CSEF

Centre for Studies in Economics and Finance

WORKING PAPER NO. 289

Voting over Selective Immigration Policies with Immigration Aversion

Giuseppe Russo

July 2011

University of Naples Federico II

University of Salerno

Bocconi University, Milan

CSEF - Centre for Studies in Economics and Finance
DEPARTMENT OF ECONOMICS – UNIVERSITY OF NAPLES
80126 NAPLES - ITALY
Tel. and fax +39 081 675372 – e-mail: csef@unisa.it

Centre for Studies in Economics and Finance

WORKING PAPER NO. 289

Voting over Selective Immigration Policies with Immigration Aversion

Giuseppe Russo*

Abstract
Selective immigration policies set lower barriers to entry for skilled workers. However, simple economic intuition suggests that skilled majorities should welcome unskilled immigrants and protect skilled natives. This paper studies the voting over a selective policy in a two-country, three-factor model with skilled and unskilled labor, endogenous migration decisions, costly border enforcement and aversion to immigration. Results show that heterogeneity in capital distribution forces skilled voters to form a coalition with unskilled voters, who become pivotal. The voting outcome is therefore biased towards the preferences of the latter, and consists in a selective protectionism. Finally, immigration aversion helps to explain why skilled majorities do not bring down entry barriers against unskilled workers.

Keywords: selective immigration policies, multidimensional voting, cultural preferences, Condorcet winner.

JEL Classification: D72, F22, J18.

Acknowledgements: I thank Paolo Addesso, Toke Aidt, Alberto Bennardo, Giovanna Bimonte, Gaetano Bloise, François Bourguignon, Hector Calvo-Pardo, Elena Del Mercato, Sergio Destefanis, Francesco Magris, Annamaria Menichini, Fabio Postiglione, Vincenzo Pierro and Luigi Senatore. I am also grateful to two anonymous referees for their insightful suggestions. Any errors are mine.

* Università degli Studi di Salerno and CSEF. Address for correspondance: Dipartimento di Scienze Economiche e Statistiche, via Ponte don Melillo, 84084 Fisciano (SA) Italy. e-mail: grusso@unisa.it.

Table of contents

1 Introduction

Decisions over immigration policy are a major issue for the developed countries. Aggregate shocks -such as regional conflicts and long-term climate changes- and persistent wage differentials foster both constrained and voluntary migration. In several European countries the importance of immigration aversion is increasing[1], and democracies respond to this shift in the voters' preferences by a stricter border enforcements (Boeri and Bruecker, 2005).

A well developed literature is concerned with voting over immigration restriction: examples include the seminal contribution by Benhabib (1996) and, more recently, Ortega (2005). Nonetheless, the study of selective immigration policies as a result of a voting process has received comparatively little attention.

A selective immigration policy is a scheme that establishes different quotas for skilled and unskilled workers. Facchini and Willmann (2005) determine immigration quotas in a common agency model. This paper instead obtains a selective immigration policy from a vote over the quotas of skilled and unskilled workers.

Considering two types of work complicates the analysis for different reasons: first when two factors are entering (leaving) a country, complementarity makes it more difficult to predict what happens to wages[2]. Second, to avoid a substantial loss in generality, the effect of immigration on capital income must be considered as well. Third, finding a Condorcet winner (henceforth CW) in a bidimensional voting implies increased technical complexity.

Some initial attempts is in this direction have been made by Grether et al. (2001) and Bilal et al. (2003). They analyse attitudes towards skilled and unskilled immigration in an economy open to international trade. However, the attention of these authors is not focused on the selection of a CW, but on the outcome of a referendum between two alternatives.

When searching for a CW of a vote over immigration, a common drawback is the inexistence of interior solutions. This carries the counterfactual consequence that voters request either open immigration or no immigration at all (see Benhabib, 1996; Bilal et al., 2003; Grether et al., 2001; Thum, 2004).

Ortega (2005) achieves interior solutions in an OLG model with intergenerational altruism without bequests where voters anticipate the effects of current immigration on the future policies.

More generally within a voting model interior solutions emerge if we take into account a cost of enforcing the border. Such a cost would be -for examplefunding an Immigration Department and frontier stations, creating the necessary databases, detecting and repatriating the illegal immigrants, and so on.

In spite of their importance, these costs are seldom considered[3]. Examples

[1] In the recent elections for the European Parliament, anti-immigration parties made significant gains in the Netherlands, Austria, Hungary, Denmark, Greece, Italy, Slovakia, UK and Finland.

[2] Ottaviano and Peri (2011 and 2008) clarify why complementarity is crucial to explain the unexpectedly low effects of immigration on wages.

[3] Ethier (1986) stresses that border enforcement "requires real resources". See also Epstein

where they are considered include Stark et al. (2009), Bosi et al. (2008), Magris and Russo (2005). In this paper, the costs associated to the enforcement of a restrictive immigration policy are funded through a flat tax on total income. Compelling economic intuition suggests that skilled, well-educated majorities should welcome unskilled immigration (see Ottaviano and Peri, 2008), whereas entry barriers are expected for skilled workers. Selective policies however, work in the opposite direction, though they are adopted by destination countries with skilled majorities (OECD, 2007; Table A1.2a)[4].

The results of this paper suggest that such an outcome appears when, though the majority of the population is skilled, a CW emerges only by aggregating a coalition where unskilled voters are pivotal. The heterogeneity of the capital distribution turns out to be crucial in this respect.

On the other hand, a coalition is not necessary when skilled majorities decide over unskilled immigration. However, since entry of unskilled workers is even more restricted, in what follows we are going to argue that non-economic factors are also relevant in the voting process.

Here it is important to recall the overwhelming empirical evidence proving that preferences over immigration depend crucially on several sociocultural factors, including concerns for preserving the national culture, the traditional religion, or feelings of increased insecurity[5].

Dustmann and Preston (2007) find that racial discrimination is the most important factor to explain opposition to immigration in the U.K.; Hainmueller and Hiscox (2007), after studying a 22-country survey, argue that views on immigration are shaped only by education and have very little connection with labour market concerns.

Usually however, results are less drastic: both economic competition and cultural factors matter. O' Rourke and Sinnott (2006), using survey evidence for 24 countries, show that attitudes towards immigration are affected by economic interest and nationalist sentiments. Similar outcomes are reported in Scheve and Slaughter (2001), Mayda (2006), Hanson et al. (2007).

A revealing case is the immigration policy adopted in Switzerland in 1991, the so-called "three-circle system": under this system, work permits were granted according to cultural proximity. In practice, permits were assigned preferentially to EU citizens, then to citizens of particular countries considered traditional migration partners of Switzerland, and finally to citizens from the rest of the world (Miguet, 2008).

---

and Weiss (2001); Hanson and Spilimbergo (2001). In Italy, the costs associated to the management of immigration flows were approximately 145 million euros in 2004 and 206 million euros in 2003 (Chiarotti and Martelli, 2005).

[4] In this paper, a worker is considered skilled when she holds at least an upper secondary level diploma. This corresponds to level 3 of the International Standard Classification of Education, and requires 12 years of education on average. This is the standard definition in the literature (see Steedman and MacIntosh, 2001, and Hanson et al., 2007).

[5] According to a poll, in April 2007 34.6% of Italians considered immigration as a threat to the national identity. In 2005, the figure was 26.6%. Similarly, the share claiming that immigration is a threat to security and public order increased from 39.2% (2005) to 43.2% (april 2007). *La Repubblica*, 05/06/2007.

Despite the empirical evidence, the effects of immigration aversion have received relatively little attention in models.

Some authors introduce cultural preferences in formal migration models. In Schiff (2002) immigration affects the social capital: people are assumed to derive utility from living in a culturally homogeneous society, with a well-defined sense of national identity.

In Hansen (2003) the natives dislike immigration and immigrants choose their destination based on a measure of cultural distance.

The model presented here is in this respect similar to Hansen (2003): native voters are averse to immigration, and immigrants show a home-bias in their utility.

It is possible to conjecture that for skilled workers in particular, immigration aversion is due to concerns about the effect of unskilled immigration on the rising cost of the fiscal transfers. Hanson et al. (2007) find support for this hypothesis in the U. S[6].

Although such considerations are important, it is unlikely that they are the only explanation of immigration aversion, since immigrants have the conflicting effects on the public budget. While they can be a burden in the short run, in the long run they can support social security systems put under pressure by population ageing (Storesletten, 2000; Bonin et al., 2000; Razin and Sadka, 1999).

The conditions required for the fiscal leakage to offset the potential gains are restrictive, and the related evidence is mixed. According to Borjas (1994) "accounting exercises that assign a dollar value to the tax burden imposed by immigration inevitably incorporate a number of hidden and questionable assumptions" (see also Razin and Sadka, 2004).

Computing these effects is methodologically difficult, and results depend strongly on the assumptions made, in particular for the long-run calculations. Nannestad (2007) concludes that -in the last 15-20 years - relatively low labour market participation and high unemployment levels made the average immigrant to European welfare states a net recipient of welfare benefits. Despite that, he recommends caution in generalizing this conclusion.

Lemos and Portes (2008) exploit a rich database to study the effect of the EU enlargement in 2004, that caused one of the largest labour inflows in the British history. In spite of the heated public discussions, they find little evidence that immigration contributed to a fall in wages or a rise in claimant unemployment in the UK.

Hanson et al. (2007) also agree that non-economic considerations contribute to shape attitudes about immigration because "prejudice and political attitudes are likely to play a bigger role in policies like immigration in comparison to policies like trade".

Of course, arguing that selective immigration policies are the result of purely non-economic concerns would be meaningless. Rather, this paper suggests that,

[6] They find that skilled workers are more likely to oppose immigration in states with generous public assistance and unemployment benefits.

when the net fiscal effect of immigration is questionable, non-economic factors become critical in tipping the scales towards immigration restriction.

This holds especially for unskilled immigration that- in spite of its possible fiscal impact- increases the returns to skilled work and capital.

The paper is organized as follows: after this introduction, Sections 2 and 3 describe the characteristics of the destination and of the origin country. Section 4 specifies the properties of the tax paid in order to fund the border enforcement. Section 5 presents the immigration policy and the formalization of the decision to migrate. Section 6 studies the individual preferences over immigration quotas, and Section 7 shows how the selective policy is determined. The conclusions are summarized in Section 8, and the proofs are gathered in the Appendix.

2 Destination Country

The destination country (henceforth D) includes a given population of skilled natives (S_D) and unskilled natives (U_D). Skilled and unskilled immigrants are denoted by and S and U respectively Each worker is endowed with a unit of labour supplied inelastically in a competitive labour market. The production technology is

$$Y_D = F\left(\left(S_D + S\right), \left(U_D + U\right), K\right) \tag{1}$$

where Y_D is a homogeneous consumption good. $\left(S_D + S\right), \left(U_D + U\right), K$ stand for skilled labour, unskilled labour, and aggregate capital respectively.

$F\left(S, U, K\right)$ has standard features. It exhibits CRS, smooth and strictly concave in all its arguments; moreover, given K, when $\left(U_D + U\right) = \left(S_D + S\right)$ the marginal productivity of the skilled labour is higher than the marginal productivity of the unskilled labour. This is the reason why S and U are different production factors. Partial derivatives are denoted by subscripts: F_S, F_U, F_K are the marginal productivities.

For simplicity, only skilled workers are endowed with capital. The capital, k, is distributed according to a continuous and differentiable function $n(k)$ defined over $\left[\underline{k}, \bar{k}\right]$, with $\bar{k} > \underline{k} > 0$[7]. $\bar{k}$ can be arbitrarily large and $\underline{k}$ can be arbitrarily small. The aggregate capital K is thus given by

$$K = \int_{\underline{k}}^{\bar{k}} n\left(k\right) k dk \tag{2}$$

and the total natives of D are

$$L_D = U_D + S_D = U_D + \int_{\underline{k}}^{\bar{k}} n\left(k\right) dk \tag{3}$$

[7] In order to avoid trivial solutions it is assumed that $n(k)$ is not uniform.

3 Origin Country

The Origin country (henceforth O) is also populated by skilled workers (S_O) and unskilled workers (U_O). The composition of the workforce (i.e. the relative shares of skilled and unskilled workers) is exogenous[8]. For simplicity, we suppose that in O there is no capital: skilled and unskilled labour are the only production factors[9]. Agents living in O also supply inelastically one unit of labour in a competitive labour market. A homogeneous consumption good Y_O is produced out of a CRS technology $G((S_O - S);(U_O - U))$ with the same properties of $F(S,U,K)$, but using only skilled and unskilled labour (S and U denote, respectively, the emigration of skilled and unskilled work):

$$Y_O = G((S_O - S),(U_O - U)) \tag{4}$$

Again, partial derivatives are denoted by subscripts: G_S, G_U are the marginal productivities.

The population of O before emigration is simply $L_O = S_O + U_O$.

4 Enforcement tax

A selective immigration policy is a pair (S^{**}, U^{**}), where S^{**} and U^{**} stand for the number of skilled and unskilled immigrants allowed to enter D.

Suppose now, as we have argued in the Introduction, that enforcing the national border is costly, and that a tax is needed in order to fund any level of immigration restriction.

For simplicity, we consider a proportional tax $0 \leq t(S,U) < 1$ on the total income. $t(S,U)$ depicts the tax necessary to enforce the immigration levels (S,U) and it is defined over $S \in [0, S_O]$, $U \in [0, U_O]$.

$t(S,U)$ is continuous and differentiable in all its arguments. The same holds for its derivatives, the marginal taxes $t_U(S,U)$ and $t_S(S,U)$. In addition, it is assumed that, $t(S,U)$ and its derivatives are invertible in all their arguments[10].

[8] As a consequence of this assumption, the natives of O only decide whether to migrate or not, and their human capital is taken as given. This shortcut is necessary in order to focus our attention on the core of the paper, namely the voting process in D. The relatioship between selective policies and human capital is the hearth of the "brain gain with a brain drain" literature (see Stark *et al.*, 1997; and, Commander *et al.*, 2004; Magris and Russo, 2009).

[9] Including capital would complicate the model without relevant gains in generality. Suppose skilled immigrants bring some capital into D: for unskilled voters, skilled immigration would be even more profitable, and for skilled voters the inflow of capital would reduce the wage loss but also the benefits on the capital income.

[10] Thus, given any tax level $\tilde{t} = t(\tilde{S}, \tilde{U})$ it is always possible to obtain $\tilde{S} = h(\tilde{t}, \tilde{U})$ and $\tilde{U} = l(\tilde{t}, \tilde{S})$. Analogously, for any $\tilde{t}_S = t_S(\tilde{S}, \tilde{U})$ it is always possible to obtain $\tilde{S} = m(\tilde{t}_S, \tilde{U})$, $\tilde{U} = n(\tilde{t}_S, \tilde{S})$ and so on for $\tilde{t}_U = t_U(\tilde{S}, \tilde{U})$.

Other simple regularity conditions for $t(S,U)$ are given below:

$$t_U(S,U),\ t_S(S,U) \leq 0 \text{ and bounded} \tag{5}$$

$$t_{UU}(S,U) > 0;\ t_{SS}(S,U) > 0 \tag{6}$$

$$t_{US}(S,U) < 0 \tag{7}$$

$$t(S_O,U_O) = 0 \tag{8}$$

$$t(0,0) = t_0 < 1 \tag{9}$$

$$t_S(S_O,U) = 0 \text{ for any } U \tag{10}$$

$$t_U(S,U_O) = 0 \text{ for any } S \tag{11}$$

Conditions (5) mean that the tax is decreasing in S,U and that the marginal tax paid to enforce the border is finite. Conditions (6) impose convexity, and assure that the marginal tax is maximum in a neighborhood of $(0,0)$. Condition (7) means that the marginal tax required to curb the entry of one factor is decreasing as less resources are needed to curb the entry of the other factor. Condition (8) states that no restriction implies no cost, and condition (9) gives the (finite) cost of a perfect border closure. Notice that, since $t_0 < 1$, perfect border closure is feasible. Condition (10) states that the marginal tax required in order to control skilled immigration is negligible when entry is open for skilled workers. Condition (11) is equivalent to condition (10) for unskilled immigrants.

Assumptions (5-11) are quite intuitive and they do not introduce any special restrictions.

The after-tax income for natives of D is therefore

$$A_S = [F_S + F_K k]\,(1 - t(S,U)) \quad \text{(skilled voters)} \tag{12}$$

$$A_U = F_U(1 - t(S,U)) \quad \text{(unskilled voters)} \tag{13}$$

where F_S is the marginal productivity of skilled workers (the skilled wage), F_U the unskilled wage and $F_K k$ is the capital income for a capital endowment k.

5 Immigration Policy and the Emigration Decision

In this Section we are going to present the decision problem of potential migrants. Individuals have an incentive to leave O when their utility is higher in D. Human capital is fully transferable from O to D.

It is important now to adopt two simplifying assumptions: D and O cannot trade, and capital cannot flow from D to O. As a consequence, only migration causes factor price convergence. These assumptions are of great help in simplifying the algebra and, though substantial, they mirror well-known stylized facts: wage differentials are persistent, and capital does not flow towards poor countries[11]-in the present framework it would be impossible since $G(S,U)$ does not use any capital.

[11] See the classical reference of Lucas (1990).

An important characteristic of the literature on migrations is the assumption that consuming at home yields a higher utility. This assumption is essential to explain why current emigration flows are indeed *low*, given the existing wage differentials. For example, Ramos (1992) shows that only 25% of Puerto Ricans migrate to the US even though they are entitled to free mobility to the U.S. According to Borjas (1999) this proves that "important non-economic factors help to restrain migration flows". These restraining factors include the differences in language and culture and the psychological costs of entering an alien environment. Hence, in order to emigrate, workers need a wage differential sufficient to compensate the non-economic costs of migration.

In the present model, the preference for domestic consumption is denoted by the parameters $\theta_S > 1$, $\theta_U > 1$ for skilled and unskilled workers respectively[12].

By using a simple linear representation, it is possible to characterize the utilities in O and D as follows:

$$u_S(c, \theta_S) = \begin{cases} \theta_S c_O & \text{(consumption in } O) \\ c_D & \text{(consumption in } D) \end{cases} \quad \text{(skilled workers)} \tag{14}$$

$$u_U(c, \theta_U) = \begin{cases} \theta_U c_O & \text{(consumption in } O) \\ c_D & \text{(consumption in } D) \end{cases} \quad \text{(unskilled workers)}$$

where c_O and c_D are, respectively, consumption in O and D.

The model can be described in three steps: (1) Natives vote over a pair of quotas S^{**}, U^{**} for skilled and unskilled immigrants; (2) Workers in O observe the wage differential and decide whether to migrate to D. This decision produces a pool of potential migrants; (3) Skilled and unskilled immigrants enter D until their respective quotas are filled. If a quota is slack, all applicants are let in; if a quota is binding, some immigrants are rationed and cannot move.

Individuals decide whether to migrate or not by comparing their utility in each location

Since we are in a single-period model, consumption coincides with income. The marginal productivities are F_S, F_U in D, and G_S, G_U in O. The net wage in D is given by the marginal productivity minus the enforcement tax. By using the linear utility defined in (14), skilled workers migrate until $F_S(1-t(S,U)) \geq \theta_S G_S$, and unskilled workers do so until $F_U(1-t(S,U)) \geq \theta_U G_U$.

To proceed in our analysis it is necessary to prove that there exists a pair $(\hat{S}^E, \hat{U}^E)$ for which both conditions hold.

In other words, we are searching for a solution to

$$\begin{cases} F_S(1-t(S,U)) \geq \theta_S G_S \\ F_U(1-t(S,U)) \geq \theta_U G_U \end{cases} \tag{15}$$
$$s.t. \quad S \leq S^{**}; \quad U \leq U^{**}$$

Each inequality means that emigration towards D continues until the utility of consuming in D weakly dominates the utility of consuming in O.

[12] It is possible to introduce heterogeneity in θ_S, θ_U. However, this does not alter the results, despite the increased analytic difficulty.

Since the system of inequalities in (15) admits locally unique solutions, it is possible to introduce the following Lemma:

Lemma 1 *When quotas are not binding, the system of inequalities (15) admits locally unique solutions* $[\hat{S}^E, \hat{U}^E]$. *When the quota* S^{**} *is binding, there exist locally unique solutions* $[S^{**}, \hat{U}^E]$*; when the quota* U^{**} *is binding, there exist locally unique solutions* $[\hat{S}^E, U^{**}]$. *When both quotas are binding the unique solution is* $[S^{**}, U^{**}]$.

Proof. See the Appendix. ■

This Lemma is important because it ensures the existence of mutually compatible emigration levels for *both* production factors. Quotas do not hinder the existence of the equilibrium. Indeed when the stock of potential immigrants is overwhelming they assure uniqueness, which seems the most likely case for practical contingencies. The rest of the paper is devoted to showing how the quotas $[S^{**}, U^{**}]$ are determined in a voting process.

6 The individually optimal immigration quotas

In this Section we characterize the voting behaviour of the natives.

In the introduction we briefly surveyed the vast literature proving that non-economic considerations matter in decisions over immigration. Another common finding is that skilled voters are less averse to immigration (see, among others, Hainmueller and Hiscox, 2007; Mayda, 2006). Moreover, some authors find not only that preferences over immigration depend on the skill level, but also that immigration aversion is smaller towards skilled immigrants (Hainmueller and Hiscox, 2007)[13].

The present model takes these findings into account in the simplest possible way by assuming that skilled and unskilled voters assign different disutilities to different immigrants. Consequently, it is possible to fit any hypothesis on the relative weight of immigration aversion.

Summarizing, we can write the utilities as follows:

$$Q_S = \underbrace{[F_S + F_K k]\,(1 - t(S,U))}_{\text{net income}} - \underbrace{\left(\frac{\gamma_S U^2}{2} + \frac{\delta_S S^2}{2}\right)}_{\text{immigration aversion}} \tag{16}$$

$$Q_U = \underbrace{F_U (1 - t(S,U))}_{\text{net income}} - \underbrace{\left(\frac{\gamma_U U^2}{2} + \frac{\delta_U S^2}{2}\right)}_{\text{immigration aversion}} \tag{17}$$

[13] Hainmueller and Hiscox (2007) use the European Social Survey, a questionnaire with the crucial advantage that separate questions are asked about specific categories of immigrants with different skill characteristics. They find that respondents are more open to immigration from richer, well educated countries.

Q_S and Q_U are, respectively, the utility of skilled and unskilled voters. The first term on the RHS of (16) and (17) is the net income, while the second term summarizes the immigration aversion. $\gamma_S, \gamma_U \geq 0$ depict the aversion to unskilled immigration for skilled and unskilled natives respectively, and $\delta_S, \delta_U \geq 0$ do so for skilled immigration[14].

Utilities (16) and (17) determine the voting behaviour. We use the procedure proposed by Shepsle (1979) in order to find out the result of the vote.

This procedure is widely used to solve multidimensional voting problems. It assumes that the decision over S and U is simultaneous, thus simplifying the problem to the existence of a Cournot-Nash equilibrium. In this model, therefore, a vote is cast on S given U, and on U given S. The single-dimension CWs mirror two reaction functions; if they exist and have a fixed point, the procedure has an equilibrium.

By applying the Weierstrass Theorem to (16) and (17) we know that along each dimension there exists an optimal quota for any voter. This is sufficient to move directly to Section 7, dedicated to the solution of the voting problem.

However, studying when voters prefer corner solutions or interior solutions is useful to understand how immigration aversion contributes to restrict the entry of a complementary factor. It is also useful to understand why the support of a coalition is crucial to determine a CW. Thus, before applying the Shepsle procedure, we characterize the individual voting behaviour in each dimension by studying some properties of (16) and (17).

6.1 Skilled voters: choice of a quota for skilled workers

We are now going to consider the optimal choice of S (for a given U) of a skilled voter. Utility (16) is defined on the interval $[0, S_O]$.

Obviously, the desired immigration level depends on the capital endowment k: skilled immigration reduces skilled wages but increases the capital income. Unfortunately, maximizing (16) with respect to S and U respectively does not yield closed-form solutions. As a consequence it is not possible to find the utility-maximizing immigration levels and to classify them with respect to the capital endowment[15]. Nonethelss, by studying the derivative $\frac{\partial Q_S}{\partial S}$ at $S = 0$ and $S = S_O$, it is possible to show that for any U we can find a capital endowment k_0 such that utility is increasing at $S = 0$ and a capital endowment k_{S_O} such that utility is decreasing at $S = S_O$. If $k_{S_O} \geq k_0$, interior solutions exist by continuity. If $k_{S_O} < k_0$, only corner solutions exist. This result is summarized in the following Proposition:

Proposition 2 *(Optimal S for the skilled voters): consider the capital endow-*

[14] In the case that there is no difference in the perception of skilled and unskilled immigration, we have simply $\gamma_S = \delta_S$ and $\gamma_U = \delta_U$.

[15] Moreover, since there may be a corner solution for some voters, we do not know whether the first-order condition equals zero, and we cannot apply the Implicit Function Theorem.

ments k_0, k_{S_O}, *given respectively by*

$$k_0 \equiv \frac{F_S t_S(0,U) - F_{SS}(1-t(0,U))}{F_{KS}(1-t(0,U)) - F_K t_S(0,U)}$$

$$k_{S_O} \equiv \frac{\delta_S S_O + F_S t_S(S_O,U) - F_{SS}(1-t(S_O,U))}{F_{KS}(1-t(S_O,U)) - F_K t_S(S_O,U)}$$

then,

$$(a) \quad \text{if} \quad k_{S_O} \geq k_0, \text{ votes are dispersed:}$$

for any	$k \leq k_0$,	*we have*	$S_S^*(U) = 0$;
for any	$k \in (k_0, k_{S_O}]$,	*we have*	$S_S^*(U) \in (0, S_O)$;
for any	$k > k_{S_O}$,	*we have*	$S_S^*(U) = S_O$

$$(b) \quad \text{if} \quad k_0 > k_{S_O}, \quad \text{votes are polarized:}$$

for any	$k \leq k_{S_O}$,	*we have*	$S_S^*(U) = 0$
for any	$k > k_0$,	*we have*	$S_S^*(U) = S_O$

Proof. *See the Appendix.* ■

The Proposition specifies when skilled voters choose interior solutions or corner solutions with respect to the entry of the competing factor for any level of U.

In a neighborhood of $S = 0$ the derivative $\frac{\partial Q_S}{\partial S}$ is simply the marginal effect of skilled immigration on net income (immigration aversion is negligible around $S = 0$). Therefore, any $k \leq k_0$ votes for complete border closure.

Interestingly, when $k_0 \leq 0$ nobody chooses a corner solution with no skilled immigration. This happens when the marginal tax needed to enforce $S = 0$ is sufficiently high, a likely case for countries with costly border monitoring. Hence the cost of sealing the border helps therefore to understand why complete closure is a rare event.

Notice also. that the effect of immigration aversion emerges as immigration grows: δ_S contributes to increase the capital endowment k_{S_O} beyond the level needed to offset the loss in labour income.

6.2 Skilled voters: choice of a quota for unskilled workers

In the case of unskilled immigration, both labour income and capital income increase as unskilled workers enter D, thus in this model any possible solution $U_S^*(S) < U_O$ is due to the effect of immigration aversion. Since closed-form solutions are not available, we still study the derivative $\frac{\partial Q_S}{\partial U}$ at $U = 0$ and at $U = U_O$ for a given S. Again, utility is increasing around $U = 0$, because the net skilled income grows with unskilled immigration, and immigration aversion is negligible. As $U \to U_O$, it is possible to compute the capital endowment sufficient to overcome the immigration aversion.

Proposition 3 *(optimal U for the skilled voters): consider the capital endowment* k_{U_O}*, given by*

$$k_{U_O} \equiv \frac{\gamma_S U_O + F_S t_U(S,U_O) - F_{SU}(1 - t(S,U_O))}{F_{KU}(1 - t(S,U_O)) - F_K t_U(S,U_O)};$$

then,

(a') *if* $k_{U_O} > 0$ *votes are dispersed:*

for any	$k \leq k_{U_O}$,	*we have*	$U_S^*(S) \in (0, U_O)$;
for any	$k > k_{U_O}$,	*we have*	$U_S^*(S) = U_O$

(b') *if* $k_{U_O} \leq 0$ *voters decide unanimously:*

for any	$k > 0$,	*we have*	$U_S^*(S) = U_O$

It is important to remark that the only positive term in the numerator of k_{U_O} is $\gamma_S U_O$. If immigration aversion (*i.e.* γ_S) is small enough we have $k_{U_O} < 0$ and therefore, open unskilled immigration.

This outcome shows that the economic incentive to throw open the doors to unskilled workers is powerful. Immigration aversion therefore, seems quite relevant to explain the increasing border closure.

However, in the model it is not shown that immigrants may increase the cost of social security transfers. Thus one may argue that the result overstates to a certain extent the net gains from immigration and, as a consequence, the importance of immigration aversion. On the other hand, immigration can also sustain the welfare state in the long run. The likely conclusion is that, for given fiscal concerns, immigration aversion can be crucial in tilting the balance in favour of restriction[16].

6.3 Unskilled voters: choice of a quota for skilled workers

Since unskilled voters are homogeneous, they decide unanimously. Their optimal choice is given by $S^*(U)$. In analysing their behaviour, it is still important to

[16] Heinmueller and Hiscox (2007) find that immigration aversion towards unskilled immigrants is higher.

remember that there are no closed-form solutions when we maximize (17) with respect to S and U. Notice that, since the unskilled income increases with skilled immigration, any restriction must come from the immigration aversion δ_U. For a given U, the level of δ_U needed to get an interior solution is found again by studying the derivative of (17) at $S = S_O$. The outcome is summarized in the following Proposition:

Proposition 4 *(Optimal S for the unskilled voters): $S^*(U) \in (0, S_O)$ if $\delta_U > \frac{F_{US}(1-t(S_O,U)-t_S(S_O,U)F_U}{S_O}$; otherwise $S^*(U) = S_O$.*

Proof. See the Appendix. ■

According to this Proposition, immigration aversion is very influential in reducing the desired inflow of skilled workers below S_O. This result has an interesting implication: in asmuch as skilled immigration is less likely to bear on the public budget, the effect of immigration aversion can be disentagled from fiscal concerns. This outcome provides an interesting avenue for applied research.

6.4 Unskilled voters: choice of a quota for unskilled workers

In the next Proposition we characterize the optimal decision of the unskilled natives with respect to the immigration of the competing factor for any level of S. Since $[F_{UU}(1 - t(S,U)) - \gamma_U U]$ is the marginal loss due to unskilled immigration and $t_U(S,U)F_U$ is the marginal benefit due to a relaxed enforcement, we can write

Proposition 5 *(Optimal U for the unskilled voters): $U^*(S) \in (0, U_O)$ when $|t_U(S,0)F_U| > |F_{UU}(1 - t(S,0))|$ and $\gamma_U > \frac{F_{UU}(1-t(S,U_O))-t_U(S,U_O)F_U}{U_O}$. Otherwise, $U^*(S) \in \{0, U_O\}$.*

Proof. See the Appendix ■

The result reported in this Proposition is intuitively appealing[17]: if the marginal tax reduction dominates the marginal wage loss in a neighborhood of $U = 0$, some openness to the competing factor is convenient. Such an outcome is not unlikely since enforcing zero immigration implies a high marginal cost and immigration aversion is negligible for small values of U. The situation is reversed if $U = U_O$: the tax reduction is negligible, whereas wage competition and disutility from immigration are maximised. Corner solutions emerge either when the marginal cost of border enforcement never offsets the marginal gain, ($U^*(S) = 0$), or when the former always exceeds the latter ($U^*(S) = U_O$).

[17] Interestingly, a similar outcome is reported by Mayr (2007) in a quite different framework.

7 The Shepsle procedure

We now investigate the possibility of obtaining a selective immigration policy from pairwise voting over S and U. It is assumed that only natives are granted voting rights. Since the majority can be either skilled or unskilled, the two cases will be analysed separately. In order to apply the Shepsle procedure, there must exist an alternative able to defeat any other policy in a pairwise contest along each dimension; then these single-dimension CWs must have a fixed point. In aggregating the individual preferences, the main issue will be proving that the single-dimension CWs exist.

In what follows, we first characterize the conditions under which there exists a CW for S and U; we then specify the equilibrium of the bidimensional voting.

It is quite helpful to remark that utility (16) describes single-crossing preferences, as it is stated in the following Lemma:

Lemma 6 *The preferences described by (16) are single-crossing over S and U.*

Proof. see the Appendix. ■

Though single-crossing preferences usually allow us to apply the median voter theorem, this is not true in the present model, as is argued in Lemma 7. Nonetheless, the single-crossing property determines regular aggregate behaviour of the skilled voters, and makes possible to find out the conditions under which a CW exists.

7.1 Single-dimension CWs: skilled majority

To simplify the results, in this Section we skip the case in which votes are polarized. This case is examined in the appendix[18].

In order to proceed with our analysis, it is useful to introduce the following Lemma:

Lemma 7 *The median voter's choice is not a CW, neither for S, nor for U .*

Proof. See the Appendix. ■

Intuitively, suppose that a skilled median voter[19] prefers an interior solution for skilled immigration. Suppose also that some capital-rich skilled voters prefer open skilled immigration (see Prop. 2). The median voter theorem breaks down here because agents with no capital to the left of the median voter (i.e. unskilled voters), whose income is increasing with skilled immigration, may support capital-rich agents to the right of the median voter.

We therefore need an alternative criterion in order to single out a CW.

First of all, it is crucial to notice that skilled voters alone cannot find a CW even though they are the majority, and a coalition with unskilled voters is always required. This is stated in the following Lemma:

[18] When votes are polarized a bidimensional CW may exist even without a coalition.

[19] Since we are in the case of a skilled majority, the median voter must be a skilled worker.

Lemma 8 *Even though skilled voters are the majority, any possible CW must be supported by a coalition of skilled and unskilled voters.*

Proof. See the appendix. ■

To see the intuition of this Lemma, consider that unskilled voters decide unanimously, whereas skilled voters disagree on the optimal value of S[20]. Lemma 6 implies that one half skilled voters support the choice corresponding to the median capital versus any other alternative. Since $1/2$ skilled voters never form a majority, the support of the unskilled voters is essential even though they are a minority.

This has the crucial consequence that unskilled voters are pivotal, as is stressed in Remark 10. For now, we want now to know whether the set of possible single-dimension CWs is nonempty. This is done in the next Lemma:

Lemma 9 *In a vote over S, there exist an interval $[S_1, S_2] \subseteq [0, S_O]$ such that any $S \in [S_1, S_2]$ can be supported by a majority coalition of skilled and unskilled voters versus any other alternative. Analogously, in a vote over U, there exist an interval $[U_1, U_2] \subseteq [0, U_O]$ such that any $U \in [U_1, U_2]$ can be supported by a majority coalition of skilled and unskilled voters versus any other alternative. Any possible CW must lie in these intervals.*

Proof. See the appendix. ■

The Lemma above states that along each dimension there exists a subset of $[0, S_O]$ and a subset of $[0, U_O]$ whose elements satisfy the properties of a CW.

To understand why a majority coalition can be aggregated only on a subset of the possible alternatives, consider the following example: let S^* be any solution chosen by the unskilled voters. Since skilled votes are dispersed on $[0, S_O]$, there must exist k^* such that $S_S^* = S^*$.

By Lemma 6, skilled voters to the left of k^* support S^* versus $S' > S^*$, and skilled voters to the right of k^* support S^* versus $S'' < S^*$. If S^* were too high, it would be defeated by $S'' < S^*$; if it were too small, it would be defeated by $S' < S^*$. The reasoning for $U^*(S)$ is analogous.

Since each dimension admits a subset of possible CWs given by $[S_1, S_2]$ and $[U_1, U_2]$, we want to know whether an alternative in these subsets is actually picked up. In order to do so, the next Remark clarifies that unskilled voters are pivotal in the choice between the alternatives supported by a coalition.

Remark 10 *Unskilled voters are pivotal in the choice between any pair $\{S_\alpha, S_\beta\} \in [S_1, S_2]$ and any pair $\{U_\alpha, U_\beta\} \in [U_1, U_2]$.*

This Remark is a straightforward consequence of Lemma 8: since no CW exists without the support of the unskilled voters, it follows that they are decisive

[20]Lemma 8 -and, generally, the results of the model- do *not* depend on the simplifying assumption that unskilled voters own no capital. What matters is that labour income is increasing is S and decreasing in U for the unskilled voters, whereas the opposite occurs for the skilled voters. Endowing unskilled voters with capital makes the algebra more cumbersome without significant gains in generality.

within the coalition. As a consequence, unskilled voters will pick up a CW when their preferred alternative lies on these intervals. Intuitively, this only happens in a subset of the domains of $S^*(U)$ and $U^*(S)$.

Proposition 11 *(Existence of the single-dimensions CWs with skilled majority): consider the unskilled voters' optimal quotas $S^*(U)$ and $U^*(S)$. $S^*(U)$ is a single-dimension CW for any $U \in [U_a, U_b] \subseteq [0, U_O]$. $U^*(S)$ is a single-dimension CW for any $S \in [S_a, S_b] \subseteq [0, S_O]$*

Proof. See the appendix. ■

For given $S^*(U)$, $U^*(S)$, the proposition simply defines the subsets of their domains that produce a single-dimension CW. These subsets are defined in the Appendix.

Clearly, this establishes important restrictions for the existence of a CW of bidimensional voting. This issue is discussed in the next Section.

7.2 Single-dimension CWs: unskilled majority

Unskilled voters are homogeneous because they own no capital. Therefore, they decide unanimously. When they are the majority, finding the CWs is trivial. This is summarized in the following Proposition:

Proposition 12 *(Existence of the single-dimension CWs with unskilled majority): the unskilled voters' optimal quotas $S^*(U)$ and $U^*(S)$ are the single-dimension CWs.*

Proof. See the appendix. ■

In this case, the single-dimension CWs exist under very general conditions.

It is interesting to recall that skilled immigration will be restricted only if immigration aversion is high enough (see Prop. 4). On the contrary, some unskilled immigration will be approved only if the marginal cost of enforcing the border dominates the marginal wage benefit at $U = 0$ (see Prop. 5). Therefore, the quotas chosen by unskilled majorities should be biased towards skilled immigrants. This suggests that selective immigration policies biased towards skilled workers can easily emerge from an unskilled majority (provided that an equilibrium of the Shepsle procedure exists).

However, as was argued in the Introduction, unskilled voters are a minority in the countries adopting selective policies. Nonetheless, since they are pivotal, they are still able to bias policy towards their preferred outcome.

7.3 The Shepsle procedure equilibrium

So far, we have discussed the existence of a CW in each dimension with skilled and unskilled majorities respectively. Now we want to know whether the Shepsle procedure admits an equilibrium (i.e. a fixed point). Since unskilled voters are pivotal, the result of the Shepsle procedure can be summarized as follows:

Proposition 13 *(Shepsle procedure equilibrium): the unskilled voters' optimal quotas* $S^*(U)$ *and* $U^*(S)$ *generate always at least an equilibrium of the Shepsle procedure given by the pair* (S^{**}, U^{**})*. When the majority is unskilled, any pair* (S^{**}, U^{**}) *is a CW of the bidimensional voting. When the majority is skilled, a pair* (S^{**}, U^{**}) *is a CW of the bidimensional voting only if* $S^{**} \in [S_1, S_2]$ *and* $U^{**} \in [U_1, U_2]$.

Proof. See the Appendix. ■

According to this Proposition, the Shepsle procedure always gives an equilibrium given by $S^{**}(U)$, $U^{**}(S)$. However, when the majority is skilled the existence of a "global" CW requires that this point lies on the intervals supported by a coalition.

The model is therefore able to generate a selective immigration policy. But in the most relevant case restrictive conditions are needed for the existence of a CW in bidimensional voting. Acknowledgement of this problem is common in the literature: aggregating heterogeneous preferences requires always strong assumptions in order to avoid voting cycles.

Nonetheless, it is also well known that real-world voting outcomes are much more stable than theory predicts (see the classical contribution of Tullock, 1981). Selective immigration policies are indeed used in countries like Canada, Australia, the UK, the US.

The solution to the stability puzzle is also well known: in representative democracies, institutional arrangements and parliamentary procedures make the selection of a CW more likely than direct democracy.

According to Shepsle and Weingast (2010), "institutions constrain behaviour in ways that prevent endless voting cycles even in the presence of cyclical preferences".

Procedures induce voting stability mainly by restricting the domain of the alternatives, for example by fixing the agenda setting rules (Romer and Rosenthal, 1978) or by allocating the plenary time (Cox and McCubbins, 2005). In this paper voting cycles might arise because unskilled voters could prefer an alternative lying outside the intervals supported by a coalition. In such a situation, any institution or procedure able to restrict the domain of the vote to the intervals $[S_1, S_2]$, $[U_1, U_2]$ would *always* generate a CW. This task is usually carried out by parliamentary routines, which, unfortunately, do not emerge in the direct-democracy framework of this paper[21].

A property of the model is that different voting outcomes are possible, depending on whether the majority is skilled or unskilled, on the weight of immigration aversion, on the cost of border enforcement. In practice however, selective policies are explicitly aimed to restrict unskilled immigration more than they do for skilled immigration.

[21] Immigration restrictions can be studied also as the result of lobbying activities from different interest groups (see Mazza and Van Winden, 1996; Goldin, 1994; Epstein and Nitzan, 2006). In Amegashie (2004) a firm and a union compete in a lobbying contest to determine the immigration quota. A democratic government may bias its decisions to a certain extent, but it cannot reverse the preferences of its voters. For this reason, the lobbying approach is complementary to the model developed in this paper in explaining selective policies.

Such an outcome corresponds to the case of a coalition where unskilled voters are pivotal and they are successful in biasing the final choice to their own advantage despite the fact that they are in the minority.

We have therefore a plausible solution to the puzzle outlined in the introduction: why skilled, well-educated societies are closed to unskilled workers and why selective policies are biased towards skilled immigration.

Interestingly, unskilled voters cannot set skilled immigration at their own will, even though they are decisive: for example, the size of the coalition supporting $S^*(U) = S_O$ could be too small, because skilled workers with little capital would never support such an outcome[22].

The last remark leads us to wonder how the capital distribution $n(k)$ affects the range of the possible CWs. The width of $[S_1, S_2]$ and of $[U_1, U_2]$ is determined by $n(k)$ and by the weight of the unskilled workers on the population. This effect is summarized in the following Remark:

Remark 14 *(Range of the possible CWs): the intervals* $[S_1, S_2]$*,* $[U_1, U_2]$ *shift according to the skewness of n(k) and to the share of unskilled voters in the total population.*

Proof. See the appendix. ■

According to this Remark, the role of $n(k)$ is crucial in determining the subsets containing the CW.

In this respect, we know that capital distribution is even more concentrated than income distribution: while Gini indexes for the latter range from 0.3 to 0.5, figures for wealth concentration are 0.6-0.8 [23](Davies et al., 2011.; see also Cagetti and De Nardi, 2008).

This finding is very important: it implies that the range of the possible CWs is biased downwards, because most voters do not own enough capital to get a net benefit from skilled immigration. Notice however, that if unskilled workers are an important share of the population, they need the support of few skilled voters to form a majority. This, in turn, widens the intervals $[S_1, S_2]$, $[U_1, U_2]$.

The final range of these intervals -thus the potential openness to immigration- depends on which effect prevails.

Actual selective policies seem compatible with a scenario in which unskilled voters bias the final outcome, but where skilled voters are still able to impose some protection.

This supposition is confirmed by the observation that barriers to entry are decreasing with respect to skills, but that skilled immigration is far from being open. This supports the conjecture that gains from immigration accruing to capital income benefit only a tiny minority. The available Gini indexes[24] are

[22] Immigration aversion is more important to explain restrictions for unskilled immigration: skilled majorities do not need to form any coalition if $\gamma_S = 0$ and $U^*(S) = U_O$.

[23] In the model, capital is a physical asset. As such, it is included in the definition of wealth adopted in Davies et al. (2011). Therefore, to conjecture that the capital distribution coincides with the wealth distribution is a good approximation.

[24] According to Davies et al. (2011) the values are 0.69 (Canada); 0.622 (Australia); 0.7 (UK); 0.81 (US).

consistent with this hypothesis[25].

8 Conclusions

This paper has developed a model of voting over selective immigration policies within a three-factor, two-country model.

Particular attention has been paid to both the effects on capital income, and the effect of aversion to immigration, whose importance in the literature seems underplayed given the empirical evidence. Heterogeneity in the capital distribution enables unskilled natives with a decisive vote to reduce protection for the skilled majority. Immigration aversion however, seems useful to explain why skilled majorities restrict the entry of a complementary factor. From an economic point of view protectionism against unskilled immigrants is more difficult to explain than protectionism against skilled immigrants. Fiscal concerns alone seem insufficient to account for this outcome, since immigration has opposing effects on the public budget: it can be a burden in the short run, but it supports the welfare state in the long run. Moreover, sealing the border entails significant costs for many countries. As a consequence it seems likely that, in the presence of uncertainty on the net fiscal effect of immigration, immigration aversion is crucial in tipping the scales in favour of restriction.

The model contributes to the literature by explaining why protection for skilled voters is less prevalent than one would expect: unskilled voters take advantage of a decisive voting power even though they are in the minority, and they bias the final choice in their favour. Skewness in the capital distribution however, is likely to reduce the extent of both skilled and unskilled immigration liberalization.

In other words, while gains from trade can be easily acquired via lower prices, gains from immigration via capital income benefit only a tiny fraction of capital owners. Since wealth concentration is a structural characteristic of the world's economies, the possibility of reducing the barriers to immigration appears quite unlikely in the near future.

In conclusion, selective policies can be considered as a clever form of *selective protectionism*: entry is easier only for highly skilled individuals in specific sectors of the economy[26]. Openness to the most qualified workers is often presented as necessary to boost economic growth. The implicit assumption is that importing only the highest skills allows gains in productivity that benefit the whole economy. A policy able to deliver such benefits would be adopted unanimously.

In practice, technological innovations of this extent are not frequent. However, the outcome of the model is not at odds with this idea, provided that

[25] By using the 1998-2007 inflow/population rate (Source: OECD, 2008) as a rough measure of openness to immigration, we get the following ranking: Canada: 0.0075; Australia: 0.007; UK: 0.0056; US: 0.0032. According to these figures, inflows per capita are higher in Canada and Australia, where wealth concentration is smaller.

[26] In some respects, these results complement the findings of Hillman and Weiss (1999), who argue that selective enforcement of immigration restrictions -hence *selective illegality*- is a form of protectionism to divert labour inflows into sectors where they benefit the natives.

the skilled quota includes the most qualified immigrants. Obviously, a proper analysis of this issue requires a dynamic endogenous growth framework. This extension is a promising subject for future research. For the moment, the model presented sheds some light on the inconsistency of the selective immigration policies.

References

[1] Benhabib J., 1996, On the Political Economy of Immigration, European Economic Review 40, 1737-1743.

[2] Bilal S., Grether J.M., de Melo J., 2003, Attitudes Towards Immigration: a Trade-Theoretic Approach, Review of International Economics 11 (2),253-67 .

[3] Boeri T., Bruecker H., 2005, Why Are Europeans so Tough on Migrants?. Economic Policy, 44 (20), 629-703.

[4] Bonin H., Raffelhuschen, B., Walliser J., 2000, Can Immigration Alleviate the Demographic Burden? FinanzArchiv 57, 1-21.

[5] Borjas G. J., 1994, The Economics of Immigration, Journal of Economic Literature, XXXII, 1667-1717.

[6] Borjas G. J., 1999, Economic Research on the Determinants of Immigration, World Bank Technical Paper no. 438, September.

[7] Bosi S., Iliopulos E., Magris F., 2008, Skills, Immigration and Selective Policies, Zagreb International Review of Economics and Business, 11 (2), 1-19.

[8] Cagetti M., De Nardi M., 2008, Wealth Inequality: Data and Models, Macroeconomic Dynamics, vol. 12(S2), 285-313.

[9] Chiarotti V., Martelli S., 2005, Gestione delle risorse previste in connessione con il fenomeno dell'immigrazione, Corte dei Conti, Rome.

[10] Commander S., Kangasniemi M., Winters A. L., 2004, The Brain Drain: Curse or Boon?, In Baldwin R., Winters A. L. (eds.), Challenges to Globalization, NBER, The University of Chicago Press, 235-278.

[11] Cox G.W., McCubbins M., 2005, Setting the Agenda: Responsible Party Government in the US House of Representatives, New York, Cambridge University Press.

[12] Davies J. B., Sandström S., Shorrocks A., Wolff E. N., 2011, The Level and Distribution of Global Household Wealth, The Economic Journal 121, 223-254.

[13] Dustmann C., Preston I., 2007, Racial and Economic Factors in Attitudes to Immigration, Advances in Economic Analysis & Policy, Berkeley Electronic Press, vol. 7(1), 1655-1681.

[14] Ethier W.J., 1986, Illegal Immigration: The Host-Country Problem, American Economic Review, 76(1), 56-71.

[15] Epstein G., Weiss A., 2001, A Theory of Immigration Amnesties, CEPR working paper 2830.

[16] Facchini G., Willmann G., 2005, The Political Economy of International Factor Mobility, Journal of International Economics 67, 201-219.

[17] Grether J.M., de Melo J., Muller T., 2001, The Political Economy of International Migration in a Ricardo-Viner Model, in S. Djajic (ed). International Migration: Trends, Policy, and Impact, Routledge, London, pp.42-68.

[18] Goldin C., 1994, The Political Economy of Immigration Restriction in the United States, 1890 to 1921, in Goldin C., Libecap G. (eds.) "The Regulated Economy: an Historical Analysis of Government and the Economy", University of Chicago Press, 223-258.

[19] Hansen J. D., 2003, Immigration and Income Redistribution in Welfare States, European Journal of Political Economy, 19, 735-746.

[20] Hanson G. H, Scheve K., Slaughter M. J, 2007, Public Finance and Individual Preferences over Globalization Strategies, Economics and Politics, vol. 19(1), 1-33.

[21] Hanson G., Spilimbergo A., 2001, Political economy, sectoral shocks, and border enforcement, Canadian Journal of Economics, vol. 34(3), 612-638.

[22] Heinmueller J., Hiscox M.J., 2007, Educated Preferences: Explaining Attitudes Toward Immigration in Europe, International Organization 61 (2): 399-442.

[23] Hillman A., L., Weiss A., 1999, A Theory of Permissible Illegal Immigration, European Journal of Political Economy, 15, 585-604.è

[24] Lemos S., Portes J., 2008, New Labour? The Impact of migration from Central and Eastern European Countries on the UK Labour Market, IZA discussion paper n. 3756.

[25] Lucas E. R., 1990, Why Doesn't Capital Flow from Rich to Poor Countries?, American Economic Review, vol. 80(2), 92-96, May.

[26] Magris F., Russo G., 2005, Voting on Mass Immigration Restriction, Rivista Internazionale di Scienze Sociali, vol.1, 67-92.

[27] Magris F., Russo G., 2009, Selective Immigration Policies, Human Capital Accumulation and Migration Duration in Infinite Horizon, Research in Economics 63, 114-126.

[28] Mayda A.M., 2006, Who Is Against Immigration? A Cross-Country Investigation of Individual Attitudes toward Immigrants, The Review of Economics and Statistics, vol. 88(3), 510-530.

[29] Mayr K., 2007, Immigration and Income Redistribution: a Political Economy Analysis, Public Choice 131 (1), 101-116.

[30] Mazza I., Van Winden F., 1996, A Political Economic Analysis of Labor Migration and Income Redistribution, Public Choice. 88(3-4), 333-63.

[31] Miguet F., 2008, Voting about Immigration Policy: what does the Swiss Experience Tell Us ?, European Journal of Political Economy, 24, 628-641.

[32] Nannestad P., 2007, Immigration and Welfare States: A Survey of 15 Years of Research, European Journal of Political Economy, 23, 512-532.

[33] OECD, 2007. Education at a Glance, Paris.

[34] OECD, 2008, Sopemi Migration Report, Paris

[35] O' Rourke K. H., Sinnott R., 2006, The Determinants of Individual Attitudes towards Immigration, European Journal of Political Economy, Vol. 22, (4), 838-861.

[36] Ortega F., 2005, Immigration Quotas and Skill Upgrading, Journal of Public Economics, 89 (9-10), pp. 1841-1863.

[37] Ortega J. M., Rheinboldt W.C., 2000, Iterative Solutions of Nonlinear Equations in Several Variables, Society for Industrial and Applied Mathematics.

[38] Ottaviano G., Peri G., 2011, Rethinking the Effect of Immigration on Wages, Journal of the European Economic Association, forthcoming.

[39] Ottaviano G., Peri G., 2008, Immigration and National Wages: Clarifying the Theory and the Empirics", NBER working papers 14188.

[40] Ramos F., 1992, Out-Migration and Return Migration of Puerto Ricans, in Borjas G. J. and Freeman R.B. (eds.), Immigration and the Work Force: Economic Consequences for the United States and Source Areas. University of Chicago Press.

[41] Razin A., Sadka E., 1999, Migration and Pensions with International Capital Mobility, Journal of Public Economics, 74(1), 141-150.

[42] Razin A., Sadka E., 2004, Welfare Migration: Is the Net Fiscal Burden a Good Measure of its Economic Impact on the Welfare of the Native-Born Population?, CESifo Economic Studies, Vol. 50, n.4, 709–716.

[43] Romer T., Rosenthal H., 1978, Political Resource Allocation, Controlled Agendas, and the Status Quo, Public Choice 33, 27-43.

[44] Scheve K.F., Slaughter M.J., 2001, Labor-Market Competition and Individual Preferences Over Immigration Policy, The Review of Economics and Statistics, 83(1), pp. 133-145.

[45] Schiff M., 2002, Love Thy Neighbor: Trade, Migration and Social Capital, European Journal of Political Economy 18, 87-107.

[46] Shepsle K. A. 1979, Institutional Arrangements and Equilibrium in Multidimensional Voting Models, American Journal of Political Science 23(1), 27-59.

[47] Shepsle K. A., Weingast B. 2010, Why So Much Stability?: Majority Voting, Legislative Institutions, and Gordon Tullock, Public Choice, special issue in honor of Gordon Tullock, forthcoming.

[48] Stark O., Casarico A., Devillanova C., Uebelmesser S., 2009, International Migration, Human Capital Formation and the Setting of Migration Control Policies: Mapping the Gains, in Kornai J., Màtiàs L., Roland G. (eds.): Corruption, Development and Institutional Design, Palgrave Macmillan, Basingstoke, chapter 9, pp.169-186.

[49] Stark O., Helmenstein C., Prskawetz A. 1997, A Brain Gain with a Brain Drain, Economics Letters, 55(2), 227-234(8).

[50] Steedman H., MacIntosh S. 2001, Measuring Low Skills in Europe: how Useful is the ISCED Framework?, Oxford Economic Papers 53(3), pp. 564-581.

[51] Storesletten K., 2000, Sustaining Fiscal Policy through Immigration, Journal of Political Economy 108(2), pp. 300-323.

[52] Thum M., 2004, Controlling Migration in an Open Labor Market, Public Choice 119, (3/4), 425-443.

[53] Tullock G., 1981, Why so Much Stability?, Public Choice 37, 189-205.

Appendix

Proof of Lemma 1
Existence:
Here we rewrite the system of inequalities in (15):

$$\begin{cases} F_S\left[(S_D+S^*),(U_D+U^*),K\right](1-t(S^*,U^*) \geq \theta_S G_S\left[(S_O-S),(U_O-U)\right] \\ \qquad\qquad (15-1) \text{ -skilled} \\ F_U\left[(S_D+S^*),(U_D+U^*),K\right](1-t(S^*,U^*) \geq \theta_U G_U\left[(S_O-S),(U_O-U)\right] \\ \qquad\qquad (15-2) \text{ -unskilled} \end{cases}$$

we first consider the case of no immigration quotas. We want to know whether the system of inequalities (15) admits a solution. The production functions F and G are strictly concave, invertible[27], and differentiable in all their arguments. The marginal productivities are also differentiable and invertible in all their arguments. Now we assume that, in the absence of any migration, the net wage is higher in D both for skilled and unskilled workers (assumption AA). This implies that the Left Hand Side dominates the Right Hand Side in $S=0$ for ineq. $(15-1)$ and that the LHS dominates the RHS in $U=0$ for ineq. $(15-2)$[28].

We explore the existence of a unique solution to $(15-1)$. The RHS of $(15-1)$ is increasing in S: the marginal productivity of skilled work in O increases as skilled workers migrate.

The slope of the LHS instead is

$$\frac{\partial LHS}{\partial S} = \underbrace{F_{SS}(.,.,.)(1-t(S,U))}_{a} - \underbrace{F_S(.,.,.)t_S(S,U)}_{b}$$

where $a<0$ is the decreasing marginal productivity, and $b<0$ is the marginal tax (decreasing in S). The slope of the LHS depends on the difference between a and b. By Assumption (10) we know that $\frac{\partial LHS}{\partial S}<0$ at $S=S_O$. On the other hand, if the marginal tax is sufficiently high at $S=0$, it is possible that $\frac{\partial LHS}{\partial S}>0$ in a neighborhood of 0. This could cause multiple solutions, as shown in the figure below:

[27] Thus, given any production level $\tilde{F}=F(\tilde{S},\tilde{U},\tilde{K})$ it is always possible to obtain $\tilde{S}=a(\tilde{F},\tilde{K},\tilde{U})$, $\tilde{U}=b(\tilde{F},\tilde{S},\tilde{K})$ and $\tilde{K}=c(\tilde{F},\tilde{S},\tilde{U})$. The same holds for $G(U,S)$, and for the marginal productivities. This assumption is required in order to assure the local uniqueness of fixed points when whe apply the Brouwer Fixed-Point Theorem. Notice that standard production functions like a CD or a CES satisfy this assumption.

[28] This assumption is needed in order to avoid multiple solutions, as we are goig to see in what follows.

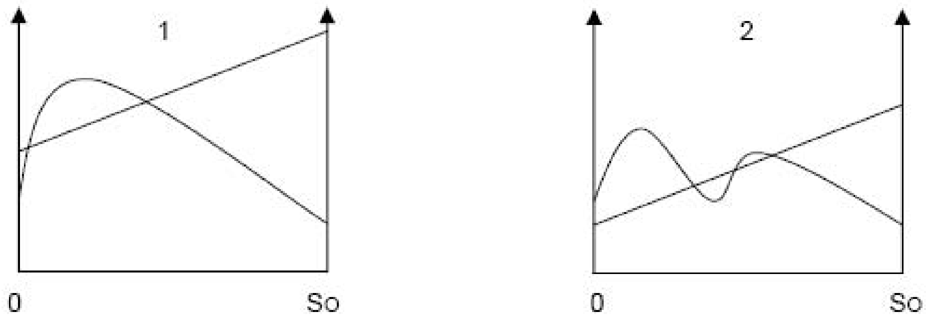

Figure A.1: multiple solutions

Howevere, Assumption AA rules out case (1) and case (2) is not possible because the derivative $\frac{\partial LHS}{\partial S}$ can equal zero at most once[29]. We conclude that $\hat{S}(U)$ that satisfies ineq. $(15-1)$ exists and is unique. Continuity of $\hat{S}(U)$ follows from the invertibility of $F_S(S,U,K)(1-t(S,U))$ and of $G_S(U,S)$[30]. The same reasoning proves that inequality $(15-2)$ admits a unique solution $\hat{U}(S)$, continuous in S.

Now, we have to prove that, given $\hat{S}(U)$ and $\hat{U}(S)$, it is possible to find a pair $(\hat{S}^E, \hat{U}^E)$ such that $\hat{S}(\hat{U}^E) = \hat{S}^E$, and $\hat{U}(\hat{S}^E) = \hat{U}^E$. This pair exists when the function $\Phi = \hat{U}(\hat{S}(\hat{U}))$ has a fixed point.

Since $\hat{S}(U)$ and $\hat{U}(S)$ are continuous and their domain is compact, $\Phi\hat{U}(\hat{S}(\hat{U}))$ maps the compact interval $[0, U_O]$ continuously into itself, and existence is proved by the Brouwer's fixed point theorem. We conclude that the system of inequalities (15) admits at least a solution.

Now we have to prove that an equilibrium exists even in the presence of quotas. We begin again with ineq. $(15-1)$. A quota S^{**} is binding whenever $S^{**} < \hat{S}(U)$. Since $\hat{S}(U)$ maps $[0, U_O]$ into $[0, S_O]$, the quota simply restricts the codomain of $\hat{S}(U)$ to $[0, S^{**}]$. Thus when the quota is binding we can define $\hat{S}_Q(U)$, that maps $[0, U_O]$ continuously into $[0, S^{**}]$.

The same holds for $\hat{U}(S)$: when the quota is binding, we can define $\hat{U}_Q(S)$ that maps $[0, S_O]$ continuously into $[0, U^{**}]$, where $U^{**} < U_O$. We have to prove that there exist a pair $(\hat{S}^E_Q, \hat{U}^E_Q)$ such that $\hat{S}_Q(\hat{U}^E_Q) = \hat{S}^E_Q$, and $\hat{U}_Q(\hat{S}^E_Q) = \hat{U}^E_Q$. This occurs when the function $\Phi_Q = \hat{U}(\hat{S}_Q(\hat{U}_Q))$ has a fixed point.

By construction, $\Phi_Q = \hat{U}_Q(\hat{S}_Q(\hat{U}_Q))$ maps continuously $[0, U_O]$ into $[0, U^{**}]$. Since $[0, U^{**}] \subseteq [0, U_O]$, it is still possible to apply the Brouwer's fixed-point theorem (see, for example, Ortega and Rheinboldt, 2000, page 161), and the system of inequalities (15) admits at least a solution.

[29] Suppose that $\frac{\partial LHS}{\partial S} = 0$. This implies $\frac{F_{SS}(S,U,K)}{F_S(S,U,K)} = \frac{t_S(S,U)}{(1-t(S,U))}$, which can be true at most once, since both members are negative and increasing.

[30] $F_S(S,U,K)(1-t(S,U))$ is the product of two functions invertible with respect to S and U. This product is also invertible. Thus, the intersection of $F_S(S,U,K)(1-t(S,U))$ and $G_S(S,U)$ moves smoothly as U changes. Notice that this also ensures that "jumps" of $\hat{S}(U)$ are not possible in a neighborhood of a corner solution.

Local Uniqueness

we begin with the case in which quotas are not binding. In order for the solution $\hat{S}(\hat{U}^E) = \hat{S}^E$, $\hat{U}(\hat{S}^E) = \hat{U}^E$ to be locally unique, we need that there does not exist an interval where the functions $\hat{S}(U)$ and $\hat{U}(S)$ overlap. This is true when they are analytic (i.e., they can be developed in a convergent Taylor series in any point of their domain). Notice that any standard, smooth, production function (like a C-D or a CES) and its derivatives are analytic. By strict concavity, the second derivative of the production function is always negative. Therefore, $\hat{S}(U)$ and $\hat{U}(S)$ are obtained by inverting an analytic marginal productivity with a nonzero derivative. Since the inverse of an analytic function with a nonzero derivative is analytic, it follows that $\hat{S}(U)$ and $\hat{U}(S)$ are analytic.

When only a quota is binding, any solution is locally unique: the quota is a straight line, thus it is still an analytic function. When both quotas are binding, only the solution (S^{**}, U^{**}) exists.

Proof of Proposition 2

Consider the derivative of (16) with respect to S:

$$\frac{\partial Q_S}{\partial S} = [F_{SS} + kF_{KS}](1 - t(S, U)) - t_S(S, U)[F_S + kF_K] - \delta_S S \tag{18}$$

at $S = 0$ it is possible to solve the inequality $\frac{\partial Q_S}{\partial S} > 0$ with respect to k: this gives k_0. k_{S_O} is obtained by solving $\frac{\partial Q_S}{\partial S} < 0$ with respect to k at $S = S_O$.

Proof of Proposition 3

Consider the derivative of (16) with respect to U:

$$\frac{\partial Q_S}{\partial U} = [F_{SU} + kF_{KU}](1 - t(S, U)) - t_U(S, U)[F_U + kF_K] - \gamma_S U \tag{19}$$

it is easy to check that, at $U = 0$, $\frac{\partial Q_S}{\partial U} > 0$. k_{U_O} is obtained by solving $\frac{\partial Q_S}{\partial U} < 0$ with respect to k at $U = U_O$.

Proof of Proposition 4

The Proposition is proved by direct inspection of the derivative $\frac{\partial Q_U}{\partial S}$.

$$\frac{\partial Q_U}{\partial S} = F_{US}(1 - t(S, U)) - t_S(S, U)F_U - \delta_U S \tag{20}$$

Since $\frac{\partial Q_U}{\partial S}$ is always positive at $S = 0$, to have interior solutions we only need that $\frac{\partial Q_U}{\partial S} < 0$ at $S = S_O$. Therefore, it is immediate to obtain

$$\delta_U > \frac{F_{US}(1 - t(S_O, U)) - t_S(S_O, U)F_U}{S_O}.$$

Proof of Proposition 5

Consider the derivative of the utility:

$$\frac{\partial Q_U}{\partial U} = F_{UU}(1 - t(S,U)) - t_U(S,U)F_U - \gamma_U U \tag{21}$$

$F_{UU}(1-t(S,U))$ is the marginal wage loss due to labour market competition, and $t_U(S,U)F_U$ is the marginal fiscal benefit due to relaxed border enforcement. Notice that, in a neighborhood of $U = 0$, the marginal tax is highest and (marginal) immigration aversion is negligible: the final result depends only on the net marginal wage effect. In a neighborhood of $U = U_O$ the situation is reversed when

$$\gamma_U > \frac{F_{UU}(1 - t(S,U_O)) - t_U(S,U_O)F_U}{U_O}.$$

Proof of Lemma 6

We need to prove that the preferences of skilled workers are single-crossing along both dimensions (S,U). That can be done by applying the definition: preferences Q_S exhibit the single-crossing property with respect to S if we can order the voters from left to right according to their capital endowment and, given $S' > S^{''}$ and $k' > k^{''}$, we have:

$$\begin{array}{llllll} if & Q_S(k'',S') \geq Q_S(k'',S'') & (\alpha) & then & Q_S(k',S') \geq Q_S(k',S'') & (\alpha\prime) \\ & \quad and & & & & \\ if & Q_S(k',S'') \geq Q_S(k',S') & (\beta) & then & Q_S(k'',S'') \geq Q_S(k'',S') & (\beta\prime) \end{array}$$

We can rearrange condition (α) as follows (omitting for simplicity the arguments other than S):

$$\begin{aligned} & k''\left[F_K(S')(1-t(S')) - F_K(S'')(1-t(S''))\right] \geq \\ & \geq F_S(S'')(1-t(S'')) - F_S(S')(1-t(S')) + \delta_S(S'-S'') \end{aligned} \tag{22}$$

since $k'' < k'$, it follows that (α) implies (α'). Now, we rearrange condition (β) as well:

$$\begin{aligned} & F_S(S'')(1-t(S'')) - F_S(S')(1-t(S')) + \delta_S(S'-S'') \geq \\ & \geq k'\left[F_K(S')(1-t(S')) - F_K(S'')(1-t(S''))\right] \end{aligned} \tag{23}$$

again, since $k' > k''$, (β) implies (β').

Now we have to prove that preferences are single-crossing with respect to U. Conditions (α) and (β) are the same, but we consider now $U' > U''$ instead of $S' > S''$. We rearrange condition (α), and we obtain

$$\begin{aligned} & k''[F_K(U')(1-t(U')) - F_K(U'')(1-t(U''))] + \\ & +[F_S(U')(1-t(U')) - F_S(U'')(1-t(U''))] \geq \gamma_S(U^{'} - U^{''}) \end{aligned} \tag{24}$$

Notice that the coefficient of k'' is negative, therefore, since $k' > k''$, (α) implies (α'). Condition (β) can be written as

$$\gamma_S(U^{'2} - U^{''2}) \geq [F_S(U')(1 - t(U')) - F_S(U'')(1 - t(U''))] +$$
$$+ k'[F_K(U')(1 - t(U')) - F_K(U'')(1 - t(U''))]$$

again, since $k' > k''$, (β) implies (β'). We conclude that the preferences described by Q_S are single crossing along S and U.

Proof of Lemma 7

We are in the case of a skilled majority, thus the median voter is skilled. Unskilled voters, who are not endowed with capital, lie on the left of the median voter. Suppose that the median voter's capital endowment is such that she chooses an interior solution $S^*_{SM} \in (0, S_O)$. By Prop. 2, voters endowed with $k > k_{S_O}$ choose the corner solution $S^*_S = S_O$. By Prop. 4, unskilled voters also choose $S^* = S_O$ when δ_U is sufficiently low. As a consequence, it is not true that all voters to the left of the median voter support S^*_M versus S_O. In general, there is no reason for the unskilled voters to support S^*_M versus $S^{'} > S^*_M$, therefore the median voter theorem cannot be applied.

Proof of Lemma 8

We want to prove that, when the vote is not polarized, a majority of skilled voters cannot single out a CW without a coalition with the unskilled voters.

In the destination country there are S_D skilled voters. Suppose they account for 70% of the total population. To form a skilled majority of the total population, it is sufficient to find z such that $0.7z > 1/2$.

In this example, we need $z > 0.715$. The crucial remark is that, until there exist at least an unskilled voter, it must be $z > 1/2$, i.e. more than one half skilled voters are needed to support a winner.

Consider now an alternative S^A. Since votes are dispersed, we know that there exist k_A such that the optimal choice of the voter endowed with k_A is S^A. From Lemma 6 we know that the skilled voters supporting S^A versus $S' > S^A$ are $\int_{\underline{k}}^{k_A} n(k)dk$. Analogously, S^A is supported versus $S'' < S^A$ by $\int_{k_A}^{\bar{k}} n(k)dk$ skilled voters. For S^A being a CW, we need that S^A has a majority both versus S' and S'', therefore the following conditions must hold *simultaneously*:

$$1): \frac{\int_{\underline{k}}^{k_A} n(k)dk}{S_D} \geq z \qquad (S^A \text{ defeats } S' > S^A)$$

$$2): \frac{\int_{k_A}^{\bar{k}} n(k)dk}{S_D} \geq z \qquad (S^A \text{ defeats } S'' < S^A)$$

However since $z > 1/2$, this implies

$$\frac{\int_{\underline{k}}^{k_A} n(k)dk}{S_D} > \frac{1}{2} \qquad \textit{and} \qquad \frac{\int_{k_A}^{\bar{k}} n(k)dk}{S_D} > \frac{1}{2}$$

i.e., $\frac{S_D}{S_D} > 1$, a contradiction. The same reasoning holds for the decision over U.

Proof of Lemma 9

The Lemma is concerned with the case of a skilled majority when votes are dispersed (Prop. 2, case (a)). By Lemma 8, we know that any CW needs the support of the unskilled voters. Consider again an alternative S^A. By Lemma 8, S^A is supported by $\int_{\underline{k}}^{k_A} n(k)dk$ skilled voters versus $S' > S^A$, and by $\int_{k_A}^{\bar{k}} n(k)dk$ skilled voters versus $S'' < S^A$.

For S^A being a CW, it must be supported by a majority coalition versus $S' > S^A$ and versus $S'' < S^A$. The coalition must therefore satisfy two conditions:

$$1') : \frac{U_D + \int_{\underline{k}}^{k_A} n(k)dk}{U_D + S_D} \geq \frac{1}{2} \qquad (S^A \text{ defeats } S' > S^A)$$

$$2') : \frac{U_D + \int_{k_A}^{\bar{k}} n(k)dk}{U_D + S_D} \geq \frac{1}{2} \qquad (S^A \text{ defeats } S'' < S^A).$$

Remark now that at least one condition must hold with inequality. For example, if unskilled voters are 30% of the total population, the smallest winning coalition needs the support of only 28.5% skilled voters. If S^A is supported by 28.5% skilled voters versus S' , it will be supported by 71.5% skilled voters versus S''. It follows that there exist a continuum of alternatives satisfying conditions 1') and 2'). Thus there exist an interval $[S_1, S_2]$ of possible CWs[31].

The lower bound (S_1) and the upper bound (S_2) can be found by computing the values of k (say k_1 and k_2) such that both 1') and 2') hold with equality: S_1 is the choice of S for the capital endowment k_1, and S_2 is the choice of S for the capital endowment k_2. Conditions 1') and 2') become then

$$1') : \frac{U_D + \int_{\underline{k}}^{k_A} n(k)dk}{U_D + S_D} = \frac{1}{2}$$

$$2') : \frac{U_D + \int_{k_A}^{\bar{k}} n(k)dk}{U_D + S_D} = \frac{1}{2}.$$

By construction, $k_2 \geq k_1$. Given $k_2 \geq k_1$, it is easy to see that $S_2 \geq S_1$. In case of interior solutions, since S_1 and S_2 are the optimal choice for k_1 and k_2 respectively, they satisfy $\frac{\partial Q_S}{\partial S} = 0$, i.e.

$$k[F_{KS}(1 - t(S,U)) - t_S(S,U)F_K] - t_S(S,U)F_S = \delta_S S - F_{SS}(1 - t(S,U)) \quad (25)$$

Where the LHS of (25) is the marginal gain and the RHS is the marginal loss. Both the LHS and the RHS are increasing in S, and k rescales the LHS. As a

[31] In the boundary case of a single unskilled voter, $[S_1, S_2]$ is reduced to a point coinciding with the choice of the individual endowed with the median capital.

consequence, the value of S that equals the marginal gain and the marginal loss must be increasing in k. In the case of corner solutions, if k_2 chooses $S_2 = S_0$, it must be $S_1 \leq S_2$; if k_2 chooses $S_2 = 0$, it must be $S_1 = S_2 = 0$. The interval $[U_1, U_2]$ is determined by the same procedure.

Proof of Proposition 11

Consider utility (17) for a given U. Eq. (17) is a continuous function defined on a compact domain, thus via the Weierstrass Theorem we know that the optimal choice $S^*(U)$ exist. According to the game-theoretical literature, it is assumed that the global maximum of the reaction function $S^*(U)$ is unique[32]. Since eq. (17) is continuous in U, and $[0, U_O]$ is compact, the Theorem of the Maximum holds, and we know that $S^*(U)$ maps continuously the interval $[0, U_O]$ into $[0, S_O]$. Therefore, there must exist a subset $[U_a, U_b] \subset [0, U_O]$ such that $S^*(U) \in [S_1.S_2]$. The same reasoning applies to the interval $[S_a.S_b]$.

Proof of Proposition 12

Unskilled voters decide unanimously, thus $S^*(U)$ and $U^*(S)$ coincide with the single-dimension CWs. The existence and continuity of $S^*(U)$ and $U^*(S)$ are shown in the previous proof.

Proof of Proposition 13

By remark 10 we know that unskilled voters are pivotal for any choice between two alternatives included in $[S_1, S_2]$, and in $[U_1, U_2]$[33]. In order to apply the Shepsle procedure, $S^*(U)$ and $U^*(S)$ can be considered two "reaction functions" defined, respectively, over the compact intervals $[0, U_O]$ and $[0, S_O]$.

Consider first $S^*(U) : [0, U_O] \to [0, S_O]$, then $U^*(S) : [0, S_O] \to [0, U_O]$. Both $S^*(U)$ and $U^*(S)$ are continuous, and we adopt the standard assumption that they are unique[34]. We build now the function $\Omega = S^*(U^*(S)) : [0, S_O] \to [0, S_O]$. For an equilibrium to exist, Ω must have a fixed point. Since Ω maps continuously $[0, S_O]$ into itself, the Brouwer theorem applies, thus there exist at least an equilibrium S^{**}, U^{**} of the Shepsle procedure. This equilibrium is always a CW of the bidimensional vote when the majority is unskilled. With a skilled majority, a pair S^{**}, U^{**} is a CW only if $S^{**} \in [S_1, S_2]$ and $U^{**} \in [U_1, U_2]$. The "reaction functions" must intersect within the intervals supporting a coalition[35].

Proof of Remark 14

Suppose that the alternative supported by unskilled voters is S^A. For S^A to defeat $S' > S^A$ we need that conditions 1') and 2') hold. Consider condition

[32] In footnote 33 it is explained why this assumption is needed.

[33] See the second part of this Appendix to check the conditions for $S^*(U)$ and $U^*(S)$ to be a CW when they lie on the boundary.

[34] Otherwise, the domain of Ω would not be convex. This assumption, usual in the literature, restricts the existence to the case in which $S^*(U)$ and $U^*(S)$ are unique.

[35] This could be not necessary when the vote of a skilled majority is polarized, as it is explained in the second part of this appendix.

1'):

$$1'):\frac{U_D+\int_{\underline{k}}^{k_A}n(k)dk}{U_D+S_D}\geq\frac{1}{2}\qquad (S^A \text{ defeats } S'>S^A)$$

Consider now two distributions $n(k)$ and $n'(k)$, both continuous and defined over $[\underline{k},\bar{k}]$. Since the population size does not change, we have also $\int_{\underline{k}}^{\bar{k}}n(k)dk = \int_{\underline{k}}^{\bar{k}}n'(k)dk = S_D$. Assume now that $n'(k)$ is symmetrical, and $n(k)$ is left-skewed. It follows that, for $k_A<\bar{k}$, $\int_{\underline{k}}^{k_A}n(k)dk > \int_{\underline{k}}^{k_A}n'(k)dk$. Therefore, Condition 1') holds with equality for $k_1<k_1'$, and $S_1<S_1'$. By applying the same reasoning to condition 2') it is possible to prove that the upper bound S_2 is lower for the left-skewed distribution $n(k)$. The same applies to the interval $[U_1,U_2]$.

Part II: polarized vote with skilled majority

Voting over S: corner solutions.

According to Proposition 2, when $k_0>k_{S_O}$, we have $S_S^*(U)=0$ for any $k\leq k_{S_O}$, and $S_S^*(U)=S_O$ for any $k>k_{S_O}$. In this case, a coalition of skilled and unskilled voters might not be necessary to form a majority if enough skilled voters choose the same solution, since the latter are more than half the population.

If a solution -say S_O- is chosen by a fraction y of the skilled voters, then, when $xy>1/2$, S_O is a CW.

Voting over U: corner solutions.

According to Proposition 3, when $k_{U_O}<0$, $U_S(S)^*=U_O$ for any k. Therefore, skilled voters decide unanimously, and $U_S(S)^*=U_O$ is the CW. Again, no coalition is needed.

The Bidimensional CW

In the case of corner solutions, a skilled majority chooses unskilled immigration unanimously, thus $U_S(S)^*=U_O$ for any S. With respect to $S_S^*(U)$, we have two possibilities: either a coalition is not needed, or it is. In the first case, the bidimensional CWs are either (S_O,U_O) or $(0,U_O)$. When skilled voters cannot decide alone, we go back to Proposition 13, remarking that $[S_a,S_b]=[0,S_O]$.