Immigration Policy and Self-Selecting Migrants*

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Abstract

We explore the implications of migrants' self-selection for the determination of immigration policy in a simple model where incentives and resources to migrate vary with skills. We show how self-selection determines the response of potential migrants to immigration policy changes, which is crucial for predicting the effects of such policy in the receiving country. For example, restricting immigration when it is low skilled may worsen self-selection and thus the receiving country skill distribution. These selection effects may lead low skilled natives to support a more restrictive policy even though current immigrants are not harmful for them, and the receiving country government to impose significant restrictions even in a purely utilitarian world.

Keywords: Immigrant self-selection; immigration policy preferences, political economy of immigration.

JEL codes: J61, F22, O24, D78

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1 Introduction

As it is well known, those who decide to migrate are not a random sample of their home country population. Incentives to migrate, and ability to pay for it, vary with skills. Besides, receiving countries' immigration restrictions significantly influence benefits and costs of migration, and thereby migrants' skill composition. Understanding migrants' self-selection becomes then crucial for the formation of the receiving countries' policies, since self-selection determines how different potential migrants respond to immigration policy changes.

In this paper, we build a simple framework to analyze the interaction between self-selection into migration and the determination of immigration policy. While it is commonly understood that various effects of migration, both in sending and receiving countries, vary significantly with immigrants' characteristics[1], the relation between immigration policy and immigrant "quality" remains largely unexplored.

In particular, we consider three facets. First, what drives the decision to migrate, i.e. which conditions are likely to lead to high vs. low skilled migration. Second, how receiving countries' policies affect this decision, i.e. what is the relation between immigration restrictions and immigrants' skill composition. Last, what are the implications for receiving countries, i.e. how immigrants' self-selection determines the impact of a policy, its political support and ultimately its "optimality".

More specifically, we model migration in a world with two countries. The sending country has an heterogeneous population of individuals (called "foreigners"), who decide whether to go and work in the receiving country. Foreigners differ in terms of skills and wealth, hence each of them faces different incentives to migrate and different resources to pay for it. The receiving country has an heterogeneous population of workers (called "natives") and a standard labor market where immigrants compete with similarly skilled natives and complement those with different skills. Natives support a policy that maximizes their equilibrium wages: high skilled aim at increasing the supply of low skilled immigrants, low skilled push for the opposite. These preferences are then aggregated by the receiving country government, which sets immigration restrictions according to the weight attached to different groups in the population.

In our model, immigrants' self-selection is driven both by their incentives and wealth constraints. The first term looks at wage differentials (net of migration costs) and tells that migrants are likely to be high skilled if returns from migration increase with skills. The second term points out that, since migration is a costly investment and credit market are typically imperfect, one has to be sufficiently wealthy to afford it. Given that wealth and skill are in general positively correlated, this constraint tends to generate high skilled migration.

[1] Restricting our attention to the economics literature, see Borjas (1994), Friedberg and Hunt (1995), Chiswick, Lee and Miller (2005) on the labor market effects, and Storesletten (2000), Lee and Miller (2000) on the effects on public finance.

Immigration restrictions increase the costs migrants have to pay to enter and work in the receiving country. Given self-selection, i.e. given that incentives and resources to migrate differ across foreigners, the policy influences immigrants' skill composition (Q). Higher costs, due to a *wealth effect,* allow only richer and more skilled foreigners to migrate, hence increasing Q. At the same time, due to an *incentive effect,* they have stronger deterrence on those with lower gains from migration, hence increasing Q if and only if returns to skills are higher at destination.

In other words, we show how the policy has an (indirect) screening power, due to the fact that its marginal effect is stronger on the poorest or least motivated. Notice however that these two groups need not coincide: high skilled are generally the ones with highest ability to pay, while if returns to skills are higher in the sending country, low skilled have the highest gain from migration and thus the highest willingness to pay. Thus, the relation between immigration restrictions and migrants' skill composition is in general shaped by both terms. In particular, we show that given that these effects may have opposite directions, and that their strength varies with the level of costs, this relation need not be monotone. If migration incentives increase with skills, it is always positive. Otherwise it may be U-shaped, with the incentive effect dominating at low levels of cost and the wealth effect taking over afterwards.

Irrespective of its shape, self-selection is generally crucial also for understanding the effect of a given policy in the receiving country. Here, the impact of immigration depends on the resulting changes in the receiving country skill composition R, that is the ratio of high to low skilled workers (natives and immigrants). By shaping migration flows, immigration restrictions influence R, and their effect can be decomposed into a *size* and a *quality* component. According to the former, flows are reduced while assuming that their quality is fixed, and the concern is on immigrants' skill composition as compared to natives. Obviously, if immigrants are less skilled than natives, admitting less of them increases R. For the *quality component,* instead, what matters is how immigrants' composition respond to different policies and, as explained above, this depends on self-selection.

We show that, as the skill compositions in receiving and sending countries get similar, the two components may push the total effect in opposite directions. Hence, encouraging immigration when it is high skilled, or equivalently restricting it when low skilled, may decrease its quality. Moreover, the quality component dominates when the *least* represented group of migrants is, in *absolute* terms, the most sensitive to a policy change. For this to be the case, migration costs has to be sufficiently small. Hence, given that the strength of quality and size effects depends on the level of cost, also the relation between immigration policy and R may be non-monotone.

As an example, suppose that returns to skills are higher at destination and the two countries have similar skill compositions, so that immigrants are positively self-selected and on average more skilled than natives. Now, Q increases everywhere with immigration costs, while R may follow an inverted-U. At low levels of cost, the quality effect tends to

be stronger: increasing the cost increases R by improving migrant quality. After some point, however, the size component takes over: at high migration costs, basically no low skilled foreigner migrates, hence further restrictions just lower the size of high skilled migration, thus reducing R.

These effects, which are driven by immigrants' self-selection, turn out to have important implications for the receiving country, both with respect to natives' attitudes and to the government's optimal policy. First, the relation between natives' skills and support for a given policy may appear counterintuitive. When the quality component is stronger, we may observe a group of natives supporting more (respectively less) restrictive policy even though current immigrants complement (respectively compete with) them. For example, low skilled natives may oppose immigration even if current immigrants are not competing with them, since further restrictions would increase immigrants' average skills, the receiving country skill ratio and hence low skilled wages. Here it is self-selection, rather than immigrants skill composition *per se*, that drives the effect of immigration policy and thus the relation between natives' skills and immigration attitudes.

Second, the government's program has now to account for immigrants self-selection. As in standard models, we show that, fixing immigrant quality, free immigration is the most efficient policy (the one maximizing total surplus in the receiving country), and immigration restrictions may be a way to protect those who lose from migration. In our setting, however, restrictions to immigration are imposed even in a world with no distributional concerns and no political economy distortions, in order to maximize (or minimize) immigrants' quality. In fact, when the quality effect matters, migration costs may be a way to optimally screen the most desirable type of migration.

The rest of the paper proceeds as follows. Section 2 presents the basic structure of the model and discusses its main assumptions. Section 3 analyzes the model, highlighting its logic and main results in comparison with other approaches and some empirical evidence. We then elaborate on some central elements of the analysis: returns to skills and labor market discrimination (Section 4.1); migration costs, networks effects and time consuming bureaucracies (Section 4.2); immigration policy preferences, fiscal policy and political economy concerns (Section 4.3). Section 5 concludes by drawing some policy implications. Before that, however, we briefly confront with the existing literature.

1.1 Related literature

The present model lies in the interaction between three streams of literature, dealing with immigrants self-selection, the determinants of immigration preferences and immigration policy formation.

The basic theory of economic migration as human capital investment goes back to Sjaastad (1962). Studies following this approach typically *assume* that the rate of return to migration increases in skills, hence they predict (and estimate) positive self-selection (see Chiswick (1978) and Chiswick (1999)). A number of other models put forward rea-

sons to question this result. The most influential work is probably by Borjas (1987), who adapts the Roy's model to international migration. He emphasizes the role of the dispersion in returns to skills while abstracting from migration costs as an important determinant of self-selection. Arguing that wage inequality is in general higher in developing country, studies on this line typically predict (and estimate) negative self-selection.[2] However, some of the most recent empirical literature stands in contradiction with Borjas (1987), as it documents positive self-selection even when returns to skills are higher in the sending country (see e.g. Chiquiar and Hanson (2005), Akee (2005), Brücker and Defoort (2006)). Our model tries to reconcile these findings by providing a general treatment of the determinants of self-selection. In addition to the role of returns to skills, we focus on the interaction between two elements highly overlooked in the formal literature. First, we introduce wealth constraints and credit market imperfections, which have been typically ignored in classical studies of self-selection into migration.[3] Second, and more importantly, we stress the role of immigration policies, while the literature generally considers only the supply side.[4] A common assumption seems in fact that immigration restrictions, by selecting from a *given* pool of applicants, act on top of the migration decision, and independently from it. The paper shows that, by considering demand and supply sides in isolation, one may draw erroneous conclusions both on self-selection and on the effect of immigration policy in the receiving country.

The demand side has traditionally received less attention.[5] Only recently, some papers have systematically investigated the determinants of individual preferences towards immigration. This literature finds a consistent pattern: in developed countries, there exists a strong positive correlation between individual education and "pro-immigration" attitudes. Nonetheless, there is no consensus on what is actually driving this relation. While basically nobody denies that different forces may be at play, some studies focus on factors

[2] Other interesting approaches challenging positive self-selection can be found in Katz and Stark (1987) on asymmetric information on immigrants productivity and the possible occurrence of lemon market effects or in Stark and Taylor (1991) where immigration is driven by poor performance relative to some reference group. In these models the "worst" are those who leave.

[3] Hatton and Williamson (2004) state: "When dealing with selection, the immigration literature tends to stress income incentive [...But] changes in selection can be best explained by changes in the costs of the move and the capital constraints on it". These constraints play a leading role in the theory of illegal migration in Friebel and Guriev (2004), that has however a pretty different focus than our one. The most similar formalization of the migration decision is presented in Lopez and Schiff (1998), who highlight the interaction between heterogeneous labor force, migration costs and financing constraints in a modified Hecksher-Ohlin model. However they focus on the effect of trade liberalization in the sending country under the assumption that high skilled migration is driven only by incentives while low skilled migration only by wealth constraints.

[4] The only exception is, to my knowledge, Bellettini and Berti Ceroni (2005). Assuming that immigrants are positively self-selected, they argue in favor of an high immigration quota. By reducing wages in the receiving country, it increases immigrant quality and maximize national income.

[5] For example Borjas (1994) states that "the literature does not yet provide a systematic analysis of the factors that generate the host country's demand function".

like racism, anxiety, social and political alienation and other cultural values and beliefs (e.g. Espenshade and Hempstead (1996), Citrin, Green, Muste and Wong (1997), Hainmueller and Hiscox (2004)), while others emphasize economic motivations. In particular, a number of papers (e.g. Scheve and Slaughter (2001), Mayda (2004), O'Rourke and Sinnott (2004), Hanson, Scheve and Slaughter (2005*b*)) relate individual skills to immigration preferences using a standard factor-proportion analysis, where immigrants are assumed to compete in the labor market with similarly skilled natives and to complement natives with different skills. They explain the positive correlation by observing that immigrants tend to be less skilled than natives and (implicitly) assuming that skill composition of immigrant is fixed. We instead keep the quality of immigrants as endogenous, and possibly dependent on immigration policies, as we are interested precisely in analyzing the effect of policy on quality, not only on size, as a determinant of immigration policy preferences. Hence, our model can also be viewed as a test of robustness of these approaches: in a sense, we follow the spirit of "rational expectation", where people account for the total effect of the proposed policy on equilibrium outcomes, as opposed to assuming "adaptive expectations", i.e. considering the quality as fixed to past levels.

On the formation of policies, one standard approach focuses on the immigration surplus (e.g. Borjas (1995)), implicitly assuming that immigration policies are based solely on efficiency considerations. On the other hand, immigration policies are generally conflictual, hence their determination depends crucially on the political and institutional factors which "aggregate" citizens' preferences.[6] The issue has attracted a few theoretical investigations, like Benhabib (1996), who explores how the median voter determines minimal capital requirements for admission, and Epstein and Nitzan (2005) and Facchini and Willman (2005), who use a lobbying model to explain the formation of immigration quotas. Our paper does not develop any new political economy model, but it may add some novel insights to this literature since individual preferences over policy and immigrant quality are fully endogenized and the role of migration cost as a policy variable is emphasized.[7]

2 The model

The model has two countries, a sending and a receiving one, and three sets of actors: workers in the sending country, who decide whether to migrate; workers in the receiving country, who express their preference over immigration policy; and the receiving country

[6] See e.g. Goldin (1994), Timmer and Williamson (1998) and Hatton and Williamson (2004) on the role of interest groups in shaping immigration policy.

[7] The fact that migration costs can (partly) be a policy variable is recognized also in Clark, Hatton and Williamson (2002), who assume that lower quotas indirectly imply higher costs for migrants. However their analysis, similarly to Mayda (2005), is focused on the volume of immigration flows and does not address the relation between policy and skills composition of immigrants.

government, which actually sets immigration policy.

More specifically, the sending country is populated by a mass n^* of heterogeneous workers, called "foreigners". Each worker is endowed with skill $\theta \in \{H, L\}$ and wealth, conditional on θ, drawn by a distribution Ω_θ with continuous density ω_θ. Let n^*_θ denote the mass of workers of type θ, so that $n^* = n^*_H + n^*_L$. Depending on their wealth and skills, foreigners may decide to migrate. Their utility is linear in wages and costs of migration, that is, a worker i of type θ enjoys

$$V_{i\theta} = \begin{cases} w^*_\theta & \text{if he stays} \\ w_\theta - (\gamma + \varepsilon_i) & \text{if he migrates} \end{cases} \tag{1}$$

where w^*_θ denotes the (exogenous) wage in the sending country, w_θ the (endogenous) wage in the receiving country, and $\gamma + \varepsilon_i$ the cost of migrating. The latter includes a common term γ, i.e. any out-of-pocket and relocating cost, and an individual specific "psychological cost" ε_i, that is a random variable with support on $\mathbb{R}_+$ following a distribution Π, with continuous density π. Immigrants have to incur the cost γ up-front, and the sending country has no credit market for them, thus only sufficiently wealthy people can afford to migrate.

The receiving country is a small open economy with perfectly mobile capital, a neoclassical production function with constant returns to scale, and a competitive labor market. In this country too there is a population of workers, here called "natives", who are heterogeneous in skills θ and have mass $n = n_H + n_L$. Apart from supplying labor, natives express their preferences over immigration policy. In fact, their equilibrium wages depend on the supply of skills in the country, which is influenced by immigration. In particular, w_H and w_L are functions of N_H and N_L, where $N_\theta = n_\theta + x_\theta$ is the total number of type θ workers and x_θ is the endogenous number of immigrant of type θ. Hence, by regulating x_θ, immigration policy affects wages and thus natives' utility $U_\theta = w_\theta$.

Finally, the receiving country government sets the immigration policy by maximizing a weighted welfare function W, where the weight μ_θ attached to group θ's utility depends on the specific institutional setting.[8] Immigration policy acts on the monetary cost γ, hence we can write the government's program as

$$\max_{\gamma \in \mathbb{R}_+} W(\gamma) := \max_{\gamma \in \mathbb{R}_+} \mu_H U_H(\gamma) + \mu_L U_L(\gamma) \tag{2}$$

[8] One may for example consider a utilitarian function where $\mu_\theta = N_\theta$ or $\mu_\theta = n_\theta$, or a majoritarian democracy where

$$\mu_\theta = \begin{cases} 1 & \text{if } n_\theta > n_{-\theta} \\ 0 & \text{otherwise} \end{cases}$$

(where $n_{-\theta}$ is the number of natives of the other type). Also, one may explore the role of lobbying by a group n_θ in order to increases its influence μ_θ.

2.1 Assumptions

Some more specific assumptions are now added, in a somewhat crude way. Their interpretation and essentiality are discussed in the next section. First, the idiosyncratic component of foreigners' utility ε_i, is assumed to be independent on type θ and to have a log-concave cumulative distribution, i.e.

$$\textbf{Assumption 1}: \frac{\pi(\varepsilon^H)}{\Pi(\varepsilon^H)} \leq \frac{\pi(\varepsilon^L)}{\Pi(\varepsilon^L)} \Longleftrightarrow \varepsilon^H \geq \varepsilon^L$$

Second, we let high skilled people be on average wealthier than low skilled. In particular, we assume that the high skilled wealth distribution is more favorable than the low skilled one, in the sense of conditional stochastic dominance, i.e.

$$\textbf{Assumption 2}: \frac{\omega_L(\gamma)}{1-\Omega_L(\gamma)} \geq \frac{\omega_H(\gamma)}{1-\Omega_H(\gamma)}, \text{ for every } \gamma \in \mathbb{R}_+$$

Finally, denote the production technology in the receiving country as $Y = F(N_H, N_L)$ and $F_\theta := \partial F(N_H, N_L)/\partial N_\theta$. We require that F_θ decreases in the amount of workers with skill θ and increases in the amount of workers with different skills, i.e.

$$\textbf{Assumption 3}: F_{HH}, F_{LL} < 0 \text{ and } F_{HL} > 0$$

2.2 Discussion of the main ingredients

Before proceeding with the analysis, let us clarify the role of our main assumptions. The psychological cost ε_i (Assumption 1) just smoothes the decision process and this allows a standard marginal analysis. It reflects individual heterogeneity, i.e. the large set of elements influencing the decision to migrate which cannot be completely reduced to monetary costs and benefits (e.g. age, family ties, access to networks at origin and destination country). The term does not drive any of the results, and its broad interpretation can be justified to the extent that these elements are not significantly correlated with the type θ (see the discussion in Section 4.2).[9]

The assumption of log-concavity is a standard monotonicity requirement. Intuitively, it captures the fact that a lower realization of the cost is associated with an higher probability of migration, i.e. the less one suffers from moving the more likely he is willing to do it. In our setting, this implies that the marginal effect of a change in gains or cost is higher for those with less incentive to migrate. Formally, log-concavity means that the

[9] See also the early thoughtful discussion of the relation between education and migration costs in Schwartz (1973).

most sensitive to a change in the parameters are not too concentrated in the tails of the distribution, and the assumption is very mild as a large class of distributions satisfies it.[10]

On wealth distribution (Assumption 2), we have again a monotonicity requirement: the probability of being able to pay the migration cost increases with skill. The positive correlation between skill and wealth is however a well documented regularity, especially in developing countries (see for example Filmer and Pritchett (1999) or Piketty (2000)).[11] Formally, we require hazard rate dominance, that is slightly stronger than first order stochastic dominance ($\Omega_H(\gamma) < \Omega_L(\gamma)$ for every γ), but weaker than the standard assumption of monotone likelihood ratio.[12]

The relation between wages and migration deserves some words. First, we think that, from an individual perspective, the effect on wages is negligible, and thus it does not influence the decision to migrate. Hence, potential migrants take wages as given. For policy formation, instead, what matters is the aggregate effect. We are interested in the receiving country's policy, hence we can keep wages in the sending country as exogenous.[13] In the receiving country, instead, Assumption 3 requires that immigrants are perfect substitutes of similarly skilled natives. The evidence on this is pretty controversial. Many studies (see the reviews in Borjas (1994) and Friedberg and Hunt (1995) or the recent study by Card (2005)) find a rather small impact of immigration on natives' wages, while Borjas (2003) forcefully documents that immigrants do compete with similarly skilled natives and significantly lower their equilibrium wages. Taken literally, our model is consistent with the latter approach, but notice that what we emphasize is citizens' belief, rather than actual effect, to be of this kind.[14] More generally, we are interested in highlighting the connection between the economic impact of immigration and natives' preferences. For this purpose, we derive how the receiving country skills' ratio changes under different immigration policies, keeping the somewhat crude and controversial assumptions on preferences and labor market outcomes as a clean way to identify the determinants of immigration policy preferences. One may think of more realistic assumption, but the

[10] For example one can consider the Uniform, Normal, Lognormal, Weibull, Exponential, Logistic, Laplace, Gamma, Chi-Squared distributions. Furthermore, we require that $\log \Phi$ is concave, that is a weaker than assuming that $\log \varphi$ is concave. For example, the Pareto distribution has logconvex density but logconcave cumulative distribution function (see Bagnoli and Bergstrom (2005)).

[11] In light of this, the fact that we do not consider the possibility to borrow money in order to migrate is also pretty innocuous. Even if an (imperfect) credit market was opened, wealthy people would be able to borrow more or at a lower cost than the poor ones, that is what we need. Obviously, if one assumed a perfect world, wealth constraints would become irrelevant.

[12] The importance of the monotonous likelihood ratio property (MLRP) in economics applications was emphasized for example by Milgrom (1981). A simple proof that MLRP implies hazard rate dominance, which implies stochastic dominance can be found in Krishna (2002) (Appendix B).

[13] This needs not to be a realistic assumption: e.g. Mishra (2003) and Hanson (2005) document how Mexican wages are affected by emigration.

[14] This seems evident if one considers the centrality of the issue in past and current policy debates and the literature on immigration attitudes quoted above.

logic of our exercise should hold (see Section 4.3).

The policy variable we focus on is γ, that is the cost foreigners have to incur to enter and work in the receiving country. A few assumptions are implicit here. First, the relevant policy space is restricted to γ. Second, this policy is not systematically related to immigrants skills. Third, the migration cost γ is (partly) endogenous, i.e. it can be significantly influenced by the receiving country policies. The first two features are clearly a simplification. Immigration policies are much more articulated, and to some extent they are made conditional on immigrant type θ. Our formalization can be thought as a starting point to explore the relation between immigration policy and self-selection, in a world where immigrant type θ is not perfectly observable or contractible. Some complications to this picture can be included as minimal extensions of the basic model, and they are presented in Section 4.2.

Endogenous migration costs are instead an essential feature of our approach: these costs are both an argument of the migration decision and a policy variable. Of course they have also exogenous components (like the distance between the two countries), and partly exogenous ones (like transportation costs or the existence of an established network of previous migrants). We argue, however, that policies in the receiving country may play a significant role. What immigrants have to pay comprises also direct fees, bureaucracies, queuing and other time consuming requirements which increase foregone earnings or the money to be spent with consulting or legal services. These components may become more and more relevant, given the historical trend of decreasing transportation costs and increasing immigration restrictions (Hatton and Williamson (Forthcoming)).[15] In addition, policy makers seem well aware of this: historically, the first interventions to limit and to select immigration flows in the US and Canada acted on prices: costs were increased, removing monetary incentives and introducing lengthy procedures or head taxes for admission. Quantity restrictions (quotas) came at a later stage.[16]

Finally, it is already clear that the political economy part of the paper is pretty stripped down, since for example we do not model where the weights μ_θ come from. It is not our

[15] This cost can also be thought as a consequence of uncertainty. The model abstracts from the issue, but one can interpret the set of people that are sufficiently wealthy as those who have sufficiently low risk aversion. The relation between skills and risk aversion however is less clear. If it tends to be positive (less risk adverse people invest more in human capital), the model may apply.

[16] Timmer and Williamson (1998) report that the United States, for example, introduced a head tax of 50 cents per migrant in 1882, that was progressively raised to $8 in 1917. Also, in 1907 they introduced the first financial test, establishing that each individual must have $25 (or $50 per family). The same acts extended the classes of "excludable" immigrants, i.e. those who were prohibited to entry because they would have surely become a burden for the hosting society. Passenger acts in the US in the 19th century (fixing minimal standards to carry immigrants) is another policy that indirectly increased migration costs. Canada has also acted on costs in order to control the composition of the immigrant population. In 1870, a travel fund of C$30 per adult (for Mennonites that agreed to build settlements) was introduced, while in 1910 migration was restricted by a tax of C$50 per head (C$200 per head for Asians). The first quota restiction in the United States came in 1921.

intention, however, to develop a new model on this. Rather, we prefer having a flexible form and, exploiting the insights of existing models, let these weights vary and look at what happens to the preferred migration policy, once immigrant quality is considered endogenous.[17]

3 Analysis

3.1 The migration decision

It follows directly from (1) that a foreigner i of type θ prefers migration iff $w_\theta - (\gamma + \varepsilon_i) \geq w^*_\theta$, and for each type θ there exists a cut-off value $\varepsilon^\theta \equiv w_\theta - w^*_\theta - \gamma$ such that any individual i of type θ with $\varepsilon_i < \varepsilon^\theta$ would like to migrate. In addition, this individual must be sufficiently wealthy to incur the migration cost γ. Thus, the supply of migrants of type θ is defined by

$$x_\theta := q_\theta n^*_\theta = [1 - \Omega_\theta(\gamma)]\Pi[w_\theta - w^*_\theta - \gamma]n^*_\theta \tag{3}$$

where the fraction $\Pi[w_\theta - w^*_\theta - \gamma]$ represents those who have incentive to move and $[1 - \Omega_\theta(\gamma)]$ those who could afford to move.

Many of the following results depend on how migrants compare to non migrants. This is described by migrants' average skill ratio, often called "quality", and implicitly defined by

$$Q := \frac{x_H}{x_L} = \frac{[1 - \Omega_H(\gamma)]}{[1 - \Omega_L(\gamma)]} \cdot \frac{\Pi[w_H - w^*_H - \gamma]}{\Pi[w_L - w^*_L - \gamma]} \cdot \frac{n^*_H}{n^*_L} \tag{4}$$

While extremely simplified, this characterization of the individual decision to migrate allows to address some fundamental debates in the current literature.

3.1.1 Positive or Negative Self-Selection

As noted, many studies document that migrants are not a random sample of the sending country population. Self-selection can be of course evaluated along many dimensions. We focus on *observable* skills (like education), and in this sense we define positive or negative self-selection when those who migrate are on average more or less skilled than those who remain at home, i.e. $Q \gtrless 1$. In the model, self-selection is driven by constraints, i.e. different ability to incur the migration cost, and incentives, i.e. different returns to skills.

[17] Notice also that the possible revenues from the "entry tax" γ do not appear in the welfare function. This is a simplification, but probably a minor one. First, the magnitude of these proceeds does not appear to be substantial, considered also the cost of maintaining a bureaucratic system of enforcement. More importantly, a significant part of the money paid for migration need not be public revenues. Take for example the amounts paid to agencies providing immigration services: these are a direct result of immigration restrictions, but they are not pocketed by the receiving country government.

Wealth constraints are less severe for the high skilled (Assumption 2) and thus push towards positive self-selection:

$$[1 - \Omega_H(\gamma)] > [1 - \Omega_L(\gamma)]$$

Incentives to migrate, instead, are greater for high skilled if the wage differential in the receiving country is higher than in the sending one. Denoting these differentials as $\Delta w^* = w_H^* - w_L^*$ and $\Delta w = w_H - w_L$, we can write

$$\frac{\Pi[(w_L - w_L^*) + (\Delta w - \Delta w^*) - \gamma]}{\Pi[w_L - w_L^* - \gamma]} \geq 1 \Longleftrightarrow \Delta w \geq \Delta w^*$$

If $\Delta w \geq \Delta w^*$ we can clearly conclude that migrants are positively self-selected, while if $\Delta w < \Delta w^*$ the total effect is ambiguous and it depends on the relative strength of the two forces, i.e. whether the migration decision is driven more from wealth constraints (likely for relatively poor source countries) or incentives (likely for relatively rich source countries).

Proposition 1 *When wealth constraints are the main determinant of the migration supply, migrants tend to be positively self-selected. When migration is driven mostly by incentives the same holds if and only if* $\Delta w \geq \Delta w^*$.

The recent findings by Chiquiar and Hanson (2005), i.e. Mexican migrants to the US are positively self-selected despite returns to skills are higher in Mexico, can be interpreted recognizing the interaction between costs of migration and returns to skills in shaping the self-selection process. In general, wealth constraints push towards positive self-selection, and this effect is greater the poorer the source country is. This matches also the more aggregate evidence in Hatton and Williamson (2004) and Brücker and Defoort (2006), where the gap in years of schooling between movers and stayers is positive (thus supporting the view that migrants are positively self-selected); it increases with the distance between source and destination country and it decreases with source country per capita GDP.

3.1.2 Comparative statics: incentive and wealth effects

We are now interested in describing how migration size and quality depend on migration costs and economic conditions in the source country. In Borjas (1987), who focuses on the role of migration incentives, higher source inequality (being a proxy for higher returns to skills) is associated with lower quality of migrants. Chiswick (1999), while not explicitly introducing wealth constraints, emphasizes the role of costs (implicitly assuming that returns to skills are higher in the receiving countries) and in his model higher costs increase the quality of migrants. We generalize these results, emphasizing how they depend crucially on self-selection, and in particular on whether migration is driven by wealth constraints or incentives.

Migration cost To see instead the effect of the migration cost on quality, notice that $\partial Q/\partial\gamma \geq 0 \Leftrightarrow q_L \cdot \partial q_H/\partial\gamma - q_H \cdot \partial q_L/\partial\gamma \geq 0 \Leftrightarrow$

$$-\Pi(\varepsilon^L)(1-\Omega_L)[\Pi(\varepsilon^H)\omega_H+(1-\Omega_H)\pi(\varepsilon^H)]+\Pi(\varepsilon^H)(1-\Omega_H)[\Pi(\varepsilon^L)\omega_L+(1-\Omega_L)\pi(\varepsilon^L)] \geq 0$$

or, rearranging,

$$\frac{\partial Q}{\partial\gamma} \geq 0 \Leftrightarrow \frac{\omega_L(1-\Omega_H)-\omega_H(1-\Omega_L)}{(1-\Omega_H)(1-\Omega_L)} + \frac{\pi(\varepsilon^L)\Pi(\varepsilon^H)-\pi(\varepsilon^H)\Pi(\varepsilon^L)}{\Pi(\varepsilon^H)\Pi(\varepsilon^L)} \geq 0 \qquad (5)$$

The first term is always positive and it represents a *wealth effect*: increasing the cost one gets richer and more skilled migrants, and the strength of this term increases with the level of cost and with wealth inequality. The second term instead is positive iff $\Delta w \geq \Delta w^*$, and this describes an *incentive effect*: changing costs has a relatively higher impact on people with lower gain from migration. If $\Delta w \geq \Delta w^*$, low skilled are on average those with less incentives to migrate, thus an increase in costs has a stronger deterrence on them and the quality increases. It is clear that when wealth constraints are the main determinant of the migration supply, migrant quality increases with migration cost, while if migration is driven mostly by incentives the same occurs if $\Delta w \geq \Delta w^*$. Instead, when $\Delta w < \Delta w^*$, the effect is ambiguous. For low levels of cost the relation is negative, since the wealth effect is weak and incentives dominate. The shape of Q as costs increase depends on the strength of the two effects. Roughly, when $\Pi(\varepsilon^H)$ goes to zero faster than $(1-\Omega_L)$, $Q \to 0$ as γ increases, since at some point a few high skilled are willing to migrate. When the opposite occurs, there exists a cost beyond which the wealth effect takes over, as a few low skilled are able to migrate, hence the relation becomes non-monotone and $Q \to \infty$ (see figure 1).

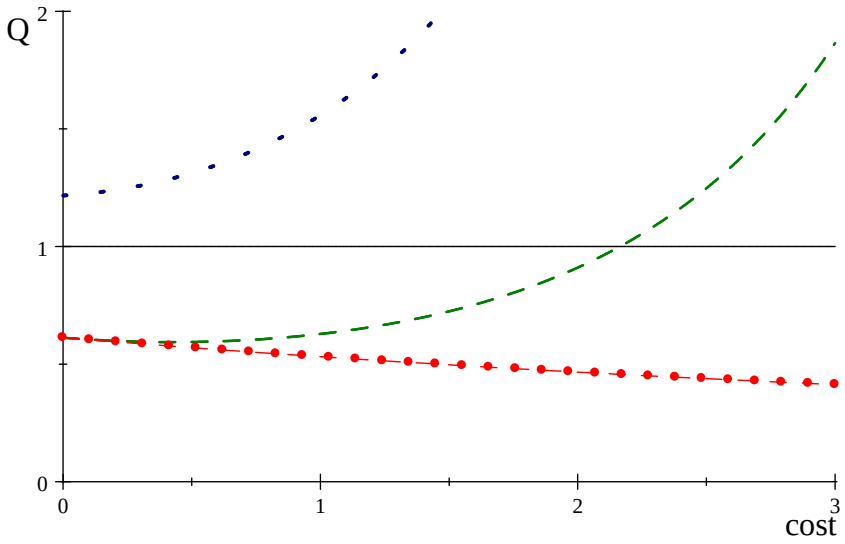
Recalling our discussion on Proposition 1, we can sum up saying:

Proposition 2 *If $\Delta w \geq \Delta w^*$ migration cost and migrant average skills are positively correlated. If $\Delta w < \Delta w^*$ the relation is ambiguous, being either decreasing everywhere or non-monotone.*

Wealth and wages As the source country becomes wealthier, more people are able to incur the migration cost, thus we should expect migration to increase. On the other hand this is often associated with an increase of wages at home, that reduces the incentives to migrate and thus the migration flow.[18] In fact source countries typically experience an inverted-U relationship between development and migration (see e.g. Rotte and Vogler (2000), Hatton and Williamson (2004) and Mayda (2005)): at early stages, higher growth relaxes wealth constraints and leads to higher migration; at later stages instead it tends to decrease the incentives and hence to reduce migration.

[18] This should be clear even if the relation between wealth and income is not explicitly analyzed in our model (that is intentionally kept a static one).

Figure 1 Relation between immigration cost and immigrant quality. The top line rapresents the case of $\Delta w > \Delta w^*$, the midlle one $\Delta w < \Delta w^*$and "strong" wealth effect, the bottom one $\Delta w < \Delta w^*$and "weak" wealth effect.



The effects on quality are similar to those analyzed in the previous point. An increase in the average wealth in the source country decreases the quality (since now more poor and low skilled people can afford to move), while an increase in the level of wages w_L^* increases Q iff $\Delta w \geq \Delta w^*$ (since as before $\partial Q/\partial w_L^* > 0 \Longleftrightarrow \pi(\varepsilon^L)\Pi(\varepsilon^H) - \pi(\varepsilon^H)\Pi(\varepsilon^L) > 0$).

Finally, the effect of source country inequality is ambiguous. More wealth inequality (i.e. the lower is Ω_H with respect to Ω_L) increases Q, while more wage inequality (i.e. higher Δw^*) decreases Q. Once again, since wealth and wage distributions tend to be highly correlated, the total effect on Q depends on whether wealth constraints or incentives are the major determinant of the migration decision.

3.2 The effects in the receiving country and natives' preferences

Immigrants' self-selection is an interesting variable *per se*. It is useful for example for understanding the impact of migration on the source country, or possibly to investigate issues like assimilation, discrimination, crime, in the receiving country (see e.g. Butcher and Morrison Piehl (2005)). However, in our model, the key determinant both of immigration policy preferences and of the ensuing government program is the labor market interaction between natives and immigrants in the receiving country. What matters here is the skill composition of immigrants as compared to natives, rather than to the source country population; hence, one has to consider also the pool of foreigners over which

self-selection takes place, and the pool of natives with whom immigrants compete.

In brief, we are interested in seeing how immigration policy shapes immigrants supply and how this affects wages. In a competitive equilibrium, wages are defined by

$$w_\theta = \frac{\partial F(N_H, N_L)}{\partial N_\theta} \text{ for } \theta \in \{H, L\} \tag{6}$$

where $N_\theta = n_\theta + x_\theta$ is the total number of type θ workers and x_θ is the supply of immigrant of type θ, as defined in (3). We consider for simplicity a Cobb-Douglas production function $F(N_H, N_L) = N_H^\alpha N_L^{1-\alpha}$, so we can express equation (6) as

$$\begin{cases} w_H = \alpha(\frac{N_H}{N_L})^{\alpha-1} = \alpha R^{\alpha-1} \\ w_L = (1-\alpha)(\frac{N_H}{N_L})^{\alpha} = (1-\alpha)R^{\alpha} \end{cases} \tag{7}$$

where R is the ratio N_H/N_L of high to low skilled workers, which varies with migration flows according to

$$R = \frac{n_H + x_H}{n_L + x_L} = \frac{n_H + [1 - \Omega_H(\gamma)]\Pi[(w_L - w_L^*) + (\Delta w - \Delta w^*) - \gamma]n_H^*}{n_L + [1 - \Omega_L(\gamma)]\Pi[w_L - w_L^* - \gamma]n_L^*} \tag{8}$$

Equations (7) and (8) implicitly define how wages depend on immigration policy. The following lemma, which is proved in the Appendix, provides a very simple way to express this relation:

Lemma 1 $\frac{\partial w_L}{\partial \gamma} \geq 0 \Leftrightarrow \frac{\partial R}{\partial \gamma} \geq 0$ *and* $\frac{\partial w_H}{\partial \gamma} \geq 0 \Leftrightarrow \frac{\partial R}{\partial \gamma} \leq 0$.

Thus, we can limit our attention to the direct effect of immigration policy on R. Since the policy influences both size and quality of immigration, and these two components may have opposing directions, the relation is not obvious ex-ante. Suppose for example immigrants are on average less skilled than natives. A more restrictive policy reduces immigration and thus *ceteris paribus* increases the skills ratio R. However, if immigrants are negatively self-selected, this same policy may also decrease their quality. The total effect may actually be a decline in the skills ratio. To see this more precisely, consider that

$$\frac{\partial R}{\partial \gamma} \geq 0 \Leftrightarrow (n_L + x_L)\frac{\partial x_H}{\partial \gamma} \geq (n_H + x_H)\frac{\partial x_L}{\partial \gamma} \tag{9}$$

Multiplying both sides by $x_L x_H$ and rearranging, we have

$$\frac{\partial R}{\partial \gamma} \geq 0 \Leftrightarrow \frac{\partial x_H}{\partial \gamma} x_L \cdot \frac{x_H}{n_H + x_H} \geq \frac{\partial x_L}{\partial \gamma} x_H \cdot \frac{x_L}{n_L + x_L} \tag{10}$$

One can see the last relation as the product of two forces. In fact,

$$\frac{x_H}{n_H + x_H} \geq \frac{x_L}{n_L + x_L} \Leftrightarrow \frac{x_H}{x_L} \leq \frac{n_H}{n_L} \tag{11}$$

and

$$\frac{\partial x_H}{\partial \gamma} x_L \geq \frac{\partial x_L}{\partial \gamma} x_H \Leftrightarrow \frac{\partial Q}{\partial \gamma} \geq 0 \tag{12}$$

As obvious, R is affected by the skill composition of immigrants vs. natives, i.e. x_H/x_L vs. n_H/n_L. This is simply a *size effect,* as described in equation (11): for a given quality of the migration flow, increasing the cost increases R if and only if immigrants are less skilled than natives. At the same time, however, changing the cost changes the pool of immigrants, as described by equation (12), and analyzed in the previous section. This represents a *quality effect*: higher costs increase the skill ratio R if and only if they improve immigrants self-selection. Standard discussions about immigration policies consider only the size effect. This may be misleading, as these two effects are not only there, but, as we now describe, they may have opposite directions.

3.2.1 The tension between the size and the quality effect

We argue that, in general, both size and quality effects are to be considered before predicting the impact of a given policy on R. In fact, there are situations where the tension between the two effects is inescapable, i.e.

$$\frac{\partial Q}{\partial \gamma} \geq 0 \Leftrightarrow \frac{x_H}{x_L} \geq \frac{n_H}{n_L} \tag{13}$$

As implied by Proposition 2, condition (13) is met for all γ when skill compositions are similar in the two countries (i.e. $n_H^*/n_L^* \simeq n_H/n_L$) and the relation between Q and γ is monotone (i.e. either $\Delta w \geq \Delta w^*$ or the wealth effect is second-order). Suppose for example immigrants are positively self-selected and more skilled than natives. In this case, a less restrictive policy tends to increase R through the effect in (11) and, as shown in Proposition 2, to decrease it through the effect in (12). On the other hand, there are no tensions for example when immigrants are positively self-selected but still less skilled than natives, since increasing the cost increases R both because you get less immigrants and because their self-selection improves.[19]

We restrict the analysis to situations where (13) holds and try to shed some light on the conditions under which one force or another is likely to prevail. It is useful to rewrite equation (9) as

$$\frac{\partial R}{\partial \gamma} \geq 0 \Leftrightarrow \frac{\partial q_H}{\partial \gamma} n_H^* n_L - \frac{\partial q_L}{\partial \gamma} n_L^* n_H + \frac{\partial q_H}{\partial \gamma} q_L n_H^* n_L^* - \frac{\partial q_L}{\partial \gamma} q_H n_L^* n_H^* \geq 0 \tag{14}$$

First, notice that the quality effect is less likely to be an issue if the skill compositions of the two country are very different. If say the sending country has a very poor skill composition

[19] Alternatively, condition (13) holds for all γ when Q is monotone and self-selection is very strong, so that immigrants are more skilled than natives despite being selected from a "bad pool" or they are less skilled than natives despite coming from a "good pool".

($n_H^* n_L << n_L^* n_H$), all else equals, a more restrictive policy is likely to increase R (recall that $\partial q_\theta / \partial \gamma < 0$), as it is likely to have a larger absolute impact on low skilled foreigners, irrespective of pattern of self-selection.

This effect being clear, we now abstract from the it and concentrate on the case where

$$n_H^* = n_H \text{ and } n_L^* = n_L \tag{15}$$

hence we write (14) as

$$\frac{\partial R}{\partial \gamma} \geq 0 \Leftrightarrow \frac{\partial q_H}{\partial \gamma} - \frac{\partial q_L}{\partial \gamma} + \frac{\partial q_H}{\partial \gamma} q_L - \frac{\partial q_L}{\partial \gamma} q_H \geq 0 \tag{16}$$

We can now see that, given (13) and (15), a *sufficient* condition for the quality effect to prevail is

$$x_H \geq x_L \Leftrightarrow \frac{\partial q_H}{\partial \gamma} \geq \frac{\partial q_L}{\partial \gamma} \tag{17}$$

In fact, given (15), $x_H \geq x_L$ is equivalent to $x_H / x_L \geq n_H / n_L$ and condition (13) implies that $q_L \cdot \partial q_H / \partial \gamma - q_H \cdot \partial q_L / \partial \gamma \geq 0$, which coupled with (17), gives the relation in (16). Hence, R increases with γ despite immigrants being more skilled than natives, i.e. the quality effect is stronger than the size effect. Condition (16) is very intuitive: the size effect is by definition random, hence it hits a group of foreigners proportionally to their propensity to migrate. On the other hand, the quality effect, as seen in the previous Section, tends to be stronger on the least represented group. Condition (17) simply tells that the latter prevails when the least represented group is, in absolute terms, the most sensitive to a policy change.[20,21] Moreover, as long as the flow of immigrants in the receiving country is relatively small, i.e. q_L and q_H are small, the condition is almost necessary.

In addition, we can state a *necessary* condition for the quality effect to prevail:

$$\gamma \leq \gamma^{\max} \tag{18}$$

where the maximum cost depends on the functional forms Π and Ω_θ we assume (see the Appendix for some examples). Roughly, a low cost is needed to have a sufficiently heterogeneous population of migrants responding to policy changes. If the cost is so high that there is basically only one group of foreigners which migrates (being them the richest or the most motivated), then by definition one cannot have any quality effect. Suppose

[20] Notice that these derivatives are negative, hence $\partial q_H / \partial \gamma \geq \partial q_L / \partial \gamma$ is equivalent to $|\partial q_H / \partial \gamma| \leq |\partial q_L / \partial \gamma|$, i.e. it means that low skilled are more sensitive.

[21] An interesting example of this (which is not a directly considered in the model, though), is when immigrants are mostly low skilled and illegals. Immigrants depress R but immigration restrictions are likely to worsen the situation by discouraging high skilled migrants, without affecting low skilled (illegal) ones.

for example migration is driven only by wealth constraints, and the cost is such that only high skilled can afford it. Immigrants are more skilled than natives, and Q increases in γ, hence condition (13) holds. But at this point the quality effect is very weak: a further increase in γ only prevents high skilled to migrate, hence it decreases R. In other words, as q_L and $\partial q_L/\partial\gamma$ are almost zero, (16) reduces to $\partial q_H/\partial\gamma < 0$.

The last observation implies that, when the quality effect matters, the relation between γ and R is non-monotone. To see this pattern in the simplest way, assume that migration is driven only by incentives, and let Π have (almost) all mass at ε. Consider for example $\Delta w \geq \Delta w^*$, hence the quality effect tells that increasing the cost increases R as more low skilled stay at home. But beyond the point $w_L - w_L^* - \varepsilon$ no low skilled foreigner wants to migrate, hence increasing the cost just discourages high skilled and thus reduce R. In this case, the relation between γ and R follows an inverted-U. Similarly, if $\Delta w < \Delta w^*$, we have a U-shaped relation, with a minimum at $\gamma = w_H - w_H^* - \varepsilon$ (see figure 2).[22]

In the Appendix, we discuss the conditions for non-monotonicity somewhat more broadly. For now, we summarize with the following

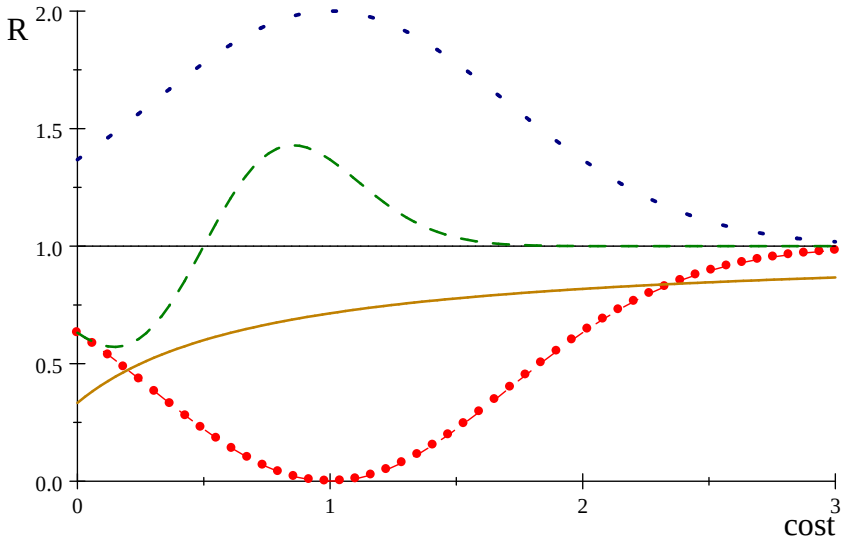
Proposition 3 *Under condition (13), quality and size effects have opposite directions. Their strength varies with γ, and the quality effect may prevail when γ is low and the skill compositions of the two country are similar. In this case, negative (positive) self-selection implies a U (inverted-U) relation between R and γ.*

3.2.2 The quality effect and immigration attitudes

The last proposition implies that, when the quality effect is at play, the support of a given policy may be counterintuitive, with some natives pushing for more (respectively less) restrictive policy even though immigrants are beneficial (respectively harmful) for them. In order to see when (and whether) this may actually be a relevant argument, suppose migration from poor country is mostly driven by wealth constraints. Those who move are basically those who can afford it, hence we have positive self-selection. If the destination country is rich and have a much higher skill composition, it may be that immigrants are less skilled than natives even though they are positively self-selected. In this case, as we have already noticed, increasing the cost benefits low skilled both because they get less immigration and because immigrants' average skill increases. Size and quality effects go hand in hand, hence they cannot be directly disentangled. However, if the destination country is also poor, skill compositions may be similar and immigrants may improve the skill ratio. Here, depending on the strength of selection and of the quality effect (i.e. on wealth inequality and the level of cost relative to wealth), you

[22] A similar pattern can be found if we instead assume that only wealth constraints matter, and that wealth distribution conditional on type is extremely concentrated at k_θ. In this case, we have an inverted-U, with the maximum at $\gamma = k_L$

Figure 2 Relation between immigration cost and receiving country skill ratio. The solid line equals n_H/n_L, the curves rapresents the case of $n_H^*/n_L^* = n_H/n_L$ under different self-selection patterns (as in figure 1). The solid curve rapresents the case of second-order quality effect.



may then observe that high skilled support a less restrictive policy even though current immigrants are high skilled. In fact, lower costs would reduce immigrants' quality, the receiving country skill ratio and thus increase high skilled wages. Similar reasonings may apply to migration between rich countries. Assume that migration here is driven mainly by incentives, and that the receiving country have higher returns to skills, so that we have positively self-selected immigrants who increase the skill ratio. Now, low skilled may want a more restrictive policy even if current immigrants complement them.[23] We can sum up with the following:

Corollary 1 *Considering only the skill composition of immigrants vs. natives may lead to erroneous predictions of natives' preferences over immigration policy. For example, low skilled natives may support a more restrictive policy, even though immigrants increase the receiving country skill ratio.*

A neat empirical test of these hypothesis is admittedly not easy. So far, there is a small literature on migration in the South and very little is known about immigration preferences there (see Mayda (2004)). In addition, surveys in the North focus on general attitudes

[23]The last case to consider would be North-South migration. But here typically only high skilled migrate (see for example SOPEMI (2004) for high skilled migration from Japan and the US to China). Hence, in our two-types model, we would have only a size effect.

towards immigration. We do not know for example whether these differ according to immigrants source country, hence possibly to self-selection. The only general fact, i.e. that support to immigration in the North increases with skills (as described in Section 1.1), is consistent with our model, but it is not a sharp test of it. In fact, the typical case of South-North migration is that the immigrants are positively self-selected but still less skilled than natives (see e.g. in Borjas (1995), Hatton and Williamson (2004) and Chiquiar and Hanson (2005)), hence quality and size effect have the same direction. On the other hand, many other dimensions are possibly important in shaping immigration policy preferences. In Section 4, we further discuss to what extent one could broaden the analysis without changing the main logic presented here.

3.3 Equilibrium Policy

We have seen that in general the relation between cost and R is not monotone and it is determined both by self-selection and by the source country's skill composition. This observation matters also for the government program. Consider again $F(N_H, N_L) = N_H^{\alpha} N_L^{1-\alpha}$ and remember that $R = N_H/N_L = (n_H + x_H)/(n_L + x_L)$. Then equation (2) becomes:

$$\max_{\gamma \in \mathbb{R}_+} W(\gamma) = \mu_H \alpha R^{\alpha-1} + \mu_L (1-\alpha) R^{\alpha} \tag{19}$$

We are now interested in seeing how the preferred policy changes by varying our weights μ_θ. First notice that if the government cares about each group of workers (i.e. immigrants and natives) according to its size, i.e. $\mu_\theta = N_\theta$, it just maximizes the total output hence, unsurprisingly, it sets $\gamma = 0$.

Suppose instead that the government cares only about natives, and the weights again depend only on the size of the group, i.e. $\mu_\theta = n_\theta$. In this case, $W = n_H w_H + n_L w_L$ and

$$\frac{\partial W}{\partial \gamma} = \frac{\partial R}{\partial \gamma} [\frac{n_L x_H - n_H x_L}{n_L + x_L}]$$

Notice that the function W is convex and has a minimum at $R = n_H/n_L$ i.e. when $x_H/x_L = n_H/n_L$. Thus economic benefits from immigration are minimized when immigrants replicate, in terms of skills, the native population. Since the government has no distributional concerns, it acts on costs in order to admit immigrants that complement natives and so maximize or minimize the skill ratio. Consider first the case in which the decision to migrate is unaffected by policy changes, or the difference in skill distribution between sending and receiving country is very large, so that immigrant quality can be kept fixed. Now $\partial R/\partial \gamma > 0 \iff x_H/x_L < n_H/n_L$ and so $\partial W/\partial \gamma < 0$. Hence welfare is maximized when migration costs are zero.[24]

[24] The result resembles a well known principle in international trade, where gains from trade are higher the greater the trading countries differ in their factor endowments. A similar point, in a more complicated setting, is made by Borjas (1995).

If the quality effect becomes relevant, the sign of $\partial R/\partial\gamma$, and hence the optimal policy, depends on self-selection and on the characteristics of the sending country. In general, when $\mu_\theta = n_\theta$, the optimal policy is the one maximizing R if $x_H/x_L > n_H/n_L$ and the one minimizing R if $x_H/x_L < n_H/n_L$.[25] Proposition 3 then implies that also the relation between natives' welfare and immigration restrictions is not monotone: in order to maximize or minimize R, the government optimally imposes a positive immigration costs. Notice that, given $\mu_\theta = n_\theta$, the government only cares about natives' total surplus. Hence, immigration restrictions are not due to distributional concerns or other departures from "pure efficiency", but they are rather a way to screen the most "desirable" type of immigrants by affecting their self-selection.

Changing the weights μ_θ typically results in different policy predictions. In particular, a deviation from the above policy can occur if redistribution of the immigration surplus is costly or imperfect, hence the government may want to moderate the burden on the loser from immigration rather than maximize the benefits of those who are gaining. Alternatively, it may be the result of a change in the political power of a group of citizens, as considered below.

3.3.1 What drives policy: a special case

As already mentioned, the most common description of South-North migration is that immigrants are positively self–selected but less skills than natives. Thus, $\partial R/\partial\gamma > 0$ and $n_L x_H - n_H x_L < 0$, and the optimal cost is zero or, if $\Delta w < \Delta w^*$, the minimal cost that creates positive self-selection. In any case, the two conditions imply that we are at the right of the optimal cost. A more restrictive policy thus comes at the expenses of efficiency and may be driven by distributional concerns towards the low skilled.

To put this in historical perspective, one may argue that during the last century immigration restrictions have been implemented in most developed countries (partly) as a result of an increase in μ_L.[26] In fact, as shown in standard lobbying models (e.g. Grossman and Helpman (1994)), the policy bias in favor of a group of voters increases with their degree of organization in influential lobbies and with the responsiveness of their support to policy changes. Low skilled workers have become more powerful (e.g. through unionization) and less abundant, hence more sensitive to immigration issues (the elasticity of w_L with respect to x_L increases in R) and more influential in the political process.[27]

[25] In words, if immigrants are less skilled than natives, the optimal policy is the one preferred by high skilled natives, and vice versa. The intuition follows directly from the fact that the government is insensitive to the effects of the policy on immigrants, hence it maximizes the benefit for the group of workers where the proportion of natives is larger.

[26] See Timmer and Williamson (1998) for pre World War II policies and Mayda (2004) for more recent reforms.

[27] Similarly, in a median voter approach, one may argue that the increasing participation of the working class in the political process (e.g. extension of the franchise) has decreased the average skill of the median voter.

This change may be a major driving force behind immigration restrictions, that are a way to limit the decline in low skilled wages.[28]

Proposition 4 *When the quality effect is secondary, total welfare is maximized with zero migration costs, and policy restrictions may be a way to protect those who lose from immigration. When the quality effect is relevant, even absent distributional and political economy issues, it is optimal for the receiving country to screen immigrants by imposing positive migration costs.*

4 Discussion and extensions

4.1 Returns to Skills

Our formalization of self-selection and of the relation between policy and quality has emphasized wealth and incentive effects. We have argued that in general they have to be considered jointly: beside adding realism to the migration decision, they may have opposing directions. Wealth constraints push towards positive self selection and a positive relation between immigration restrictions and migrant quality, incentives may push towards the opposite. As we have seen, the latter effect depends on differential returns to skills in sending vs. destination countries. Despite the relation between Δw and Δw^* being often crucial for our predictions, we have not assumed any general pattern. We now argue that a simple generalization is likely to be misleading.

On the theoretical side, with competitive labor markets, everything depends on the production function one assumes for the two countries. The standard approach for aggregate cross-country comparisons is to have output depending on some aggregate measure of human capital. Skills are typically assumed to be perfectly substitutes, and the emphasis goes on Total Factor Productivity, that is much higher in developed countries (see e.g. Lucas (1990), Hall and Jones (1999), and the review in Caselli (2004)). Here, by constructions, returns to skills increase with TFP and thus with GDP. Developed countries may be more attractive for high skilled also due to skill complementarity (Kremer (1993)), or skill biased technological differences (e.g. Acemoglu (1998), Caselli and Wilbur (2005)). Other streams of literature instead argue that returns to skills are higher in developing countries, emphasizing supply factors (skills are scarce in the South and abundant in the North) or labor market institutions (e.g. unions, minimum wage) that compress returns to skills in advanced economies (Blau and Kahn (1996) and Leuven, Oosterbeek and van Ophem (2004)).

Going to the data, as a first approximation, one can look at wage gaps conditional on skills. Strictly speaking, we are modeling migration given skills rather than the decision

[28] By the same reasoning in countries where low skilled natives had less power we should have observed higher immigration flows (see the United States vs. the European Union) and lower quality of immigrants (see the United States vs. Canada and Australia).

to acquire skills, hence wage differentials rather than Mincerian returns (the coefficient of schooling in a log-wage regression) would be more appropriated in our setting. The standard generalization is that returns to skills decrease with per capita GDP (Psacharopoulos and Patrinos (2002), Bils and Klenow (2000), Caselli and Wilbur (2005)), and also the data on wages in Freeman and Oostendorp (2000) report such a decreasing relation. In addition, they show that cross-country variation in wages slightly decreases with skills. This would imply that real gains from migration tend to be higher for low skilled, but these differences are not huge, and general patterns appear weak.[29]

A second dimensions, equally important, concerns the mapping from skills to jobs. Immigrants do not necessarily have access to the whole spectrum of jobs and wages within the receiving country, hence the wage gap *per se* may not be (fully) informative (see below). This consideration complicates considerably the issue of cross country returns to skills, as variables like skill transferability, labor market segmentation and other "barriers to entry" are not easily measurable and comparable.[30]

In the immigration literature, accordingly, there is no consensus. As already mentioned (Section 1.1) some models assume that a worker with skill s in country j gets paid $w(s) = k_j * s$ hence, by construction, gains from South-North migration increases with skills (Chiswick (1999), Giannetti (2003), Jasso and Rosenzweig (2005)). In our understanding, this formalization appears more suitable to describe self-selection in terms of unobservables (e.g. ability) conditional on observable skills (e.g. education). In a sense, it bypasses the issue of skill premia, without considering that low skilled may have the greatest incentives to migrate, hence excluding a priori negative self-selection. The latter possibility has been instead emphasized by a number of studies, following Borjas (1987), which proxy returns to skills with (wage) inequality within the country (e.g. Hatton and Williamson (2004)), while abstracting from the actual jobs immigrants tends to be employed in.

A sensible way out of this comes from detailed micro analysis. Chiquiar and Hanson (2005), for example, look at earnings by skills of Mexican resident vs. Mexican immigrants (rather than Mexican resident vs. US residents) and, building counterfactual wages, they estimate that real wage premia decrease, in absolute terms, with education.[31] Similar estimates can be found in the analysis of Palestinians immigrants to Israel (Yashiv (2004)).[32]

[29] Banerjee and Duflo (2004) argue that the common wisdom that returns to skills are higher in developing country is an artifact of low quality data.

[30] See for example the discussion in Hassler, Rodríguez Mora and Zeira (2003) on cross-country inequality and social mobility and Hassler and Rodriguez Mora (2000) on meritocracy and growth. An interesting aspect here is the relation between returns to skills and growth opportunities, as opposed to GDP levels in the standard empirical literature quoted above.

[31] They report that "real U.S. wage premium is $4.07 per hour for an individual with 5-8 years of schooling, $3.52 for an individual with 12 years of education, and $2.60 for an individual with 16 or more years of education".

[32] This study documents negative selection on observable skills (that is what we have modeled) and, conditional on this, positive selection in term on unobservables. It gives support to the idea that un-

They confirm our general point that self selection is in general driven both by differential incentives and differential possibility to migrate: those who can access migration are not necessarily those who have more to gain from it.

4.1.1 Discrimination

We have just argued that understanding cross country returns to skills requires, in our setting, looking at some measure of "meritocracy" (or, in a dynamic setting, social mobility) together with wage dispersion. It matters for example whether in a given country personal connections or skills are the key to access well paid jobs. In other words, an high wage gap does not necessarily imply that high skilled are those with highest gains from migration, if immigrants have low chances to get well paid jobs.[33]

For a series of reasons, there are instances where most immigrants are locked into traditional low skilled occupations (see e.g. Munshi (2003)), while the standard literature on self-selection typically avoids any distinction between wages for natives and immigrants in the host country. Even if convenient, the assumptions that these two groups are perfect substitutes and that immigrants are given the same opportunities to access well paid jobs are clearly problematic. It is not difficult for example to observe high skilled immigrants ending up with low skilled occupations. If good jobs are harder to get for immigrants, incentives induce negative self-selection. This also implies that labor market competition is hurting only low skilled natives, who then fear immigration even more.

One way to see this is to assume that barriers to entry are more severe for well paid jobs, hence high skilled immigrants are (partially) prevented the access to them. This may come from immigrants inability to assimilate (language, country-specific skills) or from a discriminatory labor market.[34] In our model, we can introduce a measure of the relation between immigrants' skill and wages or, equivalently, a probability for an high type immigrant to get w_H. Denoting this measure with $\tau \in [0,1]$, type H immigrants (expect to) earn $w_L + \tau\Delta w$, where $\tau = 0$ corresponds to full discrimination and $\tau = 1$ to

observable skills are multidimensional and, given that different skills are valued differently in different tasks, the selection into occupation may be non-hierarchical.

[33] To see this, assume that in the sending country high skilled have probability p_H^* to get a good job (and $1 - p_H^*$ to get a bad one). So their expected wage is $E(w_H^*) = p_H^* w_H^* + (1 - p_H^*)w_L^*$. In the same way, low skilled expect $E(w_L^*) = p_L^* w_H^* + (1 - p_L^*)w_L^*$, with $p_H^* \geq p_L^*$ and the country is considered meritocratic the more $p_H^* \to 1$ and $p_L^* \to 0$. Similarly for the destination country. Now the requirement that returns to skills are higher in the receiving country means $E(w_H) - E(w_L) > E(w_H^*) - E(w_L^*)$, i.e. $(p_H - p_L)\Delta w > (p_H^* - p_L^*)\Delta w^*$. For example, given that in Mexico we wage inequality is higher but social mobility is lower than in the US (as reported by Dahan and Gaviria (2001)), i.e. $\Delta w < \Delta w^*$ but $(p_H - p_L) > (p_H^* - p_L^*)$, who should be more likely to migrate?

[34] These effects, to my knowledge, have not been explored in a formal model before (as recognized by Borjas (1994), footnote 30). Moreover discrimination can be thought partly as a policy variable (e.g. anti discrimination laws, recognition of foreign qualifications...), thus one may replicate in this setting what we have just done with migration costs.

full integration. The new quality of migrants is defined by:

$$Q^{\tau} = \frac{[1-\Omega_H(\gamma)]}{[1-\Omega_L(\gamma)]} \frac{\Pi[(w_L + \tau\Delta w) - (w_L^* + \Delta w^*) - \gamma]}{\Pi[w_L - w_L^* - \gamma]}$$

while the new skill ratio is:

$$R^{\tau} = \frac{n_H + \tau x_H}{n_L + x_L + (1-\tau)x_H}$$

Consider $\tau = 0$, i.e. immigrants are treated as an homogeneous group of low skilled and there is no opportunity for them to access good jobs. High skilled foreigners have now less incentive to migrate and the quality of migrants decreases. Moreover discrimination creates a negative spill-over on the low skilled market. Thus it is bad news for all foreigners and migration flows also decrease.

High skilled natives thus always gain from immigration, since immigrants are prevented to compete with them; while low skilled natives bear all the costs. Thus the former group is greatly in favor of immigration while the latter strongly opposes it.

Proposition 5 *Discrimination reduces size and quality of immigration and reinforces the positive correlation between natives skills and "pro-immigration" attitudes.*

4.2 Migration costs and immigration policies

Taken literally, our model makes some important simplifications. Migration costs are essentially money, and immigration restrictions only act on costs, unconditionally on type. These assumptions are obviously not realistic, and we now discuss to what extent other elements can be incorporated without affecting the basic logic of the analysis.

What migrants have to forsake is definitely not only money, and it is not even obvious that these are always the most significant component of migration costs. An important stream of literature has emphasized that migration cannot be fully understood at the level of the single individual. Family ties matters (e.g. Mincer (1978)), and other network effects may be a major determinant of the migration decision (e.g. Massey, Arango, Hugo, Kouaouci, Pellegrino and Taylor (1993)). The access to networks of previous migrants may considerably facilitate migration by decreasing its costs (e.g. Carrington, Detragiache and Vishwanath (1996), McKenzie and Rapoport (2005)) or increasing its benefits (e.g. Munshi (2003)). As long as we restrict to costs and benefits, enlarging the picture may not add explanatory power to the mechanisms already considered. However, networks introduce a series of other dimensions which can drive migration (or the lack of it) without directly being monetary costs or wage differentials. Consider for example insurance motives. These are typically more salient for low skilled, hence they are potentially very important for understanding self-selection. Nonetheless, it is not clear whether abstracting from them may be a serious bias for our reasonings. Some literature considers

these motives to explain positive self-selection: low skilled cannot migrate and give up the support of their family or community, in terms of access to credit (e.g. Banerjee and Newman (1998) and Munshi and Rosenzweig (2005)) or unemployment insurance (e.g. Cuecuecha (2005)). Another stream of literature uses similar arguments to support negative self-selection: since low skilled cannot get formal insurance at home, migration and remittances are a way for them to smooth family consumption (e.g. Stark and Bloom (1985); Taylor (1986)). Hence, at this level of generality, the strength and direction of the bias is ambiguous. The lack of explicit formalization of network effects, and possibly their inclusion in the individual specific component ε_i, does not appear such a fundamental limitation for our purposes.

In the real world, also the policy space is definitely more multifaceted. Receiving countries can act on many dimensions rather than only on γ, and they can do so by trying to impose different restrictions on different type of immigrants. Of course, if the receiving country could perfectly contract on immigrant skills and enforce restrictions conditional on them, it would directly select the desired size and type of immigration and our analysis would be (almost) pointless. However, as discussed further below, this does not seem to be the case and, in such an imperfect world, our formalization may be of some use. In fact, on the one hand, it is a way to highlight that even a policy independent on type has some screening power. On the other, it may be a starting point to complicate the policy space. For example, one can consider direct screening mechanisms. Even if skills are not observable, a country could offer different types of entry permits, i.e. visa at price γ_θ allowing employment only in type θ jobs. Beside the issue of enforcement, incentive compatibility requires $\gamma_L \leq \gamma_H$, otherwise low skilled would pretend to be high skilled, enter and at worst get a low skilled job. Hence, this mechanisms is viable only if one need to encourage low skilled migration. Alternatively, one can think of indirect ways to affect immigrant quality. For example, a country offering generous welfare benefits may attract lower skilled immigrants (as this can be seen as a decrease in returns to skills) or, as considered below, a country offering entry visa for an high fee and no bureaucracies is likely to attract a pretty different type of applicants than a country asking for no fees but imposing a lot of red tapes.

4.2.1 Time and money

Migration costs include also the time immigrants have to spend in filling out forms and waiting for documents, and this may represent a relevant monetary entry in terms of foregone earnings. What may change our previous analysis is that the value of time also differs according to skills, e.g. high skilled may value their time more. To keep the analysis simple, assume that each migrant has to invest the same amount of time in bureaucracies, and this time is worth βw_θ^*. Hence, in absolute terms, bureaucracies β are

more harmful for high skilled.[35] Introducing bureaucracies, the average skills of migrants looks as follows:

$$Q^{\beta} = \frac{[1-\Omega_H(\gamma)]}{[1-\Omega_L(\gamma)]} \cdot \frac{\Pi[(w_L - w_L^*) + (\Delta w - \Delta w^*) - (\gamma + \beta w_H^*)]}{\Pi[w_L - w_L^* - \gamma - \beta w_L^*]}$$

Notice first that bureaucracies matters to the extent that incentives matter. As it seems intuitive, time affects constraints equally across immigrants. Then we can see that the conditions for positive self-selection become harder to satisfy. When only incentives matter, we would now need $\Delta w > (1+\beta)\Delta w^*$, i.e. differential returns to skill in the receiving country are sufficiently high to compensate also for the loss of time, that increases with $\beta \Delta w^*$.

To see the effect of an increasing in the amount of time to be spent in bureaucracies, notice that

$$\frac{\partial Q^{\beta}}{\partial \beta} \geq 0 \Leftrightarrow w_L^* \pi(\varepsilon^L)\Pi(\varepsilon^H) - w_H^* \pi(\varepsilon^H)\Pi(\varepsilon^L) \geq 0 \tag{20}$$

Once again, without any further assumption, the sign is ambiguous. Roughly, we need the relative gain to be larger for high skilled than for low skilled (while in the basic framework we had the same condition with absolute gains).[36] With respect to increasing the cost γ, however, we can clearly say that increasing bureaucracies is more likely to reduce migrant quality. Now it is necessary but no more sufficient that migrants are positively self-selected in terms of incentives for having a positive relation between cost and quality.

4.3 Immigration policy preferences

The analysis of preferences in receiving countries has assumed fully rational agents who care only about their wages. The "fully rational" approach may be questioned: given that immigration policies do not change so often, and when they do, it is typically very hard to distinguish their effect from other concurrent factors, people may not be able to account for the somewhat subtle "quality effect" and learn what is the optimal policy for them. We have already discussed some arguments of the huge debate between economic vs. non-economic motivations (Section 1.1), and, while probably of particular relevance here, these objections are by no means limited to the literature on immigration preferences. A more specific concern is whether the labor market effect is the central element to explain the relation between individual characteristics and preferences over immigration. Our approach is in line with recent studies like Scheve and Slaughter (2001), Mayda (2004),

[35] One could think that skills also affect efficiency in complying with bureucracy: if the value of foregone earning would then be smaller for high skilled, the analysis in the previous sections would apply (see Chiswick (1999)).

[36] To see this let ε_i be uniformly distributed. Condition (20) would become $\frac{w_H - w_H^* - \gamma}{w_H^*} > \frac{w_L - w_L^* - \gamma}{w_L^*}$, i.e. relative gains increase with skills.

O'Rourke and Sinnott (2004), reporting that once one restricts the sample to people out of the labor force, the correlation between education and pro-immigration preferences disappears.[37]

Moreover, we have adopted a "partial equilibrium" approach in analyzing the effect of immigration, abstracting from at least two other important issues: fiscal policy and political economy. On fiscal policy, one may argue that high skilled immigrants are always preferred since they pay higher taxes and probably receive less welfare benefits. Hence, this would lead high skilled natives trading off the reduction in wages and the benefit in transfers in accepting high skilled immigrants.[38] Not many empirical studies have looked at how this may drive preferences, and again the issue is controversial.[39] One answer may come by looking at high skilled preferences in areas with high skilled immigration: these should be more supportive towards immigration if the impact on public budget was the major concern, and less supportive if instead labor market competition was the major concern. The only study that has done this is, to my knowledge, Hanson et al. (2005*b*), who documents that across U.S. states the latter happens, i.e. the labor market effect seems to be of first order.

On political economy issues, we have not given immigrants any political power in the receiving country. Giving them voting rights may change the analysis: for example high skilled natives may want to avoid getting too many low skilled foreigners as this would increase their wages, but also, modifying the political equilibrium, change the policies in favor of low skilled people (like in Ortega (2005)). One concern, at least in this setting, is whether immigrants would vote according to their skills, hence protecting their wages, or they would remain "loyal to their roots" and oppose restrictions to immigration anyway. Lowell, Bean and de la Garza (1986) and Goldin (1994) report that immigrants lobbied and voted for pro-immigration policies and a number of survey studies (e.g. Espenshade and Hempstead (1996) and Scheve and Slaughter (2001)) report that immigrant have in general more favorable attitudes towards immigration, irrespective of their economic condition. Thus it seems that accounting for this long run political economy effect would actually strengthen the standard result, i.e. low skilled may oppose immigration even more.

In conclusion, our focus on R appears useful. While probably not the only argument of the utility function, there are a series of reasons (labor market, fiscal policy, political

[37] A similar finding was already in Jones and Lambert (1959). Still, the debate is very much open. For example Hainmueller and Hiscox (2004) find the opposite result: high skilled natives are less opposed to immigration irrespective of their economic conditions. Being part of the labor force is irrelevant, education works through cultural values and beliefs.

[38] The simplest way to introduce fiscal issues here is to think that the government collects tw_θ and distributes the revenues with a lump sum transfer to every worker. Now high skilled utility is a convex combination (with weight t) of w_θ (negatively dependent on R) and the transfer (that depends positively on R).

[39] The findings by Mayda (2004) seem to suggest that this effect is actually negligible; the ones by Hanson, Scheve and Slaughter (2005*a*) suggest the opposite.

economy) why natives may care about the impact of immigration on the receiving country skill ratio.

5 Conclusion

The paper has developed a simple and unified framework for analyzing the interaction between self-selection and immigration policy determination. This approach has uncovered some new and possibly important mechanisms shaping the migration decision, the preferences over immigration policy in the receiving country and the corresponding "optimal" policy design. Our perspective has been positive and qualitative, and a number of simplifications and limitations have emerged. However, with a large set of *caveat* in mind, one may draw some very tentative policy implications. A prime motivation for this discussion is that the quality of immigrants matters: while the literature on the impact of immigration is divided in almost any respect, a general consensus is that, considering the effect both on the labor market and on fiscal spending, high skilled immigrants create net benefits for host countries.[40] Hence, improving the ability to screen would represent a clear gain for receiving countries.

As we have shown, migrants' self-selection implies that any policy, even if independent on type, affects different migrants in a different way, i.e. it has some (indirect) screening power. This can limit the effectiveness of the policy, but it may also be viewed as an additional dimension to exploit. In fact, there are many instances where direct screening mechanisms are difficult to implement and not so powerful.[41] An alternative route is then to act on costs and influence the migration decision, affecting ex-ante self-selection rather than imposing restrictions ex-post. In this respect, however, our model does not deliver any simple and absolute policy prescription. Instead, things may change dramatically according to whether migration is driven by wealth constraints or economic incentives, and in general on the source country characteristics. If those who migrate are simply those who can afford it, issues like labor market discrimination or red tapes may not have a crucial effect on immigrants skill composition. Increasing the migration cost (e.g. through a head tax on entry) is likely to increase migrant quality, thus it may be a viable way to screen the migration flows.[42] Instead, as economic incentives become the main argument of the migration decision, the effect of these policies depends on differential returns to

[40] See e.g. Borjas (1995), Lee and Miller (2000), Storesletten (2000), Chojnicki, Docquier and Ragot (2005), Chiswick (2005).

[41] See e.g. Jasso and Rosenzweig (1995) and Jasso, Rosenzweig and Smith (1998) on US immigrants, Miller (1999) on the Australian point system, Antecol, Cobb-Clark and Trejo (2003) and Jasso and Rosenzweig (2005) on Canada and Australia vs. the US.

[42] Of course one concern with this kind of measures is that they tend to encourage illegal immigration (that is more attractive for low skilled). However the issue is common to any intervention (e.g. setting quotas or entry requirements) directed to regulate legal migration and it reveals once again that restricting entry cannot be the only dimension of a sound immigration policy.

skills and thus it is in general more difficult to predict. Discrimination and bureaucracies push migrants towards negatively self-selection and in this case a more restrictive policy is likely to lead to even less skilled immigration.

The most general conclusion of our exploration is that self-selection matters, also for receiving countries. The forces shaping self-selection affect also the way different potential migrants respond to policy changes, which is obviously a central element to consider when thinking about immigration policy. Nothing is terribly surprising in this statement. There is a huge and fundamental literature explaining how different agents respond differently to a change in price.[43] For some reason, the issue has been generally overlooked by the literature on immigration policy, and, under this perspective, the paper may be a step towards bridging the gap.

Appendix

Proof of Lemma 1. Consider $F(H,L) = H^{\alpha}L^{1-\alpha}$, $H = n_H + x_H = n_H + H(w_H, \gamma)$, $L = n_L + x_L = n_L + L(w_L, \gamma)$ and $R = H/L$, as expressed in (8). ω_H is then defined by

$$G_H = \frac{\alpha}{w_H}F(H,L) - H = 0$$

Implicitly differentiating G, we have

$$\frac{\partial G_H}{\partial \gamma} + \frac{\partial G_H}{\partial w_H}\frac{\partial w_H}{\partial \gamma} + \frac{\partial G_H}{\partial w_L}\frac{\partial w_L}{\partial \gamma} = 0$$

Given constant returns to scale and perfect competition, there is no possibility of Pareto improvements in our economy. Hence, $\partial w_H/\partial\gamma \geq 0 \iff \partial w_L/\partial\gamma \leq 0$. Moreover, $\partial G_H/\partial w_H \leq 0$ and $\partial G_H/\partial w_L \geq 0$. Hence, the above condition gives $\partial w_H/\partial\gamma \geq 0 \iff \partial G_H/\partial\gamma \geq 0$.

Now,

$$\frac{\partial G_H}{\partial \gamma} = \frac{\partial x_H}{\partial \gamma}(1-\alpha) - \alpha\frac{\partial x_L}{\partial \gamma}\frac{w_L}{w_H}$$

and since $w_L/w_H = R(1-\alpha)/\alpha$, we write

$$\frac{\partial G_H}{\partial \gamma} = (1-\alpha)(\frac{\partial x_H}{\partial \gamma} - \frac{\partial x_L}{\partial \gamma}R)$$

hence $\partial G_H/\partial\gamma \geq 0 \iff \partial x_H/\partial\gamma - R\partial x_L/\partial\gamma \geq 0 \iff (1-L)\partial x_H/\partial\gamma - (1-H)\partial x_L/\partial\gamma \geq 0 \iff \partial R/\partial\gamma \leq 0$.

[43] These agents being borrowers dealing with interest rates, workers with wages or policyholders with insurance premia (see e.g. Stiglitz and Weiss (1981))

Similarly for w_L. ■

The relation between R and γ. Examples. Recall that

$$R = \frac{n_H + (1-\Omega_H)\Pi(\varepsilon^H)n_H^*}{n_L + (1-\Omega_L)\Pi(\varepsilon^L)n_L^*}$$

Hence, imposing condition (15), $\partial R/\partial\gamma \geq 0 \Leftrightarrow$

$$\{\Pi(\varepsilon^H)\Pi(\varepsilon^L)[\omega_L(1-\Omega_H) - \omega_H(1-\Omega_L)] + (1-\Omega_H)(1-\Omega_L)[\pi(\varepsilon^L)\Pi(\varepsilon^H) - \pi(\varepsilon^H)\Pi(\varepsilon^L)]\} +$$
$$+[\omega_L\Pi(\varepsilon^L) + \pi(\varepsilon^L)(1-\Omega_L)] - [\omega_H\Pi(\varepsilon^H) + \pi(\varepsilon^H)(1-\Omega_H)] \geq 0 \qquad (21)$$

Suppose first that incentives do not depend on skills, i.e. $\Delta w = \Delta w^*$, hence $\Pi(\varepsilon^H) = \Pi(\varepsilon^L) = \Pi$. In this case, a slightly positive correlation between wealth and skills is enough to guarantee positive self-selection. The effect of cost on R is positive, i.e. the quality effect is stronger, when

$$\pi[\Omega_H - \Omega_L] + \Pi[\omega_L - \omega_H] + \Pi^2[\omega_L(1-\Omega_H) - \omega_H(1-\Omega_L)] > 0 \qquad (22)$$

Since $[\Omega_H - \Omega_L]$ is negative, the size effect is stronger when π is high, i.e. many potential immigrants are almost indifferent between moving or not. Now, increasing the cost convinces a lot of them not to move. Since we have positive self-selection, these are typically high skilled, hence R decreases. On the other hand, due to $[\omega_L(1-\Omega_H) - \omega_H(1-\Omega_L)] > 0$, the quality effect gets stronger as Π increases. When many foreigners are willing to migrate, increasing the cost increases R because an higher cost does not affect much immigrants' incentives, but it rather allows only the richest, and hence high skilled, to move. Having higher incentives is most likely with low restrictions and, in addition, a "sufficiently low" γ ensures that $[\omega_L - \omega_H]$ is positive, that is necessary to have condition (17).

The meaning of "sufficiently low" cost depends of course on the functional forms one assumes. Suppose wealth is distributed according to $\omega_\theta = Weib(k_\theta, \beta)$, that is a Weibull with location parameters $k_L < k_H$ and shape parameter $\beta > 1$. This distribution resembles a lognormal while still having a simple analytical form, which is $\Omega_\theta(\gamma) = 1 - e^{-(\frac{\gamma}{k_\theta})^\beta}$. To get a necessary condition for the quality effect to be relevant, like in (18), consider the limiting case where foreigners are insensitive to incentives (perhaps because the wage gap is so high that everybody would like to move). This may be thought as a way to isolate a pure wealth effect, and it gives the quality effect its best chances to prevail. In fact, now $\Pi = 1$ and $\pi = 0$, hence, the quality effect dominates as long as $\omega_H/(2-\Omega_H) < \omega_L/(2-\Omega_L)$. Given our wealth distribution, after some algebra, one can see that as $k_L \to k_H$, we need $\gamma < k_\theta \sqrt[\beta]{1.28}$, i.e. the cost has to be small enough to allow at least 28% of the low skilled the possibility to move. In fact, we require the ratio

$$\frac{\omega_\theta(\gamma)}{2-\Omega_\theta(\gamma)} = \frac{\frac{\beta}{k_\theta}(\frac{\gamma}{k_\theta})^{\beta-1}e^{-(\frac{\gamma}{k_\theta})^\beta}}{1+e^{-(\frac{\gamma}{k_\theta})^\beta}}$$

to be decreasing in k_θ.That is, taking the derivative and rearranging, we require

$$2(\frac{\gamma}{k_\theta})^\beta - 2 - e^{-(\frac{\gamma}{k_\theta})^\beta} \leq 0$$

and this holds for any $\gamma < \gamma^{\max} = k_\theta \sqrt[\beta]{1.28}$, where the fraction of low skilled who can afford to move is $e^{-1.28} \simeq 0.28$. The requirement gets milder the higher is $\frac{k_H}{k_L}$, i.e. wealth inequality strengthen self selection and thus the quality effect. If for example high skilled foreigners are on average twice (respectively four times) as wealthy as low skilled, similar computations show that we require that at least 10% (respectively 3%) of the low skilled can incur the migration cost. That is, if e.g. $k_H = 2k_L$ then $\gamma^{\max} = 1.52k_L$, where $\Psi_L(\gamma^{\max}) = 0.9$ while if $k_H = 4k_L$ then $\gamma^{\max} = 1.88k_L$, where $\Psi_L(\gamma^{\max}) = 0.97$.

Hence, in this example, the quality effect dominates for any $\gamma < \gamma^{\max}$ and the size effect dominates afterwards. Hence, the skill ratio R is maximum when $\gamma = \gamma^{\max}$. In terms of policy, this implies that high skilled natives will support a less restrictive policy (despite immigrants being high skilled) if $\gamma < \gamma^{\max}$ and they will instead push for a more restrictive one if $\gamma > \gamma^{\max}$. Low skilled natives will of course have the opposite preferences. Finally, $\gamma^{\max}$ would be the cost chosen by an utilitarian government solving the program in (19) with $\mu_\theta = n_\theta$.

As an alternative example, suppose that wealth distribution is independent on skills, i.e. $\Omega_H = \Omega_L = \Omega$. Consider the case $\Delta w \geq \Delta w^*$ (the other one is symmetric). The quality effect is stronger when

$$\omega[\Pi(\varepsilon^L) - \Pi(\varepsilon^H)] + (1-\Omega)[\pi(\varepsilon^L) - \pi(\varepsilon^H)] + (1-\Omega)^2[\pi(\varepsilon^L)\Pi(\varepsilon^H) - \pi(\varepsilon^H)\Pi(\varepsilon^L)] > 0 \quad (23)$$

The analysis follows the close correspondence with the one just developed, and it is meant to show just that our reasonings are robust to having different forces driving self-selection. First, since $[\Pi(\varepsilon^L) - \Pi(\varepsilon^H)] < 0$, the power of the size effect increases with ω. If the cost is at the mode of ω, many potential immigrants are at the margin between affording or not the migration cost, hence, a slight increase in the cost makes migration impossible to many of them. Given $\Delta w > \Delta w^*$, these are mostly high skilled, hence an increase in the cost decreases R. On the other hand, since $[\pi(\varepsilon^L)\Pi(\varepsilon^H) - \pi(\varepsilon^H)\Pi(\varepsilon^L)]$, the power of the quality effect increases with $(1-\Omega)$, that is with the amount of foreigners who can afford to migrate. If this fraction is high, i.e. if the cost is relatively low, increasing cost does not prevent many people but rather screens those with highest incentive. Given $\Delta w > \Delta w^*$, these are the high skilled, hence R increases. Again as above, a low cost is in general useful both for having $(1-\Omega)$ high and for having π decreasing, i.e. $\pi(\varepsilon^L) - \pi(\varepsilon^H) > 0$, which is necessary to meet condition (17). ■

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