Pro-immigration Policies Increase Outmigration: Evidence from Schengen Agreements*

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Abstract

This paper shows that policies which favor (im)-migration may actually provoke unexpected consequences by increasing the outflows of previously settled migrants. To do so, we set a 3-country theory where already settled migrants in one country of residence respond to economic and policy incentives making them move back to their country of origin or a third country. In particular, we show that outmigration from the residence country increases with a unilateral openness of that country to new migrants. Outmigration increases even further with a multilateral openness to migration of all countries. The theory has an important implication for Schengen agreements: it predicts that openness of borders through Schengen should unambiguously increase the exit of previsously settled migrants. We use the implementation of these agreements as a quasi-natural experiment, exploiting the different timing in their implementation. We use recently available data on outmigration from the OECD and a difference-in-difference approach to show that the bilateral adoption of Schengen is estimated to increase out-migration by one-third.

Keywords: Labor Productivity; Migration Outflows; Migration Policy; Schengen *JEL Classification*: F22; J61; K37; O15

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1 Introduction

Immigration is one of the critical emergencies of our time, particularly in Western Europe but also, albeit in different ways, in the United States and other high-income countries, and it seems to make a clear divide between those who prefer the term "put a brake on it" and those who emphasize the duty to "receive". However, the feeling that seems to prevail in many economies is the former, as is shown by the increase in the election of parties whose ideological platform is based primarily on promises of greater control of the borders and a no-quarter onslaught on clandestine immigration.

The widespread feeling of hostility regarding the migration phenomenon is the result of the uncontrollable dimensions it has assumed in recent years, in itself the result of various historical events of the time such as the collapse of the Soviet Union, the Arab Spring and the proliferation of regional armed conflicts in Africa and Asia which have released an explosive potential of economic and political refugees. In Europe, especially, the Schengen Treaty has led to an unprecedented circulatory flow within those nations that adhere to it, and in particular it has permitted a massive exodus of citizens from the countries of Eastern Europe towards the economically more prosperous States (Lundborg & Segerstrom, 2002; Docquier *et al.*, 2014). These hostile feelings towards the migration phenomenon have hardened since the recession of 2008 and the changed nature of immigration itself: if at first it was for the most part seasonal and temporary, but from the 70's on it was characterized by families reuniting and settling permanently (Castles, 2006). This explain why in many western countries a substantial number of citizens exerted upon their governments, under threat of electoral sanctions, considerable pressure in order that policies be adopted to contain the entry flow and at the same time ensure the rapid exit of those immigrants already settled in the country.

Controlling the entry flow depends on policies aimed at rendering access to the national territory more difficult, and are the more burdensome the more impassable one wants to make the borders. As for the policies that aim at increasing the exit flow, these seem to take on the semblance of coercive deportation, as for example the penalties predicted in Italy following

the introduction of "the crime of clandestinity", or specific legislative dispositions such as the worsening of the conditions governing the renewal of residence permits and the granting of work permits that limit the duration of residence abroad (OECD, 1999, 2001, 2013; Boeri & Brücker, 2005; Khraiche, 2015). But one can also influence the choices of the immigrants themselves, for example by way of arranging tempting financial incentives that will induce them to return home voluntarily (OECD, 2009).

The exit of migrants has received some attention in the literature, especially when it comes to temporary and/or return migration. Dustmann (1997, 2003) proposes to establish the optimal length of the migration period on the hypothesis that there exist complementarities between consumption and the location where consumption takes place, and shows that this length is reduced when the consumption is most valued at home and/or the accumulation of wealth in the host country occurs at a faster rate. Such hypotheses are tested by Dustmann & Weiss (2007) within United Kingdom. In a more recent paper, Dustmann *et al.* (2011) deepen the analysis by accounting for the role of human capital accumulation and the related brain drain phenomenon on the return migration choice. On the basis of the insights of Kossoudji (1992) and Faini (1996), Magris & Russo (2009) show how a more permissive migration policy reduces the average length of each period spent in the country of immigration, presuming that the individuals emigrate repeatedly in the course of their lives. Bazillier *et al.* (2016) observe how the economic fluctuations of a short period produce, in terms of exit flow, the same effects as restrictive policies in recessionary periods. [1] The literature on the effect of migration policies on migration outflows is still very scarce. Angelucci (2012) studies the effect of US border enforcement on inflows and outflows of Mexican illegal migration. She shows that border enforcement significantly reduces the exit of Mexican illegal workers. Czaika & Haas (2016) focus on the effect of visa policy on both inflows and outflows of migrants. They show that visa policies are reducing the number of outflows, which decreases the effect of visas on *net* migration.

[1] Borjas & Bratsberg (1996) and Dustmann & Gorlach (2014) ascertain how return migration is rather "selective" and more easily to be found among the immigrants coming from high-income countries rather than those still developing. Fan & Wang (2006) and de Haas *et al.* (2014) interpret return migration as the sign of a success or a failure of the migrant in the hosting country.

The total stock of immigrants present in a country at a particular period is made up of the difference of entry flows and the exit ones and apparently only the first flow is susceptible to the policies of border closure. In this article we propose to analyze the impact of such policies on the second flow too.

First, we set-up a simple theoretical framework involving 3 countries: a country of residence of some already settled migrants, their country of origin and a third country. One key aspect of our theoretical set-up that has not been yet studied by the literature is that each migrant has the option to circulate between those countries. For instance, he could decide to return home but if at home he experiences a negative shock, he would like to re-migrate back to his first country of residence or could choose a third country. This is why each migrant has a utility that depends on three different sets of variables: its preference to consumption at home compared to that of abroad, the expected shocks of economic activity in the different destinations and last but not least, the expected capability to circulate (re-migrate) to the countries of his choice. This capability is made easier when the hosting country favors immigration, and harder if it rather tightens its immigration policy. We model this capability to enter a hosting destination by a probability of re-migration. Our model has also a second originality: we assume that the migrants are heterogenous in their relative preferences for domestic consumption. This assumption is extremely useful as it shows how only a share of the agents eventually decide to exit from the residence country, those agents being characterized by preferences over domestic consumption which are sufficiently high to compensate for possible differences in terms of productivity across destinations. The third new aspect of our model is to compare the effect of unilateral openness with that of multilateral openness to migration on the exit of migrants from where they use to reside.

Opening the borders thus plays the role of insurance coverage against the instability affecting the country of provenance, usually low-income, characterized by weak and unstable politico-economic structures, exposed to environmental risks, and frequently shaken by the tremors of war. We show that the more likely the occurrence of the good shock, the lower the total mass of migrants settled in the residence country at the end of the period and that the more permissive

the policy migrations are the larger the number of migrants moving back to their origin country (or to the third country). In other words, softening migration rules increases the outward flows. The latter, actually, are maximized when free circulation of persons is guaranteed through multilateral/regional openness, as it is the case of the Schengen Treaty.

In a second part, we test the predictions of the model by using the OECD International Migration database which contains bilateral outflows data for some OECD countries. We use the implementation of Schengen agreements as a "natural experiment" to test the influence of changes in migration policies on outward migration. The adoption of such agreements requires the full abolition of migration restrictions with other Schengen countries and can be seen as a full liberalization of migration policies (towards certain countries).

By using a pseudo-gravity model estimating the determinants of migration outflows, we are able to test the impact of Schengen implementation on outward migrations by using a difference-in-difference approach. We exploit the decision to implement or not the Schengen agreements as well as differences in the timing of implementation. By doing so, we show that the bilateral implementation of Schengen agreements has a strong and positive impact on migration outflows. We also find a lower - but still positive and significant - impact on migration outflows for migrants from countries outside the Schengen zone, suggesting outward migration towards a third country member of the Schengen zone. These results are robust to several specifications and samples of countries.

2 The Model

In this Section we introduce the theoretical model, to be successively tested, and present the main results. We first describe the migrants' behavior and the choices they are faced with, with particular regard to the possibility of undertaking a migration return to the origin country. We analyze the conditions under which such a choice would be effectuated. Then we present the political consequences, in terms of migration outflows, of implementing specific migration policies.

2.1 Migrants

We consider a one-period, three-country economy, composed by a mass of immigrants sharing the same nationality, a residence country R, an origin country O and a "rest of the world" country W. At the beginning of the period there is a stock M of migrants settled in the residence country R belonging to a common and given nationality. Each migrant located initially in R faces the choice whether or not to move back to O. In each country, the migrant has access to a linear production function in labor whose supply, to keep things as simple as possible, is assumed to be inelastic and normalized to one. However, the three countries differ in terms of labor productivity. In country R, the productivity is certain and equal to k_R (one can, equivalently, assume that the shock has been already realized and observed by migrants), and therefore the single consumption good can be produced according to the technological relationship:

$$c_R = k_R.$$

The utility function is assumed to be linear in consumption, i.e. agents are risk neutral:

$$u\left(c_R\right) = c_R = k_R.$$

On the other hand, if a migrant decides to move to O, he or she will face a stochastic labor productivity which will take the value of k_O^H with the probability $q_O \in [0,1]$ and of k_O^L with the probability $1 - q_O$ (where H and L stand, respectively, for "high" and "low"), with

$$k_O^H > k_O^L. \tag{1}$$

The parameter q_O captures the instability of country O relative to R. A q_0 very close to zero reflects a rather stable origin country in which productivity is very likely to be high, whereas a q_0 close to zero denotes an origin country where the labor productivity is more likely to be low. In country O there is a preference for domestic consumption reflected by the parameter $\alpha \geq 0$ measuring the marginal utility of consumption. As a matter of fact, the utility function in O of

a migrant with a preference for domestic consumption α is:

$$u\left(c_O\right) = \alpha c_O = \alpha k_O^i, i = H, L.$$

If α is larger than one, the migrant prefers to consume in O a given amount of the consumption good; if, conversely, $\alpha < 1$, consumption in R yields more utility relative to that provided by the same amount of consumption effectuated in O. We assume that if the good state of the nature is realized, there exists an $\alpha_{\min}$ such that all migrants exhibiting a larger preference for domestic consumption chose to remain in O, i.e. those migrants whose α satisfies:

$$\alpha > k_R/k_O^H \equiv \alpha_{\min}. \tag{2}$$

On the other hand, if the adverse shock occurs, we assume that there exists an $\alpha_{\max}$ such that the all migrants whose α is lower, they will immediately try to re-migrate to R or to move to W, as it will become clear in the sequel. For these migrants, one has:

$$\alpha < k_R/k_O^L \equiv \alpha_{\max}. \tag{3}$$

On the other hand, if the migrant α moves to W, he or she will face a stochastic labor productivity which will take the value of k_W^H with the probability $q_W \in [0, 1]$ and of k_W^L with the probability $1 - q_W$, with

$$k_W^H > k_W^L. \tag{4}$$

In country W there is a preference for inner consumption reflected by the parameter $0 < \gamma(\alpha) < 1$ which, combined with α, describes the marginal utility of consumption. As a matter of fact, the utility function in W of a migrant with a preference for inner consumption $\gamma(\alpha)\alpha$ is:

$$u\left(c_W\right) = \gamma(\alpha)\alpha c_W = \gamma\alpha k_W^i, i = H, L.$$

We assume that $\gamma'(\alpha) < 0$ and $\left|\frac{\gamma'(\alpha)\alpha}{\gamma(\alpha)}\right| < 1$. The hypothesis of an elasticity of the func-

tion $\gamma(\alpha)$ lower than 1 in absolute value allows us to ensure that the preference for domestic consumption in O grows with α at a rate larger than that at which it grows in W.

From the definition of α_{min}, we have that the corresponding migrant when it is the good shock to realize in both countries, he is indifferent in which country to settle in:

$$\alpha_{min} K_O^H = \gamma(\alpha_{min}) \alpha_{min} K_W^H = K_R.$$

Notice that this implies that $K_W^H \geq K_O^H$. From the above mentioned property of the function γ, one immediately verifies that each migrant $\alpha > \alpha_{min}$, the following inequalities do hold:

$$\alpha K_O^H > \gamma(\alpha)_W^H > K_R \tag{5}$$

The above inequality ensures that under the assumption that in both countries it is the good state of the nature to realize, all the migrants rank first country O, then country W and finally country R.

We assume that under the hypothesis of the occurrence of the bad shock in both countries O and W, one has, in the light of the definition of α_{max}:

$$\alpha_{max} K_O^L = \gamma(\alpha_{max}) \alpha_{max} K_W^L = K_R$$

Which implies that $K_W^L \geq K_O^L$. The above equality claims that the migrant α_{max} in the case of the realization of the bad shock in both countries O and W is indifferent between staying in O, W or R.

In the light of the property of the function γ, one has that for each migrant $\alpha < \alpha_{max}$, the following inequality holds:

$$\alpha K_O^L < \gamma(\alpha) \alpha K^{LW} < K_R \tag{6}$$

The above inequalities claim that, when in both countries O and W is the bad shock to occur, all migrants rank first R, then W and finally O.

Finally, we assume that the mass M of migrants settled initially in R is distributed according to the density function $f(\alpha)$, i.e. $M = \int_0^{+\infty} f(\alpha)\, d\alpha$.

2.2 Return Migration

Suppose that migrants settled in R (as we have already said, we assume that they share the same nationality) must decide whether or not to move back to O or to migrate to W at the beginning of the period. However, they must take a decision before they know the realization of the shock, since the state of nature in O and W countries can be observed only within each country. If they decide to return to O, once they reach it, they wait for the realization of the shock. However, before choosing whether or not to move back to O, they face a probability $p_R \in [0,1]$ of succeeding in re-migrating from O to R and a probability $p_W \in [0,1]$ of succeeding in moving from O to W; p_R and p_W represent thus the migration policies implemented, respectively, by the two countries. Of course, one has $p_O = 1$, since all migrants have the O nationality. In the light of inequalities (5) and (6), a migrant having decided to return to O, will wait there for the realization of the shock. If it is the good one to occur, then he will remain in O. If, on the other hand, it is the bad shock that occurs, he will first try to migrate to W. If he succeeds, in the case the good shock is produced in W, he will stay there, otherwise he will try to migrate to R. If the migrant does not succeed to move from O to W, he will then try immediately to move back to R. Notice that this behavior is grounded on the fact that the probability p_R is invariant whatever is the country of provenience of the migrant and that one may easily assume that the permit to come back to R is demanded since the moment the migrant has decided to return to O. The expected utility u^e, for an individual settled initially in R with a preference for domestic consumption α that decides to return to O, is therefore:

$$
\begin{aligned}
u^e &= q_O \alpha k_O^H \\
&\quad + (1-q_O)\left[p_W\left(q_W\gamma(\alpha)\alpha k_W^H + (1-q_W)\left(p_R k_R + (1-p_R)\,\gamma(\alpha)\alpha k_W^L\right)\right)\right]. \qquad (7)\\
&\quad + (1-q_O)\left[(1-p_W)\left(p_R k_R + (1-p_R)\,\alpha k_O^L\right)\right].
\end{aligned}
$$

Equation (7) has the following meaning. If a migrant settled in R moves to O, with a probability q_O he faces a labor productivity k_O^H (which yields an utility αk_O^H) and, in view of (5), remains in O. Conversely, with a probability $(1-q_O)$, the bad state of the nature occurs. It follows that he will try to move to W with a probability of success p_W. In such a case, he will get an utility $\gamma\alpha k_W^H$ with a probability q_W. If he does not succeed to move to W, he will try to re-migrate to R. Assuming that the migrant succeeds in moving from O to W, if in the latter country the bad state of the nature is realized, he will try to migrate to R and will succeed with a probability p_R with the corresponding utility k_R. If he does not succeed, with a probability $(1-p_R)$, he will remain in W and get the utility $\gamma\alpha k_W^L$. If, on the other hand, the migrant does not succeed in migrating from O to W, he will try to move back to R with a probability of success p_R (and a payoff k_R) and with a probability $(1-p_R)$ he will be bound to remain in O and get an utility αk_O^L. It follows that a migrant α will decide to leave R for O at the beginning of the period if and only if the expected utility (7) is larger than the utility guaranteed by remaining in R, namely if and only if $u^e > k_R$. Since u^e is increasing in α, by solving for α the indifference condition $u^e = k_R$, one obtains the critical preference α_M for domestic consumption such that for all $\alpha > \alpha_M$ (notice that $\alpha_M > \alpha_{\min}$) the individual settled in R will decide to move back to O. As a matter of fact, this will be true when α satisfies:

$$
\begin{aligned}
&\alpha\left[q_O k_O^H + (1-q_O)\left(p_W q_W \gamma(\alpha) k_W^H + (1-q_W)\,(1-p_R)\,\gamma(\alpha) k_W^L\right) + (1-q_O)\,(1-p_W)\,(1-p_R)\,k_O^L\right] \\
> \;& k_R\left[1-(1-q_O)\left((1-q_W)\,p_R + (1-p_W)\,p_R\right)\right]. \qquad (8)
\end{aligned}
$$

i.e.

$$\alpha > \alpha_M \equiv \frac{k_R \left[1 - p_R \left(1 - q_O\right) \left(1 - p_W q_W\right)\right]}{\left[q_O k_O^H + \left(1 - q_O\right) p_W \left(q_W \gamma(\alpha) k_W^H + \left(1 - q_W\right) \left(1 - p_R\right) \gamma(\alpha) k_W^L\right) + \left(1 - q_O\right) \left(1 - p_W\right) \left(1 - p_R\right) k_O^L\right]} \tag{9}$$

The function defining α_M is concave. It starts from some positive values when $\alpha = \alpha_{min}$ and converges to some finite value. This implies that for all migrants $\alpha > \alpha_M$ will choose to leave country R.

The number of migrants who will leave country R will be therefore:

$$\int_{\alpha_M}^{\alpha_{\max}} f\left(\alpha\right) d\alpha$$

It is immediately verifiable that, under inequalities (1), (4), (5) and (6), α_M is decreasing in q_O and q_W: the larger the probabilities of the occurrence of the good states of nature in country O and W, the lower the preference α for domestic consumption needed to provide the incentive to agents to return to O. It is also immediately verifiable that the larger the labor productivity k_R in R, the larger must α be in order to provide an incentive to migrants to leave R. Thirdly, the larger the labor productiveness k_O^H, k_O^L, k_W^H and k_W^L in O and W, the lower the critical preference for the domestic consumption α_M needed to make a return to O profitable. Finally, and most importantly, α_M is monotonically decreasing in p_R and p_W since the probability of a successful migration to W or of a reinstatement in R can be viewed as a kind of insurance against the realization of the adverse shock. It is clear that for $p_R = 1$, all migrants $\alpha \geq \alpha_{\min}$ will decide to leave R; however, for a given $p_R < 1$, the critical preference for domestic consumption α_M is monotonically decreasing in p_W. It follows that the pair of migration policies $p_R = 1$ and $p_W = 1$ maximize the migration outflow. This is the case, actually, when all the three countries adhere to the Schengen Treaty. Under such a case, since migrants face the incentive to move back home, the occurrence of the domestic good shock will alleviate the migration burden in the residence country. Of course, where the bad shock to realize, all the migrants who left the residence country, will decide to return in it or to move to a third country.

2.3 Comparative Statics

2.3.1 Relation between p_R, α_M and M

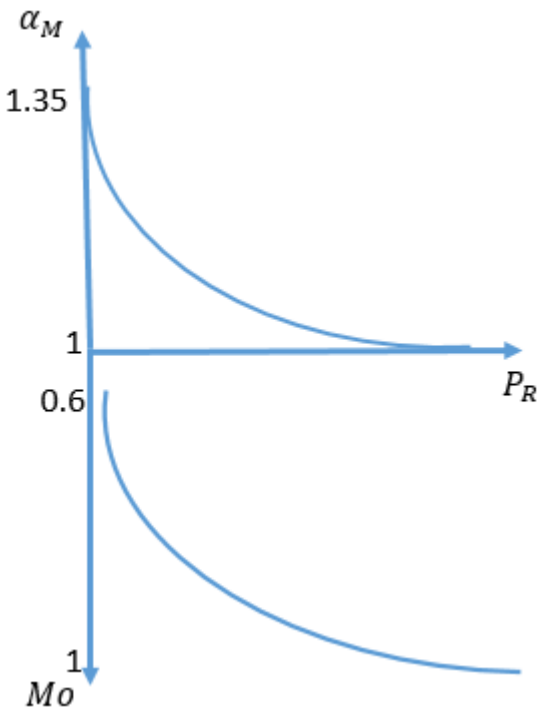
We now carry out a comparative statics in order to appraise the influence of the migratory policies implemented by country R and W on the migration outflow from country R. In order to fulfil our task, we will calibrate all the relevant parameters appearing in the expression of α_M and then draw the graphic of the latter as a function first of p_R, having fixed p_W, and eventually of p_W, after having calibrated p_R. We will show that α_M is decreasing in the degree of frontier openness, i.e. that softening migration rules in both countries yields to an increase in the migratory outflow from country R. Namely, once one increases p_W, the graphic depicting α_M as a function of p_R shifts downward: the home bias necessary to provide an incentive to migrants to leave country R becomes lower in correspondence to each migration policy p_R. The same is true once one fix p_R and let p_W make to vary: by increasing p_R, the graphic depicting α_M as a function of p_W shifts then downward. Once we have depicted the relationship between α_M and the migration policies p_R and p_W, we draw the corresponding graphic of the migration outflow M as a function of the same policies. In order to proceed in such a way, let us keep in mind the critical home bias α_M previously defined. We will focus on a specific calibration for the relevant parameters appearing in the expression of α_M.[2]

The relationship between α_M and p_R is represented therefore by the following formula: $\frac{1*(1-p*0.5*(1-0.2*0.5))}{0.5+0.5*(0.2*0.5}$ which give rise to the first part of figure 1, where is abscissa is depicted the probability p_R of entering in country R and in the ordinate the critical home bias α_M.

Notice that the above function is decreasing, since a higher probability p_R of a successful reinstallation in country R pushes immigrants to leave such a country and to try to take advantage of the realization of the good shock in O. In addition, for $p_R = 1$, all the migrants with a home bias larger than unity will move back to O since here the productivity corresponding to the realization of the good shock is equal to one, the same as in the residence country. Assuming,

[2] $k_R = 1, k_O^H = 1, k_O^L = 0, k_W^H = 1, k_W^L = 0, \gamma = 1, q_O = 1/2, q_W = 1/2, p_W = 0.2$

Figure 1: Probability of entering a country p_R, critical home bias α_M and Migration Outflows M



for sake of simplicity, that migrants are distributed uniformly according to the density function

$$\int_0^5 d\alpha$$

the migration outflow M is easily calculated by

$$M = \int_{\alpha_M}^{2} d\alpha = 2 - \alpha_M$$

which, keeping our calibration, becomes: $2 - \left(\frac{1*(1-p*0.5*(1-0.2*0.5))}{0.5+0.5*(0.2*0.5)}\right)$ whose graphic, setting in the abscissa the probability p_R of a successful resettlement in R and in the ordinate the migration outflow M, is given in the second part of figure 1.

It is not surprising, indeed, that the migration outflow increases as soon as country R implements a softer migration rule. Indeed, the probability of a re-installment in R provides an incentive to migrants to return to O in order to try to enjoy the labor productivity corresponding to the realization of the good shock.

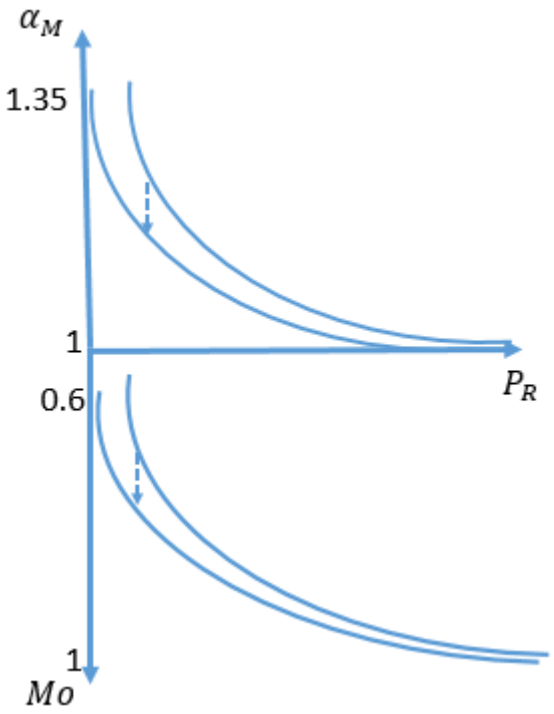
2.3.2 Effects of a multilateral liberalization

If we keep the same calibration as before, with the exception of p_W which is now set equal to 0.9, we have the following equation describing the sensitivity of α_M (depicted in the ordinate) with respect to p_R (appearing in the abscissa): $\frac{1*(1-p*0.5*(1-0.9*0.5))}{0.5+0.5*(0.9*0.5)}$. It is easily appreciable that the function $\alpha_M(p_R)$ undergoes a downward shift, by pivoting around the point $(1,1)$, in response to a softer migration rule adopted by country W: for each p_R, we have now that the critical home bias becomes lower since migrants, in the case that in O occurs the bad shock, face a larger probability of moving to country W and enjoy, possibly, the labor productivity corresponding to the realization of the good shock. Notice that the response of α_M with respect to p_R is now lighter, since the reward of leaving country R is already large in view of the high p_W. Actually, when $p_R = 1$ ($p_W = 1$), the migration policy p_W (p_R) implemented by country W (R) does not

influence the critical home bias α_M which, according to our calibration, is always equal to one. As a consequence, the outflow function will undergo an upward shift, since for each migration policy implemented in R, the number of migrants who chose voluntarily to return to O will increase. Actually, the latter is now described by the function: $2 - \left(\frac{1*(1-p*0.5*(1-0.9*0.5))}{0.5+0.5*(0.9*0.5)}\right)$.

Figure 2 summarizes these findings by showing the effect of an increase in P_W on α_M and M.

Figure 2: Sensitivity of α_M and M with respect to p_R



In the above graphic, it emerges clearly that in response to an increase of the probability of a settlement in W, for each migration policy p_R implemented by country R, the migration outflow will be more important.

3 Empirical Analysis: Evidence from Schengen Agreements

The goal is to test the prediction of the theoretical model. Overall, we show that migration outflows will increase with (i) an increase in frontier openness (p_R and p_W), (ii) a more stable

and a high economic activity in the origin country (high probability of a good state of nature in this country), and (iii) low economic activity in the residence country. In order to identify the effect of migration policies, we should overcome two problems: (i) the measurement of migration policy and (ii) to identify an exogenous variation in these policies taking into account the potential reverse causality (eg. the evolution of outflows having an impact on migration policies) but also potential coincident factors (other phenomenon or policies correlated both with migration outflows and migration policies). Concerning the former, Gest *et al.* (2014) has very well documented all measurement problems in existing indexes of migration policies.[3] Concerning the latter, this endogeneity problem is a challenge to the identification of a causal link. Our strategy is to exploit different timing in the implementation of Schengen agreements to identify such causal link.

Note that the main result of the theoretical model is that an increase in frontier openness p_R increases migration outflows towards the rest of the World (origin country or a third country). As such, the model does not predict an increase in return migration following an increase in frontier openness, but, more generally, an increase of total outward migration. The crucial parameter p_R, the probability to re-enter into the residence country, can be different among different migrants' nationality (in the case of a conditional migration policy). But for a given nationality of migrants, this probability will be similar if the migrant decides to return to his origin country or to migrate to a third country. We do not need to observe the new destination country of migrants to test the predictions of our model.

To test these predictions, we will use a very general empirical specification such as:

$$\ln M_{out,t}^{o,r} = \ln M_{r,t}^{o,r} + \beta_1 X_{r,t} + \beta_2 X_{o,t} + \beta_3 X_{o,r,t} + \lambda_t + a_{o,r} + \epsilon_{o,r,t} \tag{10}$$

[3]The most commonly used indexes are proposed by Ortega & Peri (2012), Mayda (2010) or Belot & Ederveen (2012). Docquier *et al.* (2012) discuss different problems raised by these indexes. Some indexes are based on migration policy *reforms* and cannot assess the *level* of restrictiveness as such. Others are compiling different types of migration policies (work migration, family migration, refugees) while such components and their effects can be very heterogenous.

With $M^{o,r}_{out,t}$ the number of migrants from o, outmigrating from r at time t. $M^{o,r}_{r,t}$ the number of migrants from o staying in r at time tt, $X_{r,t}$ a set of time-varying controls of residence country characteristics including the GDP per capital (as a proxy of income levels), GDP growth and unemployment, $X_{r,t}$ a set of time-varying controls of origin country characteristics, and $X_{o,r,t}$ a set of dyadic characteristics. Alternatively, we will include origin-year and/or residence-year fixed effects to capture all time varying characteristics in residence or origin countries. We will then add different levels of Schengen implementation to test the predictions of the model.

Note that this specification is closed to a pseudo-gravity model of international migration (Anderson, 2011) although the interpretation is different. Here the dyadic structure of our data is (o, r). We know the origin of migrants and where they used to reside. The origin country of migrants is not necessarily the new destination of out-migrants. However, origin countries characteristics may affect the decision to outmigrate as they affect the different migration alternatives ando the specific cost of migration for migrants from a specific origin. In annex, we show how we can derive a random utility model (RUM) that is commonly used in the migration literature (Roy, 1951; Borjas, 1987; Grogger & Hanson, 2011) when we do not know the new destination country of migrants. Equation 10 is perfectly consistent with this RUM when we include origin-year fixed effects instead of $X_{o,t}$.

3.1 Data

Migration Outflows

We use the *International Migration Statistics* (OECD, 2013) database. Migration outflows data are provided by nationality of migrants and country of residence. It is available for 24 residence and 167 origin countries between 1990 and 2001. The new destination country of migrants is unknown. We therefore take into account return migration (eg. migration back to the country of origin) and migration flows towards third countries. The data are provided by a continuous reporting system on migration set by the OECD secretariat with the approval of the authorities of member countries. Data are obtained from three major sources: population

registers, residence and/or work permits information delivered by the competent authorities, or estimations from specific survey. Due to the heterogeneity of sources, the comparability of statistics across countries is not guaranteed. Table 1 gives some statistics by country of residence. Migration outflows appear to represent between 2 and 10% of total migrants for most countries, and between 0.1 and 0.8% of the total native population. We will rely only on *within* country variations, through exploiting the temporal dimension of the database. In all our estimates, we will systematically include dyadic fixed effects. These fixed effects will capture permanent cross-country differences in the quality of reporting outflows. By exploiting information provided in the statistical annexes of OECD migration outlooks, we also exclude countries which have changed their methodology in collection of data or have changed their definitions of migrants.

One remaining concern is that the quality of reporting might also change overtime and not at the same rate for all countries. As in Bazillier *et al.* (2016), we propose three alternative ways to assess the quality of data. The first ad-hoc way to proceed is a classification based on the covariation between changes in outflows and changes in inflows of migrants for a reporting country. Migration inflows data are known to be much more reliable that those of outflows. The sign of the co-variation between the two measures is not obvious. A positive correlation may be driven by the fact that a higher number of outmigrants at a time t can be driven by a higher stock of migrants in t (due to an increase in the number of incoming migrants the years before). On the other way, economic cycles determinants will have opposite effects of inflows and outflows inducing a negative correlation. Unemployment for instance is shown to have a negative impact on migration inflows (Beine *et al.*, 2013) but a positive impact on migration outflows (Bazillier *et al.*, 2016). The two measure should co-vary positively (more likely in normal times) or negatively (likely to be the case in bad times). By comparing the changes in the two flows, we were able to identify graphically some apparent connections between inflows and outflows for 10 countries. In appendix we show the results for this subsample of countries and find similar results.

We have also run our regressions on a subsample of countries where the correlation between

Table 1: Descriptive Statistics of Migration Outflows (by country of residence)

Country	Years	Outflows (average)	Min	Max	Outflows (% tot. mig.)	Outflows (% nat. pop.)
Australia	1990-2012	15363	8090	21640		0,8%
Austria	1996-2011	53028	44350	75573	6,7%	0,6%
Belgium	1990-2011	27090	27042	56595	3,9%	0,3%
Denmark	1990-2011	13937	4561	27084	5,1%	0,3%
Estonia	2004-2011	596	444	686	0,3%	0,0%
Finland	1990-2011	2516	938	4496	2,7%	0,0%
Germany	1990-2011	551500	466000	710240	8,0%	0,7%
Greece	2009-2010	31428,5	15732	47125	3,8%	0,3%
Hungary	1991-2010	3677	1928	6047	2,2%	0,8%
Iceland	1999-2011	2364	810	5850	13,8%	0,8%
Ireland	2006-2011	36983	20700	52800	6,1%	0,8%
Italy	1999-2011	15494	7700	32404	0,5%	0,0%
Japan	1990-2011	218494	161129	291970	10,9%	0,2%
Luxembourg	1990-2011	6741	4940	8641	4,1%	1,5%
Netherlands	1990-2011	25397	20397	47612	3,6%	0,2%
New Zealand	1992-2011	178874	10561	26398		0,5%
Norway	1990-2011	13088	8057	22883	6,2%	0,3%
Slovakia	2003-2011	2745	1080	5002	7,5%	0,1%
Slovenia	1998-2010	7034	1643	15071	13,9%	0,4%
Spain	2002-2011	160144	6931	335676	3,0%	0,4%
Sweden	1990-2011	16255	12522	23673	3,2%	0,2%
Switzerland	1990-2011	54438	46320	80373	4,3%	0,8%
United Kingdom	1990-2011	133349	77000	243000	4,9%	0,2%

Source: OECD IMS Database

the two is statistically significant at 5%. Finally, we have also checked the consistency of our results by dropping each country of residence one-by-one in order to ensure thhat our results are not driven by one single country.[4]

Other variables

The total number of stayers at year t ($M_{r,t}^{o,r}$) is proxied by the stock of foreign-born population by the country of birth settled in r and reported at the end of the year t. This data is also provided by the OECD IMS database. To be consistent with the RUM, we checked that it is the number of stayers and not the stock of migrants at the beginning of the period. It is the case, since the number of migrants are registered on 31st of december, or on January 1st of the next year.

The level of income is proxied by the GDP per capital (in constant 2005%, in PPP) provided by the World Development Indicators (WDI, World Bank). We also include the growth rate and unemployment, obtained from the same source.

3.2 Identification and Empirical Strategy

By exploiting the fact that Schengen agreements are implemented in different States and years, we assess their causal impact by contrasting evolution of migration flows in Schengen and non-Schengen States. Specifically, we will estimate differences-in-difference models, using the implementation of Schengen agreements as a quasi-natural experiment. As we focus on one very specific shock in migration policies, it allows us to rule out the measurement problem of migration policies (Gest *et al.*, 2014). Before discussing more in depth the identifying assumption, we will present the Schengen agreements and show why it can be used as a policy shock to estimate the effect of a migration policy liberalization.

Schengen as "quasi-natural experiment"

Schengen agreements were signed in 1985 and supplemented in 1990 by the Schengen convention which proposed the abolition of internal border controls and a common visa policy for people

[4] All these results are available upon request.

from third countries. The Schengen area was created on 26th of March 1995 with 7 countries (Belgium, France, Germany, Luxembourg, Netherlands, Portugal, Spain) and was progressively extended since then. Today, the Schengen Area includes 26 countries.

As a matter of fact, the right to move and the right of residence for all citizens is a fundamental principle of the European Union: *"All Union citizens have the right to enter another Member State by virtue of having an identity card or valid passport. Under no circumstances can an entry or exit visa be required."*[5] For stays of less than three months, the only requirement is that they possess a valid identity document or passport. The right of residence for more than three months remains subject to certain conditions: either be engaged in economic activity (or an employed or self-employed basis), have sufficient resources and insurance, be following vocational training or be a family member of a Union citizen who falls into one of these categories. These conditions are therefore relatively extensive. Moreover, the loss of a job or stop being self-employed, is not a sufficient condition to loose the right of residence. Formally, a person retain the status of worker or self-employed person if (i) she is temporarily unable to work as the result for an illness or accident, (ii) she is in duly recorded as involuntary unemployed after having been employed for more than one year, (iii) she is in duly recorded as involuntary unemployed after completing a fixed-term employment contract of less than a year, of after having become involuntarily unemployed during the first twelve months, (iv) she embarks on vocational training.[6] If a citizen does not fulfill these conditions and is caught by the authorities, she can be invited to leave the country. However, it is explicitly mentioned that the host country cannot impose a ban on entry and the citizen keeps the right to return back at any time and enjoy the right to reside (without any conditions the first three months). Finally, the right of permanent residence in the host member state is guaranteed after a five-year period of residence and this right is no longer subject to any conditions. For all these reasons, we can reasonably assume that migration policies within the European Union are not binding for citizens from EU States.

Nevertheless, the accessing countries after the 2004 enlargement did not enjoy the same

[5] See http://europa.eu/legislation_summaries/justice_freedom_security/free_movement_of_persons_asylum_immigration/l33152_en.htm

[6] See http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004L0038&from=EN

conditions: transitional restrictions were introduced for citizens which are nationals of these new member states. By then, all the EU countries, except the United Kingdom, Ireland and Sweden, had imposed some restrictions. If all restrictions have been abolished by May 2011, it was a serious case where migration policy could be binding within the EU. Furthermore, unless they are part of the Schengen Area, physical borders between EU countries still exist and could impede the movement of people even when they happen to be EU citizens.

As such, Schengen is an agreement related to the free movement of people. The right to residence is guaranteed by EU rules. However, as specified, the exceptions to EU rules are numerous. Our underlying assumption is that the implementation of Schengen is correlated with the abolition to all restrictions to this right of residence. That is why we will focus here on the Schengen area. This area does not include all EU countries. Nevertheless, it also includes non-EU members (Iceland, Norway, Switzerland). These comply with the EU free movement and right to residence rules. However, we will provide robustness checks using the EU integration as a treatment.

Empirical specification

We use the implementation of Schengen agreements as a treatment. We therefore adapt equation 10 to a differences-in-difference framework. The estimation equation will therefore be:

$$\ln M_{out,t}^{o,r} = \ln M_{r,t}^{o,r} + a_{o,t} + \beta_1 X_{r,t} + \beta_2 Schengen_{r,t} + \lambda_t + a_{o,r} + \epsilon_{o,r,t} \tag{11}$$

With $X_{r,t}$ a set of controls of residence country characteristics including the GDP per capital (as a proxy of income levels), GDP growth and unemployment. $a_{o,t}$ are origin-year fixed effects, controlling for all possible destination for migrants from o residing in r. Alternatively, we will also add a set of controls of origin countries characteristics. $Schengen_{r,t}$ takes the value 1 if the country r is member of the Schengen area at time t.

However, the implementation of Schengen is a conditional liberalization of migration policy.

Only migrants coming from another Schengen countries will benefit from the implementation of Schengen in their residence country. That is why we propose a second specification with a triple difference. By adding a dummy variable taking a value of 1 if *both* countries ($Schengen_{o,r,t}$), we can estimate the effects of Schengen implementation on migrants from another Schengen countries. The empirical specification is then:

$$\ln M_{out,t}^{o,r} = \ln M_{r,t}^{o,r} + a_{o,t} + \chi_1 X_{r,t} + \chi_2 Schengen_{r,t} + \chi_3 Schengen_{o,r,t} + \lambda_t + a_{o,r} + \epsilon_{o,r,t} \quad (12)$$

Lastly, we propose to use the *bilateral* adoption of Schengen as a treatment, which allows us to include residence-year fixed effects as well. We then have:

$$\ln M_{out,t}^{o,r} = \ln M_{r,t}^{o,r} + a_{o,t} + a_{r,t} + \delta_1 Schengen_{o,r,t} + \lambda_t + a_{o,r} + \epsilon_{o,r,t} \quad (13)$$

We use Hubert-White Standard errors clustered at the dyadic level. Bertrand *et al.* (2004) have shown that pervasive serial correlation in state level difference-in-difference models may produce downward-biased standard errors. These standard errors clustered at the dyadic level are robust to arbitrary form of error correlation within couples of country (o, r).

Identifying Assumptions and Testing for the Common Trend Hypothesis

For coefficients β_2, χ_2 and δ_1 to capture the causal impact of Schengen on migration outflows, the implementation of Schengen in a given country for a given year has to be exogenous. First it requires that the choice to implement Schengen is not explained by the number of migration outflows, and more generally migration flows. Political scientists have documented the process of freedom of movement liberalization inside Europe. It was seen as fundamental part of the process of European integration and a way to build a European citizenship (Shaw, 1998; Maas,

2005a,b).[7] The level of immigration or emigration has never been seen as a determinant of the implementation of Schengen agreements.

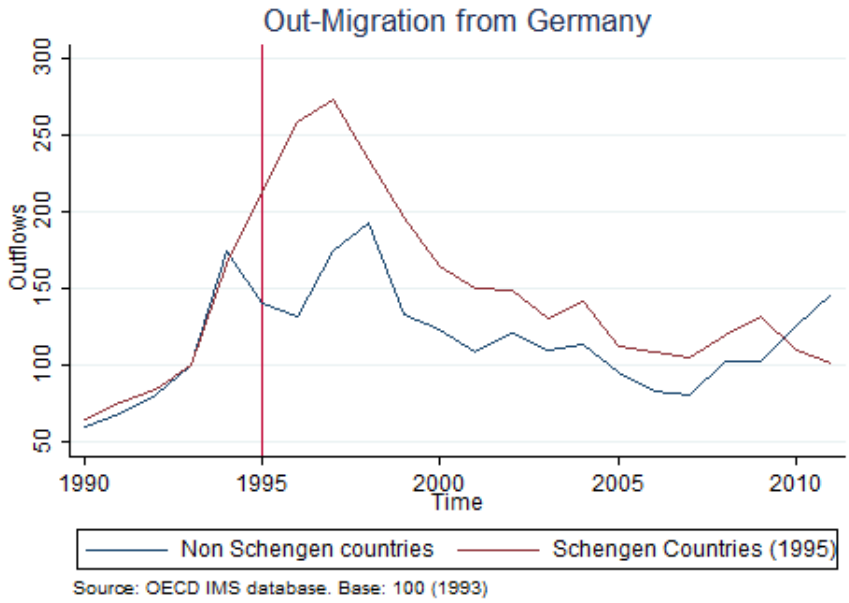
Second, we have to ensure that any coincident factors, occurring the same years than the implementation of Schengen, will not drive our results. Here the timing of the implementation of Schengen in different countries prevents this possibility. Seven countries have implemented it in 1995, one in 1997, one in 2000, five in 2001, nine in 2007, one in 2008. The probability that another policy or event took place exactely the same year in each respective country is almost nil. Our strategy is therefore based on the exploitation of the difference in the timing of implementation which allows us to identify the causal effect.

The identification of a causal link is based on the pre-existence of a common trend between the control and treated groups. We have defined three distinct treatments, with three distinct control groups. As different countries implement Schengen in different year, we cannot only compare the pre-trend evolution of Schengen and Non-Schengen countries. Countries which adopted Schengen prior to 1995 are successively part of the control group and the treated group once they have implemented Schengen. We will show here the evolution of out-migration from selected countries, comparing the evolution for residents from Schengen countries and residents from non-Schengen countries. As we have already highlighted, Schengen is a conditional liberalization of movements of people, depending on the nationality of the migrant (coming from another Schengen countries or not). We show some convincing evidence supporting the common trend assumption. One should also note that the inclusion of additional controls should strengthen the probability to fulfill this assumption, what we will do in our econometric estimates. One additional interest of observing these trends is that it reveals other empirical challenges that we will address also. We show the evolutions for Germany (figure 3), Belgium (figure 4 and 5) and Denmark (figure 6).

As we can see, there is no divergence in trends before the implementation of Schengen (1995 in Germany and Belgium, 2001 in Denmark). Another way to test the common trend assumption

[7] Maas (2005a) quotes the Luxembourg's minister of Foreign Affairs at the time of the signing of Schengen agreements: "*The agreement marked a major step forward on the road toward European Unity, directly benefiting the signatory states, and moving them a step closer to what is sometimes referred to as European citizenship*" (Maas, 2005a, p. 234).

Figure 3: Out-Migration from Germany



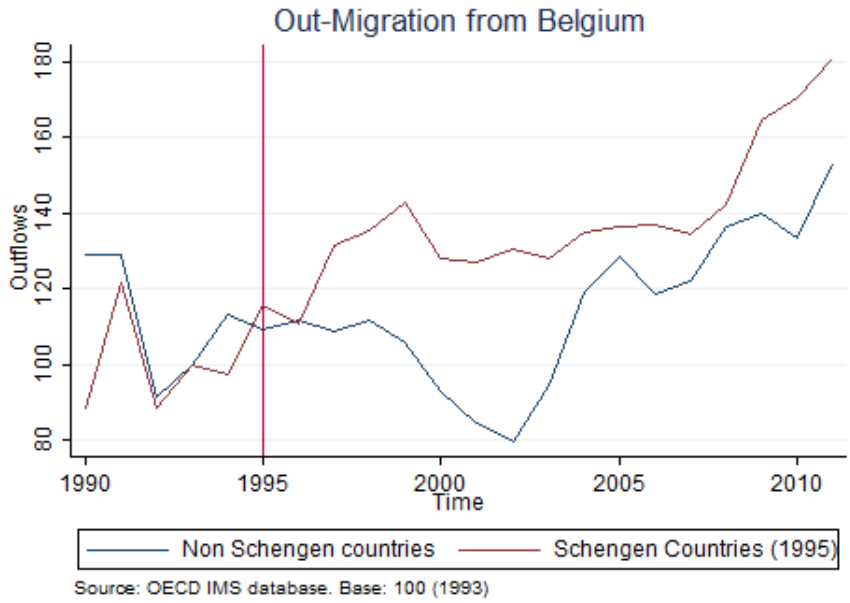
Source: OECD IMS Database

is to run falsification or placebo tests (using years before the real implementation of Schengen). If the effect is driven by a pre-trend evolution, the estimate coefficients (of Schengen prior to the real implementation) should be significant and that will violate this common-trend assumption. We will present the results of these falsification test in the robustness section (see table 4). These results are consistent with the common trend hypothesis.

Additional empirical challenges

The graphical exploration of these trends raise additional challenges that should be tackled in the empirical strategy. As we can see in figure 5, we observe an increase starting in 2004 for migrants from countries that have implemented Schengen in 2007. Basically, those countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia) are also countries which have entered the EU in 2004. As we noticed before, the right to residence and the free movement of people is part of EU regulations, before being a fundamental part of the Schengen acquis. What we are capturing is therefore the effect of EU integration. It highlights

Figure 4: Out-Migration from Belgium

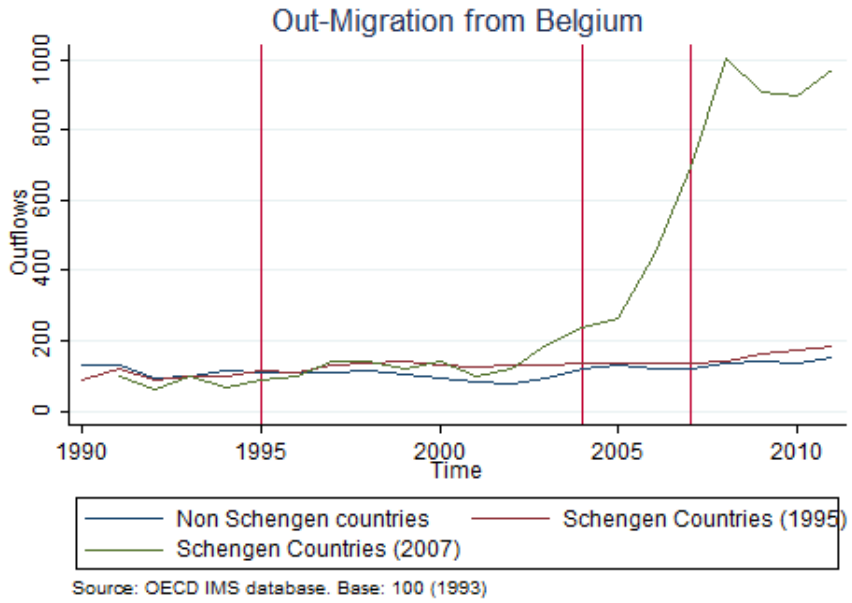


Source: OECD IMS Database

the need to take into account the EU effect in our estimates. Although most member states have imposed restrictions to the right of residence for individuals from those countries, a significant effect on outflows have been observed when they entered in the EU.

The second challenge is the **multilateral resistance applied to migration outflows**. Multilateral resistance implies that any flow between two countries will affect other bilateral flows (Anderson & van Wincoop, 2003; Anderson, 2011). It has received more attention in the literature on migration recently (Bertoli & Fernandez-Huertas Moraga, 2013). The literature shows that any shock in a third country m has an impact on migration flows betwween r and d. In our case, the situation is a bit different as we will observe total emigration rate for migrants by nationality, but we do not observe the new destination country of the migrant. A significant part of these migrations will be return migration. However, a boom in activity of country m will possibly affect the migration from r to o but the flow we will observe is the total emigration for migrants with nationality o from country r to country o and m. The multilateral resistance is

Figure 5: Out-Migration from Belgium



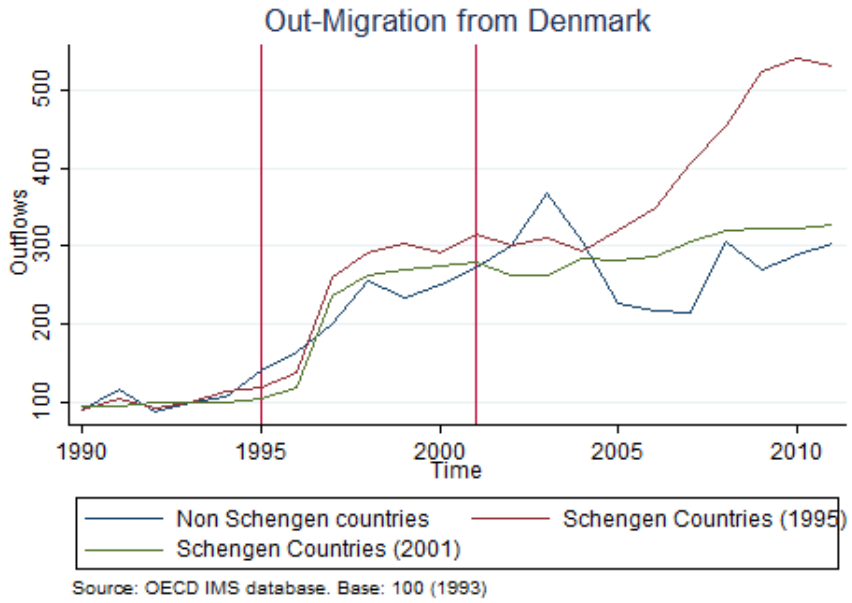
Source: OECD IMS Database

therefore embedded in our data.

If we do not observe the new destination country of migrant, we do observe however the country of origin o. Our data has a bilateral dimension in this respect. Out-migrants from different origins may have different preferences across destinations. The alternative destinations may be different among migrants from different origins, or at least, be weighted differently in their utility function. In the random utility model we use to derive the empirical specification, we allow for differences in the distribution of preferences over destinations for migrants from different origins. We capture unobserved shocks with origin-year fixed effects as well as residence-year fixed effects. This strategy is, to some extent, in the spirit of that set by Ortega & Peri (2013) or Beine *et al.* (2013).[8].

[8]We cannot implement the techniques suggested by Bertoli & Fernandez-Huertas Moraga (2013) due to the structure of our data. We do not observe the new destination of migrants. Also, we have an unbalanced panel and as this method makes use of mean values for each observed year, these means cannot be compared across time as they would not be composed of the same set of country every year.

Figure 6: Out-Migration from Denmark



Source: OECD IMS Database

4 Results

4.1 Baseline results

We first look at the effect of the implementation of Schengen in residence country, estimating equation 11. Results are given in table 2. The effect of Schengen in residence country is positive and significant when controlling for residence and origin covariates. But the effect turns not significant when we include origin/year fixed effects. As a matter of fact, the implementation of Schengen in residence country is not supposed to get an effect for migrants from non-Schengen countries. In case of out-migration, the non-Schengen migrant will face the same probability to re-enter the country. What really matters is therefore the bilateral implementation of Schengen. Schengen can be seen as a *conditionnal* liberalization of migration policies towards other countries. Migrants from third countries may be indirectely impacted as they may migrate towards other Schengen countries if they have a Schengen visa. But according to our estimates, this

latter effect appears to be small.

Implementation of Schengen in country o may be seen as a liberalization of country r migration policy towards individuals from country o. We therefore estimate equation 12 where the coefficient of $Schengen_{o,r}$ in column (3) may be interpreted as triple difference: it is the effect of the implementation of Schengen in country o for migrants from o located in r when country r is already part of Schengen area. The effect is strongly significant and positive.

Table 2: Effect of Schengen Implementation in Residence Country

Dep. Var : $\ln(Outflows)_{r,o}$	(1)	(2)	(3)
$Schengen_r$	0.244*	0.175	0.182
	(1.970)	(1.341)	(1.615)
$Schengen_{o,r}$			0.282***
			(3.662)
$\ln(StockMig)_{o,r}$	0.800***	0.716***	0.780***
	(5.492)	(4.088)	(5.264)
$GdpGrowth_r$	-0.0320*	-0.0283	-0.0322*
	(-1.736)	(-1.272)	(-1.751)
$\ln(GDP)_r$	-2.289	-2.298	-2.208
	(-1.204)	(-1.047)	(-1.158)
$\ln(Unemp)_r$	0.229	0.300	0.223
	(1.133)	(1.290)	(1.091)
$GdpGrowth_o$	0.000292		0.00251
	(0.143)		(1.300)
$\ln(GDP)_o$	0.260*		0.325**
	(1.999)		(2.193)
$\ln(Unemp)_o$	-0.0212		-0.0154
	(-0.650)		(-0.463)
Dyadic FE	YES	YES	YES
Year FE	YES	NO	YES
Origin/Year FE	NO	YES	NO
Res./Year FE	NO	NO	NO
Observations	10,396	15,743	10,396
R-squared	0.947	0.954	0.948

Robust t-statistics in parentheses, clustered at the residence and dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We then estimate equation 13, focusing on the effect of a bilateral implementation of Schengen.

Results are given in table 3. Columns (4) to (6) can be interpreted as a triple-difference, as in equation 12 and the column (3) of the last table. Columns (7) and (8) are a differences-in-difference where the treatment is directely the bilateral implementation of Schengen, which implies that the control group is pairs of countries where at least one is not member of the Schengen area.

Table 3: The Schengen Bilateral Effect

Dep. Var : $\ln(Outflows)_{r,o}$	(4)	(5)	(6)	(7)	(8)
$Schengen_r$	0.0891				
	(0.724)				
$Schengen_o$			-0.0583		
			(-0.820)		
$Schengen_{o,r}$	0.446*	0.515**	0.347***	0.303***	0.441***
	(1.967)	(2.097)	(6.037)	(5.738)	(4.697)
$\ln(StockMig)_{o,r}$	0.705***	0.716***	0.665***	0.665***	0.540***
	(3.970)	(4.297)	(10.85)	(10.82)	(11.69)
$GdpGrowth_r$	-0.0281	-0.0283			
	(-1.267)	(-1.277)			
$\ln(GDP)_r$	-2.216	-2.227			
	(-1.008)	(-1.021)			
$\ln(Unemp)_r$	0.295	0.300			
	(1.260)	(1.309)			
$GdpGrowth_o$			0.00163	0.00171	
			(0.877)	(0.912)	
$\ln(GDP)_o$			0.515***	0.506***	
			(3.194)	(3.107)	
$\ln(Unemp)_o$			0.0174	0.0166	
			(0.396)	(0.380)	
Dyadic FE	YES	YES	YES	YES	YES
Year FE	NO	YES	NO	NO	NO
Origin/Year FE	YES	YES	NO	NO	YES
Res./Year FE	NO	NO	YES	YES	YES
Observations	15,743	15,743	10,396	10,396	15,743
R-squared	0.954	0.954	0.966	0.966	0.972

Robust t-statistics in parentheses, clustered at the residence and dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The effect is strongly positive and significant whatever is the chosen specification. The bilateral implementation of Schengen is increasing the outflows of migrants from other Schengen countries by one-third approximatively. The sign and the magnitude of the effect is consistent with the results of Czaika & Haas (2016) on visa policies. In their study, they argue that there is a relation between travel visa regimes and other immigration restrictions towards particular nationalities and test the implementation of visa restrictions on inflows and outflows of migrants. If the policy experiment is very different in our case[9], it is interesting to see that we obtain comparable result. Note that our result is also robust to the inclusion of unobserved time-varying countries characteristics.

Robustness

Before exploring additional dimensions such as the role of economic cycles or cultural proximity, we propose several robustness checks. First, we propose "Placebo tests" where we test the effect of Schengen before its actual implementation. As we noted in section 3.2, it is also a way to test the validity of our identifying assumption. Results are given in table 4 and brings two main results. First, it appears that the effect is observed the year before the actual implementation of Schengen. This result is not surprising and perfectly consistent with our theoretical predictions. Let's say that the implementation of Schengen is planned on January, 1st of year t. In year $t-1$, migrants can decide to out-migrate. In our theoretical model, they will then observe the nature of the shock in the origin country and in third countries. If bad shocks are observed, they will try to come back to their former residence country. But at the time they will take this decision, Schengen would have been implemented and their probability to come back would have increased. Migrants can take that into account when they will decide to outmigrate in $t-1$. Beyond this effect observed the year before, we can say that these placebo tests strengthen our identification strategy as the Schengen coefficient is not significant from $t-2$ to $t-5$.

In table 5, we test the robustness of our results adding additional covariates at the bilateral

[9]Czaika & Haas (2016) argue that the effect of a restriction of migration policy have not necessarily symmetric effect that a migration policy liberalization.

Table 4: Placebo Tests

Dep. Var : $\ln(Outflows)_{r,o}$	(1)	(2)	(3)	(4)	(5)
$\ln(StockMig)_{o,r}$	0.542***	0.560***	0.549***	0.484***	0.445***
	(11.13)	(10.04)	(8.800)	(7.025)	(5.735)
$Schengen_{o,r,t+1}$	0.419***				
	(4.277)				
$Schengen_{o,r,t+2}$		0.147			
		(1.368)			
$Schengen_{o,r,t+3}$			0.0210		
			(0.170)		
$Schengen_{o,r,t+4}$				0.0559	
				(0.418)	
$Schengen_{o,r,t+5}$					-0.0594
					(-0.374)
Dyadic FE	YES	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES
Res./Year FE	YES	YES	YES	YES	YES
Observations	14,409	12,766	11,435	10,221	9,057
R-squared	0.972	0.971	0.970	0.971	0.973

Robust t-statistics in parentheses, clustered at the dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

level. First, the free movement of people is a fundamental principle of the European Union and we should observe an effect on migration even if the country is not member of the Schengen area. We decided to focus on Schengen agreements because there were not restrictions to the rights of residence within the Schengen area. Furthermore, because of our empirical strategy based on a differences-in-difference approach, the EU variable will only capture the effect in new member states. Nevertheless, as we higlighted in section 3.2, we observe siginificant changes in migration flows following the 2004 enlargement and we would like to test both the specific impact of EU integration and the robustness of our Schengen effect in our estimates. As we can see in column 1, the effect of EU membership is positive and significant but it does not affect the sign and magnitude of the Schengen coefficient. We also test the impact of the monetary union since free mobility is an important condition for fulfilling the criteria of an optimal currency area. The effect is not significant. We then test the impact of trade, through the common membership of a regional trade agreements or the bilateral level of trade. The effect is positive at a 10% level for the regional trade agreements and not significant for the bilateral level of trade. In all cases, the sign and magnitude of our Schengen coefficient is not affected.

Finally, we follow Autor (2003) by controlling for specific trends within each pairs of countries. Results are given in table 6 and show that this dyadic time trend does not affect the significance and magnitude of the Schengen coefficients.

Lastly, we deal with the problem of zeros flows. As we estimate the log of migration outflows, zeros flows are dropped out from the regressions. First, we propose to re-estimate the model using scaled OLS. We transform the dependent variable using $\ln(1+outflows)$ instead of $\ln(outflows)$. Results are perfectly similar. However, the occurrence of zeros might create a bias in the OLS estimates. As proposed by Silva & Tenreyro (2006), we use the Poisson Maximum likelihood estimator and also find comparable results.

Table 5: Controlling for other bilateral covariates

Dep. Var : $\ln(Outflows)_{r,o}$	(1)	(2)	(3)	(4)
$\ln(StockMig)_{o,r}$	0.543***	0.541***	0.433***	0.439***
	(11.74)	(11.69)	(5.383)	(5.428)
$Schengen_{o,r}$	0.425***	0.439***	0.237**	0.230**
	(4.470)	(4.677)	(2.167)	(2.100)
EU	0.210**			
	(2.277)			
EMU		0.0295		
		(0.337)		
RTA			0.156*	
			(1.687)	
$\ln(trade)$			0.000953	
				(0.0489)
Dyadic FE	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES
Res./Year FE	YES	YES	YES	YES
Observations	15,743	15,743	8,737	8,737
R-squared	0.972	0.972	0.972	0.972

Robust t-statistics in parentheses, clustered at the dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Controlling for a specific dyadic trend

Dep. Var : $\ln(Outflows)_{r,o}$	(1)	(2)
$\ln(StockMig)_{o,r}$	0.633***	0.272***
	(20.65)	(3.904)
$Schengen_{o,r}$	0.267**	0.333***
	(1.997)	(2.953)
Dyadic FE	NO	YES
Dyadic FE x Time Trend	YES	YES
Origin/Year FE	YES	YES
Res./Year FE	YES	YES
Observations	15,743	15,743
R-squared	0.970	0.980

Robust t-statistics in parentheses, clustered at the dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.2 Out-migration, migration policies and economic cycles

Economic cycles has been shown to have an effect both on migration inflows (Beine *et al.*, 2013) and migration outflows (Bazillier *et al.*, 2016). Unemployment in residence countries has been shown to have a positive impact on migration outflows while economic growth has a negative impact on the number of outmigrants. Migration policy may affect this effect. Concerning migration inflows, (Mayda, 2010) shows that the push and pull factors are not symmetrical because of the migration policy. In particular, "*positive pull factors are bigger than average for a destination country whose migration policy becomes less restrictive.*" (Mayda 2010, pp 1267-1268). In our theoretical model, migration policy has an effect on migration outflows as it determines the probability to come back in case of negative shocks in the new country of migration. But in case of a negative shock in the *residence* country, migrants will be less likely to out-migrate if they know their probability to come back is low. That is why we would like to interact unemployment and economic growth variable with the Schengen dummy, in order to see whether a liberalization of migration policy amplifies the effect of economic cycles. Results are given in table 7.

We present the results using the bilateral implementation of Schengen as a treatment and we therefore include both origin-year and destination-year fixed effects. The latter is capturing the unconditionnal effect of unemployement on outmigration (which is positive). The interaction term for unemployment is positive and significant at a 10% level, which means that Schengen has reinforced the effect of unemployment on outflows. The effect of Schengen is still positive and significant. However, we do not find significant effect for the interaction term with economic growth.

4.3 The role of cultural proximity

In the theoretical model, one crucial parameter α is the preference for domestic consumption. The higher is this preference, the higher will be the probability to out-migrate, all things being equal. One can reasonably assume that, in average, the preference for domestic consumption

Table 7: Out-Migration, Migration Policies and Economic Cycles

Dep. Var : $\ln(Outflows)_{r,o}$	(1)	(2)
$\ln(StockMig)_{o,r}$	0.541***	0.543***
	(11.66)	(11.73)
$Schengen_{o,r}$	0.441***	0.262*
	(4.572)	(1.894)
$Schengen_{o,r}$ x $GdpGrowth_r$	0.000289	
	(0.0396)	
$Schengen_{o,r}$ x $\ln(Unemp)_r$		0.104*
		(1.717)
Dyadic FE	YES	YES
Origin/Year FE	YES	YES
Res./Year FE	YES	YES
Observations	15,743	15,743
R-squared	0.972	0.972

Robust t-statistics in parentheses, clustered at the dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

will be higher when the cultural proximity between two countries will be lower. The preference for domestic consumption will be higher for an Estonian than for a Belgium living in France, for instance. Culture can be defined as "*a set of customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation*" (Guiso *et al.*, 2006). We propose to use the language proximity as a proxy of cultural proximity. Guiso *et al.* (2009) show the commonality between two languages have a significant and positive effect on bilateral trust and they use this commonality as a proxy of cultural proximity. We will then use different variables provided by Melitz & Toubal (2014).

They build for each pair of countries, three binary variables: common official language, common spoken language and common native language. In addition, they add two measures of language proximity. The first one (LP_1) is based on calculations of linguistic proximities on the Ethnologue classification of language trees between trees, branches and sub-branches. They allow four possibilities: 0 for 2 languages belonging to separate family trees, 0.25 for 2 languages belonging to different branches of the same family tree (English and French for instance), 0.5

for 2 languages belonging to the same branch (English and German), and 0.75 for 2 languages belonging to the same subbranch (German and Dutch). The second one rests on a scoring of similarity between 200 words.

We then propose to interact these five linguistic variables with our Schengen bilateral variable. Results are given in table 8. The coefficient is negative and significant when the Schengen dummy is interacted with the "common spoken language" but not significant for the common official language and and the common native language. This result is understandable as the common spoken language is a better proxy of cultural proximity than the *official* language which is more likely to reflect history. In column (2), the magnitude of the coefficient of Schengen and common spoken language is comparable. The fact to share a common spoken language offsets nearby completely the positive effect of the bilateral implementation of Schengen on migration outflows. Indexes of language proximity are better proxies of cultural proximity. Interestingly, both coefficients are negative and significant. The lower is language proximity, the stronger is the positive effect of the bilateral implementation of Schengen on migration outflows.

4.4 Migration policies and net migration

Lastly, we would like to compare the effect of Schengen on migration inflows and migration outflows. Ideally, what we would like to test is the effect on *net* migration. However, migration inflows and outflows are not directly comparable as the number of outflows is less observable than the number of inflows. Net migration can be positive in official statistics simply because migration outflows are underestimated. As we noted in section 3.1, this measurement issue is not an issue in the previous estimates as soon as this potential bias is not time-varying (as we always include fixed effects in our estimates). However, it is a serious issue to estimate the level of net migration. That is why we propose to test the impact of Schengen on the ratio $\frac{inflows}{outflows}$. We then compare the size of the effect in relative terms. If the estimated coefficient for Schengen is positive, it would mean that the effect is *relatively* stronger for inflows than for outflows. We also estimate the effect on migration inflows. The positive effect of Schengen on migration inflows has already been documented by Beine *et al.* (2013). Our results are given in table 9.

Table 8: The role of cultural proximity

Dep. Var : $\ln(Outflows)_{r,o}$	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(StockMig)_{o,r}$	0.562***	0.558***	0.563***	0.558***	0.557***	0.552***
	(10.99)	(10.92)	(10.99)	(10.92)	(10.89)	(10.81)
$Schengen_{o,r}$	0.415***	0.716***	0.413***	0.726***	0.698***	0.724***
	(4.477)	(4.784)	(4.470)	(4.764)	(4.638)	(4.878)
Com. Off. Language x $Schengen_{o,r}$	-0.0855			0.0400	-0.198	-0.273
	(-0.858)			(0.302)	(-1.230)	(-1.625)
Com. Spoken Language x $Schengen_{o,r}$		-0.693***		-0.719***	-0.395	-0.330
		(-2.964)		(-2.927)	(-1.356)	(-1.209)
Com. Native Language x $Schengen_{o,r}$			-0.227	0.0963	0.124	0.126
			(-0.959)	(0.286)	(0.374)	(0.378)
Language Prox. 1 x $Schengen_{o,r}$					-0.0630**	
					(-2.214)	
Language Prox. 2 x $Schengen_{o,r}$						-0.106***
						(-2.773)
Dyadic FE	YES	YES	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES	YES
Res./Year FE	YES	YES	YES	YES	YES	YES
Observations	14,521	14,521	14,521	14,521	14,478	14,478
R-squared	0.972	0.972	0.972	0.972	0.972	0.972

Robust t-statistics in parentheses, clustered at the dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9: Migration inflows, outflows and inflows/outflows ratio

Dep. Var.	$\ln(Inflows)_{r,o}$	$\ln(Outflows)_{r,o}$	$\ln(\frac{inflows}{outflows})_{r,o}$
lnstockmigbirth	0.803***	0.540***	0.296***
	(22.91)	(11.69)	(5.361)
schengen$_b ilat$	0.250***	0.441***	-0.241***
	(3.929)	(4.697)	(-2.864)
Dyadic FE	YES	YES	YES
Origin/Year FE	YES	YES	YES
Res./Year FE	YES	YES	YES
Observations	22,988	15,743	15,227
R-squared	0.979	0.972	0.868

Robust t-statistics in parentheses, clustered at the dyadic level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Consistently with Beine *et al.* (2013), we find a positive effect of Schengen on migration inflows. The magnitude of the coefficient is nevertheless lower than the one obtained when estimating the determinant of migration outflows. We find a negative coefficient when we estimate the log of the $\frac{outflows}{inflows}$ ratio which indicates that the effect of Schengen is *relatively* stronger for outflows than for inflows. It does not mean that the net effect of a liberalization policy is negative when taking into account the effect on outflows. In their study on the effect of visa policy on migration, Czaika & Haas (2016) show that outflows reduce the effectiveness of visa policies but they do find that a visa removal still have a positive (but much lower) effect on *net migration*. Here, we find that outflows increase relatively more than inflows following the bilateral implementation of Schengen. But the net effect depends on the pre-existing level of inflows and outflows.

5 Concluding Remarks

In this paper we have described the impact of migration policies on the hypothesis that by opening the borders one influence not only on the migration entry flows but the exit flows as well. We have shown how a more permissive policy increases the outward flows. We have proved

how greater stability in all the countries involved can alleviate the migration pressure and bring about a Pareto improvement. This result suggests the opportunity of policies aimed, by way of allocation of funds and political partnerships, at stabilizing the countries with a strong migration tendency, namely at minimizing the frequency with which negative shocks occur, and at the same time increasing the average labor productivity.

The choice of the immigrants to return home answers to the incentives they are met with. This choice is favorably influenced by the probability of being able to re-emigrate should their country of origin be struck by an adverse shock and by the preference for domestic consumption. We have seen that the ones who decide to return home are those for whom the latter is significantly more appreciated than consumption abroad. This differential, summed up by the value of preference for domestic consumption, may be interpreted as the measure of the "distance" (cultural, political, social, environmental and so on) between the immigrant and the local population. Smaller values for the preference of domestic consumption suggest a greater cultural proximity between the immigrant and the host country. The migration policy described, then, reveals itself as selective, insofar as the ones who stay are those culturally closer to the host country.

We have considered a three-country model, and a mass of migrants having the possibility to chose to which country try to move. The main result obtained is that softening migration rules provides an incentive to migrants to move back home. The maximization of the migration outflow, actually, corresponds to a perfect human mobility across countries, as it is the case of the Schengen Treaty. Countries that open simultaneously their frontier to a partner, increases their migration outflow.

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Annex

A A Random Utility Model applied to migration outflows

The income maximization framework which has been widely used to analyze determinants of migration flows. This approach was first introduced by Roy (1951) and Borjas (1987) and was used to analyze the role of wage differentials (Grogger & Hanson, 2011), the role of diaspora (Beine *et al.*, 2011) or the role of "brain drain" (Gibson & McKenzie, 2011). The empirical specification is then very close to a pseudo-gravity model of international migration (Anderson, 2011). It has been adapted to estimate the determinants of outflows (instead of inflows) by Bazillier *et al.* (2016) and we will follow this approach here. The main difference with a traditional random utility model is that we do not observe the new destination of migrants, although we know their country of origin.

The model considers heterogenous migrants. At each period, they have two possible choices: (1) stay in their residence country, (2) migrate to an alternative country of residence (possibly, but not exclusively, their own country of origin). They compare the expected utility from staying to that of moving to an alternative destination and choose the one associated with the highest utility. We note $u^{m,o,r}$ the utility of a migrant m of nationality o residing in r. At this stage, let consider the case of a new migration to a country simply labelled *out*. This outside option can be the own country of origin or any third country. If the migrant decides to stay in r, the utility from living in r at time t is then:

$$u_{r,t}^{m,o,r} = \beta_w \ln w_{r,t} + a_r - ac_{r,t}^{o} + \epsilon_{r,t}^{m,o,r} \tag{14}$$

with $w_{r,t}$ represents the expected wage in country r at time t, a_r is a shifter driven by country r characteristics and $ac_{r,t}^{o}$ represents, for a migrant with nationality o, her adaption cost to the

way of life in country r. This cost reflects psychological or cultural costs explained by the fact of living far from its native country. $\epsilon_{r,t}^{m,o,r}$ is a random unobservable term that might differ across migrants (captures migrant heterogeneity).

If the (m, o, r)-type migrant decides to out-migrate at time t instead, by applying the same reasoning her utility would be,

$$u_{out,t}^{m,o,r} = \beta_w \ln w_{out,t}^{o} + a_{out} - dc_{out,t}^{o,r} - dc_{r,t}^{o} - ac_{out,t}^{o} + \epsilon_{out,t}^{m,o,r} \tag{15}$$

where $w_{out,t}^{o}$ designates the expected wage in this new country. The cost of migrating can be divided in three parts. The first part is linked to the fixed cost of moving, $dc_{out,t}^{o,r}$. It is bared whichever the destination of the out-migrant would be. It includes the cost of travel and new installation for instance. The second part, $dc_{r,t}^{o}$, is specific to migrants from o, residing in r but is not a function of the new country of migration *out*. As shown in the theoretical section, the restrictiveness of migration policy in r is one example of a direct cost that will apply to all migrants from o leaving r, whatever is their new country of destination. $ac_{out,t}^{o}$ are the adaption costs related the migrants' new life. Actually, adaption costs can be observed even when moving back home ($out = o$). It is the case if the migrant needs to re-adapt herself to life at home. However, we assume that this adaption cost will be relatively small, and always smaller to the cost of migration to a third country. This latter assumption is consistent with the sequence developed in our theoretical model where migrants prefer to move to their origin country, all things being equal, before migrating to a third country in case of a negative shock in the origin country.

We assume that the random terms ($\epsilon_{r,t}^{m,o,r}$ and $\epsilon_{out,t}^{m,o,r}$), follow an iid extreme-value distribution. We can therefore apply the result of McFadden (1974) to derive two probabilities: (1) the probability that a migrant from o residing in r decides to stay in r, and (2) the probability that a migrant from o residing in r decides to out-migrate. These are conditional logit-type expressions.

Hence the probability of moving out of the country of residence can be expressed as:

$$
\begin{aligned}
P(out=1) &= \Pr\left[u_{out,t}^{m,o,r} > u_{r,t}^{m,o,r}\right] \\
&= \frac{\exp\left[\ln w_{out,t}^{o} + a_{out} - dc_{out,t}^{o,r} - ac_{out,t}^{o}\right]}{\exp\left[\sum_{k\in(out,r)} \ln w_{k,t} + a_k - dc_{r,k,t} - ac_{o,k,t}\right]}
\end{aligned} \tag{16}
$$

The probability to stay is then its complement to unity as:

$$
P(stay=1) = \Pr\left[u_{o,r,t}^{m,r} > u_{o,r,t}^{m,out}\right] = 1 - P(out=1) \tag{17}
$$

We approximate the probability of moving to another country by the share of movers $(M_{out,t}^{o,r}/Mtotal^{o,r})$, where $M_{out,t}^{o,r}$ expresses the number of setlled migrants in r which originate from o and who choose to move to the *outside* destination during period t, and $Mtotal^{o,r}$ the total stock of o-type migrants settled in r at the *beginning* of period t. The share of stayers can be then immediately obtained through $(M_{r,t}^{o,r}/Mtotal^{o,r}) = 1 - (M_{out,t}^{o,r}/Mtotal^{o,r})$. By dividing the former by the latter share, we obtain the relative share of out-migrating. This corresponds to the relative rate of movers as $\frac{M_{out,t}^{o,r}/Mtotal^{o,r}}{M_{r,t}^{o,r}/Mtotal_{o,r}} = \frac{M_{out,t}^{o,r}}{M_{r,t}^{o,r}} = \frac{P(out=1)}{1-P(out=1)}$: accounting for equations 16 and 17, taking logs and rearranging, we obtain a corresponding equation in logs :

$$
\begin{aligned}
\ln M_{out,t}^{o,r} = \ln M_{r,t}^{o,r} + \ln w_{out,t}^{o} + a_{out} - dc_{out,t}^{o,r} - dc_{r,t}^{o} - ac_{out,t}^{o} \\
- \ln w_{r,t} - a_r + ac_{r,t}^{o}
\end{aligned} \tag{18}
$$

As we do not observe directly the new country of destination, we will include origin-year country fixed effects that will capture $\ln w_{out,t}^{o} + a_{out} - dc_{out,t}^{o,r} - ac_{out,t}^{o}$. We also add a time fixed effect, in order to control for the general dynamic of the World-Wide economy. We then obtain:

$$
\ln M_{out,t}^{o,r} = \ln M_{r,t}^{o,r} + a_{o,t} - dc_{r,t}^{o} - \ln w_{r,t} - a_r + ac_{r,t}^{o} + \lambda_t \tag{19}
$$

Equation 19 can be used to justify the general empirical specification defined in equation 10.