Regional income disparity and the size of the Public Sector

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Abstract

This paper focuses on the question of how income inequality between two jurisdictions impacts upon government decision-making affecting the size of the public sector. We model policy choices as the outcome of regional representatives’ negotiations in the legislature. We show that the more unequal inter-regional income distribution is, the greater the under-provision of public goods. Particularly, larger inter-regional income disparity leads to a smaller public sector. A wealthier economy as a result may have a relatively smaller government size when income disparity increases.

Key words: Public goods; Government spending; Inequality; Redistribution; Bargaining.

JEL Classifications: D30, D78, H0, H41, H50.

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1 Introduction

Income disparities among regions, such as those between the north and the south of Italy and Spain, create conflicts in the provision of public goods due to the trade-off between equity and efficiency. Often, these tensions are mitigated either by reducing the size of the public sector as a whole or by decentralizing fiscal powers from the centre to local governments as examples from the United Kingdom, Canada and the United States illustrate. In some cases, States choose to split up, as with, for example, the former Czechoslovakia. Furthermore, income inequalities among European countries will probably constrain future European public policies, especially following the recent expansion.

Typically, governments introduce some redistributive mechanisms in the financing of public goods in order to reach equity targets. Tanzi (2000) argued that "one of the major functions of a national government is precisely to redistribute income from richer regions and individuals to poorer regions and individuals through the broadly uniform provision of public goods and services". However, the cost of greater equity is a loss of efficiency.

This paper studies the effects of inter-regional income inequalities on government's policy choices. We consider a context where policy is negotiated by regional representatives and not decided unilaterally by a paternalist central planner. More specifically, we study how the standard trade-off between more public goods and increased taxation and the transfers being made between differing jurisdictions either mitigates or increases redistributive conflicts. We show that greater income disparities among regions, due for example to a divergent income trend between rich and poor regions, makes interregional redistributive conflicts more dramatic and may lead to an under-provision of public goods. Consequently, the larger the income disparity is, the smaller the public sector. Paradoxically, a wealthier economy may lead to a relatively smaller public sector when inter-regional income disparity increases.

Meltzer and Richard (1981) studied the relation between income inequality and government spending inside a one jurisdiction polity. In their seminal paper, they relate the size of government to the difference between the mean income and the income of the decisive voter. They observe that the distribution of income in most societies is such that the mean income lies above the median income. As a consequence, an increase in the mean income relative to the income of the median voter increases the size of government. In their framework, government growth is constrained by the incentive to reduce work as the tax rate increases. This, in turn, prevents the decisive voter from equalizing incomes.

Our model can be seen as an extension of Meltzer and Richard’s analysis to

\footnote{Meltzer and Richard (1981) extended the standard model of redistributive taxation proposed by Romer (1975) and Roberts (1977).}

\footnote{Meltzer and Richard’s result supports Tocqueville’s ([1835] 1965) argument that "extension of the franchise to those who do not own property increases the proportion of voters who favour income redistribution" (Meltzer and Richard, 1983).}
a two-jurisdiction polity with a common public good and tax policy to be decided through bargaining between the jurisdictional decision makers.\textsuperscript{3} Contrary to Meltzer and Richard’s result, we show that increased inequality may reduce redistributive public spending.

As Aysan (2005) pointed out, income inequality increases the pressure for redistribution and, at the same time, the incentive to constrain it. In our model, which of the two conflicting interests prevails does not depend on the aggregate difference between benefits and losses, as a benevolent central planner would consider. It rather depends on gains from cooperation between regional representatives. Therefore, when the median voter of one region has negative net gains, he or she can exercise the veto thus the agreement is not reached. For example, if only inter-regional inequality counts, then necessarily greater income inequality increases the incentive for the rich to exercise the veto resulting in a smaller sized government.

Our bargaining approach can be considered as an alternative to the most common utilitarianism approach. The latter focuses on issues that involve no conflict between different jurisdictions, nor individuals, groups and classes (Sen, 1973). Sen argues that the utilitarian approach by “maximizing the sum of individual utilities is supremely unconcerned with the interpersonal distribution of that sum\textsuperscript{4}.” In this paper we utilize Sen’s argument in the comparison between the central planner’s and the bargaining outcome.

Our model can also be seen as extending Besley and Coate’s (2003) political economy analysis. Besley and Coate focus on the traditional issue of which level of government should be responsible for particular taxing and spending decisions. We develop the workings of the central government focusing on the decision-making process. In a model with two regions and two representatives, Besley and Coate approach decision-making in the central government considering two scenarios: the non-cooperative and the cooperative legislature. In the former, power is randomly allocated to one of the regional delegates who chooses policy by maximizing private welfare. To some extent, we consider this case as the solution to the non-benevolent dictator. In the cooperative case, the legislature is assumed to maximize delegates’ joint surplus.

A main difference between this paper and Besley and Coate’s model is that we explicitly explain how regional representatives bargain over policy. Another difference is that government does not split the cost equally between regions, but it covers the provision of public goods through a proportional income tax. Furthermore, we stress the importance of income disparities on public policy decision-making.

This paper does not cover the case of a federation, in the sense that there is not fiscal federalism. The model considers the case of a unitary yet heterogeneous country with one government and two regions, each of which elects a representative to the national government.

\textsuperscript{3}I am indebted to the Associate Editor for this comment.

\textsuperscript{4}Sen, 1973, p. 16.
Relating literature
Recent reviews of several theories of government growth and inequality are contained in Garrett and Russell (2006), Glaeser (2005) and Holsey and Borcherding (1997).

Bjorvatn and Cappelen (2003b) use cross-national regressions to show that more inequality, measured by Gini’s coefficient, is associated with smaller government. Peltzman’s (1980) empirical analysis provides evidence that greater income equality increases the demand for political redistribution. This paper gives a theoretical explanation that is different from both Kristov, Lindert and McClelland (1992) and Tridimas and Winer (2004). In Kristov, Lindert and McClelland (1992), the size of the public sector depends on the position of the median of the medians. In particular, in a model in which social affinity plays a central role, the closer the middle class is to the rich the less the amount of redistribution and, consequently, the smaller the government. In our model, the medians of a richer and a poorer jurisdiction bargain in the central legislature over the size of the public sector, whose financing calls for a certain amount of redistribution. The agreement is not coercive, which means that the poor cannot compel the rich to increase their tax income transfers without mutual consent and vice versa.

Tridimas and Winer (2004) suggest that an explanation of the smaller public sector in countries with more unequal income distribution could be a distribution of political influence in favour of the rich. In our cooperative bargaining model, political influence is equally distributed between rich and poor. However, the rich use the veto to constrain government spending when they have the perception that it exploits their private benefits. Similarly, there are also circumstances in which the veto is used by the poor to avoid exploitations against them.

Income inequality may lead to several forms of segregations between rich and poor, as argued by Bjorvatn and Cappellen (2003a) and Horstmann and Scharf (2006). Jaramillo, Kempf and Moizeau (2001) explain the social segmentation produced by income inequality. They apply the theory of clubs in which members voluntarily contribute to the funding of the club’s good. As Max Weber theorized almost one century ago, fragmentation or “social closure” is a result of the attempt of the richer to exclude the less fortunate from the benefits of a common good.

A way to create fragmentation in a society characterized by economic inequality among regions is the decentralization of taxing and spending powers from the central towards local and regional governments, as observed by Horstmann and Scharf (2006) and others. Fausto (2003) stresses the consequences caused by the disparities between wealthy and poorer regions in Italy. He argues that the fundamental means used to make a surreptitious division of the country is the financing of regions on the basis of local tax revenues and of local revenues of national taxes. Inevitably, this leads to rich regions having greater financing and higher provision of public services thanks to their greater revenues. Furthermore, undermining redistributive flows among regions contributes to increase regional conflicts and creates an atmosphere contrary to national cohesion.

Lockwood (2002), Cerniglia (2003) and Lucas (2002) presented three differ-
ent models of bargaining in the central legislature in a fiscal federalism context. Lockwood (2002) also focuses on Oates (1972) and Besley and Coate’s (2003) issue regarding the choice between centralization and decentralization of fiscal policy in a political economy setting. He assumes that a central government forms policy in a legislature comprised of elected representatives from each region. Unlike our model, decisions on local and discrete public goods are made by majority vote. More specifically, delegates first propose their alternative projects. Then, all alternatives are voted on according to an amendment agenda. Following Ferejohn, Fiorina and McKelvey (1987), Lockwood assumes that "the last vote pits the bill as amended against the status quo".

Cerniglia (2003) integrates the distributive politics literature with the political economy literature of countries, unions or federations. She develops a legislative bargaining model by specifying the behaviour of a central legislature composed of an odd number of representatives elected by regions whose preferences differ over local public goods. As in Lockwood (2002), representatives decide by majority vote on how to allocate the amount of local public goods financed by a linear income tax or by a regional income tax. With respect to our model, Cerniglia considers a more extreme point of threat represented by secession. She investigated whether the credible threat of secession by any region modifies the agenda-setter proposal and hence the outcome of the legislative bargaining game. The result is that the bargaining outcome depends on both the particular representative randomly chosen to be the agenda-setter and on the particular voting structure of the game.

Lucas (2004) gives a theoretical approach to transfers sharing by negotiation between central government and regions. He presents a model in which the central government, which takes action as a Stackelberg leader, first chooses the way to negotiate the transfers with regions (bilaterally or multilaterally). In the second stage, the bargaining process takes place and the federal government provides transfers to the regions. In this framework, Lucas analyses how spillovers affect the choice of the bargaining process.

The paper is organized into sections, as follows. Section two presents the benchmark model. Three extends it to a two-jurisdiction polity and analyses both the dictator solution and the social optimum. Four presents the legislature equilibrium policy. Five presents the comparative statics conducted to study the relationship between inter-regional inequality and government spending. Section six concludes and discusses some future developments. The appendix contains some derivations and proofs.\(^5\)

\(^5\)For an earlier version of this paper see Giuranno (2003).

2  A benchmark model of public finance

In this section we present a standard model of public finance similar to Persson and Tabellini (2000, p. 48) and derive a classical result first established by Meltzer and
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The policy to be determined concerns the level of government spending, which benefits all voters alike and is financed by proportional income tax. Income is the only dimension of heterogeneity among citizens.

Consider a polity with a large number of individuals. We normalize the size of population to unity. Each citizen $h$ has the same quasi-linear preferences over private consumption $c$ and public provided goods $g$, which are given by

$$u^h = c^h + H(g),$$

where the public spending benefit function $H(g)$ is increasing, smooth concave and satisfies the endpoint Inada condition. We can interpret public spending $g$ in different ways, as the size of the public sector or, simply, as a public or publicly provided good. We assume that government spending is provided in the equal amount to everyone, so that $g^h = g \geq 0$. The government finances the public sector by levying a proportional income tax $t$, bounded by $0 \leq t \leq 1$. Individual $h$’s private consumption is equal to private income, which represents the initial endowment of each individual, minus the cost of the public sector; i.e.,

$$c^h = (1-t)y^h.$$  \hspace{1cm} (2)

The average income is $\overline{y} = E(y^h)$, where $E$ denotes an expected value. We assume, for simplicity, that the unit cost of the public sector is one, so that if the size is $g$ the cost of the public sector is just one times $g$. The government budget constraint is then simply

$$ty = g.$$ \hspace{1cm} (3)

We can now write the policy preferences of citizen $h$ as follows,

$$u^h = (\overline{y} - g) \frac{y^h}{\overline{y}} + H(g).$$ \hspace{1cm} (4)

Individual preferences are concave in policy, implying that every citizen has a unique preferred policy. It is easy to verify that for citizen $h$ the following comparative static holds:

$$\frac{dg^h}{d(y^h/\overline{y})} < 0.$$ \hspace{1cm} (5)

This, in turn, implies that $g^h$ is increasing in $\overline{y}$ and decreasing in $y^h$. Furthermore, policy preferences are monotonic in their relative income, $y^h/\overline{y}$. Under majority rule, voters with income below that of the pivotal voter choose candidates who favor higher government spending and redistribution; voters with income above that of the decisive voter desire fewer public goods and less redistribution. The voter with median income is decisive.\footnote{As Meltzer and Richard (1981) wrote: "Roberts (1977) showed that if the ordering of individual incomes is independent of the choice of [...] $t$, individual choice of the tax rate is inversely ordered by income. This implies that with universal suffrage the voter with median income is decisive, and the higher one's income, the lower the preferred tax rate." Meltzer and Richard statement applies also to our framework with the difference that in our model the choice variable is $g$ and not $t."} Thus, if the pivotal voter decides either to increase
or decrease government size, at least half of the electorate agrees. The first-order condition describing the median voter equilibrium is

\[-\frac{y}{\bar{y}} + H'(g) = 0,\]  

which leads to the following comparative statics

\[\frac{dg}{dy}(y/\bar{y}) < 0.\]  

Condition (7) can be interpreted as follows: an increase of mean income relative to the income of the median voter increases government size (Meltzer and Richard, 1981). Meltzer and Richard assume that the median voter is poorer than the average one, hence he wants more redistribution since everybody pays the same average tax \(t\). As a consequence, more inequality represented by a lower ratio \(y/\bar{y}\) leads to a larger public sector.

Meltzer and Richard (1981) studied how income disparity inside a one-jurisdiction polity affects government size. Here, we extend their classical analysis to a two-jurisdiction polity in order to study how inter-jurisdictional income inequalities influence the degree of government growth and decline.

3 A two-jurisdiction polity

Consider two equal sized jurisdictions (or regions) comprising a state.\(^7\) Jurisdictions have the same number of people with a mass of unity. The aim of the model is to focus on the impact of inter-regional income inequality on public spending. In order to do that, we assume for simplicity that citizens have the same income within each jurisdiction. Therefore, citizens are identical in each group and decisions are made by jurisdictional representatives. However, the distribution of income differs between the two jurisdictions and we assume, to simplify the exposition, that region 1 is richer than region 2; i.e. \(\bar{y}_1 > \bar{y}_2\), where \(\bar{y}_1\) and \(\bar{y}_2\) represent per-capita income in regions 1 and 2 respectively.\(^8\)

The regional representatives form the legislature, which has to determine the size of the public sector to be financed by a proportional income tax across jurisdictions.

Once the legislature decides the quantity of \(g\), the government budget constraint is automatically determined by setting\(^9\)

\[g = t (\bar{y}_1 + \bar{y}_2).\]  

\(^7\)Note that the analysis can be easily generalized by considering two groups without stressing the geographical dimension.

\(^8\)We assume that the average regional endowments and the benefit function are such that this inequality is always fulfilled.

\(^9\)Note that the following relations hold: \(g = t \left( \sum_{n_1=1}^{N} y_{n_1} + \sum_{n_2=1}^{N} y_{n_2} \right) = \)
Consequently, the tax rate \( t = \frac{g}{\gamma_1 + \gamma_2} \) is directly proportional to the size of public expenditure and inversely proportional to the sum of regional per-head incomes.\(^{10}\) Accordingly, the cost paid by representative 1 is \( t\bar{y}_1 = \frac{\bar{y}_1}{\gamma_1 + \gamma_2} g = \gamma_1 g \). As a result, representatives share the cost according to their relative income, denoted by \( \gamma \), such that:

\[
\gamma_1 = \frac{\bar{y}_1}{\bar{y}_1 + \bar{y}_2}.
\]

Furthermore, an increase in per-capita regional income also increases the relative cost for that region while decreasing that of the other region; that is: \( \partial \gamma_1 / \partial \bar{y}_1 > 0 \) and \( \partial \gamma_2 / \partial \bar{y}_2 < 0 \). More specifically, the cost of the public sector is distributed between the two regions according to equation \( g = \gamma_1 g + \gamma_2 g \), which implies that \( \gamma_1 + \gamma_2 = 1 \). The parameter \( \gamma \) can be interpreted as an index of inter-regional inequality. When \( \bar{y}_1 = \bar{y}_2 \), then \( \gamma = 1/2 \). Thus, the more distant \( \gamma \) is from 1/2, the more national income is concentrated in one region.

The private consumption of representative \( i \) can now be written in the form \( c_i = \bar{y}_i - \gamma_i g \), which gives the following utility function:

\[
u_i = \bar{y}_i - \gamma_i g + H(g), \quad \text{with } i = 1, 2.\]

The cost sharing mechanism implies an income tax redistribution from the richest region to the poorest. We will study how the inter-regional redistributive implications of a proportional income tax influence government policy.

### 3.1 Dictator solution and first-best

Policy is chosen through bargaining. Before studying the bargaining outcome of this model, we will first describe briefly two benchmark cases: the dictator solution and the social optimum.

First, we will determine how a non-benevolent dictator chooses policy. In this example, we assume representative \( i \) possesses absolute executive power and he is in a position to choose the size of the public sector which maximizes his private welfare. It is easy to establish the following result: the size of the public sector \( g_i \) that the non-benevolent dictator would choose is the unique solution to the following equation:

\[
H' (g_i^D) = \gamma_i, \quad \text{with } i = 1, 2.
\]

\( g = t_1 \bar{y}_1 + t_2 \bar{y}_2 \). In this case, jurisdictional representatives bargain over \( g, t_1 \) and \( t_2 \).
Solution (11) states that the non-benevolent dictator would choose $g_i$ such that his private marginal cost is equal to his private marginal benefit. The private marginal cost, $\gamma_i$, corresponds to the share of the price the dictator pays for a unitary increment of the public sector. Instead, $H'(g^D_i)$ is the private marginal benefit. The dictator always reduces public expenditure when his private marginal cost increases; that is, $\partial g_i^P / \partial \gamma_i < 0$, $\partial g_i^D / \partial y_i < 0$ and $\partial g_i^D / \partial y_{-i} > 0$. Thus, the non-benevolent dictator is a free-rider. He increases the provision of $g$ when the mean income of the other region increases because this reduces both his relative and marginal cost at the expense of the other region.

Now, we turn to the efficient policy outcome, which can be interpreted as the central planner solution. Here, we suppose that the benevolent dictator maximizes an additive social welfare function as follows:

$$\max_{g^e} \left( \sum u^h_1 + \sum u^h_2 \right),$$

where $u^h_i$ denotes the utility of individual $h$ in region $i$, with $i = 1, 2$.\textsuperscript{11} The efficient government size, $g^e$, satisfies the familiar Samuelsonian condition, $\frac{\partial \gamma_1}{\gamma_1} + \frac{\partial \gamma_2}{\gamma_2} + 2N H' (g^e) = 0$, which means that the social marginal benefit is equal to the social marginal cost. Social marginal cost and benefits are just the sum of citizens marginal costs and benefits. The Samuelsonian condition leads to the following equation

$$H' (g^e) = \frac{1}{2},$$

which means that, in equilibrium, the average marginal benefit is equal to the average marginal cost.

Clearly, inter-regional income disparity does not influence the central planner’s provision of public goods. From the social planner’s point of view, a higher cost borne by citizens of region 1, for example, is compensated by the subsequent reduction of the relative cost for citizens of region voter 2. An increase in the relative cost for one region is always equal to the decrease in the relative cost for the other. For this reason, the two effects always compensate each other.

We conclude that inter-regional redistributive conflicts are not well captured by the central planner or utilitarian approach, as pointed out by Sen (1973) and other authors. In order to highlight the role played by redistributive conflicts in the legislature equilibrium policy we now introduce the following bargaining approach.

4 Legislature equilibrium policy

In this section we will analyze the public policy outcome when decisions are not made by a central planner or a non-benevolent dictator, but directly by the representatives

\textsuperscript{11}As in Besley and Coate (2002), we assume that the endowments of the median voters (and of all the taxpayers) are large enough to meet their tax obligations.
of the two jurisdictions. In this case, representatives form a government and choose policy by negotiation.

We assume without loss of generality that if no agreement is achieved, the government will not be able to implement any public good, i.e. \( g = 0 \).\(^{12}\) The utility each representative obtains in the event of disagreement is \( u^d_i = \bar{y}_i \), with \( i = 1, 2 \); that is, representatives entirely consume their private endowment. In order to reach an agreement, representatives must have positive gains by implementing \( g \). Therefore, the agreement utility must be higher than the outside option for both representatives. In formulas, it must be \( u_i - u^d_i > 0 \), which implies \( \frac{\bar{y}_1}{\bar{y}_1 + \bar{y}_2} g + H (g) > 0 \), where \( i = 1, 2 \).

We denote the gain from reaching an agreement of representative \( i = 1, 2 \), i.e. the gain from implementing \( g \), with the symbol \( \phi_i \). In formulas:

\[
\phi_i = u_i - u^d_i = -\gamma_i g + H (g)
\]  

(14)

The gain from reaching an agreement is equal to the net private benefit minus the net private cost and represents the private net benefit if agreement is reached on \( g \). Figure 1 plots the gain for the rich region in blue and the gain for the poor region in red, while the black curve represents regions’ gain in the case of income equality. As we can see, the rich region has the smallest gain from cooperating with the poor region because its marginal cost is higher, while both regions receive the same welfare when there is income equality. Larger income inequality between regions leads to larger inequality between regional gains. Furthermore, as we can see in the graph, the condition that representatives will reach an agreement if and only if their net gains are simultaneously positive implies that the equilibrium must necessarily be a point in the positive subset of the rich region.

It is interesting to note that the marginal gain from trade is equal to the marginal utility, denoted with \( Mu_i \); i.e.:

\[
\frac{\partial \phi_i}{\partial g} = -\gamma_i + H' (g) = Mu_i.
\]  

(15)

Representatives choose the government size \( g \) by bargaining. We show that by maximizing the following Nash bargaining condition:

\[
max_g [\ln ( -\gamma_1 g + H (g)) + \ln ( -\gamma_2 g + H (g))]
\]
The first order condition is:

$$\frac{-\gamma_1 + H'(g)}{-\gamma_1 g + H(g)} + \frac{-\gamma_2 + H'(g)}{-\gamma_2 g + H(g)} = 0.$$  \hspace{1cm} (16)

The first order condition can be formulated in an alternative form, which will be very useful in the comparative statics.

**Definition 1** Define with $\epsilon_i = \frac{\partial \phi_i / \partial g}{\phi_i / g}$ the elasticity of gain from reaching an agreement over an efficient government size of representative $i = 1, 2$.

The elasticity measures the percent change of gain from reaching an agreement relative to the percent change in government size. The first order condition can now be reformulated as follows:

$$\epsilon_1 + \epsilon_2 = 0.$$  \hspace{1cm} (17)

Equation (17) states that the Nash Bargaining first order condition is satisfied if and only if the sum of the elasticities of the gains from having an efficient government size is zero.\(^{13}\) In other words, the elasticity of gains through cooperation between the two regional representatives are equal in absolute value and take opposite signs in equilibrium; i.e. $\epsilon_1 = -\epsilon_2$. In figure 2, the elasticity of the rich region, $\epsilon_1$, is to the left and steeper than $\epsilon_2$.\(^{14}\) The equilibrium size, $g^*$, where $a = b$, is the unique point in which equation (17) is satisfied.\(^{15}\) Figure 2 also compares the negotiated solution with that of the non-benevolent dictator. Obviously, the agreement is a compromise, which lies between the two representatives’ first best outcomes, $g^D_1$ and $g^D_2$, which are defined in equation (11). In the Nash bargaining equilibrium, representative 2 would like to consume more of the public good and representative 1, who has the highest marginal cost, would like to consume less of it. It can be easily verified that at the agreement equilibrium the marginal utilities of the two representatives take different signs. To show this we use equation (15) to write equation (16) in the form

$$\frac{\mu_1}{\phi_1} + \frac{\mu_2}{\phi_2} = 0.$$  Clearly, the sign of the elasticity of the gains from reaching an agreement depends only on the sign of the marginal utilities of the representatives because the denominators are both positive by definition. This, in turn, implies that at the agreement point the marginal utilities of representatives take opposite signs.

In the following sections, we use the Nash bargaining first order condition to compute the comparative statics.

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\(^{13}\)Equation (17) can be obtained by writing the Nash Bargaining first order condition in the form $\frac{\mu_1}{\phi_1} + \frac{\mu_2}{\phi_2} = 0$. After multiplying it by $g$ we get the sum of the elasticity of the gains from reaching an agreement.

\(^{14}\)I am indebted to an anonymous referee for suggesting this graph.

\(^{15}\)Note that the equilibrium is unique in the set of feasible public goods provision in which regional net gains are positive for both regions. This set is shown in figure 1.
5 Inter-regional income disparity and government size

In this section we study the impact of inter-regional inequality on public spending. The comparative statics experiment shows why changes in the regional per-capita income generates conflicting interests between jurisdictions as well as weaken bargaining leverage in the government. For example, each representative would like to consume more public goods when his income raises. However, at the same time, he has to bear an increasing share of the public goods cost. How do the representatives solve these conflicts?

We have seen that both the central planner and the non-benevolent dictator fail to capture the conflicting redistributive interests between jurisdictions generated by income inequality. Instead, when regional representatives bargain over the size of the public sector and there is an exogenous change in their income, they "have a common interest to co-operate, but have conflicting interests over exactly how to co-operate" Muthoo (1999). The following Lemma is the key to solve the bargaining game between median voters.

Lemma 1 The government increases the size of the public sector when the per-capita income of region 1 increases only if the elasticity of the gain of representative 1 is sufficiently large and greater than a critical value expressed in the following condition:

\[
\frac{dg^*}{dy_1} > 0 \text{ when } \epsilon_1 > \left(\frac{\gamma_1 - \gamma_2}{2H(g^*)} - g^*\right).
\]

Similarly, when the per-capita income of region 2 increases, the government increases the size of the public sector only when the following condition is satisfied:

\[
\frac{dg^*}{dy_2} > 0 \text{ when } \epsilon_2 > \left(\frac{\gamma_2 - \gamma_1}{2H(g^*)} - g^*\right).
\]

Proof. The proof is in the Appendix. ■

Basically, Lemma 1 only considers changes in inter-regional income inequality. It is interesting to study the sign of this comparative statics since both terms of conditions (18) and (19) can be either positive or negative. In order to do this we need to identify the items on the right hand sides. The denominators represent the total or "social" gains from government spending. The social gains are the sum of representatives net gains and can be written as the difference between the social benefit and cost, which we know to be positive by definition. Even though the denominators suggest that larger social gains favour a larger public sector when the per-capita income of one region increases, we will see that this is not enough to achieve this target. The reason being that income inequality creates incentives to constrain public expenditure.

Redistributive conflicts are captured by the numerators on the right hand side of conditions (18) and (19). The numerators represent inter-regional redistribution.
associated with the provision of public goods. The assumption that \( \overline{y}_1 > \overline{y}_2 \) implies that interregional redistribution is positive for region 2, i.e. \( \gamma_1 - \gamma_2 > 0 \). In this situation, region 1 is partially financing the provision of the public sector in jurisdiction 2 through the tax system. Similarly, inter-regional redistribution is zero when representatives have the same income. We can conclude that small income disparity between jurisdictions favour a larger public sector.\textsuperscript{16}

Lemma 1 shows that income disparity between regions has a direct effect on public spending. In particular, equation (18) states that government size increases with \( \overline{y}_1 \) if the elasticity of representative 1 is greater than a positive ratio, which depends on the amount of redistribution in favour of region 2. Similarly, equation (19) states that government size increases with \( \overline{y}_2 \) if the elasticity of representative 2 is greater than a negative ratio, which depends on the amount of redistribution received from region 1. It is now essential to establish the sign of elasticity of the net gains \( \varepsilon_i \).

**Lemma 2** In the Nash bargaining equilibrium, marginal utility, marginal gains and elasticity of the gains from government spending are negatives for the rich representative and positives for the poor.

**Proof.** The proof is in the Appendix. \( \blacksquare \)

The intuition of the Lemma is that everybody receives the same benefit from the public sector, but tax-payers in the richer region pay more for it. This implies that the marginal utility of the rich is negative in equilibrium while the poor’s one is positive.

The size of the right hand side of condition (25) is directly proportional to the amount of inter-regional redistribution, \( (\gamma_1 - \gamma_2) g^* \). In particular, it is interesting to analyze the effect of income inequality represented by the difference \( \gamma_1 - \gamma_2 \) on the size of the public sector. As the following Proposition states, the effect of changes in the income of the richer is different from the effect of changes in the income of the poorer.

**Proposition 1** Government size increases when either the per-capita income of the poor region increases or that of the rich decreases. Conversely, the size of the public sector decreases when either the income of the poor decreases or that of the rich increases.

**Proof.** The proof is in the Appendix. \( \blacksquare \)

The desire to increase public consumption when income increases contrasts with the increase in marginal cost. The poor have the lowest marginal cost coupled with a positive marginal utility and marginal gain from increasing public consumption.

\textsuperscript{16}This is particularly evident when heterogeneous tastes are introduced in the analysis.
Certainly, legislature is bound to increase the size of government when the poor becomes wealthier. Similarly, the legislature will agree to decrease it when the poor becomes poorer because the poor cannot afford higher public consumption and the rich does not want to incur higher marginal cost.

In the case in which the rich becomes poorer is interesting to note the government size increases. The reason is that in such a situation the rich would agree to a larger public sector simply because the marginal cost is now lower. As a consequence, the poor have to sustain a higher marginal cost, but their net marginal gain is still positive and they will agree to a larger \( g^* \), as well.

Similarly, when the rich become even richer and the income of the poor remain the same, the rich will force the legislature to implement a lower \( g^* \) as there is a threat that, in the absence of an agreement, everybody gets \( g = 0 \).

Figure 3 provides a graphical representation of the comparative statics. As we can see, larger income inequality shifts the elasticity of the rich region to the left and the elasticity of the low income region to the right. As a consequence, the rich region would like to have less government intervention and the poorer region more of it. In the bargaining context, larger inequality makes the rich region more rigid because it has less gains from cooperating, as shown in figure 1, while the low income region becomes more elastic and more willing to cooperate. It is equivalent to say that the rich region gains more bargaining power the larger the inequality. As a consequence, the rich region will be able to obtain a reduction in government spending.

The behaviour of the rich leads to a paradoxical conclusion: there may be cases in which government is larger when the economy becomes poorer, and smaller when the economy becomes wealthier. Similarly, the size of the public sector may be relatively larger in a poorer but more equally distributed economy, and comparatively smaller in a richer but more unequal one.

We conclude with an example which compares the bargaining outcome with the central planner solution. Figure 4 plots the first order condition (16) when the benefit function is \( H (g) = g^{0.5} \) and the parameter \( \gamma \), which measures income concentration between regions, takes different values. Specifically, the graph shows the unique bargaining equilibrium in the interval in which the net gains are positive for both jurisdictions for three given values of \( \gamma \). If we start, for instance, from the case of income equality represented by the green curve, the first order condition is zero when government size is equal to 1. This is also the size that both the benevolent and non-benevolent dictators would supply. However, with income inequality, while the central planner would always provide \( g = 1 \), the two representatives would compromise on a different size. Specifically, the equilibrium curve shifts to the left the higher the regional concentration of income in the economy. This is shown in blue for the case in which \( \gamma_1 = 3/4 \) and in red for \( \gamma_1 = 1 \).
6 Conclusion

This paper analyses the relation between regional income disparity and the size of the public sector, or in general the provision of public goods, in a two-jurisdiction polity. We have used a bargaining decision-making model between regional representatives alternative to the traditional utilitarian approach. The advantage of the model is to emphasize the impact of inter-regional redistributive conflicts on public spending.

Both the financing of the public sector with a proportional income tax and the uniform provision across regions imply income tax redistributions between and within regions. In particular, the relation between intra-regional inequality was studied by Meltzer and Richard (1981, 1983). They found that, in a one-jurisdiction polity, the size of government is larger the larger the income inequality. Here, we extended Meltzer and Richard’s analysis to a two-jurisdiction polity. The main result shows that increased inter-regional inequality reduces redistributive public spending, contrary to the Meltzer and Richard result.

The paper compares three different solutions. The first shows that if a regional representative could choose policy as a non-benevolent dictator, he would "free-ride" over the other region by increasing public spending when the income and the marginal cost of the other region increases. The second, on the contrary, illustrates that if a central planner could make decisions as a benevolent dictator, he would set policy without taking into account tax-income redistribution. Instead, the third solution shows how inter-regional redistributive conflicts emerge dramatically when regional representatives choose policy by bargaining.

We find that economic inequality leads to under-provision in government spending the larger the income gap between regions. Here, for under-provision, we mean that government spending is under-provided when we compare both the case of inter-regional inequality with that of income equality and the bargaining with the central planner outcome. In particular, results state that under-provision is directly proportional to inter-regional income inequality and disappears when the income gap converges to zero. As a result, the public sector is smaller either the higher the income of the rich or the lower the income of the poor. Conversely, the size of government is larger either when the income of the poor increases or the income of the rich decreases.

In addition, we find that all three solutions lead to the same size of government in the case of income equality. With income inequality, the central planner outcome does not change. Instead, the negotiated outcome leads to a lower public spending the larger the inequality and it is always a compromise between the two most preferred policies of the non-benevolent dictators. Specifically, if the representative of the poor region was a non-benevolent dictator, he would choose a larger government than the negotiated outcome, while the representative of the rich region would choose a lower level. The negotiated outcome declines with income inequality because the marginal cost of the rich becomes too highly driven by a heavier fiscal burden while, at the same time, the gain from cooperating with the poor region too
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small. As a consequence, in the absence of coercion, the rich representative becomes more rigid in the negotiation process and public spending must decline.

The analysis also shows that larger social gains are not a sufficient condition for a larger public sector. In order to increase public consumption, for example, the poor region needs to reduce its income gap or the rich region needs to increase tax income redistribution in favour of the poor. Paradoxically, a reduction of per-capita income may cause an increase in the size of the public sector when income inequality between regions is smaller. This is due to a weakening of inter-regional redistributive conflicts. Similarly, when the economy is wealthier, but at the same time the distribution of income is more unequal between jurisdictions, the size of the public sector may be reduced because of the worsening of redistributive conflicts. These results support the thesis of that part of literature which argues that countries with larger income inequality tend to be less redistributive; see Bassett et al. (1999), Bènabou (2000), Bjorvatn and Cappellen (2003a), Persson (1995) and others.

What would the effect on public spending be if we add intra-regional inequality into the analysis? In this case, we would observe the interaction of two typically opposing effects. The first is the inter-regional inequality effect studied in this paper. The second is intra-regional inequality, or Meltzer and Richard’s effect, which leads to a larger government the larger the income disparity within jurisdictions. Consequently, regional representatives would strategise not only on the difference between their income and the per-capita income of the other region, but also on that of their own region. For instance, an increase in the income of the low income region’s representative would typically make him less interested in redistributive taxation. The intra-region effect is thus to scale down public spending. On the other hand, since the poor region has become less poor, the rich region would now be willing to expand the public sector. The net effect is uncertain and depends on the particular distribution of income between and within regions. However, there are cases in which the two inter- and intra-regional effects push in the same direction. For instance, an increase in the income of the rich representative would certainly scale down public spending with both effects. There are, however, a number of ways in which intra- and inter-regional income differences may vary and affect public spending. We leave this analysis for further research.

This analysis can also be expanded to incorporate political parties choosing policy by bargaining in a political competition framework. Party leaders bargain over policy by taking into account a function representing the social consensus or simply the probability of winning the election as, for example, in Hettich and Winer (1999). The introduction of a probabilistic voting approach would overcome some of the limits which are typical of the median voter approach. As already well established in the literature, median voter theory applies only to models using a one-dimensional policy issue with single-peaked preferences. The study of the impact of income inequality on political consensus could add new results to the inter- and intra-regional effects analysed here. Furthermore, a probabilistic voting approach would allow for the extension of the model to the study of multidimensional cases. For exam-
ple, it could be possible to study the relation between the government size and the structure of the tax system.

The model can also be extended to analyse some international issues, like international or global bargaining over pollution control or the European decision-making process. The debate concerning a European defence policy, for instance, can be formally analysed by introducing into the model an outside option representing the utility each single European country obtains if defence continues to be provided at the national level.

Finally, it could be interesting to build up a model in which the representatives of more than two districts form a minimum winning coalition to choose policy in the legislature.

Acknowledgments

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Appendix

Proof of Lemma 1. For simplicity, we denote the first order condition with

\[ G = -\frac{\bar{y}_1}{\bar{y}_1 + \bar{y}_2} + H'(g) + \frac{\bar{y}_2}{\bar{y}_1 + \bar{y}_2} + H'(g) - \frac{\bar{y}_2}{\bar{y}_1 + \bar{y}_2} g + H(g) - \frac{\bar{y}_2}{\bar{y}_1 + \bar{y}_2} g + H(g) = 0. \]  (20)

We need to study \( \frac{dg}{dy_i} = \frac{G_{y_i}}{C_{y_i}} \), with \( i = 1, 2 \). The denominator is always negative,

\[ G_{y_i} = \frac{H''(g) \phi_1 - \phi_1^2}{\phi_1^2} + \frac{H'(g) \phi_2 - \phi_2^2}{\phi_2^2} < 0. \]  (21)

Instead, for changes in \( \bar{y}_1 \), the numerator, \( G_{\bar{y}_1} \), is given by

\[ G_{\bar{y}_1} = -\frac{\bar{y}_2}{(\bar{y}_1 + \bar{y}_2)^2} \phi_1 + \frac{\bar{y}_2}{(\bar{y}_1 + \bar{y}_2)^2} g \phi_1' + \frac{\bar{y}_2}{(\bar{y}_1 + \bar{y}_2)^2} \phi_2 - \frac{\bar{y}_2}{(\bar{y}_1 + \bar{y}_2)^2} g \phi_2'. \]  (22)

As a consequence of the equilibrium condition (17), \( G_{\bar{y}_1} \) is positive when

\[ \epsilon_1 > \frac{\phi_2 - \phi_1}{\phi_2 + \phi_1}. \]  (23)
Similarly, for changes in \( \bar{y}_2 \), the numerator, \( G_{\bar{y}_2} \), is positive when

\[
\epsilon_2 > \frac{\phi_1 - \phi_2}{\phi_1 + \phi_2}.
\]  

(24)

This proves the Lemma.

**Proof of Lemma 2.** We know from equation (17) that in equilibrium the elasticities of the benefit of the two median voters have different signs. Given the structure of the elasticity, equation (17) is satisfied if and only if median voters’ marginal utilities have different signs. Now, associating this result with equation (15), the rich median voter must be the one with negative marginal utility and the poorer median voter, who benefits from positive indirect transfers, must have a positive marginal utility. This proves the lemma.

**Proof of Proposition 1.** In order to study the sign of the comparative statics, we can conveniently simplify the notation by writing condition (18) in the following form:

\[
\frac{dg^*}{d\bar{y}_1} > 0 \text{ when } \epsilon_1 > (\gamma_1 - \gamma_2) g^* \varphi,
\]  

(25)

where \( \varphi \) is the reciprocal of the social net gains and as a positive term it does not influence the sign of the comparative static. The same simplification can be done with condition (19):

\[
\frac{dg^*}{d\bar{y}_2} > 0 \text{ when } \epsilon_2 > (\gamma_2 - \gamma_1) g^* \varphi.
\]  

(26)

In order to prove the proposition we study the two conditions separately. Condition (25) shows what happens when the per-capita income of the richest region changes. We already know from Lemma 2 that the elasticity of the net gains from cooperating for representative 1, \( \epsilon_1 \), is always negative. Since the transfer from region 1 to region 2, \( (\gamma_1 - \gamma_2) g^* \), is positive because \( \gamma_1 > \gamma_2 \), the sign of the comparative static is negative; i.e. \( dg^*/d\bar{y}_1 < 0 \). Similarly, condition (26) shows the consequences of changes in the per-capita income of the poor region. We already know from Lemma 2 that the elasticity of the net gains, \( \epsilon_2 \), for the representative of the poor region is always positive. Since the transfer from region 2 to region 1, \( (\gamma_2 - \gamma_1) g^* \), is negative because \( \gamma_1 < \gamma_2 \), the sign of this comparative static is positive, i.e. \( dg^*/d\bar{y}_2 > 0 \).

**References**


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Figure 1: In blue there is the net gain from cooperating when $\gamma < 2/3$, in black when $\gamma = 0.5$ and in red when $\gamma > 1/3$.

Figure 2: In the Nash bargaining equilibrium $a = b$. 
Figure 3: Larger inter-regional inequality leads to a smaller government.
Figure 4: Bargaining equilibrium with $\gamma_1 = 1$ in red, $\gamma_1 = \frac{3}{4}$ in blue and $\gamma_1 = \frac{1}{2}$ in green; $H(g) = g^\frac{1}{2}$.
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