Internal migration and public policy

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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 exogenous inter-jurisdictional migration results in larger or smaller public spending. The paper also studies whether and when inter-regional migration leads to the efficient policy outcome. We find that the efficient size of government spending depends on the way internal migration leads to
convergence among the regional median incomes and the national average income.

*Key words*: Demographic Changes; Public Goods; Bargaining.

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

1 Introduction

It is commonly proposed that a mass of skilled (unskilled) migrants who acquire the right to vote lead to a smaller (larger) public spending.\(^1\) The literature has mainly focused on external migration. This paper studies the case of internal migration flows.

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. Public goods are uniformly provided across jurisdictions and financed through a proportional income tax.

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

\(^1\)See Cohen, Razin, and Sadka (2009), Razin, Sadka and Benjaron (2011) and many others.
the pivotal voters in local constituencies. This has been observed in the case of the relocation of citizens after German reunification or inter-regional migration between the South and the North of Italy after the second world war. In the European Union, workers’ relocation is often viewed as affecting national and European economic policies.\textsuperscript{2}

The influence on government spending of demographic changes in an economy with multi-district political constituencies has not previously been studied. 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 median voter and elected representatives, policies can change at the central level of government.

As Meltzer and Richard (1981) point out, any change in the voting population changes the median voter and thus, in a median-voter model, has a direct influence on public policy. 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.

Migration can change individual incomes (Korpi and Clark, 2014). Therefore, inter-jurisdictional mobility can affect the distribution of income within and among jurisdictions and the average income of the whole economy. In particular, incomes of jurisdictional median voters can change. In the collective choice mechanism of our model, the income gap among jurisdictional median voters characterises the dimension of inter-jurisdictional conflict of interest.

A number of cases are possible. Inter-jurisdictional mobility can lead to either a lower\textsuperscript{3} or a larger\textsuperscript{4} income disparity among jurisdictional median voters. Moreover, mobility can lead to jurisdictional median voters.

\textsuperscript{3}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 an historical perspective of the role of migration in regional income convergence in Sweden, see Enfloa et al. (2014). The Russian case has been recently analysed by Guriev and Vakulenko (2015) and Vakulenko (2014). Instead, for the German case see Monras (2015).

\textsuperscript{4}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.
voters that are simultaneously richer\textsuperscript{5} or poorer\textsuperscript{6} 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 (2011) view, our model can also be used to study the relation between internal migration and public spending for the welfare state.

Our findings suggest that public spending depends not only on whether internal migration leads to either convergence or divergence in median

\textsuperscript{5}This is the case, for example, of the brain-drain that has characterised 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 gained 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.

\textsuperscript{6}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.
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 demand of the median voter who wants less provision increases more (less) rapidly than 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.

In general, the jurisdiction with the richest median voter will be able to impose its preferences when it faces the strongest electoral perturbation induced by migration. Instead, when the electoral perturbation, in terms of changes in median voter’s demand, is more relevant for the jurisdiction with the poorest decisive voter, public spending declines under full convergence. Conversely, when median voters’ income diverge, the poorer median voter may obtain an increase in government spending only if her interest is sufficiently strong to win the interest of the richer median voter to decrease it.

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 majorly 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) empirically study the internal and fiscally driven migration in Canada. However, the question of how internal migration affects the policy making of the federal government remains still undeveloped.

Furthermore, 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.

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 and seven the conclusions. The appendix contains derivations and proofs.
2 The economic framework without migration

Consider two jurisdictions, or regions, comprising a state. 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. Furthermore, $N_1$ and $N_2$ are always assumed to be odd. 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. 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

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

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,

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

---

7Here, we focus on the territorial dimension of the model. Alternatively, we can think about two distinct ethnic, religious, income or other kinds of groups.
where the public spending benefit function $H(g)$ is increasing, smooth concave and satisfies the endpoint Inada condition.

In what follows, we analyse 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:

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

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

$$H'(g^e) = \sum_{h=1}^{N} \frac{y^h}{\bar{y}}, \quad (4)$$

which leads to the following simple equation

$$H'(g^e) = 1. \quad (5)$$

---

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.
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

\[ H'(g^h) = \frac{y^h}{\bar{y}}. \]  

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, \( y_1 \geq y_2 \).

The regional median voters form the centralized legislature, which has to determine the size of public spending. Once the legislature de-

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\[ \text{In most cases, when this condition is violated there are symmetric situations, which do not add new insights to the final results. The cases where relaxing this assumption lead to new and unpredictable results are addressed in section 5.} \]
cides the size of $g$, the government budget constraint is automatically determined by equation (1).\footnote{The 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.} Accordingly, the tax paid by median voter $i$ is $t y_i = \frac{y_i}{\bar{y}} g$, 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 jurisdictional 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 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 $\frac{\partial g_i^D}{\partial \frac{y_i}{\bar{y}}} < 0$. 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 $y_i < \bar{y}$ and under provision when $y_i > \bar{y}$.

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 analyse 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.\footnote{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.}

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.\textsuperscript{12} In order to reach an agreement, both median voters must have positive net gains from implementing $g$. In formula, it must be $u_i - u_i^d > 0$, which implies $-\frac{y_i}{y} g + H(g) > 0$.

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

$$\phi_i = u_i - u_i^d = -\frac{y_i}{y} g + H(g).$$  \hfill (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,

$$\phi_1 \leq \phi_2.$$  \hfill (10)

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

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

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

\textsuperscript{12}For a Nash bargaining situation where, in case of disagreement, policy is chosen by the jurisdictional governments see Giuranno (2010).
Representatives choose the government size $g$ by bargaining. We show that by maximizing the following Nash bargaining condition:

$$\max_g (\phi_1 \phi_2).$$  \hspace{1cm} (12)$$

The first order condition is:

$$-\frac{w_1}{g} + H'(g) + -\frac{w_2}{g} + H'(g) = 0.$$  \hspace{1cm} (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, the ratio

$$\frac{-\frac{w_i}{g} + H'(g)}{-\frac{w_i}{g} + H(g)}, \text{ with } i = 1, 2,$$  \hspace{1cm} (14)$$

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 $\frac{y_i}{y}$ increases the ratio (14) 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 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 change?

The electorate changes for many reasons such as, migration, inter-regional relocation, aging (Sørensen, 2013) and so on. 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 an electoral perturbation that changes the median voters of the two regions. 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 $\frac{y_i}{y}$.

\[^{13}\text{To see this, one has to consider that } gH'(g) - H(g) < 0, \text{ as proved in Chiang (1984, pp. 192-3).}^\]
with $i = 1, 2$. For this reason, we denote by $\gamma_i = \frac{y_i}{\bar{y}}$ the "decisive" ratio between the income of median voter $i$ and the mean income of the whole economy.

Following Razin et al. (2002), we solve the model by assuming a continuous relation between the level of inter-regional migration or re-location, $m$, and our key parameter, $\gamma$, 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 the voting right. 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.: 

$$\frac{\partial \gamma_i}{\partial m} \leq 0,$$

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 summarise, when individuals migrate between regions and acquire the right to vote in the region of destination, the following four
conceivable analytical cases arise:

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 \( \gamma'_2 (m) \leq 0 \).

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 centralised 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, \( \gamma_i \).

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:

\[
\frac{dg^*}{dm} \geq 0 \text{ when } \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \leq 0. \tag{15}
\]

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

\[
\left( \frac{\gamma'_1(m)}{\phi_1^2} + \frac{\gamma'_2(m)}{\phi_2^2} \right), \tag{16}
\]
which is a function of the marginal change in the median voters’ income ratio \( \gamma_i'(m) \) due to migration and net gain \( \phi_i \), with \( i = 1, 2 \). Obviously, we obtain \( \frac{dg^*}{dm} = 0 \) when \( \gamma'_1(m) = \gamma'_2(m) = 0 \). Of course, government size declines when \( \frac{\gamma'_1(m)}{\phi'_1} + \frac{\gamma'_2(m)}{\phi'_2} > 0 \).

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,\(^{14}\)

\[
\frac{dg^*}{dm} \leq 0 \text{ when } \gamma'_1(m) \geq 0 \text{ and } \gamma'_2(m) \geq 0 \quad (17)
\]

and

\[
\frac{dg^*}{dm} \geq 0 \text{ when } \gamma'_1(m) \leq 0 \text{ and } \gamma'_2(m) \leq 0. \quad (18)
\]

Conditions (17) and (18) consider two cases where the change in

\(^{14}\)The proof is a straightforward application of Lemma 1.
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.\textsuperscript{15}

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.

\section*{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.

\textbf{Proposition 1} \textit{Consider the case where }$\gamma_1'(m) < 0$ \textit{and }$\gamma_2'(m) > 0$ \textit{in which an increase in }$m$ \textit{leads the richer median voter to be a voter with}

\begin{footnotesize}
\textsuperscript{15}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 of the jurisdictional median voters’ relative incomes, Meltzer and Richard’s approach and our approach lead to the same policy prediction.
\end{footnotesize}
a lower relative income and the poorer median voter to be one with a higher relative income, the following comparative statics results apply:

\[
\frac{dg^*}{dm} > 0 \text{ if } |\gamma_1'(m)| \geq |\gamma_2'(m)|, \quad (19)
\]

\[
\frac{dg^*}{dm} \leq 0 \text{ if } |\gamma_1'(m)| < |\gamma_2'(m)|. \quad (20)
\]

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

\[
\frac{dg^*}{dm} < 0 \text{ if } \gamma_1'(m) = 0 \text{ and } \gamma_2'(m) > 0, \quad (21)
\]

\[
\frac{dg^*}{dm} > 0 \text{ if } \gamma_1'(m) < 0 \text{ and } \gamma_2'(m) = 0. \quad (22)
\]

The proof is based on Lemma 1. When \(\gamma_1'(m) < 0\) and \(\gamma_2'(m) > 0\), the two ratios in (16) take the following signs: \(\frac{\gamma_1'(m)}{\phi_1} < 0\) and \(\frac{\gamma_2'(m)}{\phi_2} > 0\).

Therefore, given that relation (10) is always satisfied, as we assumed \(y_1 > y_2\), expression (16) is certainly negative when \(|\gamma_1'(m)| \geq |\gamma_2'(m)|\). On the contrary, the sign of expression (16) is ambiguous when \(|\gamma_1'(m)| < |\gamma_2'(m)|\). Furthermore, cases (21) and (22) 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 (19) in the above Proposition states that if the marginal change in $\gamma$ 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 $\phi_1$ 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 $\phi_2$ 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 (20) states that if the marginal change in $\gamma$ is bigger for the poorer median voter $2$, $|\gamma_1'(m)| < |\gamma_2'(m)|$, then the change in govern-
ment 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 good provision $\phi_2$. Corollary 1 shows that the ambiguity disappears under full income convergence.

Case (21) can be seen as a limit situation of case (20). 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 (20) is solved in case (21).

Similarly, case (22) can be read as a limit situation of case (19). 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 equalise? We find the full convergence between median voters’ incomes leads to opposite results depending on whether we are in situation (19) or (20), 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 equalisation, \( y_1 = y_2 \), 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 equalisation also leads to median voters’ net gains equalisation, \( \phi_1 = \phi_2 \), in Lemma 1.

According to case (19), government size increases when inter-regional income equalisation occurs mainly because the median voter of the richer region is a poorer one. In this case, inter-regional net gains equalisation is mainly driven by a lower marginal cost for the richer median voter.

On the contrary, case (20) is not ambiguous anymore as \( \frac{d\phi^*}{dm} \) 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 equalise too, but this equalisation 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 $\frac{dg^*}{dm} = 0$. Furthermore, cases (21) and (22) apply to the above Corollary.

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** Consider the case where $\gamma'_1(m) > 0$ 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 and the poorer median voter to be one with a lower relative income, the following comparative statics results apply:

\[
\frac{dg^*}{dm} < 0 \text{ if } |\gamma'_1(m)| \geq |\gamma'_2(m)|, \quad (23)
\]
\[
\frac{dg^*}{dm} \leq 0 \text{ if } |\gamma'_1(m)| < |\gamma'_2(m)|. \quad (24)
\]

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

\[
\frac{dg^*}{dm} > 0 \text{ if } \gamma'_1(m) = 0 \text{ and } \gamma'_2(m) < 0, \quad (25)
\]
\[
\frac{dg^*}{dm} < 0 \text{ if } \gamma'_1(m) > 0 \text{ and } \gamma'_2(m) = 0, \quad (26)
\]
The proof is based on Lemma 1. When \( \gamma'_1(m) > 0 \) and \( \gamma'_2(m) < 0 \), the two ratios in (16) take the following signs: \( \frac{\gamma'_1(m)}{\sigma'_1} > 0 \) and \( \frac{\gamma'_2(m)}{\sigma'_2} < 0 \). Therefore, given that relation (10) is always satisfied, expression (16) is positive when \( |\gamma'_1(m)| \geq |\gamma'_2(m)| \). On the contrary, the sign of expression (16) is ambiguous when \( |\gamma'_1(m)| < |\gamma'_2(m)| \). Besides, cases (25) and (26) 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 (23) 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 (24), where the change in the marginal cost is greater for the poorer median voter, the influence on policy outcome is ambiguous. However, as case (25) 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 (24), in order to obtain a decrease in \( g \), the interest of the richer median voter to reduce the implementation of \( g \) must be sufficiently strong to win the interest of the poorer median voter to increase it. Furthermore, as expected, condition (26) 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 and 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 ranking of the jurisdictional median voters’ incomes leads to the following comparative statics results:

\[
\frac{dg^*}{dm} < 0 \text{ if } |\gamma'_1(m)| \leq |\gamma'_2(m)|, \quad (27)
\]
\[
\frac{dg^*}{dm} \leq 0 \text{ if } |\gamma'_1(m)| > |\gamma'_2(m)|. \quad (28)
\]

Besides, for the residual limit cases that have not been treated above, \((21)\) and \((22)\) apply.

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

In order to study the scenarios that may arise when we relax the income ranking assumption, we proceed as follows: we start from the initial situation where \( y_1 \geq y_2 \) and consider what happens when median voters’ incomes first converge and then diverge as a result of inter-regional migration.
We know, from the two limit cases (21) and (22) in Proposition 1, that inter-regional convergence leads to an increase (decrease) in public spending when the region with the richest (poorest) median voter receives a relatively lower (higher) median income, while the income of the other median voter does not change with migration. Instead, the two more general cases (19) and (20) state that government size increases when convergence is more relevant for the region with the richest median voter and is ambiguous otherwise.

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 \( y_1 = \hat{y}_2 > y_2 = \hat{y}_1 \). 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 (21) and (22) apply for the two limit cases. Moreover, there is no contradiction among (21) and (22) in Proposition 2 and (25) and (26) in Proposition 3 as median voter 1 is now poorer than median voter 2. Therefore, divergence leads to an increase (decrease) in government size when the income of the poorer (richer) median voter decreases (increases), while the income of
the other median voter is unchanged.

Similarly, there is no contradiction between (27) and (23) and between (28) and (24) by symmetry.

6 Inter-regional migration and efficiency

We conclude with 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:

\begin{align*}
\text{case 1)} & \quad \bar{y} \geq y_1 \geq y_2; \\
\text{case 2)} & \quad y_1 \geq y_2 \geq \bar{y}; \\
\text{case 3)} & \quad y_1 \geq \bar{y} \geq y_2.
\end{align*}

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),\textsuperscript{16} which could apply to countries

\textsuperscript{16}The other situations are symmetric cases, which we do not tackle. The interested
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** Changes in $m$ lead to the efficient policy outcome 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 $\bar{y} \geq y_1 \geq y_2$ government spending is over-provided and when $y_1 \geq \bar{y} \geq y_2$ government spending can be either over or under-provided.

The proof is in the Appendix.

Under efficient supply, there is no conflict of interest between regions as $\bar{y} = y_1 = y_2$ and median voters’ net gain from cooperating is identical, $\phi_1 = \phi_2$.

Now, what happens when we move away from the situation where $\bar{y} = y_1 = y_2$? 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 $\bar{y} \geq y_1 \geq y_2$, the net gains from cooperating increase for both median voters and government spending is over-provided, as suggested by (18). Similarly, in the second case, where $y_1 \geq y_2 \geq \bar{y}$, the net gains decline for both median voters and government spending is under-provided, as reader could easily derive them.
suggested by (17). Instead, in the third case, where \( y_1 \geq \bar{y} \geq y_2 \), the net gain is smaller for median voter 1 and bigger for median voter 2. Therefore, the final outcome is ambiguous.

Furthermore, 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.

It is interesting to link Proposition 4 to Corollary 1. What we understand is that when migration produces a situation where \( \gamma_1 = \gamma_2 = 1 \), than the bargaining outcome is also efficient for the society. However, efficiency will lead to an increase in government spending when \( |\gamma'_1 (m)| > |\gamma'_2 (m)| \) and a decrease when \( |\gamma'_1 (m)| < |\gamma'_2 (m)| \).

7 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 exogenous internal migration may enhance efficiency and the implications for public spending. Clearly, internal migration leads to efficiency from a social point of view...
when median regional incomes converge towards the average income of the all economy. However, the effect on government spending is not univocal: it increases when the electoral perturbation, in terms of marginal change in the regional median income, is more relevant for the region with the richest median voter and decreases otherwise.

Therefore, internal migration produces consequences on public policy formation, which depend on the way it shapes both inter-regional redistributive conflicts and their magnitude. Government spending may either increase or decrease when migration leads to either inter-regional divergence or convergence, depending on the magnitude of the marginal change in the income of the jurisdictional median voters.

Migration can also modify which jurisdictional median voter is the richest one by reversing their income ranking. Under the latter circumstance, jurisdictions also reverse their redistributive conflict of interests. As a result, public spending declines when migration leads to an electoral perturbation that is more relevant, in terms of changes in the regional median incomes, for the jurisdiction that, before migration, had the poorest median voter.

The results of our analysis cannot be found with either the classical country-wide median voter approach, or the standard normative analysis. This may be a reason why the relation between internal migra-
tion and public spending has received little attention from a theoretical point of view. 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.

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

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17 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 behaviours in the model, one could either introduce new assumptions or relax some existing ones. For 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 behaviours. This could lead to potentially interesting new insights, which may be the subject of future research.

18 Typically, non-cooperative institutional behaviours 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.

19 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 then legislative non-cooperative bargaining models, which consider more explicitly the decision-making procedures in the legislature.
A future development of our model could be along Salmon’s line (2013), where Salmon addresses the issues of mobility manipulation to shape the electorate.\textsuperscript{20} Here, the migration rate becomes a choice variable, which may be used by the incumbents to shape future public policies.

It would also be interesting to compare in a Tiebout setting the consequences of internal migration with the usual Tiebout case where people choose local public good supply through locational choice when public goods and local taxes offered by different jurisdictions are predetermined.

Appendix

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

$$F = \frac{-\gamma_1 (m) + H'(g)}{-\gamma_1 (m) g + H (g)} + \frac{-\gamma_2 (m) + H'(g)}{-\gamma_2 (m) g + H (g)} = 0. \quad (29)$$

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

$$F_m = \frac{-\gamma_1' (m) \phi_1 + \gamma_1' (m) g \frac{\partial \phi_1}{\partial g}}{\phi_1^2} + \frac{-\gamma_2' (m) \phi_2 + \gamma_2' (m) g \frac{\partial \phi_2}{\partial g}}{\phi_2^2}. \quad (30)$$

\textsuperscript{20}See, also, Mingat and Salmon (1988).
After rearranging we get

\[ F_m = \left( \frac{\gamma_1 (m)}{\phi_1^2} + \frac{\gamma_2 (m)}{\phi_2^2} \right) (-H(g) + gH'(g)). \] (31)

Here, \((gH'(g) - H(g))\) is negative because the marginal benefit is smaller than the average benefit, i.e. \(H'(g) < H(g)/g\). 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 \(2^{-1+H'(g)} = 0\). 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 (18) 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.

\[21\text{For a standard proof see Chiang (1984, pp. 192-3).}\]
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