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Abstract

We study the effect of electoral systems on openness to immigration. According to the literature, in our model plurality systems induce a rent-seeking policymaker to get re-election through locally provided public goods rather than through transfers, whereas the opposite occurs under proportional representation. In both systems policymakers can use immigration to enlarge the tax base and retrieve increased rents after compensating the decisive majority. However, this mechanism is more effective when the increased tax base does not flow to non-voting immigrants through transfers. Therefore, plurality electoral systems generate more openness to immigration. We find support for this result on a cross-section of 34 OECD countries. In addition, we show that mass immigration might incentivize policymakers to obtain re-election throug public goods rather than transfers also in proportional electoral systems.

Keywords: electoral systems, rent extraction, immigration.
JEL codes: D72, D78, F22, H00, H40.
Keywords: immigration, electoral systems, rent extraction.

1 Introduction

A well-developed literature studies the effect of the electoral systems on the level and the allocation of government spending. Typically, it is found that plurality systems incentivize the use of locally provided public goods rather than transfers, while the opposite occurs for proprotional systems (see, for example, Persson and Tabellini, 2002; Lizzeri and Persico, 2001; Milesi-Ferretti et al., 2002). This happens because the electoral system shapes the policymakers' incentives in the electoral competition.

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Immigration affects both the tax base and the distribution of welfare benefits, which, according to the literature, are connected to the electoral system. Thus, it seems possible that electoral systems interact with decisions concerning openness to immigration. However, to the best of our knowledge, the possible existence of a transmission mechanism from electoral systems to immigration openness has not yet been investigated.

Following Persson and Tabellini (2002), we develop a model of representative democracy with retrospective voting. In our model a rent-seeking government allows immigration in order to increase the tax base, then it compensates the wage loss of the decisive constituencies and retains the remaining tax revenues as a rent.

As we have remarked above, it is well-known that plurality electoral systems bias government spending towards locally provided public goods, while proportional electoral systems incentivize the use of transfers.

When decisions on immigration inflows are endogenized, we reproduce the first result, but we show that the second holds *only if the share of immigrants entitled to transfers is not too high*. This happens because foreigners have no voting rights, and transfers flowing to immigrants are useless in order to get re-election. As a consequence, if too many immigrants are entitled to transfers, a policymaker may obtain electoral consensus by using public goods rather than transfers also in proportional electoral systems.

This outcome suggests that immigration puts special pressure on expenditure for transfers, which is typical of proportional electoral systems.

When the policymaker secures the decisive constituencies' vote through public goods, he can retain a larger share of the tax base created by immigration. We conclude that plurality electoral sytems produce more openness to immigration.

We test this prediction and find favorable evidence using per-capita immigration inflows in a cross-section of 34 OECD countries over the 1998-2006 period. This result resists to standard robustness checks.

The paper is organized as follows: the next section describes the properties of the electoral systems and the voters'utility; section 3 presents the retrospective voting model, section 4 compares equilibrium immigration with plurality and proportional electoral systems, section 5 contains an empirical analysis and section 6 summarizes our conclusions. The proofs are gathered in the Appendix.

2 Electoral systems

A plurality system partitions n voters into C constituencies. For simplicity, we assume that to be re-appointed a candidate has to win in $1/2$ constituencies, and that $1/2$ votes are sufficient to win in each constituency. As a consequence, the successful candidate has to secure $n/4$ voters.

A proportional system can be considered as a single constituency where $n/2$ votes are required in order to be re-elected. Therefore a winning candidate has to secure $n/2$ voters. With some abuse of notation, in what follows we are

going to denote the majorities required to win the elections under the different electoral systems ($n/4$, $n/2$) as the "decisive voters".

2.1 Voters

Consider a country populated by n natives and (potentially) by m immigrants. Immigrants have no voting rights. The $i-th$ voter's utility is given by

$$\omega_i = w(n+m)(1-t) + g_i^{\alpha} g_{-i}^{\beta} + f \qquad i = 1, ...n \tag{1}$$

$$0 < \beta < \alpha < 1; \qquad \alpha + \beta < 1.$$

where $w(n+m)(1-t)$ is the individual net wage, and $0 < t < 1$ is a flat-rate tax.

g_i denotes the per capita amount of public goods available to voter i in his own district. Public goods in the rest of the economy (denoted by g_{-i}) affect the $i-th$ voter's utility through the externality g_{-i}^{β}.

Most public goods produce positive externalities even though they are localized: they are necessary for the economy, and their use is not restricted[1]. Therefore public goods in different districts are still useful for everybody[2].

On the other hand, transfers $f \geq 0$ are allocated on the basis of some individual carachteristics (for example the number of dependent children, the age and so on). As a consequence, the entitlement to transfers does not depend on the voter's constituency. Typically, once the eligibility criteria are established, citizens are entitled regardless to their region of residence.

In short, we adopt the approach of Milesi-Ferretti et al., (2002): while many public goods are provided on a territorial basis, transfers are universal.

For our purposes it is crucial that the policymaker can target g_i precisely[3]. In this respect, Milesi-Ferretti et al. (2002) point out that most public goods are inherently local: especially before the elections, a policymaker can decide strategically where to build a hospital, a school, a bridge and so on.

In order to have consistent results we need that the marginal utility from g_i should be neither too concave, neither linear. This is summarized in the following assumption:

$$\frac{1}{2} \leq \theta(\alpha+\beta) g_i^{\alpha+\beta-1} < 1, \qquad \text{where} \quad \theta \equiv \left(\frac{\beta}{\alpha}\right)^{\beta} < 1^{4}. \tag{2}$$

[1] Milesi-Ferretti et al. (2002) report the example of a military base, that provides defense for the whole country but increases the employment in a single district.

[2] $\beta < \alpha$ means that the externality is less important than the direct use of public goods.

[3] The policymaker has to target public goods provision to a subset of voters *within* a constituency. This requires either that the constituency is sufficiently large or that expenditures can be addressed very precisely. We use "district" to denote the sub-constituency that includes a specific voter.

[4] The marginal utility $\theta(\alpha+\beta) g_i^{\alpha+\beta-1}$ is derived in the proof of lemma 1 by imposing Pareto efficiency: g_i and g_{-i} must give the same marginal utility. This implies $g_{-i} = \frac{\beta}{\alpha} g_i$. Substituting into $g_i^{\alpha} g_{-i}^{\beta}$ we get $\theta g_i^{\alpha+\beta}$, and the marginal utility from g_i is $\theta(\alpha+\beta) g_i^{\alpha+\beta-1}$.

As it will be clearer in section 3, the lower bound is required because if the marginal utility of public goods were too low (for example, close to zero) a policymaker would always use transfers to get re-election. The upper bound is required because if public goods and transfers gave the same marginal utility there would be no reason to use the latter: public goods can be targeted to decisive voters, while transfers spread in the economy[5].

Voters adopt a retrospective voting strategy: the incumbent policymaker is going to be re-appointed only if he provides at least a reservation utility ϖ.

2.2 The policymaker

In our model the goverment is made of a single policymaker. For this reason, in what follows "government" and "policymaker" are used as synonims. Its objective is to maximize the rent it is able to extract.

The government's budget constraint is

$$tw(.)(n+m) = g + f(\delta n + \rho m) + r \tag{3}$$

where g is the aggregate expenditure for public goods, f is a transfer granted to a share $0 \leq \delta \leq 1$ of the voters and to a share $0 \leq \rho \leq 1$ of the immigrants. r denotes the rent left to the policymaker. The rent is residual, and it is retained after transfers and public goods are distributed. Intuitively, a rent-seeking government has no incentive to satisfy more than half the voters. As a consequence, when transfers are used in order to get re-election, the policymaker identifies a criterion able to entitle only one half voters. Therefore we set $\delta = 1/2$, and we can rewrite the government's budget constraint:

$$tw(.)(n+m) = g + f(\frac{n}{2} + \rho m) + r. \tag{4}$$

It is important to stress that it is difficult to deny transfers to legal immigrants: once they meet the required criteria, they are entitled as well as the natives, and ρ can be easily larger than $1/2$ because usually immigrants are disadvantaged with respect to the median native . This is the very reason why there exist concerns over the existence of welfare magnets (see for example Kaushal, 2005).

3 The model

We consider a simple model of retrospective voting with sequential decisions à la Persson and Tabellini (2002). The timing of the model is the following:

1) voters set a reservation utility ϖ required in order to re-appoint an incumbent policymaker

2) the policymaker decides the immigration inflow allowed into the economy

3) the policymaker collects taxes and compensates the wage loss of the decisive voters

[5] As we are going to see in section 3, assumption in eq. (2) rules out the possibility that it could be worth to satisfy $n/2$ voters with f rather than $n/4$ voters with g_i.

4) the policymaker retains his rent by reducing spending for non-decisive voters

5) vote is held, and the policymaker is re-elected if the decisive voters receive at least ϖ.

The model is solved backwards. In order to simplify our exposition, it is useful to introduce the following lemmas:

Lemma 1 *Under the assumption in eq. (2), in a plurality electoral system a rent-seeking policymaker secures the decisive votes through public goods rather than through transfers.*

Proof. See the appendix. ■

Lemma 2 *In a proportional electoral system, a rent-seeking policymaker secures the decisive votes through transfers rather than through public goods only if the share of immigrants entitled to transfers is not too high ($\rho \leq \rho^*$).*

Proof. See the appendix ■

Lemmas 1 and 2 reproduce a well-known outcome: plurality electoral systems bias expenditures towards locally provided public goods, whereas proportional ones create a bias towards transfers.

In lemma 2, however, we introduce an important caveat: when the economy is open to immigration, the entitlement of non-voting immigrants to transfers could change the policymaker's incentives: immigration puts pressure on transfers provision without any electoral advantage. If too many immigrants are entitled, a policymaker would be better of by using public goods rather than transfers even in a proportional electoral system.

An interesting consequence is that if restructuring public spending is too difficult, a policymaker might extend the voting franchise to immigrants.

3.1 Plurality system

Suppose for the moment that in stage 5 the policymaker is re-appointed.

3.1.1 Stage 4: rent appropriation

In stage 4 the policymaker secures re-election and retains his rent. To understand his method, consider first a re-election by unanimity. For a rent-seeking policymaker unanimity is useless: in order to be reappointed he can provide 1/4 voters[6] with their reservation utility and retain the remaining tax base as a rent.

In other words, he wants to reduce expenditures as much as possible, subject to the constraint of giving the decisive voters their reservation utility.

From Lemma 1 we know that he will do so by cutting f and increasing g_i.

[6] See the discussion in section 2.

3.1.2 Stage 3: wage loss compensation

In the third stage the policymaker collects tax revenues and compensates the decisive voters for the wage loss due to immigration. In the proof of lemma 1 (see the appendix) we show that compensation occurs through public goods also in this case. Thus, in equilibrium there will be no transfers ($f = 0$). We show how the compensation is computed in stage 2, when the policymaker decides to what extent opening the economy to immigration.

3.1.3 Stage 2: immigration

In the previous stages the government has set public goods provision in such a way to obtain re-election and to maximize its rent for a given immigration level.

When the economy is open to immigration, voters suffer a wage loss proportional to the immigration inflow:

$$Loss = w(.)'(1-t)\Delta m.$$

Consider now the marginal tax base (TB) increase due to immigration:

$$\Delta TB = t[w(.)'(n+m) + w(.)]\Delta m \tag{5}$$

Since in a plurality system the policymaker compensates the decisive voters through public goods, the individual compensation Δg_i must be such that

$$\underbrace{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}\Delta g_i}_{marginal\ utility\ from\ g_i} = \underbrace{\mid w(.)' \mid (1-t)\Delta m}_{marginal\ loss},^{7} \tag{6}$$

thus

$$\Delta g_i = \frac{\mid w(.)' \mid (1-t)\Delta m}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}.$$

The policymaker compensates $n/4$ voters, and allows immigration until the marginal tax base equals the marginal compensation cost, i.e.

$$t[w(.)'(n+m) + w(.)]\Delta m = \frac{\mid w(.)' \mid (1-t)\Delta m}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\left(\frac{n}{4}\right). \tag{7}$$

Condition (7) defines implicitly the optimal immigration level within a plurality system. Now we move to the first stage of the game.

3.1.4 Stage 1: reservation utility

In the first stage of the game voters set their reservation utility ϖ. They set the highest ϖ compatible with the policymaker's incentives.

The incumbent policymaker is able to extract a rent r. Let R be the expected discounted utility of remaining in office. Under a retrospective voting strategy,

[7] See footnote 2 and the proof of lemma 1 to see how to obtain the marginal utility $\theta(\alpha+\beta)g_i^{\alpha+\beta-1}$.

the policymaker is going to be reappointed if he provides $n/4$ voters with ϖ at least. Otherwise, voters are going to appoint a new government. When a policymaker is not concerned about re-election, he simply predates the whole tax base, thus $r = tw(.)(n+m)$.

Suppose finally that because of a distortion caused by rent extraction only a share $0 < \gamma < 1$ of the rent can be consumed, while $(1-\gamma)$ is wasted. The policymaker's utility in case of re-election is

$$U = \gamma r + R. \tag{8}$$

On the other hand, if he does not care about re-election his utility is

$$U = \gamma t w(.)(n+m). \tag{9}$$

The IC is therefore

$$\gamma r + R \geq \gamma t w(.)(n+m) \tag{10}$$

which gives the following equilibrium rent:

$$r = tw(.)(n+m) - \frac{R}{\gamma}. \tag{11}$$

Now we can exploit the aggregate budget constraint (3) in order to get the highest g_i compatible with the incentive constraint. We have thus

$$g_i^* = \frac{R4}{\gamma n}\left(\frac{\alpha}{\alpha+3\beta}\right) \tag{12}$$

and

$$g_{-i}^* = \frac{R4}{\gamma n}\left(\frac{\beta}{\alpha+3\beta}\right) \tag{13}$$

By substituting (12) and (13) into (1) we obtain ϖ:

$$\varpi_i = w(n+m_m^*)(1-t) + \left(\frac{R4}{\gamma n}\right)^{\alpha+\beta}\left(\frac{\alpha^\alpha \beta^\beta}{(\alpha+3\beta)^{\alpha+\beta}}\right) \tag{14}$$

utility (14) concerns only 1/4 decisive voters, whereas the remaining (3/4) receive

$$\omega_{-i} = w(n+m_m^*)(1-t) + \left(\frac{R4}{\gamma n}\right)^{\alpha+\beta}\left(\frac{\alpha^\beta \beta^\alpha}{(\alpha+3\beta)^{\alpha+\beta}}\right) \tag{15}$$

Expressions (14) and (15) close the model in a plurality system.

3.2 Proportional System: $\rho \leq \rho^*$

As we state in Lemma 2, whithin a proportional electoral system two outcomes are possible: when the share of immigrants entitled to transfers is sufficiently low ($\rho \leq \rho^*$), the policymaker uses transfers rather than public goods in order to get re-election; when $\rho > \rho^*$, the opposite holds[8]. We examine now the first case. Suppose again that the government is re-elected in stage 5.

[8] When $\rho = \rho^*$ it is indifferent to compensate voters through public goods of transfers. We assume that the policymaker uses public goods in a proportional system only when the inequality is strict.

3.2.1 Stage 4: rent appropriation

It is useful to remind that under proportional representation there are $n/2$ decisive voters. Since $\rho \leq \rho^*$, we know from lemma 2 that the policymaker will satisfy the decisive voters with transfers and he will not use public goods.

3.2.2 Stage 3: wage loss compensation

In stage 3 tax revenues are collected and the decisive voters are compensated for the wage loss caused by immigration. In the proof of lemma 2 we show that the policymaker compensates through transfers in this stage as well. As a consequence, in equilibrium we have $g_i = g_{-i} = 0$. Now we move to stage 2, where we show how the compensation for the wage loss is computed.

3.2.3 Stage 2: immigration

When deciding to what extent to open the economy to immigration, the policymaker has to compensate the wage loss suffered by $n/2$ voters because of immigration. In other words, he must give the decisive voters a transfer

$$\Delta f = \mid w(.)' \mid (1-t)\Delta m. \tag{16}$$

The marginal revenue of opening the economy is given by the increase in the tax base:

$$\Delta TB = t(w(.)'(n+m) + w(.))\Delta m.$$

To compute the marginal cost paid by the policymaker in order to compensate the decisive voters, it is crucial to recall that not only $n/2$ voters, but also ρm immigrants are entitled to transfers. Immigration is allowed until the marginal increase in the tax base equals the marginal electoral cost of opening the economy:

$$t(w(.)'(n+m) + w(.))\Delta m = \mid w(.)' \mid (1-t)\Delta m \left(\frac{n}{2} + \rho m\right). \tag{17}$$

Condition (17) defines implicitly the optimal immigration level m^*_{p1} in a proportional electoral system with $\rho \leq \rho^*$.

3.2.4 Stage 1: reservation utility

In the first stage of the game voters set their reservation utility ϖ. We proceed as in section 3.1.4.

The policymaker's incentive-compatible rent is

$$r = tw(n + m^*_{p1})(n+m) - \frac{R}{\gamma}. \tag{18}$$

Now we exploit again the government's budget constraint (3) in order to get the highest f compatible with the incentive constraint, substitute it into (1) and obtain ϖ. We have therefore

$$f^* = \frac{R}{\gamma}\left(\frac{2}{n + 2\rho m^*_{p1}}\right) \tag{19}$$

and

$$\varpi_i = w(n + m^*_{p1})(1 - t) + \frac{R}{\gamma}\left(\frac{2}{n + 2\rho m^*_{p1}}\right). \tag{20}$$

Non-decisive voters do not receive transfers, and their utility is

$$\omega_{-i} = w(m^*_{p1})(1 - t). \tag{21}$$

3.3 Proportional System: $\rho > \rho^*$

When the share of immigrants entitled to transfers exceeds ρ^*, the policymaker is better off by using g_i in order to get re-election, therefore $f = 0$ (see Lemma 2). This finding suggests that immigration puts under special pressure transfers-based social welfare systems. As usual, we assume that the policymaker is re-elected in stage 5, and we find the equilibrium by backwards induction.

3.3.1 Stage 4: rent appropriation

From Lemma 2 we know that in this situation the policymaker will reduce transfers for $\left(\frac{n}{2} + \rho m\right)$ individuals and will increase g_i for $n/2$ decisive voters.

3.3.2 Stage 3: wage loss compensation

In stage 3 tax revenues are collected and the decisive voters are compensated for the wage loss caused by immigration. Since we are in the case $\rho > \rho^*$, we know that compensation occurs through g_i (see the proof of lemma 2 in the appendix). Given that in stages 3 and 4 the policymaker never uses transfers, in equilibrium we have $f = 0$. Now we move to stage 2, where the optimal immigration is determined.

3.3.3 Stage 2: immigration

In Stage 2 the policymaker finds the optimal immigration level taking into account the cost of compensating $n/2$ decisive voters with g_i. The increase in g_i necessary in order to compensate the wage loss $w(.)'(1 - t)\Delta m$ is

$$\Delta g_i = \frac{\mid w(.)' \mid (1 - t)\Delta m}{\theta(\alpha + \beta) g_i^{\alpha+\beta-1}} \tag{22}$$

as in the previous sections, the policymaker allows immigration until the marginal tax base increase equals the marginal compensation cost:

$$t(w(.)'(n + m) + w(.))\Delta m = \frac{\mid w(.)' \mid (1 - t)\Delta m}{\theta(\alpha + \beta) g_i^{\alpha+\beta-1}} \left(\frac{n}{2}\right) \tag{23}$$

Condition (23) defines implicitly the optimal immigration level m^*_{p2} in a proportional electoral system with $\rho > \rho^*$.

3.3.4 Stage 1: reservation utility

The reservation utility ϖ is computed as in the previous section. The result is

$$g^*_{iP2} = \frac{R2}{\gamma n}\left(\frac{\alpha}{\alpha+\beta}\right) \tag{24}$$

$$g^*_{-iP2} = \frac{R2}{\gamma n}\left(\frac{\beta}{\alpha+\beta}\right) \tag{25}$$

by substituting (24) and (25) into (1), we get the decisive voters' equilibrium utility:

$$\varpi_i = w(n+m^*_{p2})(1-t) + \left(\frac{R2}{\gamma n}\right)^{\alpha+\beta}\left(\frac{\alpha}{\alpha+\beta}\right)^{\alpha}\left(\frac{\beta}{\alpha+\beta}\right)^{\beta}. \tag{26}$$

The utility of the remaining voters is

$$\omega_{-i} = w(n+m^*_{p2})(1-t) + \left(\frac{R2}{\gamma n}\right)^{\alpha+\beta}\left(\frac{\beta}{\alpha+\beta}\right)^{\alpha}\left(\frac{\alpha}{\alpha+\beta}\right)^{\beta}. \tag{27}$$

By comparing (26) and (27) to (14) and (15), it is immediate to verify that the only difference with respect to a plurality system is the number of decisive voters ($n/2$ instead of $n/4$).

4 Electoral systems with immigration

In this section we compare the results obtained under the different electoral systems with respect to public goods, rents and immigration.

4.1 Immigration

Conditions (7), (17) and (23) define implicitly the optimal level of immigration, given by m^*_m, m^*_{p1}, m^*_{p2} respectively. All the expressions state that the marginal increase in the tax base must equal the marginal cost of compensating the decisive voters, which is always lower under the plurality system. It is easy to show that, as far as the the marginal tax base is decreasing in m, we have $m^*_m > m^*_{p2} > m^*_{p1}$. This is summarized in the following proposition:

Proposition 3 *(Electoral systems and openness to immigration): countries adopting plurality electoral systems are more open to immigration than countries adopting proportional electoral systems.*

Proof. See the appendix ■

In other words, under proportional representation the extra fiscal base produced by immigration leaks into transfers, which benefit not only the decisive voters, but also the immigrants. From the policymaker's point of view, transfers to non-voting immigrants are wasted, because they are useless for re-election and

do not go into rents. Therefore, we expect that proportional electoral systems reduce openness to immigration, and that entitlement to transfers is restricted for the immigrants. Alternatively, there could be an incentive to extend the voting franchise.

4.2 Public goods and rents

First, we remark that in our simplified model it is not possible to state under which electoral system voters are better off: since we do not know the equilibrium wage, it is impossible to compare the utilities under the different electoral regimes. For the same reason, it is not possible to compare the utility gap between decisive and non-decisive voters under the different electoral systems.

It is very important to observe that the amount of resources to be allocated in public goods or transfers is the same ($\frac{R}{\gamma}$) under both electoral systems, and it corresponds to the resources available after the policymaker's IC is satisfied. This means that the tax base exceeding $\frac{R}{\gamma}$ goes into rents for the policymaker.

Since the tax base is larger in the plurality system we conclude that the increase in immigration benefits the policymaker. This is the reason why in our model the tax rate is exogenous: even though plurality systems tend to produce lower taxation (Persson and Tabellini; 2000, 2003), for any tax rate a policymaker can extract higher rents from immigration when the extra tax base is not "wasted" in transfers to non-voting immigrants.

The latter effect explains intuitively why in our model the proportional system generates less immigration: when the economy is open to immigration, $\frac{R}{\gamma}$ is distributed among natives and immigrants.

Summarizing, we confirm several results in the literature, namely: 1) plurality systems convey locally provided public goods towards the decisive constituencies and reduce transfers; 2) proportional systems reduce public goods provision and increase transfers; 3) benefits from government spendingare more evenly distributed under the proportional system, which makes it necessary to capture half the voters; 4) rents for the policymaker are higher under the plurality system.

On the other hand, we add some new results: 1) plurality systems reduce barriers to immigration; 2) in proportional systems immigration may switch public expenditures from transfers to public goods or a restriction of eligibility criteria; 3) proportional systems may incentivize policymakers to extend voting rights to immigrants.

The result stressed in point 2) arises because proportional electoral systems bias expenditures towards tranfers, which tend to flow automatically to immigrants. As a consequence, the equilibrium of welfare systems should be threatened by immigration especially in these countries, where we should observe larger pressures to reform. Point 3) recognizes that for a policymaker it could be easier to extend voting rights to immigrants rather than trying to deny them transfers.

5 Empirical evidence

5.1 The data

Our sample includes 34 OECD countries -see Table 1 in the Appendix- over the 1996-2008 period. Our database includes inflows and outflows of immigrants and several economic, social and institutional variables.

The institutional variables related to electoral systems come from the DPI database of the World Bank (Keefer, 2006). Electoral systems are denoted by the "plurality" dummy, which is 1 if representatives are elected with a winner-takes-all/first-past-the-post rule. If "plurality" is zero, the electoral system is proportional.

However, many countries adopt a mix of proportional and majoritarian representation. For example, some seats may be allocated on a proportional basis in oder to preserve representation.

We take this feature into account by exploiting the "housesystem" dummy of the DPI database, which is coded 1 when the majority of seats is elected under plurality rule. In such a case, we classify a country under the plurality system[9].

Naturally, we control for the economic determinants of immigration flows. Real per capita income ("gdp_per_head") is the main variable driving immigration. Trade-to-GDP-ratio[10] ("openness") measures the openness of the economy to international trade.[11] Total government spending and total tax receipts as a percentage of the GDP ("tot_exp"and "tot_tax" respectively) account for possible welfare magnet effects, that could attract immigrants where it is easier to get welfare benefits.

We also include dummies for EU membership ("EU"), and for the existence of former colonial empires ("colonial_empires").

Finally, following Persson and Tabellini (2003 and 2004) we control for other variables likely to affect immigration flows through their impact on the government outlay and on the individual revenues.

Specifically, we include in our regressions three variables measuring the demographic composition of the destination country. They are the log of the total population ("logpopt"), the percentage of population aged 20-64 ("pop2_popt"); the percentage of population aged 65 or more ("pop3_popt")[12].

Total population is relevant because it is a proxy of development: highly populated countries are less developed, thus they attract less immigration. The share of working age population is important because it is a measure of labour supply. Population over 65 is important because immigration could sustain retirement schemes and provide domestic care services.

[9] Australia, Italy, Hungary and Corea are included in the plurality systems. Greece, Germany and Spain in the proportional systems.

[10] Trade is defined as exports plus imports.

[11] Trade openness could substitute immigration in perfect competition models via Stolper-Samuelson effects, but it could be complementary in models based on agglomeration externalities.

[12] Source: OECD Online Statistics (2011).

The issue is now to define a measure of openness to immigration, which will be our dependent variable. According to standard procedures, we measure openness in terms of per capita flows. The use of flows rather than stocks also helps us to avoid the bias due to historical reasons, such as the presence of a colonial empire.

With respect to the econometric specification, we estimate a simple cross-country regression. We do not use panels because electoral systems are in practice constant over time, and finally their effect would be captured by the country effects. In other words, the time dimension is not really useful in our case.

In addition, we remove short-term factors that affect immigration (like the business cycle or crisis in developing countries) by using the average inflow in the period under consideration. We are left with a small sample of 34 observations. Of course, this restricts the generality of our conclusions, and we are aware that our results are by no means definitive.

Nevertheless, our analysis is a first step to evaluate the effect of electoral systems on the openness to immigration, and it is based on the currently available data.

Our measure of immigration openness is then the 1996-2008 per capita average inflow of immigrants ("inflows_pop").[13] We would like to use the sum of per capita inflows and outflows (mimicking the standard measure of trade openness), but, unfortunately, data on outflows are available only for a subset of countries[14]. In what follows, we perform a simple exercise: we use the available outflows for estimating the missing outflows[15]. Then, we construct a second measure of openness based on the sum of inflows plus outflows per capita ("migrationopenness").

Table 2 shows the cross-sectional 1996-2008 average, the standard deviation, the minima and maxima for each variable of our sample.

Table 3 displays the correlation matrix between our main variables of interest. It shows the cross-country correlation for each variable-country pair. Data are averaged over the full period for which observations are available .

The correlations are consistent with the theoretical predictions summarized in proposition 3. In order to avoid multicollinearity, we remove "housesys" ,"tot_exp" and "openness" from our regressors.[16]

The lack of correlation among the dummies for political institutions and the other regressors assures that our results will not be systematically biased.

5.2 Basic specification

We estimate an equation of the following form:

[13] Source: OECD Online Statistics (2011)

[14] Data on outflows are not available for Canada, Chile, France, Greece, Israel, Italy, Poland, Turkey, U.S.

[15] We estimate a regression of the outflows as a function of the inflows for the available countries. Then, we use the estimated coefficients to obtain the outflows for the missing countries.

[16] The "plurality" dummy is highly correlated with the "housesys" dummy. The other variables are highly correlated with "tot_tax", "pop3_popt", and "logpopt".

$$m_i = c + \eta z_i + \alpha x_i + \beta s_i + u_i, \tag{28}$$

where the dependent variable m_i is given by our measures of immigration openness in country i. Greek letters denote the vectors of unknown parameters to be estimated.

Openness to immigration can be affected by the electoral system z_i (the "plurality" dummy), and by the socio-economic-institutional controls x_i and s_i.

x_i includes the variables related to public expenditure, taxation, GDP, trade openness and population structure[17]. s_i includes the variables indicating the EU membership, the existence of former colonial empires and the legal system[18].

Finally, c denotes the regression constant and u_i the usual unobserved error term.

We want to know whether plurality electoral systems increase immigration as predicted by proposition 3.

The null hypothesis corresponding to this question can be formulated as:

$$H_0 : \eta = 0$$

Equation (28) can be estimated based on cross-sectional data using standard OLS. The t-statistic in plurality is thus a test of the null hypothesis H_0.

5.3 Results

The results of our estimations are summarized in Table 4, where the dependent variable is the per capita migration inflow ("inflows_pop"). We report in column 1 the coefficients of the regression including all variables, and in column 4 the coefficients of a reduced specification using only the significant variables.

Consistently with prop. 3, in both cases the coefficient on "plurality" is positive and significant at the 5% level.

The remaining significant variables are the GDP per capita and two demographic indicators. The GDP enters the regression with the expected (and highly significant) sign. Total population and the share of population aged over 65 show a negative sign. The negative effect of population is expected, since high population proxies lower development.

On the other hand, the negative sign on pop-65 is more difficult to explain. In principle a positive correlation is expected because immigration benefits the older population by sustaining the welfare system and by providing domestic care workers. Nevertheless, it is worth to point out that the contribution of immigration to the pension system concerns only marginally the *current* older generations, whose pensions have been determined in the past. In addition, many OECD countries included in our analysis were reforming their welfare state in the period under consideration (1996-2008).[19]

[17] The variables are tot_exp, tot_tax, gdp_per_head, openness, logpopt, pop2_popt, and pop3_popt.

[18] EU, colonial_empires, and civil_legal_origin.

[19] This is the case of Belgium, Chile, Denmark, France, Germany, Italy, Netherland, Portugal, Spain, Sweden, U.K.

Countries that have increased the retirement age in order to assure the intergenerational equilibrium are less dependent on immigration. In a related paper, Coleman (2008) proposes a similar interpretation.

Finally, the variable concerning colonial empires shows a weakly significant (10%) positive coefficient.

We repeat our empirical exercise by estimating eq. (28) using the sum of inflows and estimated outflows per capita ("migrationopenness") as the dependent variable. Results in Table 5 show that there is no significant difference with the previous estimation.[20] This is quite expected since the correlation between "inflows_pop" and "migrationopenness" is .933 (see Table 3).

5.3.1 Robustness

As we have argued above, we acknowledge that our specification is necessarily scarce because of the sample size.

However, we try to improve as far as possible our analysis by taking into account other omitted variables that might be correlated both with electoral systems and openness to immigration.

Bertocchi and Strozzi (2010, 2008) argue that laws determining citizenship[21] can affect openness to immigration in the long run. For example, *jus soli* legislation may cause restrictive immigration policies because it makes naturalizations easier.

This issue is addressed by including in our regressor a dummy variable for the *jus soli*. The estimated coefficient for this dummy is negative and not significant, and the overall results are unchanged[22].

In addition, it could be argued that ethnic and language fragmentation can affect voting rules and favour proportional voting systems, which can ensure better representation of minorities. Moreover, fragmentation increases public spending in order to secure the consensus of different groups (Alesina and Spolaore, 2003).

As a consequence, we check whether including a proxy of fragmentation alters our results.[23] Again, we find that its coefficient is not significant, and that the outcome of the regression is unaffected.

In small-sample empirical analyses results should be tested for the presence of outliers. When one country per time is excluded, the p-value of the estimated coefficient for "plurality" is always 5% significant. The other significant variables are unaffected as well.

[20] Colonial_empires is only no longer significant compared to the previous case. All the other variables keep the same sign as in the previous exercise and are significant.

[21] Rules governing citizenship acquisition can be traced basically to *jus soli* and *jus sanguinis*. In the first case, citizenship is attributed according to the birth place. In the second case, the children conserve their parent's citizenship.

[22] The estimates in this section are available upon request to the authors.

[23] We use an index of ethnolinguistic fractionalization. It measures the probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group. Source: Alesina, Baquir and Easterly (1999).

An additional issue concerns the period under consideration. The 1996-2008 period may not be representative, due for example to high political instability in various regions -particularly in the Africa and in the Middle East- which caused large migration outflows (Gubert and Nordman, 2010). For this reason, we have added to our sample the OECD data for the 1987-1990 period[24]. When regression in Table 4 is re-estimated, our results are confirmed.

6 Conclusions

A well-known quote from Milton Friedman says "*It is just obvious that you can't have free immigration and a welfare state*". Our results suggest that immigration affects the composition of public spending especially when the electoral redistribution is obtained through transfers, thus in proportional electoral systems. More specifically, when transfers are prevalent the tax base increase due to immigration flows also to non-voting immigrants, and policymakers retain lower rents. Consequently, the policymakers' marginal benefit from immigration is lower under proportional representation, and equilibrium immigration will be lower than in plurality systems.

When it is difficult to deny transfers to immigrants, mass immigration might push governments to secure the decisive voters using public goods even in proportional electoral systems or, alternatively, to extend the voting franchise.

However, restructuring government spending and extending voting rights entails high political costs.

In order to secure re-election and their own rents, policymakers can simply close the border to immigrants; alternatively, they could deny welfare benefits to immigrants by establishing residence requirements or even by accepting a considerable illegal immigration[25].

These outcomes are empirically testable, but data availability is quite limited. We tested our predictions on the per-capita immigration inflows in 34 OECD countries.

The limited size of our sample restricts the generality of our results, and furhter research is needed in order to find stronger evidence of the possible link between electoral systems and immigration. For the moment, our basic analysis supports the possibility that plurality electoral systems favor international labor mobility.

[24] Data have been averaged by merging the observations from 1987 to 2008.

[25] Note however that in the latter case increasing the tax base is more difficult because illegal immigrants produce in infomal sectors.

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7 Appendix

Proof of Lemma 1): .

We want to prove that in a plurality system $f = 0$ in equilibrium.

STAGE 4:

The aim of the policymaker is reducing expenditure as much as possible in order to retain rents, subject to the constraint of giving the decisive voters their reservation utility.

To achieve this purpose, in stage 4 he can reduce public goods provision for $(3/4)n$ voters and compensate the remaining $n/4$ by increasing their own share of local public goods g_i. Thus, he reallocates expenditures for public goods until g_i and g_{-i} give *the decisive voters* the same marginal utility. This implies $g_{-i} = \frac{\beta}{\alpha} g_i$.

The utility of a decisive voter becomes then

$$\omega_i = w(n+m)(1-t) + \theta g_i^{\alpha+\beta} + f \tag{29}$$

where $\theta \equiv \left(\frac{\beta}{\alpha}\right)^{\beta} < 1$.

Then, the policymaker checks whether there exists a reallocation of g_i and f that leaves the decisive voters' utility constant and leaves some rent.

If transfers for an individual decrease by Δf, this loss can be compensated by an increase in g_i. The required condition is

$$\Delta f = \theta(\alpha+\beta) g_i^{\alpha+\beta-1} \Delta g_i, \tag{30}$$

which gives

$$\Delta g_i = \frac{\Delta f}{\theta(\alpha+\beta) g_i^{\alpha+\beta-1}} \tag{31}$$

The marginal reduction of f concerns $(\frac{n}{2} + \rho m)$ individuals. In the aggregate, this gives a total marginal benefit $\Delta f(\frac{n}{2} + \rho m)$. The marginal compensation cost paid to the decisive voters is $\frac{\Delta f}{\theta(\alpha+\beta) g_i^{\alpha+\beta-1}} \left(\frac{n}{4}\right)$.

The net benefit for the policymaker is then

$$\textit{Net Benefit} = \underbrace{\Delta f(\frac{n}{2} + \rho m)}_{\text{expenditure reduction}} - \underbrace{\frac{n}{4}\left(\frac{\Delta f}{\theta(\alpha+\beta) g_i^{\alpha+\beta-1}}\right)}_{\text{compensation cost}} > 0 \tag{32}$$

From assumption (2) we know that (32) is always positive, thus we have a corner solution.

Consider now the possibility of reducing g_i and increasing f. In this case, the policymaker saves $\Delta g_i \frac{n}{4}$ and needs $\theta(\alpha+\beta) g_i^{\alpha+\beta-1} \Delta g_i (\frac{n}{2} + \rho m)$ in order to compensate the decisive voters. The net benefit from this operation is given by

$$\frac{n}{4} - \theta(\alpha+\beta) g_i^{\alpha+\beta-1} (\frac{n}{2} + \rho m) < 0 \tag{33}$$

by rearranging (33) we obtain

$$\frac{n}{4}\left(\frac{1}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\right) < (\frac{n}{2}+\rho m),$$

and we are back to (32). This confirms that the policymaker will use public goods to provide the decisive voters with their reservation utility.

STAGE 2:

In stage 2 we compute the compensation for the wage loss due to immigration. The individual wage loss is $\mid w(.)' \mid (1-t)\Delta m$. If the policymaker uses f, the total compensation cost is $\mid w(.)' \mid (1-t)\Delta m(\frac{n}{2}+\rho m)$. If the policymaker uses g_i, the total compensation cost is $\frac{|w(.)'|(1-t)\Delta m}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}(\frac{n}{4})$. Compensation through g_i dominates compensation through f if

$$\frac{n}{4}\left(\frac{1}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\right) < (\frac{n}{2}+\rho m), \tag{34}$$

which reproduces again (32). We conclude that in equilibrium $f=0$, and the policymaker compensates the decisive voters with g_i.

Proof of Lemma 2):

We want to prove that in a proportional system in equilibrium $g_i = g_{-i} = 0$ if $\rho \leq \rho^*$.

STAGE 4:

Suppose the policymaker has to decide whether to reduce g_i for $n/2$ voters and compensate them with f.

The cost of compensating the loss of a decisive voter is $\Delta f = \theta(\alpha+\beta)g_i^{\alpha+\beta-1}\Delta g_i$. There are $(\frac{n}{2}+\rho m)$ individuals entitled to transfers, and in the aggregate the marginal compensation cost will be $\theta(\alpha+\beta)g_i^{\alpha+\beta-1}\Delta g_i(\frac{n}{2}+\rho m)$. The policymaker reduces g_i until the net marginal benefit is zero, thus until

$$\Delta g_i \frac{n}{2} \geq \theta(\alpha+\beta)g_i^{\alpha+\beta-1}\Delta g_i(\frac{n}{2}+\rho m). \tag{35}$$

Notice that without immigration ($m=0$) assumption (2) assures that inequality (35) is always true, and we reproduce the result that proportional electoral system bias expenditure towards transfers. However, when immigration is allowed, the former conclusion holds only when

$$\rho < \frac{n}{2m}\left(\frac{1}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}} - 1\right) \equiv \rho^*$$

Therefore, in equilibrium, in stage 4 $g_i = 0$ if $\rho \leq \rho^*$ and $f = 0$ if $\rho > \rho^*$.

STAGE 2:

When we consider the compensation for the wage loss due to immigration, if the policymaker uses f the compensation cost is $\mid w(.)' \mid (1-t)\Delta m(\frac{n}{2}+$

ρm). If the policymaker uses g_i, the compensation cost is $\frac{|w(.)'|(1-t)\Delta m}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}(\frac{n}{2})$. Compensation through f dominates compensation through g_i if

$$(\frac{n}{2}+\rho m) < \left(\frac{1}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\right)\frac{n}{2}. \tag{36}$$

By rearranging (36) we obtain

$$\rho < \frac{n}{2m}\left(\frac{1}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}-1\right) \equiv \rho^*.$$

Summarizing, when $\rho \leq \rho^*$ the policymaker compensates the decisive voters with f. When $\rho > \rho^*$ the policymaker compensates the decisive voters with g_i.

Proof of Prop. 1)

To prove proposition 1 we have simply to use the assumption that the marginal tax base from immigration ($t[w(.)'(n+m)+w(.)]$) is positive and decreasing. Conditions (7), (17) and (23) define the optimal immigration under plurality and proportional electoral systems. In order to compare the immigration level in equilibrium we have to know when the marginal tax base is lower.

Consider first the comparison between the plurality system and the proportional system with $\rho \leq \rho^*$. The condition for having $m_m^* > m_{p1}^*$ is

$$\frac{\mid w(.)' \mid (1-t)}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\left(\frac{n}{4}\right) < \mid w(.)' \mid (1-t)\left(\frac{n}{2}+\rho m\right)$$

i.e.

$$\frac{n}{4} < \theta(\alpha+\beta)g_i^{\alpha+\beta-1}\left(\frac{n}{2}+\rho m\right). \tag{37}$$

Under the assumption in eq. (2), condition (37) is always true.

When comparing immigration in the plurality system and in the proportional system with $\rho > \rho^*$, it is immediate to verify that $m_m^* > m_{p2}^*$,:

$$\frac{\mid w(.)' \mid (1-t)}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\left(\frac{n}{4}\right) < \frac{\mid w(.)' \mid (1-t)}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\left(\frac{n}{2}\right).$$

Finally, it is possible to compare equilibrium immigration under the different cases in the proportional electoral system: the condition for having $m_{p2}^* > m_{p1}^*$ is

$$\frac{\mid w(.)' \mid (1-t)}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}\left(\frac{n}{2}\right) < \mid w(.)' \mid (1-t)\left(\frac{n}{2}+\rho m\right)$$

by rearranging the previous expression we obtain

$$\left(\frac{n}{2m}\right)\left(\frac{1}{\theta(\alpha+\beta)g_i^{\alpha+\beta-1}}-1\right) < \rho,$$

i.e. $\rho > \rho^*$.

TABLE 1

country
Australia
Austria
Belgium
Canada
Chile
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

TABLE 2

Variable	Obs	Mean	Std. Dev.	Min	Max
inflows_pop	34	0.006	0.005	0.000	0.027
migrationopeness	34	0.010	0.008	0.000	0.043
pop2_popt	34	0.602	0.027	0.524	0.642
pop3_popt	34	0.139	0.035	0.054	0.189
logpopt	34	16.497	1.421	13.011	19.497
tot_exp	34	41.967	8.675	20.399	55.748
tot_tax	34	25.646	6.604	15.921	47.781
gdp_per_head	34	23828.910	9480.084	9749.616	54963.450
openess	34	87.930	49.319	24.224	269.255
eu	34	0.636	0.489	0.000	1.000
plurality	34	0.485	0.508	0	1
housesys	34	0.333	0.479	0	1
colonial_empires	34	0.242	0.435	0	1
civil_legal_origin	34	0.788	0.415	0	1

TABLE 3

	inflow~p	newmig~s	pop2_p~t	pop3_p~t	logpopt	tot_exp	tot_tax	gdp_pe~d	openess	eu	plural~y	housesys	coloni~s	civil_~n
inflows_pop	1													
migrationopeness	0.933	1												
pop2_popt	0.214	0.115	1											
pop3_popt	0.145	0.064	0.551	1										
logpopt	-0.472	-0.361	-0.158	-0.113	1									
tot_exp	-0.004	-0.009	0.254	0.683	-0.232	1								
tot_tax	0.210	0.176	-0.017	0.329	-0.345	0.628	1							
gdp_per_head	0.744	0.716	0.206	0.388	-0.237	0.279	0.467	1						
openess	0.540	0.448	0.246	0.047	-0.746	0.619	0.060	0.304	1					
eu	0.028	-0.075	0.425	0.571	-0.312	0.123	0.181	0.026	0.458	1				
plurality	0.058	0.021	0.026	0.017	0.594	-0.389	-0.261	-0.066	-0.531	-0.401	1			
housesys	0.173	0.066	-0.180	-0.224	0.564	-0.462	-0.127	-0.027	-0.509	-0.535	0.769	1		
colonial_empires	-0.017	-0.058	0.124	0.449	0.322	0.280	0.015	0.076	-0.110	0.428	0.159	0.050	1	
civil_legal_origin	-0.142	-0.223	0.267	0.216	-0.107	0.142	-0.215	-0.228	0.190	0.378	-0.238	-0.419	0.121	1

TABLE 4: OLS Regression

inflows_pop

	(1) Coeff	(2) p-value		(3) Coeff	(4) p-value	
pop2_popt	0.0151	0.539		----------		
pop3_popt	-0.0503	0.044	**	-0.0435	0.020	**
logpopt	-0.0021	0.000	**	-0.0021	0.000	***
tot_tax	-0.0001.	0.138		----------		
gdp_per_head	4.38e-07	0.000	***	3.88e-07	0.000	***
EU	0.0005	0.750		----------		
Plurality	0.0029	0.045	**	0.0031	0.017	**
colonial_empires	0.0021	0.104	*	0.0023	0.101	*
civil_legalorigin	0.0003	0.851		----------		
Constant	0.0288	0.098	*	0.0346	0.000	***
obs.	34			34		
Adj R-squared	0.712			0.705		

*Note: *, **, *** denote significance at the 10, 5 and 1 % level.*

TABLE 5: OLS Regression

migration_openess

	(1) Coeff	(2) p-value		(3) Coeff	(4) p-value	
pop2_popt	0.0014	0.974		----------		
pop3_popt	-0.0799	0.084	*	-0.0644	0.026	**
logpopt	-0.0026	0.008	***	-0.0023	0.008	***
tot_tax	-0.0002	0.189		----------		
gdp_per_head	7.08e-07	0.000	***	6.34e-07	0.000	***
EU	0.0012	0.693		----------		
Plurality	0.0051	0.060	*	0.0049	0.029	**
colonial_empires	0.0019	0.513		----------		
civil_legal_origin	-0.0003	0.896		----------		
Constant	0.0500	0.124		0.0388	0.008	***
obs.	34			34		
Adj R-squared	0.598			0.623		

*Note: *, **, *** denote significance at the 10, 5 and 1 % level.*