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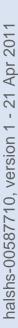ECOLE D'ECONOMIE DE PARIS

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Immigration policy and self-selecting migrants

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Immigration Policy and Self-Selecting Migrants[*]

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Abstract

I build a simple model of self-selection into migration and immigration policy determination. I first show how immigration restrictions affect not only the size but also the skill composition of the migration flow. I then explore how the optimal policy may change once this effect on immigrants' skill composition is considered. I show that the relation between immigrants' skill composition and immigration policies is governed by immigrants' self-selection, hence understanding what drives such selection becomes crucial for designing optimal immigration policies.

Keywords: Immigrant self-selection; immigration policy.

JEL codes: F22, J61, O24.

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1 Introduction

Migrants are not a random sample of their home country population. Incentives to migrate, and resources to pay the migration costs, vary with skills. This paper builds on this well-known fact in order to explore the interaction between self-selection into migration and the determination of immigration policy in receiving countries. In fact, while it is commonly understood that various effects of migration vary significantly with immigrants' characteristics,[1] the relation between immigration policy and immigrants' skill composition remains largely unexplored.

In what follows, I first show how immigration policy affects not only the size but also the skill composition of the migration flow. I then explore how the optimal policy may change once this effect on immigrants' skill composition is taken into account. As it turns out, predicting the relation between immigrants' skill composition and immigration policy may be crucial for predicting the outcome of such policy in the receiving country. This in turns requires understanding the forces behind immigrants' self-selection, which determine how different potential migrants respond to policy changes.

The above argument is developed in a model with two countries. In the sending country, individuals, called foreigners, are endowed with different skills and wealth, and according to their endowment they decide whether to work at home or migrate to the receiving country. In the receiving country, individuals, called natives, support an immigration policy that maximizes their equilibrium wages. In particular, high skilled natives aim at increasing the supply of low skilled immigrants, while low skilled natives push for the opposite. According to these preferences and to the weight attached to different groups in the population, i.e. low vs. high skilled and immigrants vs. natives, the receiving country government sets the immigration restrictions. In particular, these restrictions may affect the cost migrants have to pay to enter and work in the receiving country. For example, the government may impose direct fees or bureaucratic requirements that increase the time and money needed to comply.

Even if common to all immigrants, these restrictions affect immigrants in a different way. On the one hand, they allow only the richest foreigners to migrate, and these tend to be the high skilled. On the other, they induce only those with the most to gain to migrate. If returns to skills are higher in the sending country, these tend to be the low skilled. Hence, depending on whether immigration is driven by incentives or wealth constraints, and on whether returns to skills are higher in the sending or in the destination country, restrictions may improve or worsen immigrants' skill composition.

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[1] Restricting the 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), Chojnicki, Docquier and Ragot (2005) on the effects on public finance.

Understanding this composition effect is crucial for the receiving country because such effect may *reverse* the immigration policy outcomes, as predicted by the size effect only. In fact, size and composition effects have typically opposite directions. The size effect, whereby one varies the number of immigrants while keeping their skill composition as fixed, is by definition random, and so it hits a group of foreigners proportionally to their propensity to migrate. In contrast, the composition effect tends to be stronger on those who migrate less.

Moreover, the composition effect may dominate the size effect: the foreigners with the lowest propensity to migrate may be, in absolute terms, the most sensitive to a policy change. Finally, the strength of size and composition effects depends on the level of restrictions. In particular, when the migration cost is so high that only one group of foreigners migrates, being they the richest or the most motivated, then by definition there is no composition effect. As a result, immigration restrictions may have a non-monotone effect on the receiving country.

It follows that it is generally misleading to view immigration restrictions as just selecting from a given pool of applicants, thereby acting independently from the migration decision. As an illustration, we highlight how the composition effect may affect natives' preferences over immigration policy and the government's optimal policy design. First, such effect implies that natives' preferences over immigration policy depend not only on immigrants' skill composition but also on their self-selection. For example, some natives may support a more restrictive policy even though current immigrants are not harmful for them, since tighter restrictions would change immigrants' skill composition in their favor. Second, the composition effect implies that even a utilitarian government which maximizes natives' total income may choose positive immigration restrictions. In fact, while free immigration would always be optimal if immigrants' skill composition were taken as given, in our setting restrictions may be imposed in order to select the optimal skill mix of immigrants.

1.1 Related literature

The present paper lies within two streams of literature: the supply side of immigration, dealing with the migration decision and immigrants' self-selection; and the demand side, dealing with citizens' preferences over immigration and immigration policy formation. At a general level, the major novelty of the paper is the focus on the interaction between demand and supply, in order to show that, by considering each side in isolation, one may draw erroneous conclusions both on self-selection and on the effects of immigration policy in the receiving country.[2]

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[2] The only paper considering this interaction is, to my knowledge, Bellettini and Ceroni (2007). Assuming that immigrants are positively self-selected, they argue in favor of a

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More specifically, the migration decision is here viewed as a basic human capital investment (Sjaastad, 1962), in which self-selection may be driven both by cross-countries returns to skills (as in Borjas, 1987) and by wealth constraints.[3] In addition, I emphasize that immigration policies may be a significant determinant of immigration costs, and then of immigrants' skill composition.[4] This allows to explore in a simple way the interaction between demand and supply and to better match some recent empirical literature (see Section 3.3.2).

On the demand side, individual skills are related to preferences over immigration policy by a standard labor market interaction.[5] Differently from the existing literature, in which immigrants' skill composition is taken as given, I model individual preferences whereby natives realize that such composition is affected by immigration restrictions.

Finally, the present paper contributes to the relatively small literature on the determination of immigration policies.[6] Apart for stressing the interaction with the supply side, our approach is novel in that we consider migration cost as the policy variable. This variable seems important as any restriction to immigration entails, at least indirectly, monetary costs. Indeed, as we discuss in Section 4.1, this framework may be interpreted in more general terms. Moreover, the exercise appears useful even if one considers our policy variable literally as a tax on immigrants. Such tax has recently received attention in policy debates (see Freeman, 2006 and Legrain, 2007), but to

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high immigration quota. By reducing wages in the receiving country, this would increase immigrant quality and maximize national income.

[3] Wealth constraints have been relatively underemphasized in this literature, as pointed out by Hatton and Williamson (2004). Exceptions are the theory of illegal migration in Friebel and Guriev (2006) and the work by Lopez and Schiff (1998), who focus on the effect of trade liberalization in the sending country in a modified Hecksher-Ohlin model with heterogeneous labor force, migration costs and financing constraints.

[4] Of course, migration costs have also exogenous components, like geography. However, notice that policies may become increasingly relevant, given the historical trend of decreasing transportation costs and increasing immigration restrictions (Hatton and Williamson, 2006). Indeed, 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.

[5] This approach is taken for example in Scheve and Slaughter (2001) and Mayda (2006). They document that, in developed countries, where immigrants tend to be less skilled than natives, individual education and support for liberal immigration policy are positively correlated. The typical interpretation is in terms of labor market interaction, which is supported by the fact that the correlation disappears once one looks at people outside the labor force.

[6] See for example Benhabib (1996), who explores how the median voter determines minimal capital requirements for admission, and Epstein and Nitzan (2006) and Facchini and Willman (2005), who use a lobbying model to explain the formation of immigration quotas.

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my knowledge its effects have not been explored in a formal model.[7]

2   The model

Consider a world with two countries, a sending and a receiving one. We are interested in the interaction between the workers in the sending country, who may decide to migrate, and the receiving country government, which sets the immigration policy.

2.1   The sending country

The sending country is populated by a continuum n^* of workers, called foreigners. Foreigners are heterogeneous in three respects: skill, migration cost, and initial wealth. Let n_θ^* denote the mass of foreigners with skill θ, where $\theta \in \{H, L\}$. A foreigner i with skill θ may migrate to the receiving country, and receive the endogenous wage w_θ, or he can work in the sending country for an exogenous wage w_θ^*.[8]

If he migrates, such foreigner has to incur the migration cost $(\gamma + \varepsilon_i)$, which includes a common monetary cost γ and an individual-specific psychological cost ε_i.[9] Specifically, ε_i is assumed to be a random variable following a log-concave cumulative distribution Π with continuous density π.[10] This assumption implies that the ratio

$$\frac{\pi}{\Pi} \text{ is decreasing.} \tag{1}$$

Finally, foreigners are endowed with some wealth, drawn by a distribution Ω_θ with continuous density ω_θ. For now, we interpret θ as an observable skill (like education), and we then assume that the high skilled are on average

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[7]One may also be interested on such policy from an historical viewpoint, since the first interventions to limit and select immigration flows in the U.S. and Canada acted on costs rather than on quantities. In the U.S., for example, a head tax of 50 cents per migrant was introduced in 1882, while the first quota restriction came in 1921 (see Timmer and Williamson, 1998 for a detailed account).

[8]While wages in origin countries may be affected by emigration (see Mishra, 2007 and Hanson, 2005), we here focus on the effects in the receiving country.

[9]This cost may reflect individual characteristics like age, family ties, access to networks at origin and destination countries. In the present formulation, these elements are not systematically correlated with the skill θ. One may instead assume that the low-skilled have higher migration costs, since for example they can hardly give up the support of their community, in terms of access to credit (as in Banerjee and Newman, 1998 and Munshi and Rosenzweig, 2005) or unemployment insurance (as in Cuecuecha, 2005). This would be qualitatively similar to our analysis below, in which wealth constraints make the migration cost more difficult to pay for the low-skilled.

[10]Formally, log-concavity means that those at the tails of the distribution of cost are not too sensitive to a change in the returns of migration. This is a rather weak assumption, as basically all "named" distribution functions satisfy it (see Bagnoli and Bergstrom, 2005).

wealthier than the low skilled (see Filmer and Pritchett, 1999; and Piketty, 2000).[11] Formally, we assume that, for every $\gamma \in \mathbb{R}_+$,

$$\frac{\omega_L}{1 - \Omega_L} \geq \frac{\omega_H}{1 - \Omega_H}. \tag{2}$$

That is, the high skilled wealth distribution is more favorable than the low skilled one, in the sense of conditional stochastic dominance.[12] We also assume that migrants have to incur the cost γ up-front, and there is no credit market for them. Hence, migration may be limited by wealth constraints.

2.2   The receiving country

The receiving country is populated by a continuum n of workers, here called natives, who are heterogeneous in skill $\theta \in \{H, L\}$. Natives are assumed to have a linear utility function which depends only on equilibrium wages w_θ.[13] These wages are determined in a competitive labor market as

$$w_\theta = \frac{\partial F(N_H, N_L)}{\partial N_\theta}, \tag{3}$$

where $F(N_H, N_L)$ is the receiving country production function and N_θ is the sum of natives and immigrants with skill θ

$$N_\theta = n_\theta + x_\theta. \tag{4}$$

We focus on purely redistributive effects of immigration, whereby immigrants compete with similarly skilled natives and complement natives with different skills. In particular, for most of the analysis, we simply let the production technology be a constant returns to scale Cobb-Douglas

$$F(N_H, N_L) = N_H^\alpha N_L^{1-\alpha}, \tag{5}$$

where $\alpha \in (0, 1)$. The receiving country government is interested in regulating the inflows of immigrants as these influence natives' utility. Its goal is to maximize the welfare function

$$W = \mu_H w_H + \mu_L w_L,$$

where μ_θ denotes the weight attached to group θ's utility, as determined by the specific institutional setting.[14] Immigration policy acts on γ, which is

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[11] As it will be noticed below, this framework can be also applied to analyze selection along unobservable characteristics.

[12] This is slightly stronger than first order stochastic dominance, but weaker than the standard assumption of monotone likelihood ratio (see Krishna, 2002, Appendix B).

[13] In Section 4.3, we discuss more general formulations.

[14] We will mostly consider a utilitarian function with $\mu_\theta = n_\theta$. Some extensions and possible ways to endogenize these weights are discussed in Section 4.2.

the cost foreigners have to incur to enter and work in the receiving country[15], so the government's program can be written as

$$\max_{\gamma \in \mathbb{R}_+} \mu_H w_H(\gamma) + \mu_L w_L(\gamma). \tag{6}$$

3 Analysis

We now show that, in order to set the optimal policy, the receiving country government has to predict the effects of such policy on immigrants' skill composition. This in turn requires an understanding of the forces driving the decision to migrate, i.e. of immigrants' self-selection.

3.1 The migration decision

A foreigner i with skill θ prefers to migrate if $w_\theta - (\gamma + \varepsilon_i) \geq w_\theta^*$, so for each skill θ there exists a cut-off value $\varepsilon^\theta \equiv w_\theta - w_\theta^* - \gamma$ such that any individual with skill θ and a cost ε_i lower than ε^θ would like to migrate. In addition, this individual must be sufficiently wealthy to incur the migration cost γ. Thus, the supply of migrants with skill θ is defined by

$$x_\theta = q_\theta n_\theta^*, \tag{7}$$

where q_θ is the fraction of foreigners with skill θ who can afford and who are willing to move, i.e.

$$q_\theta = [1 - \Omega_\theta(\gamma)]\Pi[w_\theta - w_\theta^* - \gamma]. \tag{8}$$

We define immigrants' skill composition as the ratio of high to low skilled migrants, i.e.

$$Q = \frac{q_H}{q_L}, \tag{9}$$

and we say that immigrants are positively self-selected if and only if $Q \geq 1$.

3.2 Optimal immigration restrictions

According to equations (3) and (5), equilibrium wages in the receiving country can be written as

$$w_H = \alpha R^{\alpha-1}, \tag{10}$$

and

$$w_L = (1 - \alpha)R^\alpha, \tag{11}$$

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[15] As discussed in Section 4.1, this cost need not be though only as an entry tax, and as such, we do not include its potential revenues in the welfare function. In fact, a significant part of migration costs depends on immigration restrictions, but it is not pocketed by the receiving country government (e.g. immigrants' expenses for legal and consulting services needed to comply with bureaucracies).

where R is the ratio of high to low skilled workers

$$R = \frac{N_H}{N_L} = \frac{n_H + x_H}{n_L + x_L}. \tag{12}$$

Hence, the receiving country skill distribution and equilibrium wages depend on migration flows, and then on the immigration policy γ.[16] We can write the government's program in equation (6) as

$$\max_{\gamma \in \mathbb{R}_+} \mu_H \alpha R^{\alpha-1} + \mu_L(1-\alpha)R^{\alpha}. \tag{13}$$

Obviously, the optimal policy depends on the weights μ_{θ}. The higher is μ_H, the lower R will be induced by such policy.

For now, we abstract from redistributive concerns or other political economy distortions, and consider a purely utilitarian setting in which each group is valued according to its size. Notice first that, in this setting, no immigration restrictions are imposed if immigrants are given the same weight as natives. In fact, if

$$\mu_{\theta} = N_{\theta},$$

then the welfare function W does not depend on R, i.e. on high vs. low skilled wages, but only on total production. Hence, W would be maximized by setting $\gamma = 0$.

A preference for high or for low skilled workers instead arises when immigrants receive a lower weight than natives. In this case, the government sets its policy in order to benefit the group of workers in which the proportion of immigrants is lower. Suppose the government cares only about natives, then

$$\mu_{\theta} = n_{\theta},$$

and we have that

$$\frac{dW}{d\gamma} = (1-\alpha)w_H \Big[\frac{n_L x_H - n_H x_L}{n_H + x_H} \Big] \frac{dR}{d\gamma}. \tag{14}$$

In this case, the welfare function W is convex in R and it has a minimum at $R = n_H/n_L$. Efficiency gains from immigration are minimized when immigrants have the same skill composition as the native population, i.e. when $x_H/x_L = n_H/n_L$.[17] Since the government maximizes efficiency, i.e. natives' total income, it aims at optimizing the skill ratio R. In particular, if immigrants are less skilled than natives, the optimal policy is the one preferred by high skilled natives, which is the one minimizing the ratio R; and vice-versa if immigrants are more skilled than natives.

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[16] Notice that w_H, w_L and R are uniquely defined by equations (10), (11) and (12). In fact, the right hand sides of equations (10), (11) and (12) are continuous are decreasing in w_H, w_L and R, respectively. Hence, the fixed point problems in such equations have always a unique solution.

[17] 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).

3.2.1 Size and composition effects

As expressed in equation (14), the government's program needs to account for how immigration policy affects the skill ratio R. As we now show, this in turn requires an understanding of the forces driving the migration flows. Notice first that, differentiating equation (12) and rearranging terms, we have that

$$\frac{dR}{d\gamma}\left(N_L{}^2 - \frac{\partial x_H}{\partial w_H}\frac{\partial w_H}{\partial R}N_L + \frac{\partial x_L}{\partial w_L}\frac{\partial w_L}{\partial R}N_H\right) = \frac{\partial x_H}{\partial \gamma}N_L - \frac{\partial x_L}{\partial \gamma}N_H.$$

Since $\partial w_H/\partial R < 0$ and $\partial w_L/\partial R > 0$, the term in parentheses is positive, so the ratio R increases in γ if and only if

$$\frac{\partial x_H}{\partial \gamma}N_L \geq \frac{\partial x_L}{\partial \gamma}N_H. \tag{15}$$

Notice that $\partial x_\theta/\partial\gamma$ are *partial* derivatives, i.e. they describe the direct effect of immigration policy on immigration flows, abstracting from the effect on equilibrium wages.

In order to highlight the role of self-selection, one can multiply both sides of equation (15) by $x_L x_H$ and see that the ratio R increases in γ if and only if

$$\frac{x_H}{n_H + x_H}\cdot\frac{\partial x_H}{\partial \gamma}x_L \geq \frac{x_L}{n_L + x_L}\cdot\frac{\partial x_L}{\partial \gamma}x_H. \tag{16}$$

Equation (16) can be decomposed as the product of two forces:

$$\frac{x_H}{n_H + x_H} \geq \frac{x_L}{n_L + x_L},$$

which is equivalent to

$$\frac{x_H}{x_L} \leq \frac{n_H}{n_L}, \tag{17}$$

and

$$\frac{\partial x_H}{\partial \gamma}x_L \geq \frac{\partial x_L}{\partial \gamma}x_H,$$

which is equivalent to

$$\frac{\partial Q}{\partial \gamma} \geq 0. \tag{18}$$

Equation (17) describes a *size effect,* i.e. what happens to the skill ratio R when one varies the number of immigrants, while keeping their skill composition as fixed. If immigration restrictions had no other effect, then welfare would be maximized with free immigration. In fact, equation (17) tells that increasing the cost increases the ratio R if and only if immigrants are less skilled than natives. According to equation (14), we would then have

$$\frac{dW}{d\gamma} \leq 0.$$

We summarize this result in the following Proposition.

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Proposition 1 *If immigrants' skill composition was taken as given, a utilitarian government would impose no immigration restrictions.*

However, as described by equation (18), any immigration policy also changes the average skill of immigrants. This represents a *composition effect*: higher restrictions increase the skill ratio R if and only if they increase immigrants' skill composition Q. Before turning to the rest of our analysis, in which we investigate what drives such composition effect and which are its implications for the optimal policy design, we state the following Proposition.

Proposition 2 *The effect of immigration policy on the receiving country skill ratio can be decomposed in an effect on the size and an effect on the composition of the migration flow, described respectively by equations (17) and (18).*

3.3   The composition effect

Standard discussions about immigration policies abstract from the composition effect. However, such abstraction may be misleading, since this effect may sometimes *reverse* the predictions based on the size effect only. As we now show, there are situations in which the tension between the two effects is inescapable, i.e.

$$\frac{\partial Q}{\partial \gamma} \geq 0 \text{ if and only if } \frac{x_H}{x_L} \geq \frac{n_H}{n_L}, \tag{19}$$

and, in addition, the composition effect may be stronger. To show this, we first rewrite condition (15) as

$$\frac{\partial q_H}{\partial \gamma} n_H^* n_L - \frac{\partial q_L}{\partial \gamma} n_L^* n_H + \frac{\partial q_H}{\partial \gamma} q_L n_H^* n_L^* - \frac{\partial q_L}{\partial \gamma} q_H n_L^* n_H^* \geq 0. \tag{20}$$

From the last equation, we see that the composition effect is less likely to be an issue if the skill compositions of the two countries are very different. Suppose for example that the sending country has a very poor skill composition, i.e. $n_H^* n_L$ is much lower than $n_L^* n_H$. All else equals, a more restrictive policy is likely to have a larger impact on low skilled foreigners, thereby increasing the ratio R.

This effect being clear, we now concentrate on selection issues, and so consider the case in which the skill composition between the sending and the receiving country is similar. In particular, we let

$$n_H^* = n_H \text{ and } n_L^* = n_L, \tag{21}$$

and so we write condition (20) as

$$\frac{\partial q_H}{\partial \gamma} - \frac{\partial q_L}{\partial \gamma} + \frac{\partial q_H}{\partial \gamma} q_L - \frac{\partial q_L}{\partial \gamma} q_H \geq 0. \tag{22}$$

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The last equation emphasizes that the relation between R and γ depends on how the policy affects the propensity to migrate of low and high skilled foreigners. Predicting such relation then requires an understanding of the forces behind immigrants' self-selection, as we now consider.

3.3.1 The simplest case: no wealth constraints

To illustrate our argument in the cleanest way, we first abstract from wealth constraints. Besides being simple, this way of modeling the migration decision emphasizes cross-countries wage differentials, as in the classic self-selection literature.[18] In this case, immigrants' self-selection is driven only by the incentives that foreigners face according to their skills, and immigrants' skill composition in equation (9) writes simply as

$$Q = \frac{\Pi(w_H - w_H^* - \gamma)}{\Pi(w_L - w_L^* - \gamma)}. \tag{23}$$

Therefore, immigrants are positively self-selected if and only if *absolute* gains from migration increase with skills, i.e. if $(w_H - w_H^*) \geq (w_L - w_L^*)$. Alternatively, this condition can be rearranged in terms of wage differentials in the sending vs. receiving country, defined respectively as $\Delta w^* = w_H^* - w_L^*$ and $\Delta w = w_H - w_L$, as

$$\Delta w \geq \Delta w^*. \tag{24}$$

Accordingly, when condition (24) holds, we say that returns to skills are higher in the receiving country.

Wage differentials drive also the relation between Q and immigration restrictions. In fact, simply differentiating (23), we have

$$\frac{\partial Q}{\partial \gamma} \geq 0 \iff \pi(\varepsilon^L)\Pi(\varepsilon^H) - \pi(\varepsilon^H)\Pi(\varepsilon^L) \geq 0 \iff \Delta w \geq \Delta w^*. \tag{25}$$

Equation (25) describes an *incentive effect.* As expressed in condition (1), changing costs has a relatively higher impact on the foreigners with lower gains from migration. These foreigners tend to be low skilled, and so restrictions and skill composition are positively related, if and only if wage dispersion is higher in the receiving country.

To see how this effect matters for the receiving country, we simplify further our analysis by assuming that the psychological cost of migration is uniformly distributed over some interval $[a, b]$. Hence, for $\varepsilon^\theta \in [a, b]$, $\pi(\varepsilon^L) = \pi(\varepsilon^H)$ and, substituting into equation (22), we see that

$$\frac{\partial R}{\partial \gamma} \geq 0 \iff \Pi(\varepsilon^H) - \Pi(\varepsilon^L) \geq 0 \iff \Delta w \geq \Delta w^*. \tag{26}$$

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[18]This may also be the most natural setting to consider if one is interested in selection along non-observable dimensions, which need not be systematically correlated with wealth.

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From equation (26), restrictions increase R if and only if immigrants are more skilled than natives. Hence, as long as both thresholds ε^L and ε^H lie within the interval $[a, b]$, the composition effect prevails. When instead one of the thresholds ε^L and ε^H lies outside the interval $[a, b]$, the sign of the derivative is reversed, i.e. the size effect prevails.

It follows that the composition effect may prevail only when restrictions are not too high, so that both groups of natives have incentive to migrate. To see this, suppose for example that the low skilled have always higher gains from migration (i.e. $\Delta w \leq \Delta w^*$ for all γ) and that, at the current level of restrictions, some high skilled is still willing to migrate (i.e. $w_H - w_H^* - a > \gamma$). According to equation (26), a marginal increase in the cost decreases R despite that immigrants are less skilled than natives. This is due to the composition effect, i.e. to the fact that an higher cost induces an even lower immigrants' skill composition. At some point, however, the cost becomes so high that no high skilled has incentive to move, so the composition effect disappears. Such cost is implicitly defined by

$$\bar{\gamma} = w_H(\bar{\gamma}) - w_H^* - a.$$

Beyond $\bar{\gamma}$, increasing the cost just decreases the number of immigrants, without affecting their composition. Since immigrants are low skilled, this increases the skill ratio R. In sum, in this example, the composition effect is stronger for $\gamma \leq \bar{\gamma}$, while the size effect dominates afterwards, and the relation between R and γ is U-shaped, with a minimum at $\gamma = \bar{\gamma}$.[19]

Even in such simple setting, we gain some fundamental insights on the relation between size and composition effects. First, the composition effect pushes the skill ratio into the opposite direction than the standard size effect. By equations (23) and (25), further restrictions improve immigrants' skill composition if and only if immigrants are more skilled than natives, which is the tension defined in condition (19). The reason is intuitive: the size effect is by definition random, so it hits a group of foreigners proportionally to their propensity to migrate, while the composition effect tends to be stronger on the least represented group.

Second, the relation between the skill ratio and immigration restrictions may be non-monotonic.[20] In particular, the composition effect may dominate the size effect at low levels of restrictions. We summarize these findings with the following Proposition.

Proposition 3 *When migration is driven only by incentives,*

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[19] Such $\bar{\gamma}$ always exists. In fact, even if in this example w_H first increases in γ, w_H is bounded so $\gamma > w_H - w_H^* - a$ for γ sufficiently large.

[20] This has been shown using the convenient special case of a uniformly distributed cost ε_i. As it is clear from equation (22), however, this is the case whenever the ratio $\pi/(1+\Pi)$ is decreasing.

a) *Immigrants are positively self-selected if and only if $\Delta w \geq \Delta w^*$;*

b) *Immigration restrictions increase Q if and only if $\Delta w \geq \Delta w^*$;*

c) *Under condition (21), size and composition effects have the opposite direction;*

d) *The relation between R and γ may be non-monotonic, with the composition effect being stronger for low levels of restrictions.*

The fact that the composition effect may reverse the policy outcome, as predicted by the size effect only, has a number of counter-intuitive implications. First, some natives may support further immigration restrictions even if immigrants are not harmful for them. Suppose for example that $\Delta w \geq \Delta w^*$, so immigrants are positively self-selected and they improve the receiving country skill ratio. In this case, low skilled natives may push for an higher γ even if immigration increase their wage, since restrictions would further improve immigrants' skill composition and the receiving country skill ratio. Hence, individual preferences over immigration policy should consider immigrants' self-selection in addition to their skill composition.

Second, in this setting, even a utilitarian government may impose positive immigration restrictions. In fact, as discussed after equation (14), a government with weights $\mu_\theta = n_\theta$ aims at maximizing or minimizing the skill ratio. If the relation between R and γ is non-monotonic, however, this requires setting a positive γ (in the example above, it would be $\gamma = \bar{\gamma}$). Restrictions here are not due to distributional concerns, or other departures from pure efficiency, but they are a way to screen immigrants by affecting their self-selection. We summarize these observations in the following Corollaries.

Corollary 1 *When the composition effect prevails, some natives may support further restrictions even if immigrants are not harmful for them.*

Corollary 2 *Immigration restrictions may be optimal even for a utilitarian government that cares only about natives' total income.*

3.3.2 The general case: incentive and wealth effects

We now explore how the previous insights carry through in a setting where potential migrants face wealth constraints, and so self-selection is driven also by different abilities to incur the migration cost. For our purposes, this implies that it may not be sufficient to know whether immigrants are positively or negatively self-selected, but one needs to know also what drives self-selection. Those with the highest gain from migration, and then the highest willingness to pay for it, are not necessarily the ones with the highest resources to pay for it.

Besides being a more general formulation of the migration decision, this setting matches better with the empirical evidence. As implied by equation (2), wealth constraints are less severe for the high skilled. Hence, we have that

$$[1 - \Omega_H(\gamma)] \geq [1 - \Omega_L(\gamma)],$$

which pushes towards positive self-selection in terms of observables. As a result, immigrants may be positively self-selected even if returns to skills are higher in the source country and *physical* costs of migration are relatively small, as in the case of Mexican immigrants to the U.S. considered in Chiquiar and Hanson (2005).

In this setting, we first notice that increasing immigration restrictions improves immigrant skill composition Q when

$$\frac{\pi(\varepsilon^L)\Pi(\varepsilon^H) - \pi(\varepsilon^H)\Pi(\varepsilon^L)}{\Pi(\varepsilon^H)\Pi(\varepsilon^L)} + \frac{\omega_L(1 - \Omega_H) - \omega_H(1 - \Omega_L)}{(1 - \Omega_H)(1 - \Omega_L)} \geq 0. \qquad (27)$$

The first term is the same *incentive effect* described in the previous Section. The second term represents a *wealth effect.* By equation (2), this is always positive: by increasing the cost, one gets richer and more skilled migrants.

It is then clear that when only wealth constraints matter, or when $\Delta w \geq \Delta w^*$, migrants skill composition increases with migration costs. If instead $\Delta w < \Delta w^*$, the effect is ambiguous. As $\gamma \to 0$, the relation tends to be negative, since the wealth effect is weak and incentives dominate. The shape of Q as the cost increases depends on the strength of the two effects. Roughly, when $\Pi(\varepsilon^H)$ goes to zero faster than $(1 - \Omega_L)$, Q tends to zero 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, so the relation is U-shaped.

Turning to the effect of γ on the skill ratio R, we first notice that in this setting size and composition effects need not go in opposite directions. In fact, increasing restriction may decrease the size of low skilled immigration and at the same time improve immigrants' self-selection by reinforcing the wealth effect.[21] However, we concentrate in the more interesting case in which size and composition effects have opposite directions. This occurs whenever the relation between Q and γ is monotone, i.e. either $\Delta w \geq \Delta w^*$ or self-selection is driven only by wealth constraints or only by incentives, and the reason is the same as in the previous analysis.

In such cases, given equation (21), a *sufficient* condition for the composition effect to prevail is that the foreigners with the lowest propensity to

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[21]Say for example that γ is very low and that $\Delta w < \Delta w^*$, so immigrants are negatively self-selected and they decrease R. By the size effect, increasing restrictions increases R. Moreover, further restrictions may also improve immigrants' skill composition as higher costs make wealth constraints more binding, which in turn induces a further increase in R.

migrate are, in absolute terms, the most sensitive to a policy change, that is

$$x_H \geq x_L \text{ if and only if } \frac{\partial q_H}{\partial \gamma} \geq \frac{\partial q_L}{\partial \gamma}. \tag{28}$$

In fact, when the relation between Q and γ is monotone, condition (27) holds if and only if $x_H \geq x_L$. That is $q_L(\partial q_H / \partial \gamma) \geq q_H(\partial q_L / \partial \gamma)$ if and only if $x_H \geq x_L$. Together with condition (28), this implies condition (22), that is R increases with γ despite that immigrants are more skilled than natives.[22] Moreover, as it can be noticed by equation (22), if q_L and q_H are small, condition (28) is almost necessary.

Moreover, similarly to the previous analysis, the composition effect may prevail only when the cost is sufficiently small, so that the population of migrants is sufficiently heterogeneous. If the cost is so high that only one group of foreigners migrates, being they the richest or the most motivated, then by definition there is no composition effect.[23] It follows that the relation between R and γ need not be monotone. As discussed at the end of the previous Section, this implies that natives may support a more restrictive policy despite current immigrants are beneficial for them; and that a utilitarian government may optimally impose positive immigration costs. We summarize this analysis in the following Proposition.

Proposition 4 *When migration is driven both by incentives and by wealth constraints,*

a) *Immigrants are positively self-selected if $\Delta w \geq \Delta w^*$ or wealth constraints dominate;*

b) *Immigration restrictions increase Q if $\Delta w \geq \Delta w^*$ or the wealth effect dominates;*

c) *Size and composition effects may have the opposite direction;*

d) *The relation between R and γ may be non-monotonic, with the composition effect being stronger for low levels of restrictions;*

e) *Corollaries 1 and 2 still hold.*

4 Discussion and extensions

In this Section, we discuss how our main assumptions affect the above analysis and propose some extensions of our framework.

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[22]For example, this may occur when immigrants are mostly low skilled and illegal. Immigrants depress R but immigration restrictions are likely to worsen the situation by discouraging high skilled migrants, without affecting low skilled (illegal) ones.

[23]Similarly to the previous analysis, the maximum cost depends on the functional forms Π and Ω_θ one assumes (see Bianchi, 2006, for some examples).

4.1 Immigration policy

Taken literally, our model makes some important simplifications on the immigration policy space. We assume that restrictions only affect the migration cost, and that they act unconditionally on skills. We now see how our analysis would change by relaxing these assumptions.

First, immigration restrictions include several dimensions beside the monetary cost γ, so our framework may be a starting point to complicate the policy space. For example, immigration is typically restricted via quotas. In our setting, however, changing the quota affects immigrants' self-selection in a similar way than changing the cost γ. In fact, the quota affects the probability that, upon submitting a demand, a foreigner receives an entry visa. Suppose that submitting such demand entails a cost (either monetary or in terms of time). A foreigner applies for a visa only if the expected benefits, i.e. the wage differential multiplied by the probability of getting the visa, exceeds the cost. Changing the quota then has a stronger impact on those with lower gains from migration, which is the same incentive effect we described in the above analysis.

In addition, immigration typically requires spending a significant amount of time in order to comply with bureaucracies. Since the value of time may differ according to skills, bureaucracies may also affect self-selection. As a simple example, assume that each migrant has to invest some fixed amount of time β in bureaucracies, and this time is worth βw_θ^*. Since in this case bureaucracies are more harmful for the high skilled, the conditions for positive self-selection become harder to satisfy. When only incentives matter, we need that $\Delta w > (1 + \beta)\Delta w^*$, i.e. differential returns to skill in the receiving country are sufficiently high to compensate also for the higher waste of time. Hence, with respect to the case of no bureaucracies, increasing restrictions (i.e. both β and γ) is now more likely to reduce immigrants' skill composition.

Finally, countries may try to impose different restrictions on different types of immigrants. Obviously, if the receiving country could perfectly contract on immigrant skills, it would directly select the desired size and type of immigration, and the interaction between policy and skill composition would be trivial. Still, there are reasons which suggest that our exercise may still be useful. First, many aspects of immigration policies, like bureaucracies, tend to be independent on skills. In this respect, we emphasize that even such policies have screening power. Second, while countries like Australia and Canada have implemented systems to directly screen immigrants according to their skills, several authors have stressed that such systems have very little ability to affect immigrants' skills and long-term success in the receiving country (see e.g. Miller, 1999 on Australia; Antecol, Cobb-Clark and Trejo, 2003 and Jasso and Rosenzweig, 2008 on Canada and Australia vs. the U.S.). Third, immigrants' self-selection operates also along unob-

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servable dimensions, which may affect immigrants' assimilation and so be of interest for receiving countries. These dimensions are by definition not contractible and hence they can be affected only through indirect screening mechanisms.

4.2   Government's preferences

Our analysis has concentrated on the case of a utilitarian government which values each group according to its size. There are many ways to extend our framework and make the process of aggregating natives' preferences more structured (and perhaps more realistic).

For example, one could think of a majoritarian democracy where only the largest group of natives gets positive weight. If these are low skilled, the government would aim at maximizing the skill ratio R. Alternatively, one could introduce lobbying activities whereby each group may bid for protection and try to increase its weight in the government's program. In this case, the government may trade off contributions and social welfare, and aim at some intermediate R (see Bianchi, 2006, for some discussion along these lines). More generally, one could add to our model one stage in which the weights μ_θ are determined.

We have instead taken these weights as given and described how the government would change immigration costs in order to move towards the optimal skill ratio R. In this sense, much of the insights developed on size vs. composition effects are robust to the specific way in which the weights μ_θ are determined.

4.3   Natives' preferences

We now discuss our assumptions about natives' preferences. First, it should be noticed that the evidence on the labor market impact of immigration is quite controversial. While some studies find a rather small impact on natives' wages (Friedberg and Hunt, 1995 and Card, 2005), others like Borjas (2003) document that immigrants compete with similarly skilled natives and significantly lower their equilibrium wages. In a political economy framework, it would suffice that citizens' beliefs, rather than actual effects, are consistent with our assumptions on labor market interactions.[24] Moreover, as argued below, our focus on the effects on R may be useful to analyze several other issues.

Second, while considering a linear utility function simplifies our analysis, one may introduce a more general form for natives' utility. Each group

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[24]Considering the centrality of labor market competition in policy debates, and the evidence on attitudes towards immigration mentioned in footnote 6, this seems less controversial.

would then receive a weight which depends on μ_θ and on the group's marginal utility, and this would induce a greater concern for the low skilled (who have higher marginal utility). In this case, it need not be that any immigration restriction is driven by the composition effect (as stated in Proposition 1), since distributional concerns would provide an additional reason to restrict low skilled immigration. But again, to the extent that the government program requires setting an optimal R, our analysis on size and composition effects would be valid.

Finally, natives' preferences over immigration policy may include several dimensions we have abstracted from. However, focusing on the skill ratio R may provide a useful framework to analyze many such dimensions. Consider for example public finance and political economy issues. From a fiscal viewpoint, one may argue that high skilled immigrants are always preferred since they pay higher taxes and receive less welfare benefits. Hence, high skilled natives would trade-off the reduction in wages with the fiscal benefit of accepting high skilled immigrants.[25] On political economy issues, if immigrants gain political power in the receiving country, then natives may trade-off the effect on their wages with the one on the political equilibrium (like in Ortega, 2005). However, if immigrants oppose restrictions to immigration irrespective of their skills,[26] this political economy effect has the same direction of the labor market effect considered above.

4.4   Returns to skills

Many of our predictions on the relation between immigration restrictions and immigrants' skill composition depend on differential returns to skills in sending vs. destination countries. We now discuss the extent to which the literature provides some general pattern for such differentials.

Several reasons have been proposed to expect higher returns to skills in developed countries, like higher total factor productivity (Lucas, 1990), skill complementarities (Kremer, 1993), or skill biased technological change (Acemoglu, 1998); but also to expect the opposite, like the high supply of skills (Blau and Kahn, 1996) or the existence of labor market institutions which compress wages (Leuven, Oosterbeek and van Ophem, 2004). Empirical studies tends to report that returns to skills decrease with per-capita GDP (Bils and Klenow, 2000; Freeman and Oostendorp, 2000; Psacharopou-

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[25] Suppose 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 the wage w_H, which depends negatively on R, and the transfers, which depend positively on R. The effects of these concerns on individual preferences over immigration is documented in Hanson, Scheve and Slaughter (2007) and Facchini and Mayda (2006).

[26] 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 report that immigrant have more favorable attitudes towards immigration, irrespective of their economic condition (see Espenshade and Hempstead, 1996 and Scheve and Slaughter, 2001).

los and Patrinos, 2002; Caselli and Coleman, 2006), but differences are not huge, and general patterns appear weak.[27]

In the immigration literature, accordingly, there is no consensus. Various models simply assume that a worker with skill s in country j gets a wage $k_j \cdot s$, which by construction implies that returns to skills are higher in more developed countries (Chiswick, 1999; Giannetti, 2003; Jasso and Rosenzweig, 2008). On the other hand, several studies, following Borjas (1987), stress that wage inequality may be higher in developing countries and so the low skilled may have the greatest incentives to migrate.

Instead of looking for a general pattern, it appears that sensible insights may be derived from specific microanalysis. Chiquiar and Hanson (2005), for example, estimate that real wage premia for Mexican immigrants to the U.S. decrease with education. Similar estimates can be found in the analysis of Palestinian immigrants to Israel (Yashiv, 2004). These studies confirm our general point that self-selection is in general driven both by incentives and by constraints: those who can access migration are not necessarily those who have more to gain from it.

An equally important issue in estimating returns to skills regards the mapping from skills to jobs. Immigrants need not access the same spectrum of jobs and wages as natives, and in many instances they may be locked into low skilled occupations (see Munshi, 2003). Such mapping is difficult to measure and to compare across countries, and indeed it has been typically overlooked by this literature (see Borjas, 1994), but it may drive self-selection and the impact of immigration in the receiving country.[28] Suppose that good jobs are harder to get for immigrants, perhaps due to their inability to assimilate or to a discriminatory labor market. In this case, it is easy to see in our framework that incentives would push towards negative self-selection, and so towards a negative relation between immigration restrictions and immigrants' skill composition. Moreover, irrespective of their skills, immigrants would be more likely to depress low skilled wages.[29]

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[27]Banerjee and Duflo (2005) argue that the common wisdom that returns to skills are higher in developing country is an artifact of low quality data.

[28]Assume that, in the sending country, workers with skill θ have probability p_θ^* to get a good job and $1 - p_\theta^*$ to get a bad one, and similarly for the destination country. The requirement that returns to skills are higher in the receiving country writes $(p_H - p_L)\Delta w > (p_H^* - p_L^*)\Delta w^*$. For example, given that in Mexico wage inequality is higher but social mobility is lower than in the U.S. (Dahan and Gaviria, 2001), who should be more likely to migrate?

[29]To see this, one could introduce a parameter $\tau \in [0, 1]$, which measures barriers to entry into well-paid jobs. High skilled immigrants would expect to earn $w_L + \tau\Delta w$, and the skill ratio R would write $(n_H + \tau x_H)/(n_L + x_L + (1 - \tau)x_H)$. Also, one may replicate our analysis by focusing on τ as a policy variable, as this is affected e.g. by anti-discrimination laws, recognition of foreign education...

5   Conclusion

In this paper, we have developed a simple framework for analyzing the interaction between immigrants' self-selection and the determination of immigration policy. We wish to conclude by suggesting some possible policy implications of our results.

As mentioned in the Introduction, the effects of immigration largely depend on immigrants' composition. Indeed, a large part of the policy debate discusses how receiving countries may improve their ability to screen. In this respect, our results show that, given immigrants' self-selection, any policy affects different migrants in a different way, and so it has some indirect screening power. Given that size and composition effects tend to have opposite directions, this may significantly complicate the optimal policy design. On the other hand, such screening power may be viewed as an additional dimension to exploit. In fact, since as mentioned in Section 4.1 the effectiveness of direct screening mechanisms appears limited, immigration policies may consider influencing self-selection ex-ante rather than imposing restrictions ex-post.

In this respect, however, the present model does not deliver absolute policy prescriptions. Instead, we have seen how things may change dramatically depending on the forces driving the decision to migrate. If those who migrate are simply those who can afford it, increasing the migration cost, e.g. through a tax on entry, is likely to improve immigrants' skill composition.[30] Instead, as economic incentives become the main argument of the migration decision, the effect of these policies depends on differential returns to skills, and thus it may be more difficult to predict. Discrimination and bureaucracies push towards negative self-selection and, in this case, a more restrictive policy is likely to lead to an even less skilled immigration (see Sections 4.1 and 4.4).

The most general conclusion of this exploration is that immigrants' self-selection matters, also for receiving countries, since the forces shaping self-selection affect the way different potential migrants respond to policy changes. Nothing is terribly surprising in this statement. There is a huge and fundamental literature studying the response of different agents to changes in prices.[31] For some reason, the literature on immigration policy has generally overlooked this issue, and, under this perspective, this paper may be a step towards filling the gap.

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[30] Of course, one concern is that restrictions tend to encourage illegal immigration, that is more attractive for the low skilled. However, the issue is common to any intervention directed to regulate legal migration, and it reveals once again that restricting entry cannot be the only dimension of a sound immigration policy.

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

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