

# State Preferences and the Provision of Public Goods

## Staatspräferenzen und die Bereitstellung öffentlicher Güter

By Xenia Matschke\*, Madison

JEL H10, H41

Public goods, state preferences.

Öffentliche Güter, Staatspräferenzen.

---

### Summary

Countries differ substantially in the emphasis on the public sector and the ratio between state consumption and provision of public goods. It seems that these differences are often not well explained by only assuming a heterogeneous population. In this paper, I take differing state preferences as given and investigate how changes in state preferences affect the provision of a public good. The provision of the public good is modelled as a two-stage game with the state and the citizens as players. I find that the Nash equilibrium provision of the public good is independent of a so-called "welfare state" parameter. In contrast, an increase in a parameter measuring the relative importance of public good provision vs. state consumption leads to an increase in the overall public good provision, while private provision declines.

### Zusammenfassung

Unterschiedliche Länder differieren stark in der relativen Größe des öffentlichen Sektors und dem Verhältnis von Staatsverbrauch zu Bereitstellung öffentlicher Güter. Diese Unterschiede scheinen oft durch die Annahme einer heterogenen Bevölkerung nur unzureichend erklärt. In diesem Artikel nehme ich unterschiedliche Staatspräferenzen als gegeben an und untersuche, wie eine Änderung dieser Präferenzen die Bereitstellung eines öffentlichen Gutes beeinflusst. Die Bereitstellung des öffentlichen Gutes wird als zweistufiges Spiel mit Staat und Bürgern als Spielern modelliert. Es zeigt sich, dass die Nash-gleichgewichtige Bereitstellung des öffentlichen Gutes unabhängig von einem sogenannten Wohlfahrtsstaat-Parameter ist. Dagegen führt die Zunahme eines Parameters, der die relative Wichtigkeit der Versorgung mit dem öffentlichen Gut verglichen zum Staatskonsum misst, zu einer erhöhten Bereitstellung des öffentlichen Gutes, während private Beiträge zum öffentlichen Gut zurückgehen.

### 1. Introduction

In economic theory, the state is usually assumed to maximize the (sometimes weighted) utility of its citizens. This, it seems, is an assumption that many non-economists would

---

\* I thank Jim Andreoni and an anonymous referee for helpful suggestions.

not subscribe to. In rankings of popularity and trustworthiness, politicians usually rank well below the majority of other professional groups. There is often a feeling that politicians irrespective of their party affiliation do not really take into account what people want. The impression that citizens' preferences and state preferences are quite distinct may well be justified: (i) It is unrealistic to assume that the government knows its citizens' utility functions. The preferences that come to its knowledge are normally the interests of organized pressure groups. So it is reasonable to expect that the government will pay attention to only a limited selection of its citizens' preferences. Lobbying and its effects have been discussed in the political economy literature (see Becker 1983). A more extreme assumption is that the government only cares for revenue (Leviathan assumption, Brennan/Buchanan 1980), but this may negatively influence its reelection perspectives and may not be revenue-maximizing in the long run. (ii) In many democracies, parties are elected. Only few citizens are active party-members, and even fewer shape the party's agenda. For the voters, it remains to choose between party agendas that only partly reflect their preferences. (iii) Institutional constraints, often determined by long-term historical developments, may undermine a government's ability to introduce a new policy. For example, a slow and inefficient administration may effectively block any reforms that parliament might agree on, in particular, the bureaucracy may pursue its own goals (Niskanen 1971). (iv) Voters may find it too costly to find out what a certain party offers. They then vote for a certain party because their parents used to vote for it or because of some common notion such as, for instance, a worker has to vote for the socialists.

This suggests that it may be reasonable to think of the state (government and administration) as a separate entity with its own preferences which may be quite distinct from the preferences of its citizens. In fact, this was the assumption made in much of the early literature, or as Niskanen (1971) put it: "... from Confucius to Weber". In contrast to this early literature, I view this assumption as an auxiliary measure given that there are too many factors endogenously determining the so-called state preferences as that we could capture all of them.

In the real world, some countries routinely have higher public expenditures than others. No matter whether social democrats or conservatives rule in Germany, we observe higher public expenditure (in particular when considering welfare expenditures) than in the United States. I refer to countries that have strong preferences for public expenditures (including private expenditures on public goods) as "welfare states". Clearly, not all public expenditure is used for public goods. Depending on the country, a considerable amount of public expenditure is used for state consumption. This may simply mean paying administrative employees for their services which is certainly necessary to make any state work. But it may also include some politicians enriching themselves with public funds or a surplus of employees being paid for doing nothing. In this article, states with low preferences for state consumption are called "benevolent". This reflects the simplifying assumption that state consumption does not benefit the citizens and that the "useful" administrative expenditure is subsumed under public goods.

This article does not provide a theory of how state preferences can be determined. Instead, the goal is to investigate how private and overall public good provision varies with exogenously given state preferences, when consumer preferences stay the same. As in Warr (1982, 1983), a world of complete crowding-out is maintained. Increases in public expenditure for public goods crowd out private contributions one to one. I thus

choose to ignore potentially important explanations of private provision of public goods under incomplete crowding-out. Notable omissions include the existence of corner solutions especially when income is not distributed evenly (Bergstrom et al. 1986) or the warm-glow explanation of private donations (see Andreoni 1989).

The state's preferences are described by two parameters. The first parameter measures how the government values private consumption as opposed to public resources, i.e. provision of public goods and state consumption. This parameter thus reflects the degree of welfare state property. The second parameter measures how, within the public sector, the government values the provision of public goods as opposed to state consumption. Since I assume that state consumption does not benefit the citizens, this parameter provides a measure of governmental benevolence. The major finding of this article is that (i) the neutrality result, i.e. the constancy of public good provision, carries over to changes in the welfare state property, while (ii) an increase in government benevolence increases the overall provision of the public good.

## 2. A Simple Model of Public Good Provision

### 2.1. Basic Setup

The provision of a single public good is modelled as a two-stage game with the state and the citizens as players. Let us start with the description of the players' preferences. The state has a continuous separable utility function

$$V(\mathbf{x}, G, Z) = \alpha V_1(\mathbf{x}) + (1 - \alpha)[\beta V_2(G) + (1 - \beta)V_3(Z)]$$

where  $G = \sum g_i + G_S$ ,  $G_S + Z = t \sum m_i$ ,  $t$  is the uniform income tax rate, and  $m_i$  is consumer  $i$ 's income (for  $i = 1, \dots, n$ ).  $\mathbf{x}$  is a vector  $(x_1, x_2, \dots, x_n)$  where  $x_i$  is  $i$ 's consumption of the private good, and  $g_i$  is his private contribution to the public good  $G$ .  $G_S$  denotes the governmental provision of the public good. Tax income can be used for the provision of the public good or for state consumption  $Z$ . I assume that  $Z$  does not enter the utility function of the citizens. Finally, let  $V_1$ ,  $V_2$ , and  $V_3$  all be at least twice differentiable, strictly increasing and strictly concave.

I now formally introduce the concepts "welfare state" and "benevolent state". For given  $\beta$ , the state possesses a higher degree of the welfare state property if  $\alpha$  is lower. This means that a welfare state does not value private goods consumption of its citizens very much relative to provision of the public good and state consumption. For given  $\alpha$ , the state is more benevolent if  $\beta$  is higher. A benevolent state is more interested in public good provision which benefits its citizens than in state consumption.

Citizen  $i$ 's continuous and quasiconcave utility function is denoted by  $U_i(x_i, G)$  such that  $\frac{\partial U_i}{\partial x_i} > 0$ ,  $\frac{\partial U_i}{\partial G} > 0$ .

$U_i$  depends on consumption  $x_i$  of the private good and on consumption  $G$  of the public good to which  $i$  contributes  $g_i$ . Citizen  $i$  maximizes his utility function under the budget constraint  $(1 - t)m_i = x_i + g_i$  where a one-to-one transformation rate between private and public goods is assumed. In the following, I consider the symmetric case where all consumers have the same utility function and the same income so that we can drop the  $i$  subscript on  $U$  and  $m$ . This implies that in equilibrium,  $g_i$  and  $x_i$  do not depend upon  $i$ , either.

We now turn to the description of the stage game. In the first stage, the state chooses the uniform income tax rate  $t$ . In the second stage, a Nash game is played. The citizens and the state simultaneously choose their contributions to the public good and their consumption of the private goods  $x$  or  $Z$ , respectively.

## 2.2. Public Good Expenditure and State Preferences

First note that in this setup state expenditure for the public good completely crowds out private contributions if we do not consider corner solutions. This is a straightforward extension of the basic neutrality result by Warr (1982, 1983), namely, that when income is redistributed, the overall amount of contributions does not change. The only difference here is that one of the contributors is the state which spends its tax income on the public good  $G$  and a private good  $Z$ . Therefore the neutrality result carries over in our setting. The intuition behind the neutrality result is that in a neighbourhood of an interior solution, the budget constraint is not affected by the redistribution (Bergstrom et al. 1986). Away from a corner solution, an in-kind transfer, i.e. additional provision of the public good by others, gives the same consumption possibilities to the individual as additional income.

Perfect crowding-out also implies that with an interior solution, the optimal income tax rate is indeterminate. If the state increases  $t$ , the citizens lower their contributions to the public good while keeping the consumption of the private good constant. The state increases the public contribution, but due to perfect crowding-out, the overall levels of  $G$  and  $Z$  remain the same. Clearly, this only holds for intermediate levels of  $t$ : If  $t$  is too small, the state cannot spend the optimal amount on state consumption  $Z$ , i.e. the state is at a corner solution. If  $t$  is too high, the citizens cannot buy the optimal quantity of the private good  $x$ , i.e. the citizens are at a corner solution. In subsequent analysis, I assume that both the state and the citizens are at an interior solution so that the neutrality result for income redistributions and therefore the indeterminacy of the optimal tax rate hold. The effects of a change in the welfare state parameter  $\alpha$  are summarized by the following proposition:

**Proposition 1** *A decrease in  $\alpha$  (higher degree of welfare state property) changes neither the overall provision of the public good  $G$ , nor the ratio of public to private contributions to it.*

**Proof.** The first-order condition for the state in the second stage

$$\frac{\frac{dV_2(G)}{dG}}{\frac{dV_3(Z)}{dZ}} = \frac{1 - \beta}{\beta} \quad (1)$$

is not affected by the change in  $\alpha$ . Similarly, the first-order condition for any citizen

$$\frac{\partial U(x, G)}{\partial x} = \frac{\partial U(x, G)}{\partial G} \quad (2)$$

is unchanged. Therefore the same contributions to the public good  $G$ , the same state consumption  $Z$ , and the same consumption of the private good  $x$  as before constitute a solution to the Nash game in the second stage. By the neutrality result, a change in  $t$

does not change the solution. But then in the first stage, the objective function cannot be influenced by the government's choice. Thus the change in  $\alpha$  has no influence on the choice variables of any player.

To prove the next proposition, an additional assumption concerning the second derivatives of the individual utility functions  $U$  is made:

$$\frac{\partial^2 U}{\partial G \partial x} > \frac{\partial^2 U}{\partial G^2} \quad \text{and} \quad \frac{\partial^2 U}{\partial G \partial x} > \frac{\partial^2 U}{\partial x^2}. \quad (3)$$

The restriction that the cross effects exceed direct effects is in accordance with quasiconcavity, but need not hold for every quasiconcave  $U$ . To see this, note that from quasiconcavity, it follows that

$$\frac{\partial U}{\partial x} \left( \frac{\partial U}{\partial G} \frac{\partial^2 U}{\partial G \partial x} - \frac{\partial U}{\partial x} \frac{\partial^2 U}{\partial G^2} \right) + \frac{\partial U}{\partial G} \left( \frac{\partial U}{\partial x} \frac{\partial^2 U}{\partial G \partial x} - \frac{\partial U}{\partial G} \frac{\partial^2 U}{\partial x^2} \right) \geq 0$$

for every  $x$  and  $G$ . So in particular, it should also be true at the optimum where the first-order condition  $\frac{\partial U}{\partial G} = \frac{\partial U}{\partial x}$  holds. The above condition then gives us back the second-order condition

$$\frac{\partial^2 U}{\partial G^2} - \frac{\partial^2 U}{\partial G \partial x} + \frac{\partial^2 U}{\partial x^2} - \frac{\partial^2 U}{\partial G \partial x} \leq 0$$

which is clearly fulfilled under assumption (3).

**Proposition 2** *An increase in  $\beta$  (state is more benevolent) decreases state consumption  $Z$  and increases overall public good expenditure  $G$ , while the per capita private contributions  $g$  to the public good decrease.*

**Proof.** Totally differentiating (1) and rearranging yields

$$\left( \frac{dV_2}{dG} + \frac{dV_3}{dZ} \right) d\beta + \beta n \frac{d^2 V_2}{dG^2} dg = \left[ (1 - \beta) \frac{d^2 V_3}{dZ^2} + \beta \frac{d^2 V_2}{dG^2} \right] dZ. \quad (4)$$

Similarly, totally differentiating (2) and collecting terms gives

$$dZ = \frac{(n+1) \frac{\partial^2 U}{\partial x \partial G} - n \frac{\partial^2 U}{\partial G^2} - \frac{\partial^2 U}{\partial x^2}}{\frac{\partial^2 U}{\partial x \partial G} - \frac{\partial^2 U}{\partial G^2}} dg. \quad (5)$$

Due to the assumption that cross effects exceed direct effects, the fraction on the RHS is positive. Hence (5) implies that  $dg$  and  $dZ$  possess the same sign. Substituting (5) into (4) and doing some simple algebra, we obtain

$$\underbrace{\left( \frac{dV_2}{dG} + \frac{dV_3}{dZ} \right)}_{(+)} \underbrace{d\beta}_{(+)} = \left[ \underbrace{\left( (1 - \beta) \frac{d^2 V_3}{dZ^2} + \beta \frac{d^2 V_2}{dG^2} \right)}_{(-)} \underbrace{\left( \frac{\partial^2 U}{\partial x \partial G} - \frac{\partial^2 U}{\partial x^2} \right)}_{(+)} + \underbrace{(1 - \beta) n \frac{d^2 V_3}{dZ^2}}_{(-)} \right] dg.$$

The assumptions on the utility function ensure that the LHS and the square bracket term on the RHS can be signed as indicated. This leads to the conclusion that  $dg$  and  $dZ$  are both negative. In order to sign  $dG$ , simply plug in (5) for  $dZ$ :

$$dG = ndg - dZ = - \frac{\frac{\partial^2 U}{\partial x \partial G} - \frac{\partial^2 U}{\partial x^2}}{\frac{\partial^2 U}{\partial x \partial G} - \frac{\partial^2 U}{\partial G^2}} dg.$$

This establishes that  $dG$  is strictly positive.

The parameter  $\beta$  influences the public good provision because it enters the first-order conditions of the Nash equilibrium. Intuitively, it should then be expected that a higher valuation of public goods by the state leads to an increase in the public good provision. The above proof shows that this is indeed the case. Note that this increase is due to an increase in governmental provision, while the private contributions are declining. Crowding-out takes place, but is incomplete.

### 3. Conclusion

In this paper, I examined a two-stage game where the government first sets a uniform income tax rate and then together with the citizens plays a Nash game of public good provision. It was shown that if only interior solutions are considered, the neutrality of income redistributions on the provision of a public good leads to a tax rate indeterminacy, i.e. the government is indifferent between tax rates. This implies that even if the relative governmental valuation of private goods consumption of its citizens (so-called degree of welfare state property) changes, the provision of public goods remains constant. However, changes in the government's relative valuation of state consumption versus provision of public goods (so-called benevolence) are not neutral. As expected, a higher valuation of public goods increases such a provision, although some crowding-out takes place. The citizens contribute less to the public good.

This result can also be extended to the case when there are two otherwise identical regions 1 and 2 that differ in their welfare state and benevolence parameters (for a thorough discussion of public good provision in a multiregional or federal setting, see Wellisch 2000). Consider the case that contributions to the public good in one region have spillover effects in the other region; that is, contributions in one region also increase the available amount of the public good in the other region even if the contributions in the latter region remain constant. In this case, a change in the welfare state parameter of region 1 does not affect public good provision in either region. An increase in the benevolence parameter in region 1, however, is not neutral. Just as in the simple model investigated in this paper, it can be shown that public good provision in region 1 increases due to an increase in state provision, whereas the provision by private households in region 1 declines. But in addition, contributions to the public good by region 2 players change: Both the government and private households in region 2 contribute less to the public good if region 1's government becomes more benevolent, but due to the spillover effects, the amount of public good available in region 2 rises.

The model presented in this article can explain why citizens in countries with high state consumption (e.g. with bloated and inefficient administration) contribute more to public goods, but the overall provision is less than in countries with low state consumption. However, it cannot explain higher public good provision in welfare states where consumption of private goods is valued less. Instead, I find that the neutrality result carries over and the public good provision is constant. To explain differences in public good provision in such cases, the assumption of an interior solution would have to be dropped.

## References

- Andreoni, J.* (1989), Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence, *Journal of Political Economy* 97, pp. 1447–1458.
- Becker, G.S.* (1983), A Theory of Competition among Pressure Groups for Political Influence, *Quarterly Journal of Economics* 98, pp. 371–400.
- Bergstrom, T., L. Blume, H. Varian* (1986), On the Private Provision of Public Goods, *Journal of Public Economics* 29, pp. 25–49.
- Brennan, G., J.M. Buchanan* (1980), *The Power to Tax*, Cambridge (Cambridge University Press).
- Niskanen, W.A.* (1971), *Bureaucracy and Representative Government*, Chicago (Aldine).
- Warr, P.G.* (1982), Pareto Optimal Redistribution and Private Charity, *Journal of Public Economics* 19, pp. 131–138.
- Warr, P.G.* (1983), The Private Provision of a Public Good is Independent of the Distribution of Income, *Economics Letters* 13, pp. 207–211.
- Wellisch, D.* (2000), *Theory of Public Finance in a Federal State*, Cambridge (Cambridge University Press).

Dr. Xenia Matschke, Department of Economics, University of Wisconsin-Madison, 1180 Observatory Drive, Madison WI 53706, USA. E-mail: xmatschk@ssc.wisc.edu