Voting on Mass Immigration Restriction

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Abstract

We study how immigration policies are determined under voting in a model where immigration redistributes income from wages to capital, migration decisions are endogenous, there exist border enforcement costs and preference for home-country consumption. We model the migration policy as a pure entry rationing rather than a necessarily porous screening system. Unlike the existing results of polarization, our findings show that preferences about frontier closure

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are distributed on a continuum going from total closure to total openness. Thus, the Condorcet winning immigration policy may well be an interior solution. Our results fit the real-life observation that both perfect closure and perfect openness are rare events. We also study the case of a referendum over two alternative policies and show that its outcome depends upon the location of the median voter with respect to the individual indifferent between the two alternatives.

Keywords: immigration policy, voting, referendum, Condorcet winner.

Jel classification: D72, F22, J18.

1 Introduction

Immigration is one of the most compelling topics on the policy-makers agenda. The collapse of the Soviet Union, the recent surge in regional conflicts, as well as long-term climate changes have put enormous pressure on developed countries' national borders. In the EU the eastward enlargement process is going to add 50 million of workers to the existing workforce. Migration toward Europe from North African low-wage, densely populated countries is fueled by large and persistent wage differentials. The same is true for the U.S. with respect to Latin America and Asia (Lundborg and Segerstrom, 2002). In front of these figures, high unemployment rates and uncertain expectations contributed to spread immigration aversion. Anti-immigration programs yielded immediate electoral consent, causing in some cases a sudden and unexpected success of far-right parties. As a consequence, the legislative trend, as reported by OECD (1999, 2001), points to a stricter frontiers closure.

The analysis of the redistributional consequences of labor inflows is a widespread approach to the study of immigration policies: the decision on frontier closure is likely to depend on the individual shares of capital and labor income. Though the individual attitude towards immigration is likely to depend on a variety of non-economic factors as well, some survey evidence shows that income effects are prevailing (Scheve and Slaughter, 1999).

Goldin (1994) reports an interesting reconstruction of the process leading to close the U.S. borders in 1921, after more than 17 millions of entries over the previous 30 years. Goldin finds that this reversal was correlated with the impact of the immigrants on the domestic wages. Interestingly, she remarks that anti-immigration pressures were stronger during economic downturns. On the other side, owners of capital[1] were consistently pro-immigration.

This point has been studied in several contributions: Mazza and Van Winden (1996) study the role of different pressure groups in determining the redistributive decisions. In Benhabib (1996) voters decide on the immigrants' capital requirements considering the effect on their total income. Grether, de Melo and Muller (2000) (henceforth GMM) and Bilal, Grether and de Melo (2001) (henceforth BGM) analyse the same issue in an economy open to international trade.

[1] For example, the National Association of Manufacturers, the National Board of Trade, many Chambers of Commerce.

A common finding of this literature is the polarization of the economy between voters preferring free immigration and voters preferring no immigration at all. If this conclusion were true, we should observe polarization among countries as well: depending on the position of the median voter, only free immigration and no immigration policies should be observed.

Such a conclusion is clearly counterfactual: we find intermediate levels of frontier closure rather than the predicted polarization. Closure/openness is far from being complete: in democratic countries entry is restricted rather than free or forbidden.

In the next section we review some basic entry requirements for the largest immigration areas, and we show that both free immigration and no immigration do not exist.

Benhabib (1996) assumes a perfect immigrants' screening and a perfect enforcing of the policy. The migration choice, moreover, is exogenous: inflows are independent of the wage differential. In Benhabib (1996) the combination of the mentioned assumptions boils down the immigration problem to identify the appropriate entry requirements. Once they are met, the optimal inflow is determined. These assumptions are, in our opinion, too restrictive: there exist strong evidence that flows are very sensitive to market signals[2]. Both a perfect border control and a perfect screening are highly unlikely to happen in the real world: borders are porous to illegal immigration, and informational imperfections are too important to get such an effective screening. Moreover, the costs associated to a restrictive policy are quite important, and they should be explicitly considered.

GMM (2000) and BGM (2001) use a factor-specific model to study how immigration affects the individual income for both skilled and unskilled workers.

Though their results are very useful in explaining the recent stiffening in immigration policies, they depict the outcome of a referendum rather than the selection of a Condorcet winning policy. Both GMM (2000) and BGM (2001) assume that the decision to be taken concerns the possible entrance of a stock of immigrants. The final effect on the individual income determines the vote, and the median voter's decision is chosen by majority.

In this paper, we also consider the vote on immigration restriction as a

[2] See, among others, Chiswick and Hatton (2002) for an historical perspective, and Hanson and Spilimbergo (1999) for the sensitivity to wage differentials of illegal immigration to U.S.

vote on income redistribution. We argue, however, that the income redistribution caused by immigration must include the costs of the chosen policy. According to Ethier (1986) "since border enforcement requires real resources, it must be financed". The 2003 budget of the U.S. Immigration and Naturalization Service was about $ 6.5 billion. Hanson and Spilimbergo (1999) report that "the U.S. government has increased expenditures to combat illegal immigration, raising the enforcement budget of the U.S. Border Patrol from $ 290 million in 1980 to $ 1.7 billion in 1998 (in 1998 dollars)." Bucci and Tenorio (1996) introduce a government budget constraint where the cost of enforcing the immigration laws is financed via a mix of employer fines and income taxation: they conclude that most of the burden is borne by the taxpayers rather than the employers. In Djajic (1987) crowded-out native workers urge the government in order to increase the enforcement of immigration laws. None of these papers, however, model the voting process.

As we argued above most of the literature dealing with the vote on immigration find a polarization. The purpose of our model is trying to explain why polarization is indeed a rare outcome.

To this aim, we study the voting on immigration policy by providing for endogenous migration decision and rational voters' expectations with respect to their after-tax post-immigration income. In addition, we do not adopt a screening based on the capital endowment because usually capital accumulation occurs only after entering the destination country[3]. Rather, we characterize the immigration policy as a probability to enter the destination country: since any border closure implies some entry rationing, a restrictive policy is simply a low probability of entering. So doing, we do not need to assume neither a perfect screening, nor a perfect borders enforcement.

The paper is organized as follows: in the next Section we review the basic entry requirements for the largest immigration areas, then, in Section 3, we develop our model and characterize the migrants' and voters' decisions. Finally, in Sections 4 and 5, we analyze the voting behavior both in a referendum and in a pairwise alternatives contest. Our conclusions are summarized in Section 6. Some proofs are gathered in the Appendix.

[3] Of course, there exist a minority of highly skilled immigrants who are likely to be endowed with both human and physical capital. Our model, however, relies on the realistic assumption that mass immigration always dilutes the capital/labor ratio. For our results to hold, we only need that the average immigrant's capital endowment is lower than the average native's one.

2 Entry requirements

As a general rule, entry authorization is subject to the possession of a work permit, which is made more difficult when a country is willing to restrict the access. This creates a rationing for the potential immigrants: a typical example can be the "green card" lottery program of the U.S., which grants a permanent residence permit to 55000 immigrants randomly chosen from the pool of applicants. Regulations for entering the U.S. are quite complicated: different visas are granted on the basis of the individual characteristics.

Even though any visa can be used for entering and then becoming an illegal immigrant, the most important for our purposes are the H-visas, issued to specialty workers (H-1B), temporary agricultural workers (H-2A), skilled and unskilled workers (H-2B), trainees (H-3), accompanying family members (H-4)[4]. J-visas are issued for short periods of work within the U.S. There exist specific visas (TN) for citizens of countries participating to the NAFTA and for intra-company transfers (L1).

Canada allows entry to any worker in possession of an Employment Authorization (i.e. a job offer), which entitles to a temporary residence permit. The EA is not required for some activities considered "beneficial to Canada". These activities include especially some highly-skilled jobs and business operators. More requirements are needed to get a permanent residence permit: economic immigrants[5] are divided into skilled workers and business immigrants. The former are screened according to a point system, and the latter are selected upon their abilities "to make a contribution to the Canada's economy". With respect to the point system, the threshold to obtain an immigrant visa has recently been lowered from 75 to 67 points. In addition, some provinces have been given the authority to select or nominate candidates to immigration in their own territory.

Entry to Australia is heavily regulated: applicants take a point test for many visa classes. A simpler way to enter is through the employer-sponsored program: under a variety of circustances employers are allowed to recruit immigrant workers. This is equivalent to the work permit in other countries. The stringent criteria to obtain a skilled migration visa[6] are relaxed in case

[4]Notice that, unlike H-2B visas, H-1B visas are intended for college-educated workers.

[5]Of course, there still exist the possibility to enter as a refugee or through family reunification. In this paper we restrict our attention to economic immigrants.

[6]The main requirements are: being under 45, being fluent in English, matching the Australian Skilled Occupation List, having more than a post-secondary education, and

of application to low-populated regions to encourage a more balanced dispersal of immigrants. Individuals with very high scores are entitled to the "independent" immigration visa and do not need a sponsor. Business people can usually apply for a temporary four-year visa, whereas a permanent one may be granted to high calibre businessmen sponsored by State/Territory governments.

Finally, a "Special Migration Program" is targeted to individuals having close ties with Australia or to former residents whishing to return; this program is applicable to "distinguished value" individuals as well, who are supposed to be highly beneficial for the Australian economy. These persons must have an internationally recognised record of achievements in arts, business, sports, or scientific research and the support of an Australian sponsor.

The EU grants freedom of movement to nationals of the European Economic Area with some transitory restrictions for the citizens of the countries which have joined the Union on May, 1st. As for extra-EU immigrants, admissions policies are not uniform among the member countries. As a general rule, a work permit is required to immigrate. The work permit implies a job offer from an employer.

In Italy both a residence permit and a worker registration card are required. The application process for the work permit must be begun by the company recruiting the worker, and not by the employee or a job agency. Since the procedure is administered regionally, its implementation depends on the destination within Italy.

In France non-EU citizens must have a work permit and a residency visa. The introduction work permit represents the approval of a position to be filled by a foreigner, and it requires labour market testing as well as the authorization of the Labour Ministry. The residency visa is normally given after the work permit is approved.

Germany requires to apply for a residence visa before arrival; immigrants must have an employment contract. This country is implementing special programs for highly-skilled immigrants in the IT sector. Currently, the new immigration law is under discussion at the Bundestag. Its main characteristics should be a point system granting access and permanent residence even without a job offer and the establishment of mandatory, state-financed German courses for unskilled immigrants. The new law is expected to restrict the asylum right and make easier the expulsion of any foreigners deemed to

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having the Australian Assessing Authorithy approve the application.

be a security threat.

The UK issues different immigration, naturalization and working visas. Again, a point system is used to screen the most qualified immigrants, who are allowed to free entry if they score at least 65 points (notice that the previous threshold was 75 points). Since 2002, a more traditional Sectors Based Scheme (SBS) is used for unskilled workers: they must be between 18 and 30 and have a job offer from a list of sectors where the local labour supply is scarce (The new sectors based scheme covers basically the Hospitality, Catering and Food Manufacturing Industry). An immigrant entering under the SBS is allowed to work for 12 months, and must leave the UK for at least 2 months before applyng again. Moreover, he/she can bring no dependents into the country.

3 The model

The model is quite simple and uses standard assumptions about technology and preferences. We consider a two-country economy: a developed destination country (henceforth D), and an underdeveloped source country (henceforth S). Inhabitants of S are potential migrants to D to improve their welfare.

3.1 Destination country

D includes a given population of natives. Natives earn their income from labour and capital. As in Benhabib (1996), they are indexed by the unit of capital they are endowed with, denoted k. The density of natives is given by the continuous function $N(k)$ defined over $[0, +\infty)$. Thus, the aggregate capital in D, K_0, is given by

$$K_0 = \int_0^{\infty} N(k)\, k dk. \tag{1}$$

and the total population, L_0, is

$$L_0 = \int_0^{\infty} N(k)\, dk. \tag{2}$$

The median voter in the native population is endowed with an amount of capital k_m solving

$$\int_0^{k_m} N(k)\, kdk = \frac{1}{2} L_0. \tag{3}$$

Each native is endowed with a unit of labor supplied inelastically in a perfectly competitive labor market. A homogeneous consumption good is produced according to a CRS aggregate production function $F(K, L)$, where K and L stand, respectively, for aggregate capital and labor. The intensive production can be expressed in the form $f(R)$, with $R \equiv K/L$ the capital-labor ratio, exhibiting the usual neoclassical features: $f : R_+ \to R_+$ is smooth, strictly increasing and strictly concave.

The competitive wage, w, and the competitive interest rate, r, are

$$w = w(R) \equiv f(R) - f'(R) R \tag{4}$$

and

$$r = f'(R). \tag{5}$$

The main effect of mass immigration is a decrease in the capital-labour ratio. For simplicity immigrants are not endowed with capital; this assumption does not alter our results as long it is true that, on average, newcomers are endowed with less capital than natives.

Without immigration w, and r are, respectively,

$$w = w(R_0) \equiv f(R_0) - f'(R_0) R_0 \tag{6}$$

and

$$r = f'(R_0) \tag{7}$$

where

$$R_0 \equiv \frac{K_0}{L_0} = \frac{\int_0^\infty N(k)\, kdk}{\int_0^\infty N(k)\, dk} \tag{8}$$

is the pre-immigration capital-labor ratio. The total pre-immigration income, I_{k_i}, of individual k_i depends upon R_0 and k_i:[7]

$$I_{k_i} = w(R_0) + f'(R_0) k_i \tag{9}$$

Given the static nature of the model, agents consume their whole income. Therefore, for each native, utility coincides with her total income and pre-immigration utility can be ranked with respect to the capital endowment, according to (9).

[7] Capital endowment is the only source of heterogeneity across natives.

3.2 Source country

For simplicity, S is not endowed with capital. A homogeneous consumption good is produced out of a linear technology using only labor with unitary coefficient. Agents living in S supply one unit of labor in a competitive labor market. They are indexed by their preference for home consumption, θ, and their density is given by the continuous function $I(\theta)$ defined over $[0, +\infty)$.

As a consequence, only agents with a sufficiently low θ migrate. We are able to derive endogenously the share of migrants among the natives of S.

The population of S is then

$$I_0 = \int_0^\infty I(\theta)\, d\theta. \tag{10}$$

As told above, the parameter θ captures the heterogeneity in preferences: the existence of a higher marginal utility of domestic consumption is common in the literature about migrations, and it is grounded both on the externalities one can enjoy when consuming in his own ethnic environment and on non-economic factors. Notice, however, that our approach is more general: since $\theta \in [0, \infty)$ individuals can prefer consumption abroad as long as $\theta < 1$.

Assuming for simplicity a linear utility function, we have:

$$u_S(c, \theta) = \theta c_S. \tag{11}$$

(11) is the utility of an agent living in S and consuming an amount of good c_S with a preference for home consumption θ. When deciding whether to migrate or not, she compares the domestic utility to the utility abroad. The utility of a successful immigrant to D is simply

$$u_D(c) = c_D, \tag{12}$$

where c_D stands for the good consumed in D. Therefore, pre-migration heterogeneity does not translate into any post-migration heterogeneity.

Assuming a higher marginal utility of home consumption is common in the literature about return migration (see, for example, Dustmann 2001). This assumption is useful to explain why temporary migrations are the rule rather than the exception, in spite of persistent wage differentials. In our static model no return migration is possible. Nonetheless, we think that including the preference for home consumption is always essential in modelling migrations. This helps us to understand a well-known empirical puzzle: why migration flows are indeed low, given the existing wage differentials.

In other words, we should observe entire nations migrating, while this occurs only for a share of the population. In the present work we argue that this happens because even though wages do not converge, the convergence concerns the utility: for the marginal individual $U(w_D) = U(w_S)$, where $U(.)$ is the indirect utility function of a potential migrant and w_D and w_S are the prevailing wages in D and S respectively.

3.3 Immigration policy and migration decision

An immigration policy is indeed a multidimensional problem: it concerns the issuing of permanent and temporary residence permit, the granting of the refugee status, the authorization to family reunification, the combat of illegal migration. Any policy decision generates a reallocation of the immigrants within these channels. It is well known that a restriction in issuing residence permits causes an increase in the number of asylum seekers. Recently, when Germany has decided to adopt more restrictive entry requirements, a change of the law granting the refugee status has proved necessary. Currently, family reunifications account for almost one half of the legal inflows to Europe (Mc Cormick, 2001).

One of the most important problems of a restrictive policy is the reallocation of immigrants towards illegal entry: since wage differentials are unaffected by this decision, incentives to enter D do not change. When legal immigration opportunities decrease, illegal inflows are necessarily increased[8]. In the present work we do not address explicitly this issue; we simply assume that voters know the trade-off and they agree to have a larger share of underground entries in exchange for an overall immigration reduction. In our simplified world all immigrants earn the same wage, thus entering legally or illegally is indifferent for both aliens and natives, and we only consider the final effect of the policy.

We can therefore characterize the immigration policy as the overall probability to enter D. From the immigrant's point of view, an immigration policy is a real number

$$\pi \in [0, 1] \tag{13}$$

which synthesizes the degree of "frontier openness": it depicts the proba-

[8] The problem is indeed even more complex: it is quite common that immigrants become illegal after entering with a legal visa, which can be issued for students, tourists or temporary workers (see Epstein et al., 1999; and Venturini, 2001).

bility of a successful entrance, legal or illegal. This number may well be represented, for example, by the percentage of successful migrants over the pool of potential migrants.

So doing, we don't need to use any screening mechanism, whose implementation can be difficult, costly and ineffective because of illegal immigration. Our method, instead, captures the essential feature of any restriction: entry rationing. The decision whether to migrate or not for an agent living in S is made comparing the utilities within the alternative locations.

We can describe the model as a three-step process, with the following timing:

(a) Natives choose an immigration policy $\pi \in [0, 1]$;
(b) Potential migrants choose whether or not to migrate;
(c) Nature randomly chooses a fraction π of successful migrants.

In a single-period model, the migration decision is simply a comparison between utility at home and utility abroad. No saving is possible, thus the total income is consumed. Since domestic wage is 1 and residents of S are not endowed with capital, home utility is θ. The indirect utility abroad is w_D. Comparing the utilities under the two possible locations the individual decision is immediate: if $w_D > \theta$, an agent will try to migrate, otherwise she will not. Actually, for a given $\pi \in [0, 1]$, the potential migrants are those exhibiting a preference for domestic consumption θ satisfying $\theta \leq \hat{\theta}(\pi)$, where $\hat{\theta}(\pi)$ is the unique solution of

$$w\left(\frac{K_0}{L_0 + \pi \int_0^\theta I\left(\theta'\right) d\theta'}\right) = \theta. \tag{14}$$

For a given policy π, $\hat{\theta}(\pi)$ denotes the individual indifferent between staying in S and trying to migrate. Indeed, all types $\theta < \hat{\theta}(\pi)$ strictly prefer to migrate, but, because of the entry restriction, only a fraction π of them will succeed. As a consequence, the equilibrium real wage in the destination country is given by the left-hand side of (14) evaluated at $\hat{\theta}(\pi)$.

In the following Lemma, we prove the existence and the uniqueness of $\hat{\theta}(\pi)$ and show that it is decreasing in π.

Lemma 1 *For any $\pi \in [0, 1]$, equation (14) admits an unique solution $\hat{\theta}(\pi)$.*

In addition,

$$\frac{\partial\hat{\theta}}{\partial\pi} = -\frac{w'\left(R\left(\pi\right)\right)R\left(\pi\right)^{2}\frac{\int_{0}^{\hat{\theta}(\pi)}I(\theta)d\theta}{K_{0}}}{w'\left(R\left(\pi\right)\right)R\left(\pi\right)^{2}\frac{\pi I\left(\hat{\theta}(\pi)\right)}{K_{0}}+1} < 0 \tag{15}$$

where

$$R\left(\pi\right) \equiv \frac{K_{0}}{L_{0}+\pi\int_{0}^{\hat{\theta}(\pi)}I\left(\theta\right)d\theta} \tag{16}$$

is the post-immigration capital intensity corresponding to an immigration policy π*.*

Proof. See the appendix ■

$\hat{\theta}$ is decreasing in π because a higher frontier openness increases the number of successful migrations and thus reduces the wage in D. Notice that expression (16) is continuous in $\pi = 0$ since $R(0) = R_0$. Indeed, for $\pi = 0$ the number of potential migrants willing to migrate is finite and so the number of successful migrants is zero.

Next Lemma is to show that the number of successful migrants is increasing with π. Such a result is not as straightforward as it could appear at first sight: indeed, a larger π increases the probability of migrating, but also reduces the wage differential, and therefore the incentive to migrate.

Lemma 2 *The number of successful migrants is increasing in* π*, i.e.*

$$\frac{\partial}{\partial\pi}\left(\pi\int_{0}^{\hat{\theta}(\pi)}I\left(\theta\right)d\theta\right) > 0 \tag{17}$$

Proof. See the appendix ■

From Lemma 2 the following Corollary is immediately proved.

Corollary 3 $R\left(\pi\right)$ *is decreasing in* $\pi \in [0,1]$*, thus* $w\left(R\left(\pi\right)\right)$ *and* $f'\left(R\left(\pi\right)\right)$ *are decreasing and increasing in* π*, respectively.*

3.4 Enforcement costs

We now consider the immigration policy from the point of view of D. As explained in the introduction, we argue that any barrier to entry has to be effective, thus any restriction requires some enforcement. There exist two ways to enforce the immigration rules: increasing border controls and/or employer sanctions. Even though the latter instrument may seem more efficient, it is very difficult to enforce for several reasons: firms have found ways to circumventing rules, for example through sub-contracting; it is hard to prove that an employer knowingly hired illegal workers especially when forged documents are used and, finally, the sanctions must overcome the economic gain from hiring illegals.

The literature has come to pessimistic conclusions about the effectiveness of such sanctions (Boswell and Straubhaar, 2004; Martin and Miller, 2000). Chiswick (1988) argues that the enforcement is the "toothless tiger" of immigration policies, primarily because of the limited resources available to the authorities. Hill and Pearce (1990) analyse the effects of the 1987 U.S. immigration law reform and find that the incidence of sanctions against employers has been quite weak. They conclude, however, that agencies enforcing other laws and regulations have similar results because they face similar budget problems.

As a matter of fact, most of the immigration restriction relies on borders enforcement. Even though they can be even more expensive than employer sanctions (Venturini, 2001; Bean et al., 1989; Todaro and Maruzsko, 1987), border controls are the main method of enforcing entry restrictions[9]. In the U.S. the 2003 budget of the Immigration and Naturalization Service was about $ 6.5 billion (source: U.S. Department of Justice).

It is evident, indeed, that borders enforcement is costly, and that it requires a repressive system, including an immigration department, monitoring systems, jails, courts. Illegal immigrants apprehension and repatriation can be very difficult when identity documents are lacking or destroyed. For the reasons explained above, the costs of rationing immigration are finally borne by the public budget, therefore by all taxpayers. For sake of simplicity, in our model the only task of the government is to enforce the chosen immigration policy, thus the border enforcement budget and the government's budget

[9] For some interesting data on the allocation of resources to the U.S. Border Patrol and the effects on the behaviour of illegal Mexican immigrants see the 1997 February, November and December issues of Migration News (http://migration.ucdavis.edu).

coincide.

In what follows, we assume that entry restriction is financed via a flat tax on the capital income. Taxing labor income would unnecessarily complicate the model, because labor supply is fixed and the wage is the same for all agents. First, we specify the shape of the enforcement cost function, $c(\pi)$, defined on $[0,1]$.

The enforcement cost is a function $c:[0,1]\rightarrow R_{+}$ satisfying the following properties:

$$\begin{aligned} -\infty &< c'_{\min} \leq c'(\pi) < 0 \text{ for all } \pi \in [0,1] && (18)\\ c(0) &= c_0 > 0 && (19)\\ c(1) &= 0 && (20)\end{aligned}$$

Assumption (18) means that the cost is decreasing in π and its derivative is finite. Condition (19) simply normalizes the cost in zero (thus the cost of perfect enforcing is finite), and eventually condition (20) says that no restriction implies zero cost. These assumptions are quite general and fit a wide class of functional forms[10].

The amount of tax per unit of capital income is

$$\frac{c(\pi)}{\int_0^\infty N(k)\, kf'(R(\pi))dk} \tag{21}$$

and the tax $T_{k_i}(\pi)$ paid by agent k_i is

$$T_{k_i}(\pi) = \frac{c(\pi)k_i f'(R(\pi))}{\int_0^\infty N(k)\, kf'(R(\pi))dk} = c(\pi)\frac{k_i}{K_0} \tag{22}$$

It follows that, for any π, the after-tax income $I_{k_i}(\pi)$ for an individual endowed with k_i is

$$I_{k_i}(\pi) = w\left(R\left(\pi\right)\right) + \left[f'\left(R\left(\pi\right)\right) - \frac{c(\pi)}{K_0}\right]k_i. \tag{23}$$

To ensure that $I_{k_i}(\pi) > 0$ for any k_i and any $\pi \in [0,1]$ we assume that the cost of perfect enforcement, c_0, satisfies:

$$c_0 \leq K_0 f'\left(R_0\right). \tag{24}$$

[10] As an example, a simple linear function of the type $c(\pi) = c_0(1-\pi)$ satisfies (18)-(20).

Indeed, $f'(R(\pi))$ is increasing in π while the enforcing cost is decreasing in π and thus condition (24) ensures the term in brackets in (23) to be positive: in other words, the capital income of each native is sufficient to pay the tax $T_{k_i}(\pi)$ for all π and k_i. In addition, (24) obviously implies

$$c(\pi) \leq \int_0^\infty N(k)\, kf'(R(\pi))dk$$

for any $\pi \in [0,1]$, i.e. total capital income is always sufficient to finance the whole enforcement cost.

We can now go through the voting problem and the policy chosen under a majority system. We will first focus on the case of a referendum, where the existing immigration policy is compared to an alternative policy, and then we will check for the existence of an immigration policy able to defeat any other policy in a pairwise contest under majority voting.

4 Voting on immigration policy

4.1 Referendum

Suppose the current immigration policy is $\pi_1 \in [0,1]$. An alternative policy $\pi_2 > \pi_1$ ($\pi_2 < \pi_1$) is proposed to natives. Of course, they will vote against a policy that reduces their income. Let k_I be the type indifferent between π_1 and π_2, so that her income is identical under π_1 and π_2. Then k_I solves for k_i

$$w(R(\pi_1)) + \left[f'(R(\pi_1)) - \frac{c(\pi_1)}{K_0}\right] k_i = w(R(\pi_2)) + \left[f'(R(\pi_2)) - \frac{c(\pi_2)}{K_0}\right] k_i \tag{25}$$

Equation (25) can be rearranged as

$$w(R(\pi_2)) - w(R(\pi_1)) + \left[\left(f'(R(\pi_2)) - f'(R(\pi_1))\right) + \left(\frac{c(\pi_1)}{K_0} - \frac{c(\pi_2)}{K_0}\right)\right] k_i = 0 \tag{26}$$

In view of the properties of the functions $f(R)$, $R(\pi)$ and $c(\pi)$, the term in brackets multiplying k_i is positive (negative), whereas $w(R(\pi_2)) - w(R(\pi_1)) < 0$ (> 0). It follows that such a k_I exists and it is unique provided that there exists at least one native with a capital endowment sufficiently low and another with a capital endowment sufficiently large. Indeed, when k_i tends to zero, equation (26) is negative (positive), while for k_i sufficiently high it is positive (negative). It follows that all natives with a capital larger than k_I will have an higher total income under $\pi_2(\pi_1)$ and vote for the alternative policy π_2 (prevailing policy π_1), and, viceversa, all natives with a capital lower than k_I will have a higher total income under $\pi_1(\pi_2)$ and vote for the prevailing policy π_1 (alternative policy π_2). Thus, the policy π_2 will be defeated (chosen) in a referendum if and only if $k_m \leq k_I$. The outcome of the referendum can be thus summarized in the following Proposition.

Proposition 4 *Let π_1 be the current immigration policy. Then:*

(a) For any immigration policy $\pi_2 > \pi_1$ ($\pi_2 < \pi_1$), all type $k_i > k_I$ have a higher income under π_2 (lower income) and all type $k_i < k_I$ have a lower income (higher income) under π_2.

(b) The policy π_2 will be defeated (chosen) in a referendum if and only if $k_m \leq k_I$.

Remark 1 *Proposition 4 is useful to study the outcome of a referendum opposing whatever immigration policy $\pi > 0$ to the pre-immigration situation $\pi = 0$, as in Benhabib (1996). However, Proposition 4 is more general since it allows to compare whatever pair of alternative immigration policies.*

Remark 2 *Notice that Proposition 4 still holds in absence of the enforcing cost $c(\pi)$. The same argument indeed applies by simply setting in (26) $c(\pi_1)/K_0 = c(\pi_2)/K_0 = 0$.*

4.2 Majority voting with pairwise alternatives

We want now to investigate the existence of an immigration policy able to defeat any other policy in a pairwise contest under majority voting. To perform our analysis, we will first characterize the most preferred policy - denoted $\pi^*_{k_i}$ - for an individual of type k_i :

$$\pi^*_{k_i} = \arg\max_{\pi\in[0,1]} I_{k_i}(\pi) = \arg\max_{\pi\in[0,1]} w\left(R\left(\pi\right)\right) + f'\left(R\left(\pi\right)\right) k_i - \frac{c(\pi)}{K_0} k_i. \quad (27)$$

The study of the derivative $\frac{\partial I_{k_i}(\pi)}{\partial \pi}$ will help us to characterize π^*_{ki} :

$$\frac{\partial I_{k_i}(\pi)}{\partial \pi} = \left[f''\left(R\left(\pi\right)\right) R'\left(\pi\right) - \frac{c'(\pi)}{K_0}\right] k_i - f''\left(R\left(\pi\right)\right) R'\left(\pi\right) R\left(\pi\right) \quad (28)$$

Examining the properties of (28) we immediately see that for $k_i \to 0$ the expression (28) becomes negative for any π, and for $k_i \to \infty$ it is strictly positive for any π. Indeed the functions $f''(R(\pi))$, $R'(\pi)$, $R(\pi)$ and $c'(\pi)$ are all bounded in $\pi \in [0,1]$. Thus, for k_i sufficiently low, income is maximized for $\pi^*_{k_i} = 0$, and for k_i sufficiently high for $\pi^*_{k_i} = 1$. We want to know whether there exists an interval for k_i such that $0 < \pi^*_{k_i} < 1$, i.e. an interior optimal immigration policy. Computing, for a given k_i, the limit of (28) for $\pi \to 0$ we get

$$\lim_{\pi \to 0} \frac{\partial I_{k_i}(\pi)}{\partial \pi} = f''(R_0)R'(0)\left[k_i - R_0\right] - \frac{A}{K_0}k_i \tag{29}$$

where

$$A \equiv \lim_{\pi \to 0} c'(\pi) < 0$$

is finite by assumption[11]. It is easy to show that the limit of (28) for $\pi \to 0$ is positive when

$$k_i > \frac{K_0 f''(R_0)R'(0)R_0}{K_0 f''(R_0)R'(0) - A} \equiv \hat{k}_1$$

On the other hand, $\lim_{\pi \to 1}(\frac{\partial I_{k_i}(\pi)}{\partial \pi})$ is negative when

$$k_i < \frac{K_0 f''(R(1))R'(1)R(1)}{K_0 f''(R(1))R'(1) - B} \equiv \hat{k}_2$$

where $B \equiv \lim_{\pi \to 1} c'(\pi) < 0$. Therefore, a sufficient condition for the existence of an interior solution for the optimal immigration policy for a type of individual k_i is

$$\hat{k}_1 < k_i < \hat{k}_2. \tag{30}$$

Indeed, under the domain of (30), total income is increasing in zero and decreasing in one: these two features taken together ensure the existence of an interior optimal immigration policy. In order inequality (30) to be satisfied for some k_i, we need

$$A < \frac{f''(R(0))R'(0)\left[K_0 f''(R(1))R'(1)\left[R(1) - R(0)\right] + R_0 B\right]}{f''(R(1))R'(1)R(1)} \tag{31}$$

Since both the terms of (31) are negative, the condition states that A has to be large enough in absolute value.

[11] In (29) the most correct notation is $\lim_{\pi \to 0} R'(\pi)$ instead of $R'(0)$. However, since the function is continous, we prefer to use a simpler notation. Then same is true for $R'(1)$.

Remark 3 *With no enforcing costs, one has $c(\pi) = 0$ for any $\pi \in [0,1]$ and $A = B = 0$, and condition (31) is never satisfied. In such a case, in particular, (23) boils down to*

$$I_{k_i}(\pi) = w(R(\pi)) + f'(R(\pi))\, k_i. \tag{32}$$

It is easy to prove that (32) is single-caved with an absolute minimum at $\pi_{\min} = R^{-1}(k_i)$[12]. As a consequence, the population will be polarized between those preferring $\pi = 0$ and those preferring $\pi = 1$. To prove this, let $k_L^{'}$ be the type who is indifferent between $\pi = 0$ and $\pi = 1$, i.e. that solves for k_i

$$w(R_0) + f'(R_0)\, k_i = w(R(1)) + f'(R(1))\, k_i \tag{33}$$

Such a type exists and is unique provided there is at least a native with a sufficiently low capital endowment and another with a sufficiently large capital endowment[13]. Then all types $k_i < k_L^{'}$ will prefer $\pi = 0$ and types $k_i > k_L^{'}$ will prefer $\pi = 1$: indeed for types $k < k_L^{'}$ one has $w(R_0) + f'(R_0)\, k_i > w(R(1)) + f'(R(1))\, k_i$ while for types since types $k_i > k_L^{'}$ the reverse inequality holds. Therefore if $k_m < k_L^{'}$ ($k_m > k_L'$), the policy $\pi = 0$ ($\pi = 1$) is a Condorcet winner. These results actually reproduce the findings in Benhabib (1996).

When (31) holds, we have conversely proved that the population is not polarized between $\pi_k^* = 0$ and $\pi_k^* = 1$, but that for $k_i \in \left(\hat{k}_1, \hat{k}_2\right)$, $\pi_k^* \in (0,1)$: there exist an interval of k such that the optimization problem admits interior solutions. Besides, by continuity, there exists a neighborhood ϵ_1 of $k = 0$ such that $\pi_k^* = 0$ for $k_i < \epsilon_1$ and a value $\epsilon_2 > 0$ such that the optimal policy is one for $k_i > \epsilon_2$.

To prove the existence of a Condorcet winning immigration policy, it is useful to show that preferences over π are single crossing. This proof will in turn allow us to apply the median voter theorem. For preferences to be single crossing, the voters need to be ranked from left to right with respect to their capital endowment.

[12] Indeed, the first order condition is $-f''(R(\pi))\, R'(\pi)\, R(\pi) + f''(R(\pi))\, R'(\pi)\, k_i = 0$ meanwhile the second order condition evaluated at the unique point where the derivative vanishes is $f''(R(\pi))\, R'(\pi)\, R(\pi) > 0$. Of course it can be $\pi_{\min} \notin [0,1]$.

[13] Indeed, for k_i low enough, the left hand side of (33) is greater that the right one, while for k_i sufficiently high, it is the right hand side of (33) to be larger.

Lemma 5 *Let $\pi_1 < \pi_2$ and $k_1 < k_2$. Then we have:*

$$\begin{array}{lllll} \textit{if} & I_{k_2}(\pi_1) \geq I_{k_2}(\pi_2) \quad (a) & \textit{then} & I_{k_1}(\pi_1) \geq I_{k_1}(\pi_2) & (a\prime) \\ & & \textit{and} & & \\ \textit{if} & I_{k_1}(\pi_2) \geq I_{k_1}(\pi_1) \quad (b) & \textit{then} & I_{k_2}(\pi_2) \geq I_{k_2}(\pi_1) & (b\prime) \end{array}$$

where $I_{k_i}(\pi_j)$ stands for the income of a native with capital k_i associated to a policy immigration π_j.

Proof. See the appendix ■

In view of Lemma 5, it is easy to prove that the best immigration policy is non-decreasing in the capital endowment of each native.

Proposition 6 *The preferred immigration policy $\pi^*_{k_i}$ for each native is a non-decreasing function of her capital endowment k_i.*

Proof. Suppose *per absurdum* that $k_1 < k_2$ and $\pi^*_{k_1} > \pi^*_{k_2}$ and make the two agents face these two alternatives. Of course k_1 will chooses $\pi^*_{k_1}$ while k_2 will choose $\pi^*_{k_2}$. Then we would get a situation in which the richer chooses the lower π and the poor the higher one, in contradiction with Lemma 5 ■

The previous findings allow us to prove the following Proposition.

Proposition 7 *When (31) holds, the optimal policies are given by:*

$$\begin{cases} \textit{for } k_i \in (0, \epsilon_2) & \Rightarrow \pi^*_{k_i} = 0 \\ \textit{for } k_i \in \left(\epsilon_1, \hat{k}_1\right) & \Rightarrow \pi^*_{k_i} \in \left[0, \pi^*_{\hat{k}_1}\right] \\ \textit{for } k_i \in \left(\hat{k}_1, \hat{k}_2\right) & \Rightarrow \pi^*_{k_i} \in (0,1) \\ \textit{for } k_i \in \left(\hat{k}_2, \epsilon_2\right) & \Rightarrow \pi^*_{k_i} \in \left[\pi^*_{\hat{k}_2}, 1\right] \\ \textit{for } k_i \in (\epsilon_2, +\infty) & \Rightarrow \pi^*_{k_i} = 1 \end{cases}$$

Fig. 1 illustrate Proposition 7 and shows how the optimal immigration policy is a non-decreasing function of the capital endowment.

Condition 31 shows in particular that the larger $|A|$, the larger the interval $(\hat{k}_1, \hat{k}_2)$ including the types k_i for whom $\pi^*_{k_i} \in (0,1)$. In other words, the limit of the marginal cost when $\pi \to 0$ is crucial to our conclusions. A sufficiently high enforcement cost in a neighborhood of zero allows us to avoid polarization and depart from the Benhabib's (1996) result. Notice that if $A \to -\infty$ condition (31) is always met. We think that such a case is very likely in practice; remark, however, that for the existence of interior solutions only a finite value of A is required. In other words, our results don't rely on the assumption of an infinite marginal cost in $\pi = 0$, thus, from this point of view, they are quite general.

Our final step is to prove that single-crossing preferences ensure that the median voter is the Condorcet winner.

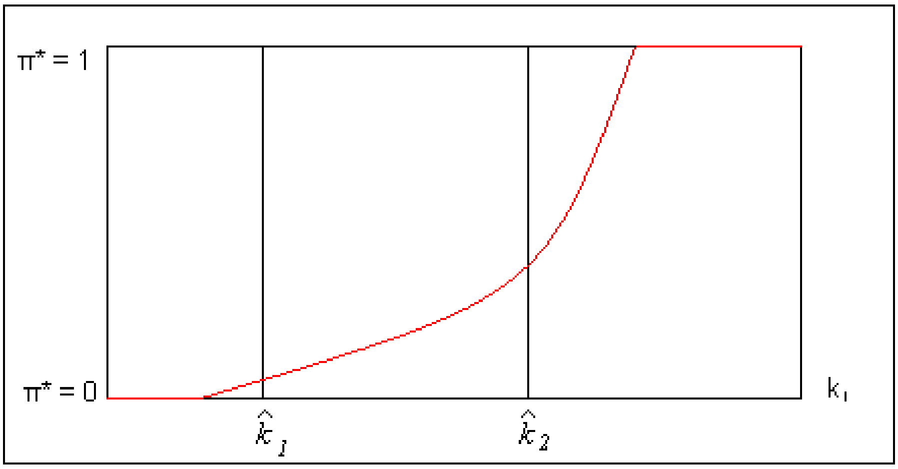

Figure 1

Proposition 8 *When preferences are single-crossing the median voter's choice is the Condorcet winner.*

Proof. Consider the median voter's optimal immigration policy $\pi^*_{k_m}$, and compare it with any $\pi_a > \pi^*_{k_m}$. Consider all the voters on the left of the median voter: since the median voter is the richest among them, condition (a) in Lemma 5 holds[14], and $\pi^*_{k_m}$ is voted by majority. Consider now the choice between $\pi^*_{k_m}$ and any $\pi_b < \pi^*_{k_m}$. The median voter is poorer than all voters on her right. In this case, condition (b) in Lemma 5[15] is verified, and $\pi^*_{k_m}$ is voted by majority. Thus, $\pi^*_{k_m}$ is the Condorcet winner ■

[14]The richer chooses the lower π.

[15]The poorer chooses the higher π.

We have proved that a sufficient condition to get an interior optimal immigration policy is that the median voter k_m belongs to the interval $\left(\hat{k}_1, \hat{k}_2\right)$. Notice however that such a condition is only sufficient, and that a Condorcet winner could easily lie outside the interval $\left(\hat{k}_1, \hat{k}_2\right)$, although probably not too far from it. We are thus able to explain the existence of intermediate policies in most countries, in contrast to the predictions of polarization common to Benhabib (1996) and to GMM (2000) and GBM (2001). Such a feature lacks indeed of realism and is unable to account for the immigration policies observed in most developed countries, where borders are neither totally open nor totally closed.

The key insight of our paper is that any analysis concerning the vote about immigration restriction must not set aside the costs of border enforcing: departing from them yields counterfactual results. The economic intuition of the existence of interior optimal immigration policies rests indeed on the fact that the presence of an enforcing cost makes it profitable for agents endowed with low levels of capital to chose nevertheless a positive degree of frontier openness in order to avoid part of the same enforcing cost.

5 Conclusions

In this paper we have tried to develop a model allowing for less restrictive assumptions with respect to some recent literature. Our findings show the importance of including the costs of borders control into the income redistribution caused by immigration. Our conclusions suggest that modelling migration policies as a probability is a convenient tool to represent immigration restriction. So doing, we were able to overcome some difficulties due to the imperfect implementation of the screening rules, because we can account for illegal immigration. Another advantage of the proposed model is that the migration decision is endogenous. Contrary to Benhabib (1996), we show that in a more realistic environment polarization does not necessarily happen, and this is consistent with the empirical observation that most countries choose intermediate policies. An interesting conclusion is that, when the immigration policy is chosen by majority, the fiscal system can be used by capital-poor agents to enjoy the benefits of frontier closure shifting the enforcement costs on the capital-rich individuals. This is probably why closed-door policies exist: making capital-poor people paying the costs of the entry barriers would probably offset the wage benefits they receive.

We are aware that our work does not address some important issues: for example, while illegal immigration is taken into account, it is not possible to identify separately the legal and illegal immigrants. Moreover, the vote on immigration seems to show cycles: apparently, countries alternate periods of openness and closure. Djajic (1987, 1997) and Hanson and Spilimbergo (1999) remark that the level of enforcement of immigration restrictions varies in response to lobbying efforts and sectoral shocks. The static nature of the proposed model is probably the most important limit to the generality of our results. Our work is silent on these problems, and we would like to devote our attention to them in a future research.

Finally, a drawback of our analysis is that in our model migrants own no capital. Nonetheless, in our opinion, mass immigration always dilutes the capital/labor ratio: it is extremely difficult that immigrants, whose majority is unskilled, are (on average) endowed with more capital than natives.

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6 Appendix

Proof of Lemma 1.

To prove the first part of the Lemma, it is sufficient to observe that the right-hand side of (14) increases from zero to infinity with θ, and that its left-hand side is decreasing in θ and strictly positive for $\theta = 0$. To prove (15), let totally differentiate

$$w\left(\frac{K_0}{L_0 + \pi \int_0^{\hat{\theta}} I(\theta)\, d\theta}\right) = \hat{\theta}$$

with respect to π and $\hat{\theta}$ in order to obtain

$$-\left[\frac{w'(R(\pi))\, K_0^2 \frac{\int_0^{\hat{\theta}} I(\theta)d\theta}{K_0}}{\left(L_0 + \pi \int_0^{\hat{\theta}} I(\theta)\, d\theta\right)^2}\right] d\pi - \left[\frac{w'(R(\pi))\, K_0^2 \frac{\pi\left(d/d\hat{\theta}\right) \int_0^{\hat{\theta}} I(\theta)d\theta}{K_0}}{\left(L_0 + \pi \int_0^{\hat{\theta}} I(\theta)\, d\theta\right)^2} + 1\right] d\hat{\theta} = 0.$$

Then setting

$$R(\pi) \equiv \left[\frac{K_0}{L_0 + \pi \int_0^{\hat{\theta}} I(\theta)\, d\theta}\right].$$

and observing that

$$\frac{\partial}{\partial \hat{\theta}} \int_0^{\hat{\theta}} I(\theta)\, d\theta = I\left(\hat{\theta}\right).$$

one gets

$$\frac{\partial \hat{\theta}}{\partial \pi} = -\frac{w'(R(\pi))\, R(\pi)^2 \frac{\int_0^{\hat{\theta}} I(\theta)d\theta}{K_0}}{w'(R(\pi))\, R(\pi)^2 \frac{\pi I\left(\hat{\theta}\right)}{K_0} + 1}$$

which is negative since $w' > 0$ ■

Proof of Lemma 2.

The derivative

$$\frac{\partial}{\partial \pi}\left(\pi \int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta\right)$$

is easily computed as

$$\int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta + \pi \frac{\partial}{\partial \pi} \int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta \frac{d\hat{\theta}(\pi)}{d\pi}$$

i.e.

$$\int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta + \pi I\left(\hat{\theta}(\pi)\right) \frac{\partial \hat{\theta}(\pi)}{\partial \pi}.$$

If we take into account expression (15) for $\frac{d\hat{\theta}(\pi)}{d\pi}$, the above expression becomes

$$\int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta - \pi I\left(\hat{\theta}(\pi)\right) \frac{w'(R(\pi))\, R(\pi)^2 \frac{\int_0^{\hat{\theta}(\pi)} I(\theta) d\theta}{k_0}}{w'(R(\pi))\, R(\pi)^2 \frac{\pi I\left(\hat{\theta}(\pi)\right)}{k_0} + 1}$$

and, by appropriately rearranging terms

$$\int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta \left[1 - I\left(\hat{\theta}(\pi)\right) \frac{w'(R(\pi))\, R(\pi)^2 \frac{\pi}{k_0}}{w'(R(\pi))\, R(\pi)^2 \frac{\pi I\left(\hat{\theta}(\pi)\right)}{k_0} + 1}\right]$$

i.e.

$$\int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta \left[\frac{w'(R(\pi))\, R(\pi)^2 \frac{\pi I\left(\hat{\theta}(\pi)\right)}{k_0} + 1 - I\left(\hat{\theta}(\pi)\right) w'(R(\pi))\, R(\pi)^2 \frac{\pi}{k_0}}{w'(R(\pi))\, R(\pi)^2 \frac{\pi I\left(\hat{\theta}(\pi)\right)}{k_0} + 1}\right]$$

which finally gives

$$\int_0^{\hat{\theta}(\pi)} I(\theta)\, d\theta \left[\frac{1}{w'(R(\pi))\, R(\pi)^2 \frac{\pi I\left(\hat{\theta}(\pi)\right)}{k_0} + 1}\right] > 0\ \blacksquare$$

Proof of Lemma 5.

Suppose (a) is true (the richer chooses the lower π) : then we have

$$w(R(\pi_1)) + f'(R(\pi_1))\, k_2 - \frac{c(\pi_1)}{K_0} k_2 \geq w(R(\pi_2)) + f'(R(\pi_2))\, k_2 - \frac{c(\pi_2)}{K_0} k_2$$

i.e.

$$[w(R(\pi_1)) - w(R(\pi_2))] + \left[(f'(R(\pi_1)) - f'(R(\pi_2))) + \left(\frac{c(\pi_2)}{K_0} - \frac{c(\pi_1)}{K_0} \right) \right] k_2 \geq 0 \qquad (a)$$

Notice that

$$[w(R(\pi_1)) - w(R(\pi_2))] > 0,\ [f'(R(\pi_1)) - f'(R(\pi_2))] < 0 \text{ and } \left[\frac{c(\pi_2)}{K_0} - \frac{c(\pi_1)}{K_0} \right] < 0.$$

Then we have

$$[w(R(\pi_1)) - w(R(\pi_2))] + \left[(f'(R(\pi_1)) - f'(R(\pi_2))) + \left(\frac{c(\pi_2)}{K_0} - \frac{c(\pi_1)}{K_0} \right) \right] k_1 \geq 0$$

i.e.

$$w(R(\pi_1)) + f'(R(\pi_1))\, k_1 - \frac{c(\pi_1)}{K_0} k_1 \geq w(R(\pi_2)) + f'(R(\pi_2))\, k_1 - \frac{c(\pi_2)}{K_0} k_1$$

It follows that the poorer chooses the lower π as well and $(a) \Rightarrow (a\prime)$.

Suppose now (b) is true (the poorer chooses the higher π):

$$w(R(\pi_2)) + f'(R(\pi_2))\, k_1 - \frac{c(\pi_2)}{K_0} k_1 \geq w(R(\pi_1)) + f'(R(\pi_1))\, k_1 - \frac{c(\pi_1)}{K_0} k_1$$

i.e.

$$[w(R(\pi_2)) - w(R(\pi_1))] + \left[(f'(R(\pi_2)) - f'(R(\pi_1))) + \left(\frac{c(\pi_1)}{K_0} - \frac{c(\pi_2)}{K_0} \right) \right] k_1 \geq 0 \qquad (b)$$

We have:

$$[w(R(\pi_2)) - w(R(\pi_1))] < 0,\ [f'(R(\pi_2)) - f'(R(\pi_1))] > 0 \text{ and } \left[\frac{c(\pi_1)}{K_0} - \frac{c(\pi_2)}{K_0} \right] > 0$$

Then

$$[w(R(\pi_2)) - w(R(\pi_1))] + \left[(f'(R(\pi_2)) - f'(R(\pi_1))) + \left(\frac{c(\pi_1)}{K_0} - \frac{c(\pi_2)}{K_0} \right) \right] k_2 \geq 0$$

i.e.

$$w(R(\pi_2)) + f'(R(\pi_2))\, k_2 - \frac{c(\pi_2)}{K_0} k_2 \geq w(R(\pi_1)) + f'(R(\pi_1))\, k_2 - \frac{c(\pi_1)}{K_0} k_2$$

It follows that $(b) \Rightarrow (b\prime)$ and the richer chooses the higher π as well. ■