



# Modelling the composition of government expenditure in democracies

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## ABSTRACT

This paper considers majority voting over the ratio of transfer payments to per capita expenditure on public goods. A model is constructed in which individuals vote for government expenditure on a public good, for a given income tax rate. Labour supply is endogenous. The equilibrium ratio of transfers to public good expenditure is a function of the ratio of median to mean wages and the tax rate. Cross-sectional regressions confirmed that reductions in the skewness of the wage rate distribution are associated with reductions in transfer payments relative to public goods expenditure, at a decreasing rate. Increases in the tax rate initially increase the importance of transfer payments but eventually tax rate increases lead to lower transfers.

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## 1. Introduction

The aim of this paper is to examine majority voting over the division between expenditure on public goods and on transfer payments. In order to guide the specification of a relationship that can be estimated using information on a cross section of democratic countries, a simple model is constructed in which individuals with similar preferences, but differing abilities and thus wages, vote for government expenditure on a public good. The choice is made conditional on the tax rate in a proportional income tax.<sup>1</sup> Hence voting is over only one dimension and a majority voting equilibrium is known to exist if certain well-known conditions apply.<sup>2</sup> The resulting level of a transfer payment, in the form of a basic income, is given by the government's budget constraint. The framework of analysis is entirely static, so that current government expenditure is financed only by current tax revenue. Despite the simplicity of the model, it is seen to provide useful insights into the various relationships involved in voting over the composition of expenditure.

The analysis contrasts with earlier studies which have tended to concentrate on the majority choice of transfer payments, and thus on the relationship between fundamental inequality in the wage rate distribution and desired redistribution of net income achieved through a tax and transfer system. Those studies are associated with the Romer (1975), Roberts (1977), and Meltzer-Richard (1981) framework involving majority voting over a linear tax.<sup>3</sup> Redistribution usually arises entirely from the self-interest of voters who

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<sup>1</sup> Bearse et al. (2001), who examine majority voting over a uniform transfer and public education, also assume that the tax rate is given exogenously. After pointing out that this is a common assumption, Tridimas (2001, p. 308) suggests that, 'This is less restrictive than it first appears, since in practice governments are often constrained in the policy instruments that they may vary at anyone [sic] time'. Tridimas and Winer (2005) consider voting over only tax-financed public goods. On difficulties raised by multidimensional voting, see Mueller (2003, pp. 87–92).

<sup>2</sup> These include single-peakedness of preferences or agent monotonicity, whereby the rankings of individuals are not affected by the tax structure; see Roberts (1977).

<sup>3</sup> On voting over redistributive taxation see also Krusell and Rios-Rull (1999) and Azzimonti et al. (2006). See also the survey by Borck (2007), who gives special attention to models which modify the extent to which inequality may lead to a majority equilibrium involving higher taxation (and thus redistribution via a transfer payment).

balance the desire for a higher transfer payment against the limits on the government's ability to redistribute income, which are imposed by labour supply incentive effects.<sup>4</sup>

In the present model, the existence of expenditure on public goods, which affects individuals' utility directly, creates a further trade-off. The benefits of higher transfer payments, which (via individuals' budget constraints) allow the consumption of more goods and leisure, are balanced against the desire for public goods which enter utility functions but are subject to a tax price rather than a consumer price. The emphasis on choice of the composition of expenditure therefore differs from those studies which have introduced more sophistication into the Romer–Roberts–Meltzer–Richard framework in order to demonstrate that a higher degree of wage inequality need not necessarily be associated with a majority choice in favour of more redistribution. It is found here that a preference for more redistribution – in terms of a greater share of public expenditure being devoted to transfer payments – does result from more inequality, though to a relatively small extent over the relevant range.<sup>5</sup> This relationship is illustrated using cross-sectional data on a group of democratic countries.

The basic model and framework of analysis are described in Section 2, which derives the indirect utility function of each individual, expressed in terms of expenditure on the public good and the given tax rate. Section 3 shows that the conditions for a majority voting equilibrium are satisfied, and generates closed-form solutions for public good expenditure and the implied transfer payment. The solutions depend on the ratio of median to arithmetic mean wage rates. The relevant relationships are investigated using numerical examples, in view of the high degree of nonlinearity involved in the analytical expressions, so that the relationships are not transparent. Section 4 extends the model by considering the potential effects of an altruistic desire for redistribution on the part of voters. An aversion on the part of voters for inequality in the distribution of net income is specified. A closed-form solution for the majority voting equilibrium is not available, but numerical results demonstrate relatively little sensitivity of the composition of expenditure to the degree of inequality aversion on the part of voters. In Section 5, the construction of a special cross-sectional dataset for democratic countries, along with estimation of the ratio of median to arithmetic mean wage rates, is described. The resulting data are then used in regression analyses using a specification based on the model. Conclusions are in Section 6.

## 2. The basic model

This section derives individuals' preferences for public good expenditure, given the income tax rate. The direct utility function and optimal consumption and labour supply, for an individual who faces a given wage rate and tax rate and receives a non means-tested transfer payment, or basic income, are examined in Subsection 2.1. The government budget constraint, derived in Subsection 2.2, means that a degree of freedom in policy choices is lost and the value of the unconditional transfer payment is determined for a given tax rate and level of public good provision. Hence, as shown in Subsection 2.3, the indirect utility function can be expressed in terms of public good expenditure and the tax rate in this static model.<sup>6</sup> Earnings are the only source of income and tax revenue is devoted only to the provision of the pure public good and the transfer payment.

### 2.1. Individual consumption and labour supply

Each individual is assumed to derive utility from consumption,  $c$ , leisure,  $h$ , and the public good.<sup>7</sup> A judgement must be made regarding the way this is modelled. Since a pure public good is by definition non-excludable, all individuals are assumed to consume the same amount,  $Q_G$ . In view of its nonrival nature a standard consumer price cannot be modelled. However, the cost of the public good enters each individual's budget constraint through the fact that it must be tax-financed, so that individuals contribute in proportion to their earnings. In addition, a higher level of the public good involves a trade-off, through the government's budget constraint whereby expenditures are financed on a pay-as-you-go basis and the tax rate is fixed, in that it requires a reduction in the size of the transfer payment. The effective 'price' of the public good is reflected in the associated partial loss of transfers and, since this affects labour supply, it also influences the amount of tax paid.

The direct utility function is assumed to be Cobb–Douglas, so that (omitting individual subscripts):

$$U = c^\alpha h^\beta Q_G^{1-\alpha-\beta} \quad (1)$$

Suppose that individuals have similar preferences but different productivity levels and therefore wage rates,  $w$ . Although all individuals consume the same amount of the public good and have similar preferences, higher wage individuals experience higher

<sup>4</sup> In the standard linear tax model, the majority voting equilibrium is characterised by equality between the elasticity of average (gross) earnings with respect to the tax rate and a measure of inequality of earnings, equal to 1 minus the ratio of median earnings to average earnings. This may be compared with the optimal tax result obtained by Tuomala (1985), where the median wage is replaced by a welfare-weighted wage.

<sup>5</sup> A modification to the Romer et al. framework, involving the composition of expenditure, was made by Moene and Wallerstein (2001). They considered separate redistributive and insurance motives for transfer payments, some of which are received only by those who do not work. They found that higher skewness of the wage distribution is associated with lower spending on insurance against income loss.

<sup>6</sup> The model therefore ignores the effect of government policies on saving. In a dynamic context, complexities can arise from changes in the identity of the median voter and inter-generational conflict, commitment and time consistency. On dynamic voting models, see Krusell and Rios-Rull (1999), Tabellini and Alesina (1990), Hassler et al. (2005), Grossman (2003), Azzimonti et al. (2006) and Hassler et al. (2007).

<sup>7</sup> Alternative approaches are clearly possible. For example, Tridimas (2001) constructed a probabilistic voting model (individuals vote for parties, where the probability function is based on preferences). This involved demand functions for a range of private and public goods, where the unit cost of each public good was treated as its price.

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