Immigration restrictions in developed economies: What are the effects on the volume and composition of migrant flows ?

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Abstract

Although a growing body of research has examined the effects of restrictive immigration policies on migration flows, the empirical evidence remains mixed and largely focused on the volume of flows. Far less attention has been paid to how such policies shape the skill composition of migrants. This paper addresses this gap by investigating how immigration restrictions affect both the size and quality of bilateral migration flows across 20 OECD destination countries and 178 origin countries between 1990 and 2010. The findings show that restrictions reduce migration flows, particularly from low- and middle-income countries and in destinations without point-based immigration systems. We also find that restrictions tend to increase the positive selection of migrants—but only up to a certain point, beyond which stricter policies reduce migrant quality. Moreover, external restrictions are associated with lower skill levels, while internal restrictions appear to improve them.

Keywords: immigration restrictions, bilateral migration flows, migrant quality, positive selection, external restrictions, internal restrictions, OECD.

JEL codes: F22, J61, J68, O5

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1 Introduction

How do restrictive immigration policies affect not only the volume of migration flows, but also the skill composition of migrants? This question is increasingly relevant as governments across advanced economies continue to tighten immigration rules, often in response to political pressures and rising public concerns. While these restrictions are typically aimed at managing or reducing immigration, their broader and potentially unintended effects on the types of migrants admitted remain poorly understood.

Calls to restrict immigration and asylum policies have become commonplace in many developed countries (Danewid, 2021). Although not a new phenomenon—Europe, for instance, began tightening policies in the early 1970s in response to post-war labour migration (Geddes and Scholten, 2016)—the issue has gained renewed salience in recent decades. This is reflected in the rise of far-right parties and the increasing reluctance of mainstream political actors to appear lenient on immigration. In 2018, Hillary Clinton notably urged European centre-left parties to adopt tougher migration stances to counter populist narratives (Wintour, 2018) [2].

The growing disconnect between policy objectives and actual migration outcomes has heightened public distrust and placed pressure on policymakers to further restrict entry and residency conditions (Hollifield and al., 2014; Ulceluse and Kahanec, 2019). Anti-immigrant rhetoric, often amplified by political elites and the media, reinforces the perception that immigration burdens public services and disrupts social cohesion (Helbling and Leblang, 2019; Ivarsflaten, 2005).

Yet this general trend toward restriction has been paralleled by increasingly liberal policies toward high-skilled immigration. Many countries actively seek to attract qualified workers, enacting selective measures such as fast-track visas, job-matching schemes, and recognition of foreign credentials (Cohen and Razin, 2008; Czaika and de Haas, 2017; de Haas and al., 2016). In 2017, 44% of UN member states reported implementing policies to increase high-skilled immigration—double the share from 2005 (UN, 2013, 2017).

[2] https://www.theguardian.com/world/2018/nov/22/hillary-clinton-europe-must-curb-immigration-stop-populists-trump-brexit

This apparent contradiction highlights the complexity of modern migration governance. Since immigration polices often combine selective and restrictive elements, there is a risk of overgeneralizing their effects. In practice, restrictions that aim to reduce low-skilled immigration may also deter high-skilled migrants, particularly when such measures raise migration costs, limit access to permanent residency, or increase legal uncertainty (Bianchi, 2013; de Haas and al., 2016; Torche and Sirois, 2019).

Moreover, as de Haas (2011) points out, migration policy effects can spill over through various substitution channels: spatial (migrants choose alternative destinations), categorical (migrants switch visa categories), inter-temporal (migrants accelerate decisions in anticipation of future restrictions), and reverse-flow (restrictions reduce return migration). These dynamics suggest that even targeted restrictions may alter both the size and composition of migration flows in complex ways.

While the impact of restrictions on the overall volume of immigration has received considerable attention with mixed results (Beine and al., 2011; Czaika and de Haas, 2017; Czaika and Hobolth, 2016; Helbling and Leblang, 2019; Mayda, 2010; Ortega and Peri, 2013; Ulceluse and Kahanec, 2019), much less is known about their effect on the skill composition of migrants. Apart from early theoretical work (Bellettini and Ceroni, 2007; Bianchi, 2013; Canto and Udwadia, 1986) and a historical case study by Chen (2015), empirical evidence on this question remains scarce.

This paper contributes to filling this gap by examining how immigration restrictions affect both the size and skill composition of migration flows. Using bilateral data on 20 OECD destination countries and 195 origin countries from 1990 to 2010, we assess the differential impact of policy dimensions (external vs. internal regulations). We also explore heterogeneity by the development level of the origin countries and whether destination countries apply point-based systems.

Methodologically, we address two key sources of endogeneity—initial conditions and correlation between time-varying covariates and unobserved heterogeneity—by applying the joint modelling approach developed by Skrondal and Rabe-Hesketh (2014). Additional robustness checks are conducted using Poisson Pseudo-Maximum Likelihood (PPML), instrumental variable estimation, and entropy balancing for continuous treatment.

Our findings indicate that restrictive immigration policies significantly reduce bilateral migration flows, especially for migrants from low- and middle-income countries and in destination countries without point-based immigration systems. We also find that restrictions tend to increase the positive selection of migrants, particularly when they are from low- and middle-income countries. The effects vary by policy type: external restrictions tend to reduce skill levels, while internal ones are associated with improved migrant quality. Moreover, results reveal an inverse U-shaped effect: moderate restrictions enhance positive selection, but more stringent measures tend to undermine it. This finding suggests the existence of a threshold beyond which restrictions become counterproductive in attracting more skilled migrants.

The paper will follow the ongoing structure. Section 1 defines a restrictive immigration policy and its main dimensions. Section 2 outlines the estimation and identification strategies. Section 3 describes the data sources and variable construction. Section 4 presents the main results, including robustness and heterogeneity checks. Section 5 concludes.

2 Restrictive immigration policy and related effects

Immigration policy determines the terms under which individuals are allowed to enter a country and access key institutions such as the labour market and the welfare system (Geddes and Scholten, 2016). As Massey (1999) puts it, it is "*the outcome of a political process through which competing interests interact within bureaucratic, legislative, judicial, and public arenas to construct and implement policies that encourage, discourage, or otherwise regulate the flow of immigrants*".

In recent decades, the growing political salience of immigration in developed countries has been accompanied by rising demands to tighten immigration policies, often driven by perceptions that immigration is problematic or destabilising. These restrictions can take various forms. According to Jasso (2021), they fall broadly into two categories: numerical and personal. Numerical restrictions involve setting a ceiling on the number of immigrants who can be admitted over a specific period. For example, the United States applies annual country-based quotas, capping the share of immigrants from any single country at no more than 7% of the total number admitted each fiscal year. However, once a ceiling is set, several questions remain: to which types of immigration does the ceiling apply? Which groups, if any, are exempt? What criteria should be used to select among applicants? And should unused visa slots be carried

over to the following year (Jasso, 2021)?

Personal restrictions, by contrast, involve selection based on characteristics of the applicants themselves—whether quantitative, such as age or income level, or qualitative, such as religion, language ability, gender, or the location from which they apply (Jasso, 2021).

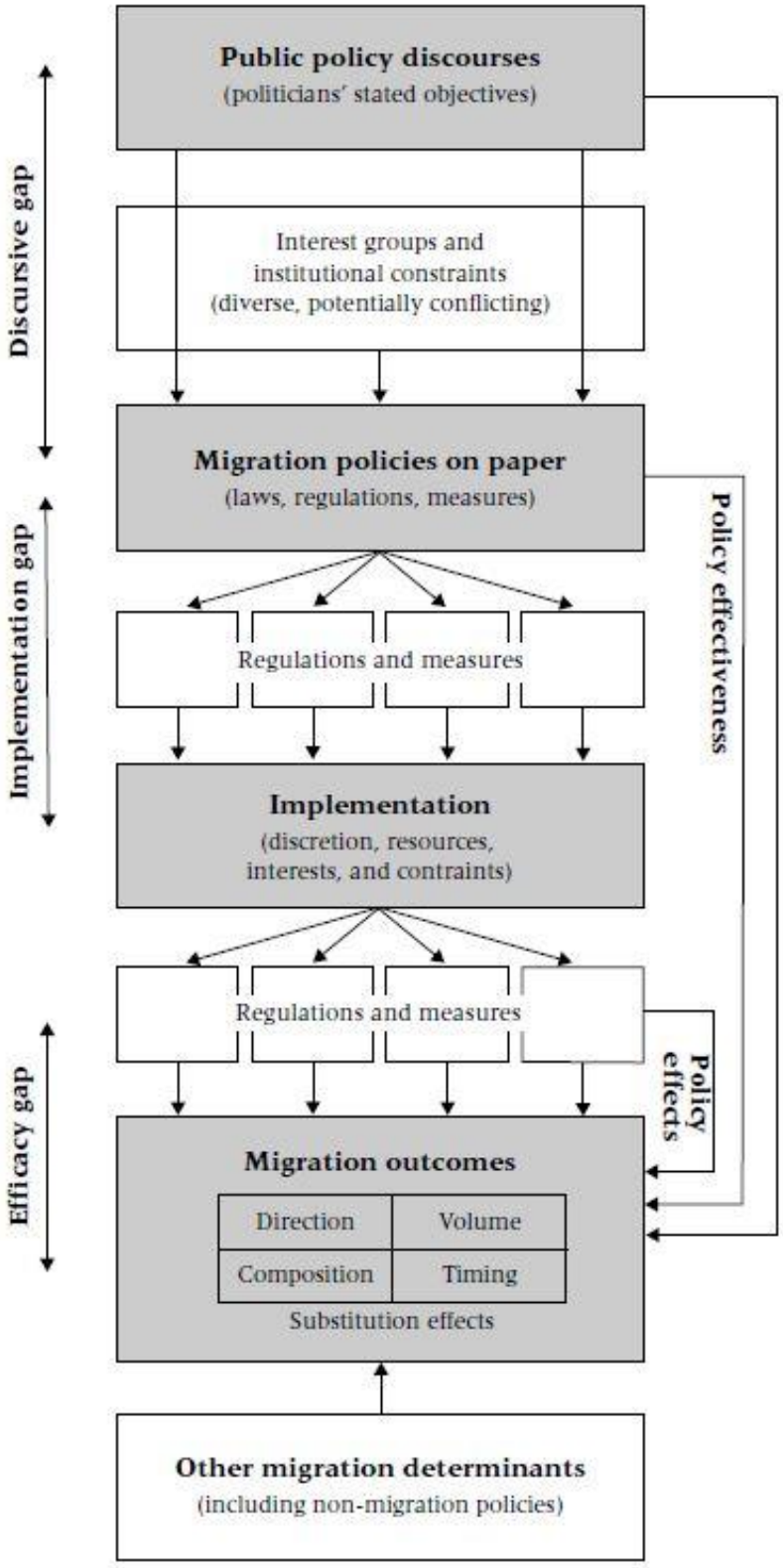
In practice, restrictive measures may include raising travel and application costs, imposing financial requirements and age thresholds, requiring pre-arranged job offers for visa eligibility, or increasing border surveillance. For migrants already residing in the host country, restrictions may relate to the length of time required for permanent residency eligibility or access to certain public services. In their analysis, Docquier and al., (2012) define stronger restrictions as measures that raise the costs of extending one's stay in the host country or sponsoring family members for reunification.

These mobility costs play a central role in shaping the self-selection of migrants. Alongside potential earnings at destination, which are influenced by both observable socioeconomic characteristics and unobserved traits like motivation or ability (Bertoli and al., 2016; Borjas, 1987), migration decisions often reflect an attempt to maximise income. From this perspective, individuals weigh differences in mean income levels between countries, net of migration costs (Borjas, 1987). If skills are not equally valued in the origin and destination countries, higher migration costs may affect not only how many people migrate, but also who migrates. Since migrants with different skill levels do not face the same constraints—financial or otherwise—restrictions may reshape the skill composition of migration flows (Bianchi, 2013).

Beyond their effects on volume and composition, restrictions can also influence how and when migrants enter or exit a destination country. The more restrictive the policy, the more likely migrants are to resort to irregular entry channels (Beauchemin, 2018, p.4; Czaika and Hobolth, 2016). At the same time, restrictions may encourage long-term settlement, as migrants fear that leaving the country might make re-entry impossible (Czaika and de Haas, 2017).

However, it is important to clarify that growing political rhetoric in favour of restriction does not automatically mean that policies are becoming more stringent in practice. The gap between official discourse and actual policy implementation is often significant. As Czaika and De Haas (2013) highlight, multiple factors influence not only how restrictive policies are on paper but also how effectively they are enforced.

Figure 1. Conceptual framework of migration policy effects and effectiveness



Source: Czaika and De Haas (2013)

As shown in **Figure 1**, Czaika and De Haas (2013) identify three distinct gaps in immigration policy. The first, referred to as the "*discursive gap*", describes the discrepancy between public discourse and the actual content of migration policies. This gap often stems from the influence of interest groups and lobbying actors, which may push policy in directions that diverge from public preferences or from national and international commitments on human rights.

The second, the "*implementation gap*", refers to the difference between what policy stipulates on paper and how it is actually enforced. This may result from economic or logistical constraints, or from the discretionary power exercised by private contractors, civil servants, or political authorities during implementation.

The third is the "*efficacy gap*", which arises when the outcomes of a policy—regarding the volume, composition, or direction of migration flows—fail to align with its stated objectives. In this context, the persistence of migration despite restrictive measures does not necessarily indicate policy failure, just as a decline in migration following new restrictions is not necessarily a sign of success (de Haas, 2011). Migration is shaped by a range of other factors, including conflict, wage differentials, taxation and social security agreements, and even climate-related pressures (Beine and Parsons, 2015; Czaika and Parsons, 2017; Fitzgerald and al., 2014).

It is also important to note that empirical trends do not always reflect public opinion in a straightforward way. In highly polarised societies, preferences toward immigration policy are often inconsistent and fragmented. Citizens may support restrictive approaches in certain domains, such as naturalisation, while favouring more inclusive measures in others, like integration (Helbling and al., 2021). This inconsistency is especially visible in countries like the United States, where people tend to express greater support for immigrant populations already residing in the country than for incoming flows—often based on moral or humanitarian grounds (Margalit and Solodoch, 2021).

3 Econometric strategy

3.1 Size effect of restrictive immigration policies

To evaluate the size effect of restrictive immigration policy, we estimate the following equation based on the gravity model:

$$bilateral\ flows_{odt} = \beta_0 + \beta_1 Policy\ restrictions_{dt} + \beta_2 \log(Population\ Origin)_{ot} + \beta_3 \log(Gdppc\ destination)_{dt-1} + \beta_4 \log(Gdppc\ origin)_{ot-1} + \delta_1 Contiguity_{do} + \delta_2 \log(Distance)_{do} + \delta_3 Common\ language_{do} + \delta_4 Colonial\ ties_{do} + FE_o + FE_d + FE_t + FE_{ot} + \varepsilon_{odt} \quad \textbf{(1)}$$

where the dependent variable is the bilateral migration flows ($Bilflows_{dot}$). The subscript *o* (*o*=1, 2,…, 78) refers to the country of origin, *d* (*d*=1, 2, ..., 20) the destination country and *t* (*t*=1990,…,2010) the time. $Policy\ restrictions_{dt}$ captures the degree of restrictiveness of the immigration policy of the destination country. We use the one lag of the *GDP per capita* as a proxy of the level of development both for the origin and the destination country. For the origin country, a high level of GDP per capita may act as a deterrent effect for emigration by improving people's well-being or livelihood in their country. It could also be viewed as increasing the opportunity of moving since emigrants become more likely to support financial migration costs. The level of GDP per capita of the destination country may act as a pull factor, as well as the fact of sharing the same border ($Contiguity$), sharing a common language ($Common\ language$), having colonial ties ($Colonial\ ties$) and the geographical distance between a pair of the country ($Distance$). The introduction of the one lag of the GDP per capita of the host country is, for instance, consistent with the result of d'Albis and al., (2016). They show that a 1% increase in the GDP per capita in France increases the immigration rate by 0,19% at the end of one year. Moreover, we introduce the population of the origin country as a control variable.

Finally, our model includes a set of fixed effects capturing time-invariant (FE_o, FE_d) and time-variant (FE_t) characteristics. The second set of fixed effects combines year fixed effects with origin fixed effects (FE_{ot}) to control for factors that could stimulate migration flows such

as drought, economic crisis, wars, and so on (Fitzgerald and al., 2014).

A specificity of bilateral data is the high presence of zeros. They may be due to the absence of migration flows between a pair of countries, missing data (Robertson and Robitaille, 2017) or the fact that the number of migrants is too weak to be counted. Under these conditions, considering the logarithm of bilateral migration flows could lead to important losses of information that could affect the quality of our estimation. Furthermore, Silva and Tenreyro (2011) have shown that, in these conditions, the use of the Ordinary Least Squares or Tobit models generates a large bias that tends to persist even when the sample size increases. Thus, they propose the use of the Poisson Pseudo Maximum Likelihood (PPML) estimation to overcome the bias, which, moreover, is more robust in the presence of heteroscedasticity (Czaika and De Haas, 2013).

Another way to handle the high presence of zero on bilateral data consists of adding one to the annual migration flows to avoid losing information from the zero migration pairs (Ortega and Peri, 2013). We use it as a robustness check to verify if results are sensitive to the change in the measure of annual migration flows.

3.2 Skill composition effects of a restrictive immigration policy

To identify the effects of restrictions on the selection of immigrants, we employ the following specification:

$$y_{it}^{*} = \alpha_i + \beta X_{it} + \theta_t + \delta B_{od} + \mu_{it} \qquad \textbf{(2)}$$

where $\boldsymbol{y_{it}^{*}}$ is the latent variable equal to 1 if the ratio of high to low-skilled migrants is higher or equal to 1 (positive selection) and 0 otherwise; $\boldsymbol{X_{it}}$ is a vector of time-varying variables related to the origin and destination country, such as the per capita GDP, restrictive immigration policy index, and the population size. $\boldsymbol{\theta_t}$ is a year-fixed effects. $\boldsymbol{B_{od}}$ is a vector of time-invariant bilateral covariates, namely the distance between the origin (o) and the destination (d) country, having colonial ties, and sharing a common language or a border. $\boldsymbol{\mu_{it}}$ corresponds to the error term.

These variables have been chosen referring to the existing literature. For instance, Grogger and Hanson (2011) show that contiguity and colonial links reduce the skill of emigrants, while

sharing a common language tends to increase it. Furthermore, Belot and Hatton (2012) argue that colonial legacies, distance and cultural similarities determine more the educational selectivity of emigrants than selective immigration policy or wages. The two studies are about the OECD countries.

The equation might be estimated using a random-effects approach. This situation assumes an absence of correlation between explanatory variables (X_{it}) and time-invariant unobserved effects α_i. This assumption is implausible in most cases (Sander, 2007) since it is unlikely that a country's immigration policy or GDP per capita may not be linked to unobserved effects related to the labour market or economy in general. Second, when the number of periods (T) is small, using a random-effects or unconditional fixed effect estimator, as well as ignoring heterogeneity (α_i) leads to persistent biased which tends to reduce with T (Greene, 2004). Likewise, the use of the logit fixed-effects does not allow the introduction of time-constant variables such as distance between countries or the fact of sharing a common language (Wooldridge, 2019).

To handle these issues, we can use a correlated random effect model of Mundlak (CRE), which allows the correlation between the unobserved heterogeneity (α_i) and the explanatory variables by introducing the within-means of the independent variables as determinants so that

$$\alpha_i = \rho\bar{X}_i + \omega_i \qquad \textbf{(3)}$$

where $\boldsymbol{\bar{X}_i}$ is the average of the explanatory variables over time and $\boldsymbol{\omega_i}$ is the true random effect non-correlated with covariates. Therefore, the equation to be estimated is

$$y_{it}^{*} = \beta X_{it} + \theta_t + \delta B_{od} + \rho\bar{X}_i + \omega_i + \mu_{it} \qquad \textbf{(4)}$$

This approach allows for the introduction of time-constant variables (contiguity, colonial relationship, distance, common language, etc.) and is a synthesis of the fixed and random effects approach (Wooldridge, 2019). However, findings from the correlated random effect approach (CRE) may be biased since it does not take into account the "*initial condition problem*" (Heckman, 1981), which derives from the lack of independence between the first observed value of the dependent variable and unobserved individual effects or its previous observations. As Grotti and Cutuli (2018) state: "*the initial condition problem refers to the fact that the initial period y_{io} that the researcher observes might not (and realistically does not)*

correspond to the beginning of the stochastic process leading to the experience of the outcome. More precisely, while the researcher observes the values in the response variable for the period $s = 0, \dots, T$; *the stochastic process starts at period* $s < 0$". Wooldridge (2005) argues that this assumption of independence is strong and results in inconsistent estimates.

We fix this problem by estimating a dynamic random effect probit model developed initially by Wooldridge (2005) and improved by Rabe-Hesketh and Skrondal (2013)[3] , who argue that this approach is the best estimation strategy for handling the initial condition problem. It consits of introducing as an independent variable the initial period of the response variable, the initial period of the time-varying explanatory variables and the within-means of the time-explanatory variables. All these regressors allow for controlling unobserved heterogeneity (Grotti and Cutuli, 2018). The lagged value of the dependent variable is also introduced to capture the genuine state dependence. The latter determines whether being positively selected in the past period affects the probability of being positively selected in the current period.

4 Data

In this paper, we combine data from several sources and build a panel data set covering 178 origin countries and 20 OECD destination countries spanning from 1990 to 2010 at five-year intervals. The included OECD countries are Austria, France, Germany, United States, Australia, United Kingdom, Canada, Denmark, Finland, Sweden, Spain, Italy, Portugal, Switzerland, Greece, Ireland, Luxembourg, Netherlands, Norway and New Zealand. The availability of immigration flow data, mainly by educational attainment level over a long period and a wide range of origin and destination countries, dictates the selection of the country sample.

4.1 Dependent variables

To measure bilateral migration flows, we use the global matrix of bilateral international migration flows provided by Abel and Cohen (2019), which is, to our knowledge, the only

[3] Wooldridge foundational's solution consisted of using as regressors the initial dependent variable and the time-varying explanatory variables (Lee, 2016). Rabe-Hesketh and Skrondal (2013) argue that this method gives room to severe bias and propose an alternative one consisting of including as additional regressors the initial period value and within-means of time-variant explanatory variables, as well as the initial period value of the dependent variable (Grotti and Cutuli, 2018).

existing one. Data are available for pairs of 200 countries for five-year periods between 1990 and 2015. Bilateral flows are estimated from annual migrant stock data provided by the United Nations by applying the *Pseudo-Bayesian* method (Azose and Raftery, 2019), which is the most appropriate estimation technique among over five other techniques analysed by the authors[4].

Regarding the skill composition of migration flows, we employ the IAB (Institute for Employment Research) database built by Brücker and al., (2013). They compute the total number of foreign-born individuals aged 25 years and older classified between low- and high-skilled immigrants living in each of 20 OECD destination countries in five-year intervals from 1980 to 2010. To our knowledge, there is no database documenting international migration flows disaggregated by skill level. Although many government ministries record entries distinguishing, *inter alia*, occupation, origin and education level attainment, data are unavailable due to issues of privacy (Czaika and Parsons, 2016).

Accordingly, we follow Beine and Parsons (2015), Bertoli and Fernández-Huertas Moraga (2015) and Lanati and Thiele (2021) by proxying migration flows by taking the difference in these stocks. This technique gives room to negative values due to returns and deaths of migrants, which are practically difficult to test, if not impossible, in the absence of suitable data (Beine and Parsons, 2015). We drop them from the analysis since immigration flows can not be negative as such. Certainly, these data are not perfect but are enough precise to derive reasonable estimations (Beine and al., 2011). Thereafter, we define the skill content of immigration flows by the ratio of high to low-skilled migrants (see Bianchi, 2013). Thus, migrants are considered to be positively selected when the ratio is higher than or equal to 1 and 0 otherwise.

4.2 Explanatory variables

We derive the measure of immigration policy restrictiveness from the newly Immigration Policies in Comparison (IMPIC) database (Helbling and al., 2017). It covers 33 OECD countries for the 1990-2010 period. The IMPIC dataset has the advantage of distinguishing between regulations related to family reunification, labour immigration, refugee and asylum

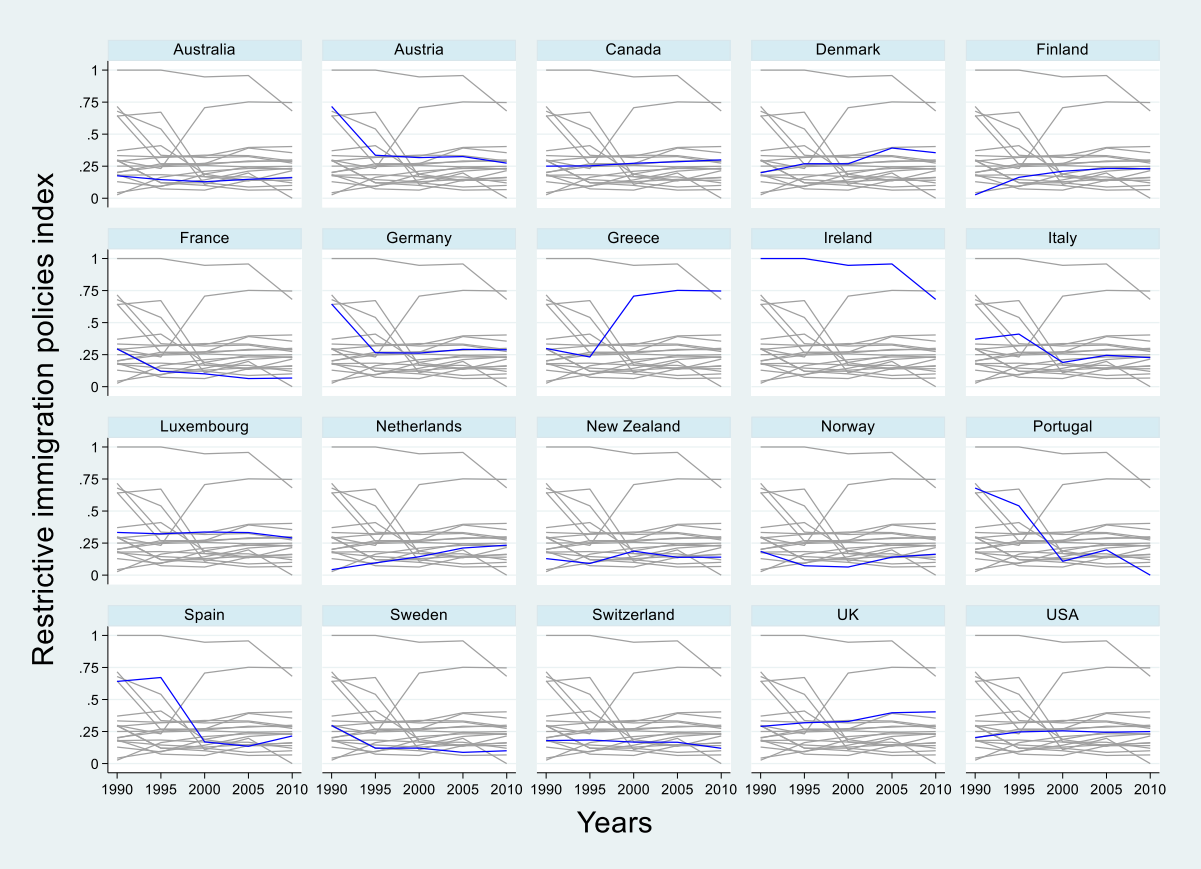
[4] The other five estimation methods are: demographic account minimisation closed, demographic account minimisation open, migration rates, stock difference drop negative and stock difference reverse negative.

policies, and co-ethnics[5]. For each of these fields, it disentangles external from internal regulations, which can be subdivided respectively between eligibility requirements and conditions on the one hand, and security of the status and rights associated on the other (See **Table A1** in Appendix). Thus, it enables analysing of within and between-country differences (Bjerre and al., 2016). Eligibility requirements and conditions refer to different criteria an immigrant has to fulfil to enter legally into the destination country. While the security of the status and rights associated relate to, *inter alia*, rules governing the obtaining of a residence permit, its duration, access to citizenship and the rights the latter grant regarding welfare benefits and the labour market, for instance.

Since admission for co-ethnics reasons is few or unusual, we follow Helbling and al. (2020) by building a restrictive policy index considering only three policy fields, namely family reunification, labour migration, and asylum and refugees, which are the main reasons for which states admit immigrants. Thus, to compute the restrictiveness of the immigration policy, we use an additive aggregation with values ranging between 0 (open) and 1 (restrictive) (see Bjerre and al., 2016). **Figure 2** describes the evolution of the restrictions index in different countries of our sample between 1990 and 2010.

[5] Co-ethnics concern immigrant groups who are entitled to immigrate or access to citizenship for a given country due to colonial, historical or cultural ties.

Figure 2. Evolution of the restrictive immigration policies index between 1990 and 2010

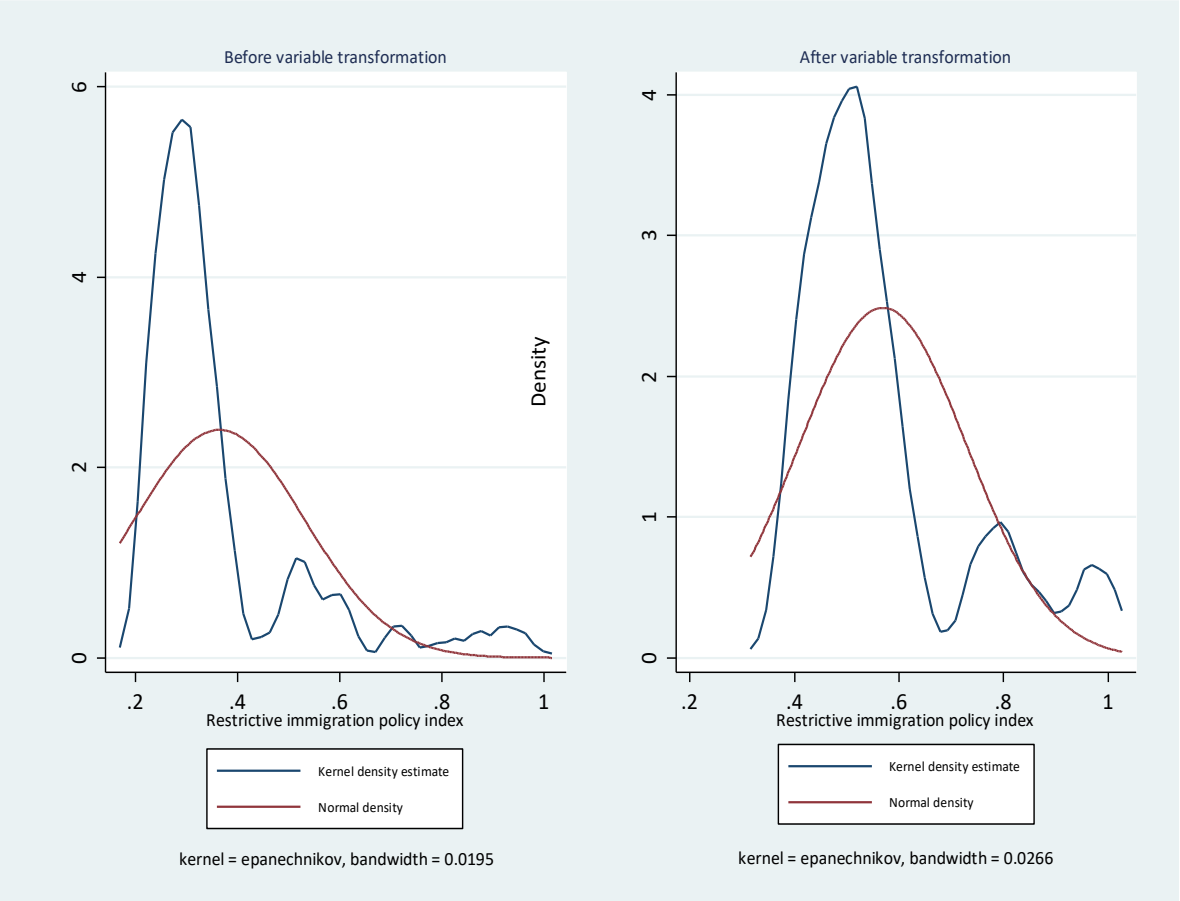


Source: Author.

Ireland is the country with the highest restriction level, even if it decreased suddenly between 2005 and 2010 from 0,96 to 0,68. EU enlargement in 2004 may explain this situation. While the old Member States were granted a transitional period of seven years to decide when to open their borders to new members, Ireland was among the countries that immediately decided to admit newcomers because of labour market needs. Accordingly, restrictions were less stringent. In comparison to other countries, Greece is the country with the highest increase in restrictions over the period. The index passed from 0.25 in 1990 to 0.75 in 2010. On the opposite side, Portugal, Spain and to a lesser extent Germany and Italy have experienced an important decrease in restrictions. For other countries in the sample, restriction levels have

been relatively stable over the years.

Figure 3. Distribution of the restrictive immigration policy index before and after transformation



Source: Author's calculation.

The resulting policy variables are highly right-skewed, as shown in **Figure 3**. This indicates a more liberal-oriented immigration policy in most countries of the sample during the 1980-2010 period. Thus, to deal with these extreme outlying values, each policy variable is transformed by reversing its scale, squaring it and reversing it again (Helbling and al., 2020).

In addition to information on the policy variable, bilateral migration flows and skill composition of migration flows, we introduce standard gravity variables such as colonial relationship after 1945, common language, contiguity and distance. Data are from the CEPII

(Centre d'Études Prospectives et d'Informations Internationales) database (Mayer and Zignago, 2011). Out of these variables, the GDP per capita of the origin and destination country, as well as the population of the origin country, are also taken into account. They are all taken from Penn World Table Version 7.1. **Table A2** in the Appendix summarises the variable descriptions and data sources.

5 Results

5.1 Effects of restrictions on bilateral migration flows

5.1.1 Main results

Table 1 gives estimates of the effects of immigration restrictions on bilateral flows between 20 OECD destination countries and 178 origin countries from 1990 to 2010. Columns 1 to 4 report results progressively controlling for year, origin, origin-year, and destination fixed effects.

Overall, we find a significant negative effect of restrictions on migration flows, regardless of the fixed effects specification. For example, a 1% increase in policy restrictions is associated with a 0,76% decrease in migration flows from each origin country.

The population size and GDP per capita of the origin country both have a significant and positive effect on bilateral migration flows. A 10% increase in each variable is associated with a 6.6% and 1.4% rise in migration flows, respectively. These results remain robust when introducing various sets of fixed effects and are consistent with previous findings in the literature (see Ortega and Peri, 2013).

However, the effect of the destination country's GDP per capita, although statistically significant, is ambiguous: its sign varies depending on whether destination fixed effects are included. Sharing a common language, a common border, or a colonial history between countries significantly increases bilateral flows. Finally, the semi-elasticity of distance with respect to migration flows is negative and statistically significant, as expected.

Table 1. PPML estimates

VARIABLES	(1) PPML	(2) PPML	(3) PPML	(4) PPML
Policy restrictions	**-0.90*** **	**-0.98*** **	**-0.80*** **	**-0.76** **
	(0.19)	**(0.19)**	**(0.20)**	**(0.38)**
Population at origin	0.59***	1.78***	1.98***	0.66***
	(0.03)	(0.33)	(0.32)	(0.02)
Gdppc at destination (lag)	0.94***	0.79***	-1.47***	-1.35**
	(0.29)	(0.22)	(0.31)	(0.59)
Gdppc at origin (lag)	0.19***	0.50***	0.53***	0.14***
	(0.05)	(0.11)	(0.11)	(0.03)
Distance	-0.08	-0.19*	-0.74***	-0.69***
	(0.19)	(0.11)	(0.09)	(0.06)
Contiguity	1.20	0.99***	0.24	0.53**
	(0.87)	(0.34)	(0.19)	(0.23)
Common language	1.67***	2.11***	1.11***	0.88***
	(0.15)	(0.16)	(0.14)	(0.08)
Colonial relationship	1.18***	1.32***	1.22***	1.34***
	(0.25)	(0.21)	(0.17)	(0.08)
Observations	13,760	13,760	13,760	13,760
R-squared	0.17	0.61	0.81	0.60
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	Yes	Yes	No
Origin-year fixed effects	No	No	No	Yes
Destination fixed effects	No	No	Yes	Yes

Notes: The dependent variable is the bilateral migration flows for columns 1 to 4. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Robust standard errors in brackets. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

5.1.2 Robustness checks

The estimations of the size effect of restrictive immigration policies are not immune to endogeneity problems, mainly to simultaneity bias. A less or more restrictive immigration policy can have significant effects on migration flows. Likewise, an important number of migration flows could be an incentive for the destination country's policymakers to toughen immigration policy. Rather than substituting the suspected explanatory variable by its lagged values to avoid simultaneity problems, which is an inconsistent and widespread practice (see Reed, 2015), we tackle this econometric issue by resorting to an instrumental variable approach.

We choose two variables as instruments, namely the one-year lagged restrictive immigration

policy index and the type of electoral system of the destination country. Two reasons justify the use of the lagged immigration policy as an instrument.

Firstly, since we use five-year interval data, the one-year lag implies that the immigration policy of five years ago directly affects the current immigration policy but does not have a direct effect on the contemporary migration flows. Given the saliency of the immigration issue during the recent decades in most developed countries, mainly fuelled by politicians, media and anti-immigrant parties, five years is long enough so that a shift happens at least in one component (family reunification, labour migration or asylum/refugees) of our immigration policy index. Thus, the policy index is different from year to year, and this is verified in all destination countries of our sample except in Ireland and Sweden, where policy has not changed, respectively, between 1990 and 1995, and between 1995 and 2000. This means the current immigration flows are directly affected by the actual immigration policy and not by the five-year-old immigration policy, which has changed to some extent meantime. Secondly, Reed (2015) shows both theoretically and empirically that when the endogeneity bias relates to simultaneity problems, using the lagged values of the suspected explanatory variable as an instrument produces consistent estimates on the condition that it does not belong in the respective estimating equation.

Our second instrument is the electoral system variable. It comes from the Comparative Political Data Set and is coded 1 if the destination country has a proportional representation system and 0 otherwise. Immigration, to some extent, contributes to enlarging the fiscal base in the destination country, but it also produces winners and losers. To be supported by nationals, the gains from immigration should be used to compensate losers (Rodrik, 2011). The latter may take the form of public goods or monetary transfers, and its extent varies depending on the type of electoral system prevailing in the host country (Russo and Salsano, 2019). Several theoretical and empirical studies (Austen-Smith, 2000; Breunig and Busemeyer, 2012; Chang, 2008; Gagliarducci and al., 2011; Iversen and Soskice, 2006; Morelli and Negri, 2017; Persson and Tabellini, 2004, 2005) suggest that proportional representation[6] in comparison to other systems redistribute and spend more in public goods.

[6] In a proportional representation system (Luxembourg, Denmark, Czech Republic, Germany, etc.), the number of seats assigned to each political party is proportional to its vote share.

In light of these findings, we argue that compensations are more likely to be significant under proportional rules, and this is not without consequence for immigration policy, as shown by Russo and Salsano (2019). They state that in plurality systems[7], compensations are only targeted in a few decisive districts that allow the policymaker to win the election or look like pork-barrel spending. Conversely, in a proportional representation system (PR), compensations are not geographically biased and cover a wide range of beneficiaries, including immigrants who can not be excluded based on their nationality. Thus, the policymaker reaps small net benefits after compensation in a proportional system, in comparison to a plural system. This leads policymakers to favour a tough immigration policy as immigration per se is not advantageous for them electorally and economically (Russo and Salsano, 2019). Furthermore, in an analysis of the interplay between the electoral system, taxation and immigration policies, Morelli and Negri (2017) find a strong relationship between countries with proportional representation and their immigration policies. But to the best of our knowledge, no study establishes a direct link between the electoral system and bilateral migration flows. To handle the high presence of zero on bilateral data, we also use the log of annual migration flows plus one as an alternative measure of the dependent variable. The results are presented in **Table 2**.

Table 2. Robustness check - Instrumental variable estimates

	(1)
VARIABLES	Ln(1+bilateral flows)
Policy restrictions	**-0.66*** **
	(0.19)
Population at origin	1.99***
	(0.10)
Gdppc at destination (lag)	-0.54***
	(0.08)
Gdppc at origin (lag)	0.23***
	(0.04)
Observations	13,820
R-squared	0.06
Number of country pairs	3,520
Kleibergen-Paap rk LM statistic	0.0000
F statistic first stage	437.53
Hansen J Statistic P-value	0.8741
Country fixed effects	Yes

Notes: The dependent variable is the log of annual migration flows plus one. All regressions include fixed effects. GDP and population are expressed in natural logarithms. Robust standard errors in brackets. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

[7] In a plurality system (Canada, United Kingdom, United States, etc.), the member of parliament of a single district is elected following a winner-take-all rule.

The first-stage regression shows that the coefficients of instruments are positive and statistically significant at the 1% level, as expected (see **Table A3** in Appendix). The *F statistic* of 437.53 is considerably larger than the rule of thumb value of 10. This strongly suggests that weak instruments are not a problem. The probability associated with the *Kleibergen-Paap LM statistic* is lower than 5%, confirming the rejection of the under-identification hypothesis. Lastly, the p-value related to the *Hansen statistic* is higher than 5%, giving us greater confidence that our instrument set is exogenous. The restrictions' effect remains negative and statistically significant at the 1% level. Thus, our result is robust to potential endogeneity bias.

As an additional robustness check, we apply the entropy balancing method for continuous treatment (EBCT) developed by Tübbicke (2023). Entropy balancing was initially developed by Hainmueller (2012) to achieve covariate balance in settings with a binary treatment. Tübbicke (2023) extends this approach to continuous treatment. In our context, the treatment variable is the interaction between rainfall anomalies and agricultural trade openness, capturing the combined exposure to climate variability and trade integration.

Table 3. Robustness checks – Entropy balancing: Summary statistics on balancing quality

	R-squared	F-statistics	p-value
Before balancing	0.039	79.028	0.000
After balancing	0.000	0.000	1.000

Notes: Results from a (weighted) regression of the treatment variable on covariates. The treatment variable is the level of restrictions.

Table 4. Robustness checks – Entropy balancing estimates

	(1)	(2)	(3)	(4)
VARIABLES	Bilateral flows	Bilateral flows	Ln(1+bilateral flows)	Ln(1+bilateral flows)
Policy restrictions	**-1.946*** **	**-1.978*** **	**-1.849*** **	**-1.831*** **
	(0.124)	**(0.096)**	**(0.125)**	**(0.090)**
Population at origin		0.856***		0.891***
		(0.010)		(0.009)
Gdppc at destination (lag)		0.119		-0.335***
		(0.106)		(0.100)
Gdppc at origin (lag)		0.364***		0.421***
		(0.015)		(0.015)
Distance		-0.684***		-0.743***
		(0.025)		(0.025)
Contiguity		0.791***		0.670***
		(0.124)		(0.124)
Common language		2.170***		2.239***
		(0.063)		(0.065)
Colonial relationship		2.617***		2.738***
		(0.090)		(0.092)
Observations	13,082	13,082	13,760	13,760
R-squared	0.021	0.474	0.018	0.492
Year fixed effects	Yes	Yes	Yes	Yes

Notes: The dependent variable is the bilateral migration flows in columns 1 and 2, and the log of annual migration flows plus one in columns 3 and 4. The treatment variable is policy restrictions. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Robust standard errors are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

The results from the preliminary balancing diagnosis of the entropy balancing procedure applied to the treatment variable are summarised in **Table 3**. Before balancing, the covariates had little explanatory power on the treatment variable (R-squared=0.039; F-statistics=79.028). After balancing, the R-squared dropped to 0.000 with a p-value of 1.000, denoting perfect covariate balance. Therefore, the entropy balancing procedure successfully eliminates systematic differences across levels of restrictions.

The weight obtained in the first step is then used in the second step to estimate the effect of restrictions through a weighted least squares method. The results are presented in **Table 4**. In all cases, the effects of policy restrictions remain negative and statistically significant at the 1% level.

5.1.3 Heterogeneity

In this subsection, we distinguish between subdimensions of the restrictive immigration policy index, focusing specifically on external and internal regulations. The results are presented in **Table 5**.

Table 5. Disaggregated effects of the restrictive immigration policy index, PPML estimates

VARIABLES	(1) External restrictions	(2) Internal restrictions
Policy restrictions	**-1.23*** **	**-0.53*** **
	(0.23)	**(0.18)**
Population at origin	2.14***	2.00***
	(0.29)	(0.29)
Gdppc at destination (lag)	-1.02***	-1.17***
	(0.29)	(0.30)
Gdppc at origin (lag)	0.55***	0.48***
	(0.10)	(0.10)
Distance	-0.74***	-0.74***
	(0.09)	(0.09)
Contiguity	0.24	0.24
	(0.19)	(0.19)
Common language	1.11***	1.11***
	(0.14)	(0.14)
Colonial relationship	1.22***	1.22***
	(0.17)	(0.17)
Observations	13,760	13,760
R-squared	0.81	0.81

Notes: The dependent variable is the bilateral migration flows. All regressions include origin and destination country fixed effects. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Robust standard errors in brackets. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

For all dimensions, restrictions implemented by OECD destination countries have a significant and negative effect on bilateral migration flows. Contrary to expectations, an increase in the destination country's GDP per capita reduces migration flows. Although wealthier countries offer more opportunities to improve migrants' living standards, we assume that this greater attractiveness may prompt policymakers to tighten immigration policy, which in turn curbs migration flows. The negative effect of the origin country's GDP per capita supports the neoclassical view that income differentials between origin and destination countries are a key driver of emigration decisions (Lanati and Thiele, 2021).

Table 6. Heterogeneity analysis - Effects of immigration restrictions in countries with and without points-based systems, PPML estimates

VARIABLES	(1) Non-PBS Countries	(3) Non-PBS without USA	(2) PBS Countries
Policy restrictions	**-0.95*** **	**-0.85*** **	**-0.94**
	(0.20)	**(0.21)**	**(1.79)**
Population at origin	1.90***	2.36***	3.01***
	(0.31)	(0.27)	(0.39)
Gdppc at destination (lag)	-1.23***	-0.84***	-0.59*
	(0.32)	(0.22)	(0.32)
Gdppc at origin (lag)	0.51***	0.39***	0.36*
	(0.12)	(0.09)	(0.19)
Distance	-0.86***	-1.17***	-0.56**
	(0.09)	(0.20)	(0.25)
Contiguity	0.35*	0.10	0.18
	(0.18)	(0.20)	(0.52)
Common language	0.88***	1.04***	0.98**
	(0.15)	(0.15)	(0.38)
Colonial relationship	1.42***	1.68***	1.47*
	(0.19)	(0.16)	(0.83)
Observations	11,696	11,008	2,064
R-squared	0.84	0.61	0.77
Origin fixed effects	Yes	Yes	Yes
Destination fixed effects	Yes	Yes	Yes

Notes: The dependent variable is the bilateral migration flows. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Robust standard errors in brackets. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

To test for heterogeneity, we also examine whether the effects of restrictions differ between countries with a point-based immigration system (PBS) and those without. PBS frameworks condition admissions on criteria such as education, age, work experience, salary, language proficiency, and skills (Aboubacar and Zhu, 2014; Antecol and al., 2003; Zhu and Batisse, 2016), with the main goal of attracting skilled workers. In contrast, demand-driven systems—more common in Europe—aim to promote the broader social and economic integration of migrants (Czaika and Parsons, 2017). In practice, both systems now coexist in several countries, where alternative immigration channels like family reunification or asylum are not subject to PBS criteria. As a result, the nature and enforcement of restrictions may differ, leading to potentially distinct effects on migration flows.

Our findings support this hypothesis, as shown in **Table 6**. Policy restrictions significantly

reduce migration flows only in countries without a point-based system. This result remains robust even when excluding the United States, whose immigration policy relies heavily on family reunification and visa quotas (Real, 2011). In contrast, the effect of restrictions is not statistically significant in PBS countries such as Canada, Australia, the UK and New Zealand.

Table 7. Effects of immigration restrictions by development level of the origin country, PPML estimates

	(1)	(2)
VARIABLES	Developing origin countries	Developed origin countries
Policy restrictions	**-1.44*** **	**-0.26**
	(0.23)	**(0.25)**
Population at origin	1.86***	2.32***
	(0.38)	(0.55)
Gdppc at destination (lag)	-0.94	-1.73***
	(0.59)	(0.31)
Gdppc at origin (lag)	0.37***	1.27***
	(0.13)	(0.21)
Distance	-1.07***	-0.36***
	(0.13)	(0.11)
Contiguity	1.53***	0.49**
	(0.30)	(0.20)
Common language	1.28***	0.76***
	(0.16)	(0.16)
Colonial relationship	1.31***	1.37***
	(0.20)	(0.29)
Observations	9,560	4,200
R-squared	0.87	0.60
Year fixed effects	Yes	Yes
Origin fixed effects	Yes	Yes
Destination fixed effects	Yes	Yes

Notes: The dependent variable is the bilateral migration flows. Robust standard errors in brackets. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Lastly, we split the sample by the development level of the origin countries to examine whether the effects of restrictions vary accordingly. Following the World Bank Classification (2021), low- and middle-income countries are defined as developing, and high-income countries as developed. **Table 7** presents the PPML estimates.

The results show that restrictions significantly reduce migration flows from developing

countries, while the effect is not significant for developed origin countries. This may reflect the fact that restrictions often target immigration from poorer countries, which tend to raise greater concern among policymakers and the public. Migrants from developing countries also face more financial and non-financial barriers, including poverty or greater geographical distance, that amplify the impact of restrictive policies.

5.2 Skill composition effects of immigration restrictions

5.2.1 Main results

The results from the dynamic random-effects probit model are reported in **Table 8**. The coefficient of the lagged dependent variable is positive and significant at the 10% level, though well below one. This suggests that skilled migration in one period increases the likelihood of positive selection in the subsequent periods. A similar finding was reported by Beine and al., (2008) who showed that doubling the emigration rate of highly skilled individuals raises human capital formation among both future emigrants and non-migrants in a cross-section of 127 countries.

We also find that policy restrictions have a negative and statistically significant effect at the 1% level: a 1% increase in restrictions reduces the probability of positive selection by 0.5%. The GDP per capita of the destination country is positively associated with skill selection, also significant at the 1% level. Sharing a common language and a colonial history promotes positive selection, while greater geographical distance has the opposite effect.

Finally, the coefficients of variables capturing unobserved heterogeneity—namely the initial value of the dependent variable, the initial GDP per capita of the destination country and the within-mean of policy restrictions—are positive and highly significant at the 1% level. This indicates that these variables are correlated with unobserved individual-specific factors that increase the likelihood of positive selection.

Table 8. Probit dynamic random effects estimates

VARIABLES	**(1)**
Lagged dependent variable	0.032*
	(0.018)
Policy restrictions	**-0.531*** **
	(0.090)
Population at origin	0.127
	(0.087)
Gdppc at destination (lag)	0.782***
	(0.126)
Gdppc at origin (lag)	-0.021
	(0.039)
Distance	-0.019**
	(0.009)
Contiguity	-0.072
	(0.081)
Common language	0.155***
	(0.017)
Colonial relationship	0.309***
	(0.064)
Dependent variable (initial period)	0.288***
	(0.018)
Policy restrictions (initial period)	-0.398***
	(0.056)
Population at origin (initial period)	-0.002
	(0.071)
Gdppc at destination (initial period)	0.350***
	(0.096)
Gdppc at origin (initial period)	0.030
	(0.032)
Policy restrictions (within-mean)	1.186***
	(0.136)
Population at origin (within-mean)	-0.110
	(0.132)
Gdppc at destination (within-mean)	-0.873***
	(0.186)
Gdppc at origin (within-mean)	0.037
	(0.058)
Number of country pairs	2598
Year fixed effects	Yes
Log pseudo-likelihood	-3810.3321

Notes: The dependent variable equals 1 if immigrants are positively selected and 0 otherwise. GDP, population, and distance are expressed in natural logarithms. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Beyond the endogeneity bias related to the initial condition problem, another source of endogeneity may arise from the correlation between explanatory variables and omitted time-

invariant covariates (level 2 endogeneity). This issue can lead to inconsistent estimates, particularly in short panels such as ours. While our baseline specification controls for dyad-specific factors like distance, linguistic proximity, and shared borders, other unobserved origin-country characteristics—such as geographic location—may still influence positive selection (Beine and Parsons, 2015).

To address these concerns, we implement the *joint modelling approach* developed by Skrondal and Rabe-Hesketh (2014), which accounts for both initial conditions and unobserved heterogeneity. As an additional robustness check, we apply entropy balancing for continuous treatment (EBCT), which corrects for endogeneity driven by observed covariates that are simultaneously correlated with the treatment variable (policy restrictions) and affect the outcome.

5.2.2 Robustness checks

The joint modelling approach addresses level-2 endogeneity by regressing the random intercept—representing omitted time-invariant covariates—on the means of the time-varying covariates. This specification allows for a time-constant correlation between the random intercept and the covariates, yielding consistent estimates for both the time-varying regressors and the lagged dependent variable, even in the presence of endogeneity (Skrondal and Rabe-Hesketh, 2014).

This method offers several advantages. First, it simultaneously addresses the initial condition problem and endogeneity due to omitted variables. Second, it accounts for time-invariant factors beyond dyadic regressors (e.g., distance, colonial ties, language, contiguity) that may influence immigration flows. Third, it provides consistent estimates even with a short time dimension. The results are reported in **Table 9.**

Interestingly, when both sources of bias are accounted for, the coefficient on the restriction variable becomes positive and statistically significant at the 10% level. Moreover, the significance of the means of time-varying covariates (e.g., policy restrictions and origin-country GDP per capita*)* at the 1% level confirms the presence of endogeneity and supports the relevance of the joint modelling approach.

Table 9. Robustness check - joint modelling estimates

VARIABLES	(1)
Lagged dependent variable	0.173*
	(0.091)
Policy restrictions	**0.434***
	(0.245)
Population at origin	0.097
	(0.243)
Gdppc at destination (lag)	1.801***
	(0.316)
Gdppc at origin (lag)	-0.022
	(0.124)
Distance	-0.056
	(0.048)
Contiguity	-0.553
	(0.464)
Common language	1.242***
	(0.101)
Colonial relationship	2.074***
	(0.375)
δ Policy restrictions (mean)	0.717**
	(0.287)
δ Gdppc at destination (mean)	-0.096
	(0.336)
δ Gdppc at origin (mean)	0.281**
	(0.129)
δ Population at origin (mean)	0.023
	(0.243)
ω (random-intercept variance)	1.25
Number of country pairs	2974
Log-likelihood value	-6092.0689
ICC (Intraclass correlation)	0.2753

Notes: The dependent variable equals 1 if immigrants are positively selected and 0 otherwise. The method is estimated using Stata's *gllamm* command, which employs adaptive quadrature. In this approach, only the coefficients of the lagged response variable and time-varying explanatory variables are consistently estimated. Significant coefficients of the mean of time-varying covariates indicate the presence of level 2 endogeneity, which does not challenges the consistency of the other estimates. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

As an additional robustness check, we apply the entropy balancing method for continuous treatment (EBCT) developed by Tübbicke (2023) (see Section 5.1.3 for details). The preliminary balancing diagnoses are presented in **Table 10**. Before weighting, covariates had limited explanatory power for the treatment variable (R-squared=0.052; F-statistics=57.409). After

balancing, the R-squared drops to 0.000 with a p-value of 1.000, indicating perfect covariate balance. This confirms that the procedure effectively eliminates systematic differences across levels of policy restrictions.

In the second step, the weights from the balancing procedure are used to estimate the effect of restrictions via weighted least squares. Results are presented in **Table 11**. Across all specifications, the effects of policy restrictions remain positive and statistically significant at the 1% level.

Table 10. Robustness checks – Entropy balancing: Summary statistics on balancing quality

	R-squared	F-statistics	p-value
Before balancing	0.052	57.409	0.000
After balancing	0.000	0.000	1.000

Notes: Results from a (weighted) regression of the treatment variable on covariates. The treatment variable is the level of restrictions.

Table 11. Robustness checks – Entropy balancing estimates

VARIABLES	(1)	(2)
Policy restrictions	0.202***	0.210***
	(0.042)	(0.042)
Population at origin		0.020***
		(0.003)
Gdppc at destination (lag)		0.224***
		(0.024)
Gdppc at origin (lag)		0.046***
		(0.005)
Distance		0.083***
		(0.006)
Contiguity		0.075
		(0.081)
Common language		-0.007
		(0.030)
Colonial relationship		0.161***
		(0.040)
Observations	7,355	7,355
R-squared	0.012	0.073
Year fixed effects	Yes	Yes

Notes: The dependent variable equals 1 if immigrants are positively selected and 0 otherwise. The treatment variable is policy restrictions. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Robust standard errors are in brackets. *** p<0.01, ** p<0.05, * p<0.1.

5.2.3 Heterogeneity

In this subsection, we examined the effects of restrictions across immigration policy sub-dimensions. Given the potential bias in estimates from the dynamic random-effects model, we rely on the joint modelling approach, which offers greater robustness to initial condition problems and endogeneity. The results are reported in **Table 12**.

Table 12: Heterogeneity analysis - Effects of immigration policy sub-dimensions on the positive selection of migrants, joint modelling estimates

VARIABLES	(1) External restrictions	(2) Internal restrictions
Lagged dependent variable	0.100	0.154*
	(0.090)	(0.088)
Policy restrictions	**-1.586*** **	**1.983*** **
	(0.399)	**(0.285)**
Population at origin	-0.003	0.451*
	(0.290)	(0.247)
Gdppc at destination (lag)	2.185***	1.832***
	(0.366)	(0.329)
Gdppc at origin (lag)	-0.101	0.095
	(0.142)	(0.119)
Distance	-0.009	-0.126***
	(0.051)	(0.048)
Contiguity	-0.463	-0.663
	(0.474)	(0.463)
Common language	1.195***	1.198***
	(0.104)	(0.101)
Colonial relationship	1.965***	2.040***
	(0.385)	(0.372)
δ Policy restrictions (mean)	4.562***	-2.321***
	(0.506)	(0.355)
δ Gdppc at destination (mean)	-0.684*	-0.135
	(0.397)	(0.351)
δ Gdppc at origin (mean)	0.362**	0.189
	(0.146)	(0.124)
δ Population at origin (mean)	0.119	-0.313
	(0.291)	(0.247)
ω (random-intercept variance)	1.49	1.34
Number of country pairs	2974	2974
Log-likelihood	-6003.4509	-6077.7283
ICC (Intraclass correlation)	0.3117	0.2894

Notes: The dependent variable equals 1 if immigrants are positively selected and 0 otherwise. The method is estimated using Stata's *gllamm* command, which employs adaptive quadrature methods. In this approach, only the coefficients of the lagged response variable and time-varying explanatory variables are consistently estimated. Significant coefficients of the mean of time-varying covariates indicate the presence of level-2 endogeneity, which does not challenges the consistency of the other estimates. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

We find that external regulations—such as condition and eligibility conditions—reduce the likelihood of a positive selection, while internal regulations—related to migrants' rights and status security—tend to enhance it. This may be because high-skilled migrants are less affected by internal constraints like permit renewal, access to employment, and long-term settlement, as they are more likely to meet these requirements due to their strong labour market integration (Bjerre and al., 2016). Moreover, many OECD countries have fine-tuned post-entry rules to attract and retain high-skilled migrants, including fast-tracked residence, family reunification rights, qualification recognition, and mobility benefits (Czaika and Parsons, 2016; OECD, 2008). These skill-targeted policies coexist with more restrictive measures aimed at low-skilled migrants, helping explain why internal restrictions, when not excessive, may have a positive effect on selection.

Another heterogeneity check involves splitting the sample between developed and non-developed origin countries to assess the heterogeneity of our findings. Results are reported in **Table 13**. We find that policy restrictions increase positive selection only among migrants from developing countries. This contrasts with Borjas' (1987) negative selection hypothesis, which predicts that in contexts of high returns to skill and income inequality, less educated individuals are more likely to emigrate. However, our results support growing evidence that migrants from developing countries tend to be among the most educated (Vargas-Silva, 2012).

Stricter immigration policies raise both monetary and non-monetary costs, such as income threshold, integration criteria, or language requirements. Although these costs apply to all migrants, the less educated are the most affected (Bianchi, 2013). For instance, in 2003, France and other OECD countries tightened family reunification policies to favour skilled labour migration by introducing more demanding entry conditions (d'Albis and al., 2016).

As Chiquiar and Hanson (2005) explain, more educated individuals are better equipped to navigate complex administrative procedures and afford legal assistance. They also face lower credit risk when financing migration and less uncertainty about future earnings (Borjas, 2019). Even for non-monetary barriers, such as language proficiency, skilled migrants are generally more advantaged. These mechanisms, however, do not imply that only the most talented migrate, but rather that selection is socially and economically stratified.

Table 13. Heterogeneity analysis – Development level of the origin country, joint modelling estimates

VARIABLES	(1) Non-developed origin countries	(2) Developed origin countries
Lagged dependent variable	0.458***	-0.480***
	(0.116)	(0.172)
Policy restrictions	**0.717****	**-0.104**
	(0.292)	**(0.452)**
Population at origin	0.278	0.051
	(0.286)	(0.575)
Gdppc at destination (lag)	1.486***	2.551***
	(0.408)	(0.596)
Gdppc at origin (lag)	0.081	-0.601
	(0.124)	(0.378)
Distance	0.002	-0.219**
	(0.058)	(0.087)
Contiguity	-0.893	-0.238
	(0.586)	(0.760)
Common language	1.329***	0.935***
	(0.114)	(0.215)
Colonial relationship	2.047***	2.528***
	(0.474)	(0.691)
δ Policy restrictions (mean)	0.306	1.662***
	(0.341)	(0.565)
δ Gdppc at destination (mean)	0.001	-0.196
	(0.428)	(0.635)
δ Gdppc at origin (mean)	0.101	0.946**
	(0.132)	(0.398)
δ Population at origin (mean)	-0.169	0.102
	(0.289)	(0.572)
ω (random-intercept variance)	0.88	2.22
Number of country pairs	2033	914
Log-likelihood value	-4137.0719	-1875.3744
ICC (Intraclass correlation)	0.2110	0.4029

Notes: The dependent variable equals 1 if immigrants are positively selected and 0 otherwise. The model is estimated using Stata's *gllamm* command, which employs adaptive quadrature methods. In this approach, only the coefficients of the lagged response variable and time-varying explanatory variables are consistently estimated. Significant coefficients of the mean of time-varying covariates indicate the presence of level-2 endogeneity, which does not affect the consistency of the other estimates. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Our findings align with Grogger and Hanson (2011), who show that the greater the skill-related wage gap between origin and destination countries, the more positively selected migrants are. We also find that sharing a common language enhances educational selectivity, as highly educated individuals benefit more from migrating to linguistically familiar destinations. This supports Beauchemin's (2018) analysis of stratified migration patterns between Europe and Africa, where former colonial powers tend to attract more students and skilled workers from their ex-colonies, partly due to degree recognition and linguistic proximity. In contrast, less educated migrants from these countries more often head to newer destinations such as Sapin, Italy, or the Netherlands.

Finally, colonial ties continue to influence migrant profiles. While Belot and Hatton (2012) found that former colonies initially sent mostly low-skilled migrants due to lower barriers, more recent immigration policies have become increasingly selective (de Haas and al., 2016b; Schultz and al., 2021), contributing to the rising share of highly educated migrants in OECD inflows (Boubtane, 2019; Zhu and Batisse, 2016).

Lastly, we follow Bianchi (2013) by testing a threshold effect by including the squared term of the restriction index. The coefficient is negative and highly significant at the 1% level in **Table 14**, indicating an inverse U-shaped relationship; moderate restrictions enhance positive selection, but overly stringent ones reduce it. This implies diminishing returns and even potential adverse effects when policies become excessively restrictive.

Table 14: Heterogeneity analysis - Threshold effect of restrictions, joint modelling estimates

VARIABLES	(1)
Lagged dependent variable	0.252***
	(0.095)
Policy restrictions	**3.249*** **
	(0.743)
Policy restrictions (square)	**-4.236*** **
	(0.910)
Population at origin	0.088
	(0.239)
Gdppc at destination (lag)	1.779***
	(0.314)
Gdppc at origin (lag)	-0.068
	(0.123)
Distance	-0.032
	(0.048)
Contiguity	-0.475
	(0.467)
Common language	1.225***
	(0.099)
Colonial relationship	2.275***
	(0.379)
δ Policy restrictions (mean)	-7.337***
	(0.863)
δ Policy restrictions square (mean)	9.874***
	(0.991)
δ Gdppc at destination (mean)	0.086
	(0.328)
δ Gdppc at origin (mean)	0.318**
	(0.129)
δ Population at origin (mean)	0.027
	(0.240)
random-intercept variance	1.092
Observations	10,684
Number of country pairs	2974
Log-likelihood value	-6043.1151
ICC (Intraclass correlation)	0.249

Notes: The dependent variable equals 1 if immigrants are positively selected and 0 otherwise. The method is estimated using Stata's *gllamm* command, which employs adaptive quadrature methods. In this approach, only the coefficients of the lagged response variable and time-varying explanatory variables are consistently estimated. Significant coefficients of the mean of time-varying covariates indicate the presence of level-2 endogeneity, which does not challenges the consistency of the other estimates. GDP, population, and distance are expressed in natural logarithms. Unreported constant included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

6 Conclusion

This paper has examined how restrictive immigration policies affect both the scale and the skill composition of migration flows. The results show that restrictions significantly reduce bilateral flows, particularly from low- and middle-income countries and in destinations that do not apply point-based immigration systems. Regarding skill composition, the analysis reveals a non-linear relationship: restrictions tend to increase positive selection at moderate levels, but higher restrictions reduce migrant quality. The effects also vary by policy dimension—external restrictions (such as financial or language requirements) are associated with lower-skilled migration, while internal restrictions (related to residence permits or labour market access) tend to favour the selection of more skilled migrants.

These findings highlight that migration policy should not be evaluated solely on its ability to restrict entry, but also on its consequences for migrant profiles. Rather than relying on broad-based restrictions, policymakers seeking to attract skilled migrants should consider targeted internal measures—such as secure residence status, streamlined permit renewal procedures, and improved access to employment and integration services. These tools may prove more effective in fostering high-skilled migration while avoiding the unintended exclusion of desirable migrant profiles.

Disclosure statement

No potential conflict of interest was reported by the author.

Appendix

Table A1. Selection of items

			Policy areas			
			Family reunification	**Labor migration**	**Asylum and refugees**	**Co-ethnics**
Regulations	**External**	**Eligibility**	Residence requirements Family members Age limits Quotas family reunification	Targeting Quotas labor Age limits Young age beneficial	Existence of Subsidiary/ humanitarian protection Nationality Quotas asylum Safe third country Safe countries of origin Resettlement agreements	Reasons for co-ethnicity Language skills Converts Ancestry Country of residence Quotas co-ethnics
		Conditions	Financial requirements Accommodation requirements Language skills Application fees	Specific income per month Specific financial funds Language skills Application fee Job offer Equal work conditions List of occupations Labor market tests	Place of application	Place of application Date of birth
	Internal	**Security of status**	Residence permit validity Autonomous residence permit	Work permit validity Renewal of permit Transition temporary permanent Loss of employment	Permit validity Permit renewal Permanent permit Right to appeal Status when crisis resolved	Access to citizenship Duration of residence permit
		Rights associated	(Self)employment	Flexibility of permit	Free movement (Self)employment Form of benefits	Region of settlement Employment programs Integration measures

Source: Bjerre and al. (2016)

Table A2. Variable descriptions and data sources

Variable	**Description**	**Source**
Bilateral flows	Bilateral flows	Abel and Cohen (2019)
Skill composition	1 if immigrants are positively selected, 0 otherwise	IAB database
Policy restrictions	Restrictive immigration policy index	IMPIC
Population at origin	log of origin population	Penn World Table
Gdppc at destination	log of GDP per capita of the destination country (lagged)	Penn World Table
Gdppc at origin	log of GDP per capita of the origin country (lagged)	Penn World Table
Contiguity	1 if two countries are contiguous, 0 otherwise	CEPII Geodist
Distance	log of the distance between the biggest cities in two countries	CEPII Geodist
Common language	1 if a language is spoken by at least 9% of the population in both countries, 0 otherwise	CEPII Geodist
Colonial relationship	1 if two countries have a colonial relationship after 1945, 0 otherwise	CEPII Geodist

Table A3. First-stage regression - Instrumental variable estimates

Variables	First-stage estimation
Policy restrictions (lag)	0.365***
	(29.37)
Proportional representation	0.0167***
	(4.54)
Population at origin	0.0529***
	(4.34)
Gdppc at destination (lag)	-0.0594***
	(-5.64)
Gdppc at origin (lag)	0.0104*
	(2.14)
Number of observations	13820

Notes: The dependent variable is bilateral migration flows. GDP, population, and distance are expressed in natural logarithms. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

References

Abel, G. J., & Cohen, J. E. (2019). Bilateral international migration flow estimates for 200 countries. *Scientific Data*, *6*(1), 82.

Aboubacar, S. A., & Zhu, N. (2014). Episodes of Non-Employment Among Immigrants to Canada from Developing Countries. *Canadian Studies in Population*.

Antecol, H., Cobb-Clark, D. A., & Trejo, S. J. (2003). Immigration policy and the skills of immigrants to Australia, Canada, and the United States. *Journal of Human Resources*, *XXXVIII*(1), 192–218.

Austen-Smith, D. (2000). Redistributing Income under Proportional Representation. *Journal of Political Economy*.

Azose, J. J., & Raftery, A. E. (2019). Estimation of emigration, return migration, and transit migration between all pairs of countries. *Proceedings of the National Academy of Sciences*, *116*(1), 116–122.

Beauchemin, C. (Ed.). (2018). Migration between Africa and Europe. Springer International Publishing.

Beine, M., Docquier, F., & Özden, Ç. (2011). Diasporas. *Journal of Development Economics*, *95*(1), 30–41.

Beine, M., Docquier, F., & Rapoport, H. (2008). Brain drain and human capital formation in Developing countries: Winners and losers. *The Economic Journal*, *118*(528), 631–652.

Beine, M., & Parsons, C. (2015). Climatic factors as determinants of international migration. *The Scandinavian Journal of Economics*, *117*(2), 723–767.

Bellettini, G., & Ceroni, C. B. (2007). Immigration Policy, Self-selection, and the Quality of Immigrants. *Review of International Economics*, *15*(5), 869–877.

Belot, M. V. K., & Hatton, T. J. (2012). Immigrant Selection in the OECD*. *The Scandinavian Journal of Economics*, *114*(4), 1105–1128.

Bertoli, S., Dequiedt, V., & Zenou, Y. (2016). Can selective immigration policies reduce migrants' quality? *Journal of Development Economics*, *119*, 100–109.

Bertoli, S., & Fernández-Huertas Moraga, J. (2015). The size of the cliff at the border. *Regional Science and Urban Economics*, *51*, 1–6.

Bianchi, M. (2013). Immigration Policy and Self-Selecting Migrants. *Journal of Public Economic Theory*, *15*(1), 1–23.

Bjerre, L., Helbling, M., Römer, F., & Zobel, M. (2016). The Immigration Policies in Comparison (IMPIC) Dataset*: Technical Report*. 196.

Borjas, G. J. (1987). Self-Selection and the Earnings of Immigrants. *The American Economic Review*, *77*(4), 24.

Borjas, G. J. (2019). *Labor Economics*. McGraw-Hill.

Boubtane, E. (2019). Les effets économiques de l'immigration pour les pays d'accueil. *L'Économie politique*, *84*(4), 72–83.

Breunig, C., & Busemeyer, M. R. (2012). Fiscal austerity and the trade-off between public investment and social spending. *Journal of European Public Policy*, *19*(6), 921–938.

Brücker, H., Capuano, S., & Marfouk, A. (2013). Education, gender and international migration: Insights from a panel-dataset 1980-2010.

Canto, V. A., & Udwadia, F. E. (1986). The Effect of Immigration Quotas on the Average Quality of Migrating Labor and Income Distribution. *Southern Economic Journal*, *52*(3), 785–793.

Chang, E. C. C. (2008). Electoral Incentives and Budgetary Spending: Rethinking the Role of Political Institutions. *The Journal of Politics*, *70*(4), 1086–1097.

Chen, J. J. (2015). The Impact of Skill-Based Immigration Restrictions: The Chinese Exclusion Act of 1882. *Journal of Human Capital*, *9*(3), 298–328.

Chiquiar, D., & Hanson, G. H. (2005). International Migration, Self-Selection, and the Distribution of Wages: Evidence from Mexico and the United States. *Journal of Political Economy*, *113*(2), 239–281.

Cohen, A., & Razin, A. (2008). The Skill Composition of Immigrants and the Generosity of the Welfare State: Free vs. Policy-Controlled Migration. *NBER Working Paper Series*.

Czaika, M., & de Haas, H. (2013). The Effectiveness of Immigration Policies. *Population and Development Review*, *39*(3), 487–508.

Czaika, M., & de Haas, H. (2017). The Effect of Visas on Migration Processes. *International Migration Review*, *51*(4), 893–926.

Czaika, M., & Hobolth, M. (2016). Do restrictive asylum and visa policies increase irregular migration into Europe? - Mathias Czaika, Mogens Hobolth, 2016. *European Union Politics*.

Czaika, M., & Parsons, C. (2016). High-Skilled Migration in Times of Global Economic Crisis (SSRN Scholarly Paper 2791018). *Social Science Research Network*.

Czaika, M., & Parsons, C. R. (2017). The Gravity of High-Skilled Migration Policies. *Demography*, *54*(2), 603–630.

d'Albis, H., Boubtane, E., & Coulibaly, D. (2016). Immigration Policy and Macroeconomic Performance in France. *Annals of Economics and Statistics*, *121/122*, 279–308.

Danewid, I. (2021). "These Walls Must Fall": The Black Mediterranean and the Politics of Abolition. In *The Black Mediterranean: Bodies, Borders and Citizenship* (Palgrave Macmillan / Springer, p. 266 / 267).

de Haas, H. (2011). The determinants of international migration Conceptualising policy, origin and destination effects. *IMI Working Papers Series 2011*, *32*.

de Haas, H., Natter, K., & Vezzoli, S. (2016a). Growing Restrictiveness or Changing Selection? The Nature and Evolution of Migration Policies. *International Migration Review*, *52*(2), 324–367.

de Haas, H., Natter, K., & Vezzoli, S. (2016b). Growing Restrictiveness or Changing Selection? The Nature and Evolution of Migration Policies. *International Migration Review*, *n/a*(n/a).

Docquier, F., Rapoport, H., & Salomone, S. (2012). Remittances, migrants' education and immigration policy: Theory and evidence from bilateral data. *Regional Science and Urban Economics*, *42*(5), 817–828.

Fitzgerald, J., Leblang, D., & Teets, J. C. (2014). Defying the Law of Gravity: The Political Economy of International Migration. *World Politics*, *66*(3), 406–445.

Gagliarducci, S., Nannicini, T., & Naticchioni, P. (2011). Electoral Rules and Politicians' Behavior: A Micro Test. *American Economic Journal: Economic Policy*, *3*(3), 144–174.

Geddes, A., & Scholten, P. (2016). The Politics of Migration and Immigration in Europe. SAGE Publications Ltd.

Greene, W. (2004). The behaviour of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects. *The Econometrics Journal*, *7*(1), 98–119.

Grogger, J., & Hanson, G. H. (2011). Income maximization and the selection and sorting of international migrants. *Journal of Development Economics*, *95*(1), 42–57.

Grotti, R., & Cutuli, G. (2018). Xtpdyn: A Community-Contributed Command for Fitting Dynamic Random-Effects Probit Models with Unobserved Heterogeneity. *The Stata Journal: Promoting Communications on Statistics and Stata*, *18*(4), 844–862.

Hainmueller, J. (2012). Entropy balancing for causal Effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political Analysis*, *20*(1), 25–46.

Heckman, J. J. (1981). The incidental parameters problem and the problem of initial conditions in estimating a discrete time—Discrete data stochastic process (p. 114). Chicago, IL, USA: *University of Chicago Center for Mathematical studies in Business and Economics*.

Helbling, marc, Bjerre, liv, Römer, friederike, & Zobel, malisa. (2017). Measuring immigration policies: The IMPIC database. *European Political Science*, *16*(1), 79–98.

Helbling, M., Jager, F., Maxwell, R., & Traunmuller, R. (2021). *The (in)consistency of immigration policy preferences*. 41.

Helbling, M., & Leblang, D. (2019). Controlling immigration? How regulations affect migration flows. *European Journal of Political Research*, *58*(1), 248–269.

Helbling, M., Simon, S., & Schmid, S. D. (2020). Restricting immigration to foster migrant integration? A comparative study across 22 European countries. *Journal of Ethnic and Migration Studies*, *46*(13), 2603–2624.

Hollifield, J. F., Martin, P., & Orrenius, P. (2014). Controlling immigration: A global perspective. *Stanford University Press*.

Ivarsflaten, E. (2005). Threatened by diversity: Why restrictive asylum and immigration policies appeal to western Europeans. *Journal of Elections, Public Opinion & Parties*, *15*(1), 21–45.

Iversen, T., & Soskice, D. (2006). Electoral Institutions and the Politics of Coalitions: Why Some Democracies Redistribute More Than Others. *American Political Science Review*, *100*(2), 165–181.

Jasso, G. (2021). Analyzing Migration Restriction Regimes. *Frontiers in Sociology*, *6*, 610432.

Lanati, M., & Thiele, R. (2021). The Link between Economic Growth and Emigration from Developing Countries: Does Migrants' Skill Composition Matter? *SSRN Electronic Journal*.

Lee, Y.-W. (2016). State dependence, unobserved heterogeneity, and health dynamics in Korea. *Hitotsubashi Journal of Economics*, *57*(2), 195–221.

Margalit, Y., & Solodoch, O. (2021). Against the Flow: Differentiating Between Public Opposition to the Immigration Stock and Flow. *British Journal of Political Science*, 1–21.

Massey, D. S. (1999). International Migration at the Dawn of the Twenty-First Century: The Role of the State. *Population and Development Review*, *25*(2), 303–322.

Mayda, A. M. (2010). International migration: A panel data analysis of the determinants of bilateral flows. *Journal of Population Economics*, *23*(4), 1249–1274.

Mayer, T., & Zignago, S. (2011). Notes on CEPII's Distances Measures: The GeoDist Database (SSRN Scholarly Paper ID 1994531). *Social Science Research Network*.

Morelli, M., & Negri, M. (2017). Electoral Systems, Taxation and Immigration Policies: Which System Builds a Wall First? (ID 3018465). *Social Science Research Network*.

OECD. (2008). A Profile of Immigrant Populations in the 21st Century: Data from OECD Countries. *Organisation for Economic Co-operation and Development*.

Ortega, F., & Peri, G. (2013). The effect of income and immigration policies on international migration. *Migration Studies*, *1*(1), 47–74.

Persson, T., & Tabellini, G. (2004). Constitutional Rules and Fiscal Policy Outcomes. *American Economic Review*, *94*(1), 25–45.

Persson, T., & Tabellini, G. (2005). The Economic Effects of Constitutions. *The MIT Press*.

Rabe-Hesketh, S., & Skrondal, A. (2013). Avoiding biased versions of Wooldridge's simple solution to the initial conditions problem. *Economics Letters*, *120*(2), 346–349.

Real, J. L. (2011). Family Reunification or Point-Based Immigration System? The Case of the United States and Mexico. *Social Science Research Network*.

Reed, W. R. (2015). On the Practice of Lagging Variables to Avoid Simultaneity. *Oxford Bulletin of Economics and Statistics*, *77*(6), 897–905.

Robertson, P. E., & Robitaille, M.-C. (2017). The Tyranny of Distance and the Gravity of Resources. *Economic Record*, *93*(303), 533–549.

Rodrik, D. (2011). The Globalization paradox: Why global markets, states, and democracy can't coexist. *Oxford University Press*.

Russo, G., & Salsano, F. (2019). Electoral systems and immigration. *European Journal of Political Economy*, *60*, 101807.

Sander, M. (2007). Return Migration and the 'Healthy Immigrant Effect' (SSRN Scholarly Paper ID 1096456). *Social Science Research Network*.

Schultz, C., Lutz, P., & Simon, S. (2021). Explaining the immigration policy mix: Countries' relative openness to asylum and labour migration. *European Journal of Political Research*, *60*(4), 763–784.

Silva, J. M. C. S., & Tenreyro, S. (2011). Poisson: Some Convergence Issues. *The Stata Journal*, *11*(2), 207–212.

Skrondal, A., & Rabe-Hesketh, S. (2014). Handling initial conditions and endogenous covariates in dynamic/transition models for binary data with unobserved heterogeneity. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, *63*(2), 211–237.

Torche, F., & Sirois, C. (2019). Restrictive Immigration Law and Birth Outcomes of Immigrant Women. *American Journal of Epidemiology*, *188*(1), 24–33.

Tübbicke, S. (2023). ebct: Using entropy balancing for continuous treatments to estimate dose–response functions and their derivatives. *The Stata Journal*, *23*(3), 709–729.

Ulceluse, M., & Kahanec, M. (2019). The effectiveness of restrictive immigration policies: The case of transitional arrangements. *GLO Discussion Paper*, *379*.

UN. (2017). International Migration Policies.

Vargas-Silva, C. (2012). Migration and development. *The Migration Observatory at the University of Oxford*.

Wooldridge, J. M. (2005). Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics*, *20*(1), 39–54.

Wooldridge, J. M. (2019). Introductory econometrics. A modern approach. *Cengage learning*.

Zhu, N., & Batisse, C. (2016). L'évolution des inégalités de revenu entre Canadiens de naissance et immigrés. *Région et Développement*, 20.