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Labor mobility agreements and exit of migrants: Evidence from Europe

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Abstract

In this paper, we study how free labor mobility agreements in Europe, usually thought to favor *inward* migration, might actually create good incentives for already settled migrants to *exit* their host country. Using outmigration data between 1990 and 2011, a period of observation where some countries entered the EU and especially a period during which Schengen agreements have been progressively implemented by a large number of European countries, we could test this conjecture. While the evidence for EU is mixed, we find very strong evidence that Schengen did increase migrations outflows by 40 to 53%. The effect appears to be even higher for outmigrants originating from Eastern Europe after their countries' accession to Schengen. Also, and consistent with the hypothesis of preferences for living at home or in a country with a close culture to home, the effect of Schengen on outmigration happens to be smaller when the countries of origin and of residence of the outmigrants are close in terms of their cultural traits. Also, we document that the Schengen effect is significantly higher for outmigration flows than for immigration flows by almost 20 percentage points.

1 | INTRODUCTION

The widespread feeling of hostility regarding the migration phenomenon is probably an outcome of uncontrollable political, economic, and social facts observed since the 1980s. Some of these are a direct consequence of various historical events that the world has experienced such as the collapse of the Soviet Union at the end of the 1980s and early 1990s, the Arab Spring in the years 2000s, and the proliferation of regional armed conflicts in Africa, Middle East, and East Asia, all of which having released, in turn, an explosive potential of economic and political refugees. In Europe, the European Union enlargement, complemented by the Schengen Treaty, has led to an unprecedented circulatory flow within those nations that joined and, in particular, has permitted a massive exodus of citizens from the countries of Eastern Europe towards economically more prosperous States (Docquier et al., 2014; Lundborg & Segerstrom, 2002). Notwithstanding, the recession of 2008 might have accentuated these hostile feelings towards the migration phenomenon. This explains why in many western countries, a substantial number of citizens exerted considerable pressure upon their governments in recent years, under threat of electoral sanctions, to adopt stringent policies against entry flows and at the same time ensure the rapid exit of those immigrants already settled in the country.

In this context, the setting and extensions of regional agreements involving a free mobility of labor have been very much criticized by anti-migrant parties because the agreements would then allow more migrants to enter a joining country. Nevertheless, anti-migrants rarely, if ever, evoke the idea that regional agreements could also be a mean to incite already settled migrants to out-migrate (i.e., leave a hosting country where they used to reside, to settle in another country).

By nature, agreements that free up the movement of labor in the region mechanically reduce the costs of their mobility, which would then increase the circulation of labor inside the region, regardless of the nationality of people involved. What is specific about outmigrants though is that they are expected to be even more mobile than standard migrants inside the union. Unlike natives, outmigrants are less attached to their hosting country (i.e., country of current residence) and, at least a part of them, might well have preferences over moving back to their country of origin or, say, moving to a country with a culture being quite close to their origin country.[1] Then, only a complete openness of borders to labor mobility secures their mobility out of their residence country by giving them the insurance to be back whenever needed, if the economy of their new hosting country (that could be their home or any other country with a close culture) is in a bad shape.

This paper is the first to study how free labor mobility agreements in Europe, usually thought to favor inward migration, might actually create good incentives for already settled migrants to exit their host country.

In particular, by concentrating on two European openness policies (EU and Schengen), this paper tests the idea that border openness changes the incentives for migrants 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 reason is that regional arrangements in favor of labor mobility, not only reduce the cost of migration inside the region but also offer in addition, as mentioned earlier, an insurance device 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 take advantage of a dataset from the OECD on outmigration over 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.

Interestingly, during this specific period of 1990–2011, some countries from Northern and Eastern Europe have entered the European Union, and Schengen agreements were implemented progressively by a very big proportion of

[1]Some literature like Levitt and Jaworski (2007) and Berggren et al. (2020) tend to show indeed that migrants, at least first generation migrants, are still significantly concerned about what happens at home when they move to a foreign country.

the EU countries. Hence, the EU and more particularly Schengen agreements constitute important policy shocks which occurred in the observed period allowing to test our predictions.

There is some literature on outmigration and especially return migration based on nonpolitical factors (Dustmann, 2003; Dustmann et al., 2011). Bazillier et al. (2017) observe how the economic fluctuations in the short run produce, in terms of exit flows, the same qualitative effects as restrictive policies in recessionary periods. Borjas and 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 and 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 and 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 in flows and out flows of Mexican illegal migration. She shows that border enforcement significantly reduces the exit of Mexican illegal workers. Czaika and 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.

There are few papers also on the role of European agreements. For instance, Ortega and 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 per se. Ortega and Peri (2013) test the effects of Maastricht Treaty, Schengen agreements, and the tightness of entry laws, but they do that by looking at how bilateral migration behaves when policies change in destination countries only (when the potential hosting country signs an agreement or tightens its laws). In particular, while they do find a positive and statistically significant impact of the EU agreements, they document a negative effect for Schengen agreements. They justify the last result by the fact that Schengen might have reallocated flows (i.e., reducing flows from non-joining third countries, because of tightening at the EU borders towards those countries). Beine et al. (2019) are the only work we know about looking at the impact of joining the EU and Schengen by the countries of origin and those of destination, on the bilateral entry of migrants. They find that the EU increases bilateral entry by an estimate of about 15% and Schengen by about 25%. These are interesting figures to keep in mind when showing our outcomes in the rest of the paper, based on outmigration data.

The focus in this paper is set on outmigration. In order to look at how European agreements shape outmigration, we need two series of observations. The first concerns outflows (exits from a current country of residence, of previously settled migrants). These need to be observed on a bilateral basis (by country of residence of the settled migrants and by their nationality, i.e., country of origin). As these border policies are specific to certain nationalities, we are more interested in the nationality of these migrants rather than their new country of destination. The OECD has made available outflows of migrant data for some OECD countries over the period 1990–2011, recorded by country of departure (residence) and nationality.

Second, during the same period, we propose to use the entry into the EU of the last waves of countries and the implementation of the Schengen agreements as important border policies' changes. 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 to assess 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 remained, and in some EU countries, the right to work related to Eastern European nationals did not apply automatically as their country joined the Union at that time. The implementation of Schengen agreements, however, has freed up more labor in Europe by going one step further: Not only they implied the abolition of internal borders on the top of EU rules but they also offered free and effective access policies to migrants without any exception of nationality.

We use a very simple reduced form econometric specification that is consistent with random utility models, albeit adapted to the case of out-migrants. As discussed further in the paper and in the appendix, this specification

can be grounded on simple theory that shows explicitly why higher proportions of potentially out-migrants choose to leave when agreements are being signed. Using outmigration data between 1990 and 2011, a period of observation where some countries entered the EU and especially a period during which Schengen agreements have been progressively implemented by a large number of European countries, we could test this conjecture. We find very strong evidence that Schengen did increase migrations outflows by 40% to 53%. The effect appears to be even higher for outmigrants originating from Eastern Europe after their countries' accession to Schengen. Also, and consistent with the hypothesis of preferences for living at home or in a country with a close culture to home, the effect of Schengen on outmigration happens to be smaller when the countries of origin and of residence of the outmigrants are close in terms of their cultural traits. Also, we document that the Schengen effect is significantly higher for outmigrations flows than for immigration flows (i.e., increases the ratio of outmigrants to immigrants by almost 20%). The evidence for joining the EU is mixed, as it does not resist all the series of robustness checks. This is probably due to one very simple reason: While our data starting in the beginning of the nineties are perfectly suitable for Schengen agreements, they are much less suitable to be neatly tested for signing EU agreements. In fact, most countries entered the Union before the 1990s, which makes our identification for EU entry to be based only on the last countries to enter.

The paper is structured as followed. The next section (Section 2) describes the data for the tests, while Section 3 presents the speci cation, econometric results, and many robustness checks.

The last section concludes.

2 | DATA AND THE BORDER POLICY VARIABLES

This section presents the data used for our tests. In particular, some description of our border policy variables is being offered (date of EU entry and date of implementation of Schengen agreements) in order to understand the differences between the two arrangements and the countries involved overtime.

2.1 | 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.[2] Migration outflows data are provided by 26 countries of residence from the OECD which register exiters by their corresponding nationality (i.e., 200 nationalities being registered), and for a period running between 1990 and up-till 2011, in general.[3] 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 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 prior paper, we discuss more thoroughly these statistics (see Bazillier et al., 2017). However, as we run fixed effects panel regressions (see the 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

[2]Via https://stats.oecd.org/

[3]For most of the reporting countries, 2010 and 2011 were the last two years of observations delivered to OECD by the time we conducted our study. See Table 1. Our final sample includes 23 residence countries (see Table 1) and 200 origin countries.

estimations, we have systematically accounted for country of residence specific effects.[4] 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 mixed (residence × 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.[5] 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 during the considered period of observation and between 0.1% and 0.8% of the total native population.

2.2 | EU and Schengen as border policies

The second type of information needed to test our prediction must be directly related to some data that could distinctively describe a change in the border policies of European countries, during the same period 1990–2011. 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. What should matter first, for countries of origin of the migrants, is the date of entry into EU and entering Schengen. Indeed, whenever their origin country signs an agreement with some group of countries, the latter are expected to open up their borders to the former, which then could increase the opportunity cost to stay in the country where they usually reside and might incite them to leave it. Furthermore, if their country of residence signs the agreement to which the origin country belongs, one could expect an additional incentive to move as it creates a new option to be back again to the former without any border related constraint, if the stay elsewhere in the globe happens not to be successful.

We exploit the differences in the timing of EU entry and Schengen entry for countries of origin and countries of residence of outmigrants to test for the influence of changes in border policies on outward migration. As an illustration, we show the dynamics of outmigration from three countries (Germany, Belgium, and Denmark) for, respectively, Schengen and non-Schengen countries in annex C (Figure C1). For Germany, we observe an increase, after the implementation of Schengen in 1995, of outmigration 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 outmigration 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 outmigration 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 outmigration 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 outmigration outflows 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 entry, or Schengen implementation, either in origin or residence countries. Our empirical strategy aims at identifying such effects by controlling carefully for all other possible factors that might explain outmigration.

[4]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 × country origin effects). For space availability, we mainly show regressions with pair of countries fixed effects in the tables. More tables can be provided upon request.

[5]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 outflows for a reporting country, where the inflow data are known to be much more reliable than out outflows data. By comparing the changes in the two outflows, 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	15,363	8,090	21,640		0,8%
Austria	1996–2011	53,028	44,350	75,573	6,7%	0,6%
Belgium	1990–2011	27,090	27,042	56,595	3,9%	0,3%
Denmark	1990–2011	13,937	4,561	27,084	5,1%	0,3%
Estonia	2004–2011	596	444	686	0,3%	0,0%
Finland	1990–2011	2,516	938	4,496	2,7%	0,0%
Germany	1990–2011	551,500	466,000	710,240	8,0%	0,7%
Hungary	1991–2010	3,677	1,928	6,047	2,2%	0,8%
Iceland	1999–2011	2,364	810	5,850	13,8%	0,8%
Ireland	2006–2011	36,983	20,700	52,800	6,1%	0,8%
Italy	1999–2011	15,494	7,700	32,404	0,5%	0,0%
Japan	1990–2011	218,494	161,129	291,970	10,9%	0,2%
Luxembourg	1990–2011	6,741	4,940	8,641	4,1%	1,5%
Netherlands	1990–2011	25,397	20,397	47,612	3,6%	0,2%
New Zealand	1992–2011	178,874	10,561	26,398		0,5%
Norway	1990–2011	13,088	8,057	22,883	6,2%	0,3%
Slovakia	2003–2011	2,745	1,080	5,002	7,5%	0,1%
Slovenia	1998–2010	7,034	1,643	15,071	13,9%	0,4%
Spain	2002–2011	160,144	6,931	335,676	3,0%	0,4%
Sweden	1990–2011	16,255	12,522	23,673	3,2%	0,2%
Switzerland	1990–2011	54,438	46,320	80,373	4,3%	0,8%
United Kingdom	1990–2011	133,349	77,000	243,000	4,9%	0,2%

Source: OECD IMS Database.

2.2.1 | Mobility principles in EU agreements

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."[6] EU integration thus requires the full abolition of migration restrictions for all EU citizens inside the EU. For stays of less than 3 months, the only requirement is that they possess a valid identity document or passport. The right of residence for more than 3 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), has sufficient resources and insurance, and he or she to be following a vocational 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 lose 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 1 year; (iii) she is in duly

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

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 12 months; and (iv) she embarks on vocational training.[7] 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 3 months). Finally, the right of permanent residence in the host member state is guaranteed after a 5-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, the other half of the EU economies continued to restrict their labor market to Eastern European migrants just after their joined, before freeing up progressively their market few years later.[8]

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). In 2007, a second (smaller) group of Eastern European Countries joined EU (Bulgaria and Romania). When confronting these dates with those where we observe data on outmigration however, one could see from Table 2 that the switching status from being out of EU to being in the EU happens to take place for five countries of residence of outmigrants only. This includes three Eastern European countries together with Finland and Sweden. On the countries of origin side, however, they are 14 to switch, but again, most of those countries are Eastern European countries, which makes most of the identification on the impact of joining the EU to be based on these countries.

2.2.2 | Abolition of all internal borders in Schengen agreements

On their side, the Schengen agreements imply the abolition of internal border controls on the top of EU rules.[9] 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 labor 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 labor 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 three non-EU countries (Switzerland, Norway, and Iceland) while excluding two EU ones (UK and Ireland). This observation should constitute a second reason for using a Schengen indicator, besides the EU one, to identify the effect of freeing up labor on outmigration.

Last but not least, one of the advantages of considering Schengen agreements to identify the labor-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 first signed in 1985 and supplemented in 1990 by the Schengen convention. Nevertheless, the Schengen area became effective on March 26.

1995, date of first implementation by seven countries (Belgium, France, Germany, Luxembourg, Netherlands, Portugal, and 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

[7]See http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004L0038&from=EN
[8]See European Integration Consortium report (2009).
[9]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.

TABLE 2 Dates of entry into EU and Schengen, availability of outmigration flows data, and switching status in the sample (during observation period, 1990–2011).

Country	EU entry	Schen. entry	Obs. period as residence country	Obs. period as origin country	Switch EU_r	Switch EU_o	Switch $Schen._r$	switch $Schen._o$
Austria	1995	1998	1996–2011	1990–2011	No	Yes	Yes	Yes
Belgium	1957	1995	1990–2011	1990–2011	No	No	Yes	Yes
Bulgaria	2007	No	NA	1992–2011		Yes	No	No
Croatia	2013	No	NA	1992–2011		No	No	No
Cyprus	2004	No	NA	1991–2011		Yes	No	No
Czech Republic	2004	No	NA	1995–2011		Yes	No	No
Denmark	1973	2001	1990–2011	1990–2011	No	No	Yes	Yes
Estonia	2004	2008	2004–2011	1992–2011	No	Yes	Yes	Yes
Finland	1995	2001	1990–2011	1990–2011	Yes	Yes	Yes	Yes
France	1957	No	NA	1990–2011		No	No	Yes
Germany	1957	1995	1990–2011	1990–2011	No	No	Yes	Yes
Greece	1981	1998	2009–2010	1990–2011	No	No	No	Yes
Hungary	2004	2008	1991–2010	1990–2011	Yes	Yes	Yes	Yes
Iceland	NO	2001	1999–2011	1990–2011	No	No	Yes	Yes
Ireland	1973	No	2006–2011	1990–2011	No	No	No	No
Italy	1957	1998	1999–2011	1990–2011	No	No	No	Yes
Latvia	2004	2007	NA	1995–2011		Yes	No	Yes
Lithuania	2004	2007	NA	1995–2011		Yes	No	Yes
Luxembourg	1957	1995	1990–2011	1995–2011	No	No	No	No
Malta	2004	2007	NA	1995–2011		Yes	No	Yes
Netherlands	1990	1957	1990–2011	1995	No	No	Yes	Yes
Norway	NO	2001	1990–2011	1990–2011	No	No	Yes	Yes
Poland	2004	2007	NA	1990–2011		Yes	No	Yes
Portugal	1986	1995	NA	1990–2011		No	No	Yes
Romania	2007	No	NA	1990–2011		Yes	No	No
Slovakia	2004	2008	2003–2011	1995–2011	Yes	Yes	Yes	Yes
Slovenia	2004	2008	1998–2010	1992–2011	Yes	Yes	Yes	Yes
Spain	1986	1995	2002–2011	1990–2011	No	No	No	Yes
Sweden	1995	2001	1990–2011	1990–2011	Yes	Yes	Yes	Yes
Switzerland	No	2008	1990–2011	1990–2011	No	No	Yes	Yes
United Kingdom	1973	No	1990–2011	1990–2011	No	No	No	No

Note: (a) "NA" indicates non-availability of data as a residence country of outmigrants; (b) the four last columns indicate whether or not the countries switch from a status of non-EU to EU and, respectively, from a status of being non-Schengen to Schengen joiners, in our sample. The countries might be observed in the sample, either as countries of residence (indexed by *r*) or as countries of origin of outmigrants (indexed by *o*).

last wave of implementation being decided on December 21, 2007, by Malta and 8 Eastern European countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia).[10] Fifteen of these countries happen to be reporters of outmigration outflows (residence countries), and all 24 of them are represented in the panel of countries of origin of migrants.

2.3 | Empirical strategy

2.3.1 | Empirical specification

We test hereafter the effect of EU integration and Schengen agreements on migration outflows. The empirical specification is a reduced form specification that is consistent with an adapted random utility model (RUM), based on the choices of potential outmigrants either to stay in a country of residence or leave it. The choice to leave, however, is based on the net expected gains from circulating across destinations, including the expected gains from being back to the country of residence again. Such a set-up is actually close to models of sequential migration like in Artuc and Ozden (2018), where the attractiveness of a given destination country does not reflect uniquely the relatively higher income level or amenities but includes also the option value of alternative destinations available for future mobility decisions. We present an alternative model of sequencial migration in the appendix, although without using a dynamic setting, but which also justifies the choice to move outside a country of residence by internalizing all possible outcomes in alternative countries and the difficulty or not of accessing these countries. Our model in the annex offers some interesting features and predictions. Let us define from now, country *o* to describe the country of origin of an observed outmigrant (or set of out-migrants), country *r* is their country of current residence, and *w* being the rest of the world.

These types of set-ups suggest that, ceteris paribus, outflows of migrants of *o* origin, from a residence country *r* will increase with (i) an increase in the openness of frontiers towards *o* nationals, (ii) a low economic activity in the residence country *r*, 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.

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. We want to assess for instance the impact on outmigration of Romanian nationals' from their early place of residence say, Hungary, when Romania accesses the EU by 2007. Besides, 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[11]:

$$\ln M^{out}_{o,r,t} = \beta_1 \ln TotM_{o,r,t} + \beta_2 X_{r,t} + \beta_3 Z_{o,t} + \beta_4 MigPolicy_{o,t} + \lambda_{[t]} + \lambda_{o,r} + \epsilon_{o,r,t} \quad (1)$$

With $\ln M^{out}_{o,r,t}$, our dependent 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 policy variable in the regression 1 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 version, this variable becomes

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

[11]Alternatively, we can use $\ln\left[\frac{M_{o,r,t}}{\ln TotM_{o,r,t}}\right]$ as dependent variable, which is equivalent to assume a coefficient of 1 for $\ln TotM_{o,r,t}$ in Equation (1). Results are presented in Table D1. They are very similar.

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: First is non-time related, and the 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.[12] 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 (i.e., $\lambda_{[t]} = \lambda_{rt} = \lambda_{ot}$, $\forall r$, $\forall o$). 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 labor 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:

$$\ln M_{o,r,tout} = \beta_1 \ln TotM_{o,r,t} + \beta_2 X_{r,t} + \beta_3 Z_{o,t} + \beta_4 MigPolicy_{o,t} + \beta_5 MigPolicy_{o,r,t} + \lambda_{[t]} + \lambda_{o,r} + \epsilon_{o,r,t}. \quad (2)$$

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 $r \times t$, and finally, adding-up further a mixed $o \times t$ fixed effect.

The inclusion of an $o \times t$ fixed effect allows to identify the pure bilateral impact of a policy change overtime between country pairs through $MigPolicy_{o,r,t}$. It captures all time-varying and time-invariant characteristics of origin countries that might have an effect on outflows of individuals from country o, such as the economic cycle in the origin country, the quality of institutions, political stability or any other socio-economic factors. More generally, in such specification, only parameters of variables changing in all three dimensions {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 countries (o,r).[13]

3 | RESULTS

3.1 | 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 (1)), 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 columns 3 and 4 the bilateral EU variable to test Equation (2). 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

[12]Note in particular that the bilateral fixed effect will capture cultural distance between two countries and therefore the emotional connection to family or culture that will affect the migration cost.

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

TABLE 3 Effect of EU and Schenghen.

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MigPolicy								
$EU_{o,t}$	0.242***	0.293***	0.125		0.196***	0.249***	0.107	
	(3.858)	(4.723)	(1.317)		(2.841)	(3.607)	(1.071)	
$EU_{o,r,t}$			0.264***	0.245***			0.227***	0.210**
			(3.169)	(2.655)			(2.682)	(2.296)
$Schengen_{o,t}$					0.155***	0.152**	-0.105	
					(3.096)	(2.615)	(-1.553)	
$Schengen_{o,r,t}$							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
$EU_{o,t} = 1$ (N)	3076	3074	3074		3074	3074	3074	
$EU_{o,t} = 1$ (%)	30.64	30.63	30.63		30.63	30.63	30.63	
$EU_{o,r,t} = 1$ (N)			2043	2045			2043	2045
$EU_{o,r,t} = 1$ (%)			20.36	13.91			20.36	13.91
$Schengen_{o,t} = 1$ (N)					2208	2208	2208	
$Schengen_{o,t} = 1$ (%)					21.99	22.0	22.0	
$Schengen_{o,r,t} = 1$ (N)							1758	1758
$Schengen_{o,r,t} = 1$ (%)							17.52	11.95
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

Note: Robust *t* statistics in parentheses, clustered at the origin and dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. $EU_{o,t}$ ($Schengen_{o,t}$) is a dummy variable taking the value of 1 when $country_o$ is a EU (Schengen) member at date *t*. $EU_{o,r,t}$ ($Schengen_{o,r,t}$) is a dummy variable taking the value of 1 when $country_o$ and $country_r$ are simultaneously members of the EU (Schengen) at date *t*.
*$p < .1$, **$p < .05$, and ***$p < .01$.

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.[14] 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 labor, outmigrants from o-origin settled in r appear to be responding but mainly when the country of residence is itself already inside the regional agreement or has also signed to join the regional agreement during the same period of

[14]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.

observation. Put differently, Polish outmigration settled in Germany or Sweden appears to react to the entry of Poland into EU after 2004 or Schengen after 2007. Nevertheless, we cannot provide robust evidence that Polish settled, say, in New Zealand are sensitive to the entry of Poland into these regional agreements.

In terms of interpretation of the coefficients, by sticking to the last column in our Table 3, it suggests that joining the EU would result into a statistically significant increase of outmigration by around exp(0.21) = 23% while joining Schengen increases outmigration by more than twice as much exp(0.425) = 53%.

Some might argue that the total stock of migrant variables on the right hand side is endogenous to the policy variables, which might provoke a bias in the estimates related to the EU and Schengen variables. In Appendix D (Table D1), we move the stock of migrants variables to the left-hand side and run again the same types of specifications than those of Table 3 except that now the dependent variable is the $(\ln M^{out}_{o,r,t} / \ln TotM_{o,r,t})$ (basically, in Equation (2) above, we are now constraining the coefficient β_1 on total stock of migrants to equal 1). Coefficients estimates for EU and Schengen appear to be very similar in magnitude and when accounting for confidence intervals they are not statistically different from those of Table 3.

All of these figures related to the impact of the EU and Schengen agreements appear to be important, especially for the latter. We study in what follows how robust they can be when confronted to another battery of tests.

3.1.1 | 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, are the ones of Eastern and Central European countries in 2004 and 2007. In Table 4, we study the effect of each wave of EU and Schengen integration (see the accession date in Schengen and EU in Table 2). The effect is not significant for countries implementing Schengen in 1995 and 1996 (most former members of the EU). The effect becomes statistically significant from the 1998 wave onwards. In particular, it appears to be very strong for countries implementing Schengen in 1998 (Italy and Austria) and in 2008 when most European and Central European countries implemented Schengen agreements. In 2001, after accession of Northern European countries (Sweden, Finland, Iceland, Norway, and Denmark), we do observe a positive coefficient at the 10% degree of significance but three times lower than that being estimated for 1998 and 2007 (the estimator is around 0.20 in 2001, while it is measured around 0.7 in 1998 and 2007).[15] Concerning EU accession, the effect is relatively strong and robust across specifications for countries entering the EU in 2007 (Romania and Bulgaria). It is much weaker and less robust in terms of statistical significance in 2004 (10 Central and Eastern European countries). It is not statistically significant for countries entering the EU in 1995 (Finland and Sweden).

Overall, stronger effects are observed when Central and European countries joined the Schengen area in 2008 and, albeit with less confidence, when Romania and Bulgaria joined the EU in 2007. This might be a concern as these countries had very specific dynamics in the 1990s (post-communist 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. Notice in passing that these temporary restrictions might explain why the effect of the

[15]That being said, a simple computation of confidence intervals suggests that the estimators of 1998 and 2001 are not statistically different from each others.

TABLE 4 Effects of different waves of EU and Schengen integration.

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)	(3)
$Schengen_{o,r,t}$ 1995	-0.0208		-0.0206
	(-0.162)		(-0.157)
$Schengen_{o,r,t}$ 1996	0.179		0.185
	(1.248)		(1.290)
$Schengen_{o,r,t}$ 1998	0.700***		0.706***
	(2.726)		(2.755)
$Schengen_{o,r,t}$ 2001	0.199*		0.207*
	(1.659)		(1.743)
$Schengen_{o,r,t}$ 2008	0.748***		0.748***
	(5.474)		(5.215)
$EU_{o,r,t}$ 1995		-0.0194	-0.0303
		(-0.123)	(-0.183)
$EU_{o,r,t}$ 2004		0.195*	0.0519
		(1.800)	(0.480)
$EU_{o,r,t}$ 2007		0.533***	0.577***
		(3.044)	(3.193)
$\ln(StockMig)_{o,r}$	0.526***	0.554***	0.524***
	(11.45)	(12.07)	(11.52)
Dyadic FE	YES	YES	YES
Origin/Year FE	YES	YES	YES
Res/Year FE	YES	YES	YES
Observations	14,706	14,706	14,706
R-squared	0.969	0.969	0.969

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. $Schengen_{o,r,t}$ 1995, $Schengen_{o,r,t}$ 1996, $Schengen_{o,r,t}$ 1998, $Schengen_{o,r,t}$ 2001, and $Schengen_{o,r,t}$ 2008 are dummy variables taking the value of 1 when $country_o$ and $country_r$ become Schengen members simultaneously in 1995, 1996, 1998, 2001, and 200,8 respectively. $EU_{o,r,t}$ 1995, $EU_{o,r,t}$ 2004, and $EU_{o,r,t}$ 2007 are dummy variables taking the value of 1 when $country_o$ and $country_r$ become EU members simultaneously in 1995, 2004, and 2007, respectively.
*$p < .1$, **$p < .05$, and ***$p < .01$.

2004 wave of EU integration is much lower than the effect of Schengen integration in 2008 for the same countries. All of these unobservable factors might be captured by the bilateral agreements terms. Thus, in order to ensure that we are capturing outmigration changes explained by policy changes in the access given to a larger labor market following the EU integration and Schengen ratifications respectively, and not changes in unobservables, we propose Placebo tests, through testing the hypothetical effect of joining the EU and Schengen at a time before the actual integration or ratification time. As already noted above, the EU and Schengen shall be defined at bilateral levels from now on, while controlling for residence-year and origin-year fixed effects. Results are given in Table 5 for EU and Table 6 for Schengen.

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 prevents 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

TABLE 5 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

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. EU_{t-1}, EU_{t-2}, EU_{t-3}, EU_{t-4}, and EU_{t-5} are dummy variables taking the value of 1 when $country_o$ and $country_r$ are EU members at date $t-1$, $t-2$, $t-3$, t_4, and $t-5$, respectively.
*p < .1, **p < .05, and ***p < .01.

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 beginning of the 1990s, where most of the European countries had 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 (Table 6). 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 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). The idea is that our coefficient of interest might be driven by specific bilateral dynamics (for instance the increase in cooperation between western and eastern countries after the fall of communism) that are not related directly to Schengen or to the EU integration. Table 7 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.

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 identify correctly 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, and except when we only estimate the coefficient on countries which ratified in the very earlier years, our estimates related to the effect of Schengen are

TABLE 6 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

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. $Schengen_{t-1}$, $Schengen_{t-2}$, $Schengen_{t-3}$, $Schengen_{t-4}$, and $Schengen_{t-5}$ are dummy variables taking the value of 1 when $country_o$ and $ountry_r$ are Schengen members at date $t-1$, $t-2$, $t-3$, t_4, and $t-5$, respectively. *p < .1, **p < .05, and ***p < .01.

very robust and stable across specifications. Recall that we have already argued that the implementation of Schengen is a step beyond EU agreements in the liberalization of labor 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.[16] For all of these reasons, we will focus in the next sections on the effects of Schengen rather than EU integration.

In Table 8, 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 fulfiling 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 to some extent the magnitude of our Schengen coefficient are not affected.[17]

In Figure 1, we would like to test if the effect of Schengen is persistent over time. We plot the coefficients for each specific year (the year of implementation and up to 5 years after). Results show coefficients remain positive and significant in the following years following the implementation of Schengen. We do not observe a decrease of the coefficient, which is consistent with a persistent effect over time.

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

[17]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 and Tenreyro (2006), we use the Poisson Maximum likelihood estimator and also find comparable results.

TABLE 7 Controlling for a specific dyadic trend.

Dep. Var : $\ln(OutMigration)_{o,r,t}$	(1)	(2)
EU	-0.0672	0.0445
	(-0.515)	(0.281)
Schengen	0.330***	0.346***
	(3.006)	(2.810)
$\ln(StockMig)_{o,r}$	0.273***	0.0280
	(3.978)	(0.286)
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

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. *EU* and *Schengen* are dummy variables taking the value of 1 when $country_o$ and $country_r$ are EU and Schengen members, respectively, at date *t*.
*p < .1, **p < .05, and ***p < .01.

TABLE 8 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

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. *Schengen*, *EMU*, *Bilateral*, and *RTA* are dummy variables taking the value of 1 when $country_o$ and $country_r$ are, respectively: Schengen members, members of the European Monetary Union, part of bilateral trade agreement, and part of the same regional trade agreement at date *t*.
*p < .1, **p < .05, and ***p < .01.

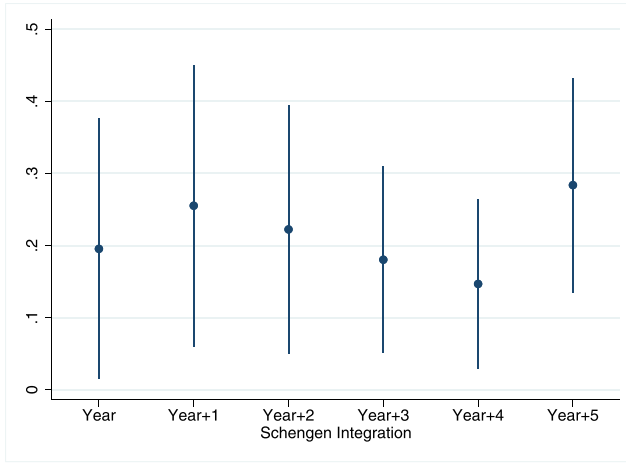

FIGURE 1 Effects of Schengen by year. *Note*: This graph shows the coefficients estimate of the following regression: $\ln M_{o,r,t}^{out} = \beta_1 \ln TotM_{o,r,t} + \beta_2 \text{Schengen-Adoption}_{o,r,t} + \beta_3 \text{Schengen-Adoption}_{o,r,t-1} + \beta_4 \text{Schengen-Adoption}_{o,r,t-2} + \beta_5 \text{SchengenAdoption}o,r,t-3 + \beta 6\text{Schengen-Adoption}o,r,t-4 + \beta 7\text{Schengen-Adoption}o,r,t-5 + \lambda[o,t] + \lambda[r,t] + \lambda o,r + \epsilon o,r,t$, where Schengen Adoption$_t$ takes the value of 1 only the year where both countries become members of the Schenghen area. Schengen Adoption$_t$, 1; Schengen Adoption$_t$, 2; Schengen Adoption$_t$, 3; Schengen Adoption$_t$, 4; and Schengen Adoption$_t$, 5, measure the effects the following years. The specification includes origin x years; residence x years and dyadic fixed effects. Standard errors are clustered at the dyadic level. Bars around each point represent the 95% confidence intervals. [Colour figure can be viewed at wileyonlinelibrary.com]

3.2 | The role of cultural proximity

In our theoretical model, in the appendix, we show that the higher is preference for domestic consumption of a potential outmigrant, the higher will be the probability to out-migrate, all things being equal. Further, one can also show (see again the appendix) that after a shock of openness to labor mobility, outmigraton from a residence country should increase more when the country of origin of the outmigrant is culturally very different from the country of residence (i.e., when differences in preferences for consumption are substantial across the two countries). To take an example, the preference for consumption at home (say in Estonia) will be higher for an Estonian than for a Romanian living in Italy, because of some common cultural heritage between Italy and Romania. When Italy let both Estonians and Romanians move out and be back freely to Italy, one could expect a disproportionate increase of Estonian outmigrants compared to Romanian ones.

We use geographical distance and contiguity as proxies of cultural proximity (the higher is the distance, the lower is cultural proximity) to test such an idea. 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 and 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 two languages belonging to separate family trees, 0.25 for two languages belonging to different branches of the same family tree (English and French for instance), 0.5 for two languages belonging to the same branch (English and German), and 0.75 for two 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 9. The coefficient is positive and significant when the Schengen dummy is interacted with simple distance and negative when interacted with contiguity, which is consistent with our prediction.

Further, 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.

We do not want to draw very robust conclusions from this exercise, as some estimates indicate no statistical significance. Nevertheless, a majority of the estimated effects linked to the cultural proximity variables at hand (including geographical distance or the contiguity variable) turn out to be consistent with our prediction, suggesting a likely additional effect on outflows when cultures are more different.

3.3 | The effect of EU and Schengen on migration inflows and out-migration to in-migration ratios

From the literature, Beine et al. (2019) show that the EU and Schengen agreements have a significant and positive effect on the entry of migrants. Here, we use the same *International Migration Statistics* database from the OECD, which provide migration inflows data to compare our previous results on migration outflows with the ones on migration inflows. We provide in what follows estimates for the effect of Schengen and EU on migration inflows to be

TABLE 9 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)	(11.07)	(11.00)	(11.08)	(11.00)	(10.97)	(10.89)
$Schengen_{o,r}$	0.194*	0.462***	0.415***	0.716***	0.413***	0.726***	0.698***	0.724***
	(1.73)	(4.95)	(4.510)	(4.820)	(4.504)	(4.800)	(4.673)	(4.915)
$Distance_{o,r}$ 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
			(-0.865)			(0.304)	(-1.240)	(-1.637)
Com. Spoken Language x $Schengen_{o,r}$				-0.693***		-0.719***	-0.395	-0.330
				(-2.987)		(-2.949)	(-1.367)	(-1.218)
Com. Native Language x $Schengen_{o,r}$					-0.227	0.0963	0.124	0.126
					(-0.966)	(0.288)	(0.377)	(0.381)
Language Prox. 1 x $Schengen_{o,r}$							-0.0630**	
							(-2.231)	
Language Prox. 2 x $Schengen_{o,r}$								-0.106***
								(-2.794)
Dyadic FE	YES	YES	YES	YES	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Origin/Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	14,586	14,586	13,688	13,688	13,688	13,688	13,652	13,652
R-squared	0.965	0.969	0.97	0.97	0.97	0.97	0.97	0.97

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. $Schengen_{o,r}$ is a dummy variable taking the value of 1 when $country_o$ and $country_r$ are Schengen members. Contig is a dummy variable taking the value of 1 when countries *o* and *r* are contiguous. Com. O . Language, Com. Spoken Language and Com. Native Language are dummy variables taking the value of 1 when countries *o* and *r* shares the same official, spoken, or native language. Language Prox. 1 and Language Prox. 2 are two proxies of language proximity provided by Melitz and Toubal (2014). The first one relies on linguistic proximities form the Ethnologue classification of Language and the second one on scoring of similarity between 200 words.

*$p < .1$, **$p < .05$, and ***$p < .01$.

TABLE 10 The effects on ln (migration outflows), ln (inflows), and the ln (rate of outflows to inflows).

Dep. Var :	$\ln(OutMigration)_{o,r,t}$	$\ln(InMigration)_{o,r,t}$	$\ln \frac{OutMigration}{InMigration}_{o,r,t}$
$\ln(StockMig)_{o,r}$	0.543***	0.799***	
	(11.84)	(22.85)	
$EU_{o,r,t}$	0.210**	0.248**	0.101
	(2.296)	(2.295)	(0.880)
$Schengen_{o,r,t}$	0.425***	0.221***	0.182**
	(4.508)	(3.443)	(2.148)
Dyadic FE	YES	YES	YES
Origin/Year FE	YES	YES	YES
Origin/Year FE	YES	YES	YES
Observations	14,706	21,874	14,204
R-squared	0.969	0.978	0.858

Note: Robust *t* statistics in parentheses, clustered at the dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. $EU_{o,r,t}$ ($Schengen_{o,r,t}$) is a dummy variable taking the value of 1 when $country_o$ and $country_r$ are simultaneously members of the EU (Schengen) at date *t*.
*$p < .1$, **$p < .05$, and ***$p < .01$.

compared with those of outflows on one hand, and, on the other hand, we show how these agreements have affected out-migration to in-migration ratios.[18]

These specifications will allow to investigate the difference of reactions of outflows compared to inflows due to joining the EU and/or Schengen. In particular, these specifications when taken together can be viewed as a sort of test to identify the specific characteristics of outflows making them differently sensitive to border openings when compared to inflows of migrants.

We concentrate on two factors here which predict differences in those reactions. Now, wherever they are residing, whether at home or in any foreign country, potential migrants know that a land free of borders would make them circulate more in the long run due to the insurance argument of having free access to all opportunities of work in the enlarged labor market. Nevertheless, while people have a home bias (prefer to live and consume at home), everything being equal one could observe outmigration to react more to openness of borders than in-migration. In fact, home bias is a factor of resistance to leave for people living at home, while it is a push factor for people living out of their home land. This push factor combined with the insurance factor of moving back and forth across countries without borders thanks to openness might then affect more outmigration flows than standard migration flows between pairs of countries (*o*,*r*).

Table 10 shows the results using the specifications with all possible combinations of fixed effects. Column 1 reproduces the same results for outmigration flows than those produced by column 8 in Table 3. In column 2, we present those of standard migration inflows (labeled in-migration here). Schengen and EU appear to have a clear and statistically significant positive effect on in-migration as well.[19] Nevertheless, while the coefficient on EU is similar across both specifications 1 and 2 that on Schengen is almost as twice as high in magnitude for outmigration than for in-migration. Besides, it is interesting to note that our results on the EU and Schengen effects on inflows of migrants are very similar to those obtained by Beine et al. (2019). In a third specification, we then look at the log of the ratio $\frac{outflows}{inflows}$. It suggests that Schengen increases the rate of out-migration to in-migration by around 19% with statistical significance. Hence, outmigration flows appear to react more to openness than in-migration, which is consistent with our prediction.

[18]Note that $\ln(outflows) - \ln(Inflows) = \ln\left(\frac{Outflows}{Inflows}\right) = \ln\left(\frac{Outflows/TotalMig}{Inflows/TotalMig}\right) = \ln\left(\frac{Outflows}{TotalMig}\right) - \ln\left(\frac{Inflows}{TotalMig}\right)$. In other words, when estimating the effect on $\ln(Outflows) - \ln(Inflows)$, we also measure the relative effect on migration outflows *rate* compared to migration inflows *rate*.
[19]Of course, we know from prior sections that the EU variable is probably correlated with other unobserved variables covarying also with outmigration over pair of countries and time, making the identification of our effect difficult. However, we leave it in the specification for sake of comparison with in-migration data. Running the same specifications without the EU variable produces the same outcomes anyway.

4 | CONCLUDING REMARKS

In this paper, we have shown that opening-the-borders policies, which favor (im)-migration within regional agreements, may actually provoke an increase in the outflows of previously settled migrants. Openness to labor movements within regional arrangements 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 good support to our simple intuition through the implementation of Schengen agreements. We have also tested the prediction of our intuition against the data by looking at the effect of joining the EU. There we could find some support to it too, but the obtained estimates did not resist our battery of robustness tests.

Many questions are still binding though. One would like to access individual data to investigate how the heterogeneity of migrants is playing a role, with respect to their skills, age, professional status, or some other characteristics that might influence the decision of immigrants to move back and forth.

Besides, our work is based on a partial equilibrium reasoning. In general equilibrium, after openness, labor might fly back from high wage to low wage countries because of the preference for home consumption hypothesis, making wages converge between the two types of economies, inducing further departures.

Last but not least, beyond the scope of this study, two important questions emerge: how regional agreements reallocate labor resources across countries and whether it is good or bad for the region as a whole and in particular, for each of the countries involved. We have tried to respond to the first question, at least partially. Further research is needed to exploit more thoroughly how labor services move within open regions with respect to the characteristics of individuals on one hand, and how this is affecting the overall performance of the economies being involved. In particular, it is interesting to note from the literature that the responsiveness of migrant supply of services to skill labor shortages in some industries in the EU is higher than that of the natives (Guzi et al., 2018). Then, outmigration might have some consequences on skill shortages and need to be accounted for when looking at these issues regarding skill shortages in the European labor market.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available at Harvard Dataverse (doi: https://doi.org/10.7910/DVN/QPUEOS). These data were derived from the following resources available in the public domain: OECD (2013).

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APPENDIX A: THE MODEL

In this appendix, 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 incidentally 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 largely inspires our empirical specifications in the heart of the paper.

A.1 | Migrants

Modeling discrete choice problems and aggregating heterogeneous individuals' behavior is one of the recent and most compelling issues in both theoretical and empirical economics. The more useful and used models seem to be the discrete choice ones with Frechet or Gumbel draws. Such models are well fitted to mimic large economic patterns and appraise changes in aggregate behavior in response to some modification undertaken by relevant structural parameters of the surrounding economic environment. This in turn allows proposing economic predictions within rigor and tractability. Nevertheless, some limits to the Frechet or Gumbel draws are recognized. The main one is not to allow easily accounting for heterogeneity at the individual level and therefore to make it difficult to deal with, for example, binomial or uniform distributions. In other words, the analysis is conducted at an aggregate level by neglecting the underlying and not homogeneous individual behaviors.

We develop in this appendix an alternative model that is able to provide analytical results: Such model, indeed, is grounded upon individual behavior, that is, fully microfunded, and the transition from a microanalysis towards a macro one is easy and does not involve any convoluted equations. As we will explain later on, our model is quasi-static, in the sense that although it involves one period, there are indeed three sub-periods in each one that individuals take different decisions. There then emerges a clear and easily interpretable decision tree whose final outcome may be immediately evaluated in terms of subjective utilities. The decision tree is strongly linked to the presence of a range of available final destinations for migrants initially settled into a given foreign country. In fact, our model allows computing in an internally consistent way the expected outcomes associated to any postulated and virtual "path." We will clearly explain the timing assumption in detail with the help of decision-tree type of graph. In order to make it clear, let us describe the basic set-up.

We consider a three-country set-up with a country *R*, a country *O*, and a third country *W*. The period of reference is splitted into two sub-periods, and in each of them, different decisions are taken, as we will explain later on. 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, in the first sub-period, faces then the choice of whether or not to exit *R*; such choice is effectuated 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. She will actually internalize the fact that if she experiences a bad shock at home, she could decide leaving home to another destination, say *W*, and then from there, she 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 alike

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. In the light of these considerations, it clearly appears that the model is not fully static but it is more like a two-period decision model. Within each sub-period, different decisions are made and actions are undertaken. As a matter of fact, in the first sub-period, residents living in *R* and native in *O* must decide whether to go back home or not. If they decide to move back to *O*, they can face a good shock or a bad shock. Only under the latter occurrence they might want to move to *W* or, in the case they not succeed in this way, to go back to *R*. According to this picture, there clearly emerges an implicit dynamic setup with thus decision points. As a consequence, there are two time periods, although it is more appropriate to refer as to two time sub-periods.

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).

A.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.

A.2.1 | 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; that is, 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.

A.2.2 | 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

$$k_O^H > k_O^L. \tag{A1}$$

The parameter q_o captures the instability of country *O* relative to *R*. A q_o very close to one reflects a rather stable origin country in which productivity is very likely to be high, whereas a q_o 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 (home bias) 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

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

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 available in *O*. We assume that the migrants are distributed in the interval $[\alpha_{min}, \alpha_{max}]$, where

$$\alpha_{min} \equiv k_R / k_O^H \tag{A2}$$

and

$$\alpha_{max} \equiv k_R / k_O^L. \tag{A3}$$

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.

A.2.3 | 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

$$k_W^H > k_W^L. \tag{A4}$$

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

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

A.2.4 | 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 $|\frac{\gamma'(\alpha)\alpha}{\gamma(\alpha)}| < 1$.[20] The hypothesis of an elasticity of the function $\gamma(\alpha)$ lower than one 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 $\gamma(\alpha)$, we make the hypothesis that the migrant with the lowest home bias α_{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, that is,

[20]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*.

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

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

$$\alpha k_O^H > \gamma(\alpha)\alpha k_W^H > k_R. \tag{A5}$$

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 α_{min} will conversely be indifferent between these three destinations.

In an analogous way, we assume that the migrant with the largest home bias α_{max}, in the case of the realization of the bad shock both in the *O* country and in the *W* country, is indifferent which country to settle in, that is,

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

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 $< \alpha_{max}$:

$$\alpha k_O^L < \gamma(\alpha)\alpha k_W^L < k_R \tag{A6}$$

Of course, the individual α_{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 $f(\alpha)$, that is, $M = \int_{\alpha\min}^{\alpha\max} f(\alpha)d\alpha$.

A.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 $p_{OO} = 1$, 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, that is, country *O*.

So our migrant first best, if she 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 (A5) and (A6), 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, she will first try to migrate to *W*. If she succeeds, in the case the good shock is produced in *W*, she will stay there, otherwise she 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 comeback to *R* is demanded since the moment the migrant has decided to return to *O*.

A.3.1 | Timing and decision tree

In order to make it clear the timing of the set of decisions, a given individual endowed with a home bias α is faced with ; let us introduce the following decision-tree type of graph (Figure A1). In the first sub-period, individual α must decide whether to remain in *R* or to move to *O*. Of course, having the *O* nationality, the probability p_{RO} of moving from *R* to *O* is one. On the other hand, since the individual is always free to try to move from *O* to *W*, such strategy always dominates that of moving directly from *R* to *W*, whose probability of success is $p_{RW} = p_{OW}$. If, for a given configuration of the parameter values, the individual with home bias α is such that satisfies $\alpha > \alpha_M$, then she moves to *O*. In the subsequent sub-period, such an individual observes the realization of the shock in *O*. Where the shock happens to be the good one, she remains in *O* until the end of the period and gets utility αk_O^H. On the other hand, facing the realization of the negative state of nature, she immediately tries to move to *W* with a probability of succeeding equal to p_{OW}. If she fails, she will be bounded to remain in *O* and obtain utility αk_O^L all through the remaining time spent in *O*. In case of a successful migration to *W*, in the third sub-period, she will observe the realization of the shock in such a country. Where here the shock to occur be the good one, she remains in *W* until the end of the period with payoff $\alpha\gamma(\alpha)k_W^H$. On the other hand, face the realization of the negative shock, she will try to move to *R* with a probability of success equal to p_{WR} enjoying the utility k_R. If she fails, she will be bounded to remain in *W* and obtain utility $\alpha\gamma(\alpha)k_O^L$ all through the remaining time spent in *O*.

The above decision-tree may be of great help to eliminate some possible criticisms about the internal consistency of the model. Indeed, the graph enables to clearly list the possible feasible destinations for given migration policies and thus to pick the best choice. To shed light on this point, let us observe that with probability $p_{OR}p_{OW}$, all choices, that is, *O*, *R*, and *W*, are available as destinations. In view of our assumptions, individual with home bias $\alpha > \alpha_M$ ranks first the choice to stay in *O* were there the good shock to occur, then *W* where there the good state of

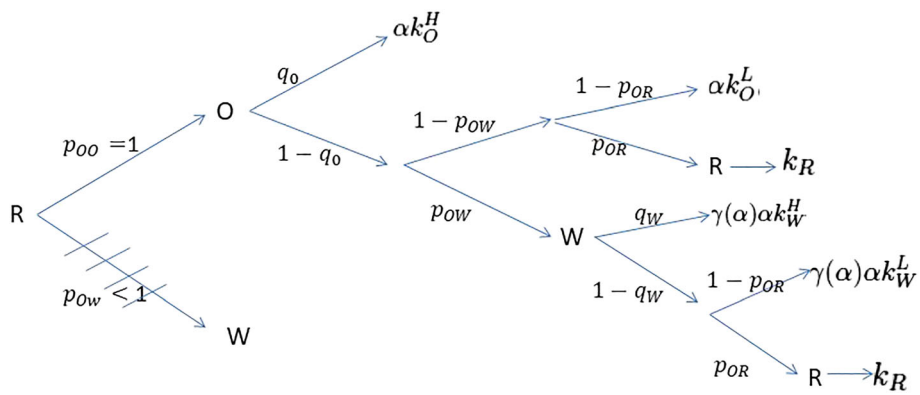

FIGURE A1 Decision tree. [Colour figure can be viewed at wileyonlinelibrary.com]

nature to realize, then *R*. Indeed, face to a bad shock in *O* he will try to move to *R*, and, if even there is the bad shock to occur, individual α will prefer *R* to *W*. In turn, with probability $p_{OR}(1-p_{OW})$ only *R* and *O* will be available and the ranking in terms of utility depends upon the realization of the shock in *O*. The composed probability $p_{OW}(1-p_{OR})$ is on the other hand meaningfulness since the migrant prefers always to move first from *O* to *R* rather than from *O* to *W*. Eventually, with probability $(1-p_{OW})(1-p_{OR})$, only *O* will be available so no decision to make. Nevertheless, from the decision-tree, it emerges clearly that decisions are taken sequentially: In each node of the tree further behavior rests upon the observed realization of the shock.

A.3.2 | Migration decision

Now, we aim at introducing the conditions under which an individual with home bias equal to α decides whether to move back home or to remain in the initial destination country. 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

$$\begin{aligned} u^e = q_O \alpha k_O^H + (1-q_O)\left[p_{OW}\left(q_W \gamma(\alpha)\alpha k_W^H + (1-q_W)\left(p_{OR}k_R + (1-p_{OR})\gamma(\alpha)\alpha k_W^L\right)\right)\right] \\ +(1-q_O)\left[(1-p_{OW})\left(p_{OR}k_R + (1-p_{OR})\alpha k_O^L\right)\right]. \end{aligned} \tag{A7}$$

Equation (A7) has the following meaning. If a migrant settled in *R* moves to *O*, with a probability q_O she faces a labor productivity k_O^H (which yields an utility αk_O^H) and, in view of (A5), remains in *O*. Conversely, with a probability $(1-q_O)$, the bad state of the nature occurs. It follows that she will try to move to *W* with a probability of success p_{OW}. In such a case, she will get an utility $\gamma(\alpha)\alpha k_W^H$ with a probability p_{OW}. If she does not succeed to move to *W*, she 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, she will try to migrate to *R* and will succeed with a probability p_{OR} with the corresponding utility k_R. If she does not succeed, with a probability $(1-p_{OR})$, she 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*, she will try to move back to *R* with a probability of success p_{OR} (and a payoff k_R) and with a probability $(1-p_{OR})$, she 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 (A7) 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

$$\begin{aligned} &\alpha\left[q_O k_O^H + (1-q_O)\left(p_{OW}q_W\gamma(\alpha)k_W^H + (1-q_W)(1-p_{OR})\gamma(\alpha)k_W^L + (1-q_O)(1-p_{OW})(1-p_{OR})k_O^L\right)\right] \\ &> k_R[1-(1-q_O)((1-q_W)p_{OR} + (1-p_{OW})p_{OR})], \end{aligned} \tag{A8}$$

that is,

$$\alpha > \alpha^*(\alpha) \equiv \frac{k_R[1-p_{OR}(1-q_O)(1-p_{OW}q_W)]}{\left[q_O k_O^H + (1-q_O)\left(p_{OW}q_W\gamma(\alpha)k_W^H + (1-q_W)(1-p_{OR})\gamma(\alpha)k_W^L + (1-q_O)(1-p_{OW})(1-p_{OR})k_O^L\right)\right]}. \tag{A9}$$

Notice that the left-hand side of (A7) is, under the hypothesis $|\frac{\gamma'(\alpha)\alpha}{\gamma(\alpha)}| < 1$, increasing in α; therefore, there exists an α_M such that the left-hand side of (A7) equalizes the right-hand side and such that for any $\alpha > \alpha_M$, one has that the left-hand side of (A7) is larger than the corresponding right-hand side. With respect to (A7), this implies that the function $\alpha^*(\alpha)$ is increasing and concave with, in view of the definitions of α_{min} and α_{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 B of migrants who will leave country R can be then computed according to $f(\alpha)$, the density function of α, on the interval $[\alpha_M, \alpha_{max}]$:

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

It is verifiable that, under inequalities (A1), (A4), (A5), and (A6), 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. The proof of this statement could be drawn by applying the Implicit Function Theorem but emerges more simply from the fact that u^e, as it is defined in (A7), is increasing in q_O and q_W. Where one of the latter made to increase, u^e would increase; in order to re-establish the indifference condition $u^e = k_R$ would require a decrease of the critical α_M. In fact, only a decrease in α_M will provide the flow of return migration now attracted by a more expected favorable environment at home. It is also 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 and 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. To prove these results, it is sufficient to check the expression (A7) for u^e and verify that, again under inequalities (A1), (A4), (A5), and (A6), it is increasing in k_O^H, k_O^L, k_W^H, k_W^L, and α. As a consequence, an increase in k_R in order to re-establish the indifference condition $u^e = k_R$ will require an increase in α, while facing an increase in k_O^H, k_O^L, k_W^H, and k_W^L the indifferent individual will be now naturally endowed with a lower α. Finally, and most importantly, inequalities (A1), (A4), (A5), and (A6) ensure that α_M is monotonically decreasing in p_{OR} and p_{OW}. Indeed, 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. The formal proof of this statement is immediately obtained once one observes that, under inequalities (A1), (A4), (A5), and (A6), u^e is increasing in p_{OR} and p_{OW} and, therefore, is response to an increase in one of the latter probabilities, in order to re-establish the indifference condition $u^e = k_R$, it is required a lower preference for home consumption. 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.

A.3.3 | Migrants from different origins

Our model predicts that all the migrants with a large enough home bias, will decide to move back to their origin country after openness. However, a host country is usually recipient of distinct groups of migrants, proceeding from different countries. One can assume that each of such groups to be characterized by a different distribution for the home bias, reflecting an average cultural distance from the host country. As a consequence, a simultaneous relaxation of the migration policy in the host country in respect to all the possible countries of provenance of

migrants will increase in different degrees of amplitude the migration outflows of each national group of migrants. Indeed, the migration outflows will be more sustained for those groups of migrants exhibiting on average a larger cultural distance from the host country; for such groups, in fact, the increase in utility induced by a return at home is larger, and thus, it is sufficient to provide them a relatively small incentive to push them to move back home. The same idiosyncratic effect on the migration outflows within different groups of migrants characterized by different averages of cultural distance is obtained in the case it is the migration policy of a third country to be relaxed. Here again, indeed, one will observe a larger migration outflow in respect to those groups of migrants sharing larger average cultural distances. As a consequence, in order to measure the changes of the migration outflows in response to the modification of the migration policy of a given host country, one must account for the specification of all the possible bilateral migration policies as well as for the distribution of the cultural proximity within each national group of migrants.

APPENDIX B: MIGRATION OUTFLOWS DATA

TABLE B1 Migration outflows data source and definition.

Country	Source	Definition
Australia	Residence permits	Permanent departures are persons who on departure state that they do not intend to return to Australia. Long-term departures include persons departing for a temporary stay of more than 12 months.
Austria	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 6 weeks.
Belgium	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 3 months. Outflows include administrative corrections
Denmark Estonia	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 3 months. However, the data presented in the tables count immigrants who live legally in Denmark, are registered in the Central population register, and have been living in the country for at least 1 year. Outflows include administrative corrections
Finland	Population registers	Criteria for registering foreigners: holding a residence permit, intending to stay in the country for at least 1 year.
Germany	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 1 week.
Hungary Iceland	Population registers	Data include foreigners who have been residing in the country for at least a year and who currently hold a long-term permit. Data are presented by actual year of entry (whatever the type of permit when entering the country). Outflow data do not include people whose permit has expired.
Ireland	Household surveys	
Italy	Residence permits	
Japan	Population registers	Criteria for registering foreigners: holding a valid visa and intending to remain in the country for more than 90 days.
Luxembourg	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 3 months.

(Continues)

(Continued)

Country	Source	Definition
Netherlands	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 4 of the next 6 months.
New Zealand	Residence permits	Outflows: Permanent and long term departures (foreign-born persons departing permanently or intending to be away for a period of 12 months or more).
Norway	Population registers	Criteria for registering foreigners: holding a residence or work permit and intending to stay in the country for at least 6 months.
Slovakia	Population registers	Data include permanent residence, temporary residence, and tolerated residence.
Slovenia		
Spain	Population Registers	Criteria for registering foreigners: Residing in the municipality.
Sweden	Population registers	Criteria for registering foreigners: holding a residence permit and intending to stay in the country for at least 1 year.
Switzerland	Population registers	Criteria for registering foreigners: holding a permanent or an annual residence permit. Holders of an L-permit (short duration) are also included if their stay in the country is longer than 12 months.
United Kingdom	Residence permits	Outflows: Non-British citizens leaving the territory of the United Kingdom.

Source: OECD IMS Database.

APPENDIX C: OUTMIGRATION IN SELECTED COUNTRIES, BEFORE AND AFTER THE IMPLEMENTATION OF SCHENGEN

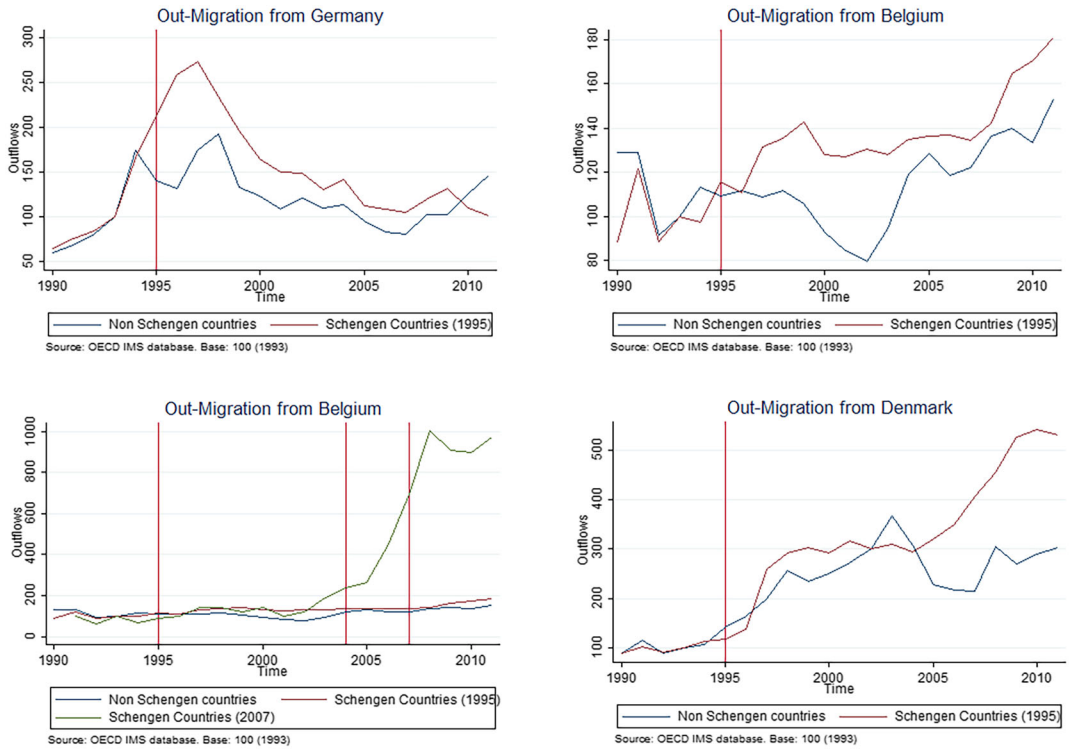

FIGURE C1 Outmigration from selected countries. *Source*: OECD IMS Database. [Colour figure can be viewed at wileyonlinelibrary.com]

APPENDIX D: ROBUSTNESS WITH OUT-MIGRATION RATE AS DEPENDENT VARIABLE

TABLE D1 Robustness with out-migration rate as dependent variable.

Dep. Var : $\ln(OutMigration/StockMig)_{o,r,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MigPolicy								
$EU_{o,t}$	0.193***	0.205***	0.0156		0.149**	0.166**	-0.00396	
	(2.742)	(2.950)	(0.155)		(1.998)	(2.255)	(-0.0381)	
$EU_{o,r,t}$			0.300***	0.267***			0.269***	0.240***
			(3.547)	(3.876)			(3.141)	(3.403)
$Schengen_{o,t}$					0.146***	0.131**	-0.0991	
					(2.980)	(2.452)	(-1.507)	
$Schengen_{o,r,t}$							0.301***	0.341***
							(5.094)	(3.338)
Controls								
$GDPgrowth_{r,t}$	-0.0308***				-0.0311***			
	(-6.440)				(-6.513)			
$\ln(GDPpercap)_{r,t}$	-2.375***				-2.361***			
	(-4.399)				(-4.359)			
$\ln(Unemp)_{r,t}$	0.239***				0.238***			
	(5.247)				(5.189)			
$Gdpgrowth_{o,t}$	0.00208	0.00171	0.00167		0.00288	0.00239	0.00299	
	(1.101)	(0.924)	(0.902)		(1.427)	(1.264)	(1.554)	
$\ln(GDPpercap)_{o,t}$	-0.0563	-0.0135	0.00869		-0.0384	0.00109	0.0775	
	(-0.270)	(-0.0646)	(0.0419)		(-0.181)	(0.00513)	(0.382)	
$\ln(Unemp)_{o,t}$	-0.0369	-0.0124	-0.0102		-0.0363	-0.0120	-0.00408	
	(-0.834)	(-0.279)	(-0.230)		(-0.840)	(-0.276)	(-0.0973)	
Dyadic FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	YES	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	0.880	0.921	0.921	0.936	0.881	0.921	0.922	0.936

Note: Robust *t* statistics in parentheses, clustered at the origin and dyadic level. Observations are dyadic with *o* the migrants' origin and *r* the residence country. $EU_{o,t}$ ($Schengen_{o,t}$) is a dummy variable taking the value of 1 when $country_o$ is a EU (Schengen) member at date *t*. $EU_{o,r,t}$ ($Schengen_{o,r,t}$) is a dummy variable taking the value of 1 when $country_o$ and $country_r$ are simultaneously members of the EU (Schengen) at date *t*.

*$p < .1$, **$p < .05$, and ***$p < .01$.