of the median voter, obviously D(a_m) >0. It follows that all voters with $a \le a_m$ (and some voters with a greater than but close to a_m) will prefer z_m to z_a. ii. Assume next that $(V_m^1 - V_a^1) > 0, (V_a^2 - V_m^2) > 0$, i.e. the alternative policy is more generous to type two and less generous to type one. Then $D'(a) > 0$. It follows that all voters with $a \ge a_m$ (and some voters with a less than but close to a_m) will prefer z_m to z_a. We may note that in the cases considered so far z_a may or may not be a Pareto efficient policy. The only assumption is that this policy is not Pareto dominated by z_m, which is the

final case to be considered[12]. iii. Assume that $(V_m^1 - V_a^1) > 0, (V_a^2 - V_m^2) < 0$. Since the alternative policy is Pareto dominated by z_m, everybody will prefer z_m to z_a. **QED**

Readers familiar with the median voter theorem know that the theorem is only applicable to voting over one dimensional issues. So why do we obtain a median voter result here? The reason is that the voting is *de facto* over points on the Pareto frontier, which is one-dimensional.

According to proposition 2 the median voter's preferred policy will be a Condorcet winner, that is, it will win in majority voting against any other proposed policy. Since the median voter's preferred policy is Pareto efficient, public provision will be part of the policy if the median voter´s preferred policy is in a certain range of the Pareto frontier. We note that in the present setting optimal nonlinear income taxes are available. Still, the voting equilibrium will be such that public provision is part of the policy. The reason is that by using public provision of a private good the efficiency of the income redistribution is increased. It also means that the characterization of private goods suitable for public provision that is given in Blomquist and Christiansen (1995) and reproduced in section 2 above would be valid also in the present context.

5. Representative democracy with two political parties

We shall consider a voting model of two political parties. The model is established by first making assumptions about the political parties and then about the voters. The competition between the parties is perceived as a non-cooperative game which is shown to have a Nash equilibrium. The properties of this equilibrium are examined in some detail.

The parties

Our model is inspired by Hansson and Stuart (1984), Lindbeck and Weibull (1993) and Dixit and Londregan (1998). There are two parties denoted by *L* (leftist party) and *R* (rightist party). A policy consists of a constellation of before and after tax incomes intended for the high and low skill groups and a public provision level $\{\bar{x}, Y^1, B^1, Y^2, B^2\}$. Let Z be the set of combinations of $\{\bar{x}, Y^1, B^1, Y^2, B^2\}$ that achieves budget balance. Then each party chooses a $z_p \in Z$, $p = L,R$ prior to the election.

[12] Since z_m is Pareto efficient, there is of course no case where it is Pareto dominated by the alternative policy.

We assume that the policy that is actually implemented is the policy of the party that wins the election. The underlying presumption is that each party is able to credibly commit to a certain policy. Thus we rule out the possibility that a party does not keep its promises from the election campaign[13]. It is a common in the literature to make some kind of assumption to the effect that the parties implement their promised policies if winning. Sometimes it is just imposed as an assumption that the parties implement their promised policies (e.g. Dixit and Londregan (1998)), sometimes the assumption is implicit (e.g. Lindbeck and Weibull (1987) or Hansson and Stuart (1984)), and sometimes there is an appeal to underlying assumptions. Lindbeck and Weibull (1993) assume that at least all voters believe that the winning party will implement its announced policy. For a theory of what happens at the election this may be a sufficient assumption. For a theory of actual policy one obviously needs to know also how the parties actually behave. Lindbeck and Weibull also appeal to the existence of future elections (otherwise not appearing in the model), to suggest that cheating may be prohibitively costly in terms of future loss of credibility. Besley and Coate (1997) point out that it is natural to assume that the citizen who wins the election implements his preferred policy (i.e. the policy he would choose as a dictator), and that promising anything else is not credible, while commitment to other policies is more problematic.[14]

At the pre-election stage the outcome of the election is perceived as random. Once the outcome of the election is known, each party evaluates the winning policy according to its social welfare function. We assume there is no benefit from winning the election as such. There is no so-called ”ego-rent”. It follows that prior to the election the objective function of a party is the expected welfare that will emerge.

For party *L* the expected welfare is given by:

$$p(z_L, z_R)W^L(z_L) + \left(1 - p(z_L, z_R)\right)W^L(z_R) \qquad (7)$$

[13] A complication in practice may be that at the time the policy is designed the state of the world that will materialise in the period of office is not known with certainty. Since there is limited scope for state contingent election manifestos, it may be a matter of interpretation whether the actual policy is according to the pre-election platform when allowing for the need to adjust to the circumstances that materialise. We abstract from uncertainty of this kind.

[14] See Alesina (1998).

where $p\,(z_L, z_R)$ is the probability that party L will win the election. This probability depends on the policy choices of the two parties. Below we describe how this probability is determined. The social welfare function $W^L(z_p)$ is given by

$$W^L(z_p) = a_L N^1 V^1(B_p^1, Y_p^1, \bar{x}) + (1-a_L) N^2 V^2(B_p^2, Y_p^2, \bar{x}) \qquad p = L,R. \qquad (8)$$

The expected welfare from the perspective of party R is defined in a symmetric way. We assume the leftist party puts a larger weight on the welfare of the low skill group, $a_L > a_R$. Party L maximizes the expected welfare w.r.t. z_L for a given z_R and vice versa.

Individuals' voting behavior

When deciding on his consumption/leisure choice an individual acts so as to maximize the utility $V(B^i, Y^i, \bar{x})$. However, when voting individuals also take into account how different policies affect other individuals. Hence, when voting, an individual attaches a weight to the utility for the own group, but in general also for the other group. There may be several ways to justify such an assumption. Even if people are maximising their own utility as agents in the market, to vote is to express an opinion also about distributional policy. Voting may be seen as a matter of principle. The voters may endeavor to put themselves behind the veil of ignorance about their attainable position in society. And even if people know something about their present position there may be a probability that their position may change, and they may be ignorant of their children's future position. Whatever the reason the voters may adhere to a certain altruism. But we shall not rule out the possibility that a number of voters may assign a zero weight to the utility of the other skill group, or that voters from one class may typically attach a greater weight to the utility of his/her own class. An individual's political preferences are represented by a *policy preference function*:

$$W^p = a\, N^1 V^1(B_p^1, Y_p^1, \bar{x}) + (1-a) N^2 V^2(B_p^2, Y_p^2, \bar{x}) \qquad (9)$$

where $0 < a \leq 1$. As a shorthand we write this as[15]

[15] It is of interest to elaborate a bit on the preferences that can be captured by a function of the type $\alpha N^1V^1+(1-\alpha)N^2V^2$, where for simplicity the party index has been omitted. In the political economy literature preferences are sometimes assumed to be made up of a "social" part and a "selfish" part; see e.g. Dixit and Londregan (1997). A way to represent such a "mixed" preference function could be as $\beta V^1+\gamma N^1V^1+(1-\gamma)N^2V^2$ for a person who is a member of group 1. Here β is a parameter measuring the selfishness of the person and βV^1 is the selfish part

$$W^p = a\,N^1V_p^1 + (1-a)\,N^2V_p^2 \qquad (10)$$

In our model it is optimal to vote sincerely. To understand why this is so it is worthwhile to consider a number of the assumptions that have been made. First, a voter cannot influence a party's choice of programme by threatening to vote for the other party under certain contingencies. This is because there is no way a voter can credibly commit to do so. Everybody knows that when election day comes along it is in the interest of a citizen to cast his vote in favour of the policy which is more in line with his preferences. Doing otherwise will only increase the probability that a policy he likes less is going to win. Second, it is assumed that the policy of the winning party is fully implemented. If the actual policy were to be determined as some sort of weighted compromise between the policies of the two parties with the weights affected by voting shares, strategic voting behaviour might creep in as a voter might then hope to draw the actual policy a bit closer to his preferred policy by voting for a policy he would not like to see fully implemented. (But even then sincere voting is not necessarily ruled out; see Dixit and Londregan (1998)). Third, there is only one election period and thus no incentive to try and influence a party's future choice of platform.

Our assumptions imply that an individual votes for party *L* if

$$a\,N^1V_L^1 + (1-a)\,N^2V_L^2 \geq a\,N^1V_R^1 + (1-a)\,N^2V_R^2 \qquad (11)$$

We rewrite this as

$$a \geq \frac{N^2(V_R^2 - V_L^2)}{N^1(V_L^1 - V_R^1) + N^2(V_R^2 - V_L^2)} = \hat{a} \qquad (12)$$

Let a be distributed as $f^1(a)$ and $f^2(a)$ for the low and high skill groups, respectively. The number of individuals preferring party *L's* policy is then given by

$$m = m(z_L, z_R) = \int_{\hat{a}}^1 N^1 f^1(a)\,da + \int_{\hat{a}}^1 N^2 f^2(a)\,da \qquad (13)$$

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while the remaining part is the social one. We assume that $b \geq 0$, $0 \leq g \leq 1$, and at least one of the parameters is strictly positive. These preferences are equally well represented by a function $\sigma(\beta V^1+\gamma N^1V^1+(1-\gamma)N^2V^2)$ where σ is an arbitrary positive parameter. It is easy to show that (10) is general enough to accommodate this class of preferences. To see this let σ and α be defined by the following equations: $\sigma(\beta+\gamma N^1)= \alpha N^1$ and $\sigma(1-\gamma)=1-\alpha$. Solving with respect to σ and α we get $s = N^1/(N^1+b)$ and $a = (b+N^1g)/(b+N^1)$. We note that $\sigma>0$ and $0 < a \leq 1$ as should be the case.

If the voting behaviour is entirely deterministic each party can calculate for any configuration of policies whether it is going to win the election. The policies will then converge as from the perspective of any party a winning policy is always better than a losing policy as long as the winning policy is considered at least slightly preferable to the policy of the opponent. This scenario is not very realistic. In practice there are numerous elements which are beyond the control of the parties and which they will treat as random. In the literature several approaches have been adopted to model random voting behaviour[16]. But it seems that the exact way to model random voting behaviour is of less importance. What is central is that the parties can only affect the probabilities of winning and the expected outcome in terms of policy and welfare according to a party's preference scale. Accepting this premise we may as well choose a simple random element.

We know that in most elections not everyone will vote and that an important aspect of winning an election is to motivate the individuals supporting the party to actually vote. We do not intend to go into this in any depth, but use a quite stylized model to capture the fact that many people do not vote. Without lack in generality we assume that individuals supporting party R will always vote. However, only a fraction of the individuals supporting party L will actually vote[17]. This fraction is a random variable q assumed to follow a uniform distribution with support $0 < a < q < b < 1$. Let $N=N^1 + N^2$ and $g=(N-m)/m$. If $\gamma < a$ the probability that party L will win is 1. If $\gamma \geq b$ the probability that party L will win is zero. For $a < g < b$ the probability that part L will win is given by:

$Pr(\text{party } L \text{ wins}) = Pr(qm(z_L, z_R) > N - m(z_L, z_R)) = Pr[q > (N - m(z_L, z_R)) / m(z_L, z_R)] =$

$\int_g^b \frac{1}{b-a} dq = \frac{b-g}{b-a}$. Rewriting this probability we obtain: $Pr(\text{party } L \text{ wins}) =$

16 Sometimes it is just postulated that probabilities depend on policy choices. Sometimes more specific assumptions are made. For instance Dixit and Londregan (1998) assume that there are groups of extremist voters supporting their respective parties irrespective of election manifestos, but the size of each group is unknown to and is treated as random by the parties.

17 The inclination to go and vote may depend on weather conditions, whether there is an influenza epidemic, the encouragement offered by the mass media, etc. One may argue that it is a bit special to link voting propensity to party adherence as such. The important assumption is that the probability of voting differs between groups otherwise the stochastic element would just be similar to having an electorate of random size but with deterministic shares of party support. We have opted for the simplest way to model a systematic difference between classes. Our approach may even have a claim for realism as it is known from several countries that conditions inducing a high turn-out tend to favour certain parties.

$p(z_L, z_R) = \frac{1+b}{b-a} - \frac{N}{m(b-a)}$. An important feature of this expression is that $\partial p / \partial m > 0$.

Nash Equilibrium

To study the Nash equilibria for this model we need to study the reaction functions $z_L(z_R)$ and $z_R(z_L)$. This is complicated since z_P is multidimensional. However, we can reduce the dimensionality of the problem and instead study the reaction functions $V_L^1(V_R^1)$ and $V_R^1(V_L^!)$. The reason why it is sufficient to study these functions is that each party will always respond with a Pareto efficient policy. This means that we can summarize the policy of party *P* by a single number V_P^2. Since only Pareto efficient points are relevant V_P^1 is then uniquely determined.[18] Let us establish that all chosen policies are Pareto efficient.

Proposition 3: The optimal strategy for a party is to propose a Pareto efficient policy.

Proof: Recall that the expected welfare from the point of view of a party p is $p_p(z_p, z_o)[W^p(z_p) - W^p(z_o)] + W^p(z_o)$, where z_p is the party's own policy, z_o is the policy of the opponent and W^p is the welfare level according to the preferences of the party. Also recall that the welfare function of any party and voter is of the form $\alpha N^1 V^1 + (1-\alpha) N^2 V^2$. We assume that for both parties $0 < \alpha < 1$, and there is a continuous distribution of voters from those with $\alpha = \alpha_o \geq 0$ to those with $\alpha = \bar{\alpha} > 0$. Assume that the party is going to make a choice between a policy z_p^N which is not Pareto efficient, and a Pareto superior policy z_p^P, while taking the policy proposal of the opponent as fixed. The choice will have two effects. It will affect the welfare that the party obtains if it wins, and it will affect the probability of winning. Since the party adheres to the Pareto principle (i.e., it always considers a Pareto improvement to be desirable), the welfare it obtains if winning must increase if it picks the Pareto superior policy. Since the voters also adhere to the Pareto principle, all voters will find the party more attractive if it selects the Pareto superior policy[19]. Becoming a more attractive party to vote for the party cannot lose support. In fact, since there is a contimuum of voters,

[18] We also make the technically convenient assumption that there is a unique policy that corresponds to each Pareto efficient point.

some who would otherwise be marginal supporters of the opponent will now vote for the party under consideration. Choosing a Pareto superior policy is the way to increase welfare if the party wins and the way to increase the probability of winning. **QED**

When discussing further the political equilibrium it is useful to consider as benchmarks the (hypothetical) cases in which each party is not exposed to political competition.

Definition: If the parties could act as dictators they would chose policies that maximize (8). We will denote these policies as the **dictator policies**. We denote the corresponding values of V^2 as $\overline{V}_R^2$ and $\overline{V}_L^2$. The implied points on the Pareto frontier are indicated by *R* and *L* in figure 2.

Depending on their value of a different individuals prefer different points on the Pareto frontier. For an individual with $a = 0$ the preferred point will be the one where V^2 achieves its maximum. We denote this $V_{\max}^2$. As a increases the preferred point will move down towards the right along the Pareto frontier. If $a = 1$ the point where V^1 is maximized will be the preferred one. We denote this point $V_{\min}^2$.[20]

To guarantee that the voting problem is non-degenerate, i.e. that no party wins with certainty, we have to make assumptions on the distribution of a. We assume the distribution of a is such that more than 50% of the individuals prefer a value of V^2 that is less than $\overline{V}_R^2$. Otherwise the policy corresponding to R would win with certainty. We also assume that more than a fraction (1-0.5/a) of the individuals prefer a value of V^2 that is larger than $\overline{V}_L^2$. Otherwise the policy corresponding to *L* would win with certainty.

Proposition 4: There exists a Nash equilibrium.

Proof: We want to study crucial properties of the reaction functions $V_R^2(V_L^2)$ and $V_L^2(V_R^2)$ and show that the response curves cross at least once. First, suppose that one party proposes to set

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19 The only caveat is that as a special case the Pareto superior policy may only benefit one group, and there may be voters who assign a zero weight to that group. These voters will then be indifferent, while the others strictly prefer the Pareto superior policy.

20 The Pareto frontier consists of the part of the curve in figure 2 where the curve is downward sloping.

$V^2 = V^2_{\max}$. Then there exists a value of $V^2 = \tilde{V}^2 < V^2_{\max}$ which the opponent prefers to $V^2_{\max}$, and which the opponent can adopt and be sure of winning the election. To see this it suffices to note that by picking $\tilde{V}^2$ arbitrarily close to $V^2_{\max}$ the share of the electorate favouring the $V^2_{\max}$ can be made infinitesimally small. It obviously follows that the best response of the opponent is also some value of $V^2 < V^2_{\max}$. We can conclude that $V^2_R(V^2_{\max}) < V^2_{\max}$, and $V^2_L(V^2_{max}) < V^2_{\max}$. By analogous reasoning we can show that $V^2_R(V^2_{\min}) > V^2_{\min}$ and $V^2_L(V^2_{\min}) > V^2_{\min}$.

These features of the response functions are reflected in figure 3. $V^2_L(V^2_R)$ will start below the 45 degree line and end up above the 45-degree line on the horizontal axis indicating $V^2_{\max}$. $V^2_R(V^2_L)$ will start above the 45-degree line and end up below the 45-degree line on the vertical line indicating $V^2_{\max}$. Hence the response curves will cross and there will be a Nash equilibrium. **QED**

Corollary: A Nash equilibrium is Pareto efficient and the Results 1 and 2 apply.

Proof: The corollary follows from proposition 3 and the results 1 and 2. **QED**

The corollary implies that there will be public provision of a private good at a political equilibrium provided that consumer preferences satisfy the assumption in Result 2 and the redistributional ambitions are sufficiently large.

Definition: We denote a Nash equilibrium as $\hat{V}^2_L, \hat{V}^2_R$.

Having established the existence of a Nash equilibrium we next proceed to characterize further such an equilibrium. In the lemma and proposition below we narrow down the set of possible Nash equilibria.

Lemma: A party *p* will always propose a policy which it according to (8) considers to be strictly better than that of its opponent *o,* in the sense that $W^p(z_p) > W^p(z_o)$.

Proof: A party will never choose a policy which it according to (8) perceives as strictly worse than the policy of the opponent. If the opponent's policy is better, it is rational for the party to adopt that policy because then a better policy will win with certainty. Suppose next that the parties consider selecting the same policy. That policy must differ from the dictator policy of at least one party since the parties have distinctly different preferences. Then a party with a different dictator policy will gain by switching to a policy which it prefers to the common policy. Then there is a lower probability that the initial policy will win and a positive probability that a better policy will win, so the outcome can only get better from that party's perspective. **QED**

Proposition 5: A Nash equilibrium will be such that $\bar{V}_L^2 < \hat{V}_L^2 < \hat{V}_R^2 < \bar{V}_R^2$.

Proof: The lemma implies that $\hat{V}_L^2 < \hat{V}_R^2$. The assumption that $a_L > a_R$ implies that $\bar{V}_L^2 < \bar{V}_R^2$. Party *L* will never choose a V^2-level below $\bar{V}_L^2$ and party *R* will never choose a V^2-level above $\bar{V}_R^2$. By picking a value of V^2 that is less than $\bar{V}_L^2$ party *L* will switch to an inferior policy without getting any more votes. The reason is that those who prefer a value of V^2 that is less than $\bar{V}_L^2$ will already vote for party *L*. However, by choosing a V^2-level slightly above $\bar{V}_L^2$ party *L* may gain votes from those who would otherwise be indifferent between the parties' policies. Thus party *L* will choose a policy such that a small increase in V^2 would be preferable as such, but would scare away some voters. Similarly, party R will choose a policy such that a further decrease in V^2 would be considered welfare decreasing according to (8) while attracting more voters. **QED**

The proposition implies: i. Both parties deviate from the dictator policies. ii. Each party will trade off the quality of the policy from its own perspective and the chance of winning the election. iii. The policies converge to some extent without coinciding.

This characterisation has some important features in common with Dixit and Londregan (1998), Hansson and Stuart (1984) and Lindbeck and Weibull (1993), while it differs from the analysis of Lindbeck and Weibull (1987) where there is complete convergence to a single policy.

It can also be of interest to investigate the first order conditions. The objective functions of the respective parties are given by:

$$p(V_L^2, V_R^2)W^L(V_L^2) + (1 - p(V_L^2, V_R^2))W^L(V_R^2) \text{ for party L} \quad (14)$$

and

$$p(V_L^2, V_R^2)W^R(V_L^2) + (1 - p(V_L^2, V_R^2))W^R(V_R^2) \text{ for party R.} \quad (15)$$

where $W^p(V_o^2)$ denotes party *p*:s evaluation of the other party's policy proposal expressed in terms of the implied utility level for type two individuals. The first order conditions for maximizing these objective functions are given by:

$$(W^L(V_L^2) - W^L(V_R^2))\frac{\partial p}{\partial V_L^2} + p\frac{dW^L}{dV_L^2} = 0 \quad (16)$$

and

$$-(W^R(V_R^2) - W^R(V_L^2))\frac{\partial p}{\partial V_R^2} + (1-p)\frac{dW^R}{dV_R^2} = 0 \quad (17)$$

Each condition consists of two main terms. The former term of (16) expresses the expected welfare gain party L can obtain by giving a slightly higher utility to class two, and thus increasing the probability of winning the election by gaining the support of some voters who would otherwise vote R. The latter term reflects that there is a cost because in order to obtain the additional votes the party has to adopt a policy which is less satisfactory according to its own preferences. The party will trade off the probability of winning and the quality of the policy it proposes. Up to a point ideological purity is sacrificed in order to reduce the likelihood of losing to a policy which is ideologically even less acceptable. The similar trade-off for party R is expressed in (17).

6. Concluding remarks

Public provision of private goods is a phenomenon which has to a large extent been neglected by textbooks in normative public economics. The conventional view has been that it is public goods, and possibly the closely related private goods provided under decreasing average costs, that should be publicly provided. It should normally be the task of private markets to provide private goods. This observation is not easily reconciled with the fact that in many countries

private goods provision constitutes a large share of public expenditure. Two explanations seem possible. One is that normative public economics does not capture what is actually going on on the arena of economic policy. Policy making is motivated not by welfare theoretic efficiency criteria, but rather by the desire to design a policy which can obtain a majority in the voting process. The other possibility is that the conventional normative theory has missed out considerations that may be important for understanding the potential role of public provision in promoting economic efficiency.

In recent years both approaches have appeared in the literature. Political economy models have explained public provision of private goods as a political phenomenon. Modern public economics models have explained how there may be an efficiency case for public provision of private goods under plausible information constraints. However, the two approaches have been quite disparate, and have been based on quite different assumptions. This paper has integrated the welfare approach and the political economy approach by investigating whether the mechanisms appearing in the welfare models may be sustained by the political processes studied in political economy. We have presented a number of political economy models in which this is the case.

The models range from a set-up where one class has the majority of the votes via a median voter model to a two-party model of representative democracy. The common central feature of the models is that it is desirable from the perspective of the decision makers to achieve a (second best) Pareto optimal allocation. As we know from the normative models, the role of public provision is to soften the self selection constraint and thus to relax a major restriction on the attainable Pareto efficiency. Since Pareto optimality is desirable, it is not surprising that the agents of the political economy would like to take advantage of the same mechanism to promote efficiency. Implicit in our models is the argument that efficiency according to the normative theories is not necessarily in conflict with the political objectives that are at the heart of political economy models. How robust this coexistence of economic efficiency and political objectives is, can only be answered by considering a wider range of political economy models with different assumptions. This will have to be the topic of future research. The main distinction between the normative and the political models that we have considered is that the latter also explain which Pareto optimum that is going to be chosen by the political process (even if not necessarily in a deterministic way).

It is the central result of the present study that under plausible information constraints economically efficient public provision of private goods will be part of political

rational decisions within the context of majority voting. There is no need to appeal to political concerns that are at odds with economic efficiency to explain the sizable public provision of private goods.

Appendix

Let us consider in detail the effects on the low-skill people of changing the utility of high-skill persons. To simplify the exposition we neglect public provision at the moment as this will make no difference as to the principles involved. For the same reason we simplify by assuming that there is only one person of each type.

The utility of a type two person is

$$V^2 = V^2(B^2, Y^2) = V^2(Y^2 - T^2, Y^2) \qquad (1)$$

It is a well-known property of the maximisation of V^1 for a fixed value of V^2 that

$$\frac{dV^2(Y^2 - T^2, Y^2)}{dY^2} = 0 \qquad (2)$$

The property is known as the zero marginal tax rate at the top. (1) and (2) together imply that $T^2 = T^2(V^2)$ and

$$\frac{dT^2}{dV^2} = -\frac{1}{l^2} \qquad (3)$$

where $l^2 = \partial V^2 / \partial B^2$ is the marginal utility of income. A binding self-selection constraint implies that

$$V^m(B^1, Y^1) = V^2 \qquad (4)$$

which can also be expressed as

$$B^1 = e^m(Y^1, V^2), \qquad (5)$$

where *e* is the expenditure function expressing the disposable income required to achieve the prescribed utility level conditional on a certain gross income, and *m* indicates that we now consider the expenditure function of person two as a mimicker. The budget constraint of the economy implies that

$$B^1 = Y^1 - r + T^2(V^2) \qquad (6)$$

where *r* is the net tax revenue required for public expenditures on goods and services.

Considering (5) and (6) we see that the arguments of the utility of a type one person are affected by V^2 both via the self-selection constraint (5) and the resource constraint (6). Inserting (5) into (6) and differentiating we get

$$\frac{dY^1}{dV^2} = \frac{e_V^m + e_V^2}{1 - e_Y^m}$$

where subscripts denote partial derivatives. We have made use of the fact that $l^2 = 1/e_V^2$. Under normal assumptions the numerator and the denominator are both positive. Assuming a utility function $V(B,Y)$ to be maximised for a fixed wage rate, the slope of the indifference curve, $e_Y(Y,V)$, is constant. Considering a change in *V* reflecting a change in real (non-labour) income, we get

$$\frac{dY}{dV} = -\frac{e_{YV}}{e_{YY}}.$$

By standard assumptions $e_{YY} > 0$. Assuming a negative real income effect on labour supply, it follows that $e_{YV} = e_{VY} > 0$. Since at the tax optimum $Y^2 > Y^1$, $e_V^2 = e_V^2(Y^2, V^2) > e_V^2(Y^1, V^2) = e_V^m$. Due to the curvature of the indifference curve $e_Y^m < e_Y^2 = 1$.

To find the effect on a person of type one we differentiate $V^1(e^m(Y^1, V^2), Y^1)$

$$\frac{dV^1}{dV^2} = (V_B^1 e_Y^m + V_Y^1)\frac{dY^1}{dV^2} + e_V^m V_B^1$$

$$= l^1(e_Y^m - e_Y^1)\frac{e_V^m + e_V^2}{1-e_Y^m} + e_V^m\, l^1$$

$$= \frac{l^1}{1-e_Y^m}\left[(e_Y^m - e_Y^1)(e_V^m + e_V^2) + (1-e_Y^m)e_V^m\right]$$

$$= \frac{l^1}{1-e_Y^m}\left[(1-e_Y^1)e_V^m + (e_Y^m - e_Y^1)e_V^2\right]$$

$$= \frac{1-e_Y^1}{1-e_Y^m}\, l^1\left[e_V^m - \left(\frac{1-e_Y^m}{1-e_Y^1} - 1\right)e_V^2\right]$$

$(1-e_Y)$ is the marginal distortion of faced by an individual. We see that the sign depends on the relative sizes of the marginal distortions facing person two as a mimicker and person one, respectively. If the ratio is not too large, it is possible that the sign is non-negative which means that class one can gain nothing by depriving class two of further resource units. It will help produce the same result if e_V^2 is not too large compared to e_V^m, which means that there is a small income effect on labour supply. The sign is zero if

$$\left(\frac{1-e_Y^m}{1-e_Y^1} - 1\right) = \frac{e_V^m}{e_V^2}$$

which then characterises the endpoint of the Pareto frontier if there is such an endpoint for a utility level above the subsistence level.

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