

REGIONAL INCOME DISPARITY AND THE SIZE OF THE PUBLIC SECTOR

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Abstract

This paper explores the impact of income inequality between jurisdictions on 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. More specifically, greater 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

Interregional income disparities, such as those characterizing the north-south divide in Italy and Spain, give rise to 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 overall size of the public sector or by decentralizing fiscal powers from the centre to local governments as examples from the United Kingdom, Canada and the United States illustrate. In other cases, nations may decide to dissolve, as the former Czechoslovakia. It is likely that public policy decisions in Europe will be constrained by income inequality across member states, particularly following the recent expansion.

Typically, governments introduce 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, gains in equity come at a loss of efficiency.

This paper examines the effects of inter-regional income inequalities on governmental policy choices. In the context under consideration, policy is negotiated by regional representatives rather than established unilaterally by a paternalist central planner. We study how redistributive conflicts can either be mitigated or aggravated by the standard trade-off between the supply of public goods and the tax rate as well as the transfers between different jurisdictions. We find that greater income disparities among regions, arising in some cases from the growing divergence between richer and poorer regions, intensify interregional redistributive conflicts, potentially leading to an under-provision of public goods. Consequently, the larger the income gap, the smaller the public sector. Paradoxically, a wealthier economy may result in a relatively smaller public sector as inter-regional income disparity increases.

Meltzer and Richard (1981) studied the relation between income inequality and government spending within 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.¹ They observe that the distribution of income in most societies is such that the mean income lies above the median income. Thus, an increase in the mean income relative to the income of the median voter increases the size of government.² In this 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 a

¹Meltzer and Richard (1981) extended the standard model of redistributive taxation proposed by Romer (1975) and Roberts (1977).

²Meltzer 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).

two-jurisdiction polity with a common public good and tax policy stipulated on the basis of bargaining among the jurisdictional decision makers.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 both the pressure for redistribution and 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. Rather, it depends on gains from cooperation between regional representatives. Therefore, when the representative of one region has negative net gains, he or she can exercise the veto and, thus, the agreement is not reached. For example, if only inter-regional inequality counts, then greater income inequality necessarily 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, individuals, groups or 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*⁴." In this paper, we refer to Sen's argument in comparing 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. 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 the 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. An extension of this paper to a federal framework with two levels of government is presented in Giuranno (2009). In the latter, decisions by the central government are made according to the subsidiarity

³I am indebted to the Associate Editor for this observation.

⁴Sen, 1973, p. 16.

principle. Hence, when the central government fails to reach a cooperative agreement over policy, decisions are made independently and competitively by the decentralized governments.

Related literature

Recent reviews of several theories of government growth and inequality are contained in Garrett and Russell (2006), Glaeser (2005) and Holsey and Borchering (1997).

Bjorvatn and Cappelen (2003b) use cross-national regressions to show that greater 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 differs 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 lower the redistribution and, consequently, the smaller the government. In our model, the representatives 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, meaning 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 the smaller public sector in countries with more unequal income distribution might be the result of 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 their veto power to constrain government spending when they feel it exploits their private benefits. Similarly, there are circumstances in which the veto power is used by the poor to prevent exploitation against them.

Income inequality may lead to several forms of segregation between rich and poor, as argued by Bjorvatn and Cappelen (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.

One 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 richer 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 receiving greater financing and a higher provision

of public services, as a result of their greater revenues. Furthermore, undermining redistributive flows among regions contributes to an increase in regional conflicts, creating an atmosphere contrary to national cohesion.

Lockwood (2002), Cerniglia (2003) and Lucas (2002) presented three different 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) question 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 literature on distributive politics with that of the political economy 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 how to allocate the amount of local public goods financed by a linear income tax or by a regional income tax. Cerniglia considers a more extreme point of threat than in our model represented by secession. She investigates 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) provides a theoretical approach to transfer 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 how 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 analyzes 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

⁵For earlier versions of this paper see Giuranno (2005, 2007 and 2008).

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 Richard (1981).

The policy to be determined concerns the level of government spending, which benefits all voters alike and is financed by a 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

$$u^h = c^h + H(g), \quad (1)$$

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 equally 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.,

$$c^h = (1 - t) y^h. \quad (2)$$

The average income is $\bar{y} = E(y^h)$, 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

$$t\bar{y} = g. \quad (3)$$

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

$$u^h = (\bar{y} - g) \frac{y^h}{\bar{y}} + H(g). \quad (4)$$

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:

$$dg^h/d(y^h/\bar{y}) < 0. \quad (5)$$

This, in turn, implies that g^h is increasing in \bar{y} and decreasing in y^h . Furthermore, policy preferences are monotonic in their relative income, y^h/\bar{y} . Under majority rule, voters with incomes below that of the pivotal voter choose candidates who favour higher government spending and redistribution; voters with incomes above that of the decisive voter desire fewer public goods and less redistribution. The voter

with median income is decisive.⁶ 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

$$-\frac{y}{\bar{y}} + H'(g) = 0, \quad (6)$$

which leads to the following comparative statics

$$dg/d(y/\bar{y}) < 0. \quad (7)$$

Condition (7) can be interpreted as follows: an increase in 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 average, hence he desires greater 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 within 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 so, we assume for simplicity that citizens have the same income within each jurisdiction. Note that, here, we do not need to model an election, given that all citizens are alike within the regions. Therefore, we assume that one individual per group is randomly selected to represent the belonging jurisdiction. 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.

⁶As 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's statement also applies to our framework, with the difference that, in our model, the choice variable is g and not t .

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

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

Once the legislature decides the dimension of g , the government budget constraint is automatically determined by setting⁹

$$g = t(\bar{y}_1 + \bar{y}_2). \quad (8)$$

Consequently, the tax rate $t = \frac{g}{\bar{y}_1 + \bar{y}_2}$ 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 $t\bar{y}_1 = \frac{\bar{y}_1}{\bar{y}_1 + \bar{y}_2}g = \gamma_1 g$. As a result, representatives share the cost according to their relative income, denoted by γ , such that:

$$\gamma_1 = \frac{\bar{y}_1}{\bar{y}_1 + \bar{y}_2}. \quad (9)$$

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 γ can be interpreted as an index of inter-regional inequality. When $\bar{y}_1 = \bar{y}_2$, then $\gamma = 1/2$. Thus, the farther γ 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:

$$u_i = \bar{y}_i - \gamma_i g + H(g), \quad \text{with } i = 1, 2. \quad (10)$$

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 briefly describe 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 is in a

⁹Note that the following relations hold: $g = t \left(\sum_{n_1=1}^N y_{n_1} + \sum_{n_2=1}^N y_{n_2} \right) = Nt \left(\frac{\sum_{n_1=1}^N y_{n_1}}{N} + \frac{\sum_{n_2=1}^N y_{n_2}}{N} \right) = Nt(\bar{y}_1 + \bar{y}_2)$; where $\left(\sum_{n_1} y_{n_1} + \sum_{n_2} y_{n_2} \right)$ is the sum of indi-

vidual incomes in regions 1 and 2 and N is the population size, which is assumed to have a mass of unity and to be the same in the two regions.

¹⁰The model can be extended to consider the case of a non-uniform tax rate as follows: $g = t_1\bar{y}_1 + t_2\bar{y}_2$. In this case, jurisdictional representatives bargain over g , t_1 and t_2 .

position to choose the size of the public sector maximizing his or her own 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:

$$H'(g_i^D) = \gamma_i, \quad \text{with } i = 1, 2. \quad (11)$$

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, γ_i , corresponds to the share of the price the dictator pays for a unitary increment of the public sector. Instead, $H'(g_i^D)$ is the private marginal benefit. The dictator always reduces public expenditure when his private marginal cost increases; that is, $\partial g_i^D / \partial \gamma_i < 0$, $\partial g_i^D / \partial y_i < 0$ 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:

$$\max_{g^e} \left(\sum u_1^h + \sum u_2^h \right), \quad (12)$$

where u_i^h denotes the utility of individual h in region i , with $i = 1, 2$.¹¹ The efficient government size, g^e , satisfies the familiar Samuelsonian condition, $-\frac{\sum y_1^h + \sum y_2^h}{\bar{y}_1 + \bar{y}_2} + 2NH'(g^e) = 0$, which means that the social marginal benefit is equal to the social marginal cost. The Samuelsonian condition leads to the following equation

$$H'(g^e) = \frac{1}{2}, \quad (13)$$

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 a 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.

¹¹As 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.

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 of the two jurisdictions. In this case, representatives form a government and choose policy through negotiation.

We assume 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 $u_i^d = \bar{y}_i$, with $i = 1, 2$; that is, representatives entirely consume their private endowment. In order to reach an agreement, representatives must have positive gains from implementing g . Therefore, the agreement utility must be higher than the outside option for both representatives. In formulas, it must be $u_i - u_i^d > 0$, which implies $-\frac{\bar{y}_i}{\bar{y}_1 + \bar{y}_2}g + H(g) > 0$, 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 ϕ_i . In formula:

$$\phi_i = u_i - u_i^d = -\gamma_i g + H(g) \quad (14)$$

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 an agreement is reached on g . In figure 1, the area below the curves represents the gain from cooperating for three different values of γ . The smallest area is the gain of the rich region for a value of $\gamma = 0.6$, the largest area is the gain of the poor region for $\gamma = 0.4$ and the area in the middle is the gain for $\gamma = 0.5$.¹³ 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, which is the smallest area in the graph.

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

$$\frac{\partial \phi_i}{\partial g} = -\gamma_i + H'(g) = Mu_i. \quad (15)$$

¹²The Italian Constitutional Law, for example, in regulating budget guidelines for the central legislature, states that an agreement over public spending "must" be reached within a certain term. Literally, as Art. 81 states: "For each year, chambers vote on the budget and final balance submitted by the government. *Temporary execution* of the budget may not be granted except by law and for periods of no more than four months as a all". It is implicit that, in the Italian case, if an agreement is not reached within the temporary execution, which can last until April 30th at the latest, public expenditure is zero. Further hypotheses are not contemplated by the law, with the advantage that the negotiating factions cannot therefore strategize on them.

¹³In order to plot figure 1 we considered $H(g) = \ln(g + 1)$.

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:

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

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

Definition 1 Define with $\epsilon_i = \frac{\partial \phi_i / \partial g}{\phi_i / g}$ the elasticity, with respect to g , of gain from cooperating for the representative of jurisdiction i , with $i = 1, 2$.

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

$$\epsilon_1 + \epsilon_2 = 0. \quad (17)$$

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.¹⁴ 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, ϵ_1 , is to the left and steeper than ϵ_2 .¹⁵ The equilibrium size, g^* , where $a = b$, is the unique point in which equation (17) is satisfied.¹⁶ 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_1^D and g_2^D , 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 easily be 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 section, we use the Nash bargaining first order condition to compute the comparative statics.

¹⁴Equation (17) can be obtained by writing the Nash Bargaining first order condition in the form $\frac{\phi'_1}{\phi_1} + \frac{\phi'_2}{\phi_2} = 0$. After multiplying it by g we get the sum of the elasticity of the gains from reaching an agreement.

¹⁵I am indebted to an anonymous referee for suggesting this graph.

¹⁶Note 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 the smallest area 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 and may weaken bargaining leverage in the government. For example, both representatives would like to consume more public goods when their income increases. However, at the same time, they have 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 solving the bargaining game between regions.

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

$$\frac{dg^*}{dy_1} > 0 \text{ when } \epsilon_1 > \frac{(\gamma_1 - \gamma_2)g^*}{2H(g^*) - g^*}. \quad (18)$$

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:

$$\frac{dg^*}{dy_2} > 0 \text{ when } \epsilon_2 > \frac{(\gamma_2 - \gamma_1)g^*}{2H(g^*) - g^*}. \quad (19)$$

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 the comparative statics since both terms of conditions (18) and (19) can be either positive or negative. In order to do so, 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 the representatives' net gains and can be written as the difference between the social benefit and cost, which we know is 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 such a target. This is because 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 $\bar{y}_1 > \bar{y}_2$ implies that interregional redistribution is positive for region 2, i.e., $\gamma_1 - \gamma_2 > 0$. In this situation, region 1 partially finances the provision of the public sector in region 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 favours a larger public sector.¹⁷

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 \bar{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 \bar{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 ϵ_i .

Lemma 2 *In the Nash bargaining equilibrium, marginal utility, marginal gain and elasticity of the gain from government spending are negative for the rich representative and positive for the poor.*

Proof. The proof is in the Appendix. ■

The intuition of the Lemma is that everyone 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 that of the poor is positive.

The size of the right hand side of conditions (18 and 19) 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. ■

A higher per-capita income in jurisdiction i increases the marginal cost for the citizens of that region, thus restraining the desire to increase public consumption. The

¹⁷This is particularly evident if heterogeneous tastes are introduced in the analysis.

poor, for example, have the lowest marginal cost coupled with a positive marginal utility and marginal gain from increasing public consumption. Certainly, legislature is bound to increase the size of government when the poor become wealthier. Similarly, the legislature will agree to decrease it when the poor become poorer because the poor cannot afford higher public consumption and the rich do not want to incur higher marginal costs.

In the case where the rich become poorer, it is interesting to note that government size increases. The reason is that the rich would agree to a larger public sector simply because their 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^* .

Similarly, when the rich become even richer and the income of the poor remains the same, the rich will force the legislature to implement a lower g^* because of the threat that, in the absence of an agreement, everyone will receive $g = 0$.

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 prefer less government intervention and the poorer region more. In the bargaining context, larger inequality increases the rigidity of the rich region because it has fewer gains from cooperating, as shown in figure 1, while the low income region becomes more elastic and more willing to cooperate. This is equivalent to saying that the rich region gains more bargaining power as the inequality increases. As a consequence, the rich region will be able to obtain a reduction in government spending.

The behaviour of the rich leads to a counter-intuitive conclusion: there may be cases of growing government when the economy becomes poorer, and of shrinking government 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 a second Proposition that compares the bargaining outcome with the central planner solution.

Proposition 2 *Inter-regional economic inequality leads to under-provision in government spending as the income gap between regions widens.*

Proof. The proof is in the Appendix. ■

The Appendix provides a simple proof of the above Proposition, which shows that both the central planner and bargaining approaches lead to the same outcome when there is income equality between regions. The central planner does not change the level of public spending with income inequality, but according to Proposition 1 the bargaining solution leads to a lower level of public spending when inequality increases. Consequently, the bargaining outcome leads to under-provision when compared with the central planner outcome.

The following numerical example illustrates the result stated in Proposition 2. Figure 4 plots the first order condition (16) when the benefit function is $H(g) = g^{0.5}$ and the parameter γ , which measures income concentration between regions, assumes 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 γ . If we start, for instance, from the case of income equality represented by the third curve on the right side of the graph, the first order condition is zero when government size is equal to 1. This is the same 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 as the regional concentration of income in the economy increases. This is shown by the second curve in the middle of the graph, for the case in which $\gamma_1 = 3/4$, and by the first curve on the left for $\gamma_1 = 1$.

6 Conclusion

This paper analyzes the relation between regional income disparity and the size of the public sector 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 this model is that it highlights 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, Meltzer and Richard (1981, 1983) found that, in a one-jurisdiction polity, the size of government grows with income inequality. Here, we have 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 Meltzer and Richard's result.¹⁸

The paper compares three different scenarios. The first shows that a regional representative choosing policy as a non-benevolent dictator would "free-ride" on the other regions by increasing public spending when the income and marginal cost of the other regions increase. The second, instead, illustrates that a central planner making decisions as a benevolent dictator would set policy without taking into account tax-income redistribution. Finally, the third solution shows the surge in inter-regional redistributive conflicts when regional representatives choose policy through a process of bargaining.

We find that economic inequality leads to under-provision in government spending as the income gap between regions increases. By under-provision, we mean that government spending is under-provided when comparing both the case of inter-regional inequality with that of income equality and the bargaining with the central

¹⁸We used a utility function that is linear in private consumption and assumed separability between private and public consumption.

planner outcome. In particular, the results show 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 as inequality increases and it is always a compromise between the two favourite policies of the non-benevolent dictators. In particular, 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 becomes too small. As a consequence, in the absence of coercion, the rich representative becomes more rigid in the negotiation process and public spending inevitably declines.

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 diminishes. 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 intensification 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 added 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 larger government as the income disparity within jurisdictions increases. Consequently, regional representatives would take into account the difference between their income and the per-capita income of both the other region and their own region. For instance, an increase in the income of the low income region's representative would typically make him or her 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 across 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.

The present 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 provide new results to the inter- and intra-regional effects analyzed here. Furthermore, a probabilistic voting approach would allow for the extension of the model to the study of multidimensional cases. For example, one could study the relation between 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 might 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.

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Appendix

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

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

We need to study $\frac{dg^*}{d\bar{y}_i} \equiv -\frac{G_{\bar{y}_i}}{G_g}$, with $i = 1, 2$. The denominator is always negative,

$$G_g = \frac{H''(g)\phi_1 - \phi_1'^2}{\phi_1^2} + \frac{H''(g)\phi_2 - \phi_2'^2}{\phi_2^2} < 0. \quad (21)$$

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

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

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

$$\epsilon_1 > \frac{\phi_2 - \phi_1}{\phi_2 + \phi_1}. \quad (23)$$

Similarly, for changes in \bar{y}_2 , the numerator, $G_{\bar{y}_2}$, is positive when

$$\epsilon_2 > \frac{\phi_1 - \phi_2}{\phi_1 + \phi_2}. \quad (24)$$

The last two inequalities prove the Lemma.

Proof of Lemma 2. We know from equation (17) that, in equilibrium, the elasticities of the benefit of the two representatives have different signs. Given the structure of the elasticity, equation (17) is satisfied if and only if the representatives' marginal utilities have different signs. Now, associating this result with equation (15), the representative of the rich region must be the one with negative marginal utility and the representative of the poorer region, 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:

$$\frac{dg^*}{d\bar{y}_1} > 0 \text{ when } \epsilon_1 > (\gamma_1 - \gamma_2) g^* \varphi, \quad (25)$$

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

$$\frac{dg^*}{d\bar{y}_2} > 0 \text{ when } \epsilon_2 > (\gamma_2 - \gamma_1) g^* \varphi. \quad (26)$$

In order to prove the proposition, we study the two conditions separately. Condition (25) shows what happens when the per-capita income of the rich region changes. We already know from Lemma 2 that the elasticity of the net gains from cooperating for representative 1, ϵ_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, ϵ_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. $dg^*/d\bar{y}_2 > 0$.

Proof of Proposition 2. According to Proposition 1, larger inter-regional inequality leads to less public spending. On the contrary, the central planner solution, which satisfies the Samuelsonian equilibrium condition (13), is not influenced by income inequality. Therefore, in order to prove the Proposition we need to prove that both the central planner and bargaining solutions lead to the same policy outcome when the two regions have the same per-capita income. We also know from equation (9) that if $\bar{y}_1 = \bar{y}_2$, then $\gamma_1 = \gamma_2 = 0.5$. The bargaining outcome in the case of income equality can be obtained by substituting γ_1 and γ_2 with 0.5 in the bargaining equilibrium equation (16), which leads to the following equation:

$$2 \frac{-0.5 + H'(g)}{-0.5g + H(g)} = 0. \quad (27)$$

Equation (27) is satisfied when $H'(g) = 1/2$, which is also the central planner solution in equation (13). This proves the Proposition.

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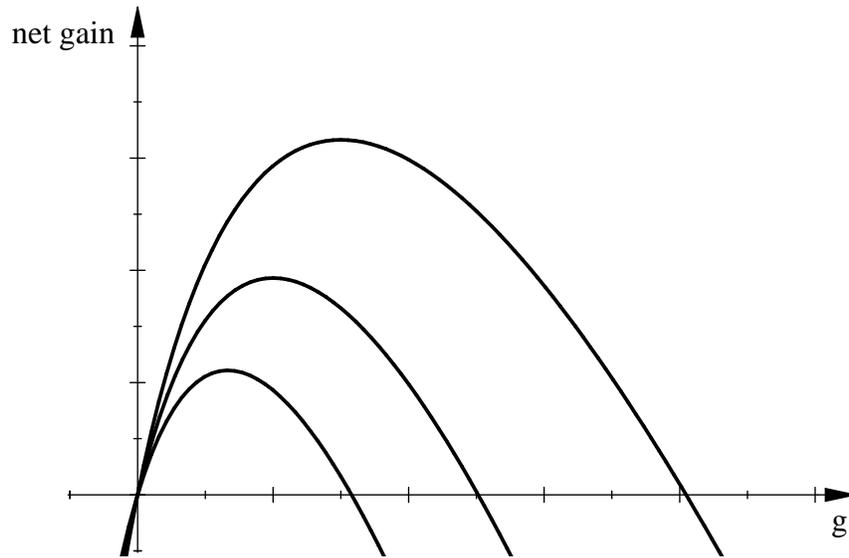


Figure 1: The smallest area corresponds to the net gain from cooperating when $\gamma < 2/3$, the curve in the middle is the net gain when $\gamma = 0.5$ and the curve with the largest area is the net gain when $\gamma > 1/3$.

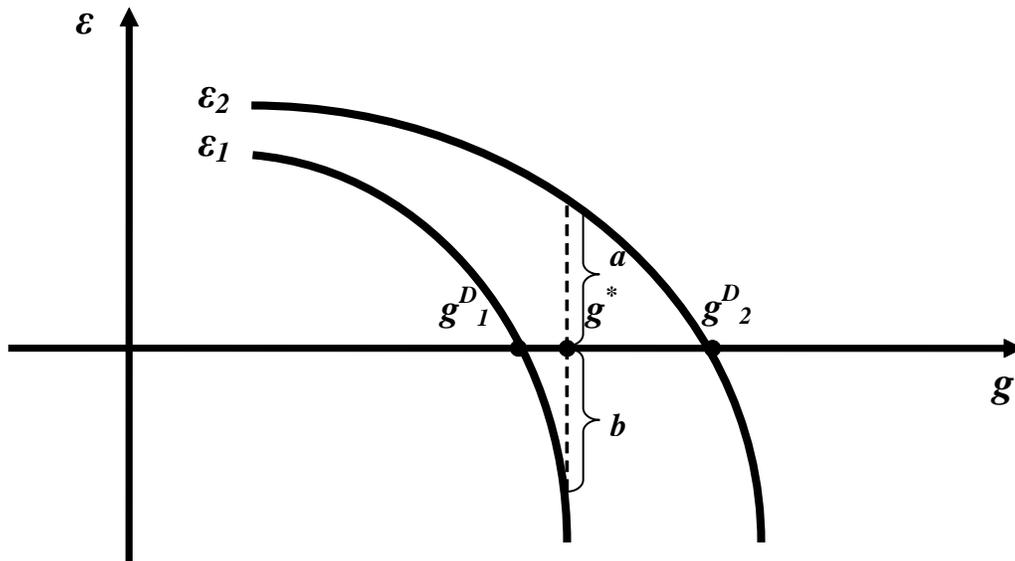


Figure 2: In the Nash bargaining equilibrium, $a = b$.

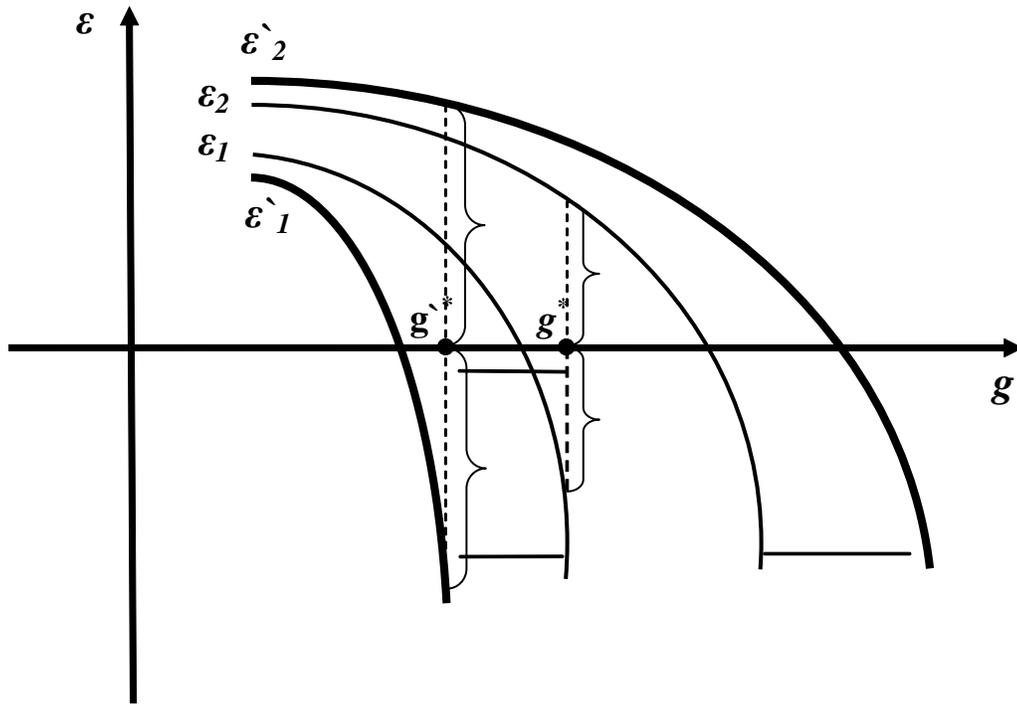


Figure 3: Larger inter-regional inequality leads to smaller government.

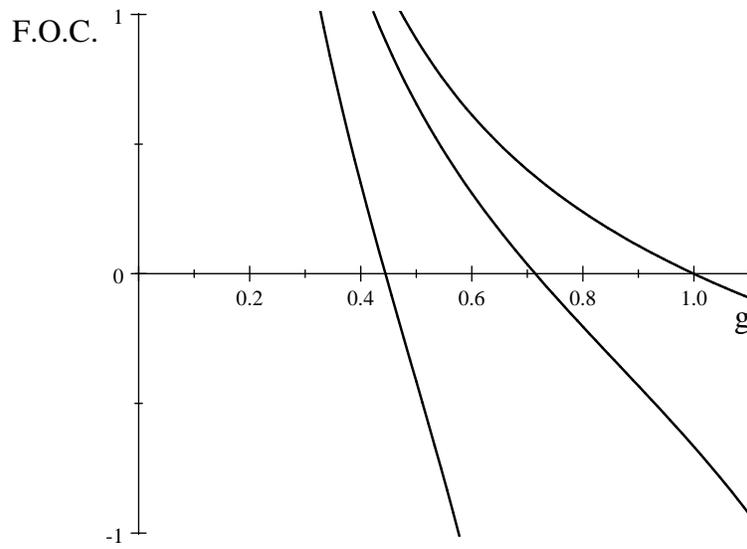


Figure 4: The curve on the left shows the bargaining equilibrium with $\gamma_1 = 1$, the second curve with $\gamma_1 = \frac{3}{4}$ and the last curve on the right with $\gamma_1 = \frac{1}{2}$; $H(g) = g^{\frac{1}{2}}$.