Labor Mobility Agreements and Exit of Migrants: Theory and Evidence from Europe*

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January 31, 2020

Abstract

This paper sets a simple framework to study how freeing labor mobility shapes the movement of out-migrants (those exiting a country where they used to live as a migrants). We then tests it empirically using the case of free mobility agreements in Europe. We set a 3-country theory (i.e. a current country of residence, a country of origin of the migrant and a third country) where heterogenous migrants already settled in a residence country respond to economic and policy incentives making them circulate across these countries. We show how agreements to opening labour markets across these countries, acts as an insurance providing incentives to migrants to circulate across countries, with the possibility given to them to be back. Armed with outmigration data between 1990 and 2011, a period of observaton where some countries entered the EU and especially a period during which Schengen agreements have been progressively implemented by a big number of European countries, we could take some predictions of our set-up to the test. While joining the EU meets the predictions, the estimations do not resist robustness checks. Nevertheless, we show that signing Schengen agreements for the country of origin and more so when the

*The authors acknowledge funding from the Val de Loire Region (MutMonde Project). We would like to thank Simone Bertoli, Ekrame Boubtane, Francesca Busetto, Giulio Codognato, Clara Graziano, Ismael Issifou, Mathilde Maurel, Mouhoub El-Mouhoud, Marcelo Olarreaga, Antoine Parent, Flavio Pressacco, Giuseppe Russo, Marina Shenker, Ariane Tichit and Farid Toubal as well conferences and seminar participants at CEPII (Paris), CERDI (Clermont-Ferrand) , LEO (Orleans) and Rome3 universities for very helpful comments. Any errors are our own.

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country of origin and that residence are part of the same agreement, is (very) robustly associated with an increase in outmigration.

Keywords: Migration Outflows; Migration Policy; Free Mobility; EU; Schengen
JEL Classification: F22; J61; K37; O15

1 Introduction

Regional agreements involving free mobility of labor have been questioned recently, with the rise in votes for anti-migrant, anti-free trade sovereignist parties, in many OECD countries, especially in Europe. The recent votes for Brexit or the 2018-2019 Italian cabinet formed by a coalition of Eurosceptics promising greater control at the borders provide examples.

This paper studies how free labor mobility agreements which are usually thought to be a device for more *inward* migration, might actually create incentives for already settled migrants to fly out to other destinations. They might want to circulate across countries or go back their home country of birth (i.e. origin country). Our paper develops a simple but original theoretical framework, which shows how border openness defined in particular within regional arrangements, changes the incentives for people to circulate across countries. In particular, people from some nationality of origin, already settled in a foreign country of residence, might be more incited to exit the latter if their origin country has signed an agreement of labor mobility with the hosting country or any other third country. The idea is that regional arrangements freeing labor mobility offer an insurance to move back and forth across countries, making people escape more easily bad shocks when they are experienced in the country where they live.

We then take some of the predictions of the framework to the test by taking advantage of a dataset from the OECD on outmigration in the period 1990-2011. Outmigration is a measure of transit migration where individuals who had migrated in the past into one country are now registered to be exiters. Thus, outmigration includes all those who are flying back to their home land (i.e. return migration) as well as those moving to other foreign destinations. During this period, some countries from Northern and Eastern Europe have entered the European Union, and Schengen agreements were implemented progressivly by most of the EU countries. For reasons explained in details in the paper, EU and more particularly, Schengen agreements constitute a quasi-natural experiment to test our predictions.

There is some literature on outmigration and especially return migration based on non-political factors. By studying return migration, Dustmann (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.[1] Bazillier *et al.* (2017) observe how the economic fluctuations of a short period produce, in terms of exit flow, the same qualitative effects as restrictive policies in recessionary periods. Borjas & Bratsberg (1996) 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.

There are also studies on the effect of migration policies on migration outflows and/or return migration. 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. 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. Besides their expected impact on inflows, they show that restrictive visa policies are reducing the number of outflows too. Thus, the impact on *net* entry appears not to be as big as one might expect.

Papers on transit migrations are scarce, however. Artuc & Ozden (2018) is recent one which discusses in details the importance of transit migration [2]. The authors explain transit migration with a dynamic model of global migration that allows transit migration opportunities to impact the attractiveness of locations. Their model indeed is dynamic and accounts for repeated and sequential migration; in particular, the attractiveness of a given country does not reflect uniquely

[1] 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.

[2] Another paper from Kennan & Walker (2011), covers optimal sequences of location decisions and tests how expected income can be a key variable to help understanding why people circulate across locations overtime.

the relatively higher income level or amenities but includes also the option value of alternative destinations available for future mobility decisions. In Artuc and Ozden (2018) agents, at a given point in time, are characterized on the ground of their current location, on their birth country and on their skill category and their utility depends on these factors in addition to a stochastic country-specific moving cost. Within the dynamic programming methodology which entails the use of the Bellman equation, Artuc and Ozden (2018) assume that the value for a migrant of a given birth country and of a given skill level settled at present in a given location can be decomposed into the current instantaneous utility of staying in this location, into the discounted expected next period utility of remaining in the same location and into the option value of the location, i.e. the access it allows to other destination countries. On the ground of their theoretical model, in the sequel, Artuc and Ozden perform numerical simulations aimed at highlighting the importance of migration corridors for immigration to the US. Our model differs from Artuc & Ozden (2018) in several aspects. First, although we assume repeated and circular migration decisions too, we restrict such movements to a single period which is split into a discrete number of sub-periods in each of which migrants decide whether or not to move to another country. In other words, we do not make use of dynamic programming methods but deal with a finite decision tree. Second, we do not take explicitly into account moving costs but they are implicitly embedded into the (exogenous) degree of restrictiveness of the migration policy of each country under study. Such a hypothesis, jointly with the assumption of a heterogeneous consumption bias across countries and migrants discussed in what follows, allows us to establish precisely the functional relationship arising between the migration policies implemented by each country and the entry and exit migration flows. Eventually, the simple linear specification for instantaneous utilities makes it simpler to perform comparative statics in terms of the reactiveness of exit flows with respect to tighter migration policies and, as a consequence, to easier test the model.

Thus, our paper is linked to strand of literature mentioned above. It focuses however, in theory and empirics, on the shock of regional agreements involving free mobility of labor on outmigration flows and more broadly on circulation of people across countries. Ortega & Peri (2013) and Beine *et al.* (2019) test the impact of Schengen agreements but these authors look at

how these agreements among other determinants of migration are shaping the entry of migrants, not outmigration (or transition migration) *per se*. Concerning the effect of migration policies on migration *inflows* (in addition to the effect of Schengen), Ortega and Peri (2013) test the effects of Maastricht Treaty and the "tightness of entry laws". Besides, Beine *et al.* (2019) introduce a variable capturing other mobility agreements (such as the Australian / New Zealand free mobility one).

In the theory part of the paper, we begin by setting-up a simple but rather original theoretical framework involving 3 countries: a country of residence of some already settled migrants, their country of origin and a third country. One important aspect of our theoretical set-up is that each migrant has the option to circulate between those countries, a consideration that is not accounted for by standard models of migration, like random utility models. Our migrant internalizes the idea of the possibility of moving back and forth across destinations in his expected utility-function: for instance, he expects to return home (birth country) but he also internalizes the fact that 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 form some nationality has an expected utility to exit a country of residence 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 set-up has also a second originality: we assume that migrants are heterogenous in their relative preferences for consumption in their country of origin (i.e. we shall call it 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.

As it will be shown in the theory, opening the borders plays a role of insurance coverage against

the instability affecting the country of origin. One could think of instability as to be characterized by weak and unstable politico-economic structures, a high exposure to environmental risks, or a country frequently shaken by the tremors of war which results in low expected income. Importantly, our set-up shows that the more permissive the policy migrations are in the hosting country the larger the number of migrants who will choose to circulate across countries (i.e. move out, while keeping in mind that they could choose to be back). In other words, softening migration rules against one nationality in a residence country increases the outward flows of that nationality in view of a possible return. Further, our set-up shows that exits are actually maximized when free circulation of persons is guaranteed through multilateral/regional openness (i.e.when all 3 countries open-up their frontiers to each another).

In order to confront our model to the data we need two series of observations. The first concerns outflows (exits of previously settled migrants). These need to be observed on a bilateral basis (by country of residence and by nationality, i.e. country of origin). One needs to be aware here that what is critical to have is not the country of destination of the movers but their nationality because border policies related to migration are, in general, nationality-specific. Recently, the OECD has made available outflows of migrants data for some OECD countries over the period 1990-2011, recorded by country of departure (residence) and nationality.

Secondly, in order to test our theory predictions, we need some information that could distinctively describe a change in the border policy of some country favouring the access of migrants of some other identified nationality, during the same period 1990-2011. Here, we consider EU entry during the period and the implementation of the Schengen agreements to be two such policies. Precisely, we exploit the differences in the timing of entry into EU and the differences in timing of implementation of Schengen agreements across European countries which we then consider to constitute "quasi-natural experiments" to test for the influence of changes in border policies on outward migration. As discussed in the paper, EU entry implies in theory the abolition of migration restrictions. In practice however, physical barriers remain and in some EU countries the right to work related to Eastern European nationals does not automatically apply as their country joins the Union. The implementation of Schengen agreements frees up more labour in

Europe by going one step further: not only they imply the abolition of internal borders on the top of EU rules, but also offer free and effective access policies to migrants without any exception of nationality.

While we find some evidence that joining the EU in the 1990s and the years 2000s produces more outmigration for EU nationals, the evidence does not resist robustness checks, for reasons that will be discussed in the heart of the paper. In particular, one reason for not obtaining robust results on EU entry might be due to the period under study. In fact most countries entered the Union before the 1990s, which made our identification to be based only on the last countries to enter (mainly from Eastern Europe). But when looking at the impact of Schengen agreements, where restrictions on labour movements where completely removed *de facto*, we show that the bilateral implementation of these agreements has a strong, positive and very robust impact on migration outflows, increasing outflows by 30 to as much as 50%.

The paper is structured as followed. The next section (section 2) presents our simple theory set-up. Section 3 describes the data for the tests while section 4 takes some of the theory predictions to the test. The last section concludes.

2 The Model

In this section we develop a microfunded model that explains how border and migration policies on entry taken by a given country can actually affect exit decisions formulated by previously settled migrants in that country. We also examine how border polices undertaken by other third countries might incidently influence the choice of the same migrants too. We first describe the migrants' behavior and the choices they are faced with. Then we present the political consequences, in terms of migration outflows, of implementing specific migration policies. The predictions of this model will be taken to the test in the upcoming sections.

2.1 Migrants

We consider a one-period, three-country set-up with a country R, a country O and a third country W. At the beginning of the period there is a stock M of migrants belonging to a common and given nationality O and who are settled in the residence country R. Each migrant faces then the choice of whether or not to exit R. The migrant formulates this choice at the beginning of the period by comparing the utility that he gets from staying in R with the expected utility obtained from exiting. As it will be made clearer below, we assume that if a migrant decides to exit he would not only consider going to one particular country (say, his country of origin O) and stay there for the rest of his life. Instead, – and this is an originality in our set-up– we consider that our migrant follows a pathway where home could only be an intermediary and thus temporary destination. He will actually internalize the fact that if he experiences a bad shock at home, he could decide leaving home to another destination, say W and then from there, he could also opt for heading back again to the country where he was residing in the beginning of our period, country R. Hence, we consider that our migrant's expected utility from exiting R is actually a pathway-expected utility (or a circular migration-expected utility): it depends on a path of nested predictions of all possible outcomes that he could experience in the rest of the period, had he decided to leave. Besides formulating expectations about the state of nature in each destination affecting his utility there, our migrant internalizes in his pathway-utility function the fact that an entry into W or the possibility to reach back R again cannot be met with certainty, if there are borders and other migration policy restrictions in these countries that might prevent him to do so. All of these factors affecting the migrant's choice to leave R would be characterized in details in what follows.

But before stating clearly this pathway-expected utility function related to the exit of our migrant and comparing it with the utility from staying in R, we begin by developing the set of utilities he or she will obtain under each case (in each destination and under each state of nature).

2.2 Expected utilities *in* each destination

In each of the alternative destinations, 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.

Destination R

In country R, we shall assume that 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:

$$u(c_R) = c_R = k_R.$$

$u(c_R)$ is the benchmark utility, the one the migrant would always compare to the pathway-expected utility from moving out and that will be shown in the sequel.

Destination O or return migration

In the home country O. we consider that the migrant faces *uncertainty*. We assume the migrant to have 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 1 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 relative preference for domestic consumption reflected by the parameter $\alpha \geq 0$, which measures the marginal utility of consumption in O (compared to R). As a matter of fact, the utility function in O of a migrant with a relative preference for domestic consumption α is:

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

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 the migrants are distributed in the interval $[\alpha_{\min}, \alpha_{\max}]$ where:

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

and :

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

In view of these definitions, one has that all migrants with $\alpha > \alpha_{\min}$ choose to remain in O, if the good state of nature is realized in O . On the other hand, all migrants with $\alpha < \alpha_{\max}$ will immediately express a willingness to move to another country (W or R) if the adverse shock occurs in O, as it will become clearer below.

Destination W

In case the migrant is settled ***in country*** 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:

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

Ranking utilities across destinations

In order to simplify the model but without any loss of generality, we assume from here that $\gamma'(\alpha) < 0$ and $\left|\frac{\gamma'(\alpha)\alpha}{\gamma(\alpha)}\right| < 1$.[3] The hypothesis of an elasticity of the function $\gamma(\alpha)$ 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.

After having introduced the scaling preference $\gamma\left(\alpha\right)$, we make the hypothesis that the migrant with the lowest home bias $\alpha_{\min}$, in the case of the realization of the good shock in both the O-country and in the W-country, is indifferent with respect to which country to settle in, i.e.

$$\alpha_{\min} k_O^H = \gamma\left(\alpha_{\min}\right)\alpha_{\min} k_W^H = k_R.$$

In view of the assumptions on the behavior of the scaling function $\gamma\left(\alpha\right)$, one immediately verifies that for all $\alpha > \alpha_{\min}$, the following inequalities do hold:

$$\alpha k_O^H > \gamma\left(\alpha\right)\alpha k_W^H > k_R \tag{5}$$

Therefore, in the case of the occurrence of the good shock everywhere, any migrant with $\alpha > \alpha_{\min}$ will rank, in term of utility, first country O, then country W and, last, country R. The individual $\alpha_{\min}$ will conversely be indifferent between these three destinations.

In an analogous way, we assume that the migrant with the largest home bias $\alpha_{\max}$, in the case of the realization of the bad shock both in the O-country and in the W-country, is indifferent

[3] We have considered this simplification to reduce the strategy set of the migrant when taking his decision to exit or not country R. Had we had considered a more general function γ we would have enlarged the number of strategies of the migrant to circulate across the three countries but to obtain at the end, exactly the same predictions about the role played by migration policies in R (and third countries W) on the willingness or not to exit of people from nationality O.

which country to settle in, i.e.

$$\alpha_{\max} k_O^L = \gamma(\alpha_{\max})\, \alpha_{\max} k_W^L = k_R.$$

Again in view of the properties of the scaling function $\gamma(\alpha)$, one easily sees that any migrant with $\alpha < \alpha_{\max}$ will rank, in term of utility, first country R, then country W and, last, country O. The following inequalities are indeed satisfied for all $\alpha < \alpha_{\max}$:

$$\alpha k_O^L < \gamma(\alpha)\, \alpha k_W^L < k_R \tag{6}$$

Of course, the individual $\alpha_{\max}$ will be indifferent which country to settle in the case the bad shock were to occur everywhere.

Notice that under such all these inequalities, for all migrants, in the case they decide to leave country R, the dominant strategy is first to move to O, then, were here the bad to occur, to W and eventually, were here also the bad shock to realize, to return back to R.

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

2.3 Pathway-Expected Utility and the Decision to Migrate

Now, our migrants know that if they leave R the only certainty they have is that they can go back home freely. In contrast, entering country W or choosing to return again to R after a while, might be restricted by some border policies. So we shall consider from here that our migrants will be facing a known probability $p_{OR} \in [0,1]$ of succeeding in re-migrating from O to R and a probability $p_{OW} \in [0,1]$ of succeeding in moving from O to W; p_{OR} and p_{OW} 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.

Armed with the expected payoffs associated with residing in different countries and the probabilities of entry, we now proceed to respond to our questions: when to decide to leave R? and

having decided to leave, where should migrants go, while internalizing all uncertainties regarding the state of activities and border policies in each of the possible destinations?

We begin by responding to the latter question before treating the former. Thus, having decided to move, one can easily show that migrants will always choose O over W, in their first move. In such case in fact, a strategy of going from R to O and then move from there to W (in case of a bad shock experienced in O) will always dominate a strategy where the migrant decides to reach W instantly from his first move (i.e. from R). The reason is that a migration policy set by W at its entry, is nationality-specific. It would be as much as restrictive for an O-national migrant when coming directly from R or, indirectly, when going through O and then reaching W. In contrast, there are no barriers to entry for an O-migrant who wishes to go back home, i.e country O.

So our migrant first best, if he has decided to leave is then to head back to his country of origin O. Now, while settled in O, and in the light of inequalities (5) and (6), if it is the good shock to occur, he will then 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_{OR} is invariant whatever is the country of provenance 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:

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

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_{OW}. In such a case, he will get an utility $\gamma(\alpha).\alpha k_W^H$ 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_{OR} with the corresponding utility k_R. If he does not succeed, with a probability $(1-p_{OR})$, he will remain in W and get the utility $\gamma(\alpha).\alpha k_W^L$. 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_{OR} (and a payoff k_R) and with a probability $(1-p_{OR})$ 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:

$$u^e > k_R$$

.

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:

$$\begin{aligned} & \alpha\left[q_O k_O^H + (1-q_O)\left(p_{OW} q_W \gamma(\alpha) k_W^H + (1-q_W)(1-p_{OR})\gamma(\alpha) k_W^L\right) + (1-q_O)(1-p_{OW})(1-p_{OR}) k_O^L\right] \\ > \quad & k_R\left[1-(1-q_O)\left((1-q_W)p_{OR} + (1-p_{OW})p_{OR}\right)\right] \end{aligned} \tag{8}$$

i.e.

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

Notice that the left-hand side of (9) is, under the hypothesis $\left|\frac{\gamma'(\alpha)\alpha}{\gamma(\alpha)}\right| < 1$, increasing in α; therefore there exists an α_M such that the left-hand side of (9) equalizes the right-hand side and such that for any $\alpha > \alpha_M$ one has that the left-hand side of (9) is larger that the corresponding right-hand side. With respect to (9), this implies that the function $\alpha^*(\alpha)$ is increasing and concave with, in view of the definitions of $\alpha_{\min}$ and $\alpha_{\max}$, $\alpha_{\min} < \alpha^*(\alpha_{\min})$ and $\alpha_{\max} > \alpha^*(\alpha_{\max})$. This implies that there exists a unique α_M that belongs to $(\alpha_{\min}, \alpha_{\max})$ such that $\alpha_M = \alpha^*(\alpha_M)$, such that for $\alpha < \alpha_M$ one has $\alpha < \alpha^*(\alpha)$ and such that for $\alpha > \alpha_M$ one has $\alpha > \alpha^*(\alpha)$. It follows that for any $\alpha > \alpha_M$, the expected utility for the corresponding migrant is larger if it chose to leave the resident country R. This implies that all migrants $\alpha > \alpha_M$ will choose to leave country R.

The number of migrants who will leave country R can be then computed according to $f(\alpha)$, the density function of α, on the interval $[\alpha_M; \alpha_{max}]$:

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

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_{OR} and p_{OW} 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 $p_{OR} = 1$, all migrants $\alpha \geq \alpha_{\min}$ will decide to leave R; however, for a given $p_{OR} < 1$, the critical preference for domestic consumption α_M is monotonically decreasing in p_{OW}. It follows that the pair of migration policies $p_{OR} = 1$ and $p_{OW} = 1$ 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.

2.4 Comparative Statics

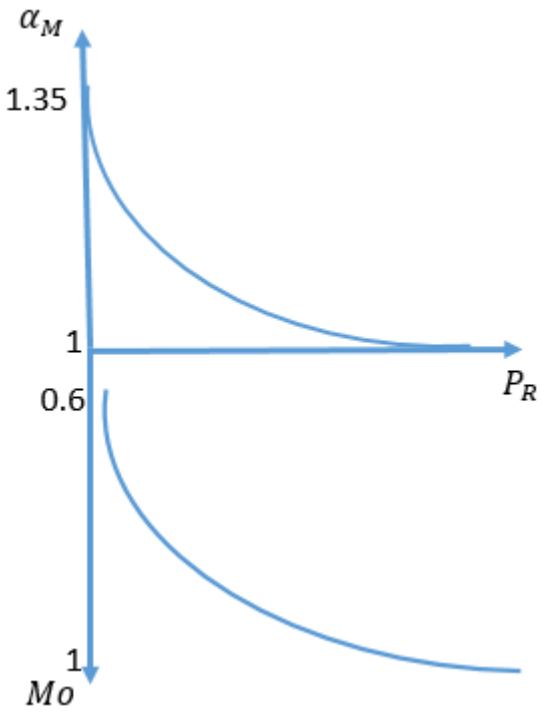
2.4.1 Relation between p_{OR}, α_M and M

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_{OR}, having fixed p_{OW}, and eventually of p_{OW}, after having calibrated p_{OR}. 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_{OW}, the graphic depicting α_M as a function of p_{OR} 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_{OR}. The same is true once one let p_{OW} vary for each different value of p_{OR}: by increasing p_{OR}, the graphic depicting α_M as a function of p_{OW} shifts then downward. Once we have depicted the relationship between α_M and the migration policies p_{OR} and p_{OW}, we draw the corresponding graphic of the migration outflow M as a function of these 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.[4]

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

Figure 1: Probability of entering a country p_{OR}, critical home bias α_M and Migration Outflows M



Notice that the above function is decreasing, since a higher probability p_{OR} of a successful reinstallation in country R pushes immigrants to leave such a country and try to take advantage of the realization of the good shock in O. In addition, for $p_{OR} = 1$, 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,

[4] $k_R = 1, k_O^H = 1, k_O^L = 0, k_W^H = 1, k_W^L = 0, \gamma = 1, q_O = 1/2, q_W = 1/2, p_{OW} = 0.2$

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: $2 - \frac{(1-(p_{OR}\times 0.5).(1-0.2\times 0.5))}{0.5+0.5\times(0.2\times 0.5)}$ whose graphic, setting in the abscissa the probability p_{OR} 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: 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.

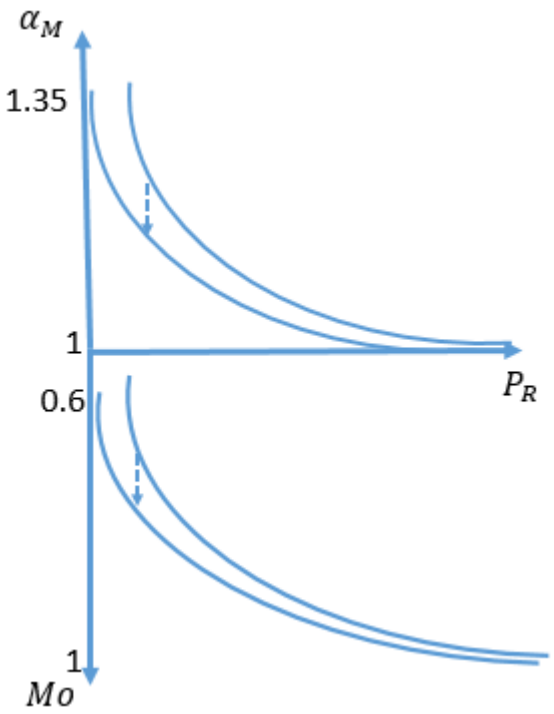
2.4.2 Effects of a multilateral liberalization

If we keep the same calibration as before, with the exception of p_{OW} 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_{OR} (appearing in the abscissa): $\frac{1\times(1-(p_{OR}\times 0.5).(1-0.9\times 0.5))}{0.5+0.5\times(0.9\times 0.5)}$. It is easily appreciable that the function $\alpha_M(p_{OR})$ 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_{OR}, 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_{OR} is now lighter, since the reward of leaving country R is already large in view of the high p_{OW}. Actually, when $p_{OR} = 1$ ($p_{OW} = 1$), the migration policy p_{OW} (p_{OR}) 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: $2-\left(\frac{1\times(1-(p_{OR}\times 0.5).(1-0.9\times 0.5))}{0.5+0.5\times(0.9\times 0.5)}\right)$.

Figure 2 summarizes these findings by showing the effect of an increase in P_{OW} on α_M and M.

Figure 2: Sensitivity of α_M and M with respect to p_{OR}



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_{OR} implemented by country R, the migration outflow will be more important.

3 From theory to data: the experiences of EU accession and Schengen agreements

Our model offers some interesting predictions. In particular, it suggests that, *ceteris paribus*, outflows of O-nationals from R will increase with (i) an increase in the openness of frontiers towards O-people (via p_{OR} and p_{OW}), (ii) a low economic activity in the residence country and (iii) a more stable and a high economic activity in the rest of world, including the origin country. In this paper we focus on testing prediction (i), while controlling for the rest.

Hence, in order to look at the impact of border policies on out-migration, one needs two types of data. The first concerns outflows (exits of previously settled migrants), to be observed on bilateral basis (by country of residence and by nationality, i.e. country of origin). The second type of observables however, has to inform about the extent of border policies (i.e. ease of access into hosting countries).

3.1 Data

Migration Outflows

As already mentioned, migration outflows need to be observed on bilateral basis (by country of residence and by nationality, i.e. country of origin). The *International Migration Statistics* database from the OECD provides such information[5]. Migration outflows data are provided by 26 countries of residence from the OECD which register exiters by their corresponding nationality (i.e. 167 nationalities being registered), and for a period running between 1990 and up-till 2011, in general[6]. The new destination country of migrants is unknown (not reported), which is to say that they might have been going back to their country of origin or they might have been moving out to reside in a third country. One needs to be aware however, that what is critical to have for our test is not the country of destination of the movers *per se* but more crucially their nationality

[5] via https://stats.oecd.org/

[6] For most of the reporting countries, 2010 and 2011 were the last years of observations delivered to OECD by the time we conducted our study. See table 1.

because we want to link these data to border policies data that are usually nationality-specific.

Depending on the reporting country to the OECD, the data are collected through three major sources: population registers, residence and/or work permits information delivered by the competent authorities, and estimations from specific surveys. Due to the heterogeneity of these sources, the comparability of the statistics across countries is not guaranteed. In a recent paper, we discuss more thoroughly these statistics (see Bazillier, Magris and Mirza, 2017). However, as we run fixed effects panel regressions (see next section for more details), we rely by construction on *within* country variations, through the exploitation of the temporal dimension of the database. In practice, in all our estimations we have systematically accounted for country of residence specific effects.[7] Accounting for fixed effects allows to capture permanent cross-country differences in the quality of reporting outflows. However, within-reporters, the quality of reporting might also change over time. We account for this by including in some of our preferred regressions (residence $\times$ time) fixed effects. Finally, we have also excluded the Czech Republic, Korea and Portugal from our panel of residence countries, as these countries appear to have changed their methodology in collecting their data or have changed their definitions of migrants during the period.[8] Table 1 offers some statistics for the 23 countries of reporters (residence countries) which have been kept in our data sample. Migration outflows appear to represent between 2 and 10% of total settled migrants in most countries, and between 0.1 and 0.8% of the total native population.

[7] We have run a series of regressions while including country of residence fixed effects and country of origin effects or through the inclusion of pair of countries effects (country of residence $\times$ country origin effects). For space availability we mainly show regressions with pair of countries effects in the tables. More tables can be provided upon request.

[8] The information is provided in the statistical annexes of OECD migration outlooks. In Bazillier *et al.* (2017), we further assess the quality of outmigration data by looking at the co-variation between the changes in migrant outflows and inflows for a reporting country, where the inflow data are known to be much more reliable than outflows data. By comparing the changes in the two flows, we were able to graphically identify some apparent connections between the two types of data for at least 50% of residence countries. Econometric results were similar when focusing only on these countries.

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

Table 2: European countries data availability by the time of entry dates into EU and Schengen

	Availability of outmigration data as:		Entry date into:		Switch within period[(a)]:			
Country	Residence	Origin	EU	Schengen	EU_r	EU_o	$Schengen_r$	$Schengen_o$
Austria	1996-2011	1990	1995	1998	NO	YES	YES	YES
Belgium	1990-2011	1990	1957	1995	NO	NO	YES	YES
Bulgaria	NA	1992	2007	NA	NO	YES	NO	NO
Croatia	NA	1992	2013	NA	NO	NO	NO	NO
Cyprus	NA	1991	2004	NA	NO	YES	NO	NO
Czech Republic	NA	1995	2004	NA	NO	YES	NO	NO
Denmark	1990-2011	1990	1973	2001	NO	NO	YES	YES
Estonia	2004-2011	1992	2004	2008	NO	YES	YES	YES
Finland	1990-2011	1990	1995	2001	YES	YES	YES	YES
France	NA	1990	1957	1995	NO	NO	NO	YES
Germany	1990-2011	1990	1957	1995	NO	NO	YES	YES
Greece	2009-2010	1990	1981	1998	NO	NO	NO	YES
Hungary	1991-2010	1990	2004	2008	YES	YES	YES	YES
Iceland	1999-2011	1990	NO	2001	NO	NO	YES	YES
Ireland	2006-2011	1990	1973	NO	NO	NO	NO	NO
Italy	1999-2011	1990	1957	1998	NO	NO	NO	YES
Latvia	NA	1995	2004	2007	NO	YES	NO	YES
Lithuania	NA	1995	2004	2007	NO	YES	NO	YES
Luxembourg	1990-2011	1995	1957	1995	NO	NO	NO	NO
Malta	NA	1995	2004	2007	NO	YES	NO	YES
Netherlands	1990-2011	1990	1957	1995	NO	NO	YES	YES
Norway	1990-2011	1990	NO	2001	NO	NO	YES	YES
Poland	NA	1990	2004	2007	NO	YES	NO	YES
Portugal	NA	1990	1986	1995	NO	NO	NO	YES
Romania	NA	1990	2007	NA	NO	YES	NO	NO
Slovakia	2003-2011	1995	2004	2008	YES	YES	YES	YES
Slovenia	1998-2010	1992	2004	2008	YES	YES	YES	YES
Spain	2002-2011	1990	1986	1995	NO	NO	NO	YES
Sweden	1990-2011	1990	1995	2001	YES	YES	YES	YES
Switzerland	1990-2011	1990	NO	2008	NO	NO	YES	YES
United Kingdom	1990-2011	1990	1973	NO	NO	NO	NO	NO

Note: (a) The "Switch within period" columns indicate whether or not the countries switch from a status of non-EU to EU and, trepectively, from a status of being non-Schengen to Schengen joiners. The countries might be observed as countries of residence (indexed by r) or countries of origin of outmigrants (indexed by o).

3.2 EU and Schengen as border policies: a quasi-natural experiment

The second type of information needed to test our theory prediction must be directly related to some data that could distinctively describe a change in the border policies of residence countries, during the same period 1995-2011. Here, we consider (1) the date of entry into the EU and (2) Schengen ratification dates, to offer two distinctive institutional changes in border policies. Precisely, we exploit the differences in the timing of EU integration and implementation of Schengen of European countries as a sort of "natural experiments" to test for the influence of changes in border policies on outward migration.[9]

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."*[10] EU integration thus requires the full abolition of migration restrictions for all EU citizens inside the EU. 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 that we shall show not to be really constraining.

In fact, the right is given either if one is engaged in economic activity (on an employed or self-employed basis), have sufficient resources and insurance and he or she to be following a vocational

[9] As an illustration, we show the dynamics of out-migration from three countries (Germany, Belgium and Denmark) for respectively Schengen and non-Schengen countries in annex A. For Germany, we observe an increase, after the implementation of Schengen in 1995, of out-migration of individuals from other Schengen countries compared to individuals from non Schengen-countries. We observe a similar pattern for Belgium. Also for Belgium, when looking at the out-migration of individuals from countries that have joined Schengen in 2007 (which are countries that entered into the EU in 2004), we observe a jump of out-migration in 2004 already (when origin countries entered into the EU). The last example is Denmark which entered into Schengen in 2001. In that case, we do not observe clear dynamics for individuals from other Schengen countries. We observe an increase in out-migration of individuals from countries that entered into Schengen in 1995 after 2005, which is likely to be observed by other factors that cannot be observed in this graph but that we will control for in the econometric analysis. As we can see, these illustrative examples show that there is variation over time of out-migration flows that *might* be related to policy changes in residence or in origin countries. Nevertheless, it is very difficult to disentangle potential effects of, respectively EU, Schengen, in origin, or in residence countries. Our empirical strategy aims at identifying such effects by controlling carefully by all factors that might explain out-migration.

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

training or simply be a family member of a Union citizen who falls into one of these categories. Moreover, the loss of a job or ceasing to be self-employed, is not a sufficient condition to loose the right of residence. Formally, a person conserves the status of worker or self-employed person if (i) she is temporarily unable to work as a result of 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.[11] If a citizen does not fulfill these conditions and is caught by the authorities, she can only then 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.

All in all, we can reasonably assume that when a country enters the European union, it opens, in theory, almost-completely its borders to all people who belong to the Union. In practice however, not all EU citizens benefit complete access as their country joins the Union. In fact, although over half of the EU countries including England or Sweden provided full access to Eastern European citizens after the integration of their countries, other EU economies like France continued to restrict their labour market to Eastern European migrants at least 2 years after their country joined, before freeing up progressively their market few years later. [12]

Between 1990 and 2011, our period of interest, table 2 shows that three waves of countries in three distinctive dates have joined the EU. In 1995, Austria, Finland and Sweden joined, followed in 2004 by Cyprus, Malta and a first group of Eastern European Countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia). Finally, in 2007 a second (smaller) group of Eastern European Countries could enter the EU (Bulgaria and Romania). When confronting these dates with those where we observe data on outmigration

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

[12] see European Integration Consortium report (2009).

however, one could see from table 2 that our test concerning EU entry is mostly based on the entry of Eastern (and East Mediterranean) European countries by 2004 and 2007. In the data, these appear to be in particular the countries of origin of outmigrants settled in the rest of the world. On the countries of residence side, only 5 countries of residence happen to enter the EU during the period of observation including, again, 3 Eastern European countries together with Finland and Sweden. This means that our identification of the EU effect if any, would be largely driven by East European economies switch from their status of non-EU to EU-joining countries in the years 2000s.

On their side, the **Schengen agreements** imply the abolition of internal border controls on the top of EU rules.[13] Our first underlying assumption for an identification of their impact on outmigration is that the implementation of Schengen agreements constitutes then a step beyond EU agreements in the liberalization of labour movements in Europe. Two reasons can be given here: First, the removal of physical barriers reduces transaction costs from crossing the borders making the circulation and settlement of people inside the Schengen area easier. Second, and more importantly, under Schengen agreements all countries are now treated equally with full labour market access upon implementation.

Besides, the list of countries that have signed Schengen agreements does not match that of those which belong to the EU and vice-versa. In fact, the Schengen agreements include 3 non-EU countries (Switzerland, Norway and Iceland) while excluding 2 EU ones (UK, Ireland). This observation should constitute a second reason for using a Schengen indicator, besides the EU one, to identify the effect of freeing up labour on outmigration.

Last but not least, one of the advantages of considering Schengen agreements to identify the labour-openness policy effect on outmigration is that the time during which these agreements are implemented matches very well the period for which we have data for outmigration. In fact, the Schengen agreements were firstly signed in 1985 and supplemented in 1990 by the Schengen convention. Nevertheless, the Schengen area became effective on the 26th of March

[13] As it is well known but beyond the scope of this paper, Schengen agreements have also set-up a common visa policy for people from third countries.

1995, date of first implementation by 7 countries (Belgium, France, Germany, Luxembourg, Netherlands, Portugal, Spain), and was progressively extended since then. By 2011, date at which our period of study ends, 24 countries out of the 31 European countries presented in table 2 had already implemented the convention, the last wave of implementation being decided on the 21st of december 2007 by Malta and 8 Eastern European countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia)[14]. Fifteen of these countries happen to be reporters of outmigration flows (residence countries) and all 24 of them are represented in the panel of countries of origin of migrants.

3.3 Empirical Strategy

Empirical specification

We test hereafter the effect of EU integration and Schenghen agreements on migration outflows. The empirical specification is a reduced form specification that is fairly simple. It is set to capture the essence of the theory predictions that we have set-up in the previous section. It turns out that such specification approaches a standard Random Utility Model (RUM). But conceptually it is not a random utlity model, or at least if it can be shown to be consistent with a RUM in partial equilibrium, it is not a standard one. In fact, while in RU models migration flows are bilateral, they are not in our set-up. Of course, we have two country dimensions in the data (origin and residence) but the flow of migration has one dimension in a given year. Put differently, we do not know where o-nationals outmigrate. All that we know is the country of residence from where they migrate. And this is sufficient to identify what we are looking for, that is whether or not openness policies taken towards o-nationals, by the residence country r or the rest of the world, make them circulate within the area that opens up to them.[15]

[14] To date, the Schengen Area involves 30 signatories, but 26 out of which have already implemented the convention

[15] One can actually show, from applying directly Random Utility models in partial equilibrium, that the decision to outmigrate from r to the rest of the world by an o-migrant can be linked to conditions in r and in the rest of the world (i.e. wages, unemployment, here and there) along with additional costs of moving observed by migrants before leaving r including, say migration policies. But then here, one needs to assume that the outmigrant makes

Before estimating the impact of bilateral agreements between o and r *per se*, we begin by studying the impact of the signature of an agreement by a country o, on outmigration of o-nationals residing anywhere in the world. Here, as suggested by our theory, freeing-up labour movements with a group of countries through an increase in p_{OR} and p_{OW}, should lead to an increase in o-nationals' access to these countries. By doing such regression we are studying for instance the impact on outmigration of Romanian nationals' from their early place of residence say, Hungary, when Romania accesses the EU by 2007. Also, when considering the alternative Schengen agreements indicator, we would be studying cases like the impact on the number of Norvegian outmigrants from Denmark or Germany, when Norway enters the Schengen area. We call the obtained effect a "regional-effect", as it follows from entry of country o into a regional agreement (EU or Schengen) A way to test this regional-effect on outmigration is to run the following regression[16]:

$$\ln M_{o,r,t}^{out} = \beta_1 \ln TotM_{o,r,t} + \beta_2 X_{r,t} + \beta_3 Z_{o,t} + \beta_4 MigPolicy_{o,t} + \lambda_{[t]} + \lambda_{o,r} + \epsilon_{o,r,t} \qquad (10)$$

With $\ln M_{o,r,t}^{out}$ our dependant variable of total observed o-nationals outmigrating from r at time t. $TotM_{o,r,t}$ represents the total stock of migrants from country o who are observed to be residing in r at time t, $X_{r,t}$ a set of controls related to the residence country characteristics including the GDP *per capita* (as a proxy of income levels), GDP growth and/or unemployment and $Z_{o,t}$ a similar set of controls but specific to the country of origin. Our critical variable in the regression is called $MigPolicy_{o,t}$, which, in its first version, is a dummy variable that takes the value of 1 when origin countries become members of the European Union. In an alternative

a choice between r and the rest of the world taken as a whole, not each possible destination per se. Besides, a RUM is badly suited to handle outmigration, when attempting to introduce a constraint on labour market clearing into the picture in general equilibrium to account for multilateral resistances (Anderson, 2011). Finally, the possibility to circulate (i.e. give the possibility for an outmigrant to move across countries overtime and be back to residence r) is a critical hypothesis in our framework, it is not a feature of RU models where there are no circulation possibilities.

[16] Alternatively, we can use $\ln[\frac{M_{o,r,t}^{out}}{\ln TotM_{o,r,t}}]$ as dependent variable, which is equivalent to assume a coefficient of 1 for $\ln TotM_{o,r,t}$ in equation (10). Results (not reproduced here) are similar.

version, this variable becomes a vector of two variables with one still designing the fact of being an EU member and another variable which now indicates whether or not an origin country o takes part in the Schengen area by time t. Besides, we control for unobservable effects on outmigration through two components: a first is non-time related and a second is time-specific. The parameter $\lambda_{o,r}$ is a non-time mixed effect, set to control for any bilateral permanent feature provoking heterogeneity in outmigration across pairs due to geography, culture or any other gravity type variable one could think of. The time related effect here $\lambda_{[t]}$, will be actually further specified in two alternative ways: first, we assume a basic specification where any change in this unobservable is purely due to time, not to a possible non-observed shock in either of the countries (that is $\lambda_{[t]} = \lambda_{rt} = \lambda_{ot}$, $\forall r$, $\forall o$). In an alternative specification, we introduce further a mixed effect λ_{rt}. Of course, by so doing we do not include the variables which vary along the $r \times t$ dimensions.

In a second step, we propose to augment the previous specification through adding a new bilateral related variable to approximate bilateral openness to labor, besides the regional one. We thus add a dummy variable ($MigPolicy_{o,r,t}$) taking the value of 1 when *both* are members of the EU (or Schengen respectively) at time t. Then, in the presence of $MigPolicy_{o,t}$ in the regression, the inclusion of the new variable $MigPolicy_{o,r,t}$ should be able to tell us whether entering a free-labour access area increases or not outmigration further when the country r where o-nationals are already settled belongs by itself to the free mobility area. The empirical specification consistent with such a test is presented by the following equation:

$$\ln M^{out}_{o,r,t} = \beta_1 \ln TotM_{o,r,t} + \beta_2 X_{r,t} + \beta_3 Z_{o,t} + \beta_4 MigPolicy_{o,t} + \beta_5 MigPolicy_{o,r,t} + \lambda_{[t]} + \lambda_{o,r} + \epsilon_{o,r,t} \tag{11}$$

In this specification, however, the unobservable time-related effect $\lambda_{[t]}$, will be specified in three alternative ways: a time fixed effect, to which we then add a mixed effect through $r \times t$. Finally, in order to identify the pure bilateral impact of a policy change through $MigPolicy_{o,r,t}$,

we add-up further a mixed $o \times t$ fixed effect. In the third specification, only parameters of variables changing in all three dimension $\{o, r, t\}$ could then be estimated.

Note in passing that we use Hubert-White Standard errors clustered at the dyadic level, known to be robust to arbitrary forms of error correlation within couples of country (o, r).[17]

4 Results

4.1 Baseline results

The results are provided by table 3. In columns (1) and (2), we test the regional-effect of o signing to enter the EU (equation 10), with the respective inclusion of residence country's control variables with pure time effects on column 1 and a residence-year fixed effects in column 2. We find a positive and highly statistically significant effect of country o entering the EU on outmigration flows related to o-nationals. We then add in column (3) and (4), the bilateral EU variable to test equation 11. Here, we want to test whether besides the regional-effect one can expect an additional bilateral effect. The coefficient on $EU_{o,t}$ turns out to be then statistically insignificant while the coefficient on the bilateral term $EU_{o,r,t}$ appears to be positive, statistically significant and with a value of a same magnitude than that of the regional-variable, in previous columns. This is very much consistent with the hypothesis that the bilateral dimension is driving the result observed in columns 1 and 2. In columns (5)-(8), we reproduce specifications 1 to 4, by testing the effects of EU and Schenghen simultaneously[18]. We find both a positive and statistically significant effect of Schengen and EU but that appear to be sourced in particular by the bilateral dimension. That is to say that when country o signs a regional agreement on labour, outmigrants from o-origin settled in r, appear to be responding but mainly when the country of

[17] see Bertrand *et al.* (2004) on serial correlation pervasiveness in such models which are very close to difference-in-difference models

[18] Of course we have also tested the effect of Schengen alone (without inclusion of the EU variables) and have obtained very similar results quantitatively and in terms of statistical significance. Results are available upon request.

residence is itself already inside the regional agreement, or has also signed to join the regional agreement during the same period of observation. Put differently, and consistent with the theory prediction related to the increase in p_{OR}, Polish outmigration settled in Germany or Sweden appear to react to the entry of Poland into EU after 2004, or Schengen after 2007. Nevertheless, while theory predicts an increase in outmigration after openness towards W (through p_{OW}), the data does not reject such prediction but cannot verify it neither in a robust and convincing manner. That is to say that we cannot provide robust evidence that Polish settled, say, in the US are sensitive to the entry of Poland into these regional agreements.

We thus stick to the estimates based on the bilateral dimension in what follows and study in what follows how robust they are.

Robustness

First, recall that we are in a fixed-effect set-up. By adding residence-year and origin-year fixed effects like in columns (4) and (8), we control for all time-varying but unobservable characteristics which are specific to residence and origin countries respectively. One remaining concern is that our bilateral variables $EU_{o,r,t}$ and $Schengen_{o,r,t}$ might be correlated with other unobservable variables that might still vary across not two but three dimensions $\{o, r, t\}$, which could bias our coefficients as the estimation of the latter might be then based on unobserved confounding factors. For instance, during the time-span of our study, we observe several waves of EU integration and Schengen ratifications. The main waves of EU integration we observe and could confront to outmigration flows however, is the ones of Eastern and Central European countries in 2004 and 2007. This might be a concern as these countries had very specific dynamics in the 1990s (post-communism countries) and for history reasons had also some specific relations with some countries (Germany, Austria or France). Besides, as also noted earlier, a number of western EU member economies have decided to keep temporary restrictions to the right of residence for citizens from the East after their accession. All of these unobservable factors might be captured by the bilateral agreements terms. Thus, in order to ensure that we are capturing effectively changes explained by policy changes in access to a larger labour market following the EU integration (and Schengen

Table 3: Effect of EU and Schenghen

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MigPolicy								
$EU_{\mathbf{o,t}}$	0.242***	0.293***	0.125		0.196***	0.249***	0.107	
	(3.858)	(4.723)	(1.317)		(2.841)	(3.607)	(1.071)	
$EU_{\mathbf{o,r,t}}$			0.264***	0.245***			0.227***	0.210**
			(3.169)	(2.655)			(2.682)	(2.296)
$Schengen_{\mathbf{o,t}}$					0.155***	0.152**	-0.105	
					(3.096)	(2.615)	(-1.553)	
$Schengen_{\mathbf{o,r,t}}$							0.336***	0.425***
							(6.096)	(4.508)
Controls								
$Ln(StockMig)_{o,r,t}$	0.808***	0.652***	0.656***	0.556***	0.804***	0.646***	0.640***	0.543***
	(11.90)	(10.70)	(10.71)	(12.05)	(11.85)	(10.79)	(10.93)	(11.84)
$GDPgrowth_{r,t}$	-0.0335***				-0.0338***			
	(-7.061)				(-7.123)			
$\ln(GDPpercap)_{r,t}$	-2.347***				-2.332***			
	(-4.329)				(-4.280)			
$\ln(Unemp)_{r,t}$	0.251***				0.250***			
	(5.524)				(5.467)			
$Gdpgrowth_{o,t}$	0.00173	0.00122	0.00119		0.00257	0.00199	0.00267	
	(0.905)	(0.663)	(0.647)		(1.255)	(1.054)	(1.363)	
$\ln(GDPpercap)_{o,t}$	0.132	0.315	0.330*		0.155	0.337*	0.423**	
	(0.650)	(1.646)	(1.742)		(0.754)	(1.740)	(2.323)	
$\ln(Unemp)_{o,t}$	-0.0254	0.00913	0.0108		-0.0245	0.00998	0.0186	
	(-0.560)	(0.196)	(0.233)		(-0.559)	(0.222)	(0.433)	
Dyadic FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO		NO	NO	NO	
Origin/Year FE	NO	NO	NO	YES	NO	NO	NO	YES
Res/Year FE	NO	YES	YES	YES	NO	YES	YES	YES
Observations	10,039	10,036	10,036	14,706	10,039	10,036	10,036	14,706
R-squared	0.945	0.964	0.964	0.969	0.945	0.964	0.965	0.969

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

ratifications respectively) and not changes in unobservables, we propose Placebo tests, through testing the hypothetical effect of EU and Schengen, before the actual integration or ratification. As already noted above, the EU and Schengen are defined at bilateral levels from now on, while controlling for residence-year and origin-year fixed effects. Results are given in table 4 for EU and 5 for Schengen.

Table 4: Placebo test for EU

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)	(4)	(5)
EU_{t-1}	0.200**				
	(1.987)				
EU_{t-2}		0.223*			
		(1.692)			
EU_{t-3}			0.308**		
			(2.254)		
EU_{t-4}				0.353***	
				(2.636)	
EU_{t-5}					0.418***
					(2.938)
$\ln(StockMig)_{o,r}$	0.561***	0.570***	0.553***	0.488***	0.443***
	(11.62)	(10.47)	(9.139)	(7.306)	(5.851)
Dyadic FE	YES	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES
Res/Year FE	YES	YES	YES	YES	YES
Observations	13,126	11,574	10,310	9,138	7,955
R-squared	0.968	0.967	0.966	0.967	0.968

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

In practice, a placebo test undertaken here suggests that if our estimates really measure the bilateral effects created from changes in labor access policies (EU and Schengen), we must obtain non-significant estimators on their lagged values. It is clearly not the case for EU where we obtain positive and significant coefficients whatever the chosen lag is. This result prevent us to get a causal interpretation of our previous results on the *EU* variable. As suspected, the variable is driven by the integration of eastern and central European countries, which might have specific trends in their bilateral relations with other EU countries. This does not imply however that signing to enter the *EU* does not have an effect in reality. It only means that because our period of observation starts by the begining of the 1990s, where most of the European countries had

Table 5: Placebo test for Schengen

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)	(4)	(5)
$Schengen_{t-1}$	0.419***				
	(4.326)				
$Schengen_{t-2}$		0.147			
		(1.385)			
$Schengen_{t-3}$			0.0210		
			(0.173)		
$Schengen_{t-4}$				0.0559	
				(0.424)	
$Schengen_{t-5}$					-0.0594
					(-0.379)
$\ln(StockMig)_{o,r}$	0.542***	0.560***	0.549***	0.484***	0.445***
	(11.26)	(10.17)	(8.921)	(7.123)	(5.814)
Dyadic FE	YES	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES
Res/Year FE	YES	YES	YES	YES	YES
Observations	13,126	11,574	10,310	9,138	7,955
R-squared	0.968	0.967	0.966	0.967	0.968

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

entered the EU, we might not have enough variations in the data at hand to be able to identify clearly the effect of entry into the EU on outmigration.

Nevertheless, we have very different results for Schengen. The coefficient turns out to be significant only for the year before the bilateral ratification of Schengen. This effect can be interpreted easily as an anticipation effect. We start to observe positive effects on outflows a year before the actual implementation of Schengen probably because the date of implementation is known in advance. The coefficients on the lags 2-5 are not statistically significant, however. This is consistent with the idea that we are identifying the effect of the shock we want to identify.

Alternatively, the same interpretation holds when we include dyadic linear and quadratic trends into a regression like that of column (8) in the first table of results, following Autor (2003). Table 6 provides the related results. For Schengen, the coefficient is still positive and significant, and the magnitude of the effect is a bit smaller but still in the same order of magnitude. On the contrary, the EU coefficient turns out to be non-statistically significant, consistent with the idea that it is capturing a specific dynamic for such couples of countries.

Table 6: Controlling for a specific dyadic trend

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)
EU	-0.0672	0.0445
	(-0.515)	(0.272)
Schengen	0.330***	0.346***
	(3.006)	(2.726)
$\ln(StockMig)_{o,r}$	0.273***	0.0280
	(3.978)	(0.277)
Dyadic FE x Time Trend	YES	YES
Dyadic FE x Time Trend^2	NO	YES
Origin/Year FE	YES	YES
Res/Year FE	YES	YES
Observations	14,706	14,706
R-squared	0.979	0.984

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

At this stage, we thus reject the causal interpretation of results obtained in table 3 for EU probably because the data do not offer the possibility to correctly identify the effect we are searching for. With few changes in the EU indicators coming mainly from new EU members, known to have had very specific trends in the 1990s and 2000s we could not find any convincing effect of EU on outmigration. By contrast, our estimates for the effect of Schengen are very robust and stable across all specifications. Recall that we have already argued that the implementation of Schengen is a step beyond EU agreements in the liberalization of labour movement in Europe. Being part of Schengen must be correlated with the abolition of most if not all of the restrictions to this right of residence. Besides, some non-EU countries like Iceland or Norway have nevertheless signed and implemented the Schengen convention during our 1990-2010 period of observation[19]. For all of these reasons, we will focus in the next sections on the effects of Schengen rather than EU integration.

In table 7, we test the robustness of our results by further adding covariates at the bilateral level. We 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

[19]Switzerland is another non-EU country which joined Schengen area, although after 2010.

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 to some extent the magnitude of our Schengen coefficient is not affected. [20]

Table 7: Additional bilateral covariates

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)	(4)
Schengen	0.439***	0.441***	0.237**	0.230**
	(4.717)	(4.732)	(2.186)	(2.119)
EMU	0.0295			
	(0.340)			
Bilateral		0.137		
		(0.670)		
RTA			0.156*	
			(1.702)	
$\ln(trade)_{o,r}$				0.000953
				(0.0493)
$\ln(StockMig)_{o,r}$	0.541***	0.541***	0.433***	0.439***
	(11.79)	(11.79)	(5.432)	(5.477)
Dyadic FE	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES
Res/Year FE	YES	YES	YES	YES
Observations	14,706	14,706	7,851	7,851
R-squared	0.969	0.969	0.968	0.968

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

4.2 The role of cultural proximity

In the theoretical model, one crucial parameter α designates the preference for domestic consumption. The higher is this preference, the higher will be the probability to out-migrate, all things being equal. If so, then on average, the preference for consumption at home (in the country of origin) is higher when the country of residence is not culturally close to the country of

[20] We have also dealt with the problem of zeros flows that are not shown in the paper for space reasons. 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 $\ln(1 + OutMigrations)$ instead of $\ln(OutMigrations)$. The 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.

origin of the potential outmigrant. To take an example, the preference for consumption at home (say Estonia) will be higher for an Estonian than for a Belgium living in France. 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 first use geographical distance and contiguity as proxies of cultural proximity (the higher is the distance, the lower is cultural proximity).

We then propose to test the effect of language 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 use different variables provided by Melitz & Toubal (2014). These authors 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 from the Ethnologue classification of language trees across 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 two geographic and five linguistic variables with our Schengen bilateral variable. Results are given in table 8. The coefficient is positive and significant when simple distance the Schengen dummy is interacted with simple distance and negative when interacted with contiguity. It is negative and significant when the Schengen dummy is interacted with the "common spoken language" but not significant for the common official language and the common native language. However, when using the Indexes of language proximity which we think to be better proxies of cultural proximity, both coefficients on these indexes appear to be negative and significant. Hence, the lower is proximity (i.e. the more distant cultures are) when proxied by these indexes and the stronger is the positive effect of the bilateral implementation of Schengen on migration outflows. Although the latter two estimates are highly suggestive of

an additional effect on outflows when cultures are more different, two out of the three former estimates indicate no statistical significance, which prevent us to draw robust conclusions from this exercise.

Table 8: The role of cultural proximity

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(StockMig)_{o,r}$	0.533***	0.539***	0.562***	0.558***	0.563***	0.558***	0.557***	0.552***
	(11.35)	(11.42)	(10.99)	(10.92)	(10.99)	(10.92)	(10.89)	(10.81)
$Schengen_{o,r}$	0.194*	0.462***	0.415***	0.716***	0.413***	0.726***	0.698***	0.724***
	(1.73)	(4.95)	(4.477)	(4.784)	(4.470)	(4.764)	(4.638)	(4.878)
$Distance_{o,r}$ x $Schengen_{o,r}$	0.0001***							
	(3.36)							
Contig. x $Schengen_{o,r}$		-0.200**						
		(-2.52)						
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	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Res./Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	14,586	14,586	14,521	14,521	14,521	14,521	14,478	14,478
R-squared	0.965	0.969	0.972	0.972	0.972	0.972	0.972	0.972

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

5 Concluding Remarks

In this paper we have shown, using theory and suggestive empirics, that opening-the-borders policies which favour (im)-migration, set at a national level or further, within regional agreements, may actually provoke unexpected consequences by increasing the outflows of previously settled migrants. We have set a 3-country theory where heterogenous migrants already in a residence

country respond to economic and policy incentives making them circulate across these countries. We have shown how openness to labour movements across at least two of these countries, acts as an insurance providing incentives for more people to circulate and thus making some leave a stable country to which they would be willing to go back, in case of a bad shock elsewhere.

Armed with outmigration data between 1990 and 2011, we could find very good support to our simple theory through a natural expriment, i.e the implementation of Schengen agreements. We have also tested our theory against the data through another natural experiment, based on EU entry. There we could find some support to the theory too but the obtained estimates did not resist our battery of robustness tests.

In order to better test our theory, we think that individual data are needed regarding outmigrants but this is still difficult to obtain. Also, one relevant question to policy is to look at the heterogenity of outmigrants with respect to their skills. Would openness make more or less skilled people leave the country of residence. If unskilled leave more because, say, they are more attached to their home country's culture than skilled ones, policymakers might be even more interested in such outcome.

Besides, our simple set-up is not studied in general equilibrium. If for instance, after openness, labour flies back from high wage to low wage countries (because of this preference for home consumption hypothesis), wages might end up converging between the two types of economies, inducing further departures. Also, another research question is to endogeneize the degree of openness. One can ask what is the optimal policy to set by the authorities which could maximize national welfare or, integrate in a political economy dimension, by asking what is the best policy to undertake that maximizes the likelihood of being elected.

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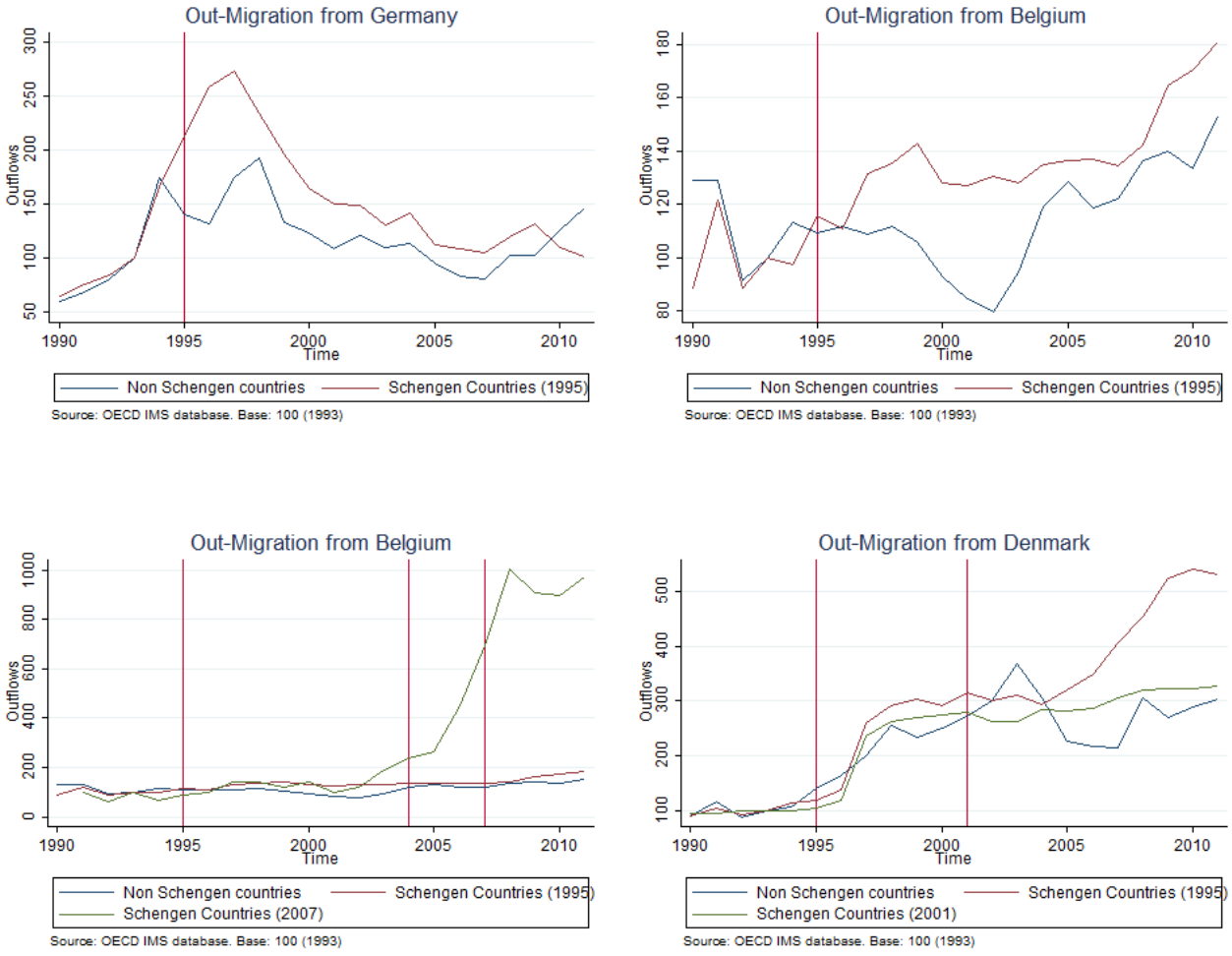
Annex

A Out-Migration in selected countries, before and after the implementation of Schengen

Figure 3: Out-Migration from selected countries



Source: OECD IMS Database