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Voting populace and centralised public spending

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Abstract

This paper considers a two-region economy and develops a model of centralized public spending when the regional pivotal voters change as a result of exogenous changes in the voting populace. Decisions over public spending are made by bargaining by the regional representatives in the centralized legislature. We study how changes in the composition of the electorate due, for example, to voters' relocation, migration or aging either deteriorates or mitigates inter-jurisdictional redistributive conflicts and how this influences the size of government.

Key words: Demographic Changes; Government Spending; Inequality; Redistribution; Bargaining; Political Economy Theory.

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

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1 Introduction

This paper studies the relation between inter and intra-regional distribution of income and the level of centralised public spending.

As it is very well known in the economic literature, the continuous changes in the voting populace produce significant changes in the distribution of income and affect in this way the collective policy decisions. Some examples are the migration between East and West Germany as well as its capital Berlin after unification or those between the North and the South of Spain and Italy after the second world war. In Canada migration policies are sometimes explicitly used to influence the electoral outcomes as in the province of Quebec where there is a strong separatist movement.

We claim that the impact of demographic changes in a multi-jurisdictional economy have not been adequately studied yet. Here, we consider a multi-regional economy where policy decisions are made by bargaining by the regional median voters in the central legislature. In this context, whether an individual votes in one or in another jurisdiction, for example, may have important policy implications. Migrants who acquire the right to vote in their final destination contribute to the collective choice mechanism by moving the median voters in both the region from where they come from and that where they end up. Often, migrants do not acquire the right to vote in their final destination but commute to vote in their region of origin. In this case, they may produce an electoral perturbation only in the region of origin as they may go back to vote with different income and preferences with regards to public spending.

When people move they may acquire a different individual income. Therefore, inter-regional mobility affects the distribution of income within and among regions and the average income of the all economy. Voters' mobility leads to regional pivotal voters that may be either relatively richer or poorer with respect to the per-capita income of the economy. In the collective choice mechanism here developed, the income gap among regional median voters characterises the dimension of the inter-regional redistributive conflict. We study how and exogenous migration rate either mitigates or deteriorates the inter-jurisdictional redistributive conflict and how the latter influences both the level and the efficiency of public spending.

Our theory complements the classic theory of the determinants of the size of government and fiscal redistribution which depends on the level of income inequality. Meltzer and Richard (1981, 1983) showed that in a one-jurisdictional polity the more skewed the distribution of income, the larger is the difference between the median and the mean income and the higher will be the size of government. Giuranno (2009) showed that in a two-jurisdiction structure the larger is the inter-regional income inequality, the lower will be the government size. Thus, there are two conflicting effects. One is due to the intra-regional inequality as in Meltzer and Richard (1981) and the other to the inter-regional inequality as in Giuranno (2009). Now, can the two conflicting effects be linked to each other? As discussed in Giuranno (2009)

without providing a formal analysis, the two effects interact. In this paper, we address this issue formally by building up a model that clearly links the two effects and studies their interaction.

We show that people mobility decreases government size when it produces median voters that are simultaneously richer relative to the per-capita income. This may be the case, for example, of the brain-drain that has strongly characterised the migration from the poorer South to the richer North in the last twenty years in Italy, where reducing public spending has become a priority in the political agenda. Often, skilled workers from the poorer regions who just gained their University degree move to richer regions to increase their income. Before migrating, their income is usually lower than the median voter income of their region. Once they migrate to a rich region, skilled workers can gain a wage above that of the median voter of the region where they end up and eventually vote. As a result, the brain-drain from the poorer to richer regions alters the composition of the voting populace and may produce regional median voters that are simultaneously richer in all regions. We know from Meltzer and Richard that a median voter will always decrease the government size when her income increases relative to average income. Therefore, in a multy-regional economy, if all regional median voters become simultaneously richer, they will unanimously agree to decrease the size of government. This result can be considered as an extension of Meltzer and Richard effect to a multy-region economy.

Similarly, we show that people mobility increases government size when it produces median voters that are simultaneously poorer relative to the per-capita income. This happens when workers that are richer in a poor region move to a region where they become poorer in a rich context even if their private income has increased.

Migration worsens inter-regional redistributive conflicts when the income gap among regional median voters either increases or decreases. In this case, the impact of migration on centralised public spending is more ambiguous. To illustrate the case we consider a two-region economy and first assume that inter-regional mobility leads to a larger income disparity between regional median voters. This happens when voters who live in the poorer region and gain an income below that of the regional median voter migrate and acquire the right to vote in the rich region where they gain a salary below that of the regional median voter. This is the case, for example, of the massive migration of unskilled workers from the South to the North of Italy during the fifties and sixties. In this case, low income workers left the poorer regions to gain a better salary in the rich regions. However, unskilled workers usually have an income to the left of the regional distribution of wealth and to the left of the median voter income. Therefore, if unskilled workers move from poorer to rich regions and their income increases, but remains always below that of the regional median voter, the perturbation in the electorate is such that the median voter of the poorer region becomes relatively richer and the median voter of the rich region relatively poorer. We show that when mobility leads to a smaller income disparity

in median voters' incomes, public spending increases if the income effect is more relevant for the median voter of the rich region. This is because the reduction of inter-regional redistributive conflicts makes the median voter of the rich region more willing to increase government spending as her private marginal cost declines. However, if the income effect is more relevant for the poorer region, a smaller income inequality leads to ambiguous results. Specifically, the median voter of the poorer region is now richer and she may obtain an increase in public spending since this is also the will of the rich median voter. However, she is now facing a higher marginal cost and, therefore, may end-up negotiating a reduction of public spending.

Inter-regional migration may also worsen the inter-regional redistributive conflicts when the income gap between the resulting median voters increases. This happens when the median voter of the rich region is a richer one and that of the poorer region is a relatively poorer one. This can be the case of migration of skilled workers from the poorer to a richer region when workers do not migrate just as soon as they obtain their degree or specialization. In this case, skilled workers of the poorer region first spend sometime in their region where they gain an income above that of the regional median voter and then decide to migrate to a richer region where they still get a salary above that of the regional median voter. We show that if the income effect on the regional median voters is more relevant for the median voter of the rich region, then government size declines as the rich region is the one that constraints public spending in this case. On the contrary, if the income effect is more relevant for the median voter of the poorer region, then the policy outcome is ambiguous. In this case, the marginal tax paid by the poorer median voter declines and she will be happy to increase public spending. However, this effect must be strongly enough to convince the richer median voter to increase the size of government.

This paper also studies the relation between migration and the efficiency of public spending. Here, we consider two cases. In the first case, both median voters have an income below that of the average income. While, in the second case, the average income is smaller than the rich median voter's income and larger than the poorer's income. According to empirical evidence (see Meltzer and Richard 1981, 1983 and others) we can rule other hypothesis out of the game. We find over-provision of public goods and services when both median voters are poorer than the average income voter. Instead, when the rich median voter is richer than the average income voter we may obtain either over or under-provision. In any case, when we compare the bargaining outcome with the social optimum, we find that migration leads to more efficiency in public spending as the distribution of income becomes more uniformly distributed across regions.

Related literature. A negation of the theory of the "utilitarian" view of redistribution for the sake of winning elections is encapsulated in Acemoglu and Robinson (2000). During the nineteenth century most Western societies extended voting rights, a decision that led to unprecedented redistributive programs. They argue that these political reforms can be viewed as strategic decisions by the political elite

to prevent widespread social unrest and revolution. Political transition, rather than redistribution under existing political institutions, occurs because current transfers do not ensure future transfers, while the extension of the franchise changes future political equilibria and acts as a commitment to redistribution. In other words, redistribution is an end rather than a direct means for maintaining the political status quo. Furthermore, there are several phenomena that lead to changes in the electoral populace. Acemoglu and Robinson (2000) and others describe the case of the extension of the franchise. An other phenomena is population aging besides migration.

Within the purview of a general equilibrium setting comprising individuals, the local and the central governments, Epple and Romer (1991) study how much redistribution occurs when only the local governments can have tax transfer instruments, individuals can move freely among jurisdictions and voters in each jurisdiction are fully aware of the migration effects of the redistributive policies. Their model predicts that local redistribution induce sorting of the population, with the poorest households located in the communities that provide the most redistribution. While the threat of out-migration affects the potential for redistribution, their results suggest that significant local redistribution is nonetheless feasible.

Wildasin (1994) analyses redistribution policies that transfer income between owners of immobile factors of production and workers in a given region. The menu of income distribution possibilities attainable through tax/transfer policy in the presence of labour mobility is characterized. Simple general equilibrium analysis shows that migration can lead to Pareto-inferior outcomes in the destination region if immigrants are the beneficiaries of redistributive transfers. All residents of the destination region may gain, however, if transfer payments are also paid to workers in the source region so as to reduce the level of immigration.

Dolmas and Huffman (2003) study several general equilibrium models in which the agents in an economy must decide on the appropriate level of immigration into the country. Immigration does not enter directly into the native agents' utility functions, and natives have identical preferences over consumption goods. However, natives may be endowed with different amounts of capital, which alone gives rise to alternative levels of desired immigration. They show that the natives' preferences over desired levels of immigration are influenced by the prospect that new immigrants will be voting in the future, which may lead to higher taxation to finance government spending from which they will benefit. They also show that changes in the degree of international capital mobility, the distribution of initial capital among natives, the wealth or poverty of the immigrant pool, and the future voting rights and entitlements of immigrants can all have a dramatic effect on the equilibrium immigration and taxation policies. Both their model and the empirical evidence support the notion that inequality can lead to reduced immigration. The results also suggest that opposition to immigration can be mitigated by enhanced capital mobility, as well as from removing some of the benefits that immigrants ultimately receive, either in the form of government transfers, or the franchise to vote.

A reason why immigration policy is such a contended issue is that often immigrants acquire the right to vote and, hence, may affect future policies. With the help of a dynamic, general equilibrium model of immigration policy, Ortega (2004) contends that there is a trade-off between skill-complementary immigration and the resulting shift in political power. In each period, a heterogeneously skilled population chooses an immigration policy by majority vote. Voters anticipate that immigration affects the skill premium and the skill composition of the electorate. Ortega shows that a reasonably parameterized version of the model is consistent with the main features of US immigration.

The crucial insight of Ortega (2010) is that unskilled voters trade-off the lower wages from larger unskilled immigration with the increased political support for redistribution provided by the children of the current immigrants. These mechanisms are relevant for the ongoing debates over comprehensive immigration reform in the U.S, and elsewhere.

Armenter and Ortega (2010) ask whether worker mobility has undermined the ability of U.S. states to redistribute income. They build a model where both migration decisions and redistribution policies are jointly determined. Taking into account a large number of heterogeneous regions and skilled and unskilled workers with idiosyncratic migration costs, they find that worker mobility has induced substantial convergence, but no downward pressure, in tax rates. They also find some evidence of migration-induced convergence in transfer levels, but to a much lesser degree due to an offsetting tax-base effect. Their calibrated model is able to account for the main features of interstate migration in the U.S., as well as some qualitative features of the cross-sectional distribution of redistributive policies.

Using a calibrated general equilibrium overlapping generations model, which explicitly accounts for differences between immigrants and natives, Storesletten (2000) investigates whether a reform of immigration policies alone could resolve the fiscal problems associated with the aging of the baby boom generation in the context of the U.S. Such policies are found to exist and are characterized by an increased inflow of working-age high- and medium-skilled immigrants.

The paper is organized as follows. The next section defines a benchmark model and reproduces a standard result first due to Meltzer and Richard (1981). Section three extends the model to a two-jurisdiction state. Section four presents the legislature bargaining equilibrium, section five the results and six the conclusions. The appendix contains derivations and proofs.

2 The model

Consider two jurisdictions, or regions, comprising a state.¹ In jurisdiction 1 there are N_1 people and in jurisdiction 2 N_2 people, with $N_1 + N_2 = N$ and N normalized to one. There are two goods in this economy, a public good g and a private

¹Here, we focus on the territorial dimension of the two groups. Alternatively, we can think about two distinct ethnic, religious, incomes or other kinds of groups.

good y , which can be thought of as individual income or initial endowment. The central government provides the public good uniformly across regions and levies a proportional income-tax t , bounded by $0 \leq t \leq 1$, on individual income y in order to finance the provision of g . We assume, for simplicity, that the unit cost of g 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

$$t\bar{y} = g, \tag{1}$$

where $\bar{y} = \sum_{h=1}^N y^h/N$ is the average income of the all economy.

Each citizen h has the same quasi-linear preferences over private consumption, $(1-t)y^h$, and publicly provided goods g . We can now write the policy preferences of a citizen h as follows,

$$u^h = (1-t)y^h + H(g) = (\bar{y} - g) \frac{y^h}{\bar{y}} + H(g), \tag{2}$$

where the public spending benefit function $H(g)$ is increasing, smooth concave and satisfies the endpoint Inada condition.²

2.1 The social optimum

We first study the social optimum that can be interpreted as the policy outcome of a benevolent central planner. We suppose that the central planner maximizes an additive social welfare function as follows:

$$\max_{g^e} \sum_{h=1}^N u^h, \tag{3}$$

where u^h denotes the utility of individual h .³ The efficient government size, g^e , satisfies the familiar Samuelsonian condition,

$$-\frac{\sum y^h}{\bar{y}} + NH'(g^e) = 0, \tag{4}$$

which means that the social marginal benefit is equal to the social marginal cost. The Samuelsonian condition leads to the following equation

$$H'(g^e) = 1, \tag{5}$$

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

Clearly, the distribution of income does not influence the central planner's provision of public goods. Therefore, any change in either the inter or intra-regional distribution of income does not influence the social optimum outcome.

²We assume that government spending is provided equally to everyone, so that $g^h = g \geq 0$.

³As in Besley and Coate (2003), we assume that the endowments of the median voters and of all the taxpayers are large enough to meet their tax obligations.

2.2 The regional first best under majority voting

Individual preferences are concave in policy, implying that every citizen has a unique preferred policy, which satisfies the following first order condition

$$H'(g^h) = \frac{y^h}{\bar{y}}. \quad (6)$$

Under majority rule, the voter with median income is decisive. Here, we assume that voters vote sincerely. Furthermore, Income is the only dimension of heterogeneity among citizens. Therefore, voters with incomes below that of the median voter prefer a higher level of public spending and redistribution. Voters with incomes above that of the decisive voter desire less public spending and less redistribution.

The distribution of income differs between the two jurisdictions. We denote by y_i , with $i = 1, 2$, the income of the median voter of region i and, to simplify the exposition, assume $y_1 \geq y_2$; i.e. the income of median voter of region 1, y_1 , is greater than that of the median voter of region 2, y_2 .⁴

The regional median voters form the centralized legislature, which has to determine the size of the public sector. Once the legislature decides the dimension of g , the government budget constraint is automatically determined by equation (1).⁵ Accordingly, the tax paid by median voter i is $ty_i = \frac{y_i}{\bar{y}}g$, with $i = 1, 2$. Thus, we write the utility function of median voter i as follows,

$$u_i = y_i - \frac{y_i}{\bar{y}}g + H(g), \quad \text{with } i = 1, 2. \quad (7)$$

Policy is chosen by bargaining by the regional median voters in the centralised legislature. Before looking at the bargaining solution, we first consider the first best policy outcome for a regional median voter, which is the unique solution to the following equation:

$$H'(g_i^D) = \frac{y_i}{\bar{y}}, \quad \text{with } i = 1, 2. \quad (8)$$

Solution (8) states that if the median voter of region i is, let us say, a non-benevolent dictator she would choose g_i such that her private marginal cost is equal to her private marginal benefit. The non benevolent dictator is a free-rider. She always reduces public expenditure when her private marginal cost increases; that is, $\partial g_i^D / \partial \frac{y_i}{\bar{y}} < 0$. She increases the provision of g when either the mean income increases or her private income declines because this reduces her marginal cost.

If we compare equations (8) and (5) we can conclude that the regional first best under majority voting equals the social optimum when median and mean incomes

⁴When this condition is violated, we have a symmetric situation. So the assumption does not have any bearing on the end result.

⁵The model could also be extended by introducing a different tax-rate for the two jurisdiction so that the legislature can bargain over g , t_1 and t_2 . In this case, budget constraint would be $g = N_1 t_1 \bar{y}_1 + N_2 t_2 \bar{y}_2$, where \bar{y}_1 and \bar{y}_2 are the mean income of jurisdiction 1 and jurisdiction 2 respectively.

are the same. Otherwise, we get over provision when $y_i < \bar{y}$ and under provision when $y_i > \bar{y}$.

2.3 The legislature bargaining equilibrium

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 median voters of the two jurisdictions. In this case, median voters 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., $g = 0$. Therefore, the utility each representative obtains in the event of disagreement is $u_i^d = y_i$, with $i = 1, 2$. That is, everybody consumes entirely their private income. In order to reach an agreement, median voters must have positive gains from implementing g . In formula, it must be $u_i - u_i^d > 0$, which implies $-\frac{y_i}{\bar{y}}g + H(g) > 0$.

We denote the gain from reaching an agreement of median voter i with the symbol ϕ_i , such that

$$\phi_i = u_i - u_i^d = -\frac{y_i}{\bar{y}}g + H(g). \quad (9)$$

The gain from reaching an agreement is equal to the net private gain minus the net private cost and represents the private net benefit if an agreement is reached on g . The gain from cooperating on the provision of g is smaller for the richer median voter; i.e.: given that we assumed $y_1 \geq y_2$, it must be $\phi_1 \leq \phi_2$.

Note that the marginal gain from cooperation is equal to the marginal utility, denoted as Mu_i ; i.e.:

$$\frac{\partial \phi_i}{\partial g} = -\frac{y_i}{\bar{y}} + H'(g) = Mu_i. \quad (10)$$

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

$$\max_g \left[\ln \left(-\frac{y_1}{\bar{y}}g + H(g) \right) + \ln \left(-\frac{y_2}{\bar{y}}g + H(g) \right) \right] \quad (11)$$

The first order condition is:

$$\frac{-\frac{y_1}{\bar{y}} + H'(g)}{-\frac{y_1}{\bar{y}}g + H(g)} + \frac{-\frac{y_2}{\bar{y}} + H'(g)}{-\frac{y_2}{\bar{y}}g + H(g)} = 0. \quad (12)$$

Since the two denominators are positive, it turns out that $Mu_1 < 0$ and $Mu_2 > 0$ because marginal cost is higher for median voter 1. This proves that the bargaining equilibrium is a compromise between median voters' most preferred policy; that is, in equilibrium, median voter 1 would like to consume less g and median voter 2 would like to consume more of it.

Furthermore, the ratio

$$\frac{-\frac{y_i}{y} + H'(g)}{-\frac{y_i}{y}g + H(g)}, \quad \text{with } i = 1, 2, \quad (13)$$

can be interpreted as the elasticity with respect to g of the net gain from bargaining for median voter i . The elasticity measures the percent change in gain from reaching an agreement relative to the percent change in public spending. It is easy to verify that as $\frac{y_i}{y}$ increases the ratio (13) declines. This means that a median voter becomes more rigid in the negotiation as she becomes richer relative to the mean. Therefore, she will be less willing to reach an agreement over g .

3 Voting populace and majority voting outcome

The voting populace changes for many reasons such as, migration, inter-regional relocation, population aging, birth rate and so on. Here, the question is: what happens to the three equilibrium conditions we have derived in the previous paragraph when the regional composition of the voting populace changes?

The central planner's equilibrium condition, represented by equation (5), implies no changes in public policy when the regional composition of the voting populace changes. The reason is that the social marginal cost and benefit do not change. Instead, both the equilibrium condition (8) representing the regional median voters' first best and the bargaining equilibrium (12) are affected substantially. Consider, for example, the case of inter-regional migration, which alter the composition of the electorate without altering the total population. When an individual migrates, or relocate, and acquire the right to vote in the region where she ends up, there is an electoral perturbation that causes a change in the median voters of the two regions. What matters is who becomes the regional median voter after a perturbation in the electorate has been taking place. Actually, from equilibrium conditions (8) and (12), it is evident that what really matters is the income of the new regional median voters and the average income or, simply, their ratio $\frac{y_i}{y}$, with $i = 1, 2$. For this reason, we denote by $\gamma_i = \frac{y_i}{y}$ the decisive ratio between the income of median voter i and the mean income of the all economy.

To capture the effects of a change in the electorate on public policy, we assume that there exist a common and exogenous variable $m \geq 0$ that affects the composition of the voting populace in the two regions. For example, m can be thought as the inter-regional migration or relocation rate, which tells us how many people have moved from, let us say, the poorer region to the rich region. In this case we could interpret m as the number of yearly accepted migrants who acquire the voting rights in the region where they end up.⁶

Any change in the exogenous variable m determines a change in the voting populace of the two regions, which leads to the election of new regional median

⁶Note that m could also be a vector compounded by the migration and relocation rates, population aging, the extension of the franchise and the birth rate.

voter who is characterized by a different γ_i . Therefore, any change in m leads to a change in the decisive ratios γ_i , with $i = 1, 2$.

Now, assume that there is a continuous relation between m and γ and denote by $\gamma(m)$ a function that explains this relation.⁷⁸ This implies that the rate of change in the electorate changes the median mean income ratios such that $\frac{\partial \gamma_i}{\partial m} \leq 0$, with $i = 1, 2$. Thus, $\frac{\partial \gamma_i}{\partial m} > 0$ means that an increase in m results in a median voter with a higher income ratio and vice versa.

A change in the perturbation rate m can lead to one of the following four conceivable analytical cases:

- 1) $\gamma'_1(m) \geq 0$ and $\gamma'_2(m) \geq 0$;
- 2) $\gamma'_1(m) \leq 0$ and $\gamma'_2(m) \leq 0$;
- 3) $\gamma'_1(m) \leq 0$ and $\gamma'_2(m) \geq 0$;
- 4) $\gamma'_1(m) \geq 0$ and $\gamma'_2(m) \leq 0$.

Now, according to equation (8) if a small increase in m leads to a richer median voter in region i relative to the mean, the first best policy outcome for median voter i results in a lower g . On the contrary, if a small increase in m leads to a poorer median voter in region i relative to the mean, the first best policy outcome for median voter i is represented by a lower g as suggested by Meltzer and Richard (1981).

We now study the impact on inter-regional public spending when there is a change in the voting populace in the four conceivable cases.

⁷The nature of the relation between m and γ_1 and γ_2 is not trivial and there may be an infinite number of ways in which we can map m on to γ_i . We assume that among all the conceivable correspondences there exist at least one sub-set of them which fits into a functional form that is continuous, monotonic and differentiable. The study of the possible ways in which we can map m into γ to obtain a functional relation goes beyond the purpose of this paper. To make an intuitive example, consider the case of a town divided into two districts where people vote in the district where they leave. Assume that people can relocate between districts without changing their job and income. Any individual relocation does not affect the average income, but changes the composition of the voting populace of both districts and the corresponding median voters. Now, consider the case where a rate, or simply a number, m of people relocate from the poorer district 2 to the rich district 1, while none moves from district 2 to district 1. What is the impact of this relocation on the voting populace in the two regions? If, for example, in region 2 only people with income below the median income move there will be a richer pivotal voter in region 1 and a poorer pivotal voter in region 2; i.e.: $\frac{\partial \gamma_1}{\partial m} < 0$ and $\frac{\partial \gamma_2}{\partial m} > 0$.

⁸Alternatively, one could consider that the rate of change of the voting populace increases a regional median voter's income ratio with a certain probability. This would be an interesting set-up for a future development of this model that internalizes the choice of m for the government. However, in this paper, the introduction of probabilities would be superfluous.

4 Changes in the voting populace and inter-regional public spending

So far, we have argued that, in a world where income is the only element of heterogeneity among citizens, changes in the composition of the voting populace modifies the distribution of income inside jurisdictions leading to different jurisdictional median voters. This, in turn, implies that the redistributive conflict of interest between regions can assume different forms and intensities, which depends on whether the new pivotal voters have either a lower or higher median-mean income ratio, γ_i . In order to identify the nexus between the inter-regional redistributive conflicts and centralised public spending we need to consider that regions react differently to changes in m in terms of their willingness to reduce private for public consumption. According to equation (13), regional median voters with a different γ can be more or less elastic in the negotiation. Similarly, the marginal change in the elasticity can also be more or less intense for the two median voters leading to ambiguous bargaining situations. The following Lemma is the key to solve the comparative statics for the four conceivable cases.

Lemma 1 *The government increases the size of the public sector when the voting populace changes at a rate m when the following relation holds:*

$$\frac{dg^*}{dm} \geq 0 \text{ when } \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \leq 0. \quad (14)$$

The proof is in the Appendix.

The Lemma states that the relation between government spending and the change in the voting populace depends on the interaction among the marginal change in the median voters' income ratios, $\gamma'_i(m)$, and the gains from cooperating ϕ_i .

To understand the implication of the Lemma it necessary to study the four conceivable cases separately. We start from the case in which both median voters have become richer relatively to the mean income voter and the opposite case in which they have become relatively poorer.

Proposition 1 *An increase in m , which leads to richer regional median voters relative to the national average, causes a decrease in g . Similarly, an increase in m , which leads to poorer regional median voters relative to the national average, leads to an increase in g . In formulas,*

$$\frac{dg^*}{dm} \leq 0 \text{ when } \gamma'_1(m) \geq 0 \text{ and } \gamma'_2(m) \geq 0 \quad (15)$$

and

$$\frac{dg^*}{dm} \geq 0 \text{ when } \gamma'_1(m) \leq 0 \text{ and } \gamma'_2(m) \leq 0. \quad (16)$$

The above Proposition considers the cases in which the change in the voting populace does not lead to a conflict of interest between regional median voters. In the first case, the relocation, let us say, of an additional individual from one region to the other has caused the election of regional median voters who are both more rigid with respect to public spending and will certainly agree to reduce it. In the second case, both median voters want more redistribution and, therefore, a bigger government. This Proposition shows that when there is no conflict of interest between median voters the classical Meltzer and Richard (1981) result is replicated in a multi-jurisdiction economy.

The following two Propositions consider the two cases in which a change in m causes a conflict of interest between regional median voters.

Proposition 2 *Consider the case $\gamma'_1(m) < 0$ and $\gamma'_2(m) > 0$ in which an increase in m leads the rich median voter to be a voter with a lower relative income with respect to the average income and the poorer median voter to be one with higher relative income, the following results apply:*

$$\frac{dg^*}{dm} > 0 \text{ if } |\gamma'_1(m)| \geq |\gamma'_2(m)|, \quad (17)$$

$$\frac{dg^*}{dm} \geq 0 \text{ if } |\gamma'_1(m)| < |\gamma'_2(m)| \text{ and } \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \leq 0, \quad (18)$$

$$\frac{dg^*}{dm} \leq 0 \text{ if } |\gamma'_1(m)| < |\gamma'_2(m)| \text{ and } \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \geq 0. \quad (19)$$

Proof. The proof is straightforward once you recall that $\phi_1 < \phi_2$. ■

In the case in which $\gamma'_1(m) < 0$ and $\gamma'_2(m) > 0$, the incomes of the median voters of the two regions are converging. Median voter 1, the richer one by assumption, is becoming poorer with respect to the mean and median voter 2 is becoming relatively richer. In this situation, median voter 1 would like to increase the size of g because her marginal cost is now declining. Instead, median voter 2 has a conflict of interest. On the one hand she would like to increase g because in equilibrium she is the one who wants more of it. However, on the other, her marginal cost is now higher and she is receiving less redistribution from public spending. Clearly, if the marginal change in γ is bigger for median voter 1, i.e. $|\gamma'_1(m)| \geq |\gamma'_2(m)|$, than g increases.⁹ We recall that, in equilibrium, the poorer median voter would like a higher g and the rich median voter a lower size. Therefore, if the rich median voter is now willing to increase g , she will certainly obtain this increase as long as this does not cause a conflict of interest for the poorer median voter. The conflict of interest for the poorer median voter arises when $|\gamma'_1(m)| < |\gamma'_2(m)|$. In this situation,

⁹A bigger change in the gamma means a bigger change in the bargaining points of threat, which determine the utility median voters receive in the case of disagreements. As the relative income of the rich median voter declines, her gains from cooperating increase and she becomes more willing to cooperate over g .

the change in the marginal cost is more relevant for median voter 2. Therefore, median voter 2 has to balance her willingness to have more g with a higher marginal cost. The final outcome is ambiguous and depends on the sign of the expression $\frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2}$. In particular, we notice that as γ_1 and γ_2 tend to equalise, which means that the incomes and consequently the net gains of the regional median voters tend to coincide, more likely is that $\frac{\gamma'_2(m)}{\phi_2^2} > \frac{\gamma'_1(m)}{\phi_1^2}$. In the limit case where median voters' incomes become perfectly equal, public spending increases. However, if median voters' income tend to coincide but without equalising, the direction of policy outcome is ambiguous.

Now, we turn to the last case in which the income gap between median voters widens and the change in their marginal cost is not symmetric.

Proposition 3 *Consider the case $\gamma'_1(m) > 0$ and $\gamma'_2(m) < 0$, in which an increase in m leads the rich median voter to be a voter with a higher relative income with respect to the average income and the poor median voter to be one with a lower relative income, the following comparative statics results apply:*

$$\frac{dg^*}{dm} < 0 \text{ if } |\gamma'_1(m)| \geq |\gamma'_2(m)|, \quad (20)$$

$$\frac{dg^*}{dm} \leq 0 \text{ if } |\gamma'_1(m)| < |\gamma'_2(m)| \text{ and } \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \geq 0, \quad (21)$$

$$\frac{dg^*}{dm} \geq 0 \text{ if } |\gamma'_1(m)| < |\gamma'_2(m)| \text{ and } \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \leq 0. \quad (22)$$

Proof. *The proof is straightforward. ■*

In the case where $\gamma'_1(m) > 0$ and $\gamma'_2(m) < 0$, the incomes of the regional median voters are diverging implying a larger conflict of interests between regions. Here, the region with the richest median voter has a even richer pivotal voter, while the region with a poorer median voter has a even poorer pivotal voter, relative to the mean income of the all economy. The situation where the change in the marginal cost is more relevant for the richest median voter leads unambiguously to a smaller public sector. The richest median voter sees her gains to cooperate becoming smaller and uses this to gain bargaining power in the negotiation, which allows her to impose her preference on public policy. The case where the change in marginal cost is more relevant for the poorer median voter the impact on policy outcome is more ambiguous and depends on the sign of $\frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2}$. In this case, public spending may increase if, for example, median voters incomes and net gains are very similar, so that $\frac{\gamma'_2(m)}{\phi_2^2} < \frac{\gamma'_1(m)}{\phi_1^2}$.

Note that the case $|\gamma'_1(m)| = |\gamma'_2(m)|$ in last two Propositions replicates the results in Giuranno (2009). In this case, when an increase in m lowers the income gap between regional median voters public spending increases because there are less inter-regional redistributive conflicts. On the contrary, when the income gap

increases redistributive conflicts worsen and public spending declines. Giuranno (2009) found a comparable result in the absence of intra-regional inequality and can be seen as a special case in which $|\gamma'_1(m)| = |\gamma'_2(m)|$. Indeed, the only dimension of heterogeneity considered in Giuranno (2009) is inter-regional income disparity.

Propositions 2 and 3 shows that there exist and inverse relation between regional median voters income gap and public spending when the change in the marginal cost is more relevant for the richest median voter, e.i. when $|\gamma'_1(m)| \geq |\gamma'_2(m)|$, and that this relation also holds with both inter and intra-regional income inequalities. Instead, when the change in the marginal cost is more relevant for the poorer median voter, e.i. when $|\gamma'_1(m)| < |\gamma'_2(m)|$, the inverse relation between regional median voters income gap and public spending does not always hold.

We conclude with a Proposition that compares the bargaining outcome with the central planner solution. In order to do this, we distinguish two cases. In the first case $\bar{y} \geq y_1 \geq y_2$ and in the second case $y_1 \geq \bar{y} \geq y_2$. When $\bar{y} \geq y_1 \geq y_2$ both median voters have income below the average income of the whole economy. This is a standard assumption based on the empirical evidence (see Meltzer and Richard 1981 and 1983 and others). However, since we have a model with two regions and two median voters, this assumption could be violated especially by the richer median voter. For this reason, we also consider the case where $y_1 \geq \bar{y} \geq y_2$, which could explain some developing countries situations.¹⁰

Proposition 4 *The change in the voting populace leads to the social optimum policy outcome when the gap between regional median voters' income and the mean income becomes null for both median voters; i.e. when $\gamma_1 = \gamma_2 = 1$. On the contrary, when $\bar{y} \geq y_1 \geq y_2$ government spending is over-provided and when $y_1 \geq \bar{y} \geq y_2$ government spending can be either over or under-provided.*

Prof. In order to prove the proposition, we first show that the bargaining solution leads to the efficient solution when $\gamma_1 = \gamma_2 = 1$; i.e.: the bargaining first order condition (12) becomes $2 \frac{-1+H'(g)}{-g+H(g)} = 0$. This is satisfied when $H'(g) = 1$, which is the social optimum solution (5). Second, consider the case $\bar{y} \geq y_1 \geq y_2$. The social optimum condition (5) does not change when the distribution of the electorate changes between regions. On the contrary, conditions (16) shows that the provision increases as the median mean income ratios declines for both median voters. Third, consider the case $y_1 \geq \bar{y} \geq y_2$. The impact on g of moving away from the situation $\gamma_1 = \gamma_2 = 1$ is explained by Proposition 3. Therefore g may either increase or decrease.

We can use the above Proposition to state that any change m of the voting populace that leads to a uniform distribution of income between and within regions generates a optimum policy outcome from the social point of view. This has to be taken into account by the government should it decide to internalise m to maximise

¹⁰The other situations are either symmetric or empirically non relevant cases, which we do not tackle. The interested reader could easily derive them.

social optimum. The coincidence between the bargaining and the social optimum solution is represented by the two thick curves in figures 1 and 2. The two graphs put government sizes on the horizontal axes, the bargaining and the central planner's first order conditions and the regional median voters net gains on the vertical axes. Specifically, the vertical curves are the first order conditions and the parabolic curves the net gains. The thick parabolic curve in figures 1 and 2 represent regional median voter's net gains for the case $\gamma_1 = \gamma_2 = 1$. In this case, the net gains are the same for both median voters. The point where the vertical thick line is zero represents the size of g that maximizes joint surplus for both median voters. This point coincide with the central planner's solution. Thus, the vertical thick line represents both the central planner's and the bargaining first order conditions. Now, the thin curves in figure 1 show the bargaining situation for the case $\bar{y} \geq y_1 \geq y_2$. Specifically, the smaller thin parabolic curve is the net gain for the richest median voter, median voter 1 and the larger thin curve is the net gain for the poorer median voter. Thus, figure 1 shows that happens when we move away from a situation where $\gamma_1 = \gamma_2 = 1$ to a situation where $\bar{y} \geq y_1 \geq y_2$. As we can see, regional median voters do not have the same gain from cooperating anymore. Now, both median voters have the a larger convenience to reach an agreement over public spending, but this convenience is more relevant for the poorer median voter 2. The central planner's first order condition and, therefore, the social optimum size of g does not change. Instead, the vertical thin lines represents the new bargaining first order condition. As we can see, there are several points where the bargaining first order condition is zero, but only the first thin line is the unique bargaining solution because it lies within the set where the net gains of both regional median voters intersect. The graph shows that when regional median voters have both an income below the average income, public spending is over-provided.

Graph 2 shows a situation where the bargaining outcome leads to under-provision. This graph shows what may happen when the economy moves from a situation where $\gamma_1 = \gamma_2 = 1$ to a situation where $y_1 \geq \bar{y} \geq y_2$. Again, regional median voters now have a different net gain from cooperating. However, differently from figure 1, median voter 1 has now become not only richer than median voter 2, but also richer than the average income. Therefore, if her convenience from cooperating becomes small enough compared with the situation of the poorer median voter, the size of the public sector can decline, as shown in the particular simulation in figure 2.

5 Conclusion

Interregional redistributive conflicts shape the nature of public spending in any representative democracy. The outcome of a democratic collective choice mechanism may change as a consequence of changes in the composition of the voting populace. The underlying political process that determines public policy formation in an inter-regional economy is usually a result of bargaining among regional representatives which aims at resolving these conflicts. Therefore, a deeper understanding of this

kind of interregional decision-making process is essential to predicting the changing nature and intensity of government spending in the presence of a changing voting populace.

This paper considered a multi-regional economy where the jurisdictional median voters form a centralized government and negotiate over a common policy. Demographic variations bring about a change the median voters income relative to the mean income of the economy. We saw how this change either mitigates or deteriorates inter-jurisdictional redistributive conflicts and how that in turn affects the size of the government.

We find that public spending unambiguously increases when the median voters in the jurisdictions become simultaneously richer and declines when they both become poorer. These cases are straightforward in terms of policy implementation because there is no conflict of interest between the regional median voters. However, the conflict of interest arises when the income gap between regional median voters declines or increases. We find that when the change in the median mean income ratio is more sensitive or equally so for the rich median voter compared to its poorer counterpart the sign of the comparative statics is clear. When the income gap between regional median voters declines, public spending increases. On the contrary, when the income gap increases, public spending declines. However, this is not always true when the change in the median mean income ratio is more relevant for the poorer median voter. In this case, the size of government depends on the relative magnitude of this change, which is the change in the marginal cost for the regional pivotal voters.

We also find that efficiency occurs not only when regional median voters have the same income, but also when their income converges towards the average income of the all economy. An equalitarian distribution of income within and between regions, for example, leads to an efficient allocation of resources between public and private consumption. However, regional median voters' income is usually different and smaller than the average income. When it is smaller public goods will be over-provided. Conversely, when a regional median voter is richer than the average income, public goods can be either over or under-provided.

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6 Appendix

Proof of Lemma 1. Denote by F the first order condition (12),

$$F = \frac{-\gamma_1(m) + H'(g)}{-\gamma_1(m)g + H(g)} + \frac{-\gamma_2(m) + H'(g)}{-\gamma_2(m)g + H(g)} = 0. \quad (23)$$

We want to study $\frac{dg^*}{dm} \equiv -\frac{F_m}{F_g}$. It is straightforward to verify that $F_g < 0$, while the numerator is

$$F_m = \frac{-\gamma'_1(m)\phi_1 + \gamma'_1(m)g\frac{\partial\phi_1}{\partial g}}{\phi_1^2} + \frac{-\gamma'_2(m)\phi_2 + \gamma'_2(m)g\frac{\partial\phi_2}{\partial g}}{\phi_2^2}, \quad (24)$$

$$F_m = \gamma'_1(m)\frac{-H(g) + gH'(g)}{\phi_1^2} + \gamma'_2(m)\frac{-H(g) + gH'(g)}{\phi_2^2}.$$

In order to prove the Proposition, we rewrite equation (24) under the following form

$$F_m = \left(\frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \right) (-H(g) + gH'(g)). \quad (25)$$

Here, $(gH'(g) - H(g))$ is negative because the marginal benefit is smaller than the average benefit, i.e. $H'(g) < H(g)/g$.¹¹ We conclude that F_m is positive when $\left(\frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \right)$ is negative. This proves the Proposition.

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¹¹For a standard proof see Chiang (1984, pp. 192-3).

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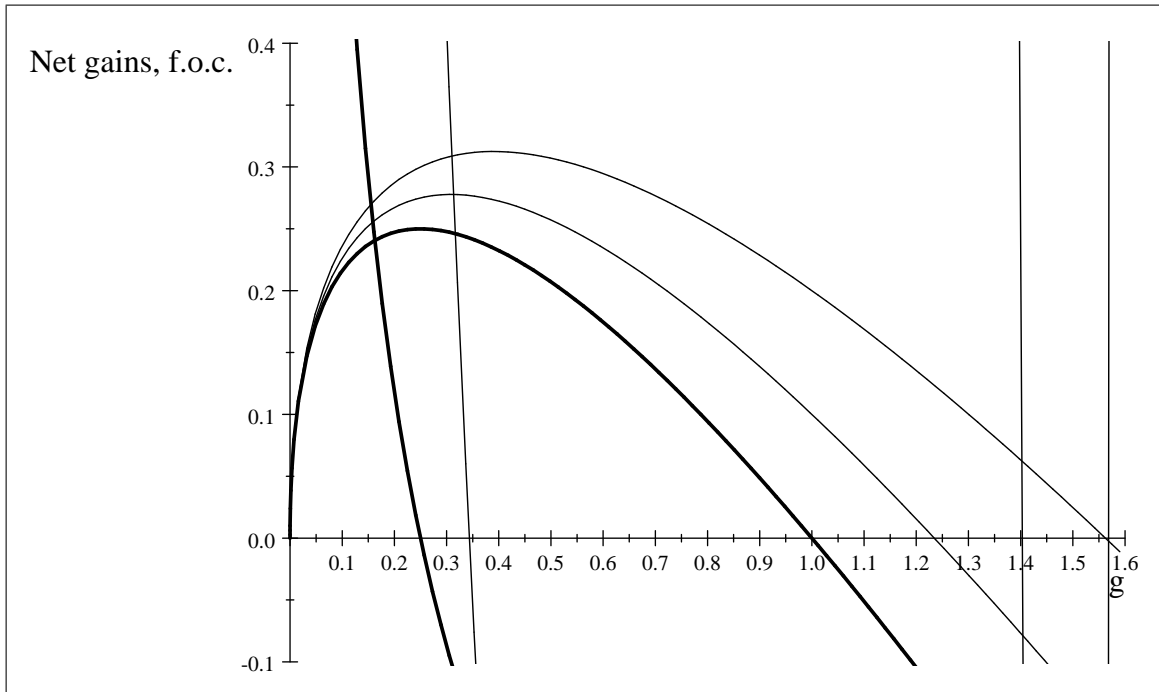


Figure 1: A case of over-provision when $H(g) = \sqrt{g}$; the thick curve shows the bargaining equilibrium and the net gains when $\gamma_1 = \gamma_2 = 1$; the parameters for the thin curves are $\gamma_1 = 0.9$ and $\gamma_2 = 0.8$.

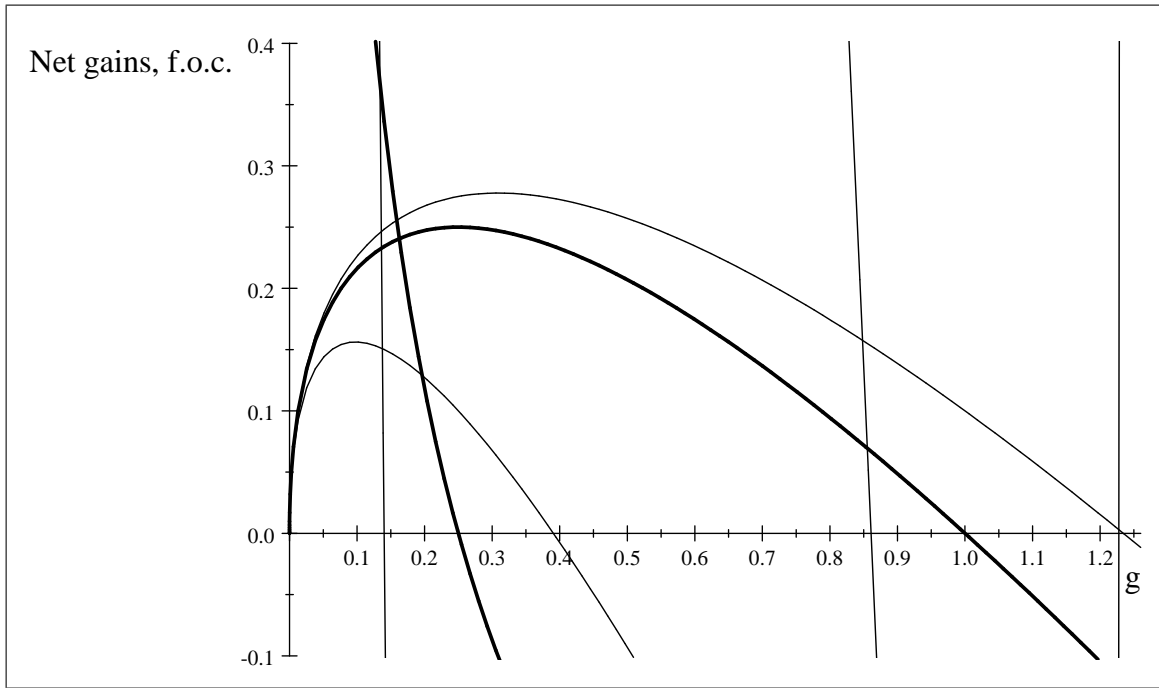


Figure 2: A case of under-provision when $H(g) = \sqrt{g}$; the thick curve shows the bargaining equilibrium and the net gains when $\gamma_1 = \gamma_2 = 1$; the parameters for the thin curves are $\gamma_1 = 1.6$ and $\gamma_2 = 0.9$.