Giordani, Paolo E.; Ruta, Michele

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Paolo E. Giordani
LUISS "Guido Carli" University

Michele Ruta
World Trade Organization

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Self-Confirming Immigration Policy*

Paolo E. Giordani†
LUISS "Guido Carli" University

Michele Ruta‡
World Trade Organization

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Abstract

We study immigration policy in a small receiving economy under self-selection of migrants. We show that a *non-discriminatory* immigration policy choice affects and is affected by the migratory decisions of skilled and unskilled foreign workers. From this interaction multiple equilibria may arise, which are driven by the natives' expectations on the welfare effects of immigration. In particular, pessimistic (optimistic) beliefs induce a country to impose higher (lower) barriers to immigration, which crowd out (crowd in) skilled migrants and thus confirm initial beliefs. This self-fulfilling mechanism sustains the endogenous formation of an anti or pro-immigration *prejudice*. We discuss how the adoption of a *skill-selective* policy affects this result.

Keywords: Immigration policy, skilled/unskilled workers, small economy, multiple equilibria.

JEL Classification: F22, J24, J61.

*This paper presents a new and more general model of our previous work that circulated with the title "Prejudice and Immigration". **Disclaimer**: The opinions expressed in this paper should be attributed to the authors. They are not meant to represent the positions or opinions of the WTO and its Members and are without prejudice to Members' rights and obligations under the WTO.

†Department of Economics and Finance, LUISS "Guido Carli" University, Viale Romania 32, 00197 Roma, Italy (e-mail: pgiordani@luiss.it).

‡Economics Research Division, World Trade Organization, Rue de Lausanne 154, 1211 Geneva, Switzerland (e-mail: michele.ruta@wto.org)

1 Introduction

How are immigration and prejudice related? Three stylized facts in the empirical literature suggest that this relationship is a complex one. First, a deterioration of the skill composition of the migrant force is associated to stronger opposition to immigration and tighter restrictions in destination economies (Hanson et al., 2009, Facchini and Mayda, 2008 and 2009). Second, high-skill migrants are more *internationally mobile* than low-skill migrants and, hence, more responsive to changes in immigration policy in receiving countries (Belot and Hatton, 2008, McKenzie and Rapoport, 2010, Grogger and Hanson, 2011).[1] Third, skill-selective immigration policies, that have been the exception rather than the rule in destination economies over the past two centuries, tend to be associated to more positive attitudes of natives over immigration and a less restrictive policy stance (Hatton and Williamson, 2004 and 2005, O'Rourke and Sinnott, 2006).

In this paper, we build a formal model of immigration that allows us to discuss the relationship between natives' beliefs on the effects of immigration (i.e. their *prejudice*, in the etymological sense of "pre" "judgement" or "preconceived opinion", whether positive or negative) and immigration policy in destination countries. While we provide further details below, the intuition of our argument can be simply stated. The skill composition of the migrant labor force affects the welfare of a receiving society and, hence, its choice of migratory restrictions. This choice, in turn, affects the quality of the migrant population as it alters the migratory decision of skilled and unskilled foreign workers. From this mutual interaction multiple equilibria may arise if receiving governments adopt non-discriminatory immigration policies.[2] Specifically, if society has a belief that immigration will have a negative impact on welfare (*anti-immigration prejudice*), its government will choose high restrictions to the entry of foreign workers. In equilibrium, strict immigration policies that are not skill selective reduce the number of high-skill migrants (for reasons which will soon be clarified), in which case immigration will be relatively more costly and social beliefs will be self-fulfilled. If

[1] Specifically, these authors find that the choice of low-skill migrants is more *constrained* relative to high-skill migrants by such factors as geographical distance, cultural distance, colonial origin, network effects (because of more stringent poverty constraints or lower adaptation capacity to diversity). The evidence on the actual distribution of foreign born workers in OECD countries shows that unskilled migrants concentrate in fewer destinations relative to the skilled (Docquier et al., 2008).

[2] As discussed in more detail in the paper, we focus on the concept of *self-confirming equilibria* developed by Fudenberg and Levine (1993a).

instead society has a belief that immigration will be beneficial (*pro-immigration prejudice*), it will set low restrictions, thus increasing the number of high-skill migrants and making this belief self-confirmed as well.

Our analysis begins with a model of immigration with a sending and a receiving country. This is a useful benchmark and corresponds to the standard two-country structure of most immigration policy models (see the discussion on related literature below). The sending economy is populated by - skilled and unskilled - workers, who decide whether to migrate or not. The receiving economy chooses migratory restrictions to maximize the welfare of natives. The model has two key features. The first is that both migration choices and migration policy are *endogenous*. The former depend on the economic incentives that foreign workers face, and on the policy regulating migratory flows enacted in the receiving country. Immigration policy in our set-up is parametrized by a cost borne by (high and low-skill) immigrants once in the destination country. The second important feature of the model is the assumption that low-skill and high-skill migrants affect natives' welfare differently, the latter group being more beneficial to the receiving economy.[3] In this simple framework, we characterize the non-discriminatory optimal immigration policy for the host country.

The benchmark model neglects a salient feature of migratory choices discussed above. Foreign workers choose not only whether to migrate or not but also, to a certain extent, which country to move to. In addition, as we have already claimed above, high-skill and low-skill migrants are not equally free in making this choice. We, therefore, extend the benchmark model in order to capture this key empirical feature. Specifically, we assume that the sending and receiving countries are, respectively, part of larger origin and destination regions. The receiving country is a *small economy* which shares the same fundamentals with the rest of the destination region and can decide independently its immigration policy, without affecting the rest of the region. We capture the higher international mobility of high-skill migrants by assuming that they can choose to emigrate to a larger set of destination countries relative to unskilled migrants. In this setting, non-discriminatory immigration policies have a novel effect on the composition of the migrant labor force that could not emerge in the simple

[3] Several theoretical arguments suggest that "skilled" migrants are more beneficial to the receiving country than "unskilled" migrants. These include: higher production complementarities between skilled labor and capital, greater flexibility of the skilled labor market, higher fiscal cost of low-skill migrants. Borjas (1995) provides an overview of these arguments.

benchmark model. In particular, a restrictive immigration policy in the small destination country will reduce the number of high-skill workers, as they will choose to migrate where restrictions are lower (*crowding out* effect). In contrast, a soft immigration policy will increase the number of high-skill migrants, in that it will attract them from the rest of the region (*crowding in* effect). This mechanism is at the root of the key result of this paper on the relationship between prejudice and immigration.

We prove that, when only non-discriminatory measures are available and a small economy in the receiving world decides immigration policy independently from the rest of the region, multiple equilibria arise which depend on the country's expectations. In the first equilibrium, the economy benefits of a *high-skill immigration boom* which is driven by optimistic expectations on the number of high-skill migrants. If a relatively large number of highly skilled foreign workers is expected to enter, the policy maker will rationally set low restrictions to immigration. The effect of low barriers to immigration will be to attract -highly mobile- skilled migrants (crowding in effect) and, hence, to validate initial beliefs. In the second (and opposite) equilibrium, the small economy can be stuck in an *unskilled immigration trap*, driven by pessimistic expectations. In particular, suppose that the host society has pessimistic beliefs about the quality of immigration. The rational response to this belief would be to impose higher barriers to immigration than the rest of the region. Given the skilled migrants' freedom of choice, this policy will have the effect of crowding them out. The composition of immigration in this country will then be biased towards low-skill immigrants, thus validating the initial pessimistic belief. We show that welfare is lowest for the receiving country under the "unskilled immigration trap" and highest under the "high-skill immigration boom".

A key insight follows from this analysis which is radically different from the simple two-country model of immigration. The self-fulfilling mechanism described above may sustain the endogenous formation of a *prejudice* pro or against immigration. Given the nature of the equilibrium, these prejudices will be difficult to change and, therefore, even small differences in initial perceptions may induce large and persistent differences in immigration policy and outcomes across countries. In particular, our analysis raises the theoretical possibility that the hostility against immigrants may have resulted from a combination of pessimistic expectations and the non-selective barriers to immigration historically adopted by most receiving countries. This is complementary to explanations that emphasize the role of "fundamentals", such as

the size of redistributive programs or the substitutability between natives and migrants in labor markets, as determinants of public perceptions of immigration.

What if receiving governments can adopt skill-selective policies? We argue that the multiplicity of equilibria disappears if the government introduces a *fully* discriminatory immigration policy that selects for the skills of foreign workers. Intuitively, a skill-selective policy that allows receiving countries to directly choose the composition of the migrant labor force would disprove prejudices in equilibrium.[4] This is important for three reasons. First, while (as noticed by Hatton and Williamson, 2005) family reunification still constitutes a major plank of immigration policy for permanent immigrants, policies that select for the skills of foreign workers are becoming empirically more relevant in recent years, as a growing number of receiving countries are changing their rules on immigration (e.g. the new rules on the Blue Card in the European Union). Second, we argue that the extensive and protracted use of non-discriminatory policies adopted in most host economies in the past two centuries is essential to understand the self-fulfilling nature of immigration policy and the endogenous formation and persistence of natives' prejudices. Third, and more importantly, this finding points to a novel (and positive) effect of skill-selective policies on destination countries. A switch to a discriminatory policy improves the quality of migrants and the attitudes of natives towards immigration and, ultimately, may contribute to eradicate a pre-existing anti-immigration prejudice.

This paper contributes to the growing economic literature on formal models of immigration policy (among others, Borjas, 1995, Benhabib, 1996, de Melo et al., 2001, Dolmas and Huffman, 2004, Ortega, 2005, and Facchini and Willman, 2005). Differently from the present study, these works assume a two-country structure and consider as exogenous the migratory decision of foreign workers. Bellettini and Berti Ceroni (2007) and Bianchi (forthcoming) focus on the interdependence between immigration policy in the host economy and immigration decisions, but differently from our analysis they also abstract from the location decision of foreign workers. Two recent contributions by Bubb et al. (forthcoming) and Giordani and Ruta (2011) are closely related to this paper. They remove the two-country assumption of

[4] However, as we discuss in Subsection 3.5, there are limits to the ability of governments to set discriminatory immigration policies. In particular, there is a distinction between border measures, which can be skill-selective, and behind-the-border measures that can often only be set on a non-discriminatory basis. Hence, fully skill-selective and non-discriminatory policies are best seen as the extremes of the spectrum of immigration policies that receiving governments can adopt in practice.

most formal immigration policy models and find that multiplicity of equilibria can characterize immigration policy. Aside from focusing on the case of a small economy rather than emphasizing the interaction of large countries, this paper differs from previous contributions as it allows for the different international mobility of high and low-skill migrants. It is this novel feature that determines the endogenous formation of an immigration prejudice.

The rest of the paper is organized as follows. In the next section we introduce the benchmark model, analyze the migration choice of skilled and unskilled foreign workers and characterize the optimal immigration policy for the receiving country. In Section 3 we extend the model to consider a small receiving economy, analyze the new migration choice, and derive the policy equilibria for this economy. Section 4 analyzes a specific model of immigration policy for illustrative purposes. Concluding remarks are in Section 5, while all proofs are in the technical appendix.

2 A Benchmark Model of Immigration Policy

We begin with a simple two-country structure as a useful benchmark. The world is made up of a receiving country, or "home" (H), and a sending country, "foreign" (F). Two key sets of actors characterize the economy: foreign workers, who choose whether to migrate or not to H; and the home government, which decides immigration policy to maximize natives' welfare. Country F is populated by measures F_s and F_u of, respectively, skilled and unskilled workers.

Country H's welfare depends on the number and the quality of immigrants. Denote by I_s and I_u the (endogenous) measure of skilled and unskilled immigrants to H and define H's welfare as a twice continuously differentiable function in its two arguments, $W_H(I_s, I_u)$. We assume that $\partial W_H/\partial I_s > 0 \ \forall I_s \in [0, F_s]$, i.e. skilled migrants are always beneficial to the host economy, and $\partial W_H/\partial I_u \lesseqgtr 0$, meaning that unskilled immigration may improve or lower natives' welfare. To make the problem economically interesting, assume that, after a certain threshold, unskilled migrants become harmful for the receiving economy, that is: $\exists\ \underline{I_u} \in (0, F_u)$ such that $\partial W_H/\partial I_u < 0$ for any $I_u \in \left[\underline{I_u}, F_u\right]$.[5]

[5] Section 4 presents a specific model where the differential welfare effect of low-skill immigration is rooted in its higher fiscal cost in presence of redistributive policies in the host economy. As discussed in the Introduction and shown below, the origin of this differential effect on natives' welfare is immaterial for the results of this paper.

2.1 The Migration Choice

Migration is assumed to be a one-time and non-reversible decision. Each immigrant i - whether skilled or unskilled - faces a psychological cost to leave her own country, θ_i, measured in migrants' utils and uniformly distributed in $[0, 1]$. In addition, the government in H can set up an immigration policy which is parametrized by a cost -still measured in terms of utils- borne by immigrants once in the new country, $\mu_H \in \mathbb{R}_+$. One can interpret μ_H in several ways, from the number of bureaucratic procedures (i.e. the time a worker needs to spend applying for a work permit in the receiving country, which implies an opportunity cost for the applicant), to laws that affect the life of immigrants in the host country, such as the number of years to obtain voting rights or citizenship. This policy is assumed to be non-discriminatory, while the case of a skill-selective immigration policy is analyzed in Subsection 3.5.

Define the two continuously differentiable functions, $b_s(\mu_H, z), b_u(\mu_H, z)$, as the net benefits from migrating to H for, respectively, skilled and unskilled migrants. It is natural to suppose that $\partial b_j/\partial \mu_H < 0$ for $j = s, u$, that is, a more restrictive policy lowers the benefits from migrating. The variable z instead captures all other factors which may affect the decision to migrate, such as the wage differential between H and F or the presence of a social redistributive policy in country H (Section 4 provides an example where these aspects affect the decision to migrate).

An unskilled foreign worker i will migrate to H if and only if

$$b_u(\mu_H, z) \geq \theta_i, \tag{1}$$

while a skilled foreign worker i will migrate to H if and only if

$$b_s(\mu_H, z) \geq \theta_i. \tag{2}$$

We can then find the two threshold values of θ, call them θ_u and θ_s respectively for unskilled and skilled, such that all those below that value are willing to migrate. We have $\theta_u = b_u(\mu_H, z)$ and $\theta_s = b_s(\mu_H, z)$.

All unskilled workers whose θ is lower than θ_u, and all skilled workers whose θ is lower than θ_s are willing to migrate. If both unskilled and skilled foreign workers are distributed

uniformly in $[0,1]$, the number of unskilled and skilled migrants will be respectively

$$I_u = \theta_u(\mu_H, z) F_u \text{ and } I_s = \theta_s(\mu_H, z) F_s. \tag{3}$$

A higher μ_H lowers the benefits from migrating and, hence, lowers the number of both unskilled and skilled migrants.

2.2 The Optimal Immigration Policy at Home

We now determine the optimal (non-discriminatory) immigration policy for the receiving country. The problem for the home government is the one of finding the value of μ_H which maximizes the welfare function, $W_H(\theta_u(\mu_H) F_u, \theta_s(\mu_H) F_s)$, where we have substituted for the number of unskilled and skilled migrants given in (3).[6] Define

$$\hat{\mu} \equiv \arg\max_{\mu_H} W_H(\theta_u(\mu_H) F_u, \theta_s(\mu_H) F_s),$$

as the optimal immigration policy. Formally, assuming for simplicity that the welfare function is strictly concave in μ_H, policy $\hat{\mu}$ is the one solving the first order condition

$$\frac{\partial W_H}{\partial I_u}\frac{\partial I_u}{\partial \mu_H} + \frac{\partial W_H}{\partial I_s}\frac{\partial I_s}{\partial \mu_H} = 0,$$

that is, the one for which the marginal benefits from a policy tightening (in terms of fewer unskilled migrants, $(\partial W_H/\partial I_u)\cdot(\partial I_u/\partial \mu_H) > 0$) exactly equalizes its marginal costs (in terms of fewer skilled migrants, $(\partial W_H/\partial I_s)\cdot(\partial I_s/\partial \mu_H) < 0$).[7]

The next section shows that, once we move away from the simple two-country structure of the benchmark model, expectations (and not only fundamentals) play a role in immigration policy, and that this leads to a multiplicity of equilibria.

3 Immigration Policy in a Small Economy

Most models of immigration policy have a two-country structure, as the one discussed in the previous section. However, as emphasized in the introduction, this structure fails to consider

[6] To ease notation we have dropped the catch-all, exogenous, variable z.

[7] Needless to say, we can exclude that the optimal policy be associated with a number of unskilled migrants lower than $\underline{I_u}$.

two relevant features of migratory choices. First, a model with only one receiving country inevitably neglects that some foreign workers may not only decide whether to migrate or not, but also select their destination country. Secondly, low-skill migrants are generally more constrained in their choice as to where to migrate compared to high-skill migrants. We now develop an extension of the model above to incorporate these two aspects.

Consider country H and country F as part of, respectively, a large receiving region (R) and a large sending region (S). Countries H and F are identical to the regions they belong to, but are assumed to be *small* compared to them (so that changes in these countries do not affect the rest of the regions). We can easily capture this structure by imagining that H and F are two zero-mass countries in two intervals $[0, 1]$, representing the measures of both receiving and sending regions.

As the evidence provided in the introduction suggests, skilled foreign workers are more internationally mobile relative to low-skill foreign workers as they have more freedom in choosing their destination country. We capture this empirical finding with the simplest possible set of assumptions. First, we suppose that low skill foreign workers are fully constrained in their location decisions, so that those *potentially* entering into country H are still F_u. Second, the pool of skilled foreign workers targeting country H is made up of two subsets. A first group of size $F_s\underline{\Psi}$ (where $0 \leq \underline{\Psi} < 1$) is constrained to migrating to country H. A second group of size $F_s\left(\overline{\Psi} - \underline{\Psi}\right)$ (where $\overline{\Psi} > 1$) is "free" to target country H as well as any other country in the rest of region R. This construction captures the simple idea that skilled foreign workers *potentially* entering into country H are no longer F_s in a world where high-skill migrants have some degree of freedom in choosing the country of destination.[8]

Country H selects immigration policy μ_H independently. We focus on the equilibrium characterization of country H while supposing that the rest of the receiving region implements the optimal immigration policy. Since country H is simply a "scaled down" version of region R, it must be $\mu_R = \hat{\mu}$. We characterize the mutual interaction between the policy maker in country H and foreign workers as a two-stage *sequential* game in which *(i)* the former chooses

[8] Note that this formalization could be generalized in several directions. For instance, and more realistically, one could think that each foreign worker, whether skilled or unskilled, has a favorite destination country and a distribution of "switching costs", that is, of costs associated to migrating somewhere else. Each foreign worker could then in principle migrate everywhere inside the region R, but the cost would vary with the destination. Taking this route would complicate our framework but would not alter substantially any of our results, as long as these switching costs (inversely capturing the flexibility over choice of destination) are assumed lower for high-skill than for low-skill migrants (which is what the empirical evidence suggests).

immigration policy as a function of the expected migratory inflows, *(ii)* the latter make their migratory choices depending on this immigration policy. To find the policy equilibria in country H, we analyze the behavior of the policy maker and that of foreign workers as described in points *(i)* and *(ii)*, starting with the latter.

3.1 The New Migration Choice

The migration choice of low-skill foreign workers is identical to that developed in the benchmark model. These workers migrate to H if and only if (1) holds, from which the number of unskilled migrants, as a function of the country H's immigration policy, is again given by $I_u = \theta_u(\mu_H) F_u$.

High-skill foreign workers targeting country H compare their pay-off as immigrants in country H to the one from their country of origin, and migrate if (2) holds. The number of constrained skilled migrants will then simply be $\theta_s(\mu_H) F_s \underline{\Psi}$. The subset of free skilled workers, however - $F_s\left(\overline{\Psi} - \underline{\Psi}\right)$ - also compare their pay-off in H with the one they would obtain in region R, and choose country H if the former is higher than the latter. More formally,

$$\begin{array}{ccc} b_s(\mu_H) - \theta_i & > & b_s(\hat{\mu}) - \theta_i \\ & \Longleftrightarrow & \\ \mu_H & < & \hat{\mu}. \end{array} \tag{4}$$

The relation above holds because it is $db_s/d\mu_H < 0$.

All *free* skilled workers whose psychological cost is lower than θ_s will enter country H if and only if $\mu_H < \hat{\mu}$ (*crowding in*), while they will migrate to the rest of the region if and only if $\mu_H > \hat{\mu}$ (*crowding out*). When $\mu_H = \hat{\mu}$, these workers will be *indifferent* between country H and the rest of the region R, and we assume that in this case they will distribute uniformly across the receiving region.

The total number of skilled migrants, as a function of immigration restrictions in H, will then be $I_s = \theta_s(\mu_H) F_s \Psi_H$ where

$$\Psi_H = \begin{cases} \overline{\Psi} \text{ if } \mu_H < \hat{\mu} \\ 1 \text{ if } \mu_H = \hat{\mu} \\ \underline{\Psi} \text{ if } \mu_H > \hat{\mu}. \end{cases} \tag{5}$$

INSERT FIGURE 1 ABOUT HERE

The sum of skilled and unskilled immigrants, $\theta_s(\mu_H) F_s \Psi_H + \theta_u(\mu_H) F_u$, is a piecewise continuous function in μ_H whose only discontinuity point is $\mu_H = \hat{\mu}$. It can be interpreted as the immigrants' best-response function, as it captures the optimal reaction of immigrants to any level of immigration restrictions chosen by the policy maker in H. What makes this behavior interesting, and different from the one we have illustrated in the benchmark model, is the step function $\Psi_H(\mu_H)$ (defined in expression (5) and depicted in Figure 1), which captures the pool of high-skill foreign workers targeting country H as a function of migratory restrictions enacted in that country. This function is responsible for the discontinuity of the immigrants' best-response to immigration restrictions at point $\mu_H = \hat{\mu}$.

3.2 The Immigration Policy Choice

We have seen above that the migration choice of foreign workers depends on the immigration policy enacted in country H. In particular, internationally mobile skilled workers might decide not to target country H when observing a comparatively stricter policy than in the rest of the region and vice-versa. In this subsection we analyze how immigration policy in country H depends on the expected migratory behavior of foreign workers, and prove an "instrumental" result, which we are going to use in the next subsection.

As in the two-country model, the policy maker in the small economy H chooses immigration policy to achieve the combination of skilled and unskilled migration which maximizes natives' welfare, $W_H(I_u, I_s)$. The crucial difference with respect to the policy problem illustrated in Section 2 is that here the migratory restrictions chosen by country H to reach that combination, $\mu_H(\cdot)$, also depend on Ψ_H, that is, on the pool of high-skill foreign workers that the policy maker expects will target H.[9] Denoting the welfare function as

[9] Notice that the *expected* and *actual* number of free skilled foreign workers targeting H are both denoted by Ψ_H. Clearly, in equilibrium, they coincide.

$W_H(\mu_H, \Psi_H) \equiv W_H(\theta_u(\mu_H) F_u, \theta_s(\mu_H) F_s \Psi_H)$, we define

$$\mu_H(\Psi_H) \equiv \arg\max \{W_H(\mu_H, \Psi_H)\}$$

as the optimal immigration policy as a function of Ψ_H. The relationship between μ_H and Ψ_H is analyzed in the following

Lemma 1. *The optimal (non-discriminatory) immigration policy in country H, $\mu_H(\cdot)$, is a decreasing function of $\Psi_H \in \left[\underline{\Psi}, \overline{\Psi}\right]$.*

INSERT FIGURE 2 ABOUT HERE

The intuition for this result is straightforward. The higher the expected pool of skilled foreign workers (Ψ_H), the higher the marginal costs associated to a tightening of immigration policy, and the lower the optimal migratory restrictions. The curve drawn in Figure 2 describes the locus of points in which immigration policy in country H is optimal for any value of Ψ_H between $\underline{\Psi}$ and $\overline{\Psi}$. Clearly, when $\Psi_H = 1$, the maximum problem coincides with the one analyzed in Subsection 2.2, and hence $\mu_H(\Psi_H = 1) = \hat{\mu}$. A decrease in the expected pool of skilled foreign workers ($\Psi_H \downarrow$) is associated with a tightening of immigration policy ($\mu_H \uparrow$), and vice-versa. Hence, Lemma 1 implies that $\mu_H(\underline{\Psi}) > \mu_H(1) > \mu_H\left(\overline{\Psi}\right)$, as $\underline{\Psi} < 1 < \overline{\Psi}$.

3.3 Self-Confirming Policy Equilibria

In this subsection, we study the non-discriminatory equilibrium immigration policy. We focus on *self-confirming equilibria* à la Fudenberg-Levine (1993a).[10] For country H, an equilibrium is defined as a configuration in which *(i)* the policy maker chooses the immigration policy which maximizes her objective function given her (correct) beliefs on the migratory inflows, *(ii)* foreign workers make their migration choice to maximize their utility for given immigration policy (μ_H). Our results are summarized in the following

Proposition 2. *Three policy equilibria exist in country H: 1. The "**high-skill boom**" equilibrium, where the non-discriminatory policy in H is softer, $\mu_H\left(\overline{\Psi}\right) \equiv \mu^{soft} < \hat{\mu}$, and the*

[10] The self-confirming equilibrium has recently found several applications in the macroeconomic literature, including Sargent et al. (2006) theory of inflation and Alesina and Angeletos (2005) model of fairness and redistribution. For a concise review of macroeconomic applications of this concept refer to Fudenberg and Levine (2009).

*proportion of skilled migrants over native workforce as well as welfare are higher than in the rest of the receiving region R (crowding in). 2. The "**globally optimal policy**" equilibrium, in which the policy* $\mu_H(1) = \hat{\mu}$*, the proportion of skilled migrants over native workforce as well as welfare are equal to those in R. 3. The "**unskilled migration trap**" equilibrium, in which the non-discriminatory policy in H is tighter,* $\mu_H(\underline{\Psi}) \equiv \mu^{tight} > \hat{\mu}$*, and the proportion of skilled migrants over native workforce as well as welfare are lower in country H than in the rest of the receiving region (crowding out).*

A graphical intuition of this result is provided in Figure 3, where the two schedules, capturing the pool of high-skill foreign workers and the optimal immigration policy, intersect in three points, which constitute the policy equilibria of country H.

INSERT FIGURE 3 ABOUT HERE

In this model, expectations are self-fulfilling. In a country where the dominant belief is that few skilled migrants will enter, the government sets a restrictive immigration policy. A restrictive policy, in turn, "scares" at least some skilled foreign workers who prefer to migrate to other countries in the region. This creates a trap with few skilled migrants in H and lower welfare compared to the rest of the receiving region. The opposite -i.e. good- equilibrium with high skilled immigration and higher welfare is triggered by a positive belief on high skilled immigration (and its welfare effects). Finally, the third possibility is that a country expects the same proportion of high-skill migrants over native population as in the rest of the region. In this case, the equilibrium implies that the policy and the welfare in country H are exactly as in region R, and beliefs are again vindicated.

A Cournot *tatonnement* argument suggests that the "high-skill boom" and the "unskilled trap" are locally stable equilibria, while the "globally optimal policy" equilibrium is unstable. The very existence of the latter indeed, crucially hinges on an assumption "disciplining" the number of high-skill migrants when $\mu_H = \hat{\mu}$. Under that policy, high-skill migrants are indifferent as to where to migrate. For reasons of symmetric migratory behavior across the receiving region, we have found it reasonable to assume that $\Psi_H = 1$. If that were not the case, however, the equilibrium would disappear. Moreover, a small perturbation of

this behavior makes the economy diverge towards either of the two equilibria (depending on whether that perturbation is positive or negative). Consider a $\pi-$perturbation of $\Psi_H = 1$, for a however small real number π. If $\pi > 0$, for Lemma 1 the government reacts by slightly softening its immigration policy, that is, $\mu_H (1 + \pi) < \hat{\mu}$. Skilled migrants respond to this policy by crowding in country H, which in turn leads the policy maker to set up $\mu_H = \mu^{soft}$. The economy then converges to the high-skill boom equilibrium. Conversely, if $\pi < 0$ the government sets up a slightly tighter immigration policy. As a consequence, skilled migrants crowd out of country H, the policy maker sets up $\mu_H = \mu^{tight}$, and the economy converges to the unskilled migration trap. This sequential discrete *tatonnement* process is captured graphically in Figure 4.

INSERT FIGURE 4 ABOUT HERE

Finally note that our extension has brought about rather different results from the baseline model. First, the globally optimal policy equilibrium, which is the only equilibrium of the benchmark model, is unstable, and its existence crucially hinges on the assumption of complete symmetry. Secondly, two new policy equilibria emerge, the high-skill boom and the unskilled migration trap. As discussed in the next subsection, these equilibria respectively rationalize the formation of a pro- and an anti-immigration prejudice. A situation that could never materialize in the benchmark model of immigration policy.

3.4 Endogenous Immigration Prejudices

This subsection provides an interpretation of the self-confirming immigration policy equilibria. In a self-confirming equilibrium each player plays her best response to her beliefs on the opponent's behavior, and beliefs must be correct *along the equilibrium path*. The peculiarity of this equilibrium is that it is in fact compatible with incorrect beliefs *off* the equilibrium path, also called "superstitions". The self-confirming equilibrium is a generalization of the Nash equilibrium, whose rationale can be briefly explained as follows. If it is true that "non-cooperative equilibria should be interpreted as the outcome of a learning process, in which players revise their beliefs using their observations of previous play" (Fudenberg-Levine, 1993a, p. 523), the concept of self-confirming equilibrium captures the idea that players tend

to learn - and hence to have correct beliefs on - their opponents' behavior along the path followed by the equilibrium but not (necessarily) in contingencies that are in fact never played.

If we follow this logic, the "anti-immigration prejudice" may be interpreted as the social (or the policy maker's) conviction that the pool of skilled foreign workers potentially entering country H simply be $F_s\underline{\Psi}$. This conviction in fact contains a "superstition" (namely, an off-the-equilibrium incorrect belief), that when the policy maker sets up a soft immigration policy, the pool of high-skill foreign workers will still be $F_s\underline{\Psi}$. Indeed, that is not the case, since the size of the pool is disciplined by (5). The policy maker of a country that is stuck in an unskilled migration trap, however, ignores it, and the reason is that she never observes it. The only thing she observes is what happens along the equilibrium path, where the pool of high-skill foreign workers is $F_s\underline{\Psi}$. In other words, no evidence ever emerges that contradicts the policy maker's belief, which can in principle be sustained forever to the extent that play follows the equilibrium path.

An analogous interpretation could be given to the "pro-immigration prejudice". Driven by the optimistic belief that most skilled foreign workers will target country H ($F_s\overline{\Psi}$), the policy maker sets up a soft policy which will in fact attract most skilled immigrants. Notice, however, that this is not the only possible interpretation of the high-skill boom equilibrium. In fact, this solution does not need any off-the-equilibrium "superstition" and can be sustained as a subgame-perfect equilibrium.

One might argue that a society that is stuck into the unskilled migration trap might experiment alternative paths and eventually learn its mistake. As argued by Fudenberg and Levine (1993b), superstitions may vanish if players are patient enough to carry out a sufficient amount of *experimentation* off the equilibrium. In our theoretical framework, deviating from the restrictive policy could in principle help the policy maker learn the migratory behavior of free skilled foreign workers (as captured by (5)), and thus eradicate the superstition. Notice, however, that a "timid" reduction of migratory restrictions would not be sufficient to reach this goal. As is apparent from Figure 5, along the unskilled migration trap the policy maker -implementing policy μ^{tight}- always observes $\Psi_H F_s = \underline{\Psi} F_s$, and any "experimentation" in the whole "policy region" between μ^{tight} and $\hat{\mu}$ would not bring any evidence of $\Psi_H \neq \underline{\Psi}$. In other words, unless the policy maker opens up migration policy at or above $\hat{\mu}$, she will never observe any change in the pool of skilled foreign workers targeting H. Under the

principle that "you learn what you observe", the policy maker would then need to soften "remarkably" her immigration policy to be able to learn her mistake. This sizeable shift in immigration policy might not be easy to attain, especially when observing that in the real world (i) high-skill foreign workers do not respond instantaneously to changes in immigration policy, which may render the real learning process far more complex and slow than suggested in our simple stylized world, (ii) patience may not be a major virtue of policy makers who, along the unskilled migration trap, must respond to the voters' hostility towards immigration (Facchini and Mayda, 2008).

3.5 Skill-Selective Policies

We now discuss the case of a discriminatory immigration policy and argue that a policy that can *perfectly* discriminate among foreign workers with different skills removes the multiplicity of equilibria for the small economy.[11] Given that high-skill foreign workers are beneficial to country H, the best immigration policy for this skill group ($\hat{\mu}_H^s$) is an "open door" policy (say $\hat{\mu}_H^s = 0$, if we do not consider the possibility of subsidizing immigration). Low-skill migrants are instead beneficial only up to a certain threshold (that we denoted by $\underline{I_u}$), beyond which they become harmful for the receiving economy. The optimal policy for low-skill migrants ($\hat{\mu}_H^u$) is then implicitly defined by equation $\underline{I_u} = \theta_u\left(\hat{\mu}_H^u\right) F_u$. This optimal pair of immigration policies, $(\hat{\mu}_H^s, \hat{\mu}_H^u)$, is totally unaffected by the policy-maker's beliefs on migratory flows. Finally, notice that social welfare in country H depends on whether or not the rest of the receiving world (region R) also implements a selective policy. In fact, if country H were the only country filtering skills, it would enjoy a higher number of skilled migrants ($F_s\overline{\Psi}$) and a higher welfare with respect to region R.

While discriminatory measures break the self-fulfilling mechanism that we have highlighted above and thus eliminate the multiplicity of equilibria, it is important to reflect on what constitutes a skill-selective policy. Immigration policy, as defined in Section 2, is a combination of border and behind-the-border measures that affect the life of foreign workers in the host country. While border measures, as a point system, can in principle target differently high and low-skill migrants, there are important limitations to the extent to which behind-the-border measures can be set in a discriminatory fashion. For instance, the number

[11] Formally, this result is trivial, which is why we omit the proof and provide only an intuitive discussion.

of years required to obtain citizenship can, and often do, vary for different skill groups of foreign workers. However, access to public health systems or to public education for migrants' children are generally not offered on a discriminatory basis for both efficiency and ethical reasons. This implies that fully discriminatory and non-discriminatory policies are best seen as the extreme of the spectrum of immigration policy that a country can adopt. Actual regulations will lie somewhere in between. In this context, introducing stronger filters for different skill groups at the border will moderate, but not necessarily eliminate, the self-confirming nature of immigration policy.

4 An Illustrative Example

In this section we construct a model of immigration policy capturing a few salient features of receiving economies and of migratory decisions, and we illustrate the possibility of prejudices pro or against immigration arising in the receiving economies.[12] The structure of the world is identical to that introduced in Section 3. Country F is a small sending country, populated by F_u unskilled and F_s skilled workers and belonging to a large sending region, S. Country H is a small receiving country, populated by N_H natives and K capitalists (each owning one unit of capital), and belonging to a large receiving region, R.

The receiving small economy H produces competitively a unique final good via a Cobb-Douglas technology in *effective* labor (L) and in capital, denoted by K:

$$Y = K^{\alpha} L^{1-\alpha}.$$

Effective labor is defined as

$$L \equiv N_H + \varepsilon_u^* I_u + \varepsilon_s^* I_s,$$

where ε_u^* and ε_s^* denote the productivities of unskilled and skilled foreign workers respectively, with $\varepsilon_u^* < \varepsilon_s^* \leq 1$, and, as before, I_u and I_s denote the endogenous number of unskilled and skilled migrants. Each of the N_H natives supplies inelastically one unit of labor, whose productivity is normalized to 1. Natives' and migrants' utility is linear in their (disposable) income, which is entirely spent to consume the only final good produced in the economy

[12] Our previous working paper (Giordani and Ruta, 2009), which has been superseded by this article, provides further details of this example.

(whose price is normalized to one).

Factor demands for capital and labor per efficiency unit (r_H, w_H) are given by their respective marginal productivities from the Cobb-Douglas technology above. Finally, country H has a social policy that redistributes resources from native capitalists to low-skill foreign workers. This policy consists of an exogenous and fixed lump-sum transfer γ_u to unskilled migrants which is financed through a proportional tax $\tau \in [0,1]$ on the capitalists' income.[13] The balanced budget constraint can be written as $r_H K \cdot \hat{\tau} = \gamma_u I_u$ where I_u is the endogenous number of unskilled migrants entering country H.

We capture the greater freedom of choice of skilled migrants with respect to unskilled migrants exactly as in the model in Section 3. The pool of potential unskilled migrants to country H is F_u: these workers either go to H or stay in their country of origin. The pool of potential skilled migrants to country H is instead $\overline{\Psi} F_s$ (with $\overline{\Psi} > 1$): a subset of them, $\underline{\Psi} F_s$, are constrained in their choice (they either go to H or stay in their country of origin). All others, $\left(\overline{\Psi} - \underline{\Psi}\right) F_s$, are free to choose whether to move to H or any other country in the receiving region.

In F the wage rate is exogenous and denoted by w^*. Moreover, and only for simplicity, suppose that foreign unskilled workers are unproductive ($\varepsilon_u^* = 0$), and hence that they migrate only to benefit from the social assistance program.[14] An unskilled foreign worker i will migrate to H if and only if

$$\gamma_u - \mu_H - \theta_i \geq 0,$$

where μ_H and θ_i are defined as in Section 2. From the expression above, the number of unskilled migrants as a function of migratory restrictions can be obtained as $\theta_u F_u$ with $\theta_u = \gamma_u - \mu_H$. Given this number of unskilled migrants, the tax rate on capital ($\hat{\tau}$) that balances the budget of the income support program is

$$\hat{\tau} = \frac{\gamma_u \left(\gamma_u - \mu_H\right) F_u}{r_H K} \tag{6}$$

[13] Naturally, one can model the social policy in the receiving country in a number of different ways (for instance, taxing native labor rather than capital). Alternative formalizations would generally not alter the logic of our results as long as the social policy implies a net transfer of resources from natives to unskilled foreign workers.

[14] Nothing substantial would change if ε_u^* were strictly positive (but lower than ε_s^*). Algebra simplifies a lot with this hypothesis though.

Similarly, skilled foreign workers targeting country H compare their pay-off as immigrants in country H to the one from their country of origin, and migrate if

$$w_H \varepsilon_s^* - \mu_H - \theta_i \geq w^* \varepsilon_s^*,$$

from which the threshold $\theta_s = (w_H - w^*)\,\varepsilon_s^* - \mu_H$ is determined. The number of constrained skilled migrants will then simply be $\theta_s F_s \underline{\Psi}$. The subset of free skilled workers, however - $F_s\left(\overline{\Psi} - \underline{\Psi}\right)$ - also compare their pay-off in H with the one they would obtain in region R, and choose country H if the former is higher than the latter. Denoting by $\hat{\mu}$ the immigration policy set up in the rest of the receiving region, we have

$$\begin{array}{ccc} w_H \varepsilon_s^* - \mu_H - \theta_i & > & \hat{w} \varepsilon_s^* - \hat{\mu} - \theta_i \\ & \Longleftrightarrow & \\ \mu_H & < & \hat{\mu}, \end{array}$$

where $\hat{w}$ is the equilibrium wage in region R when $\mu_R = \hat{\mu}$. The relation above holds because, as we prove in Appendix B, a given policy change causes a smaller change in wage, that is, $\Delta\left(\varepsilon_s^* w_H\right)/\Delta\mu_H < 1$. Country H is then subject to a crowding out if $\mu_H > \hat{\mu}$ and to a crowding in if $\mu_H < \hat{\mu}$. As in the model of Section 3, the total number of skilled migrants, as a function of immigration restrictions in H, will be $\theta_s F_s \Psi_H$ with Ψ_H given in (5).

Although very simple, this model is compatible with several well-established empirical results. First, the data confirm that high-skill migrants are highly responsive to wage earning differences (Grogger and Hanson, 2011). Second, the idea that the generosity of the welfare system in destination countries serves as a magnet to unskilled migrants finds support in Boeri et al. (2002) and Cohen and Razin (2008) among others.

Define the welfare function of the government in the small receiving country as a weighted sum of the utilities of native capitalists and native workers:

$$W_H\left(\mu_H, \Psi_H\right) \equiv a \cdot r_H\left(\mu_H, \Psi_H\right) K\left(1 - \hat{\tau}\right) + (1 - a) \cdot w_H\left(\mu_H, \Psi_H\right) N_H, \tag{7}$$

where the expression for $\hat{\tau}$ is given in (6), and where $r_H = \alpha\left[K/\left(N_H + \varepsilon_s^* I_s\right)\right]^{\alpha-1}$, $w_H = (1-\alpha)\left[K/\left(N_H + \varepsilon_s^* I_s\right)\right]^{\alpha}$, with $I_s = \theta_s F_s \Psi_H$ being the expected number of skilled foreign

workers. Immigration has clear redistributive effects on the native population. In particular, the entry of foreign workers hurts native workers (by lowering their wage), and it has an ambiguous effect on capitalists (in that it raises both their rent (r_H) and their tax rate ($\hat{\tau}$)). The policy maker might not be neutral with respect to the distributional consequences of immigration, which is captured by the weight on the utility of capitalists, $a \in [0,1]$.[15]

The policy maker maximizes condition (7) with respect to μ_H. In Appendix B we prove that the (politically) optimal migratory restrictions in country H are a decreasing function of Ψ_H: $d\mu_H/d\Psi_H < 0 \ \forall \Psi_H \in \left[\underline{\Psi}, \overline{\Psi}\right]$ (that is, the analogous to Lemma 1 for this economy). This, together with the migratory behavior of skilled foreign workers, implies that the strategic interaction between migrants and the policy-maker of country H is identical to that described in Section 3. It follows that Proposition 2 applies to this economy as a special case of the general model presented in this paper.

5 Conclusion

This paper provides a model to investigate how attitudes towards immigration and immigration policy interact with migratory decisions. We have shown that in a setting where high skilled foreign workers are more beneficial and more mobile than unskilled migrants, different perceptions on immigration in host countries lead to radically different outcomes. Optimistic beliefs on immigration induce a government to set low restrictions which attract high-skill foreign workers, while pessimistic beliefs bring high restrictions which scare skilled immigrants. This self-fulfilling mechanism sustains the endogenous formation of a prejudice, pro or anti immigration. While clearly not the only explanation, our work sheds some light on why differences in attitudes towards immigration may be so rooted in different countries.

This analysis contributes to the discussion on the proper design of immigration policy in host countries. The model implies that the choice of the right policy may have a significant impact in the short run, as well as in the long run through the formation of attitudes towards immigration that will change only slowly. First, the small economy setting helps us clarify that a country must be careful in implementing non-discriminatory restrictions to control

[15] As it is well understood from the theory of collective action (Olson, 1965), governments tend to give higher weight to organized special interests. This may explain deviations from pure welfare maximization. Facchini et al. (forthcoming) find evidence of the over-representation of capitalists' interests in immigration policy in the US.

the migration flow. The reason is that immigration policies affect not only the number of migrants but also their composition, and a restrictive policy could indirectly act as an instrument of selection of the lowest quality immigrants. Secondly, the economic literature has proposed several arguments in favor of policies that filter foreign workers in terms of observable skills. This paper adds to these arguments that selective policies may influence natives' attitude towards immigration and, hence, increase support for further reductions of barriers. In principle, an anti-immigration prejudice could be moderated via a combination of rules that favor more productive migrants with a more open immigration policy.

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A Proofs of Section 3

Proof of Lemma 1

Given the welfare function $W_H(\mu_H, \Psi_H) \equiv W_H(\theta_u(\mu_H) F_u, \theta_s(\mu_H) F_s \Psi_H)$, we now want to prove that the optimal policy function, $\mu_H(\Psi_H)$, is decreasing in Ψ_H. Given that the welfare function is strictly concave in μ_H, the optimal policy function is implicitly defined by the first order condition:

$$G(\mu_H, \Psi_H) \equiv \frac{\partial W_H}{\partial \theta_u} \frac{\partial \theta_u}{\partial \mu_H} F_u + \frac{\partial W_H}{\partial \theta_s} \frac{\partial \theta_s}{\partial \mu_H} F_s \Psi_H = 0.$$

According to the implicit function theorem, it is

$$\frac{d\mu_H}{d\Psi_H} = -\frac{\frac{\partial G}{\partial \Psi_H}}{\frac{\partial G}{\partial \mu_H}}.$$

Now notice that $dG/d\mu_H$ is strictly lower than zero (given that the welfare function is strictly concave in μ_H by assumption). On the other hand, it is immediate to verify that

$$\frac{\partial G}{\partial \Psi_H} = \frac{\partial W_H}{\partial \theta_s} \frac{\partial \theta_s}{\partial \mu_H} F_s < 0$$

given that $\partial W_H/\partial \theta_s > 0$ and $\partial \theta_s/\partial \mu_H < 0$. Then it follows that $d\mu_H/d\Psi_H < 0$.

Proof of Proposition 2

We start by finding the three equilibria, then we show that they can be Pareto ranked.

1a. The globally optimal policy equilibrium. We have assumed that, when the policy maker sets up the globally optimal policy, $\mu_H = \hat{\mu}$, then in country H it is $\Psi_H = 1$ and hence $F_s \Psi_H = F_s$ (which is meant to capture the idea that skilled migrants distribute uniformly along the receiving region R). On the other hand, when the government expects $F_s \Psi_H = F_s$, the best policy coincides with the globally optimal policy, $\mu_H = \hat{\mu}$ (the two maximum problems for small economy H and region R are identical). The point $(\mu_H, \Psi_H) = (\hat{\mu}, 1)$ then satisfies our definition of equilibrium. Denoting the number of natives by N_H in both country H and region R, the proportion of skilled migrants over natives is $\hat{\theta}_s(\hat{\mu}) F_s/N_H$ in both of them.[16]

[16] Recall that, given our assumptions on country H being a zero-measure country inside region R, whose measure is the unit interval, then N_H stands for both the mass of native workers in country H, and the number

1b,c. High-skill boom and unskilled migration trap. The mechanics of the behavior of skilled foreign workers is such that, when $\mu_H < \hat{\mu}$ then $\Psi_H = \overline{\Psi} > 1$, and when $\mu_H > \hat{\mu}$ then $\Psi_H = \underline{\Psi} < 1$. On the other hand, the policy maker's best response function $\mu_H(\cdot)$ is a continuous, strictly decreasing function in $\Psi_H \in \left[\underline{\Psi}, \overline{\Psi}\right]$ (as proven in Lemma 1), which takes value $\mu_H(\cdot) = \hat{\mu}$ when $\Psi_H = 1$ (as proven above). These elements ensure that, when $\Psi_H = \overline{\Psi} > 1$, then $\exists\, \mu_H\left(\overline{\Psi}\right) \equiv \mu^{soft} > \hat{\mu}$, and when $\Psi_H = \underline{\Psi} < 1$, then $\exists\, \mu_H\left(\underline{\Psi}\right) \equiv \mu^{tight} > \hat{\mu}$. The two points $(\mu^{tight}, \underline{\Psi})$, $(\mu^{soft}, \overline{\Psi})$ satisfy our definition of equilibrium.

Under the high-skill boom equilibrium, the proportion of skilled migrants over natives is higher for country H than for region R as

$$\frac{\theta_s\left(\mu^{soft}\right) F_s \overline{\Psi}}{N_H} > \frac{\theta_s\left(\hat{\mu}\right) F_s}{N_H} \text{ as } \theta_s\left(\mu^{soft}\right) > \theta_s\left(\hat{\mu}\right) \text{ and } \overline{\Psi} > 1.$$

Under the unskilled migration trap, the proportion of skilled migrants over natives is lower for country H than for region R as

$$\frac{\theta_s\left(\mu^{tight}\right) F_s \underline{\Psi}}{N_H} < \frac{\theta_s\left(\hat{\mu}\right) F_s}{N_H} \text{ as } \theta_s\left(\mu^{tight}\right) < \theta_s\left(\hat{\mu}\right) \text{ and } \underline{\Psi} > 1.$$

2. We now prove that the three equilibria can be ranked in terms of welfare from the lowest - unskilled migration trap - to the highest - the high-skill boom equilibrium. By assumption, skilled migrants are beneficial for the receiving economy, that is, $dW_H/d\Psi_H > 0$. It is then immediate to prove that welfare under the high-skill boom equilibrium ($W_H\left(\mu^{soft}, \overline{\Psi}\right)$) is unambiguously higher than welfare under the globally optimal policy equilibrium ($W_H\left(\hat{\mu}, 1\right)$). In fact, (i) since $\overline{\Psi} > 1$, then welfare is higher when $\Psi_H = \overline{\Psi}$ and with the same immigration policy ($W_H\left(\hat{\mu}, \overline{\Psi}\right) > W_H\left(\hat{\mu}, 1\right)$); (ii) $\hat{\mu}$ is, however, a sub-optimal policy when $\Psi_H = \overline{\Psi}$ since, as we have seen above, welfare is maximized when $\mu_H\left(\overline{\Psi}\right) \equiv \mu^{soft} > \hat{\mu}$ (that is, $W_H\left(\mu^{soft}, \overline{\Psi}\right) > W_H\left(\hat{\mu}, \overline{\Psi}\right)$). Hence it will be $W_H\left(\mu^{soft}, \overline{\Psi}\right) > W_H\left(\hat{\mu}, 1\right)$.

Analogously, it is possible to prove that welfare under unskilled migration trap ($W_H\left(\mu^{tight}, \underline{\Psi}\right)$) is unambiguously lower than welfare under globally optimal policy equilibrium ($W_H\left(\hat{\mu}, 1\right)$). In fact, (i) under the same immigration policy μ^{tight}, it is $W_H\left(\mu^{tight}, \underline{\Psi}\right) < W_H\left(\mu^{tight}, 1\right)$ as

of native workers for the whole region, R:

$$N_H = \int_0^1 N_H d\omega.$$

$\underline{\Psi} < 1$; (ii) μ^{tight} is a sub-optimal policy when $\Psi_H = \underline{\Psi}$, and hence $W_H\left(\mu^{tight}, 1\right) < W_H\left(\hat{\mu}, 1\right)$. We then conclude that $W_H\left(\mu^{tight}, \underline{\Psi}\right) < W_H\left(\hat{\mu}, 1\right)$.

B Proofs of Section 4

With reference to the specific economy presented in Section 4, we now first prove that the reaction of the skilled migrants' equilibrium wage to an increase in migratory restrictions is positive but strictly lower than 1 ($\Delta\left(\varepsilon_s^* w_H\right)/\Delta\mu_H \in (0,1)$). We then show that the (politically) optimal immigration policy set up by country H is a decreasing function of Ψ_H ($d\mu_H/d\Psi_H < 0$).

(i) The proof of this statement proceeds in two steps. We first prove that, in the benchmark two-country model where the wage function is differentiable, it is $d\left(\varepsilon_s^* w_H\right)/d\mu_H \in (0,1)$. We then show that this result continues to hold, mutatis mutandis, even when allowing for the crowding in and crowding out of high-skill migrants.

In the benchmark model, the equilibrium in the domestic labor market with immigration is determined by the intersection of the labor demand curve and the total (i.e. augmented for immigration) effective labor supply:

$$\begin{cases} \varepsilon_s^* w_H = \varepsilon_s^* (1-\alpha)\left(\frac{K}{L}\right)^{\alpha} \\ L = N_H + \left[\left(w_H - w^*\right)\varepsilon_s^* - \mu_H\right]\varepsilon_s^* F_s \end{cases}$$

where we have subsitituted for the threshold value θ_s given in the main text into the labor supply. Plugging the second equation into the first, we obtain the implicit function for w_H as

$$F(\varepsilon_s^* w_H, \mu_H) \equiv \varepsilon_s^*\left(1-\alpha\right)\left[\frac{K}{N_H + \left[\left(w_H - w^*\right)\varepsilon_s^* - \mu_H\right]\varepsilon_s^* F_s}\right]^{\alpha} - \varepsilon_s^* w_H = 0.$$

We now differentiate $\varepsilon_s^* w_H$ with respect to μ_H using the implicit function theorem and obtain

$$\frac{d\left(\varepsilon_s^* w_H\right)}{d\mu_H} = \frac{\left(1-\alpha\right)\alpha\left(\frac{K}{L}\right)^{\alpha}\frac{\left(\varepsilon_s^*\right)^2 F_s \Psi_H}{L}}{\left(1-\alpha\right)\alpha\left(\frac{K}{L}\right)^{\alpha}\frac{\left(\varepsilon_s^*\right)^2 F_s \Psi_H}{L} + 1},$$

which is a number between 0 and 1.

In the more general model encompassing skilled migrants' freedom of choice, the wage function depends on Ψ_H which is not differentiable in μ_H. We now prove, via a simple

reductio ad absurdum, that even in this case it is $\Delta(\varepsilon_s^* w_H)/\Delta\mu_H < 1$. Suppose that in country H it is $\Delta(\varepsilon_s^* w_H)/\Delta\mu_H \geqslant 1$, that is, suppose that, following an increase in μ_H, the skilled migrants' wage in H goes up by more than μ_H. As we have just shown in the first step of this proof, this may only occur as a result of a crowding out of high-skill migrants. By definition however, a crowding out occurs only when $w_H\varepsilon_s^* - \mu_H - \theta_i < \hat{w}\varepsilon_s^* - \hat{\mu} - \theta_i$, that is, when $\varepsilon_s^*(w_H - \hat{w}) < \mu_H - \hat{\mu}$, which contradicts the initial assumption. A totally analogous contradiction arises under the opposite case of crowding in.

(ii) The policy maker in H chooses the immigration policy μ_H that maximizes

$$\begin{aligned} W_H(\mu_H, \Psi_H) &= a \cdot \left[\alpha\left(\frac{K}{N_H + \varepsilon_s^*\theta_s(\mu_H) F_s \Psi_H}\right)^{\alpha-1} K - \gamma_u \theta_u(\mu_H) F_u\right] \\ &\quad + (1-a) \cdot \left[(1-\alpha)\left(\frac{K}{N_H + \varepsilon_s^*\theta_s(\mu_H) F_s \Psi_H}\right)^{\alpha} N_H\right]. \end{aligned}$$

The expression above is obtained from (7) after substituting for $\hat{\tau}$ as given in (6), and after using the conditions for factor prices from the main text.

The first-order condition writes as

$$\frac{dW_H}{d\mu_H} = a\gamma_u F_u - \frac{\chi_H(\Psi_H, \mu_H)\left[a - (1-a)\frac{N_H}{L}\right]}{1 + \chi_H(\Psi_H, \mu_H)\frac{\varepsilon_s^*}{L}} = 0, \tag{8}$$

where

$$\chi_H(\Psi_H, \mu_H) \equiv (1-\alpha)\alpha\left(\frac{K}{L}\right)^{\alpha} \varepsilon_s^* F_s \Psi_H > 0.$$

The second derivative of welfare with respect to μ_H is

$$\frac{d^2 W_H}{d\mu_H^2} = -\frac{\frac{d\chi_H}{d\mu_H}\left[a - (1-a)\frac{N_H}{L}\right] + \chi_H \frac{1}{L^2}\frac{dL}{d\mu_H}\left[(1-a)N_H + a\chi_H\varepsilon_s^*\right]}{\left[\frac{1}{L}\chi_H\varepsilon_s^* + 1\right]^2},$$

where

$$\frac{d\chi_H}{d\mu_H} = -(1-\alpha)\alpha^2\left(\frac{K}{L}\right)^{\alpha} \varepsilon_s^* F_s \Psi_H \frac{1}{L}\frac{dL}{d\mu_H} > 0,$$

and

$$\frac{dL}{d\mu_H} = -\frac{\varepsilon_s^* F_s \Psi_H}{(1-\alpha)\alpha\left(\frac{K}{L}\right)^{\alpha}\frac{1}{L}(\varepsilon_s^*)^2 F_s \Psi_H + 1} < 0.$$

We restrict the attention to interior maxima. The locus of points of interior maxima,

$\mu_H(\Psi_H)$, is implicitly given by (8). Denote it by $G(\mu_H, \Psi_H)$. In order to prove our statement, we need to show that

$$\frac{d\mu_H}{d\Psi_H} = -\frac{\frac{dG}{d\Psi_H}}{\frac{dG}{d\mu_H}} < 0.$$

First notice that $dG/d\mu_H = d^2W_H/d\mu_H^2 < 0$ given that μ_H is an interior maximum for any Ψ_H. On the other hand, after some algebra we obtain

$$\frac{dG}{d\Psi_H} = -\frac{\frac{d\chi_H}{d\Psi_H}\left[a-(1-a)\frac{N_H}{L}\right] + \chi_H \frac{1}{L^2}\frac{dL}{d\Psi_H}\left[(1-a)N_H + a\chi_H\varepsilon_s^*\right]}{\left[\frac{1}{L}\chi_H\varepsilon_s^* + 1\right]^2} < 0,$$

given that

$$\frac{dL}{d\Psi_H} = \frac{\varepsilon_s^*\theta_s F_s}{\chi_H \frac{1}{L}\varepsilon_s^* + 1} > 0,$$

and that

$$\frac{d\chi_H}{d\Psi_H} = (1-\alpha)\alpha\left(\frac{K}{L}\right)^{\alpha}\varepsilon_s^* F_s\left[1-\alpha\frac{1}{L}\Psi_H\frac{dL}{d\Psi_H}\right] > 0.$$

Since both $dG/d\mu_H < 0$ and $dG/d\Psi_H < 0$, then it will be $d\mu_H/d\Psi_H < 0$, that is to say, function $\mu_H(\Psi_H)$ is strictly decreasing in Ψ_H.

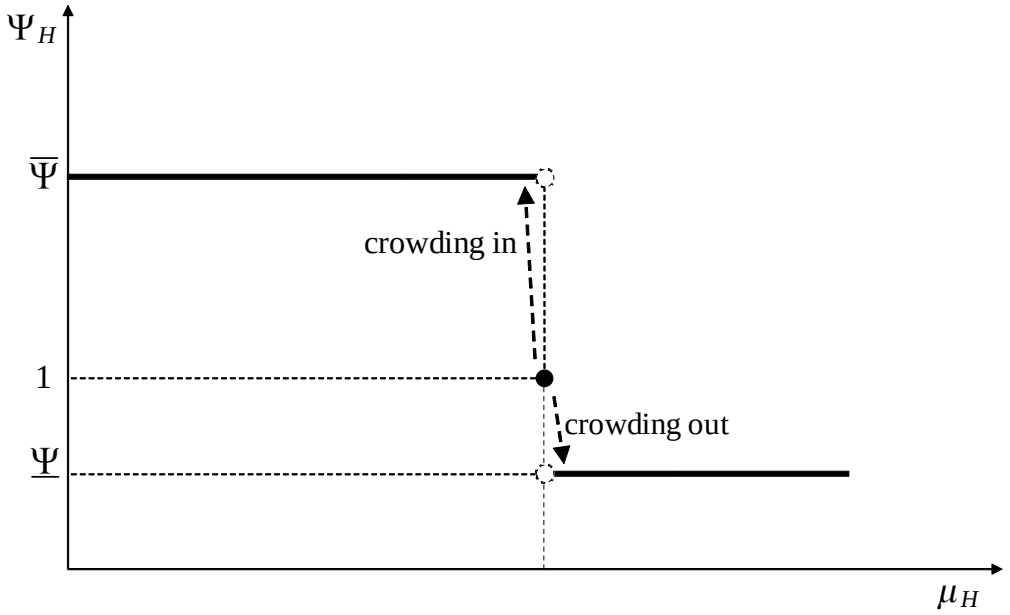

Figure 1: Crowding in and crowding out of skilled immigrants as a function of immigration policy.

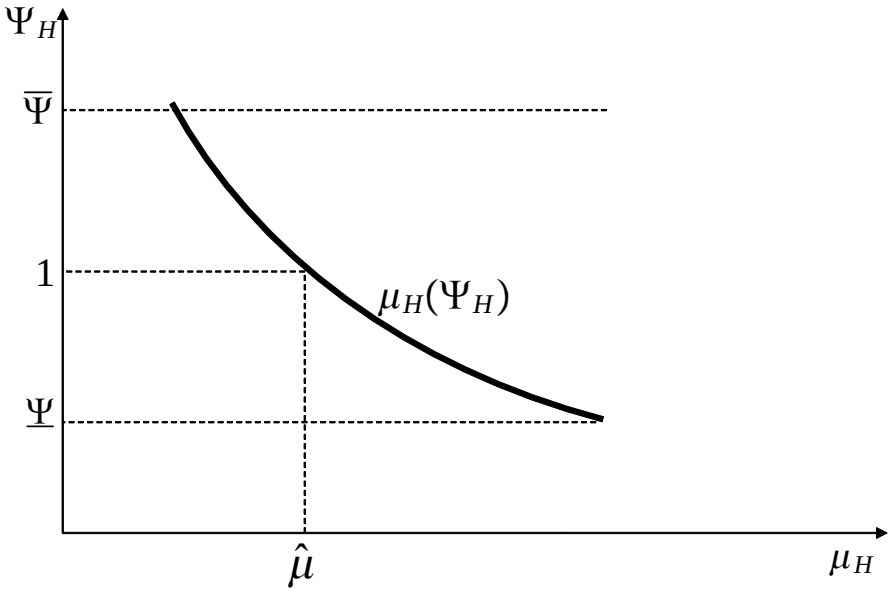

Figure 2: The optimal immigration policy in country H as a function of Ψ_H.

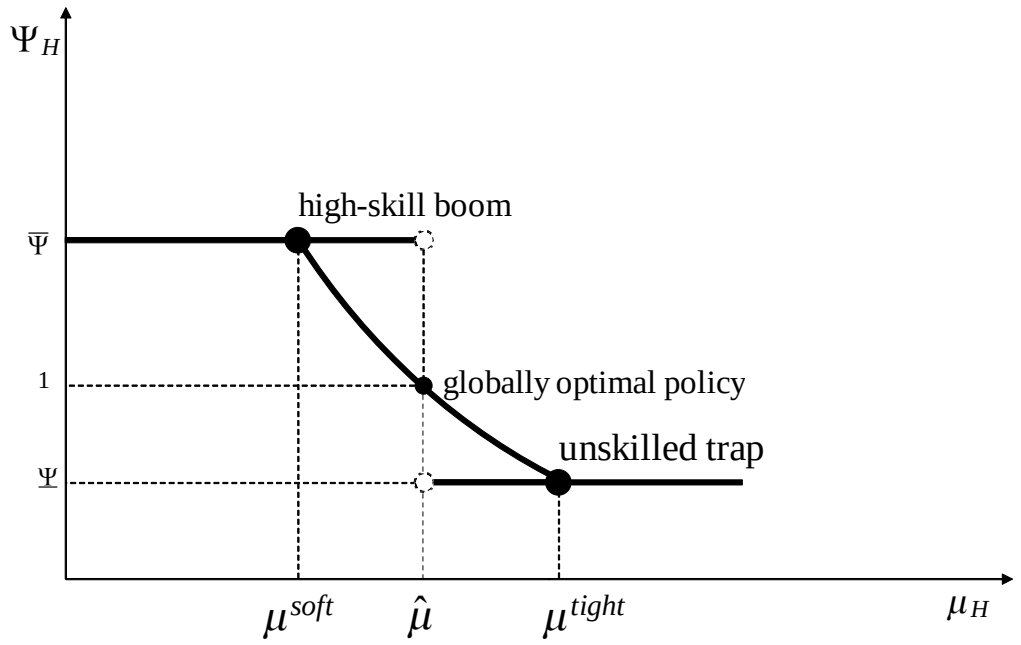

Figure 3: The three policy equilibria.

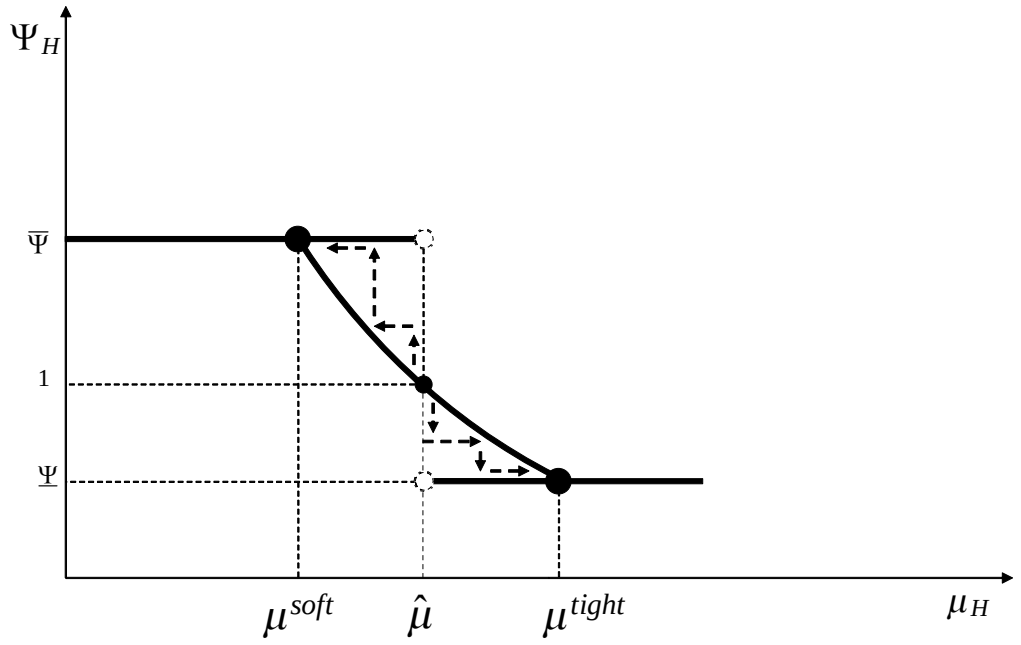

Figure 4: *Tatonnement* stability of equilibria.