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Abstract

This paper studies the relation between internal migration and public spending on public goods. We describe centralized public policy when a central government is comprised of elected representatives from local electoral districts. Internal migration determines the median voter in the districts. The median voters decide the equilibrium policy through bargaining. We find the conditions under which voters' mobility results in larger or smaller public spending. Furthermore, the distance between the actual size and the efficient size of government spending depends on the way internal migration changes the distribution of income within and between districts.

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1 Introduction

It is commonly proposed that immigrants who acquire the right to vote lead to either a smaller or larger public spending depending on whether it regards skilled or unskilled workers respectively.[1] The literature has mainly focused on external migration. This paper studies the case of internal migration flows.

The role of internal migration in population redistribution has been observed in a large number of countries (Rees et al., 2017; Bell et al. 2018), such as in the cases of the relocation of citizens in Latin American cities (Rodríguez-Vignoli and Rowe, 2018; Stillwell et al., 2018), after the reunification in Germany or after the second world war between the South and the North of Italy. In the European Union, workers' relocation is often viewed as affecting national and European economic policies.[2]

Given the empirical relevance of internal migration, this paper develops a theoretical framework which will be able to identify the implications of internal migration on a country's policy formation. This is an issue conspicuously absent in public economics literature. In order to do so, we develop a model on central government's public spending on public goods. The equilibrium policy outcome is a compromise between the conflict of interests of the median voters of the local jurisdictions that comprise a state. The geographical distribution of voters determines the median voter and elected representatives of the constituencies of the central government. Therefore, inter-jurisdictional migration changes the identity of the pivotal voters in local constituencies.

In this paper we consider political institutions in which policy decisions are made through bargaining by locally elected representatives in the central legislature. When migration changes the "local" median voters and, accordingly, the locally elected representatives, policies also change at the central level.

After migrating, individual incomes may change (Korpi and Clark, 2015). Therefore, inter-jurisdictional mobility can affect the distribution of income[3] within and among jurisdictions and the average income of the whole economy.[4] In particular, incomes of jurisdictional median voters

[1] See Cohen, Razin, and Sadka (2009), Razin, Sadka and Benjaron (2011) and many others.

[2] See, among the others, De Giorgi and Pellizzari (2009), Kvist (2004) and Skupnik (2013), Yazgia (2014).

[3] For a recent discussion of the relation between income distribution and the design of public policies see Arachi, Giuranno, and Profeta (2018).

[4] Note that mobility can affect the distribution of income even if individual incomes do not change after migration because the rank of the migrating individual in the income distribution of the origin region is different than that in the region of destination.

can change. In the collective choice mechanism of our model, the income gap among jurisdictional median voters characterizes the dimension of inter-jurisdictional conflict of interest.

A number of cases are possible. Inter-jurisdictional mobility can lead to either a lower[5] or a higher[6] income disparity among jurisdictional median voters. Moreover, mobility can lead to jurisdictional median voters that are simultaneously richer[7] or poorer[8] relative to the national average income.

In our model, public spending can be interpreted either as the provision of a public or publicly provided good. Some authors use a similar set-up to model a simple welfare system. In Razin, Sadka and Benjarong (2011), for example, the government levies a proportional income tax, with the revenues redistributed equally to all citizens, regardless of their contribution to the finances of the system. In this view, government spending may capture outlays on public services such as health, sickness compensation, disability benefits and the provision of other welfare benefits. Following Razin, Sadka and Benjarong's (2011) view, our model can also be used to study the relation between internal migration and public spending for the welfare state.

[5] This may happen when unskilled workers, who live in a poorer district and earn an income below that of the local median voter, migrate, and vote in a richer district where they still earn a salary below that of the jurisdictional median voter. This appears to have been the case, for example, in the massive migration of unskilled workers from the South to the North of Italy during the fifties and sixties.

For a historical perspective of the role of migration in regional income convergence in Sweden, see Enfloa et al. (2014). The Russian case has been recently analyzed by Guriev and Vakulenko (2015) and Vakulenko (2014). Instead, for the German case see Monras (2015).

[6] This is the case of the migration of skilled workers from a poorer to a richer region. Borozan (2015) found empirical evidence of regional divergence in Croatia due to internal migration.

[7] This is the case, for example, of the brain-drain that has characterized the migration from the South to the North in the last twenty years in Italy. Di Cintio and Grassi (2013) found empirical evidence that a large number of skilled workers from the poorer Italian regions who just received their University degree move to richer regions to increase their income. Usually, before migrating, their incomes are lower than the local median income. Once they migrate, they earn a wage above that of the median voter of the destination region. As a result, the brain-drain from a poorer to a richer region results in regional median voters that are simultaneously richer.

[8] This case may happen when voters who are richer than the jurisdictional median voter move to a district where they become poorer than the local median voter. Note that Davies and Winer's (2011) empirical evidence provides a different example. They show that the US immigration restrictions that came into effect in 1968 for more than two decades reduced Canadian emigration. This, in turn, may have contributed to increasing both economic inequality within provinces and the size of government in Canada.

Our findings suggest that public spending depends not only on whether internal migration leads to either convergence or divergence in median voters' incomes and demands for public provision. It also depends on the relative magnitude of these changes. Full convergence, for instance, leads to higher (lower) supply when the increase in the demand of the median voter who wants less provision dominates (is dominated by) the decrease in the demand of the median voter who wants more provision. As a result, median voters' income convergence may lead to either a higher or a lower public good supply.

We also study the relation between migration and the efficiency of public spending. We find that efficiency may not be achieved when median incomes are equal to the regional average incomes, as regional averages may be different from the national average income.

1.1 Related literature

As we have already mentioned, most existing literature deals mostly with the case of external migration, which can be either welfare-driven or affect the welfare state of the destination (Gaston and Rajaguru, 2013) and where the decision makers are, usually, either the national median voter or the jurisdictional governments in a Nash equilibrium set-up (Dolmas and Huffman, 2004; Cohen and Razin, 2008; Razin and Wahba, 2011 and 2012; Razin et al., 2011; Hansen, 2003; Armenter and Ortega, 2010 and 2011 and many others). Day and Winer (2012) study the internal and fiscally-driven migration in Canada within an empirical framework. However, the question of how internal migration affects the policy making of the federal government still remains undeveloped.

Our model is also different from Tiebout's (1956) analysis. Tiebout describes a model of community formation on the basis of given tax-public goods combinations whereas ours is a model of bargaining about the size of government spending among the jurisdictions. Furthermore, the case where voters migrate in order to endogenously influence government taxing and spending at the centralized level does not seem to be an empirically relevant question.

Furthermore, we have used a cooperative approach to study policy formation. Institutional cooperation is one of the main achievements of modern democracies. Cooperation brings institutional credibility,[9]

[9]Cooperation implies the existence of a credible commitment of not cheating between jurisdictional median voters. In the current model, the commitment is credible as we use a one shot game with one level of government, where policy makers negotiate under the threat that the status quo, which implies no public good provision, holds in the case of disagreement. In order to introduce cheating behaviors in the model, one could either introduce new assumptions or relax some existing ones. For

public consent and is a guarantee against any form of discrimination and coercion.[10] This justifies the use of the cooperative Nash bargaining approach to model policy formation.[11]

Meltzer and Richard (1981) linked the size of government spending to the preferences of the national median voter. However, their approach cannot explain government policy in a multi-jurisdictional economy where locally elected representatives form a central government and policies are determined through political bargaining (Giuranno, 2009).

We extend Meltzer and Richard (1981) to the case of internal migration in a multi-district economy. Following Giuranno (2009), we note that Meltzer and Richard's logic applies to a median voter in a single jurisdiction. However, governments are composed of representatives of electoral districts. Meltzer and Richard's centralized median voter approach cannot explain public policy in a multi-jurisdictional context where locally elected representatives form a central government and policies are determined through bargaining.

The paper is organized as follows. The next section defines the benchmark model. Section three discusses the relation between interregional migration and majority voting outcome. Sections four, five and six present the results. Section seven develops a generalization of the model to n districts. Section eight discusses some examples of the real world present in the economic literature and nine concludes. The appendix contains derivations and proofs.[12]

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example, cheating may arise in a fiscal federalism set-up with two or more tiers of government or in a model that allows for either a repeated game or alternative voting behaviors. This could lead to potentially interesting new insights, which may be the subject of future research.

[10] Typically, non-cooperative institutional behaviors raise voices for institutional reforms and may lead to the limit case of the break of a nation (Bolton and Roland, 1997), which goes beyond the purposes of this paper.

[11] Furthermore, Stokman and Thomson (2004), Thomson et al. (2006), Schneider et al. (2006) and Hertz and Leuffen (2010) found empirical evidence that supports the choice of cooperative bargaining models for predicting policy outcomes inside a multi-jurisdiction polity as the European Union. They suggest that cooperative negotiations, which usually take place in informal meetings, provide a more accurate forecast than legislative non-cooperative bargaining models, which consider more explicitly the decision-making procedures in the legislature.

[12] Preliminary versions of this paper appeared in the following working paper series: Giuranno, M. G., and Biswas, R., "Internal migration and public policy," POLIS Working Papers 183, Institute of Public Policy and Public Choice - POLIS and "Inter-jurisdictional migration and the size of government", MPRA Paper 42604.

2 The economic framework without migration

Consider two jurisdictions, or regions, comprising a state.[13] 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. We assume that a pivotal voter always exists in the two jurisdictions. There are two goods in this economy, a public or publicly provided good g and a private good y, which can be thought of as individual income or initial endowment. We denote by superscript h a generic individual. 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^h in order to finance the provision of g. We assume, for simplicity, that the unit cost of g is one. Therefore, the government budget constraint can be written as

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

where $\overline{y} = \sum_{h=1}^{N} y^h/N$ is the average income of the whole 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,

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

where $H\,(g)$ is the public spending benefit function, with $H'\,(g) > 0$ and $H''\,(g) < 0$.

In what follows, we analyze the efficient policy outcome, the regional first-best policy under majority voting and finally, the legislature equilibrium policy. Then, we study how a change in the distribution of the electorate, due to inter-regional relocations or migration, affects the legislature equilibrium policy.

2.1 The efficient policy outcome

In order to study the efficient supply of the public good, g^e, we maximize the following welfare function:[14]

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

[13] Here, we focus on the territorial dimension of the model. Alternatively, we can think about two distinct ethnic, religious, income or other kinds of groups.

[14] As 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.

The efficient supply, g^e, satisfies the familiar Samuelsonian condition,

$$H'\left(g^e\right) = \frac{\sum y^h}{\overline{y}}, \tag{4}$$

which leads to the following simple equation

$$H'\left(g^e\right) = 1. \tag{5}$$

Equation (5) states that, in equilibrium, the marginal benefit is equal to the marginal cost.

2.2 The regional first best under majority voting

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

$$H'\left(g^h\right) = \frac{y^h}{\overline{y}}. \tag{6}$$

We assume that voters vote sincerely. Under majority rule, the voter with median income is decisive. Furthermore, income is the only dimension of heterogeneity among citizens. Therefore, voters with incomes below (above) that of the median voter prefer a higher (lower) level of public spending on public goods.

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 that median voter 1 is not poorer than median voter 2, $y_1 \geq y_2$.[15]

The regional median voters form the centralized legislature, which has to determine the size of public spending. Once the legislature decides the size of g, the government budget constraint is automatically determined by equation (1).[16] Accordingly, the tax paid by median voter i is $ty_i = \frac{y_i}{\overline{y}}g$, with $i = 1, 2$. Thus, we write the utility function of median voter i as follows,

$$u_i = y_i - \frac{y_i}{\overline{y}}g + H\left(g\right), \qquad \text{with } i = 1, 2. \tag{7}$$

[15] In most cases, when this condition is violated there are symmetric situations, which do not add new insights to the final results. The cases where relaxing this assumption lead to new and unpredictable results are addressed in section 5.

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

Policy is chosen by bargaining by the jurisdictional median voters in the centralized 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:

$$H'\left(g_i^D\right) = \frac{y_i}{\overline{y}}, \qquad \text{with } i = 1, 2. \tag{8}$$

Solution (8) states that the first best for the median voter of region i is the amount g_i^D that equates her private marginal benefit to her private marginal cost. Median voter i prefers a lower public expenditure when her private marginal cost increases; that is, when $\partial g_i^D / \partial \frac{y_i}{\overline{y}} < 0$. This in turn, implies that she would like a higher provision when either the mean income increases or her private income declines because this reduces her marginal cost.

Equation (8) finds the first best national policy that a regional median voter would choose if she were a non-benevolent dictator at the national level. If we compare equations (8) and (5), we can conclude that the first best for a regional median voter equals the efficient supply when the regional median and the national mean incomes are the same. Otherwise, we obtain over provision when $y_i < \overline{y}$ and under provision when $y_i > \overline{y}$.

In the next section we describe how the regional median voters negotiate over policy in the national legislature.

2.3 The legislature bargaining equilibrium

In this section we will analyze the public policy outcome when decisions are made directly by the jurisdictional median voters in the central legislature. Here, median voters form a government and choose policy through negotiation.[17]

We assume that if no agreement is reached, 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 his or her private income.[18] In order to reach an agreement, both median voters must have positive net gains from implementing g. In formula, it must be $u_i - u_i^d \geq 0$, which implies $-\frac{y_i}{\overline{y}} g + H(g) \geq 0$.

[17] Note that we assume that voters vote sincerely when they elect the regional representatives. Relaxing this assumption would be an interesting extension of this paper, which we leave for future research.

[18] For a Nash bargaining situation where, in case of disagreement, policy is chosen by the jurisdictional governments see Giuranno (2010).

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

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

The net 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. It is easy to see that the net gain from cooperating on the provision of g is smaller for the richer median voter; that is,

$$\phi_1 \leq \phi_2. \tag{10}$$

Median voters have the same net gains when they have the same income y_i and, hence, the same marginal cost $\frac{y_i}{\overline{y}}$.

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

$$\frac{\partial \phi_i}{\partial g} = -\frac{y_i}{\overline{y}} + H'(g) = Mu_i. \tag{11}$$

Representatives choose the government size g by bargaining. We solve the bargaining problem by maximizing the following Nash bargaining product:

$$\max_g (\phi_1 \phi_2). \tag{12}$$

The first order condition is:

$$\frac{-\frac{y_1}{\overline{y}} + H'(g)}{-\frac{y_1}{\overline{y}} g + H(g)} + \frac{-\frac{y_2}{\overline{y}} + H'(g)}{-\frac{y_2}{\overline{y}} g + H(g)} = 0. \tag{13}$$

Since the two denominators must be positive, it turns out that $Mu_1 < 0$ and $Mu_2 > 0$ because the marginal cost is higher for median voter 1. This shows that the bargaining equilibrium is a compromise between median voters' most preferred policies; that is, in equilibrium, median voter 1 would like a smaller provision of g and median voter 2 would like more public consumption.

Furthermore, equation (13) can be easily rewritten in the form of the sum of the elasticities of the net gains:

$$\frac{-\frac{y_1}{\overline{y}} + H'(g)}{\left(-\frac{y_1}{\overline{y}} g + H(g)\right)/g} + \frac{-\frac{y_2}{\overline{y}} + H'(g)}{\left(-\frac{y_2}{\overline{y}} g + H(g)\right)/g} = 0. \tag{14}$$

In order to see that, consider that the ratio

$$\frac{-\frac{y_i}{\overline{y}} + H'(g)}{\left(-\frac{y_i}{\overline{y}} g + H(g)\right)/g}, \quad \text{with } i = 1, 2, \tag{15}$$

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 public spending. It is easy to verify that, as $\frac{y_i}{\overline{y}}$ increases, the ratio (15) declines.[19] 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 Regional median voters and inter-regional migration

What happens to the three equilibrium conditions (5), (8) and (13) when the inter and intra-regional distribution of voters changes?[20]

A simple way to think about this issue is to consider the case of inter-regional relocation or migration, which alters the composition of the electorate without altering the total population. An individual who relocates, and acquires the right to vote in the region where he or she ends up, causes a change in the median voters of the two regions, as both regional income distributions change. What matters is who becomes the regional median voter after a perturbation in the electorate has taken place. Actually, from equilibrium conditions (8) and (13), it is evident that what really matters is the income of the new regional median voters and the average income or, simply, their ratio $\frac{y_i}{\overline{y}}$, with $i = 1, 2$. For this reason, we denote by $\gamma_i = \frac{y_i}{\overline{y}}$ the "decisive" ratio between the income of median voter i and the mean income of the whole economy.[21]

Following Razin et al. (2002), we solve the model by assuming a continuous relation between the level of inter-regional migration or relocation, m, and the parameter γ, which determines a change in the regional median voters. The level of migration m may have several interpretations. Razin et al. (2002) consider m either as an exogenous binding quota or simply the number of migrants. We can simply think about m as the number of migrants who move from region 1 to region 2, or vice versa, where they acquire voting rights. Specifically, when $m = 0$ the electorate does not change as no one moves between jurisdictions. As m increases, the median voters of the two regions change; i.e.: $\frac{\partial \gamma_i}{\partial m} \lesseqgtr 0$,

[19] To see this, one has to consider that $gH'(g) - H(g) < 0$, as proved in Chiang (1984, pp. 192-3).

[20] Note the electorate changes for many reasons such as, migration, inter-regional relocation, aging (Sørensen, 2013) and so on.

[21] Note that changes in median-to-mean income ratios within and across jurisdictions could be due to internal as well as external migration, or to other reasons unrelated to migration.

with $i = 1, 2$. The sign of $\frac{\partial \gamma_i}{\partial m}$ depends on the ranking in both regions of the income of the individuals who migrate.

Therefore, as in Dolmas and Huffman (2004), for a given value of m, we need to conjecture the inter- and intra-regional distributions of income. To summarize, when individuals migrate between regions and acquire the right to vote in the region of destination, the following four conceivable analytical cases arise:

$$\begin{aligned}
&1)\ \gamma_1'(m) \geq 0 \text{ and } \gamma_2'(m) \geq 0;\\
&2)\ \gamma_1'(m) \leq 0 \text{ and } \gamma_2'(m) \leq 0;\\
&3)\ \gamma_1'(m) \leq 0 \text{ and } \gamma_2'(m) \geq 0;\\
&4)\ \gamma_1'(m) \geq 0 \text{ and } \gamma_2'(m) \leq 0.
\end{aligned}$$

According to equation (5), the efficient supply implies no changes in public policy when the regional composition of the electorate changes. The reason is that neither the aggregate marginal cost nor the aggregate marginal benefit is influenced by internal migration flows. Instead, both the equilibrium condition (8) representing the regional median voters' first best and the bargaining equilibrium (13) are affected substantially.

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

We now study the influence on centralized public spending when there is a change in the electorate in the four conceivable cases.

4 Public spending under inter-regional migration

So far, we have argued that, in a world where income is the only element of heterogeneity among citizens, changes in the composition of jurisdictional electorates modifies the distribution of income inside jurisdictions leading to the election of different jurisdictional median voters. This, in turn, implies that the redistributive conflict between regions assumes different intensities, which depend on whether the new regional pivotal voters have either a lower or higher median-mean income ratio, γ_i.

The following Lemma provides the key to solving the comparative statics for the four conceivable cases.

Lemma 1 *An increase in m leads to a larger public sector when the following relation holds*

$$\frac{dg^*}{dm} \gtrless 0 \ \textit{when} \ \frac{\gamma_1'(m)}{\phi_1^2} + \frac{\gamma_2'(m)}{\phi_2^2} \lessgtr 0 \tag{16}$$

and to a smaller public sector otherwise.

The proof is in the Appendix.

Lemma 1 states that the relation between inter-regional migration and the size of the public sector depends on the sign of expression

$$\left(\frac{\gamma_1'(m)}{\phi_1^2}+\frac{\gamma_2'(m)}{\phi_2^2}\right), \tag{17}$$

which is a function of the marginal change in the median voters' income ratio $\gamma_i'(m)$ due to migration and net gain ϕ_i, with $i=1,2$. Obviously, we obtain $dg^*/dm=0$ when $\gamma_1'(m)=\gamma_2'(m)=0$. Of course, government size declines when $\frac{\gamma_1'(m)}{\phi_1^2}+\frac{\gamma_2'(m)}{\phi_2^2}>0$.

In order to understand the implications of Lemma 1 it is necessary to study the four conceivable cases separately. We start from the two simpler cases 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.

We find that an increase in m that leads to richer regional median voters relative to the national average causes a decrease in the size of g. Conversely, an increase in m that leads to poorer regional median voters relative to the national average causes an increase in the size of g. In formulas,[22]

$$\frac{dg^*}{dm}\leq 0 \text{ when } \gamma_1'(m)\geq 0 \text{ and } \gamma_2'(m)\geq 0 \tag{18}$$

and

$$\frac{dg^*}{dm}\geq 0 \text{ when } \gamma_1'(m)\leq 0 \text{ and } \gamma_2'(m)\leq 0. \tag{19}$$

Conditions (18) and (19) consider two cases where the change in the electorate does not worsen the conflict of interest between regional median voters. In the first case, an increase in the number of individuals who move from one region to the other causes the election of relatively richer regional median voters who are both more rigid with respect to public spending. Therefore, they will certainly agree to reduce public good provision. In the second case, both regional median voters are poorer relative to the mean income. Therefore, they will agree to increase redistributive public spending and have a larger public sector.[23]

[22] The proof is a straightforward application of Lemma 1.

[23] These results show that when there is no substantial conflict of interest between median voters the classical Meltzer and Richard (1981) result is replicated in a multi-jurisdiction economy. However, only when the national median voter's relative income moves in the same direction as the jurisdictional median voters' relative incomes, both Meltzer and Richard's approach and our approach lead to the same policy prediction.

Now, we turn to the cases of inter-regional convergence and divergence where the impact of internal migration on national decision making is not trivial.

4.1 Migration and inter-regional convergence

What happens when migration either mitigates or worsens inter-regional redistributive conflicts? We answer this question in the following two Propositions. Specifically, Proposition 1 refers to case 3 (convergence) of section 3, while Proposition 2 refers to case 4 (divergence).

Proposition 1 *An increase in m such that $\gamma_1'(m) < 0$ and $\gamma_2'(m) > 0$ leads to the the following comparative statics results:*

$$\frac{dg^*}{dm} > 0 \text{ if } |\gamma_1'(m)| \geq |\gamma_2'(m)|, \tag{20}$$

$$\frac{dg^*}{dm} \gtreqless 0 \text{ if } |\gamma_1'(m)| < |\gamma_2'(m)|. \tag{21}$$

Besides, for the residual limit cases that have not been treated above, the following comparative statics results apply:

$$\frac{dg^*}{dm} < 0 \text{ if } \gamma_1'(m) = 0 \text{ and } \gamma_2'(m) > 0, \tag{22}$$

$$\frac{dg^*}{dm} > 0 \text{ if } \gamma_1'(m) < 0 \text{ and } \gamma_2'(m) = 0. \tag{23}$$

The proof is based on Lemma 1. When $\gamma_1'(m) < 0$ and $\gamma_2'(m) > 0$, the two ratios in (17) take the following signs: $\frac{\gamma_1'(m)}{\phi_1^2} < 0$ and $\frac{\gamma_2'(m)}{\phi_2^2} > 0$. Therefore, given that relation (10) is always satisfied, as we assumed $y_1 > y_2$, expression (17) is certainly negative when $|\gamma_1'(m)| \geq |\gamma_2'(m)|$. On the contrary, the sign of expression (17) is ambiguous when $|\gamma_1'(m)| < |\gamma_2'(m)|$. Furthermore, cases (22) and (23) are straightforward applications of Lemma 1.

In the case under consideration, the incomes of the median voters of the two regions converge as median voter 1, the richer one by assumption, becomes poorer with respect to the mean and median voter 2 becomes relatively richer. In this situation, median voter 1 would like to increase the size of g because her marginal cost is now lower. But, median voter 2 has a conflict of interest. On the one hand she would like to increase g as she can benefit from redistributive public spending. On the other hand, her marginal cost is now higher and this reduces redistribution in her favour.

Case (20) in the above Proposition states that if the marginal change in γ is weakly greater for the richer median voter 1 , $|\gamma_1'(m)| \geq |\gamma_2'(m)|$, then g increases. A bigger change in the gamma for median voter i means a bigger change in her marginal cost. Therefore, as the marginal cost of the richer median voter declines, her gain from cooperating ϕ_1 increases and she becomes more willing to agree on a larger provision of g. On the contrary, as the marginal cost of the poorer median voter increases, her gain from cooperation ϕ_2 declines and she becomes less willing to agree on a larger g. Since, the change in the marginal cost is more relevant for the region with the highest median income, the interest of the richer median voter is dominant in the renegotiation. This, in turn, leads to an increase in the size of government spending.

Case (21) states that if the marginal change in γ is bigger for the poorer median voter 2, $|\gamma_1'(m)| < |\gamma_2'(m)|$, then the change in government spending is ambiguous. In order to understand the ambiguity, we recall that according to the equilibrium condition (13), median voter 2 always wants more public good provision than median voter 1, in equilibrium. When median voter 2 is relatively richer, she has to balance her willingness to have more public spending with a higher marginal cost, which decreases her net gain from public goods provision ϕ_2. Corollary 1 shows that the ambiguity disappears under full income convergence.

Case (22) can be seen as a limit situation of case (21). It states that government size declines, $\frac{dg^*}{dm} < 0$, if income convergence induced by migration does not affect the richer median voter, $\gamma_1'(m) = 0$ and $\gamma_2'(m) > 0$. Thus, the ambiguity of case (21) is solved in case (22).

Similarly, case (23) can be read as a limit situation of case (20). As expected, it states that government size unambiguously increases, $\frac{dg^*}{dm} > 0$, if income convergence does not affect the poorer median voter, $\gamma_1'(m) < 0$ and $\gamma_2'(m) = 0$.

The above Proposition has an interesting Corollary. We noticed that when $\gamma_1'(m) < 0$ and $\gamma_2'(m) > 0$, median voters' income disparity declines. Now, what happens when they actually equalize? We find the full convergence between median voters' incomes leads to opposite results depending on whether we are in situation (20) or (21), as stated in the following Corollary.

Corollary 1 *Consider the case where $\gamma_1'(m) < 0$ and $\gamma_2'(m) > 0$ in which an increase in m leads to median voters' income equalization, $y_1 = y_2$, then government size increases when $|\gamma_1'(m)| > |\gamma_2'(m)|$ and declines when $|\gamma_1'(m)| < |\gamma_2'(m)|$.*

The proof of the Corollary is straightforward after considering that median voters' income equalization also leads to median voters' net gains

equalization, $\phi_1 = \phi_2$, in Lemma 1.

According to case (20), government size increases when inter-regional income equalization occurs mainly because the median voter of the richer region is a poorer one. In this case, inter-regional net gains equalization is mainly driven by a lower marginal cost for the richer median voter.

On the contrary, case (21) is not ambiguous anymore as $\frac{dg^*}{dm}$ is strictly negative when $y_1 = y_2$. Thus, government size declines when inter-regional convergence occurs mainly because the median voter of the poorer region is a richer one. In this case, inter-regional net gains from reaching an agreement tend to equalize too, but this equalization is mainly driven by a higher marginal cost for the poorer median voter. Therefore, since the impact on the marginal cost of the richer median voter is less relevant, it will be mutually convenient to agree on a lower g.

For completeness, we also note that when $|\gamma_1'(m)| = |\gamma_2'(m)|$ and $y_1 = y_2$ then $\frac{dg^*}{dm} = 0$.

4.2 Migration and inter-regional divergence

Now, we turn to the next case in which the gap between median voters' incomes and marginal costs widens. This is illustrated in Proposition 2.

Proposition 2 *An increase in m such that $\gamma_1'(m) > 0$ and $\gamma_2'(m) < 0$ leads to the the following comparative statics results:*

$$\frac{dg^*}{dm} < 0 \text{ if } |\gamma_1'(m)| \geq |\gamma_2'(m)|, \tag{24}$$

$$\frac{dg^*}{dm} \lessgtr 0 \text{ if } |\gamma_1'(m)| < |\gamma_2'(m)|. \tag{25}$$

Besides, for the residual limit cases that have not been treated above, the following comparative statics results apply:

$$\frac{dg^*}{dm} > 0 \text{ if } \gamma_1'(m) = 0 \text{ and } \gamma_2'(m) < 0, \tag{26}$$

$$\frac{dg^*}{dm} < 0 \text{ if } \gamma_1'(m) > 0 \text{ and } \gamma_2'(m) = 0, \tag{27}$$

The proof is based on Lemma 1. When $\gamma_1'(m) > 0$ and $\gamma_2'(m) < 0$, the two ratios in (17) take the following signs: $\frac{\gamma_1'(m)}{\phi_1^2} > 0$ and $\frac{\gamma_2'(m)}{\phi_2^2} < 0$. Therefore, given that relation (10) is always satisfied, expression (17) is positive when $|\gamma_1'(m)| \geq |\gamma_2'(m)|$. On the contrary, the sign of expression (17) is ambiguous when $|\gamma_1'(m)| < |\gamma_2'(m)|$. Besides, cases (26) and (27) are straightforward applications of Lemma 1.

In Proposition 2, the incomes of the median voters of the two regions diverge as median voter 1 becomes richer with respect to the mean and median voter 2 becomes relatively poorer. In this situation, median voter 1 would like to decrease the size of g because her marginal cost is now higher. Instead, median voter 2 would like to increase g as she can benefit from increased redistributive public spending at a lower marginal cost. In addition, the poorer median voter has a higher net gain from cooperating. While, the net gain is lower for median voter 1, which restricts the set of possible agreements.

The situation where the change in the marginal cost is weakly greater for the richer median voter, case (24) in the Proposition, leads unambiguously to a smaller public sector. The richer 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.

In case (25), where the change in the marginal cost is greater for the poorer median voter, the influence on policy outcome is ambiguous. However, as case (26) suggests, we can establish the sign of the comparative statics when $\gamma_1'(m) = 0$, which unambiguously leads to $\frac{dg^*}{dm} > 0$. Thus, if the income of the richer median voters does not change, median voter 2 will be able to renegotiate an increase in g^*. Therefore, in case (25), in order to obtain a decrease in g, the interest of the richer median voter in reducing the implementation of g must be strong enough to win the interest of the poorer median voter in increasing it. Furthermore, as expected, condition (27) states that the size of g decreases when the income of the poorer median voter does not change.

5 What happens when migration modifies which median voter is the richest?

In order to simplify both the analysis and the exposition, we have assumed that the median voter of jurisdiction 1 is always richer than the median voter of jurisdiction 2; i.e.: $y_1 \geq y_2$. We now relax this assumption as this leads to an additional intriguing situation in which case 3) flows into case 4); that is, when the income ranking of the jurisdictional median voters gets destroyed, the incomes of the median voters first converge to the same level and then cross over and diverge.

The following Proposition presents the case where median voters' incomes reverse their initial ranking.

Proposition 3 *Consider an initial situation where $y_1 \geq y_2$. An increase in m such that $\gamma_1'(m) < 0$ and $\gamma_2'(m) > 0$ that reverses the rank-*

ing of the jurisdictional median voters' incomes leads to the following comparative statics results:

$$\frac{dg^*}{dm} < 0 \text{ if } |\gamma_1'(m)| \leq |\gamma_2'(m)|, \tag{28}$$

$$\frac{dg^*}{dm} \lessgtr 0 \text{ if } |\gamma_1'(m)| > |\gamma_2'(m)|. \tag{29}$$

Besides, for the residual limit cases that have not been treated above, (22) and (23) apply.

The proof of the above Proposition follows from Lemma 1, after considering that $\widehat{y}_1 \leq \widehat{y}_2$ implies $\widehat{\phi}_1 \geq \widehat{\phi}_2$, where $\widehat{y}_i$ and $\widehat{\phi}_i$ denote respectively the post migration median voter's income and net gain, with $i = 1, 2$.

When migration reverses the ranking of jurisdictional median incomes, we obtain a new income divergence case. Here, the initial size of government is certainly restored when the incomes of the median voters are symmetrically reversed; that is, when $y_1 = \widehat{y}_2 > y_2 = \widehat{y}_1$. In this case, the median voter of jurisdiction 1 (jurisdiction 2), who wanted less (more) public spending in the equilibrium before migration, wants more (fewer) public goods after migration.

Furthermore, the above Proposition states that (22) and (23) apply for the two limit cases. Moreover, there is no contradiction among (22) and (23) in Proposition 1 and (26) and (27) in Proposition 2 as median voter 1 is now poorer then median voter 2. Similarly, there is no contradiction between (28) and (24) and between (29) and (25) by symmetry.

6 Inter-regional migration and efficiency

In this section, we present a Proposition that compares the bargaining outcome with the efficient supply of the public good. In order to do this, we distinguish the following three analytical cases:

$$\text{case 1) } \overline{y} \geq y_1 \geq y_2;$$

$$\text{case 2) } y_1 \geq y_2 \geq \overline{y};$$

$$\text{case 3) } y_1 \geq \overline{y} \geq y_2.$$

In case 1) both median voters have incomes below the average income of the whole economy. This is a standard assumption based on empirical evidence (see Meltzer and Richard 1981, 1983 and others). However, since we have a model with two regions and two median voters, this assumption could be violated in some cases. For this reason, we

also consider case 2), which could apply to some developing countries' situations and, for completeness, case 3), which could apply to countries where median voter income is above the national income in the urban districts and below the average national income in the rural areas.

Proposition 4 *The bargaining outcome is efficient when regional median voters' incomes converge towards the mean income of the economy; i.e., when* $\gamma_1 = \gamma_2 = 1$. *On the contrary, when* $\overline{y} \geq y_1 \geq y_2$ ($y_1 \geq y_2 \geq \overline{y}$) *government spending is over- (under-) provided and when* $y_1 \geq \overline{y} \geq y_2$ *government spending can be either over or under-provided.*

The proof is in the Appendix.

When, in each region individually, the regional median choice is equal to the regional average, the median choice in each region might not be equal to the average for the country, which is required for both median voters to choose the efficient supply. Under the latter, there is no conflict of interest between regions as $\overline{y} = y_1 = y_2$ and median voters' net gain from cooperating is identical, $\phi_1 = \phi_2$.

It is interesting to link Proposition 4 to Corollary 1. Accordingly, when migration leads to inter-regional convergence, where condition $\gamma_1 = \gamma_2 = 1$ is also satisfied, then efficiency may imply either an increase in government spending when $|\gamma_1'(m)| > |\gamma_2'(m)|$, or a decrease when $|\gamma_1'(m)| < |\gamma_2'(m)|$.

Now, what happens when we move away from the situation where $\overline{y} = y_1 = y_2$? Clearly, the bargaining outcome leads to different results for the three cases under consideration where median voters do not have the same net gain from cooperating anymore. In the first case, where $\overline{y} \geq y_1 \geq y_2$, the net gains from cooperating increase for both median voters and government spending is over-provided, as suggested by (19). Similarly, in the second case, where $y_1 \geq y_2 \geq \overline{y}$, the net gains decline for both median voters and government spending is under-provided, as suggested by (18). Instead, in the third case, where $y_1 \geq \overline{y} \geq y_2$, the net gains of the two median voters diverge; i.e., $\phi_1 < \phi_2$. Therefore, the final outcome is ambiguous.

7 A generalization

In this section we extend the model to the case of more than two jurisdictions. Thus, we denote by j a generic jurisdiction, with $j = 1, ..., J$ and $J > 2$. Furthermore, we keep the total population normalized to one; i.e., $\sum_{j=1}^{J} N_j = 1$. Government budget constraint is given by equation

(1), since it does not depend on the number of local jurisdictions. For the same reason, the efficient policy outcome satisfies equation (5).

Now, we study the legislature equilibrium policy with J jurisdictions. The Nash bargaining solution implies that the net gains from reaching an agreement on the size of g must be weakly positive for all regional median voters; that is,

$$\phi_j = u_j - u_j^d = -\frac{y_j}{\overline{y}} g + H(g) \geq 0, \forall\ j = 1, ..., J. \tag{30}$$

The equilibrium policy maximizes the following Nash bargaining product of the net gains of the J representatives:

$$\max_g \prod_{j=1}^{J} \phi_j, \qquad \text{with } j = 1, ..., J. \tag{31}$$

The first order condition is

$$\sum_{j=1}^{J} \frac{-\frac{y_j}{\overline{y}} + H'(g)}{-\frac{y_j}{\overline{y}} g + H(g)} = 0. \tag{32}$$

As we already know, migration may change the median income of both the origin and destination districts and the average income of the economy. Furthermore, when a citizen migrates in an economy with more than two jurisdictions, we must also consider that any variation in the average income impacts on the median/mean income ratios of jurisdictions not directly affected by the migratory movement.

After using equilibrium condition (32), we can rewrite Lemma (1) in a more general form.

Lemma 2 *In an economy with $J > 2$ jurisdictions, an increase in m leads to a larger public sector when the following relation holds*

$$\frac{dg^*}{dm} \geqslant 0 \ \textit{when} \ \sum_{j=1}^{J} \frac{\gamma_j'(m)}{\phi_j^2} \leq 0, \qquad \textit{with } j = 1, ..., J, \tag{33}$$

and to a smaller public sector otherwise.

The proof is in the Appendix.

Clearly, even with $J > 2$ government size increases (decreases) when inter-regional migration leads to regional median voters that are simultaneously poorer (richer) relative to the mean income of the whole economy; That is,

$$\frac{dg^*}{dm} \geqslant 0 \text{ when } \gamma_j'(m) \leq 0, \qquad \forall\ j = 1, ..., J, \tag{34}$$

and

$$\frac{dg^*}{dm} \leq 0 \text{ when } \gamma'_j(m) \geq 0, \qquad \forall\ j = 1, ..., J. \tag{35}$$

Proposition 5 provides the comparative statics solutions for the conflicting cases.

Proposition 5 *In an economy with $J > 2$ jurisdictions, when an individual migrates from jurisdiction $\underline{j}$ to $\overline{j}$, such that $y'_{\underline{j}} \neq 0$ and $\overline{y}' \equiv 0$, the following comparative statics results apply:*

$$\frac{dg^*}{dm} \gtrless 0 \text{ when } \frac{1}{\overline{y}} \left(\frac{y'_{\underline{j}}}{\phi^2_{\underline{j}}} + \frac{y'_{\overline{j}}}{\phi^2_{\overline{j}}} \right) \leqslant 0, \qquad \text{with } j = 1, ..., J. \tag{36}$$

Similarly, when an individual migrates from jurisdiction $\underline{j}$ to $\overline{j}$, such that $y'_{\underline{j}} \equiv 0$ and $\overline{y}' \neq 0$, the following comparative statics results apply:

$$\frac{dg^*}{dm} \gtrless 0 \text{ when } -\frac{\overline{y}'}{\overline{y}^2} \sum_{j=1}^{J} \frac{y_j}{\phi^2_j} \leqslant 0, \qquad \text{with } j = 1, ..., J. \tag{37}$$

Furthermore, when an individual migrates from jurisdiction $\underline{j}$ to $\overline{j}$, such that $y'_{\underline{j}} \neq 0$ and $\overline{y}' \neq 0$, the following comparative statics results apply:

$$\frac{dg^*}{dm} \gtrless 0 \text{ when } \frac{1}{\overline{y}^2} \sum_{j=1}^{J} \frac{y'_j \overline{y} - \overline{y}' y_j}{\phi^2_j} \leqslant 0, \qquad \text{with } j = 1, ..., J. \tag{38}$$

The proof is a straightforward application of Lemma 2.

In order to deal with the conflicting cases, it is useful to study separately the effects of migration on the marginal change of regional median incomes and on the average income of the whole economy, as reported in conditions (36) and (37).

Specifically, condition (36) describes what happens when an individual migrates from region $\underline{j}$ to region $\overline{j}$ and the impact on the average income is negligible ($\overline{y}' \equiv 0$) because either his income does not change significantly, or its marginal impact on the average income of a large population is zero. In that situation, the equilibrium policy is driven only by the change in the median incomes of the region of origin and that of destination. It is easy to verify that Propositions (1), (2) and (3) apply in the cases, respectively, of median income convergence, divergence or income reversing between regions $\underline{j}$ and $\overline{j}$.

Now, assume that migration flows lead to a change only in the average income, without significantly affecting regional median incomes, so that

we can set $y'_j \equiv 0$ into (33) for any j. According to (37), government size increases (decreases) when the average income increases (decreases); that is, $dg^*/dm \geqslant 0$ when $\overline{y}' \geq 0$ and $dg^*/dm < 0$ when $\overline{y}' < 0$.

Furthermore, according to (38), when migration flows lead to significant variations in both the average income and the regional median voters' income, the sign of the comparative statics is ambiguous, as it depends on the specific magnitudes of these changes. However, it is clear that when the average income increases (decreases), government size also increases (decreases) when either all regional median voters are poorer (richer), or the impact on the regional median incomes is sufficiently stronger in the regions where median incomes decline (increase).

Finally, the following Proposition generalizes Proposition (4) to the case with $J > 2$ jurisdictions.

Proposition 6 *In an economy with $J > 2$ jurisdictions, the bargaining outcome is efficient when regional median voters' incomes converge towards the mean income of the economy; i.e., when $\gamma_j = 1$, $\forall\ j = 1, ..., J$.*

The proof is in the Appendix.

Therefore, even in the model with more than two jurisdictions, government spending equalizes the efficient policy outcome represented by equation (5) when median voters' incomes converge towards the mean income of the economy in all jurisdictions. However, the relation between government size and efficiency is ambiguous, as it depends on the magnitude of the changes in median/mean incomes.

8 Discussion

The present work may stimulate further empirical research and provide a theoretical foundation to the already existing one. Furthermore, the model can be tested by laboratory experiments that have the advantage of isolating the effect of mobility on public policy from other effects.

The aim of this section is to discuss some real-world examples, presented in economic literature, where internal migration is likely to have increased or decreased public spending and efficiency.

First, we focus on the relation between interregional migration and efficiency that, according to Proposition 6, depends on income convergence. Pissarides and McMaster's (1990) seminal work demonstrate the existence of a direct relation between internal migration and interregional convergence relying on the working of the labour market. According to traditional economic theory, regions with high unemployment rates tend to experience falling relative wages. This, in turn, generates two effects. On one hand it increases the demand for labour. On the

other hand, it encourages workers in poor regions, especially the unemployed, to look for jobs in regions with higher relative wages and lower unemployment rates. In the absence of impediments to mobility, workers are encouraged to relocate until regional salaries converge towards the same level. This, in turn, may satisfy the necessary condition for efficiency stated in Proposition 6. Therefore, by matching Pissarides and McMaster's relation and our Proposition 6, we can conclude that a relation between internal migration and efficiency in public spending may exist through the functioning of the labor market. A question that emerges concerns the time needed for full interregional convergence. Based on UK data, Pissarides and McMaster (1990) found empirical evidence that full convergence, through internal migration, is a rather slow process. As a result, internal migration may improve efficiency in the short run, while achieving full efficiency is a long-term issue.

Recent economic literature (Chevalier et al. 2018; Alesina et al, 2018) is increasingly focusing on the relation between migration and redistribution through public expenditure. Chevalier et al. (2018), Falck (2012) and Decressing (1994), for instance, focused on the German case where interregional migration has played a prominent role since the post World War II. Following a massive relocation of German population after World War II, internal migration had profound effects on the size of public spending for the welfare state in West Germany (Chevalier et al., 2018). At that time, inter-regional migration flows in Germany involved around eight million Germans. Chevalier et al. (2018) used this historical episode as a natural experiment by exploiting the fact that internal migrants had full voting rights. The relocation of considerably poorer individuals from East to West Germany increased the demand for redistribution in West Germany local constituencies. This, in turn, increased the demand for public spending for the welfare state in West Germany. Since East and West Germany became politically divided at that time and the elected representatives in local West German districts become relatively poorer voters after immigration from the East, the size of the public sector increased. The historical episode described by Chevalier et al. (2018) was followed by several migratory shocks in Germany, whose impact on public spending deserves further empirical analysis.[24]

[24] According to Decressin (1994), the erection of the Berlin Wall in 1961 interrupted the migration from Eastern to Western Germany that then become a North-South migration with the direction depending on the rise and fall of heavy industries such as coal, shipbuilding and metallurgy that were concentrated mainly in the North of West Germany. The following dismantling of the Berlin Wall caused a new wave of migratory flows from East to West Germany that, according to Parikh and Van Leuvensteijn (2003), leaded to interregional wage convergence. Furthermore, De-

Paci et al. (2007) conducted an empirical analysis focusing on Central European countries and the Baltic Region. They found that, starting in the mid-nineties, internal migrations became highly concentrated among skilled and better educated workers. Such migratory phenomena created a push towards a greater divergence of inter-regional incomes. Therefore, according to our analysis, we should expect less efficiency in public spending in those countries.[25]

In India, which is politically a quasi-federal state, internal migration happens quite often because the income differential between the rich and the poor states can be rather substantial there (Sharma, 2017; Bhagat, 2010). Several hypotheses can be empirically tested. When, for instance, a poor citizen moves from a lower-income state like Bihar to a higher income state, say Maharashtra, the median income of both the states may decline, if the worker was from a relatively high-income bracket in his home state but he is getting a low wage (still higher than his original wage in his home state). If the local median voters are decisive, they will ask for a higher size of the government in a setting like India, where private health and education are way beyond the reach of the poor, sometimes even the middle class. However, if the converse is true, that is, both the states become relatively richer, they will end up asking for lower government size because the quality of government health and education is viewed by the richer classes with suspicion in India.

Furthermore, the median income of Indian jurisdictions might move differently. If the migrants ends up adding to the productivity of the state where they move for work, the median incomes of the receiving states increase, whereas the incomes of the departing states decline. There, an immediate conflict will ensue, which depends on the force of the conflicting demand of important social goods like health and education.

9 Final remarks

A rational theory that sheds new light on the relation between internal migration and public policy is conspicuously absent in economic literature, where most theoretical works deal mainly with the relation between public spending and external migration.

This paper investigates under what conditions internal migration

cressin (1994) found a significant procyclical effect of internal migratory flows, which therefore seem to be less effective in reducing interregional wage differences.

[25] Furthermore, in order to understand the changes in the size of government spending, depending on internal migration, one should consider the magnitude of the changes on regional median/mean incomes in each single country, which could be the base for new empirical investigations.

may enhance efficiency and the implications for public spending.

Clearly, migration leads to efficiency from a social point of view when median regional incomes converge towards the average income of the overall economy. However, the effect on government spending is not univocal. Government size increases when the electoral perturbation is more relevant for the region with the richest median voter and decreases otherwise.

As a result, the consequences on public policy of migration flows depend on the way migration shapes both inter and intra-regional redistributive conflicts and their magnitude. In general, in order to make policy predictions, it is not enough to know whether migration flows lead to either convergence or divergence in the incomes of the regional pivotal voters, one must also know the magnitude of the marginal change in their relative incomes.

The results of our analysis cannot be found with the classical country-wide median voter approach. Clearly, no prediction is possible within the country-wide median voter approach when internal migration leads to inter-regional convergence, divergence or when the income ranking of regional median voters reverses, as inter-jurisdictional conflicting interests would not emerge in that approach.

A future development of our model could be along Salmon's line (2015), where Salmon addresses the issues of mobility manipulation to shape the electorate.[26]

Appendix

Proof of Lemma 1. Denote by F the first order condition (13),

$$F = \frac{-\gamma_1(m) + H'(g)}{-\gamma_1(m)\, g + H(g)} + \frac{-\gamma_2(m) + H'(g)}{-\gamma_2(m)\, g + H(g)} = 0. \tag{39}$$

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

$$F_m = \frac{-\gamma_1'(m)\,\phi_1 + \gamma_1'(m)\, g \frac{\partial \phi_1}{\partial g}}{\phi_1^2} + \frac{-\gamma_2'(m)\,\phi_2 + \gamma_2'(m)\, g \frac{\partial \phi_2}{\partial g}}{\phi_2^2}. \tag{40}$$

After rearranging we get

$$F_m = \left(gH'(g) - H(g)\right)\left(\frac{\gamma_1'(m)}{\phi_1^2} + \frac{\gamma_2'(m)}{\phi_2^2}\right). \tag{41}$$

[26] See, also, Mingat and Salmon (1988).

Here, $(gH'(g) - H(g))$ is negative because the marginal benefit is smaller than the average benefit, i.e. $H'(g) < H(g)/g$.[27] 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 Lemma.

Proof of Proposition 4. In order to prove the proposition, we first show that the bargaining solution leads to the efficient solution when $\gamma_1 = \gamma_2 = 1$. In this case, the bargaining first order condition (13) becomes $2\frac{-1+H'(g)}{-g+H(g)} = 0$. This is satisfied when $H'(g) = 1$, as in equation (5). Second, consider the case $\overline{y} \geq y_1 \geq y_2$. The efficiency condition (5) does not change when the distribution of the electorate changes between regions. On the contrary, condition (19) shows that the provision of g increases as the median mean income ratios decline for both median voters. Third, consider the case $y_1 \geq \overline{y} \geq y_2$. The impact on g of moving away from the situation $\gamma_1 = \gamma_2 = 1$ is explained by Proposition 2. Therefore g may either increase or decrease.

Proof of Lemma 2. Denote by V the first order condition (32),

$$V = \sum_{j=1}^{J} \frac{-\gamma_j(m) + H'(g)}{-\gamma_j(m)\, g + H(g)} = 0. \tag{42}$$

We want to study $\frac{dg^*}{dm} \equiv -\frac{V_m}{V_g}$. It is straightforward to verify that the second order condition is negative, $V_g < 0$, while the numerator is

$$V_m = \sum_{j=1}^{J} \frac{-\gamma_j'(m)\,\phi_j + \gamma_j'(m)\, g \frac{\partial \phi_j}{\partial g}}{\phi_j^2}. \tag{43}$$

After rearranging we obtain

$$V_m = (gH'(g) - H(g)) \sum_{j=1}^{J} \frac{\gamma_j'(m)}{\phi_j^2} \tag{44}$$

where, we already know that $(gH'(g) - H(g))$ is negative. We conclude that V_m is positive when $\sum_{j=1}^{J} \frac{\gamma_j'(m)}{\phi_j^2}$ is negative.

Proof of Proposition 6. In order to prove the proposition, we need to show that the bargaining solution with $J > 2$ jurisdictions leads to the efficient solution when $\gamma_j = 1$ for all $j = 1, ..., J$. In this case, the bargaining first order condition (32) becomes $J\frac{-1+H'(g)}{-g+H(g)} = 0$, which is satisfied when $H'(g) = 1$, as in equation (5).

[27] For a standard proof see Chiang (1984, pp. 192-3).

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