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BARRIERS TO MIGRATION IN THE EUROPEAN UNION: DOES JOINING THE UNION LEAD TO LOWER BARRIERS?

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This working paper reflects the views of the authors only. It is intended to stimulate debate, comments and criticism.

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Content

Abstract

This working paper looks at the effect of joining the European Union on openness to migrants, both European and non-European. It replicates and extends Head & Mayer's (2021) gravity model-based analyses of barriers to migration within European countries. Using an event analysis, we show in addition that EU membership is responsible for a reduction in barriers to migration, of over 25% compared to their level 5 years prior to EU entry, for EU migrants.

Résumé

Ce document de travail s'intéresse à l'effet de l'entrée dans l'Union européenne sur l'ouverture aux migrants, européens ou non. Il réplique et étend les analyses à partir de modèles de gravité de Head & Mayer (2021) sur les barrières à la migration au sein des pays européens. À l'aide d'une analyse événementielle, nous montrons de plus que l'adhésion à l'Union Européenne est à l'origine d'une réduction des barrières à la migration, de plus de 25 % par rapport à leur niveau 5 ans avant l'entrée dans l'Union, pour les migrants communautaires.

Introduction

The free movement of persons has been at the heart of European integration since its inception. As early as 1957, Article 48 of the Treaty of Rome committed the Member States to ensuring "the free movement of workers...within the Community". This provision gives workers the right to move within the European Union to find employment and prohibits discrimination on the basis of nationality. Subsequent treaties have attempted to remove the remaining barriers to migration within the Union. The 2007 Lisbon Treaty, for example, extended the free movement principle from workers to all persons, including pensioners.

The Schengen area, which includes 23 of the 27 countries of the European Union and four associated countries[1], is thus the largest multinational area of free movement of persons. Article 3 of the TEU stipulates that any individual (EU or third country national), once he/she has entered the territory of a member country of the Schengen area, can cross the borders of the other countries without controls.

What are the advantages of this mobility? In general, economists look at labor migration as a positive-sum game for the home and host countries (Clemens, 2011). It has a positive impact on the economy of the host countries, thanks in particular to the relative youth of migrants, their participation in the labor market (Brücker *et al.*, 2014), the increase in the size of the markets they generate (a migrant is also a consumer) and a possible effect of immigration on entrepreneurship and innovation (Diodato *et al.*, 2022).

It can also benefit the migrants' countries of origin, as temporary migrants return with skills acquired during their stay, which increases the human capital of the country of origin; and their presence also increases financial and trade flows between the two countries (Bahar & Rapoport, 2018). However, it is important to note that migration can also have negative consequences for some natives in the host countries (increased competition in the labor market (Altonji & Card, 1991), use of public goods, etc.) as well as in the countries of origin ("brain drain", reduction of the labor force, etc.).

As far as European Union countries are concerned, due to the lesser heterogeneity of wages and socio-fiscal systems, but also because of the higher proportion of temporary migration, the ratio between the benefits and costs of immigration may be more favorable (Caliendo *et al.*, 2021; Batut, Gantois & Lavallée, 2023) and makes the European experience of freedom of movement a potentially important economic asset.

Given these economic benefits, it is especially interesting to look at the economic literature that studies the extent to which barriers to migration remain in Europe. A recent paper, « The United States of Europe: A Gravity Model Evaluation of the Four Freedoms », by Keith Head and Thierry Mayer (*Journal of Economic Perspectives*, 2021) is one example. The authors analyze the change in the openness of the European Union countries to trade in goods and services, migrant flows and capital flows in the long run. They find that while the European Union experienced a gradual opening in these four dimensions since the 1960s, reaching an internal level of openness similar to the United States for goods, services and capital flows in 2015, it is not the case for migrants. According to their results, a spectacular opening to European migrant inflows did happen in the 1960s but the degree of openness of the European Union stagnated ever since.

This short paper first reviews and replicates the main analysis of Head & Mayer (2021) focusing on the openness to European Union migrants. We use the same datasets, update them when possible and make additional robustness checks. Furthermore, we extend their analysis thanks to an event analysis approach, using accession to the European Union to investigate whether institutional change related to it may cause further opening to EU and third-country migrants.

[1] Bulgaria, Ireland, Romania and Cyprus are not involved, while Norway, Iceland, Switzerland and Liechtenstein are part of it.

We successfully replicate Head & Mayer's (2021) main results regarding openness to European and non-European migrants and find that they pass with flying colors additional robustness tests. However, the extent of the liberalization in the 1960s appears to have been overstated and is dependent on using a Poisson Pseudo Maximum Likelihood estimation. Taking a slightly different lens, we are also able to show that the subsequent stagnation is partly explained by a composition effect: the accession of relatively more closed countries in the European Union in more recent years leads to an underestimation of the opening since the 2000s. We further show that joining the European Union is accompanied by a statistically significant reduction in frictions to goods and persons inflows, particularly for European migrants, proving that the removal of institutional barriers to migration linked to joining the European Union might partly explain the low level of frictions estimated in Head & Mayer (2021).

In what follows, Section 1 presents Head & Mayer's (2021) approach, Section 2 introduces datasets used by Head & Mayer (2021) and this paper and then our replication results. Section 3 extends their original analysis and Section 4 concludes.

1. Presentation of Head & Mayer (2021) approach

In their paper, Head & Mayer (2021) estimate the evolution of frictions between European Union countries for four types of flows: goods, peoples, services, and business capital flows. To do this, following a literature that goes back to Tinbergen (1962), they use a gravity model to estimate a measure τ_{nit} of frictions between countries i and n at time t in units of the value of the flow under consideration. Gravity models mimic the modelization of gravitational attraction in physics to explain the importance of flows between countries: they are mainly determined by the distance between countries and their relative size (GDP or population). In this context, frictions can be understood as what counters these "physical" forces and may limit flows between countries (tariffs, closed borders, cultural differences, etc.). Most papers in this literature estimate τ_{nit} using bilateral panels with the value of trade between countries and equations as such: $-\epsilon \ln \tau_{nit} = \beta_t^{EU} EU_{nit} + \nu_{nit}$ where ϵ is the elasticity of welfare with respect to τ, EU_{nit} is a binary variable equal to 1 if countries i and n are both part of the European Union in t and 0 otherwise, and ν_{nit} captures all other determinants like proximity or relative GDP. In this framework, $e^{\frac{\beta_t^{EU}}{-\epsilon}} \times 100$ measures the change in frictions associated with joining the European Union in percentage points. Head & Mayer (2021) refine this basic model:

1. Following Mayer, Vicard, and Zignago (2019), they add δ_{ni} i.e., fixed effects per dyad {n;i} to control for all unobservable variables constant per country pair including distance, or cultural proximity.

2. Also following Mayer, Vicard, and Zignago (2019), they incorporate δ_{nt} and δ_{it} , fixed effects for the interactions between each importing and exporting countries and the time dimension. This controls for all country-specific shocks in the panel.

3. Finally, they allow the estimation model to compare external and internal flows (their variable of interest becomes $BN_{ni}EU_{nit}$ where BN_{it} is a binary variable equal to 1 if the two countries differ and 0 otherwise) and distinguish three types of flows: intra-European flows, flows towards the European Union and extra-European flows.

Thus, they estimate the following model:

$$-\epsilon \ln \tau_{nit} = \beta_t^{EU} BN_{ni} EU_{nit} + \beta_t^{CET} BN_{ni} CET_{nit} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$$

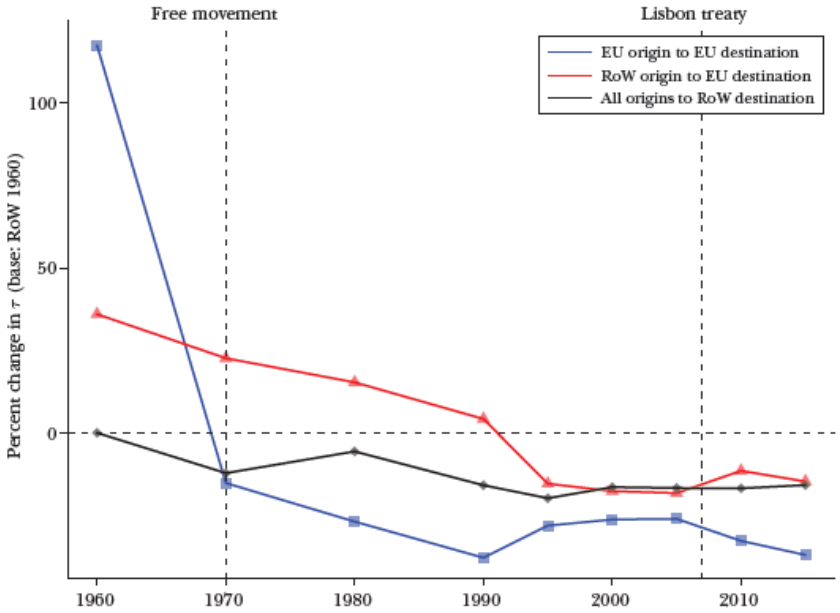
Where CET_{nit} is a binary variable equal to 1 if the flow origin country is extra-European and the destination country is in the European Union (0 otherwise) and ROW_{nit} is a binary variable equal to 1 if both the flow destination and the flow origin countries are extra-Europeans (0 otherwise). Here, β_t^{EU} is still our variable of interest and β_t^{CET} allows to check that an opening within the Union countries does not translate into a relative closing to the countries outside, what the authors call the "Fortress Europe" hypothesis. The authors explain that the intensification of exchanges between European Union countries might replace exchanges that happened between European and non-European union countries. Given the presence of δ_{ni}, the dyad fixed effects, Head & Mayer (2021) can only estimate frictions relative to a benchmark τ_0 : they choose frictions to extra-European countries in 1960 for this (β_{1960}^{ROW}). Moreover, given the large proportion of non-trading countries, they do not rely on ordinary least squares estimation but on a Poisson Pseudo Maximum Likelihood (PPML) approach, as suggested by Santos Silva and Tenreyro (2006).

The dependent variable for their study of migration frictions is the share of the population born in the country of origin that is living in the country of destination[2]. Such stock changes might be a non-optimal way of assessing flows because of return migrations: if between 1960 and 1970, 10 000 French immigrate to Germany and 10 000 go back then it would not register as a change. In their analysis, this could lead them

[2] A definition that does not depend on citizenship laws or naturalization practices.

to underestimate relative openness in places or time where return migrations are more prevalent[3]. It has also the disadvantage of making the friction measure more dependent to previous periods: for example, a country which stops accepting migrants will still be estimated to be "open" if the preexisting stock is large enough. Still, Head & Mayer (2021) use migrant stocks because intra-national flow data are not widely available and that their model needs some measure of it to estimate frictions. Figure 1 is taken from their paper and shows the distribution of β_t coefficients. Their results point to a strong liberalization of migration flows between European Union countries between 1960 and 1970, much faster than between Non-European and European countries, and a relative stagnation thereafter. In the next section, we show that we can successfully replicate their results and that they seem quite robust to additional tests, even though the scale of the initial liberalization might be overstated.

Figure 1: Evolution of frictions to migration, original graph in Head & Mayer (2021),



Note: Distribution of the estimated coefficients $\boldsymbol{\beta_t^{EU}}$, $\boldsymbol{\beta_t^{CET}}$ and $\boldsymbol{\beta_t^{ROW}}$ from equation $-\boldsymbol{\epsilon} \ln \boldsymbol{\tau_{nit}} = \boldsymbol{\beta_t^{EU} BN_{ni} EU_{nit}} + \boldsymbol{\beta_t^{CET} BN_{ni} CET_{nit}} + \boldsymbol{\beta_t^{ROW} BN_{ni} ROW_{nit}} + \boldsymbol{\delta_{nt}} + \boldsymbol{\delta_{it}} + \boldsymbol{\delta_{ni}} + \boldsymbol{\nu_{nit}}$. Each point is obtained by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -1.63$, exponentiating, subtracting one, and multiplying by 100. Reading: Compared to frictions to the rest of the world in 1960, frictions to migrant flows between European countries have been reduced by more than 30% in 2015. They were more than 100% higher in 1960.

Head & Mayer (2021) also ambition to compare levels of border frictions within the United States and within the EU. To do that, they estimate a simplified version of their original model on cross sections of the datasets including only intra-EU flows or intra-US states flows. In practice, the regression equation becomes: $-\boldsymbol{\epsilon} \ln \boldsymbol{\tau_{ni}} = \beta_{ni.} \boldsymbol{BN_{ni}} + \boldsymbol{X_{ni}} + \boldsymbol{\delta_i} + \boldsymbol{\delta_n} + \boldsymbol{\nu_{ni}}$ where $\boldsymbol{X_{ni}}$ is a set of controls for a given dyad and include the logarithm of the distance between two countries or US-states and whether they have a common language or not. From this, it is possible to measure the *ad-valorem* equivalent of frictions as $e^{-\beta_{ni}/\epsilon} - 1$. Table 1 shows their original results which seem to point to *ad-valorem* frictions in 2017 of 256% of yearly income within the US and 2304% in Europe. While these numbers hardly make sense in isolation[4], especially for migration (where they can be understood as a percentage of the real wage gain to migration but are in practice paid at the societal level), they are more informative taken in relation to each other: frictions for internal migrants are about ten times higher within the EU than within the US.

[3] According to Dumont & Spielvogel (2008), in some countries as much as 50% of migrants leave in the first five years and a majority of them go back to their origin country. In addition, return migration is more prevalent in countries with similar level of development and which are close to each other.
[4] In general, in gravity model without pair fixed effects, the estimates will tend to overstate the barriers because of omitted variable bias.

Table 1: Original estimation of *ad-valorem* frictions in Head & Mayer (2021)

	United States		European Union		
	1997	2017	EU15 1997	EU15 2017	EU28 2017
Goods	11	10	19	13	8
Migrants	233	256	2 302	2 304	1 929
Mergers and Acquisitions	23	48	42	8	36

Note: Results of the estimation of coefficient β_{ni} from equation $-\epsilon \ln \tau_{ni} = \beta_{ni} \boldsymbol{BN}_{ni} + \boldsymbol{X}_{ni} + \boldsymbol{\delta}_i + \boldsymbol{\delta}_n + \boldsymbol{\nu}_{ni}$ for different type of flows. Amount in each cell should be understood as the ad valorem equivalent (AVE) of frictions for state or national borders. AVE are expressed in percentage of the price of unit that is flowing, and for migration it must be understood as a percentage of the annual real wage gain to migration. For migrants, the early year is 1995 (European Union) and 2000 (United States) and the late year is 2015. Standard errors are not reported but for goods and mergers and acquisitions, the difference between the United and Europe estimates are not statistically significant in 2017. Reading: In 2017, frictions between American states amounted to 10% of the price of the goods exchanged.

2. Data and Replication

2.1 Data

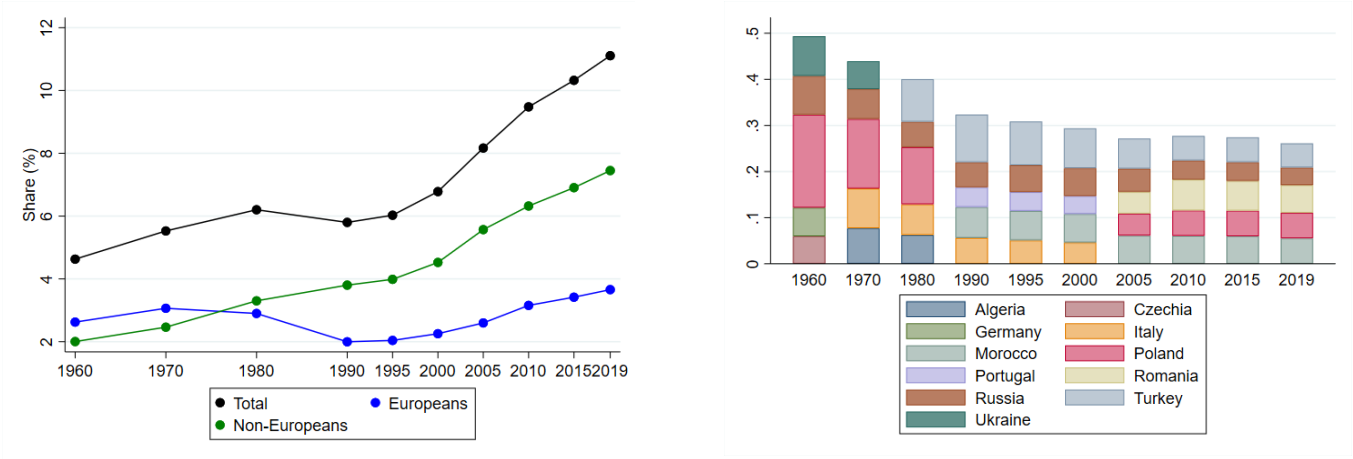
Head & Mayer (2021) use bilateral migration stock data from the World Bank before 1990 and the United Nations from that date on. For all other variables, they rely on the CEPII gravity database (Conte *et al.*, 2022). Thanks to these datasets, we can lay out some basic descriptive statistics about migration flows to European Union countries in Figure 2. The share of migrants, meaning people who were not born in their resident country, within the current EU27 countries has increased since the 1960s and reached more than 10% of the European population in 2019. While European internal migration was dominant in the 1960s and 1970s, it has dialed back as migration movements initiated after World War II lost their potency. In 1960, among the Top 5 origin countries of migrants in Europe were Poland, Czechia, Italy and Germany while thirty years later, only Italy remained. Since 1990, the stock of European Union migrants in Europe has increased again and now almost 4% of all EU residents came from another European Union country. Nonetheless, most of the increase of the stock of migrants has come from non-European Union countries. Migrant origins are also more diverse: in 1960, migrants from Top 5 countries represented more than half of all migrants while in 2019 they represented slightly more than one quarter.

This is consistent with the story of migration in Europe sketched by Van Mol & De Valk (2016): European Union countries in the 1950s and 1960s drafted many bilateral labor migration agreements, and up until the first oil crisis, the period was characterized by steady economic growth and development and deployment of guest worker schemes. After that and up until the fall of the Iron curtain, European governments increasingly restricted migration, and migrants' main route of entrance became family reunification and family formation. Migration policies in the 1990s saw increasing European Union influence and encouragement of intra-European mobility, which was further reinforced with the extension of the Union in 2004.

Figure 2: Basic descriptive statistics about stock of migrants to the actual countries of the European Union

a) Share of migrants within current EU countries since 1960

b) Top 5 countries of origin of migrants in EU27 countries



Sources: UN Population Division and World Bank. Note: The first panel shows the share of migrants according to their origin within the population of the current EU27 countries. The second panel shows the share of migrants (between 0 and 1) coming from the Top 5 countries.

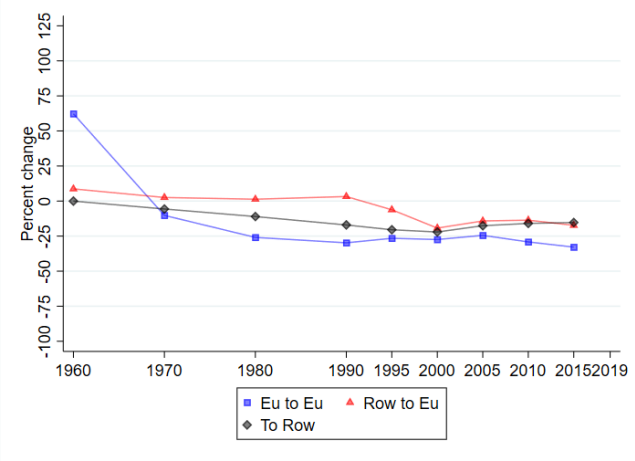
2.2 Replication proper

Thanks to the online appendix and replication package provided by Head & Mayer (2021), we are able to replicate their results with and without the dataset they used. We also replicated their approach using a panel OLS log linear estimation instead of a PPML estimation as is done in Mayer, Vicard, and Zignago (2019) to provide a benchmark. The results of these replications can be seen in Figure 3.

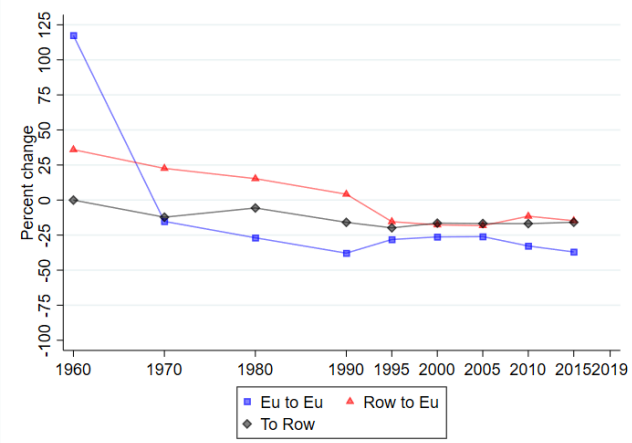
Our results are close to theirs using the dataset they provided but less so in the first periods when with our updated dataset. The spectacular opening between 1960 and 1970 seems to be less pronounced with our own dataset. Comparing both datasets, we point out two main differences: we add recent and updated observations (we have 184 000 observations against their 172 000), also stocks are often different for some dyads (there are discrepancies in 14% of cases). This might be because we used the 2019 version of the UN bilateral migrant stock database while the original paper uses the 2015 version. Using the exact same set of dyads, and the same 172 000 observations, do not change significantly our results so we assume that the differences in estimations are due to the revisions in the 2019 version of the UN bilateral migrant stock database. If the stock changes in one year, because of the presence of dyad fixed effects, it will change the estimation of EU border effects for all years in our models, which might explain the differences.

Figure 3: Replication figures for Head & Mayer (2021) estimation of frictions to migration in four different configurations

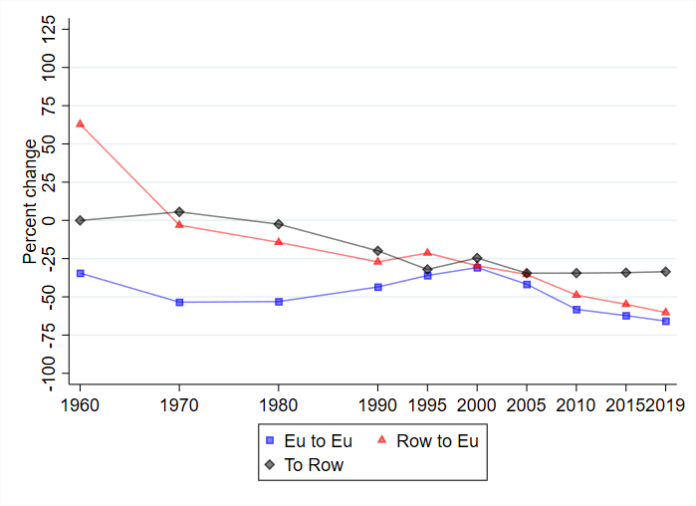
a. PPML estimation - own data



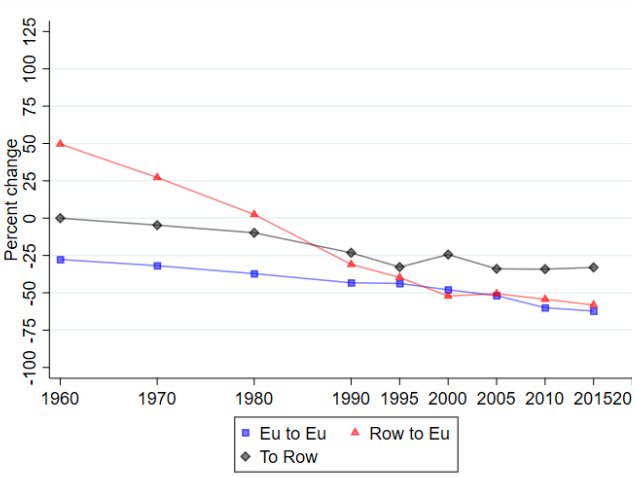
b. PPML estimation - Head and Mayer (2021) provided data



c. OLS estimation – own data



d. OLS estimation - Head and Mayer (2021) provided data



Note: The four panels replicate Figure 1 in four different configurations: with Poisson Pseudo Maximum Likelihood Estimation or OLS estimation and with our own output dataset or the one provided by the authors. They show the distribution of the estimated coefficients β_t^{EU}, β_t^{CET} and β_t^{ROW} from equation $-\epsilon \ln \tau_{nit} = \beta_t^{EU} BN_{ni} EU_{nit} + \beta_t^{CET} BN_{ni} CET_{nit} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$. Like in the original figure, each point is obtained by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -1.63$, exponentiating, subtracting one, and multiplying by 100. Reading: In panel a., compared to frictions in 1960 for the rest of the world, frictions to migrant flows between European countries have been reduced by more than 30% in 2015. They were more than 60% higher in 1960.

Using OLS log linear estimation instead of a PPML estimation, the main story changes compared to Head & Mayer (2021): it is the one of a continuing but relatively slow opening of European Union countries to European migrants (European Union countries were already more open to European migrants than the rest of the world in that regard in 1960) but above all that of an opening of European countries to migrants from the rest of the world. In the OLS estimation we find that frictions of mobility for European and non-European migrants are converging in the most recent periods.

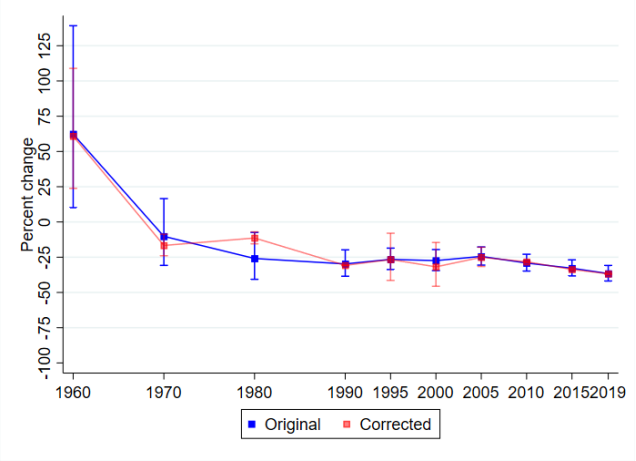
The discrepancy between OLS and PPML estimations is likely to have to do with the fact the PPML approach takes into account country pairs with no migration flows[5] on the contrary to the OLS log linear

[5] In our own dataset, 0.03% of country pairs have zero bilateral stock when both are part of the European Union, 5.2% of country pairs when only the destination country is part of the Union and 10.4% of country pairs when both countries are out of the Union.

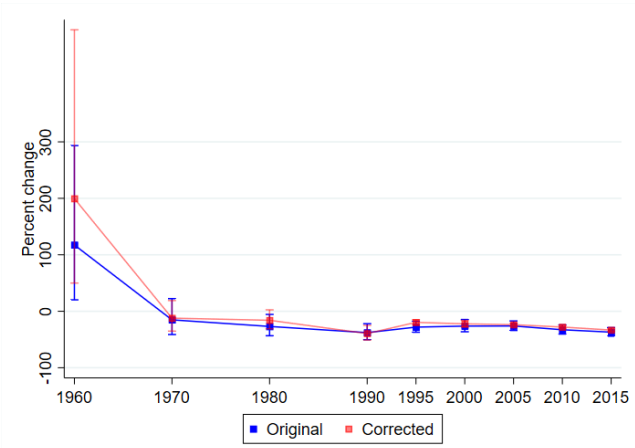
estimation but also that, as shown in Santos Silva and Tenreyro (2006), OLS will be biased when the share of country pairs with no migration flows is too high. Reviewing the last 15 years literature, Santos Silva and Tenreyro (2022) show convincingly why taking the PPML approach is the best choice but also notice that in the case of modern gravity models with three-way fixed effects, like in our case, point estimates might be biased because of incidental parameters problems unlike the OLS estimation. In Figure 4, we implement the jackknife bias correction advocated by Weidner & Zylkin (2020) to correct for this issue: the initial Head & Mayer results seems to hold up pretty well. We also added a 95% confidence interval showing that there is huge uncertainty regarding the level of friction in the first period and the confidence intervals between the two first periods sometimes overlap. It might help to understate the decrease of the relative level of frictions between 1960 and 1970.

Figure 4: Comparison of original and jackknife corrected estimation of frictions between European countries

a. PPML estimation - Own data



b. PPML estimation - H&M (2021) data



Note: The two panels show the distribution of β_t^{EU} from equation $-\epsilon \ln \tau_{nit} = \beta_t^{EU} BN_{ni} EU_{nit} + \beta_t^{CET} BN_{ni} CET_{nit} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$ in the original specification (blue) and its jacknife corrected estimation (red) with our own dataset (panel a) and the one provided by the authors (panel b). We also added 95% confidence intervals. Reading is as in Figure 3.

Table 2: Replication Table of Ad Valorem frictions to migration from other European Countries for the EU

	EU15 1997 – own data	EU15 2015 – own data	EU28 2015 – own data	EU15 1997 – provided data	EU15 2015 – provided data	EU28 2015 – provided data
β	−5.52 (.31)	−5.68 (.40)	−5.76 (.28)	−5.18 (.53)	−5.18 (.42)	−4.90 (.35)
Ad-valorem equivalent	2864	3175	3331	2302	2304	1928
Number of observations	225	220	705	225	225	764

Note: Results of the estimation of coefficient β_{ni} from equation $-\epsilon \ln \tau_{ni} = \beta_{ni} BN_{ni} + X_{ni} + \delta_i + \delta_n + \nu_{ni}$ like in Table 1 for migrant flows and the EU only. Amount in middle cell is the ad valorem equivalent (AVE) of frictions for state or national borders. AVE are expressed in percentage of the price of unit that is flowing, and for migration it must be understood as a percentage of the annual real wage gain to migration.

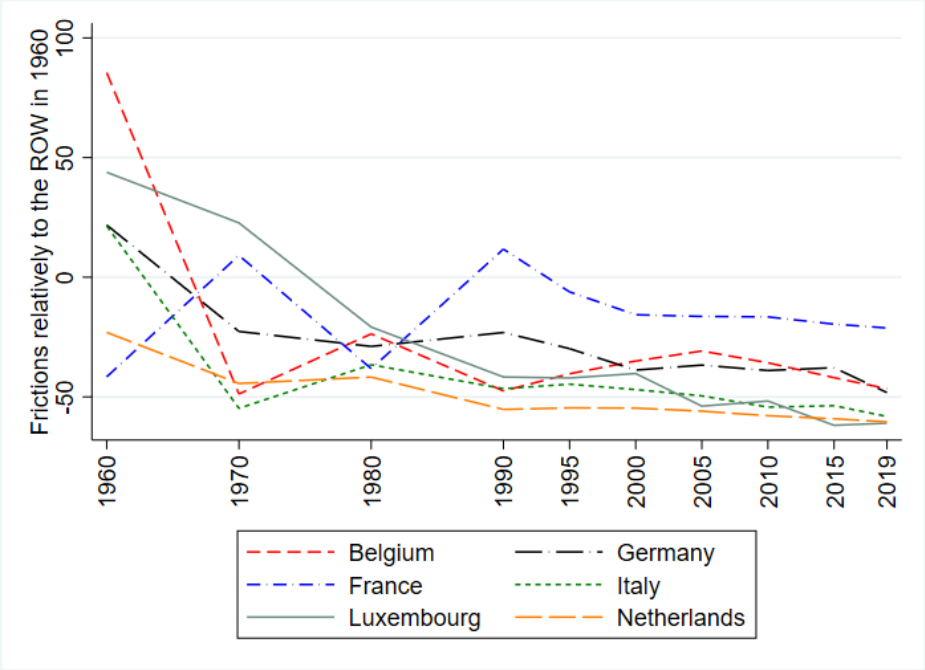
2.3 Examining the aggregate effect

Head and Mayer also estimate the absolute size of migration barriers within Europe in the second part of the paper and we also succeed in replicating their results. Table 2 shows our own estimations. With our own dataset, they are in the same ballpark than in the original paper even though they are a bit higher and increasing over time (but not statistically different from each other).

Aggregate estimations of frictions to migration inflows might hide differential liberalization trends by region or country. For example, aggregate trends presented in Figure 3 can be understood as averages of country

specific trends which might be different from one another. Figure 5 shows these specific trends for the 6 founding countries of the European Union: France, Italy, Germany, Belgium, the Netherlands, and Luxembourg. These country estimates contribute for all years to the estimation to the EU border effect, which is the estimate of interest in this paper. As can be seen, they draw different stories: most of them more or less reproduce the overall trends highlighted previously but France seems to stagnate over the years. This is partly explained by the much higher incertitude regarding country-specific estimates: the great majority of estimates confidence intervals overlap. It makes it almost inane to discuss the fine differences between country specific trends. Figure 5 still shows that the aggregate trends might hide some heterogeneity. We could assume for example that, because of their recent history, Eastern European countries were relatively more closed-off when they entered the European Union and this could possibly drive Head & Mayer (2021) estimates. This is especially true given that we look at stocks rather than flows and that Eastern European countries were partially closed in the 90's: their stock of external migrants will only increase slowly at first.

Figure 5: Country specific estimates of frictions to migration from other European Countries for the original EU countries



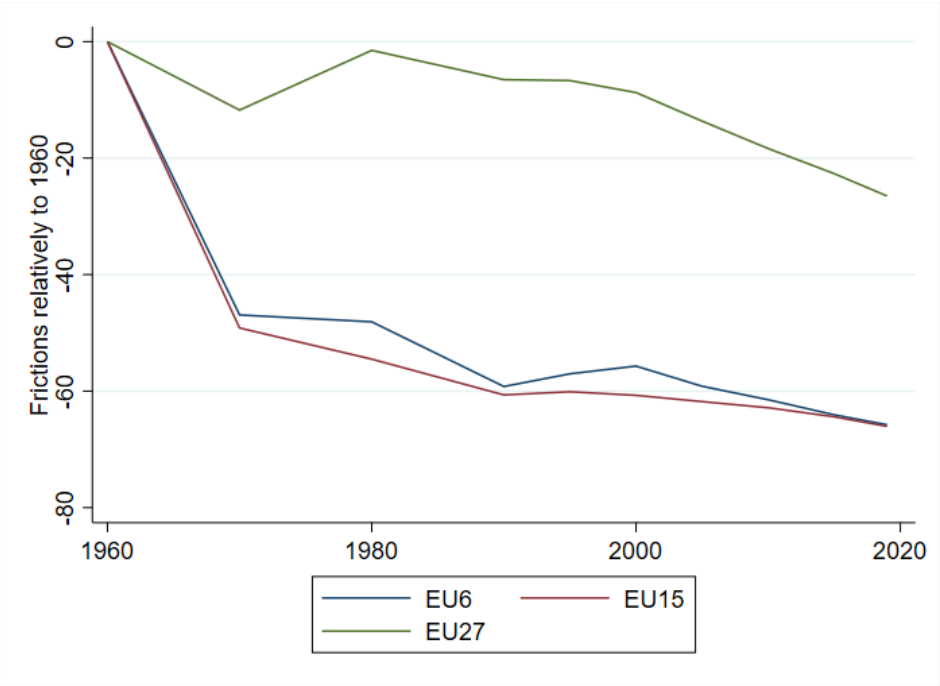
Note: The figure shows the distribution of the PPML estimation of the interaction between country fixed effects and $\boldsymbol{\beta_t^{EU}}$ on barriers to migration for six countries from equation $-\epsilon \ln \tau_{nit} = \boldsymbol{\beta_t^{EU} BN_{ni} EU_{nit}} + \boldsymbol{\beta_t^{CET} BN_{ni} CET_{nit}} + \boldsymbol{\beta_t^{ROW} BN_{ni} ROW_{nit}} + \boldsymbol{\delta_{nt}} + \boldsymbol{\delta_{it}} + \boldsymbol{\delta_{ni}} + \boldsymbol{\nu_{nit}}$. Each point shows the evolution of frictions to a given country for a given year relatively to frictions to countries from the rest of the world in 1960.

To shed a new light on this issue, we re-estimate Head & Mayer (2021) model but keep the composition of EU countries taken into account fixed. If we keep the group of countries fixed, then we do not have to worry about composition effects, related to the heterogeneity we just highlighted, driving the evolution of the EU internal border effect. We focus on three different groups of countries: the original six founding countries (EU6), the EU15 countries (the European Union as it was in 1995) and then the EU27 countries (the European Union as it was in 2021). Figure 6 compares the evolution of the internal friction estimates for these three regions taking their initial level as a reference point. Keeping the group of European countries fixed means that one period estimate will be collinear because of the set of fixed effects used and that we need to choose a reference point different from $\boldsymbol{\beta_{1960}^{ROW}}$.

The evolution of internal frictions within EU6 and EU15 countries is quite similar: the sudden liberalization in the 1960s is followed by a much slower one in the following years. In the EU27 countries then, liberalization to European migrant inflows only really picked up between 2000 and 2005 consistently with

the accession of Eastern European countries in the European Union. This is evidence that the evolution of the EU effect estimated by Head & Mayer (2021) might partly be driven by a composition effect: the late accession of relatively more closed-off Eastern European countries (and the fall of the iron curtain, see Van Mol & De Valk, 2016) could explain its stagnation in the most recent years.

Figure 6: Internal friction to migration estimates with fixed groups of countries



Note: The figure shows the evolution of the PPML estimation of the coefficient β_t^{EU}(when the reference period is 1960) from $-\epsilon \ln \tau_{nit} = \beta_t^{EU} BN_{ni} EU_{nit} + \beta_t^{CET} BN_{ni} CET_{nit} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$ on barriers to migration for three different groups of countries : the EU6 countries, the EU15 countries and the EU27 countries. Compared to previous figures, the evolution of the estimated coefficients takes their initial level as a reference. Reading: In 2019, the frictions to migrants between the original EU6 countries are more than 60% lower.

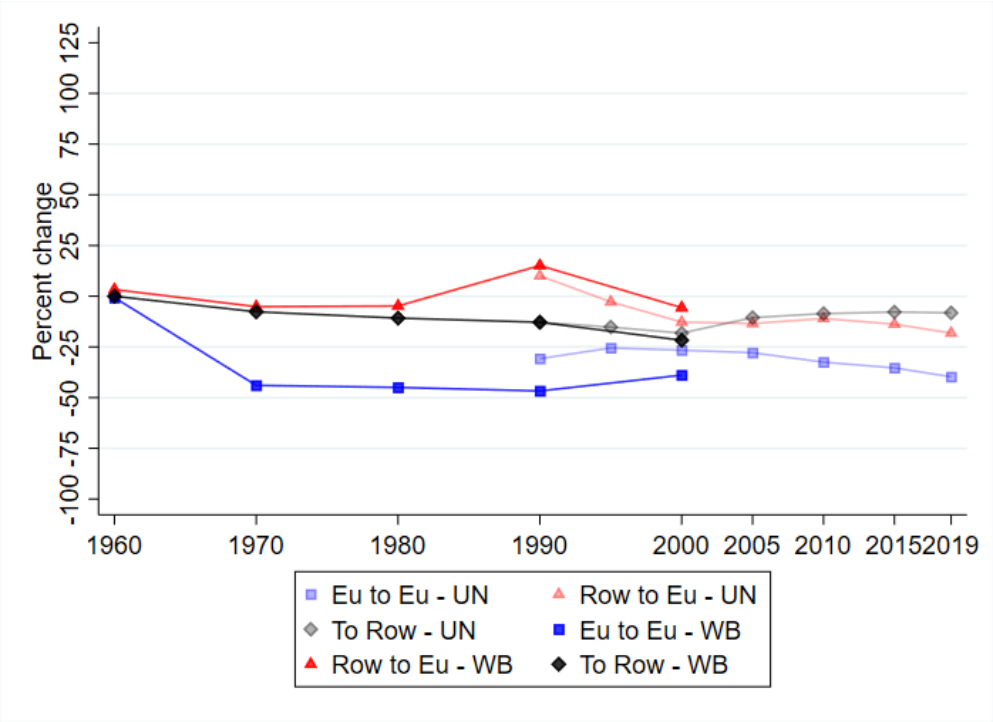
2.4 Data quality

Head & Mayer (2021) rely on two different data sources that may be at odds with each other's: the World Bank (before 1990) and the United Nation Population division (1990 and after). While the World Bank database can be used up to 2000, Head & Mayer (2021) stop using after 1980 because it would be of a lower quality. How much does it matter for their overall story? To answer this question, we re-estimate their main model using only one data source or the other (the World Bank between 1960 and 2000 and the United Nation between 1990 and 2019). In Figure 7, we show how these coefficients link to each other. Importantly, we find that the high level of frictions for European migrants in 1960 in Head & Mayer (2021) is dependent on using both the UN and World Bank datasets: using only World Bank data, the level of frictions for European migrants in 1960 is similar to the one between non-European countries in the same year. This might be explained by the particular type of estimation conducted and the use of dyad fixed effects. Dyad fixed effects control for all unobservable variables constant per country pair and use then all information provided on the exchanges between two countries. The modification of the data for one period, or the addition of one, will then affect estimates of border effects for all periods.

The opening observed between 1960 and 1970 still happens though: the level of frictions is reduced by almost 50 points in 10 years. Estimations with UN and World Bank data do link with each other rather neatly except for frictions between European countries where there is a difference in levels. Figure 7 shows that UN estimates are almost 20 points higher in 1990 and 2000.

The overall story described by Head & Mayer (2021), a liberalization in the 1960's and a stagnation afterward, still holds, but looking at UN data alone, Europe does seem to experience a second opening since the 2000's: frictions have decreased by 15 points since then. This is consistent with the story of migration in Europe sketched by Van Mol & De Valk (2016) and the evolution of European migrations in Figure 2.a.

Figure 7: Comparison of UN and World Bank only estimates of frictions to migration



Note: The figure replicates the model of Figure 1 with Poisson Pseudo Maximum Likelihood Estimation with our own output dataset using data from the UN or the World Bank only. Like in the original figure, each point is obtained from the estimation of equation $-\epsilon \ln \tau_{nit} = \beta_t^{EU} BN_{ni} EU_{nit} + \beta_t^{CET} BN_{ni} CET_{nit} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$ by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -1.63$, exponentiating, subtracting one, and multiplying by 100. United Nation estimates are rescaled so that β_{1990}^{ROW} are equals for both estimations and UN coefficients can be expressed in relation to β_{1960}^{ROW}. Reading is similar than in Figure 3.

3. Extensions

Head & Mayer (2021) do not explain the evolution of frictions to European migrant flows in the European Union. Is joining the European Union itself a nexus for opening or does increasing trade in goods comes with a slow liberalization of migrant flows? This also raises an identification issue. If countries were to open their border in anticipation of their accession to the EU, then we might underestimate the EU effect as they were part of the rest of the world (and then implicitly, part of the control countries) prior to their entry.

3.1 Event analysis: is the EU accession anticipated?

To study whether the decrease in frictions to European and non-European migrants coincide with joining the European Union, we conduct an event analysis building on the original model of Head & Meyer (2021). We estimate, with the same dataset, the following model:

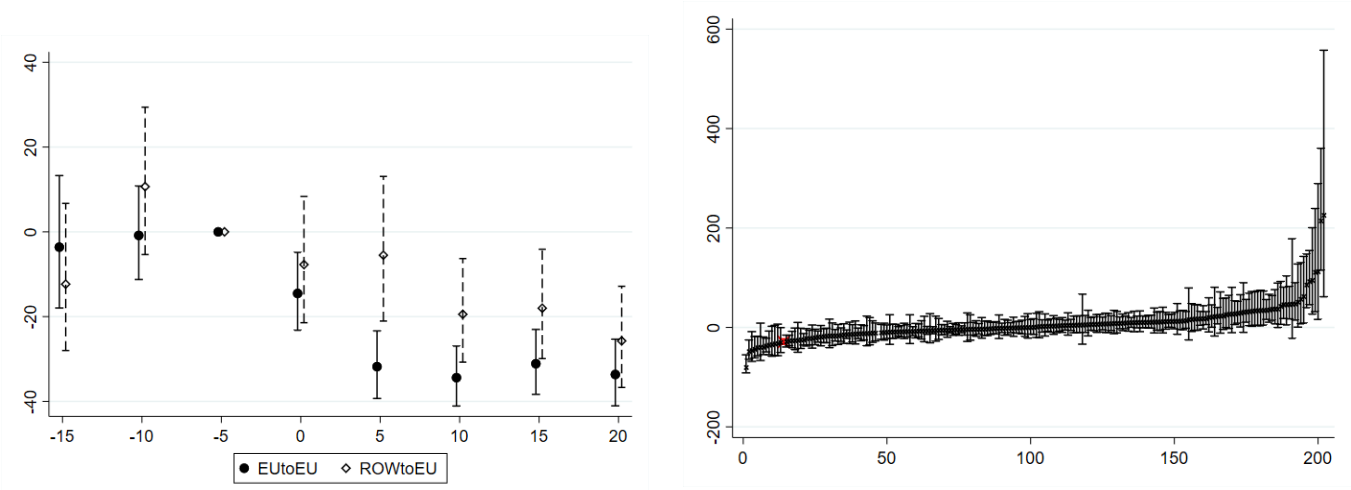
$$-\epsilon \ln \tau_{nit} = \sum_{l=-3}^{3} \beta_l^{EU} EU_{nil} \times \mathbf{1}\{t = l\} + \sum_{l=-3}^{3} \beta_l^{CET} CET_{nil} \times \mathbf{1}\{t = l\} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$$

Where $\boldsymbol{EU_{nil}}$ and $\boldsymbol{CET_{nil}}$ are dummy variables equal to one for dyad where the destination country is a would-be European country and respectively the origin country is an actual European country at the time or a country from the rest of the world and $\mathbf{1}\{\boldsymbol{t} = \boldsymbol{l}\}$ is a dummy variable for the relative time to the entry of the destination country into the European Union. As a consequence, for example, $\boldsymbol{\beta}_{-2}^{\boldsymbol{EU}}$ estimates the relative frictions to European migrants two periods before joining the European Union. For the coefficients to be estimated, we need to take one baseline period. We choose the one just before accessing the European Union *i.e.* five years before. The left panel of Figure 8 shows the distribution of the estimated coefficients from a PPML estimation. As we can see, joining the European Union does not seem to be anticipated by an opening to European or international migrants but frictions are greatly reduced afterwards: compared to the reference point 5 years before the accession, frictions to European migrant inflows are reduced by more than 30% 5 years after. Frictions to international migrants follow a similar path but in a more gradual way: they converge towards frictions of internal migrants 20 years after. Beware that the distribution of our estimated coefficients might be partly driven by a composition effect: some countries (notably in eastern Europe) have not yet experienced a full 20 years into the European Union.

Figure 8: Effect of joining the European Union on barriers to migration

a. Dynamic effect of entering the EU on migration barriers

b. Falsification test thanks to placebo randomization



Note: The left panel shows the distribution of the PPML estimates of barriers to migration $\boldsymbol{\beta_l^{EU}}$ and $\boldsymbol{\beta_l^{CET}}$ from the PPML equation $-\boldsymbol{\epsilon} \ln \boldsymbol{\tau_{nit}} = \sum_{l=-3}^{3} \boldsymbol{\beta_l^{EU}} \boldsymbol{EU_{nil}} \times \mathbf{1}\{\boldsymbol{t} = \boldsymbol{l}\} + \sum_{l=-3}^{3} \boldsymbol{\beta_l^{CET}} \boldsymbol{CET_{nil}} \times \mathbf{1}\{\boldsymbol{t} = \boldsymbol{l}\} + \boldsymbol{\beta_t^{ROW}} \boldsymbol{BN_{ni}} \boldsymbol{ROW_{nit}} + \boldsymbol{\delta_{nt}} + \boldsymbol{\delta_{it}} + \boldsymbol{\delta_{ni}} + \boldsymbol{\nu_{nit}}$ with respect to time of accession to the European Union (dynamic effects). The right panel places the original static effect of joining the European Union (in red) on frictions to migrants in a distribution of placebo effects. Reading: Compared to their level five years before joining the EU, barriers to migration from other European countries decrease by about 30% five years atter.

To further test the robustness of our results, as advocated by Bertrand, Duflo, and Mullainathan (2004), we conduct a placebo randomization test. In practice, it means we rerun our main estimation model 200 times for different sets of random pseudo-European countries with random pseudo-dates of entry into the European Union. The second panel of **Figure 8** places the original static effect[6] (in red) within the distribution of the pseudo effects. If our initial results were the product of a statistical artifact, we would expect that a relevant number of pseudo treatment effects would be close to it. As can be seen in the figure, our initial estimate is in the tail of the distribution and is much more precise. The static effect of the opening is a reduction of frictions to migration of Europeans by 28%.

[6]The static estimation equation is the following : $-\epsilon \ln \tau_{nit} = \beta^{EU}.EU_{nil} \times Post_{nit} + \beta^{CET}.CET_{nil} \times Post_{nt} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$ where $Post_{nit}$ is equal to one when both the origin country and destination country are part of the European Union.

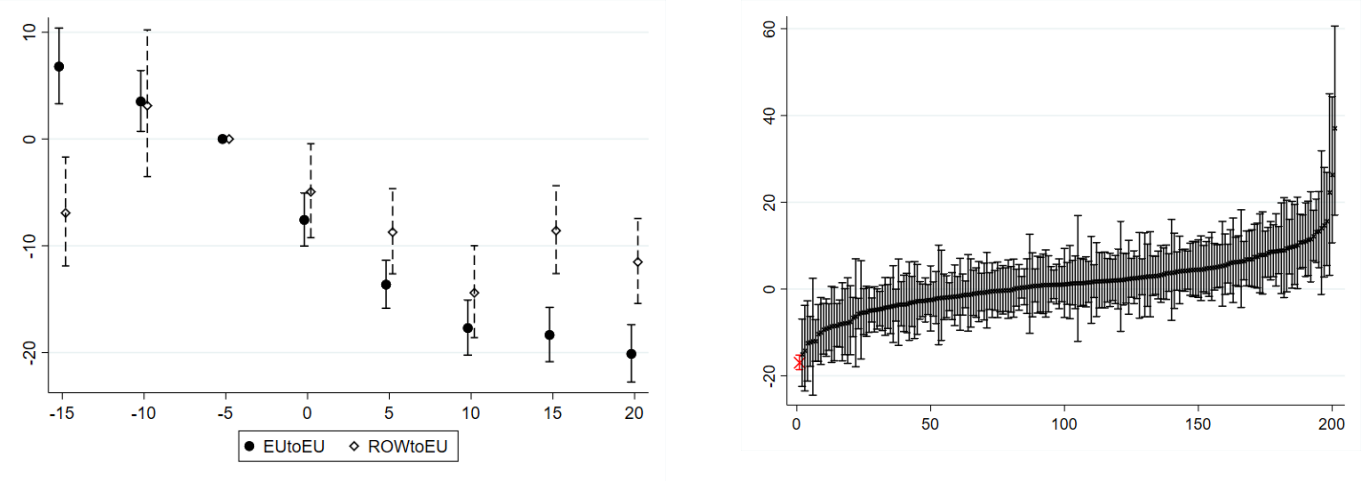
3.2 Event analysis: the case of goods trade

We reproduce a similar analysis for trade in goods using the CEPII gravity dataset. We do so to check whether liberalization of trade in goods and migration inflows were comparable. Figure 9 shows the evolution of the estimated coefficients using a PPML estimation. We find that joining the European Union is associated with a 20% decrease in frictions to other European countries and to countries outside Europe 10 years later but also that it seems partly anticipated in the case of openness to other European countries: there is a substantial drop in the 15 years preceding the entry in the European Union.

Figure 9: Event analysis: effect of joining the European Union on barriers to goods

a. Dynamic effect of entering the EU on frictions on goods trade

b. Falsification test thanks to placebo randomization



Note: The right panel shows the distribution of the PPML estimates of barriers to goods trade β_l^{EU} and β_l^{CET} from equation $-\epsilon \ln \tau_{nit} = \sum_{l=-3}^{3} \beta_l^{EU} EU_{nil} \times \mathbf{1}\{t = l\} + \sum_{l=-3}^{3} \beta_l^{CET} CET_{nil} \times \mathbf{1}\{t = l\} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$ with respect to time to entry in the European Union (dynamic effects). The right panel compares the original static effect of entering the European Union (in red) to a placebo distribution. Reading is as in Figure 8.

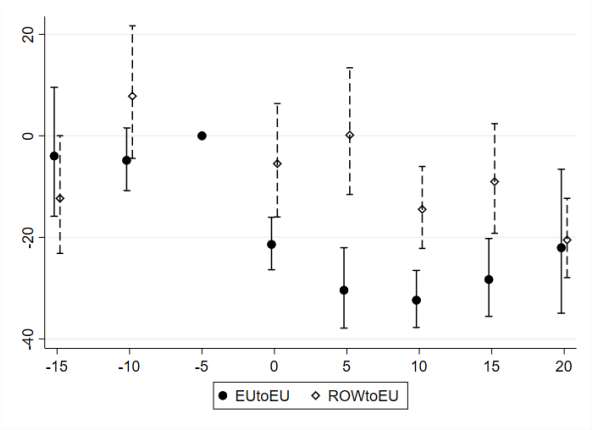
Perhaps surprisingly, joining the European Union has a greater liberalization effect on the flows of migrants than of goods. The static effect on goods is robust to our falsification test: the original estimate is at the extreme tail of the distribution of pseudo effects presented in the left panel of Figure 9. But it seems that joining the European Union was anticipated for the trade of goods (unlike for migrant inflows): the accession to the European Union is the consequence of a long process that comes with many policy changes (like the alignment to European standards) that may lead to a liberalization of trade in goods with European Union countries even prior to the actual entry.

3.3 Robustness check: local projection Differences-in-differences

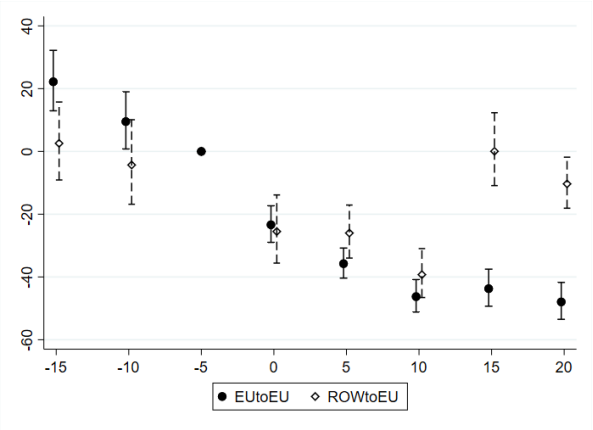
We reproduce our two event analyses to take into account recent evolutions in the multi-way fixed effects literature. As shown, among others, in De Chaizemartin & D'Haultfoeuille (2020), two-way fixed effect regressions can be understood as weighted sums of the average treatment effects in each group and period, with weights that may be negative. Due to the negative weights, the regression coefficient may for instance be negative while all the average treatment effects are positive. To correct for this possible bias, we follow the solution proposed by Dube *et al.* (2023) and adopt a local projection approach to our event analysis. In practice, it means we use the same model as before but we estimate it separately for each period and we restrict the control group of countries to never treated dyads (pair of countries where none of the countries will be part of the European Union) and drop already treated dyads from the estimation sample (pair of countries where one country already entered the European Union). The results of this approach can be seen in Figure 10.

Figure 10: Event analysis: local projection approach estimations of barriers to migration and goods

a. Migration



b. Goods



Note: The right panel shows the distribution of the PPML estimation β_l^{EU} and β_l^{CET} from equation $-\epsilon \ln \tau_{nit} = \sum_{l=-3}^{3} \beta_l^{EU} EU_{nil} \times \mathbf{1}\{t = l\} + \sum_{l=-3}^{3} \beta_l^{CET} CET_{nil} \times \mathbf{1}\{t = l\} + \beta_t^{ROW} BN_{ni} ROW_{nit} + \delta_{nt} + \delta_{it} + \delta_{ni} + \nu_{nit}$ with time to entry in the European Union (dynamic effects) on barrier to migration and the left panel to goods. Each coefficient is estimated thanks to the local projection approach advocated in Dube *et al.* (2023). Reading is as in Figure 8 and 9.

Results are broadly similar to the ones shown in Figures 8 and 9: joining the European Union comes with a reduction in frictions for flows of goods and migrants. This liberalization is anticipated in the case of goods but not for migrants. While liberalization between European and non-European goods is not different, except 15 years after the accession[7], it does seem like the reduction of frictions for European migrants is steeper than for non-European ones.

4. Conclusion

We started by successfully replicating Head & Mayer's (2021) results regarding openness to European and non-European migrant flows in the European Union since the 1960s, but attempt to go further towards explaining this reduction. This is an important question if one believes in the economic advantages associated to a greater liberalization of migrant flows. We found evidence that joining the Union was associated with a significant reduction of frictions for migrant flows, particularly for European migrants, as well as for trade in goods. This is proof that openness to migrants is at least partly driven by institutional factors and that the expansion of the Schengen Area to Eastern Europe might explain the rise in the share of European migrants since the 1990s. However, now that this expansion has happened, what is left to do? Significant barriers to migration remain, some of them are cultural and might be hard to act on, but some are more operational (see Aussiloux *et al.*, 2017) like residual transport costs, skill mismatches between countries, discrimination against foreigners, etc. Future policies need to take these barriers into account if we think that further openness is desirable (a question which was not the focus of this paper).

[7] As written above, the distribution of coefficients is partly driven by a composition effect might explain the odd evolution of the ROWtoEU coefficient when more recent EU countries are not taken into account.

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