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Lucas Guichard
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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Externalities of Immigration Policies on Migration Flows: The Case of an Asylum Policy*

We analyze the externalities arising from a bilateral asylum policy - the list of safe origin countries - relying on a tractable model. Using self-collected monthly data, we estimate that including one origin country on the safe list of a given destination decreases asylum applications from that origin to that destination by 29%. We use a counterfactual policy simulation to quantify the spillover effects occurring across origin and destination countries. Individuals from targeted origin countries move to alternative destinations. Individuals from untargeted origins divert from alternative destinations. The magnitude of the externalities depends on the size of the affected flows.

JEL Classification: F22, K37, J61

Keywords: migration, asylum seekers, asylum policy, safe origin country, refugee

Corresponding author:
Joël Machado
Luxembourg Institute of Socio-Economic Research
Maison des Sciences Humaines
11, Porte des Sciences
L-4366 Esch-sur-Alzette / Belval
Luxembourg
E-mail: joel.machado@liser.lu

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1 Introduction

Countries around the world define their migration policies based on their own national interests and priorities. However, unilateral policy choices can generate externalities for other destination countries by altering their relative attractiveness (Boeri and Brücker, 2005). To fully understand the effects of migration policies on the location choice of migrants, it is therefore important to account for all types of spillover effects. This is particularly relevant in the context of asylum migration, where affected individuals often lack the possibility to remain in their country of origin.

In this paper, we study the externalities triggered by the list of safe countries of origin, an asylum policy defined by destination countries. The list of safe countries establishes an explicit distinction across origin countries by setting a presumption that a given country can be defined as being safe for their nationals.[1] The criteria for being granted refugee status are generally stricter for asylum seekers from an origin classified as safe. Applications from such individuals are often presumed to be manifestly unfounded, leading to a potential acceleration of their processing time and prioritized examination.[2] Several destination countries have relied on this type of asylum policy in the last thirty years.

We analyze how the list of safe countries defined by a destination country affects (*i*) asylum applications from the targeted origin country to that destination (the direct effect), (*ii)* asylum applications from the targeted origin to other destination countries (the *redirection* effect across *destinations*), and (*iii*) asylum applications from other origin countries to all possible destination countries (the *redirection* effect across *origins*). Listing a country as safe implies that the destination, where the policy is implemented, becomes a less interesting option for asylum seekers from the targeted origin, thereby reducing the number of applications in this corridor (i.e., the *direct* effect). At the same time, asylum seekers from this origin country are likely to divert to other destination countries, which become relatively more attractive for them (i.e., the *redirection* effect across *destinations*). In addition, the destination country that adds a given origin to its list might become more attractive for asylum seekers from other origin countries (i.e., the *redirection* effect across *origins*), for instance because its hosting capacities face less pressure. The opposite mechanisms materialize when an origin country is removed from a destination country's list.

In order to evaluate the impact of the safe country policy on asylum applications, we develop a micro-

[1] Annex II of the Asylum Procedure Directive on the "Designation of safe countries of origin for the purposes of Articles 29 and 30(1)." defines a country as being safe when: "It can be shown that there is generally and consistently no persecution as defined in Article 9 of Directive 2004/83/EC, no torture or inhuman or degrading treatment or punishment and no threat by reason of indiscriminate violence in situations of international or internal armed conflict."

[2] The procedural implications of the policy differ across destination countries. For instance, while the German administration prioritizes applications coming from origins designated as safe, France applies an accelerated admissibility procedure. More details can be found here. In September 2015, the European Commission proposed a regulation for a common EU list of safe countries of origin, but it was never implemented (source).

founded theoretical framework inspired by the structural gravity models of trade that were extended to migration by Anderson (2011). The latter is adjusted to the asylum context by allowing for spillover effects of asylum applications on the acceptance rate at destination. From the model, we derive a migration gravity equation that is empirically estimated to determine the direct effect of the asylum policy on the bilateral asylum applications. We rely on (*i*) monthly asylum data from the UNHCR over the period 2000-2017 and (*ii*) unique self-collected information on the monthly evolution of the safe country lists in 19 OECD destination countries for 199 origin countries. The high-frequency pattern of the data is exploited to estimate the gravity specification with a rich structure of fixed effects. We find that the destination-specific inclusion of a given origin to the list of safe countries leads to a 29% reduction in its asylum applications.

We then use the estimated coefficient in a counterfactual policy scenario to quantify the redirection effects arising from changes in the list of safe origin countries. We assume that Sweden, one of the main destination countries in terms of asylum applications without a safe country list during our period of observation, defines five Balkan countries as safe origins. The comparison between the baseline and the simulated counterfactual asylum applications suggests a redirection of asylum seekers from the five safe countries away from Sweden to other destination countries (i.e., redirection across destinations). Applications from the five countries to Sweden decrease between 19.6 and 27.7%, depending on the year, and deviate to other destinations in proportions that depend on their relative attractiveness. These outflows generate between 0.5 and 4.9% more applications from untargeted origin countries to Sweden (i.e., redirection across origins). Our simulations therefore capture heterogeneous redirection effects across origin and destination countries, accounting for the evolution of the relative attractiveness of each destination country.

The contribution of our paper is threefold. First, it contributes to the empirical literature estimating the impact of migration policies on migration (see, among others, Bertocchi and Strozzi, 2008; Mayda, 2010; Bertoli et al., 2011; Ortega and Peri, 2013; Czaika and de Haas, 2013; Fitzgerald et al., 2014; Czaika and Hobolth, 2016; Figueiredo et al., 2016; Czaika and de Haas, 2017; Beverelli and Orefice, 2019; Beine et al., 2020; Bratu et al., 2020). A strand of prior work evaluates the determinants of asylum migration and, especially, the role of asylum policies as drivers of asylum applications beyond other push and pull factors (Di Iasio and Wahba, 2024). Several papers exploit indexes that track the stance in terms of migration/asylum policy both over time and across countries (Thielemann, 2004, 2006; Neumayer, 2004). More closely related to our paper, Hatton (2016) estimates a gravity equation with different sets of fixed effects to assess the effect of three categories of policies (targeting access, processing, and welfare) with respect to asylum applications (see also Hatton, 2004, 2009; Keogh, 2013). The literature analyzing the effect of bilateral policies on asylum applications is more limited. The paper closest to ours is Bertoli et al. (2022), who include processing times, deportation risk and acceptance rates in a gravity framework to study asylum applications in several European countries. We contribute to this literature by collecting unique data on the monthly evolution of the safe country of origin lists in 19 OECD destination countries, which account for more than 80% of asylum applications among its member states. We then exploit this fine-grained information in a saturated gravity specification to estimate the direct effect of this asylum policy on bilateral asylum applications.[3]

Second, from a theoretical perspective, we build a flexible model which accounts for cross-country externalities through rigidities on hosting capacities. Most of the existing literature focuses on general equilibrium effects that materialize through immigrants' impact on the labour market at destination. Beverelli and Orefice (2019) find that lower migration costs in a given corridor can reduce employment of individuals from culturally similar origin countries in the destination country. Accounting for endogenous wages, Docquier et al. (2015) and Delogu et al. (2018) simulate the impact of visa restrictions on migration flows. Adjustments through the labour market are arguably a less relevant channel when it comes to asylum seekers, as the latter often face important barriers to employment (Fasani et al., 2021). We therefore model spillover effects stemming from acceptance rates of asylum applications in destination countries. Our framework is nonetheless versatile enough to handle alternative and/or additional externalities, including through the probability of employment (Beverelli and Orefice, 2019) or wages (Anderson, 2011), and hence could be adapted to study other migration policies.

Third, our theoretical framework allows us to quantify the redirection effects arising across origins *and* destinations. Building on the structural gravity literature, we provide an explicit form to the multilateral resistance terms of the migration gravity model. The latter define the spatial correlation of (*i*) the flows originating from different countries and directed towards the same destination, and (*ii*) the flows from one origin towards various destinations. An active branch of the literature tackles the methodological challenges raised by the identification of cross-country spillover effects on bilateral flows (Bertoli and Fernández-Huertas Moraga, 2013; Beine et al., 2016; Marchal and Naiditch, 2020). Bertoli and Fernández-Huertas Moraga (2015) show that the requirement of a visa in one country increases migration flows to alternative locations on average between 2.8 and 16.9%. Brekke et al. (2016) control for weighted indexes of asylum policies in other relevant destinations and find that a tightening of asylum policies reduces the number of new asylum applications, both by reducing the outflows from origin countries and by deflecting the flow to other destination countries. Peracchi and Tornari (2023) adopt a flexible Spatial Dynamic Panel Data model which accounts for time and spatial autocorrelation in asylum application processing times and acceptance rates across destination countries. Using our simulations, we quantify cross-country spillover effects across *all* origin and destination countries arising from a policy within a specific bilateral corridor.

[3] Bertoli et al. (2022) use a subset of the data that we collected on safe country lists (six countries over a shorter period) and confirm our findings on the policy's direct effects.

The rest of this paper is structured as follows: Section 2 presents the migration gravity framework and Section 3 describes our data. Section 4 refers to the empirical analysis carried out to identify the direct effect of the asylum policy. Then, Section 5 describes the calibration and simulation of the model. Finally, Section 6 concludes.

2 Structural gravity model of migration

We adjust a multinomial discrete choice model, based on Anderson (2011), to the case of asylum seekers. In particular, we allow cross-country externalities to materialize through an endogenous acceptance rate at destination, which affects the relative attractiveness of each country.

We assume that the number of asylum seekers from each origin country i (N_i) is given and focus on their destination choice. We argue that the conditions at origin push people out of a given country, who then choose their preferred destination based on the constraints that they face and the socio-economic conditions in the potential alternatives forming their choice set. The model is therefore consistent with explaining how asylum seekers choose their utility-maximizing destination, while being agnostic about the causes underlying their departure.[4]

Consider an individual s, born in country i, who decides to apply for asylum in a location included in a choice set that encompasses J alternatives corresponding to all possible destination countries j. Individual s is a utility-maximizer who chooses the destination country associated with the highest level of utility. As standard in random utility maximization models applied to migration, the utility is defined by two components, i.e. a deterministic part common to all potential migrants and an individual-specific feature that captures unobserved individual heterogeneity in preferences. The model abstracts from inter-temporal connections. To simplify notation, we omit a time indicator t.

The deterministic component of utility is defined by the characteristics v_j of destination $j \in J$ and by the costs of applying for asylum (henceforth, also referred to as migration costs) from i to j, i.e. δ_{ij}. Suppose that the location-decision problem is solved after individual s has observed all the realizations of the stochastic part of utility φ_{ij}, which is assumed to be identically and independently distributed according to an EVT-1 distribution. Following McFadden (1974), the probability p_{ij} that destination j is the utility-maximizing alternative for an i-born individual s is:

$$p_{ij} = \frac{e^{u_j}}{\sum_{k \in J} e^{u_k}}. \tag{1}$$

[4]This simplifying assumption increases the analytical tractability of the mechanisms that we want to stress. We relax it in the empirical analysis, where we control for time-varying origin-specific push factors through origin-time fixed effects. We also extend the model in Appendix F to account for endogenous changes in the total number of asylum seekers.

Assuming logarithmic utility ($u_j = \ln(v_j) - \ln(\delta_{ij})$) and aggregating over all individuals from country i, we obtain:

$$M_{ij} = p_{ij} N_i = \frac{v_j/\delta_{ij}}{\sum_{k \in J} v_k/\delta_{ik}} N_i \ . \tag{2}$$

In the context of asylum seekers, p_{ij} represents the probability of an individual from country i applying for asylum in country j. N_i is the total number of asylum seekers from origin country i and excludes individuals who would choose (or be constrained) to stay.[5] Hence, p_{ij} is also the share of asylum seekers from country i who choose j as their preferred destination.

To account for possible cross-country spillover effects of asylum policies, we build a model inspired by Anderson (2011), who considers endogenous wages and assumes that immigrants face a rigid labor demand curve at destination. In contrast, we argue that asylum seekers have a negligible short-term impact on labor markets and wages, in particular due to restrictive labor market accesses prevailing in several destination countries (Fasani et al., 2021). Hence, we assume that the deterministic component of the utility, v_j, is a function of exogenous wages, w_j, and of the endogenous acceptance rate of the refugee status at destination, a_j, such that $v_j = a_j \times w_j$.[6] The latter is assumed to depend on the endogenous number of asylum applicants at destination, which generates the channel through which spillover effects materialize. This assumption is consistent with a fixed (exogenous) number of visas ($\bar{A}_j$) that has to be distributed among an endogenous pool of applicants by the destination country:[7]

$$a_j = \frac{\bar{A}_j}{\sum_{i \neq j} M_{ij}} = \frac{\bar{A}_j}{L_j}. \tag{3}$$

The deterministic component of utility, v_j, is therefore endogenous to the number of asylum applications from all origins i to destination j, denoted as $L_j = \sum_{i \neq j} M_{ij}$. Note that a_j can be interpreted as an average destination-specific acceptance rate applied to all asylum seekers from different origin countries i. This

[5]Our model builds on asylum applications (migration flows), whereas Anderson (2011) relies on migration stocks. In Appendix F, we allow the origin-specific number of asylum seekers, N_i, to vary with the potential utility obtained from emigration (W_i). In this framework, an increase in the acceptance rate of a destination country (or a decrease in bilateral migration costs) raises the potential utility from emigrating and thereby incentivizes additional individuals to leave their origin country.

[6]We assume that asylum seekers have some degree of information allowing them to compare destination countries. Qualitative research finds that asylum seekers are aware of policies at destinations to varying degrees (see Gilbert and Koser (2006); Crawley and Hagen-Zanker (2019); McAuliffe and Jayasuriya (2016). Andersson and Jutvik (2022) find a fast reaction in Syrian asylum applications in Sweden after the country decided to grant them permanent status in September 2013, which points to an informed decision making by asylum seekers.

[7]Alternatively, a_j could be interpreted as exogenously determined amenities at destination in the short term ($\bar{A}_j$), such as housing infrastructure or administrative capacities to handle asylum applications, that have to be shared among an endogenous number of asylum seekers. The interpretation given to this term is of second order as, throughout the paper, it defines a structural characteristic of each destination country j whose sole function is to allow for spillover effects of asylum seekers on the destination country's acceptance rate. Intuitively, this implies that the more asylum requests a destination country faces, the stricter it is in its acceptance criteria.

assumption allows us to derive clear and analytically tractable expressions for the multilateral resistance to migration terms.[8] In Appendix E, we document that using bilateral acceptance rates, a_{ij}, does not affect the mechanisms of the model nor simulation results.

Rewriting equation (2), we have:

$$M_{ij} = \frac{a_j(w_j/\delta_{ij})}{\sum_{k\in J} a_k(w_k/\delta_{ik})} N_i = \frac{a_j(w_j/\delta_{ij})}{W_i} N_i, \tag{4}$$

where $W_i = \sum_{j\neq i} a_j w_j/\delta_{ij}$ can be interpreted as a weighted average acceptance rate, where each destination j has a weight depending on its wage and bilateral migration costs, w_j/δ_{ij}. The sum of bilateral asylum applications from country i equals the total exogenous number of asylum seekers from that origin, such that $N_i = \sum_{j\neq i} M_{ij}$. The endogenous acceptance rate at destination affects its attractiveness. However, which applications are eventually accepted by the destination is outside of the model. Moreover, as we have to rely on aggregate asylum applications data, our model remains agnostic about asylum seeker self-selection, both relative to the origin country and across destinations (see Aksoy and Poutvaara, 2021).

Combining equation (3) and equation (4), we express the number of asylum applicants from i to j as (see Appendix A for details):

$$M_{ij} = \underbrace{\frac{L_j}{M} N_i}_{\text{Frictionless migration}} \times \underbrace{\frac{1/\delta_{ij}}{\Omega_j W_i}}_{\text{Migration frictions}} \tag{5}$$

with

$$\underbrace{\Omega_j = \sum_{i\neq j} \frac{N_i/\delta_{ij}}{W_i M}}_{\text{Inward multilateral resistance}} \quad \text{and} \quad \underbrace{W_i = \sum_{k\in J} \frac{L_k/\delta_{ik}}{\Omega_k M}}_{\text{Outward multilateral resistance}}.$$

The asylum applications from i to j increase with the total number of asylum seekers from origin country i, N_i, and with the attractiveness of destination country j that receives L_j asylum seekers relative to the number of total asylum seekers in the world M. The first component of equation (5) corresponds to the number of asylum seekers that would be observed in a frictionless world. However, asylum seekers face mobility barriers, δ_{ij}, and the multilateral resistance terms Ω_j and W_i. The inward multilateral resistance, Ω_j, is the weighted average of the probabilities that j is the utility-maximizing destination for i-born individuals, with weights given by the share of the i-born asylum seekers among the sum of all asylum seekers in the world, $M = \sum_i N_i$. The

[8]The acceptance rate is however not strategically adjusted in response to changes occurring in other countries. Görlach and Motz (2021) relax this assumption and develop a dynamic model of refugees' location choices, where a destination country's endogenous acceptance rate affects other destination countries' policies.

outward multilateral resistance, W_i, is the weighted average of the accessibility of destination j for i-born asylum seekers, with weights given by the share in the world number of asylum seekers hosted by country j.

The number of individuals from i applying for asylum in j therefore depends on the entire matrix of bilateral applications, which results in an interdependency across countries. As detailed in Appendix D.3, the endogeneity of the acceptance rate at destination, a_j, relaxes the independence of irrelevant alternatives assumption (IIA, hereafter) that would be obtained with exogenous acceptance rates (such that asylum applications from origins $q \neq i$ do not affect individuals from country i).[9] Our framework provides an explicit form to multilateral resistance terms and a theoretical micro-foundation to empirical and quantitative applications. While our focus lies in understanding interdependencies across countries regarding asylum applications, our modelling approach is flexible and can be adapted to different settings involving cross-country externalities.

The migration gravity equation (5) is translated into an empirical gravity specification and used to estimate the direct effects of the safe country list on asylum applications in Section 4. In Section 5, we use the model to quantify the redirection effects of the policy across all origin and destination countries.

3 Data and descriptive statistics

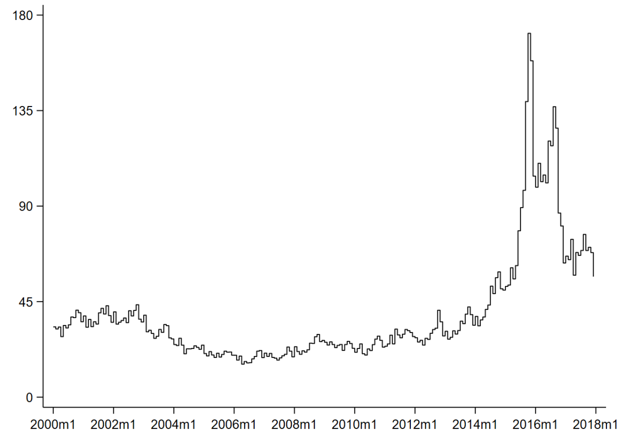
In this Section, we introduce the data and present some descriptive statistics on the information that we draw on for the econometric investigation and the counterfactual policy simulations.

3.1 Asylum applications

We use UNHCR data on monthly asylum applications for the years 2000 to 2017. More than 15 million asylum applications were recorded in the world during this period, including more than 10 million in OECD countries (UNHCR, 2022). Figure 1 depicts the number of first-time asylum applications in the 19 OECD countries in our sample, representing over 80% of total applications in the OECD during the study period. Monthly applications remain relatively stable over time until the onset of the civil conflict in Syria, which led to a notable increase in applications in Europe. This, in turn, entails that Syria is the main origin country of asylum applicants recorded in the sample, followed by Afghanistan and Iraq (Table 1). A large fraction of the applications has been recorded by Germany, which received more than twice the number of the second top destination (France).

[9] See Beine et al. (2016) for an introduction on the micro-foundations of multilateral resistance to migration and Appendix D.3 for references on alternative models relaxing the IIA assumption.

Figure 1: Evolution of the total monthly number of asylum applications (in 1,000s)



Source: Authors' elaboration based on UNHCR asylum applications.

Table 1: Main asylum origin and destination countries

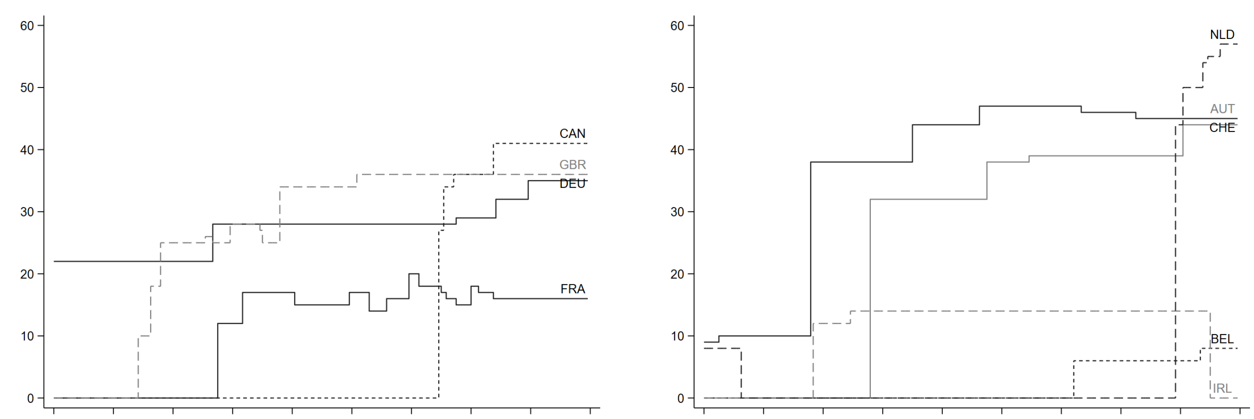
Origin		Destination	
Syria	932,152	Germany	2,143,140
Afghanistan	641,709	France	945,433
Iraq	613,871	United Kingdom	730,966
Serbia	439,321	Sweden	644,217
Pakistan	299,191	Italy	531,915
Nigeria	294,260	United States	519,998
Russia	261,488	Canada	492,544
Somalia	259,447	Austria	434,446
Eritrea	254,239	Belgium	342,064
Iran	253,167	Switzerland	323,927
Total	8,391,179	Total	8,391,179

Note: The top 10 origins represent 4,248,845 of total applications. Source: Authors' elaboration based on UNHCR asylum applications.

3.2 List of safe countries of origin

This paper builds upon original self-collected information, based on legal and administrative sources, covering 19 OECD countries over the period 2000-2017 with policy changes occurring at the monthly level. This data is converted into a binary variable that takes the value 1 if an origin i is on the list of destination j at month t, and 0 otherwise. In our sample, ten countries (i.e., Australia, Finland, Greece, Italy, New Zealand, Norway, Portugal, Spain, Sweden, United States of America) never officially adopt a list of safe origin countries, while the remaining nine (i.e., Austria, Belgium, Canada, France, Germany, Ireland, the Netherlands, Switzerland, the United Kingdom) have classified some origins as safe at some point during the study period.

Figure 2: Evolution of the number of safe origin countries in the nine relevant destinations

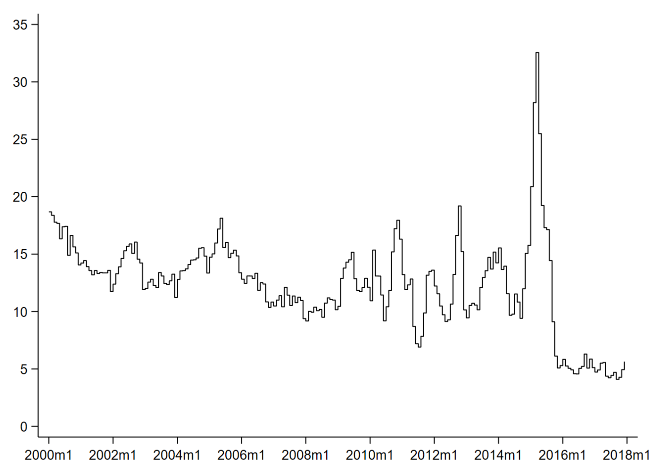


Source: Authors' elaboration based on self-collected data.

We detail the origin countries classified as being safe and the date of their inclusion on (or, in some instances, removal from) the lists in Appendix B. We find differences across destinations with respect to (*i*) the identity of the safe countries of origin and (*ii*) the timing of their addition on the list. For instance, Canada mainly defines high-income countries as being safe, while France has only registered low- and middle-income countries on its list. Belgium started its list of safe countries in June 2012, while Germany classifies some countries as being safe since July 1993. Figure 2 highlights the evolution of the total number of safe countries that have been listed by the nine relevant destinations. The general trend exhibits an increase in the number of safe origin countries over time, even though Ireland removed its list at the end of 2016 and others have withdrawn some origin countries from their respective list (e.g., France withdrew Armenia and Madagascar in August 2010).

Figure 3 and Table 2 focus on asylum applications originating from countries listed as being safe. Figure 3 reports that the share of asylum applications from safe countries relative to the total number of applications ranges from 0.5 to 27.5% with a sharp and short-lived increase contemporaneous to the peak (2015-2016) in asylum applications observed in OECD countries. Balkan countries (Serbia, Albania, Macedonia, and Bosnia-Herzegovina) are the main safe origin countries, whereas Germany and France are the main destinations for applications from origins listed as safe.

Figure 3: Evolution of the share of applications from safe countries relative to the total number of applications



Source: Authors' elaboration based on UNHCR asylum applications, and self-collected information on the destination-specific list of safe origin countries.

Table 2: Main safe origin countries and their respective destination

Origin		Destination	
Serbia	129,922	Germany	131,917
Albania	62,267	France	94,247
Macedonia	28,083	United Kingdom	45,549
Bosnia-Herz.	18,726	Switzerland	20,518
India	15,738	Austria	10,890
Nigeria	15,370	Belgium	6,204
Ghana	14,956	Netherlands	6,130
Armenia	11,653		
Senegal	10,371		
Georgia	8,369		
Total	399,937	Total	399,937

Notes: Canada and Ireland did not receive asylum applications from the origin countries listed. The top 10 countries represent 315.455 of total applications.
Source: Authors' elaboration based on UNHCR monthly asylum applications.

4 Safe countries of origin and asylum applications: direct effect

In this Section, we empirically estimate the direct effect of the list of safe origin countries on the bilateral number of asylum applications.

4.1 Empirical strategy

We first analyze *the direct effect* of adding a country i to the list of safe origin countries in destination j during month t on the number of asylum applications from nationals of country i in destination j. The migration gravity equation (5) is translated into an empirical gravity specification. We take its logarithmic form and add an error term ε_{ijt} which captures potentially unobserved origin-destination-month factors. We then use the exponential form to be consistent with the Poisson Pseudo-Maximum Likelihood (PPML) estimator, which Silva and Tenreyro (2006) have shown to perform well even in the presence of a large share of zeros in bilateral asylum applications. From equation (5), we obtain:

$$m_{ijt} = \exp\Big[\ln(L_{jt}) + \ln(N_{it}) - \ln(M_t) + \ln(1/\delta_{ijt}) - \ln(\Omega_{jt}) - \ln(W_{it})\Big] * \varepsilon_{ijt}\,. \tag{6}$$

Applying a rich set of fixed effects, we rewrite:

$$m_{ijt} = \exp\Big[\beta\,\text{SCO}_{ijt} + \mu_{it} + \mu_{jt} + \mu_{ijy}\Big] * \varepsilon_{ijt}\,. \tag{7}$$

where m_{ijt} is the number of asylum applications from origin i to destination j at month t and SCO_{ijt} is a binary variable taking the value 1 if origin i is included on the list of safe origin countries of destination j in month t.

The specification controls for a large set of month-, origin- and destination-specific attributes driving asylum applications as well as for the influence of multilateral resistance to migration through a rich structure of fixed effects. Origin-month fixed effects, μ_{it}, control for attributes such as total asylum applicants from that country in a given month, N_{it}, and outward multilateral resistance, W_{it}. Destination-month fixed effects, μ_{jt}, control for any destination-month specific attributes, such as total asylum applicants received at destination, L_{jt}, and outward multilateral resistance, Ω_{jt}. Country-pair-year fixed effects, μ_{ijy}, capture any features of the migration costs, δ_{ijt}, that do not vary across months within a year, i.e., standard gravity controls such as distance or common language between countries (which are constant over time) but also any policy dimension that does not change within a year.

The empirical strategy is similar to a triple difference-in-differences (DID) framework with homogenous effects across groups and time.[10] Under the assumption of parallel trends, the parameter β identifies the effect of being added to the safe country of origin list in destination j on asylum applications from origin i in month t, exploiting within-year variation.

The large set of fixed effects implies that typical push and pull factors (e.g., conditions at origin, including the level of conflict and terror) determining the sheer scale of bilateral asylum applications are taken into account. In Appendix C.3, we use the DID estimator by de Chaisemartin and D'Haultfoeuille (2020), which allows for heterogenous effects across groups and time, in order to confirm parallel trends during the pre-treatment period and alleviate potential concerns related to anticipation effects.

The decision of a destination country to register a specific origin on the list of safe countries is not random but is exogenous from the asylum applicants' perspective. A destination is likely to change its list of safe origin countries if (*i*) economic and/or safety conditions at origin have improved, or if (*ii*) it faces (or expects) a high number of asylum applications coming from this origin.[11] The origin-month fixed effects, μ_{it}, should attenuate the influence of (*i*) as they capture improvements in security or economic conditions at origin that could lead a destination to consider that country as being safe. On the other hand, the dyadic-year fixed effects, μ_{ijy}, should mitigate the effect of (*ii*), given that we only use variability at the bilateral level and within year to identify β. In case the above attempts are insufficient to (completely) deal with endogeneity concerns, the direction of the related bias is unclear. We would over-estimate the effect of interest if the inclusion on the list of safe origin countries mostly reflects an improvement of the conditions at origin, while we would under-estimate the size of the coefficient of interest if the policy change is mostly driven by a recent increase in the number of asylum applications originating from a given country.

An additional threat to the identification could arise from the simultaneous implementation of bilateral policies alongside the list of safe origin countries. For instance, Germany added Albania, Kossovo and Montenegro to its safe country of origin list in December 2015. Starting January 2016, Germany opened up legal pathways for low-educated workers from Balkan countries ("Westbalkanregelung").[12] Origin-destination-year fixed effects allow in this specific case to account for the changing conditions faced by potential asylum applicants from the Balkan countries between 2015 and subsequent years (when new migration pathways became avail-

[10]In Appendix C.2, we relax the assumption that the direction of the policy change has symmetric effects by including two indicator variables corresponding to (*i*) additions in and (*ii*) removals of countries from the list. The estimates related to the former are similar to those reported in Table 3, whereas the coefficients of the latter are positive but insignificant.

[11]For instance, France added Benin on its list of safe origin countries in July 2005, while there were 25 applications in 2003 and 13 in 2004. In contrast, several destination countries added Balkan countries to their safe country of origin lists during the 2000s although (or because) there were still numerous applications from these countries considered as being safe. For instance, France added Serbia on its list in November 2009 while it had received 3.129 applications in 2008 from Serbian nationals. Note that point (*i*) might explain the observed diversity in terms of origins listed as safe across destination countries. Point (*ii*) is consistent with the fact that some destinations (e.g., the UK) have several English-speaking countries in their lists, which are not included by other destinations.

[12]We thank an anonymous reviewer for providing this example.

able). However, even absent this demanding fixed effects structure, the destination-month fixed effects would partially capture the general policy environment in Germany. In addition, we show in column (3) of Table 3 that our main coefficient of interest only slightly increases when we account for origin-destination fixed effects and explore the variation across time within dyads. In Appendix C.1, we further show that our main estimation is only marginally affected by changes in the estimation sample.

Our theoretical framework does not rely on the standard IIA assumption often implicit in gravity models. The adoption of a list of safe origin countries does not necessarily have the same effect across all destinations, as an increase in the bilateral costs of a set of country-pairs does not lead to a proportional change on other pairs. In the context of asylum applications, this feature is key because one would expect that a new list in a given destination would redirect proportionally more asylum seekers towards countries that do not have the targeted origins on their list. In the empirical analysis, we can relax the IIA assumption using nests of destination countries that are interacted with the origin-month fixed effects:

$$m_{ijt} = \exp\left[\beta\,\mathrm{SCO}_{ijt} + (\mu_{it} \times d_{jk}) + \mu_{jt} + \mu_{ijy}\right] * \varepsilon_{ijt}\,, \tag{8}$$

where d_k is a categorical variable that splits the 19 OECD destination countries in eight nests (indexed by k). We define our nests on geographic and linguistic proximity and classify the countries as follows: (*i*) Australia and New Zealand, (*ii*) Canada and the United States, (*iii*) Portugal and Spain, (*iv*) Ireland and the United Kingdom, (*v*) Finland, Norway, and Sweden, (*vi*) Belgium and the Netherlands, (*vii*) Austria, Germany, and Switzerland, (*viii*) France, Greece, and Italy.

In a staggered setting with heterogeneous effects over time and across groups, the average effect estimated with equation (7) might be biased (de Chaisemartin and D'Haultfoeuille, 2020). Furthermore, equation (7) cannot evaluate the dynamics of the impact, i.e. whether anticipatory responses aroused due to the past number of asylum applications in a given destination. If individuals sought asylum before the list was actually modified and, in turn, triggered the policy change, the estimates would obscure this reverse causality. In addition, the effect of being added on the list might take some time to fully unfold. In Appendix C.3, we use the estimator developed by de Chaisemartin and D'Haultfoeuille (2020) to address these points and show that our baseline estimate is likely a lower-bound.

Furthermore, in Appendix C.4, we rely on a subsample of European countries for which we have quarterly data on final decisions to highlight potential channels that could drive the negative pattern unveiled in the results. In particular, we document that acceptance rates for a humanitarian status tend to decrease while provisions of a subsidiary status tend to increase after a list is implemented. A lower number of applicants combined with a higher fraction of accepted applications could point to a change in applicants' self-selection. In addition, we find that the policy implementation tends to reduce processing times by around 3 months on average.

4.2 Baseline results

The results are presented in Table 3. We find a significant and negative effect of the list of safe origin countries on the number of asylum applications lodged in the destination country implementing the list. The coefficient (-0.342) reported in column (2) translates into an average partial effect of $e^{-0.342} - 1 \simeq -29\%$. This implies that the classification of an origin as being safe reduces, on average, the number of asylum applications from that country to the corresponding destination by 29%. In column (3), we show that the coefficient is only marginally affected when we control for constant dyadic factors, with origin-destination fixed effects, instead of restricting our estimation on within-year variation (i.e the average partial effect is $\simeq -26.2\%$).

Relaxing the IIA assumption, using eight nests for the destination countries in column (4), we find an average effect of around -21.1% on the number of asylum applications. This smaller effect likely reflects the role played by the more demanding set of fixed effects included in the model. In Appendix C.1, we further document that our main estimate is robust to potential issues related to sample composition and time period covered. Overall, the robustness checks provide consistent evidence supporting the deterring effect of the list of safe origin countries on asylum applications from targeted countries.

Table 3: Direct effect of the list of safe origin countries on asylum applications

	(1) OLS	(2) PPML	(3) PPML	(4) PPML
List SCO	-0.243***	-0.342***	-0.304**	-0.237**
	(0.055)	(0.068)	(0.148)	(0.105)
μ_{it}	✓	✓	✓	
μ_{jt}	✓	✓	✓	✓
μ_{ijy}	✓	✓		✓
μ_{ij}			✓	
$\mu_{it} * d_k$				✓
Observations	218,774	218,792	224,934	157,600
R^2	0.909			
Pseudo-R^2		0.953	0.902	0.967

Notes: OLS is estimated with the Stata command `reghdfe` and PPML is based on the Stata command `ppmlhdfe`. m_{ijt}: asylum applications at the origin-destination-month level; SCO_{ijt}: indicator variable which equals 1 if origin i is on the safe country list of destination j in month t; μ_{it}: origin-month FE; μ_{jt}: destination-month FE; μ_{ijy}: origin-destination-year FE; μ_{ij}: origin-destination FE; $\mu_{it} * d_k$: origin-year fixed effects interacted with the nests. Clustered standard errors by country-pair are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

5 Safe countries of origin and asylum applications: redirection effects

Changes to one destination's safe country list entail spillover effects in other origin and destination countries, affecting the distribution of asylum applications across all potential destination countries. The model developed in Section 2 accounts for these externalities by endogenizing the acceptance rate as a decreasing function of the total number of asylum applications in destination j at time t.

In particular, the addition of country i on the list of safe origin countries in destination j leads theoretically to a reduction in the number of bilateral asylum applications from i to j (i.e., the direct effect). This reduction in applications from i to j alleviates constraints leading to an increase in the acceptance rate in country j, a_j, for asylum seekers from other origin countries $q \neq i$. Hence, destination j becomes relatively more attractive for asylum seekers that, absent the policy shock, would have chosen a destination l different from j. Therefore, applications decrease in other destination countries l. Simultaneously, some asylum seekers from country i, who would have applied for asylum in country j absent the policy change, redirect towards other destination countries l. The net effect of these externalities on the size and composition, in terms of the origin countries, of the counterfactual asylum applications in the different destination countries is *a priori* undetermined. We therefore calibrate our model in Section 5.1 and provide a counterfactual policy simulation in Sections 5.2.

5.1 Model calibration and simulation approach

We use yearly data on the bilateral number of asylum applications from each origin i to destination j in year t from UNHCR. Our simulations account for the 199 origin countries and 19 OECD destination countries used in Section 4. All other destination countries contained in the UNHCR dataset are aggregated into a rest-of-the-world (ROW) country. Such alternative destinations are important for origin countries to varying degrees. For instance, 54% of asylum seekers from Afghanistan applied in a country outside our main sample, while only 11% of asylum seekers from Balkan countries did so. As a proxy of the economic conditions at destination, w_{jt}, we exploit average wages as provided by the OECD. Finally, we derive the acceptance rate, a_{jt}, by combining information on decisions related to asylum applications from Eurostat and UNHCR (see Appendix D.1 for further details).

We match observed bilateral asylum applications by calibrating the baseline migration costs, δ_{ijt}, as a residual from equation (2). These costs capture all bilateral elements that can affect asylum applications. As a validation exercise, we show in Appendix D.1 that the calibrated migration costs are positively correlated with distance and negatively correlated with colonial links and migrant stocks in the 90s. We further show that an out-of-sample cross-validation fits the observed asylum applications data very well, with a correlation of

93.75% between the observed and calibrated values.

Our counterfactual simulations build on shocks to migration costs (or, alternatively, application costs) induced by changes in the list of safe origin countries. They provide counterfactual distributions for an exogenous number of total asylum applications from each origin i, N_{it}.[13] The counterfactual migration costs, δ^c_{ijt}, are:

$$\delta^c_{ijt} = \delta_{ijt} \times f\Big(\exp(\beta_{SCO})\Big) , \tag{9}$$

where $f\Big(\exp(\beta_{SCO})\Big)$ is a function of the coefficient estimated in Section 4. The magnitude of the effect of including origin i on the safe country list of destination j depends on the benchmark importance of this bilateral corridor, reflected by its migration costs: the reduction in applications from origin i, in absolute numbers, is higher in a destination that has low migration costs (and hence many asylum applications) than in a destination with high migration costs (and hence few applicants). To obtain the counterfactual equilibrium, we use a Gauss-Seidel iterative algorithm, given that the bilateral asylum applications, M_{ijt}, and the recognition rates, a_{jt}, are interdependent and affected by the counterfactual migration cost structure (see Appendix D.2 for further details).

5.2 Simulation results: introduction of a list in Sweden

Our counterfactual scenario assumes that Sweden, the main destination country in our sample without such a policy, defines five origin countries as being safe: Albania, Bosnia-Herzegovina, Macedonia, Montenegro, and Serbia. These origin countries are among those most often listed by other destinations (see Appendix B) and account for approximately 21% of bilateral corridors with a safe country list in our data. Hence, our counterfactual policy increases the bilateral migration costs to Sweden for asylum seekers from these five countries ($i = \{ALB, BIH, MKD, MNE, SRB\}$):

$$\delta^c_{i,SWE} = \delta_{i,SWE} \times \exp(0.342) = \delta_{i,SWE} \times 1.4077603.$$

We compare the counterfactual to the calibrated benchmark equilibrium. In the figures below, each point corresponds to the annual percentage change between the counterfactual (affected by the policy change) and the benchmark (observed in the data) values, i.e. $\Big(Y^c_t/Y^{base}_t - 1\Big) \times 100$. In Appendix D.8, we simulate an opposite scenario in which the United Kingdom removes the same five Balkan countries from its safe country list.

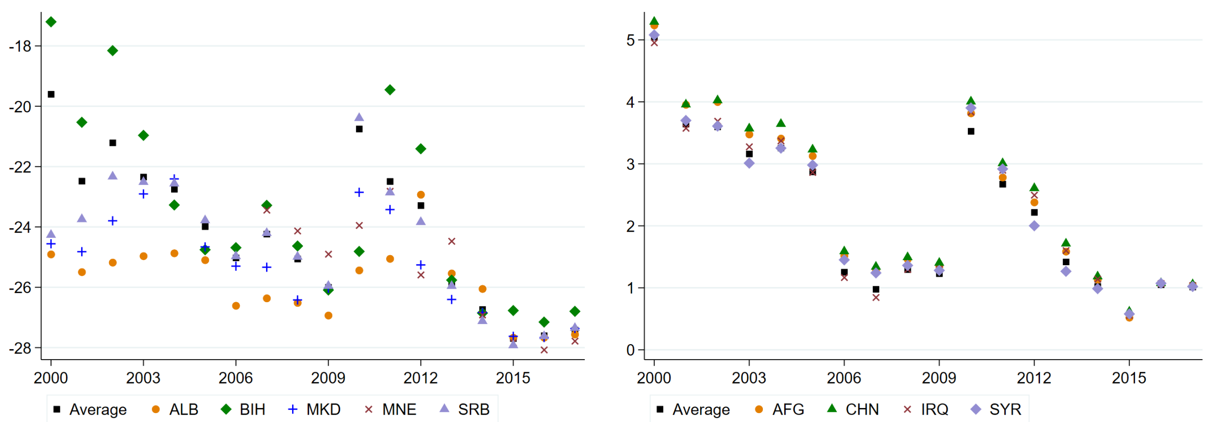
Assessing the direct effect of the policy. The policy shock leads to an average deterring effect on the bi-

[13] See Appendix F for an extension with endogenous N_{it}.

lateral applications from the five countries added on the list in Sweden that ranges from 19.1%to 27.6%, depending on the year. Figure 4a shows a heterogeneous decrease in asylum applications from the five targeted countries. For instance, in 2000, applications from Bosnia and Herzegovina (16.5%) decrease less than those from Albania (25%). The relatively higher importance of Sweden as a destination for asylum seekers from Bosnia-Herzegovina than from Albania implies that, despite a shock of similar magnitude, the applications from Bosnia-Herzegovina divert proportionally less to other destinations.[14] The smaller negative direct effect of the list relative to the empirically estimated average effect (29%) reflects the influence of general equilibrium mechanisms that are fully taken into account by the simulations of the model.

Figure 4: Effect of the counterfactual policy scenario in Sweden

(a) Direct effect (b) Redirection effects across origins



Note: Panel 4a shows the change in yearly asylum applications (in %) from the five Balkan countries in Sweden, as well as the average change for these countries. Panel 4b details the change in applications in Sweden from a selection, as well as the average change for all untargeted countries.

In Appendix D.5, we show that the policy reduces total applications in Sweden by 0.6% to 4.8%, depending on the year, which represents between 431 and 2,009 less yearly applications.

Redirection effects of the policy across origin countries. Our model predicts that a modification of the list of safe origin countries leads to the redirection of asylum seekers from origins not considered as being safe to Sweden. Figure 4b shows that the number of asylum applications from untargeted origin countries (i.e. excluding the five targeted Balkan countries) in Sweden increases, on average, between 0.5 and 4.9%, depending on the year. The magnitude of the increase in applications from the untargeted origin countries is heterogeneous. For instance, in 2000, the number of asylum applications from China (CHN) increases by 5.2% while appli-

[14]In the model, this is reflected by a higher weight of Sweden in the outward multilateral term, W_i. Despite a shock of similar magnitude in the nominator of equation (4), the denominator decreases more for countries with a strong preference for Sweden. The reaction to the policy is therefore lower for applicants from these origin countries (see Appendix D.4 for details).

cations from Iraq (IRQ) increase by 4.7%. The country-specific reaction to the list essentially hinges on two channels. First, it depends on how important the affected destination (Sweden) is for asylum seekers from each origin country. Second, it depends on how the externalities affect all other destination countries for each origin. We further elaborate on these mechanisms in Appendix D.4, where we leverage the fact that we can recover explicit values of the multilateral resistance to migration terms.

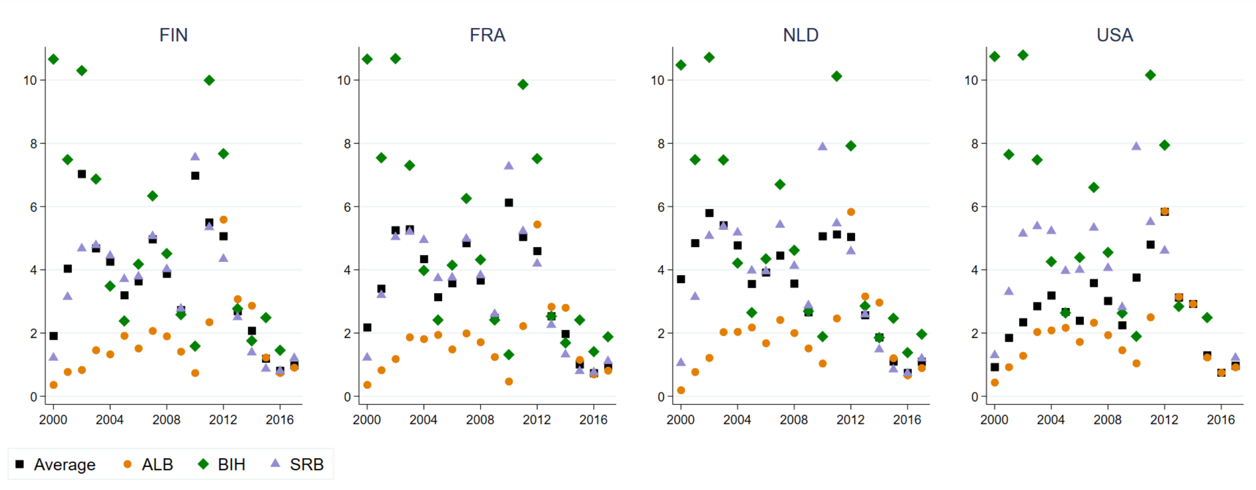
Redirection effects of the policy across destination countries. The policy change in Sweden also leads to consequences on other destination countries, which experience an increase in asylum applications. Figure 5 shows results for four countries, i.e., one without a list in Europe and geographically close to Sweden (Finland), two where a list is in place (France and the Netherlands), and one without a list outside Europe (USA).[15] They confirm that a fraction of the asylum seekers facing the new restrictive policy in Sweden now redirect to alternative countries.

The size of the redirection effect varies both over time and across destinations. For instance, in 2004, asylum applications from Serbia increase slightly more in France (4.34%), than in Finland (4.27%) and in the United States (3.19%). This heterogeneity among destination countries materializes due to differences in the acceptance rates after the policy change, which implies that the relative attractiveness of each alternative destination country differs compared to Sweden. However, for the origin countries directly targeted by the policy change in Sweden, the direct effect of higher migration costs clearly outweighs the spillover effects it has on other destination countries.[16] This explains why the heterogenous redirection effects (in %) are similar in magnitude across the four alternative destinations. In absolute numbers, however, more prominent alternative destinations among affected asylum applicants receive more additional applications (see Figure D.6 and Table D.2 in the Appendix).

[15] Results for other destinations are shown on Figure D.7 in the Appendix.

[16] The decrease in W_i in equation (4), which uniformly affects applications from targeted origins to any destination, dominates the externalities on the acceptance rate, a_j, in alternative destinations. We show in Appendix D.3 that endogenous acceptance rates imply a relaxation of the IIA assumption which would generate perfectly identical redirection effects (depending only on the change in W_i).

Figure 5: Redirection effects across destination countries under the counterfactual scenario

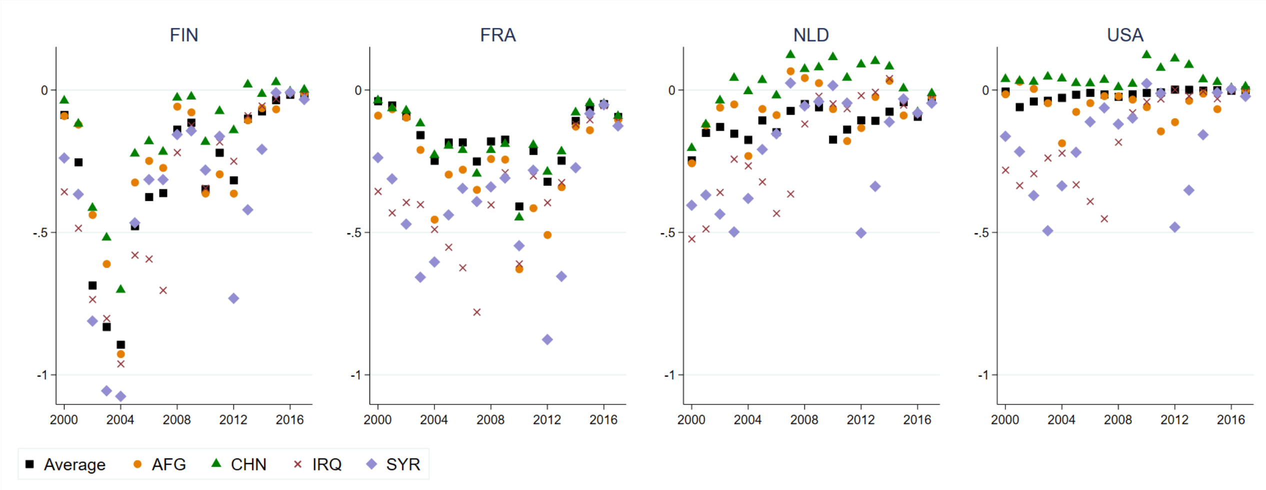


Note: Each of the four panels shows the change in yearly asylum applications (in %) from the targeted countries added to the safe country list of Sweden to an alternative destination.

Redirection effects from untargeted origin countries. The redirection effects across destinations for origin countries that are not directly targeted by the policy are displayed on Figure 6.[17] Finland experiences a larger decrease (in %) in asylum applications than the US, which is consistent with the fact that more individuals seeking asylum redirect from Finland to Sweden. This suggests that Finland is a closer substitute destination for Sweden than the US. In Appendix D.7, we show that the policy in Sweden generates a yearly change in total applications in alternative destinations between -0.1% and +1%.

[17]Results for other destination countries are shown on Figure D.8 in the Appendix.

Figure 6: Redirection effects across destinations for untargeted origins



Note: Each of the four panels shows the change in yearly asylum applications (in %) from untargeted origin countries to one alternative destination country due to the implementation of the safe country list in Sweden.

6 Conclusion

In this paper, we exploit theoretical and quantitative methods to study externalities of migration policies across countries. We focus on the case of an asylum policy –the list of safe origin countries– and we estimate the direct and the indirect effects that changing the listed origin countries generates on asylum applications across all origin and destination countries.

To do so, we first develop a theoretical framework that adjusts the migration gravity model introduced by Anderson (2011) to the asylum context by allowing for spillover effects of total asylum applications on their acceptance rate at destination. From the model, we derive a migration gravity equation that is estimated using high-frequency data, including self-collected information on safe country lists for 19 OECD countries, to identify the direct effect of the asylum policy on bilateral asylum applications. We find that the destination-specific inclusion of one origin country in the list of safe countries leads to an average decrease of around 29% in the number of asylum applications.

In a second step, we use this point estimate to evaluate a counterfactual policy scenario and quantify the redirection effects arising from changes in the list of safe origin countries. The comparison between the baseline and the counterfactual asylum applications highlights the redirection effects across origin and destination countries. Their magnitude depends on the size of the affected bilateral corridor(s) and the relative attractiveness of each destination country, thus relaxing the IIA assumption that is common in standard migration gravity models. We assume that Sweden creates a safe country list with five Balkan countries. Applications from these five origins in alternative destinations increase between 0.5 and and 11%, depending on the year and country. In contrast, applications from other origins in Sweden increase by 0.5 to 5% on average. In other destination countries, asylum applications vary between -0.5 and +0.5%, depending on the relative attractiveness of these alternative destinations.

Our unified framework quantifies the direct effect and all types of externalities generated by a bilateral policy on the location choice of *all* asylum seekers, regardless of whether they are directly targeted by the policy. We apply it to analyze the safe country of origin lists, but it can be extended to evaluate the effects of other bilateral migration policies that generate externalities across countries.

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Appendix

A Technical details of the theoretical framework

We start by rewriting equation (2) as:

$$M_{ij} = \frac{a_j(w_j/\delta_{ij})}{W_i} N_i \tag{10}$$

and then insert it in equation (3) that defines the acceptance rate at destination j, such that:

$$a_j = \frac{\bar{A}_j}{L_j} = \frac{\bar{A}_j}{\sum_{i \neq j} M_{i,j}} = \frac{\bar{A}_j}{\sum_{i \neq j} \frac{a_j(w_j/\delta_{ij})}{W_i} N_i} \tag{11a}$$

$$\iff a_j^2 = \frac{\bar{A}_j}{w_j} \frac{1}{\sum_{i \neq j} \frac{1/\delta_{ij}}{W_i} N_i} \tag{11b}$$

$$\iff a_j = \left(\frac{\bar{A}_j}{w_j M} \frac{1}{\sum_{i \neq j} \frac{1/\delta_{ij}}{W_i} \frac{N_i}{M}} \right)^{1/2} \tag{11c}$$

$$\iff a_j = \left(\frac{\bar{A}_j}{w_j \times M \times \Omega_j} \right)^{1/2} \tag{11d}$$

with

$$\Omega_j = \sum_{i \neq j} \frac{1/\delta_{ij}}{W_i} \frac{N_i}{M} \ . \tag{12}$$

Using the fact that $a_j = \bar{A}_j / L_j$ in equation (11d), we obtain:

$$a_j = \frac{L_j}{w_j \times M \times \Omega_j} \ . \tag{13}$$

Next, we use equation (13) in equation (10) to derive an equation defining the asylum applications from i to j, M_{ij}. This equation mirrors the one in Anderson (2011), providing an explicit formulation of the inward and outward multilateral resistance terms:

$$M_{ij} = \frac{L_j}{M} N_i \times \frac{1/\delta_{ij}}{W_i \Omega_j} \ . \tag{14}$$

B Details on the list of safe countries of origin

Table B.1: List of safe origin countries in the nine relevant destination countries

	Austria	Belgium	Canada	France	Germany	Ireland	Netherlands	Switzerland	UK
Albania	12-2012	09-2016		05-2006 (02-2008) 03-2011 (04-2012) 01-2014	12-2015		11-2015	10-1993	04-2003
Algeria	02-2016						10-2016		
Armenia				12-2009 (08-2010) 12-2011					
Benin				07-2005				01-2007	
Burkina Faso								04-2009	
Bangladesh				12-2011 (03-2013)					08-2003 (05-2005)
Bulgaria	08-2005				07-1993	09-2003[b]	(03-2001) 11-2015	03-1991	04-2003 (01-2007)
Bosnia-Herz.	07-2009	06-2012		07-2005	11-2014		11-2015	08-2003	08-2007
Bolivia									08-2003
Cape Verde				07-2005					
Ecuador									08-2003
Georgia	02-2016	09-2016		07-2005 (12-2009) 01-2014			10-2016		
Ghana	02-2016			07-2005	07-1993		(03-2001) 02-2016	10-1993	12-2005[c]
Gambia								10-1993	08-2007[c]
Croatia	07-2009		12-2012	07-2005 (07-2013)	07-2013	09-2003[b]	11-2015	01-2007	
Hungary	08-2005		12-2012		07-1993	12-2004[b]	(03-2001) 11-2015	08-2003	11-2002
India		06-2012		07-2005			02-2016	03-1991	02-2005
Jamaica							02-2016		04-2003
Kosovo	07-2009	06-2012		03-2011 (04-2012) 01-2014 (10-2014) 10-2015	12-2015		11-2015	04-2009	03-2010
Kenya									08-2007[c]
Liberia									08-2007[c]
Morocco	02-2016						02-2016		
Moldova				12-2011				01-2007	04-2003
Madagascar				05-2006 (08-2010)					
Macedonia	07-2009	06-2012		05-2006	11-2014		11-2015	08-2003	04-2003
Mali				07-2005[a] (01-2013)				01-2007 (03-2012)	08-2007[c]
Mauritius									08-2007
Montenegro	07-2009	06-2012		12-2011	12-2015		11-2015	01-2007	04-2003
Mongolia				07-2005			02-2016	07-2000	12-2005
Malawi									08-2007[c]
Niger				05-2006 (02-2008)					
Nigeria									12-2005[c]

Table B.1: List of safe origin countries in the nine relevant destination countries (cont.)

	Austria	Belgium	Canada	France	Germany	Ireland	Netherlands	Switzerland	UK
Peru									08-2007
Romania	08-2005		10-2014		07-1993	09-2003[b]	(03-2001) 11-2015	11-1991	04-2003 (01-2007)
Senegal				07-2005	07-1993		(03-2001) 02-2016	10-1993	
Sierra Leone									08-2007[c]
Serbia	07-2009	06-2012		12-2009	11-2014		11-2015	04-2009	04-2003
Sri Lanka									08-2003 (12-2006)
Togo							12-2016		
Tunisia	02-2016						10-2016		
Tanzania				05-2006 (10-2015)					
Trinidad-Tob.							05-2017		
Ukraine				07-2005 (04-2014)			10-2016	01-2007 (07-2014)	08-2003
Andorra			10-2014				11-2015		
Australia			02-2013				11-2015		
Austria			12-2012		01-2000[d]		11-2015	08-2003	
Belgium	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Brazil							05-2017		08-2003
Canada	08-2005						11-2015		
Chile			06-2013						
Cyprus	08-2005		12-2012		05-2005	09-2003[b]	11-2015	08-2003	11-2002
Czech Republic	08-2005		12-2012		07-1993	09-2003[b]	(03-2001) 11-2015	08-2003	11-2002
Denmark	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Estonia	08-2005		12-2012		05-2005	09-2003[b]	11-2015	08-2003	11-2002
Finland	08-2005		12-2012		01-2000[d]		11-2015	10-1993	
France	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Germany	08-2005		12-2012				11-2015	08-2003	
Greece	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Iceland	08-2005		02-2013				11-2015	08-2003	
Ireland	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Israel			02-2013						
Italy	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Japan			02-2013				11-2015		
Latvia	08-2005		12-2012		05-2005	09-2003[b]	11-2015	08-2003	11-2002
Liechtenstein	08-2005		10-2014				11-2015	08-2003	
Lithuania	08-2005		12-2012		05-2005	09-2003[b]	11-2015	06-1998	11-2002
Luxembourg	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Malta	08-2005		12-2012		05-2005	09-2003[b]	11-2015	08-2003	11-2002
Mexico			02-2013						
Monaco			10-2014				11-2015		
Netherlands	08-2005		12-2012		01-2000[d]			08-2003	
Norway	08-2005		02-2013				11-2015	08-2003	
New Zealand	08-2005		02-2013				11-2015		
Poland	08-2005		12-2012		07-1993	09-2003[b]	(03-2001) 11-2015	08-2003	11-2002
Portugal	08-2005		12-2012		01-2000[d]		11-2015	08-2003	

Table B.1: List of safe origin countries in the nine relevant destination countries (cont.)

	Austria	Belgium	Canada	France	Germany	Ireland	Netherlands	Switzerland	UK
San Marino			10-2014				11-2015		
Slovakia	08-2005		12-2012		07-1993	09-2003[b]	(03-2001) 11-2015	08-2003	11-2002
Slovenia	08-2005		12-2012		05-2005	09-2003[b]	11-2015	08-2003	11-2002
South Africa						12-2004[b]			08-2003
South Korea			06-2013						03-2010
Spain	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Sweden	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
Switzerland	08-2005		02-2013				11-2015		
Turkey				12-2009 (08-2010)					
United Kingdom	08-2005		12-2012		01-2000[d]		11-2015	08-2003	
United States			12-2012				11-2015		

Notes: Dates in parentheses indicate that the country was dropped from the list of safe country of origin, otherwise the dates represent the time when the origin country was added to the list of the respective destination country. *a* – on July 23, 2010 (i.e., 08-2010 in the data), Mali was maintained on the list but only for male asylum seekers. *b* – the International Protection Act that came into effect on December 31, 2016 revoked the list of safe origin countries, i.e. the safe country indicator is equal to 0 for Ireland from January 2017 onwards. *c* – these countries were included in the list of safe country of origin only for male asylum seekers. *d* – these countries were automatically added to the list of safe origin countries because they are EU Member States. The date refers simply to the starting date of the time period considered, since they have been EU Member States before January 2000.
Source: Authors' elaboration based on self-collected data.

B.2 Sources of information

The notes written below the figures and tables inserted in the main text refer to self-collected data as the source of information about the destination-specific list of safe countries of origin. In this Section, we clarify the material used to extract information on the evolution of the safe country policy across countries and over time.

Table B.2: List of safe countries of origin: sources of information (December, 2019)

Destination	Source of information (website)
Multiple	Asylum Information Database (AIDA) country reports (Source)
	Asylum Procedures: Report on Policies and Practices in IGC Participating States (Source)
	European Parliament (Source)
	European Commission (Source)
Austria	Legal Information System (Sources: 1, 2, 3, 4)
Belgium	Belgian Official Journal (Sources: 1, 2)
	Federal Public Service (Justice) (Sources: 1, 2, 3, 4)
	Council of State (Sources: 1, 2, 3, 4)
Canada	Government of Canada (Source)
France	Wikipedia (Source)
	National website (Source)
Germany	Federal Law Gazette (Sources: 1, 2)
	National website (Sources: 1, 2)
	Wikipedia (Source)
Netherlands	Central Government (Sources: 1, 2)
	Meyers (2004) (Source)
Ireland	Irish Statute Book (Sources: 1, 2)
Switzerland	State Office for Migration (Sources: 1, 2, 3)
UK	The National Archives (Sources: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

Source: Authors' elaboration based on self-collected information.

We have mostly relied on the Asylum Information Database (AIDA) country reports and the "Asylum Procedures: Report on Policies and Practices in IGC Participating States" published by the intergovernmental consultations (IGC) on migration, asylum and refugees. Beyond these two corpora, some official websites tracking and reporting changes in migration law enacted in the respective countries (e.g., Canada and the United Kingdom) have been exploited. We have also drawn on some reports delivered by European institutions, in particular to get information on the safe country policy at the beginning of the time period covered by our sample. Finally, we have complemented the above data with some country-specific information, e.g. from Wikipedia. Details about the data collection are presented in Table B.2.

C Robustness checks and further results related to the empirical estimation

C.1 Robustness checks: direct effect of the asylum policy

The robustness of the negative effect associated to the safe country policy on the number of asylum applications is confirmed through different tests. In column (1), the sample of destination countries is restricted to European countries only, which arguably have a different asylum system than the United States, Canada, Australia and New Zealand. Column (2) focuses on the ten countries (i.e., Germany, France, United Kingdom, Sweden, Italy, Canada, United States, Austria, Belgium and Switzerland) that received the largest number of asylum applications over the period 2000-2017. Column (3) further excludes non-European countries from the previous destinations (i.e., Canada and United States are excluded from the set of destination countries). Column (4) only considers the main origin countries, i.e., origins representing at least 0.5% of the total number of asylum applications over the covered time period (equivalent to the top 43 out of 199 origin countries in our sample). In column (5), we only keep origin countries with at least 5.500 asylum applicants over the covered time period (equivalent to the top 99 origin countries). In column (6), we exclude countries that were OECD members by January 1, 2000 from the set of origin countries (29 countries). Finally, the analysis is replicated with information related only to 2012 and later years (column (7)), whereas the counterpart is done in column (8) for the period 2000-2012. In unreported results, we also confirm that simultaneously limiting the sample to the main origin countries (as defined in columns (4) and (5) of Table C.1) and EU destination countries leads to similar results, with coefficients of -0.326*** and -0.325***, respectively.

Table C.1: Robustness tests - Direct effect of the list of safe countries of origin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SCO_{ijt}	-0.333***	-0.460***	-0.450***	-0.334***	-0.335***	-0.332***	-0.269**	-0.402***
	(0.070)	(0.061)	(0.063)	(0.078)	(0.069)	(0.073)	(0.136)	(0.054)
μ_{it}	✓	✓	✓	✓	✓	✓	✓	✓
μ_{jt}	✓	✓	✓	✓	✓	✓	✓	✓
μ_{ijy}	✓	✓	✓	✓	✓	✓	✓	✓
Observations	165,298	147,919	106,714	115,385	198,499	208,167	69,547	149,245
Pseudo-R^2	0.956	0.961	0.964	0.959	0.953	0.953	0.970	0.914

Notes: All regressions are estimated with PPML using the Stata command `ppmlhdfe`. SCO_{ijt}: indicator variable which equals 1 if origin i is on the safe country list of destination j in month t; m_{ijt}: asylum applications at the origin-destination-month level; μ_{it}: origin-month FE; μ_{jt}: destination-month FE; μ_{ijy}: origin-destination-year FE. Clustered standard errors by country-pair are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

C.2 Additional results: asymmetry of the direct effect

In this Section, we allow the variable of interest to have an asymmetric influence on the outcome (i.e., depending on whether a country is added or removed from the list). In practice, this translates into two indicator variables, SCO^A_{ijt} and SCO^R_{ijt}, with the former being associated to the addition of an origin to the safe origin countries list, whereas the latter refers to a removal from that list. Table C.2 shows that the negative effect remains when a country is added to the list. Albeit insignificant, the estimates associated to the removal of an origin from the list feature the expected direction, with a positive sign on the number of asylum applications.

Table C.2: Asymmetry of the direct effect

	(1)	(2)
	OLS	PPML
Dependent variable	$\ln(m_{ijt})$	m_{ijt}
SCO^A_{ijt}	-0.216***	-0.313***
	(0.060)	(0.076)
SCO^R_{ijt}	0.195	0.178
	(0.127)	(0.130)
μ_{it}	✓	✓
μ_{jt}	✓	✓
μ_{ijy}	✓	✓
Observations	218,774	218,792
R^2	0.909	
Pseudo-R^2		0.953

Notes: OLS is estimated with the Stata command `reghdfe` and PPML is based on the Stata command `ppmlhdfe`. SCO^A_{ijt} is an indicator variable taking value 1 when country i is added on the list in country j at time t and onwards; SCO^R_{ijt} is an indicator variable taking value 1 when country i is removed from the list in country j at time t and onwards; m_{ijt}: asylum applications at the origin-destination-month level; μ_{it}: origin-month FE; μ_{jt}: destination-month FE; μ_{ijy}: origin-destination-year FE. Clustered standard errors by country-pair are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

C.3 Dynamic effects

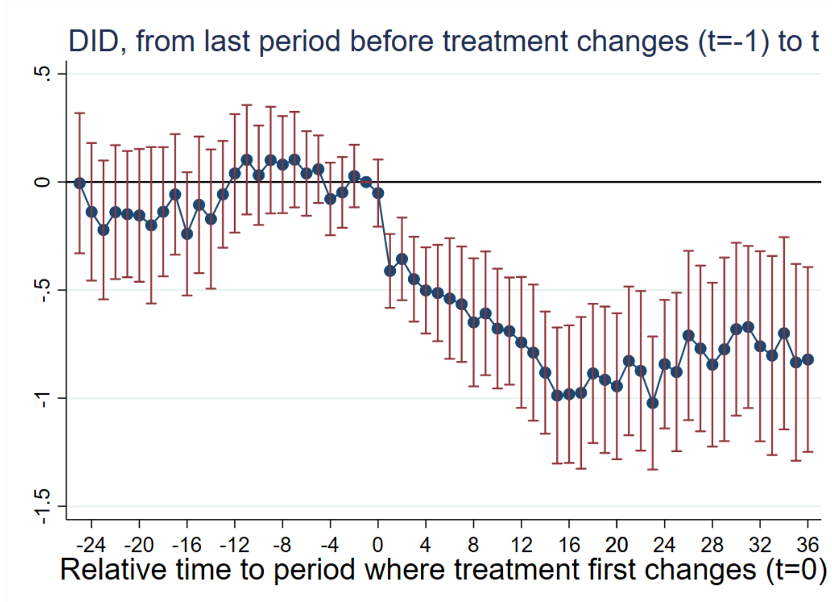
The specification proposed in equation (7) is useful to pinpoint how changes in the list of safe origin countries affect the bilateral number of asylum applications under the assumption of homogenous effects over time and across group. In a staggered setting with heterogeneous effects over time and across groups, the estimated average effect might however be biased (de Chaisemartin and D'Haultfoeuille, 2020). Furthermore, we cannot evaluate the dynamics of the impact, i.e. whether anticipatory responses aroused due to the past number of asylum applications in a given destination. If individuals sought asylum before the list was actually modified and, in turn, triggered the policy change, the estimates would obscure this reverse causality. In addition, the effect of being added on the list might take some time to fully unfold.

To address these points, we rely on the estimator proposed by de Chaisemartin and D'Haultfoeuille (2020) which allows to estimate dynamic and heterogeneous treatment effects.[18] All possible leads and lags are included in the estimation, in order to avoid assuming constant effects after a certain date (Borusyak et al., 2023),

[18] In addition, it allows for a staggered design with units changing treatment status multiple times (i.e. countries being removed from the safe country of origin list).

but we restrict Figure C.1 to 24 leads and 36 lags. The specification further controls non-parametically for origin-month and destination-month fixed effects. The month before the policy change is the reference point.

Figure C.1: First-time applications: dynamic effects



Notes: Estimations are based on the Stata command `did_multiplegt`, controlling non-parametically for origin-month and destination-month fixed effects.. The circles correspond to the point estimate of the effects of the list of safe origin countries on the logarithm of asylum applications. The bars represent the 95% confidence intervals around long difference effects and placebo tests. Standard errors clustered by country-pair based on 100 bootstrap replications.

Accounting for the time dynamics of the effect, Figure C.1 shows that the reported estimates for the 24 months leading to the policy change are close to zero and are not statistically different from 0. Hence, there is no evidence of diverging pre-trends or anticipatory responses of asylum applications to the future policy change up to 24 months before it occurred. The policy change generates a nearly 50% decline in the number of asylum applications one month after its implementation. Over time, the deterrent impact of the list intensifies, reaching a close to 100% reduction 18 months post-implementation. Thereafter, the point estimate decreases to around 75% three years after the policy change.[19] Hence, the estimates obtained with the gravity framework in Section 4, exploiting within-year variations, are likely lower bounds.

C.4 Potential mechanisms

We show that the introduction of a country on a safe country of origin list reduces asylum applications by its nationals in the destination implementing the policy. In this Section, we explore possible channels underlying this negative effect by using additional outcome variables provided by Eurostat. Due to data (un)availability, we have to rely on quarterly data for the European countries in our sample over the period 2008-2016.[20] However,

[19] In additional results, available upon request, we show that the absence of diverging pre-trends holds for up to 86 months before the policy shock. A statistically significant negative effect of the policy on asylum applications can be identified up to 66 months after the policy change. Thereafter, confidence intervals widen, and the coefficient decreases in magnitude, but it remains negative for up to 156 months after the policy change.

[20] Australia, Canada, New Zealand and the United States are thus excluded from the study of the mechanisms.

we show in column (1) of Table C.3 that the average negative effect of the safe country of origin list on asylum applications is still observed in affected corridors within this sub-sample of European countries.

A first channel through which the policy change can materialize is that it might lead to more restrictive decisions with respect to the determination of the status of individuals coming from safe origin countries. This would lower the origin-specific recognition rate of the respective applications.[21] We explore this mechanism with the empirical setting detailed in Section 4.1, considering the recognition rate of asylum applications as the outcome variable. The results are reported in Table C.3, where the different specifications are estimated with PPML.[22]

Column (2) in Table C.3 provides evidence of a slight positive and significant effect of the list of safe origin countries on the overall recognition rate of asylum applications from the targeted origin countries. This unexpected finding could suggest that the implementation of the list takes some time to fully materialize, a dimension we explore further at the end of this section. It could also be consistent with variations in the composition of the pool of asylum seekers who decide to file an application after the policy has been modified. In particular, the policy could generate a selection among asylum seekers such that only individuals who expect a high probability to be granted protection on different grounds than the asylum status (such as a humanitarian or subsidiary protection) submit an application.

We investigate this potential change in selection patterns in columns (3) and (4) of Table C.3, which replicate the analysis with disaggregated data on the type of protection that was granted in the destination country. First, we find in column (3) that the positive effect coinciding with the change of the list does not seem to be related to a change in the probability of being granted refugee/humanitarian protection.[23] Second, the estimate in column (4) documents that the positive effect uncovered for the total recognition rate could be the result of an increase in the probability of being granted subsidiary protection.[24] This is in line with a potential composition shift in the pool of asylum applicants, where individuals with good chances of being granted protection are able to get a subsidiary status at destination.

The safe country of origin list could in addition influence the processing of asylum applications. In particular, the inclusion of an origin country on the list could trigger a decrease in the expected time required to process the applications coming from specific origins.[25] We provide an empirical test of this assumption using

[21]The recognition rate is defined here as the share of first-instance positive decisions relative to the total number of decisions made on asylum applications.

[22]One difference in comparison to the baseline specification relates to the fixed effects. The (quarterly) time dimension of the data implies lower variability to identify the estimates of interest, leading us to include time-invariant country-pair fixed effects in the model.

[23]Refugee protection is defined by Eurostat as "a status as defined in Art.2(d) of Directive 2004/83/EC within the meaning of Art.1 of the Geneva Convention relating to the Status of Refugees of 28 July 1951, as amended by the New York Protocol of 31 January 1967." Humanitarian protection encompasses "persons who are not eligible for international protection as currently defined in the first stage legal instruments, but are nonetheless protected against removal under the obligations that are imposed on all Member States by international refugee or human rights instruments or on the basis of principles flowing from such instruments."

[24]Subsidiary protection is defined as "a status as defined in Art.2(f) of Directive 2004/83/EC. According to Art.2(e) of Directive 2004/83/EC a person eligible for subsidiary protection means a third country national or a stateless person who does not qualify as a refugee but in respect of whom substantial grounds have been shown for believing that the person concerned, if returned to his or her country of origin, or in the case of a stateless person, to his or her country of former habitual residence, would face a real risk of suffering serious harm and is unable, or, owing to such risk, unwilling to avail himself or herself of the protection of that country."

[25]The expected processing time in month t is defined as the number of months required to accumulate applications in order to reach the number of pending applications in month $t-1$. The quarterly value is defined as the average over the three relevant months and we set an upper-bound limit at 48 months. The median value of the variable in our sample is 7 months and the average is 11.2 months.

a specification with the expected processing time as dependent variable. Results are presented in column (5) of Table C.3. The estimates provide support for a negative and significant effect of the list of safe origin countries on the expected processing time. The coefficient of -0.297 implies that being added on the list reduces average processing time by 25.8%, which, evaluated at the mean, represents an average reduction of almost 3 months in processing time. This could translate into a lower expected duration of stay in the destination country for individuals coming from safe origins, which could deter future asylum arrivals from these countries, as discussed by Bertoli et al. (2022).

Table C.3: Effect of the safe country policy on the recognition rate and expected processing time

	(1)	(2)	(3)	(4)	(5)
	Applications	Recognition rate	Recognition rate Ref./Hum.	Recognition rate Subsidiary	Expected processing time
SCO	-0.423*	0.419*	0.043	1.679***	-0.297**
	(0.237)	(0.237)	(0.174)	(0.616)	(0.117)
μ_{it}, μ_{jt}, μ_{ij}	✓	✓	✓	✓	✓
Observations	47,795	34,728	31,329	15,825	76,765
Pseudo-R^2	0.957	0.520	0.502	0.604	0.456

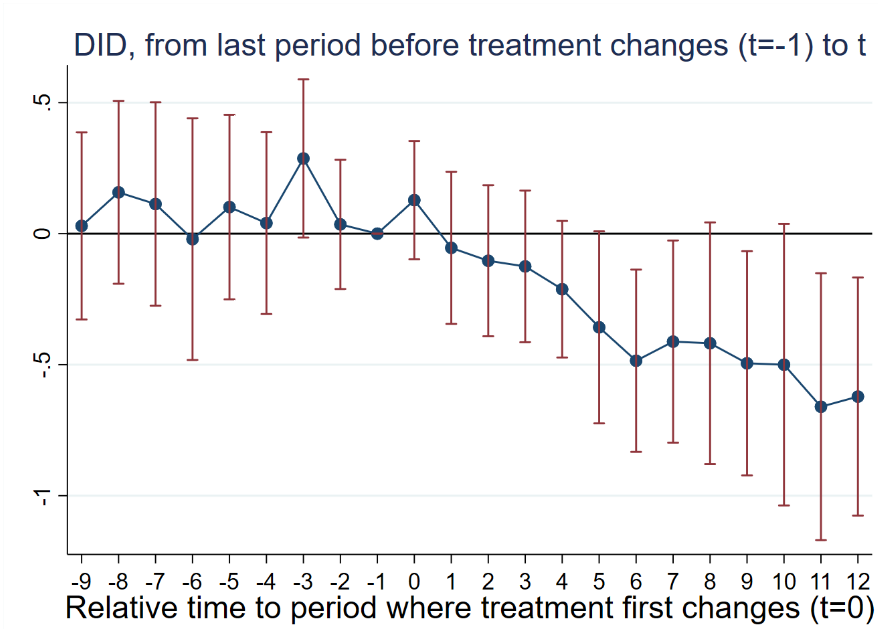
Notes: All regressions are estimated with PPML using the Stata command `ppmlhdfe`. μ_{it}: origin-month FE; μ_{jt}: destination-month FE; μ_{ij}: origin-destination FE. Clustered standard errors by country-pair in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Given that the effects of the policy change might take time to fully materialize, we explore its dynamics on the different channels by relying on de Chaisemartin and D'Haultfoeuille (2020). The dynamic trajectories of the estimates follow the expected directions, albeit large confidence intervals often limit statistical significance.[26] Figure C.3a shows that acceptance rates slightly decrease over time. This pattern hides a decrease in the acceptance rates for refugee status (Figure C.3b), which is only partially compensated by an increase in the probability to obtain a subsidiary protection status (Figure C.3c).

Regarding processing times, Figure C.3d suggests some anticipation by the public authorities who seem to speed up the processing of asylum applications from countries targeted by the list a few quarters before the safe country of origin list is officially implemented. Between two years and up to three quarters before the policy shock, processing times are significantly higher (by around 10 months) for corridors that are eventually affected by the policy. They are substantially reduced three quarters before the policy implementation. Subsequently, they take some time to adjust further but between three to nine quarters after the policy change, processing times are lower for affected countries (by around 3 months). However, coefficients are only statistically significant for quarters 6 and 7.

[26] We show in Figure C.2 that the coefficients associated with first time applications in this sub-sample exhibit similar patterns as those highlighted for the full sample in Figure C.1. Although confidence intervals are large, applications from affected countries are statistically significantly lower by around 50% six and seven quarters after the policy change.

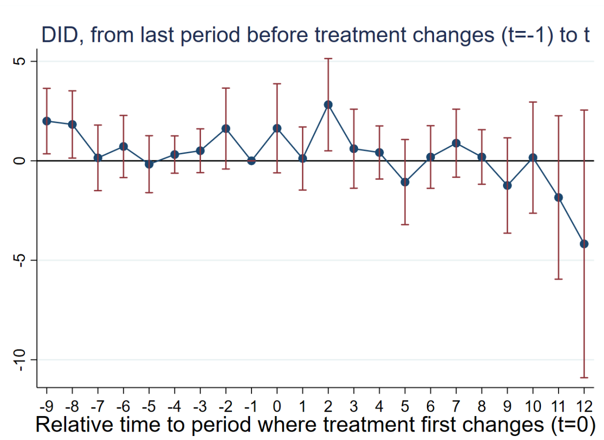
Figure C.2: First-time applicants (quarterly Eurostat data 2008-2016)



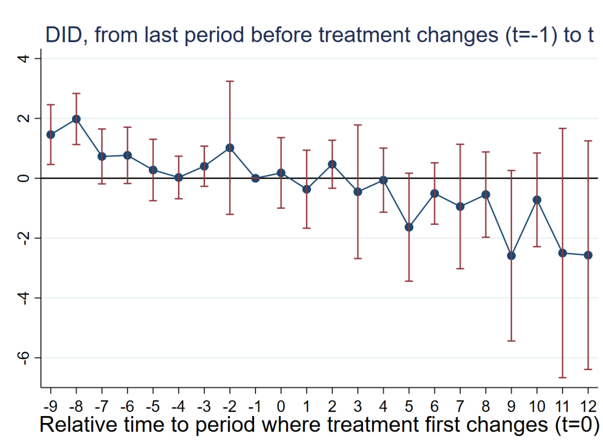
Note: Figure C.2 shows the effect of the introduction on a safe country list on quarterly asylum applications for the European countries in our sample over the period 2008-2016. Estimations are based on the Stata command `did_multiplegt`, controlling non-parametically for origin-month and destination-month fixed effects.

Figure C.3: Dynamics of potential mechanisms: acceptance rate by type of decision and processing time

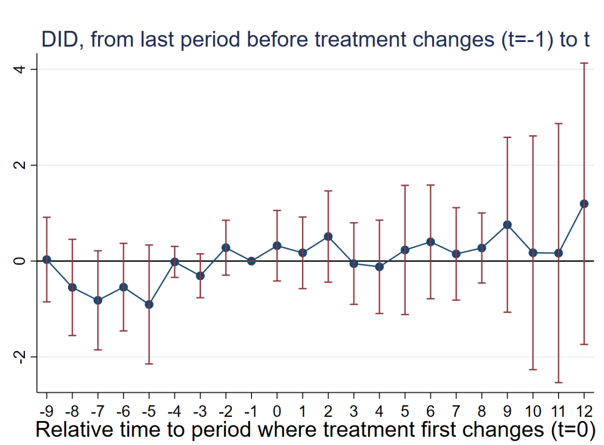
(a) Overall acceptance rate



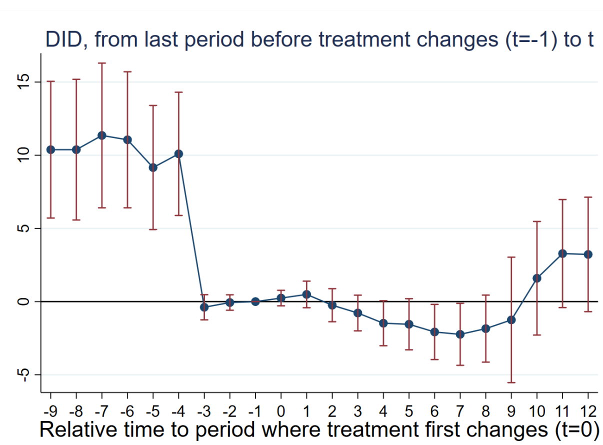
(b) Acceptance Rate: Humanitarian status



(c) Acceptance Rate: Subsidiary status



(d) Processing time



Note: Each panel shows the effect of the introduction on a safe country list on a different quarterly outcome variable. Estimations are based on the Stata command `did_multiplegt`, controlling non-parametically for origin-month and destination-month fixed effects. Panel C.3a shows the effect of safe country of origin list on the acceptance rate of an asylum application. Panel C.3b and Panel C.3c show the effect on the acceptance rate of humanitarian protection and subsidiary protection, respectively. Panel C.3d shows the effect on processing times.

D Details on the calibration and simulation

D.1 Calibration

The calibration of the baseline bilateral migration costs, δ_{ijt}, requires several data inputs. First, we aggregate the monthly number of asylum applications from each origin i to each destination j by year t (from UNHCR). We also build a rest-of-the-world (ROW) destination using annual data on asylum applications in all countries in UNHCR data that are not in our sample. Second, we adjust available information on the asylum policy at the yearly level. We assume that an origin is considered as safe by a destination in a given year t whenever it is in the relevant country's list of safe countries for a minimum of six months within that year t.

Third, we use the average wages at destination j, as provided by the OECD, to approximate the economic conditions in the destination countries. They are obtained by dividing the national-accounts-based total wage bill by the average number of employees in the total economy, which is then multiplied by the ratio of the average usual weekly hours per full-time employee to the average usual weekly hours for all employees. This indicator is measured in USD constant prices using 2016 base year and Purchasing Power Parities (PPPs) for private consumption of the same year (see source). The wage in the ROW country is assumed to be 20% of the yearly average wage of our set of OECD countries. This approximates the gap in average GDP per capita in 2022 (in PPP) between high-income countries (60,620$) and the rest of the countries (13,216$) according to the World Development Indicators (see source). As can be deduced from equation (16), this value does not affect the results as a different wage for the ROW would be reflected in a proportional adjustment of the calibrated bilateral migration costs that fit the observed asylum applications data.

Finally, we also exploit information about the average acceptance rate of asylum applications at destination j in year t, a_{jt}. We rely on two data sources to compute this variable. The first one exploits the share of positive decisions on first-instance asylum applications (for refugee/humanitarian protection) derived from Eurostat. Relevant information covers the period 2008-2017 and all destinations located in Europe. We then complement it with data from the UNHCR, from which we derive the share of recognized decisions for all non-European destination countries, and for European countries before 2008.[27] Note that a_{jt} might be zero while we do observe some asylum applications. In this case, we assume that the acceptance rate takes the value 0.001, so that the applications are matched (and non-zero). We also assume that a_{jt} equals zero when no applications are observed, thus prioritizing the asylum applications data.[28]

To further proceed with the calibration of the migration costs, we need to define a benchmark country. In standard migration applications (e.g., Docquier et al., 2015; Delogu et al., 2018), the natural reference is to use the option to stay, which would translate as $\delta_{iit} = 1$ in our framework. In our context, this option is outside the choice set, as we study the distribution of a given number of asylum seekers across 19 potential destinations. Hence, we use Canada as reference country and assume $\delta_{i,CAN,t} = 1 \; \forall \; i, t$. The choice of reference country is neutral, as long as it is used both in the benchmark and counterfactual simulations. Concretely, using

[27] One drawback of the UNHCR data is that, for some countries such as Austria and Germany, we cannot distinguish first-instance applications from other types of applications.

[28] Inconsistencies in the data are due to the fact that asylum decisions taken in a given year t do not necessarily relate to asylum applications of that same year, as there might be a delay in the registration and/or treatment of the application.

equation (2), we have that:

$$M_{ijt} = \frac{a_{jt}(w_{jt}/\delta_{ijt})}{W_{it}} N_{it} \tag{15a}$$

$$M_{i,CAN,t} = \frac{a_{CAN,t}(w_{CAN,t}/1)}{W_{it}} N_{it}. \tag{15b}$$

Dividing equation (15a) by equation (15b) and reorganizing, we have:

$$\delta_{ijt} = \frac{a_{jt}w_{jt}}{a_{CAN,t}w_{CAN,t}} \frac{M_{i,CAN,t}}{M_{ijt}}. \tag{16}$$

Equation (16) shows that a different reference point simply implies a re-scaling of the bilateral migration costs of origin i by replacing $\left[a_{CAN,t}\,; w_{CAN,t}\,; M_{i,CAN,t}\right]$ with a different reference value $\left[a_{REF,t}\,; w_{REF,t}\,; M_{i,REF,t}\right]$. Hence, the relative migration costs between two potential destinations remain unaffected by the choice of the reference country:

$$\frac{\delta_{ijt}}{\delta_{ilt}} = \frac{a_{jt}w_{jt}}{a_{lt}w_{lt}} \frac{M_{ilt}}{M_{ijt}}. \tag{17}$$

Note that our calibration strategy requires that $M_{i,CAN,t} \neq 0 \; \forall \; i, t$. If this does not hold, equation (16) implies that $\delta_{ijt} = 0 \; \forall \; j$ in period t and bilateral migration costs are indistinguishable for origin i across all potential destinations. In case $M_{i,CAN,t} = 0$ in the data, we therefore assume that it takes a small number, i.e. $M_{i,CAN,t} = 0.1$. Again, results are neutral to choosing a different value as it does not affect the relative attractiveness of alternative destinations (see development of equation (17)). Corridors without any applications (i.e. case $M_{i,j,t} = 0$) are characterized by infinite migration costs. For these cases, adding country i on a safe country list has no effect and they remain at 0.

Next, we calibrate $\bar{A}_{jt}$ using data for the recognition rate, a_{jt}, and the sum of asylum applications, L_{jt}, in equation (3):

$$a_{jt} = \frac{\bar{A}_{jt}}{L_{jt}} \tag{18a}$$

$$\bar{A}_{jt} = a_{jt}L_{jt}. \tag{18b}$$

In case a destination j does not receive any applications in a given year t, we assume that $a_{jt} = 0$. Our calibration strategy is such that we perfectly match asylum applications in each origin-destination-year corridor from the UNHCR data by obtaining a residual (yearly) bilateral migration cost.

As a validation exercise, we can use the calibrated migration costs and correlate them with variables that are not explicitly accounted for by the model, but have been shown in the literature (e.g., Beine et al., 2016) to affect migration costs (such as distance, common languages and cultural links). We estimate different variations of the following equation:

$$c_{ijt} = \beta_1 language_{ij} + \beta_2 colonial_{ij} + \beta_3 lndist_{ij} + \beta_4 lnMig90_{ij} + \mu_{it} + \mu_{jt} + \epsilon_{ijt}, \tag{19}$$

where $language_{ij}$ takes value 1 if countries share a common primary language, $colonial_{ij}$ takes value 1 if

Table D.1: Migration costs

	(1)	(2)
$language_{ij}$	-0.790	0.634
	(2.400)	(2.757)
$colonial_{ij}$	-4.961**	-1.323
	(2.196)	(2.683)
$lndist_{ij}$	7.905***	6.234**
	(2.615)	(2.723)
$lnMig90_{ij}$		-1.782***
		(0.531)
μ_{it}, μ_{jt}	Y	Y
Observations	33,743	28,267
R^2	0.388	0.393

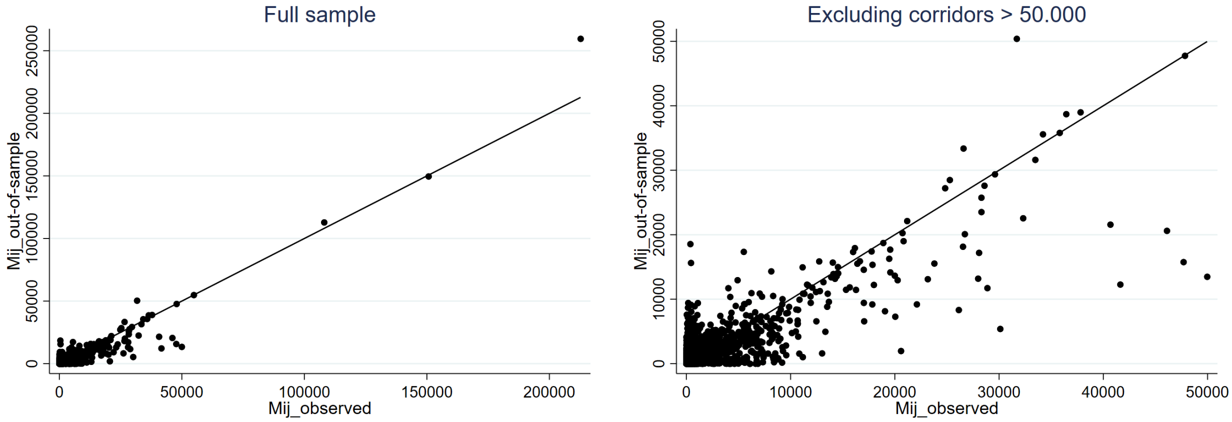
Notes: OLS is estimated with the Stata command `reghdfe`. μ_{it}: origin-month FE; μ_{jt}: destination-month FE; μ_{ij}: origin-destination FE. Clustered standard errors by country-pair are reported in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

countries share (past) colonial ties, $lndist_{ij}$ is the (ln) distance between countries i and j (see Head et al., 2010), $lnMig90$ is the (ln) total adult migrant stock from origin i in destination j in the year 1990 (see Artuc et al., 2014).

Controlling for origin-year and destination-year fixed effects in all regressions, we find the expected signs for most variables in Table D.1. Migration costs are positively correlated with distance and negatively correlated with colonial relations and the bilateral migrant stock in 1990 in column (2). Adding the network control variable leads to a counter-intuitive positive correlation between migration costs and language. Without the network control, the common language dummy has the expected negative sign in column (1), pointing to a correlation between the two variables.

In addition, to assess how well our model fits the yearly distribution of asylum applications from each origin across all destinations, we provide a cross-validation by splitting our sample in two periods. Specifically, we use the calibrated migration costs from the second half of the period (2010-2017) to obtain the yearly asylum applications for the first half of the period (2000-2009). For each bilateral corridor ij, we calculate the average c_{ij} over 2010-2017. Then, we apply this average migration cost in equation (10) to calibrate the yearly applications M_{ij}, keeping all other variables (w_j, a_j, N_i) from the data. Figure D.1 compares this "out-of-sample calibration", and shows that the calibrated bilateral applications fit the ones from the data very closely - with a correlation of 93.75%. Unsurprisingly, the early period out-of-sample calibrated asylum applications will deviate most from observed values for the corridors that witnessed an important change in their relative importance between the two periods. For example, the out-of-sample calibrated asylum applications from Afghanistan to Germany are overestimated while applications to the Rest-of-the-World are underestimated in the early period because, in the data, Germany became more important relative to the Rest-of-the-World in the second period of the sample. The advantage of our calibration method, fitting yearly applications from observed data, is that it avoids any assumption on the inter-temporal evolution of determinants for asylum applications.

Figure D.1: Out-of-sample calibration of Mij (2000-2009)



Note: Figure D.1 shows yearly asylum applications from all origin countries i to all destination countries j for the years 2000-2009 observed in the data (horizontal axis) and the asylum applications in the same corridors calibrated using average bilateral migration costs over the period 2010-2017 (vertical axis). Panel (a) shows all bilateral corridors while Panel (b) zooms into corridors with less than 50.000 applications.

D.2 Simulation procedure

Our counterfactual simulations build on shocks to migration costs induced by changes in the list of safe origin countries. Hence, the counterfactual migration costs, δ^c_{ijt} take the form:

$$\delta^c_{ijt} = \delta_{ijt} \times f\big(\exp(\beta_{SCO})\big)\,, \tag{20}$$

where $\exp(\beta_{SCO})$ is a function of the coefficient estimated in Section 4.

We then write a Gauss-Seidel iterative algorithm[29] to obtain the counterfactual equilibrium, given that the bilateral asylum applications, M_{ijt} and the recognition rates, a_{jt}, are interdependent and affected by the counterfactual migration cost structure. Concretely, for each year t, the first iteration I starts with the values from the benchmark equilibrium, except the migration costs which have been shocked. With the counterfactual matrix of bilateral costs, we calculate the new $W^I_{it}\ \forall\ i, t$:

$$W^I_{it} = \sum_{j \in J} \tilde{a}^I_{jt}(w_{jt}/\delta^c_{ijt}). \tag{21}$$

Then, we assess the new bilateral asylum applications. Note that at this stage only the countries affected by a change in migration costs δ^c_{ij} witness a change in their applications:

$$M^I_{ijt} = \frac{\tilde{a}^I_{jt}(w_{jt}/\delta^c_{ijt})}{W^I_{it}} N_{it}. \tag{22}$$

Next, we aggregate the bilateral applications at the destination level to obtain the counterfactual total number of applications $L^I_{jt} = \sum_{i \neq j} M^I_{ijt}\ \forall\ j, t$. As the inclusion on a list of safe countries alters the redistribution of asylum seekers from the targeted origins towards *all* the destinations, the total number of asylum applications

[29] We use `Matlab2020R` for the calibration and simulation of the model.

changes in all destinations, thereby modifying the acceptance rates $\hat{a}^I_{jt}$ in all destinations:

$$\hat{a}^I_{jt} = \frac{\bar{A}_{jt}}{L^I_{jt}}. \tag{23}$$

These acceptance rates differ from the initial (observed) values used to compute the counterfactual equilibrium. We compute, ϵ_t, the sum of the deviation between the actual values and those obtained with the new matrix of bilateral asylum applications as:

$$\epsilon_t = \sum_{jt} |\tilde{a}^I_{jt} - \hat{a}^I_{jt}| < E. \tag{24}$$

If this value exceeds a certain precision threshold, which we set at $E = 0.0000000000001$, a new iteration begins. In this new iteration ($I = I + 1$), the new value of $\tilde{a}^{I+1}_{jt}$ is adjusted as:

$$\tilde{a}^{I+1}_{jt} = \eta \tilde{a}^I_{jt} + (1 - \eta)\hat{a}^I_{jt}\,, \tag{25}$$

where, in the first iteration, $\tilde{a}^I_{jt}$ takes the values used in the calibration and η represents the correction factor which affects the speed of convergence towards the new equilibrium.

The new iteration therefore starts with calculating a new value of W^{I+1}_{it} using $\tilde{a}^{I+1}_{jt}$:

$$W^{I+1}_{it} = \sum_{j \in J} \tilde{a}^{I+1}_{jt}(w_{jt}/\delta^c_{ijt}), \tag{26}$$

and then repeats the steps described in equations (22) to (25). Note that, from this second iteration on, the acceptance rate $\tilde{a}^{I+1}_{jt}$ changes in all countries and, hence, W^{I+1}_{it} changes for all origins and leads to changes in all bilateral corridors M^{I+1}_{ijt}. These new applications alter $\hat{a}^{I+1}_{jt}$ again, and the loop continues until it reaches the new equilibrium defined by the acceptance rate at the end of the iteration matching the one used to compute the bilateral matrix of asylum applications (up to the marginal error E). The counterfactual equilibrium is determined separately for each year.

D.3 Comparison with IIA

In this Section, we briefly illustrate how endogenizing a_{jt} relaxes the IIA assumption, such that a change in migration costs within specific dyads can indirectly and asymmetrically affect other dyads.[30]

In order to highlight this, consider the change in bilateral asylum applications between a counterfactual and

[30] Several recent papers have developed alternative models relaxing the IIA assumption. Burzynski (2018) develops a model in which destination countries provide temporary and permanent visas, imposing correlations across the choice options. Marchal and Naiditch (2020) introduce credit constraints into a RUM model which imply that individuals from different origins have a different set of reachable destinations. Bertoli et al. (2020) use a rational inattention framework to account for differences in costly information acquisition.

a benchmark scenario:

$$\frac{M^c_{ijt} - M_{ijt}}{M_{ijt}} = \frac{\dfrac{a^c_{jt} w_{jt}/\delta^c_{ijt}}{W^c_{it}} - \dfrac{a_{jt} w_{jt}/\delta_{ijt}}{W_{it}}}{\dfrac{a_{jt} w_{jt}/\delta_{ijt}}{W_{it}}} \tag{27a}$$

$$\iff \frac{\Delta M^c_{ijt}}{M_{ijt}} = \frac{\dfrac{a^c_{jt}/\delta^c_{ijt}}{W^c_{it}} - \dfrac{a_{jt}/\delta_{ijt}}{W_{it}}}{\dfrac{a_{jt}/\delta_{ijt}}{W_{it}}}. \tag{27b}$$

M_{ijt} changes when acceptance rates are endogenous (i.e. $a_{jt} \neq a^c_{jt}$), independently of whether W_{it} changes too (which it does). Let us assume that origin i faces a policy shock in destination 1, such that $\delta^c_{i1t} \neq \delta_{i1t}$. From equation (27a), it is clear that the applications from i to 1 are affected by this policy change. Next, consider the applications from origin i to destination l, which are not directly affected by a policy shock, such that $\delta^c_{ilt} = \delta_{ilt}$. Rewriting equation (27a):

$$\frac{\Delta M^c_{ilt}}{M_{ilt}} = \frac{\dfrac{a^c_{lt}}{W^c_{it}} - \dfrac{a_{lt}}{W_{it}}}{\dfrac{a_{lt}}{W_{it}}} \tag{28}$$

If the acceptance rates are exogenous (and therefore constant), $a_{lt} = a^c_{lt} = \bar{a}_{lt}$, equation (28) can be further simplified:

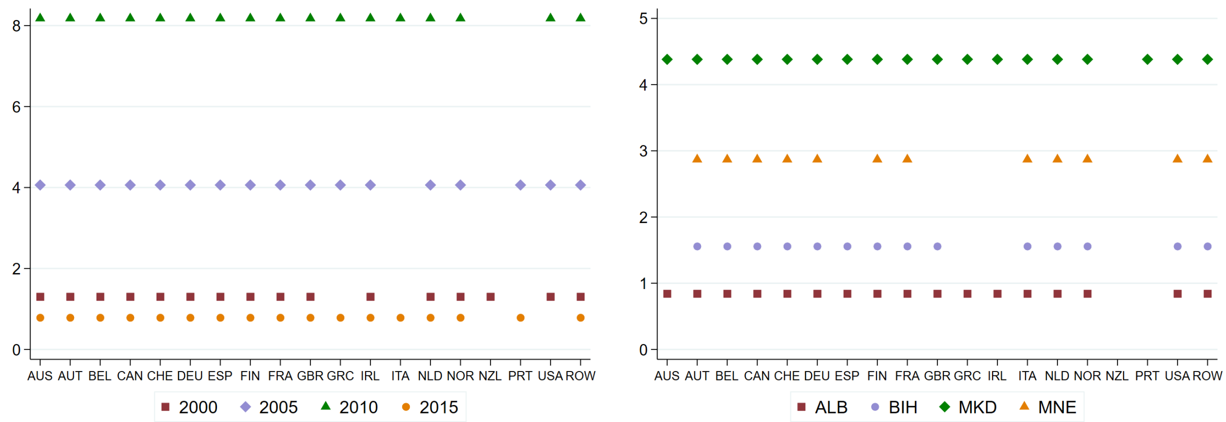
$$\frac{\Delta M^c_{ilt}}{M_{ilt}} = \frac{a^c_{lt} W_{it}}{a_{lt} W^c_{it}} - 1 = \frac{W_{it}}{W^c_{it}} - 1. \tag{29}$$

Equation (29) shows that, for constant $a_{lt} = \bar{a}_{lt}$, bilateral applications from origin i to any destination l unaffected by a shock to their bilateral migration costs δ_{ilt} change proportionally by $(W_{it}/W^c_{it}) - 1$. This is a consequence of the IIA assumption. Finally, note that applications from origins other than i, which are untargeted by the policy change and, hence, experience no change of their bilateral migration costs, remain constant. For these countries, $W_{it} = W^c_{it}$ and equation (29) implies that $\Delta M^c_{ijt} = 0$, $\forall j$.

Endogenizing the acceptance rate a_{jt} relaxes this assumption. Equation (28) highlights that each bilateral corridor from i to l not directly affected by a shock to the bilateral migration costs δ_{ilt} still changes differently, depending on how a_{lt} is affected by the policy change occurring in j. As a^c_{lt}/a_{lt} can vary for two different destinations, the asylum applications from i towards these different destinations adjust in varying proportions.

In order to quantify the effect of the IIA assumption, we simulate our main counterfactual policy scenario, detailed in Section 5.2 assuming exogenous acceptance rates. Figure D.2 depicts the change of asylum applications across destinations. The left panel of Figure D.2 shows, for different years ($t = \{2000, 2005, 2010, 2015\}$), that asylum applications from Serbia redirect in the same proportions across all alternative destinations (excluding Sweden). The right panel of Figure D.2 focuses on the year 2010 and confirms that the IIA assumption also holds for the four other safe origins (ALB, BIH, MKD, MNE). Importantly, this holds only for relative changes, expressed in % deviation from the baseline value but not for absolute numbers.

Figure D.2: Redirection effects in destination countries under the IIA assumption (change in % relative to baseline)



Note: The left panel shows that, for different years (t = 2000, 2005, 2010, 2015), asylum applications from Serbia redirect in the same proportions across all alternative destinations (excluding Sweden), thereby validating the IIA assumption. The right panel focuses on the year 2010 and confirms that the IIA assumption also holds for the four other safe origins (ALB, BIH, MKD, MNE).

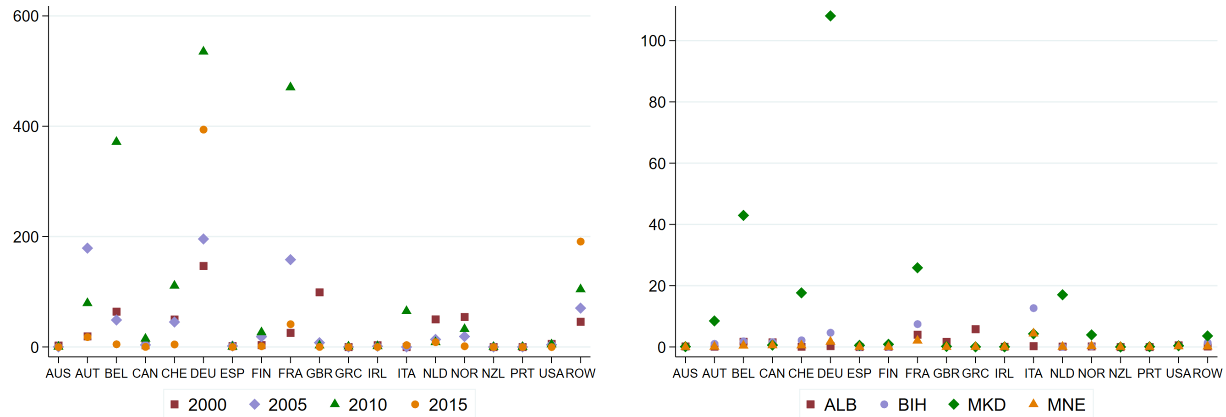
The effect of the policy on the *number* of applications from targeted origin countries across alternative destinations varies, even under the IIA assumption.

$$M_{ijt}^c - M_{ijt} = \frac{a_{jt}^c w_{jt}/\delta_{ijt}^c}{W_{it}^c} - \frac{a_{jt} w_{jt}/\delta_{ijt}}{W_{it}} = \frac{a_{jt}^c w_{jt}}{\delta_{ijt}^c} * (W_{it}^c - W_{it}) \ . \tag{30}$$

Equation (31) shows that for targeted origins i, the number of applications in alternative destinations will vary depending on their attractiveness $a_{jt} w_{jt}/\delta_{ijt}$. This is shown in Figure D.3, which replicates Figure D.2 using absolute numbers. For untargeted origin countries, the term in parenthesis in equation (30) equals 0 when acceptance rates are exogenous (and therefore the policy has no effect for these countries). Note that in our baseline model, externalities on the acceptance rates, a_{jt}, imply that the number of asylum applications change according to:

$$M_{ijt}^c - M_{ijt} = \frac{a_{jt}^c w_{jt}/\delta_{ijt}^c}{W_{it}^c} - \frac{a_{jt} w_{jt}/\delta_{ijt}}{W_{it}} = \frac{w_{jt}}{\delta_{ijt}^c} * \left(\frac{a_{jt}^c}{W_{it}^c} - \frac{a_{jt}}{W_{it}} \right) \ . \tag{31}$$

Figure D.3: Redirection effects in destination countries under the IIA assumption (number of applications)



Note: The left panel shows that, for different years (t = 2000, 2005, 2010, 2015), the number of asylum applications from Serbia differs across alternative destinations (excluding Sweden). The right panel focuses on the year 2010 shows the number of asylum applications in alternative destination countries for the four other safe origins (ALB, BIH, MKD, MNE).

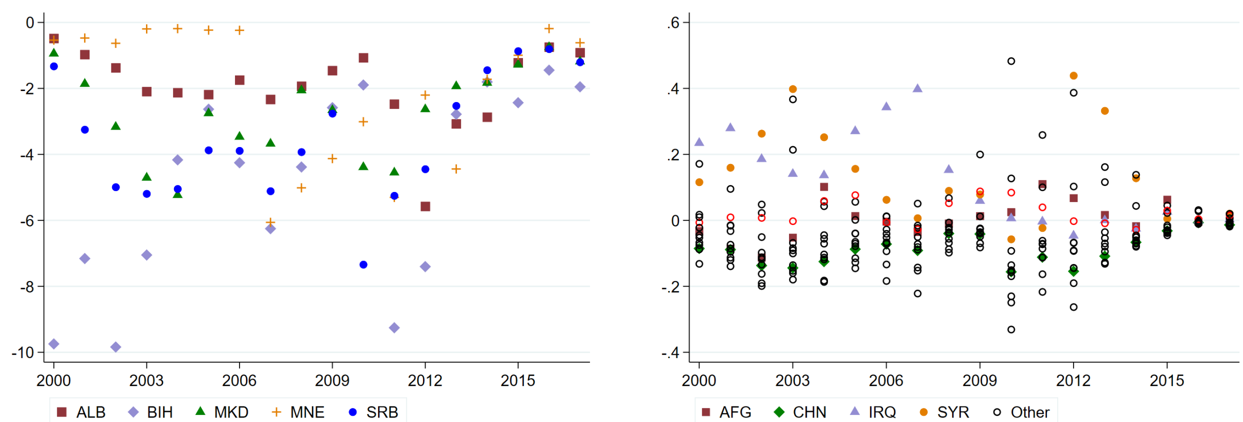
D.4 Diving into the inner workings of the model

One interesting feature of the theoretical framework described in Section 2 is the possibility to derive explicit values for the multilateral resistance to migration terms, namely Ω_j and W_i. The outward multilateral term for a given origin i, W_i, depends on the attractiveness that each destination j exerts on origin i relative to other destinations k (reflected by the bilateral migration costs δ_{ij} in equation (5)). Moreover, it also depends on the attractiveness of that destination for other origin countries (reflected by the share of asylum seekers received by destination j, L_k/M and the inward multilateral term, Ω_k, in equation (5)). On the one hand, W_i is more strongly altered when destinations important for country i, i.e., featuring relatively low migration costs δ_{ij}, are affected. On the other hand, for two destinations with similar migration costs δ_{ij} (thus, perceived as rather close substitutes by individuals from i), the outward multilateral resistance of origin i is more strongly affected by the destination that is more prominent among the other origin countries.

An increase in the bilateral migration costs towards one destination reduces the outward multilateral resistance for the origins directly affected by the change. In our baseline scenario, the left panel of Figure D.4 shows that W_i decreases for the five Balkan countries that are registered on the list of Sweden. Moreover, the more important Sweden is as a destination for a given origin (i.e. the higher its weights in W_i), the lower the decrease in the observed applications from the safe countries. Applicants from an origin country with a comparatively stronger preference for a destination therefore react proportionally less to a shock of the same magnitude relative to applicants from other countries. This property of the model can be seen by comparing the impact on asylum applications from Bosnia-Herzegovina (BIH) with those from Serbia (SRB). More than 40% of asylum seekers from the former are in Sweden in 2000, whereas this share is below 5% for the latter. Hence, a lower share (but not necessarily number) of asylum seekers from Bosnia-Herzegovina change their destination compared to those from Serbia.

The countries not directly facing a change in their migration costs are affected by the redirection effects that the policy in Sweden exerts on all origins. The fact that asylum seekers from the five safe countries are now less likely to choose Sweden as a destination, increases the country's attractiveness for all other origins (i.e., in technical terms, Sweden has a lower inward multilateral resistance, Ω_j). Nevertheless, this higher attractiveness implies that individuals from origin countries for which Sweden is a top destination not only have stronger incentives to apply for asylum there but also experience an increase in the relative competition faced at that destination. The latter effect translates into a higher outward multilateral resistance term, which is thus larger for countries that favor Sweden as a destination. For instance, in 2000, Sweden attracted 11% of asylum seekers from Iraq, whereas less than 0.3% of asylum seekers from China lodged an application there. The right panel of Figure D.4 confirms that the externalities induced by a policy in Sweden affect asylum seekers from Iraq more than individuals seeking protection from China.

Figure D.4: Variations of the origin-specific multilateral resistance term W_i

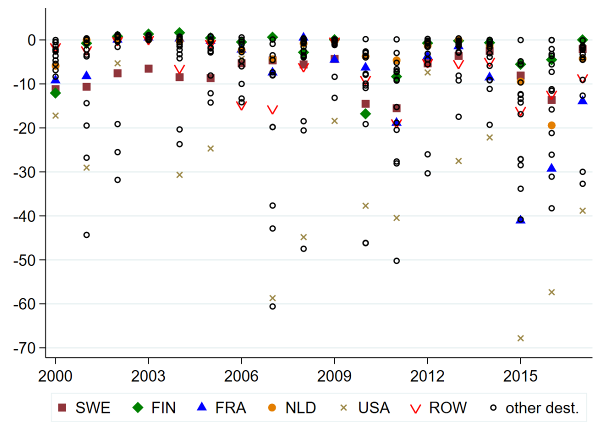


Note: The left panel shows the yearly change in the outward multilateral resistance term, W_i, for the five Balkan countries added to the safe country list of Sweden. The right panel shows the effect of this policy on the outward multilateral resistance term for a selection of untargeted origin countries.

The inward multilateral resistance term of Sweden, Ω_{SWE}, is altered by the increase in the bilateral migration costs related to the five safe countries. The higher the share of these origins among all asylum applications in Sweden, the larger the externalities and, subsequently, the more Sweden becomes attractive for all other origin countries not directly targeted by the policy shock. In our model, this translates into a lower inward multilateral resistance term for Sweden. Note that this term is the same for all origins i. Yet, the fact that Sweden's relative attractiveness as a destination varies across origins (as reflected by differences in the bilateral migration costs) implies a heterogeneous effect on the outward resistance terms, as can be deduced from equation (5). For instance, the outward resistance to migration decreases more strongly for Iraq than for China. This, in turn, implies heterogeneous redirection effects towards Sweden, as the bilateral number of asylum applications increases more from Iraq than from China.

By contrast, asylum seekers from the five safe origins are likely to divert towards destination countries that they already favored before the shock. These redirected asylum applicants thus decrease the relative attractiveness of the alternative destinations for all other origins, which can even lead to a higher inward multilateral resistance, Ω_j, in some destination countries. The more a destination is considered to be a close substitute to Sweden, the more it receives diverted applications and the less attractive it becomes for asylum seekers from other origin countries. For instance, Figure D.5 shows that for most years, Ω_{USA} decreases more than Ω_{FRA}, Ω_{NLD} or Ω_{FIN}. Therefore, the three latter countries receive more asylum applicants redirecting from Sweden than the US.

Figure D.5: Variations of the destination-specific multilateral resistance term Ω_j



Note: Figure D.5 shows the yearly change in the inward multilateral resistance term, Ω_j, of Sweden and of the alternative destination countries due to the addition of the five Balkan countries to the safe country list of Sweden.

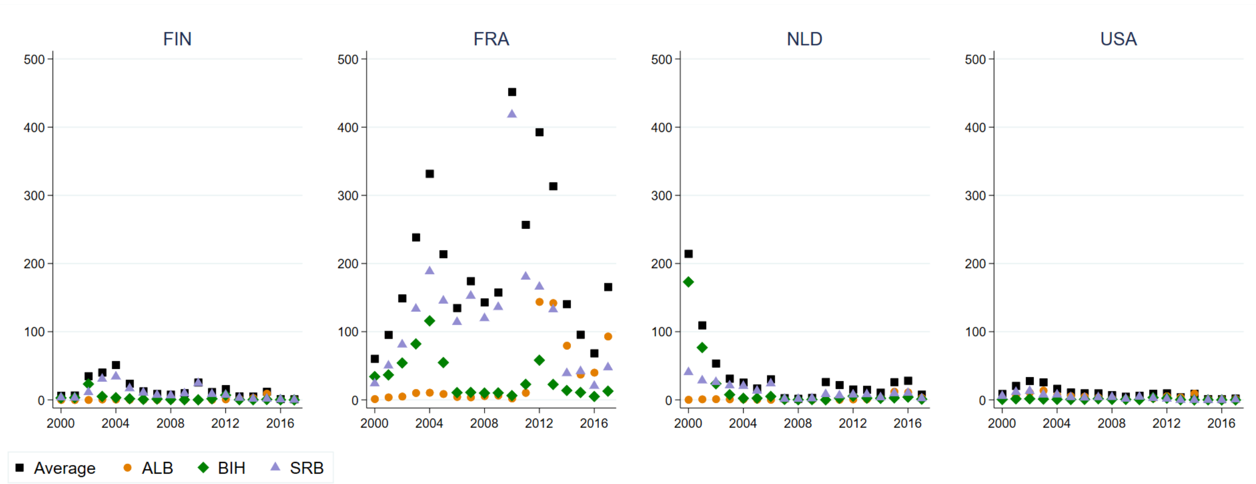
D.5 Quantifying the effects with absolute numbers

Table D.2: Adding five Balkan countries to the safe list of Sweden: change in number of asylum applications

Year	Sweden			Germany			Other destinations		
	Total applications	Direct effect	Indirect effect	Total applications	Direct effect	Indirect effect	Total applications	Direct effect	Indirect effect
2000	15,817	-1,257	475	76,132	297	-134	753,834	960	-341
2001	22,919	-1,452	599	85,781	421	-199	526,131	1,031	-400
2002	32,032	-2,009	812	68,961	449	-207	569,298	1,560	-605
2003	29,436	-1,669	695	48,791	311	-144	500,610	1,357	-551
2004	21,330	-1,241	517	34,350	222	-103	430,432	1,019	-414
2005	16,599	-877	372	26,127	188	-84	462,878	689	-288
2006	23,353	-611	262	19,837	127	-57	418,512	483	-205
2007	34,655	-736	309	17,815	109	-54	436,534	627	-255
2008	22,844	-593	266	20,765	69	-38	680,700	523	-228
2009	22,968	-564	256	26,762	64	-33	739,778	500	-223
2010	30,357	-1,875	752	40,215	561	-241	611,276	1,315	-510
2011	28,257	-1,386	591	44,723	385	-176	605,654	1,000	-415
2012	40,909	-1,722	744	63,578	678	-292	601,180	1,044	-451
2013	46,763	-1,328	590	106,873	575	-256	685,179	753	-334
2014	67,197	-1,377	635	166,290	709	-328	849,715	668	-307
2015	148,034	-1,647	788	422,716	1,175	-504	1,256,249	472	-284
2016	21,193	-431	206	698,531	264	-125	1,027,489	166	-81
2017	19,554	-386	184	174,893	115	-62	1,254,830	271	-122

Notes: Total applications is the number of asylum applications each year. The direct effect is the number of applications from the five safe origins, whereas the indirect effect corresponds to the number of applications from untargeted countries.

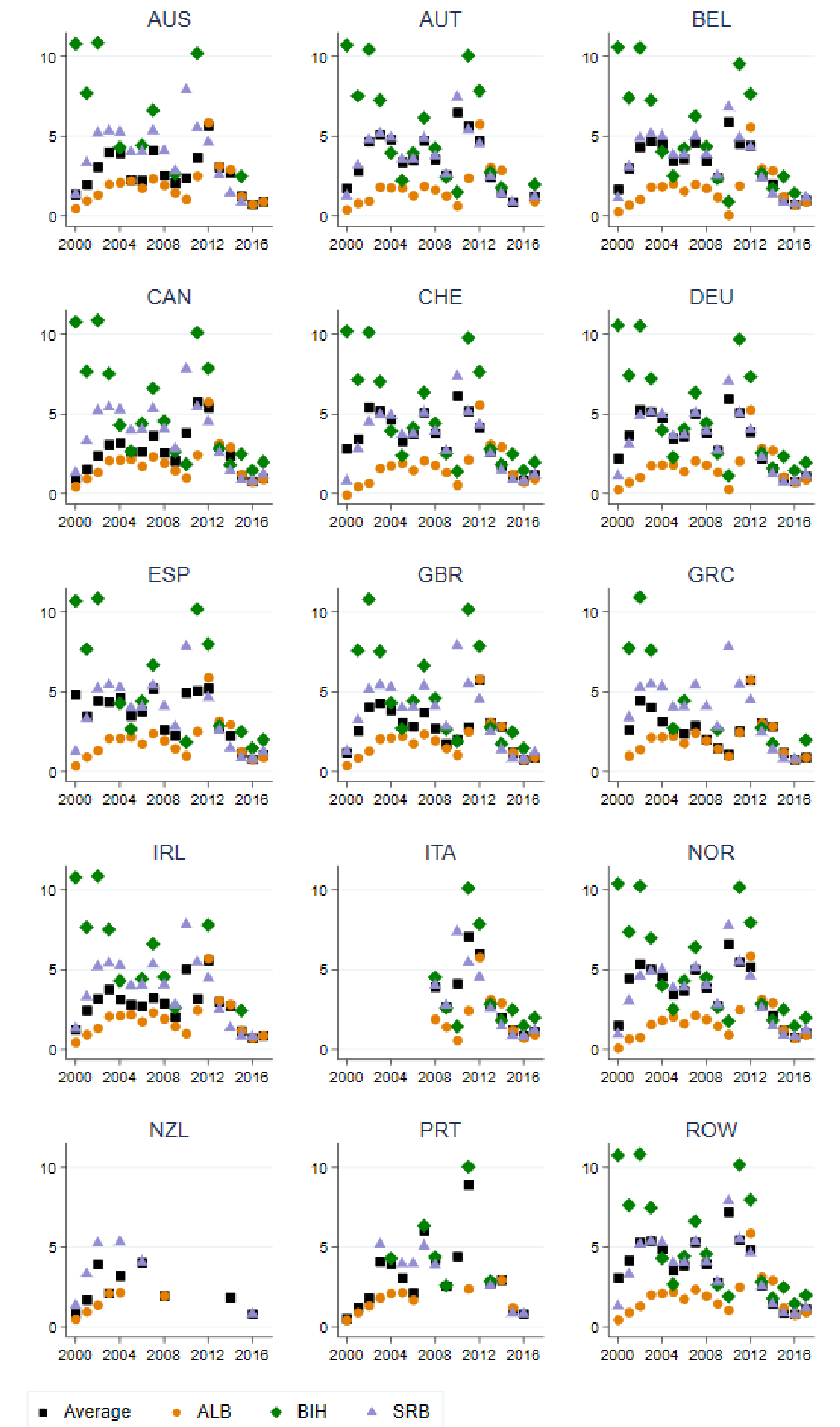
Figure D.6: Redirection effects across destination countries under the counterfactual scenario (number of applications)



Note: Each of the four panels shows the change in number of yearly asylum applications from the targeted countries added to the safe country list of Sweden to an alternative destination.

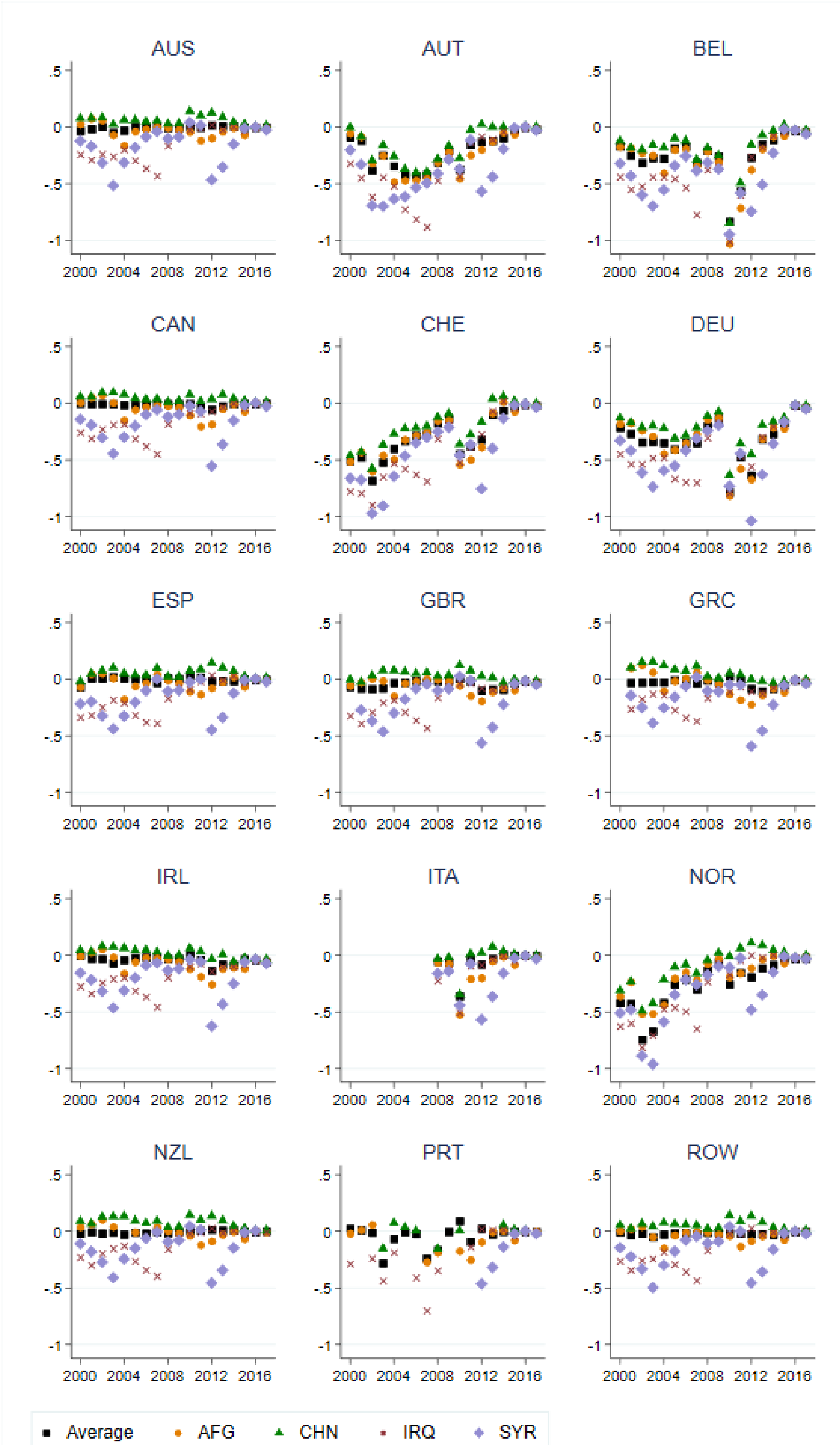
D.6 Simulation results of the baseline scenario for other destinations

Figure D.7: Redirection effects across destinations for safe origins



Note: Change in asylum applications from the five Balkan countries added to the safe country list of Sweden to other destination countries (in %).

Figure D.8: Redirection effects across destinations for untargeted origins

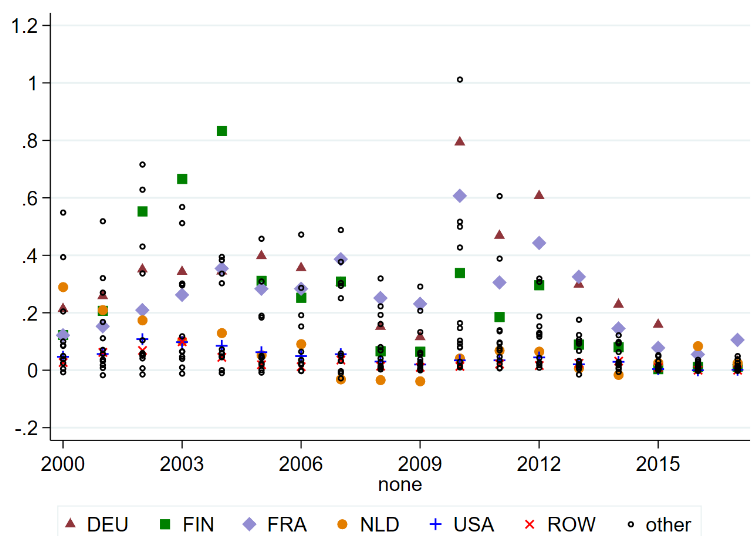


Note: Change in asylum applications from untargeted countries to other destination countries caused by the addition of five Balkan countries to the safe country list of Sweden (in %).

D.7 Variation in total asylum applications in alternative destinations

The policy in Sweden affects alternative destinations differently. Figure D.9 confirms that the US is less affected by the spillovers generated by the policy shock than the three other destination countries. For instance, in 2000, total applications increase by 0.05% in the US, by 0.12% in France and by 0.29% in the Netherlands. Yet, both the absolute and the relative magnitudes of the effects driven by the list vary across years. For instance, Finland is among the countries where asylum applications increase the most in 2000 (+0.12%) and even becomes the alternative destination with the highest positive redirection effect in 2004 (+0.83%). However, its relative attractiveness tends to decrease in 2015 and 2016, when its recorded asylum applications barely change. Note that the safe country list in Sweden might increase the relative attractiveness for untargeted origins to the point that some other destinations end up with lower asylum applications in the counterfactual scenario. This is particularly visible for the years 2007-2009, when relatively less asylum seekers redirect from Sweden (whose total number of recorded applications decrease between 1 and 2% relative to the benchmark) and the Netherlands experience a decrease in asylum applications of around 0.05-0.1% (Figure D.9). While asylum applications from the five safe countries increase (as shown in Figure 5), the redirection of asylum seekers from other origins away from the Netherlands more than compensates these arrivals, such that the net effect of the policy shock on the total number of applications is negative.

Figure D.9: Variation in total asylum applications



Note: Figure D.9 shows the change in yearly asylum applications (in %) in alternative destination countries.

D.8 Simulation results: removal of safe origins from the list of the UK

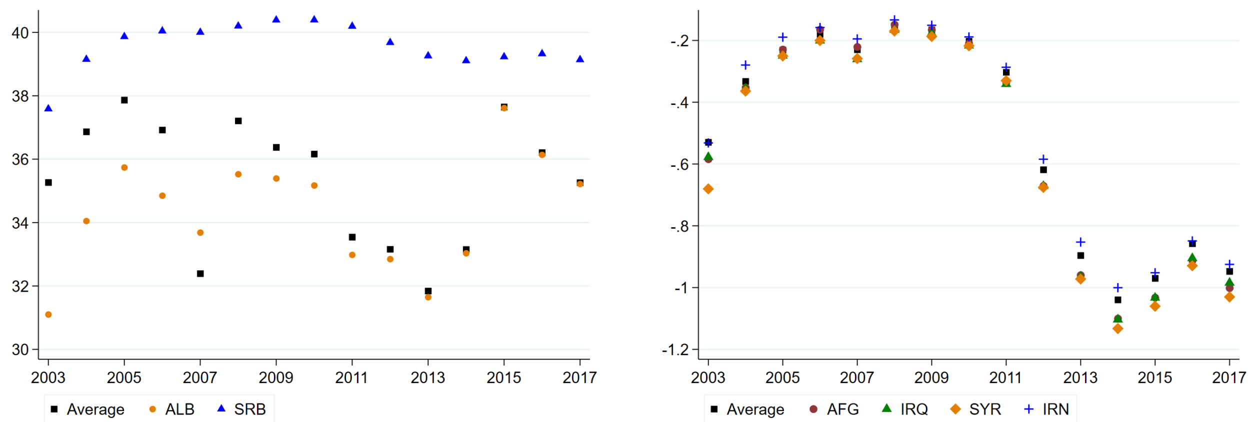
In this Section, we simulate a counterfactual policy that mirrors the one applied to Sweden in Section 5, i.e. we assume the same five Balkan countries are removed from the list of safe countries in the United Kingdom. Hence, this policy scenario translates into a decrease of the bilateral migration costs for the five origin countries ($i = \{ALB, BIH, MKD, MNE, SRB\}$) towards the United Kingdom:

$$\delta^c_{i,GBR} = \delta_{i,GBR} \times 1/\exp(0.342) = \delta_{i,GBR} \times 1/1.4077603.$$

As the United Kingdom added these five countries to its as safe country list in 2003, the results reported on the next figures do not depict changes before that year.

Direct and indirect effects in the UK. We first discuss the effects of the counterfactual policy change on asylum applications in the UK. When it removes the five Balkan origin countries from its list, the bilateral migration costs from these countries to the UK decrease. As a direct effect, individuals originating from the newly unlisted countries are now filling more applications in the UK (left panel of Figure D.10). The increase is heterogeneous across origin countries, and the asylum applications from Serbia increase more than those from Albania. This is due to the fact that the UK is considered as relatively more attractive for asylum seekers from Serbia than from Albania. On the other hand, asylum seekers from countries not directly affected by the policy modification are now lodging fewer applications in the UK, as displayed on the right panel of Figure D.10. This pattern is consistent with the predictions of the model, and mirrors the one previously described for Sweden. Again, due to the influence of the multilateral resistance to migration terms, the effects are heterogeneous across origins and over time.

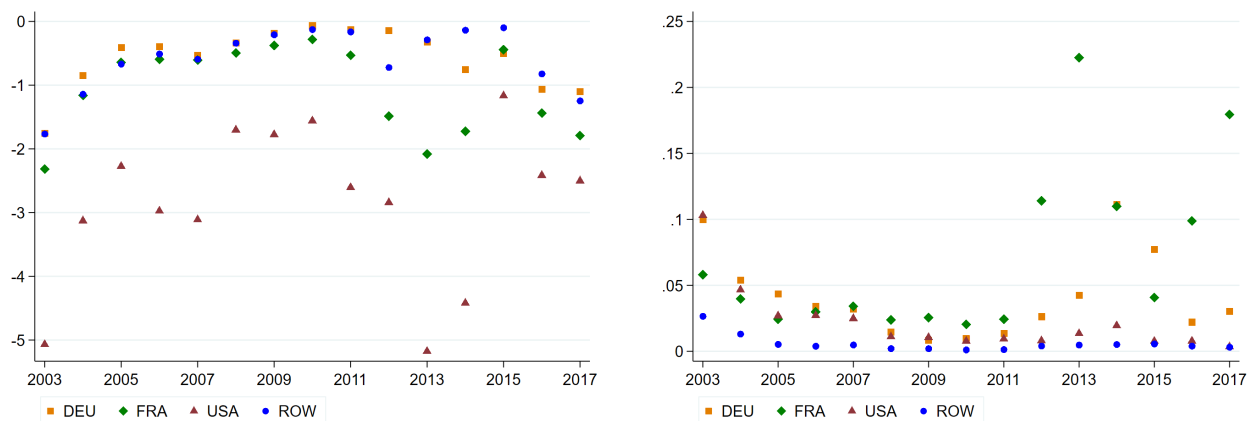
Figure D.10: Direct and redirection effects observed for the UK



Note: The left panel shows the change in yearly asylum applications (in %) from the five Balkan countries removed from UK's safe country list. The right panel details the change in yearly asylum applications from untargeted countries to the UK (in %).

Redirection effects in other destination countries. The decision of the UK to remove some origin countries from the safe country list also influences the number of asylum applications in other OECD destination countries. In particular, given that more individuals from the five Balkan countries redirect to the UK, asylum applications registered in alternative destinations from these origin countries decrease (left panel of Figure D.11). The effect is heterogeneous across destinations. For instance, in 2003, applications in the US decrease relatively more (in %) than in France, which is a direct implication of differences in the bilateral migration costs (and hence relative preferences) for these destination countries. The redirection of applications from the five Balkan countries towards the UK, increases the attractiveness of alternative destinations for individuals seeking protection from untargeted origins (right panel of Figure D.11). The increase in asylum applications varies across destination countries, depending on how substitutable destinations are within each migration corridor. In the beginning of the period under study, France experiences a lower increase in diverted asylum applications compared to the US, whereas from 2007 onward, it becomes the preferred destination among the three countries depicted in Figure D.11).

Figure D.11: Externalities in other destination countries



Note: The left panel shows the average change in yearly asylum applications from the five Balkan countries removed from UK's safe country list to other destination countries (in %). The right panel shows the average change in yearly asylum applications from untargeted origin countries in these alternative destinations (in %).

E Theory and simulation: extension of the model with bilateral acceptance rates

Our baseline model builds upon the average acceptance rate in each destination j, a_{jt}. This average rate might hide important variations in the acceptance rate across origin countries. The model developed in Section 2 can be adjusted to account for bilateral acceptance rates, although a clear analytical expression, such as the one provided in equation (5), cannot be derived. We first extend the theory to the bilateral case in Section E.1. We then show in Section E.2 that simulating our benchmark counterfactual scenario in a bilateral framework does not affect our results. In addition, we use our bilateral model to simulate two additional policy interventions beyond the implementation of the safe country list in Sweden. In a first extension, Sweden adds the five Balkan countries to its safe country of origin list and, at the same time, lowers the number of visas that it is willing to provide to asylum seekers from these countries by 50% (i.e., a decrease in A_{ijt} for the affected origin countries i). In a second extension, the visas that are no longer available for asylum seekers from the five Balkan countries are redistributed among the asylum seekers coming from other origin countries.

E.1 Theoretical framework

For the sake of simplicity, we omit the time dimension t in this Section. The bilateral acceptance rate of asylum applications from origin i in country j is defined as:

$$a_{ij} = \frac{A_{ij}}{L_{ij}}. \tag{32}$$

We then rewrite the bilateral number of accepted applications as:

$$A_{ij} = Z_{ij} \times \frac{L_{ij}}{\sum_{i \neq j} L_{ij}} \tag{33a}$$

$$\iff A_{ij} = \bar{Z}_j \times \alpha_{ij} \times \frac{L_{ij}}{\sum_{i \neq j} L_{ij}}, \tag{33b}$$

where $\bar{Z}_j$ can be seen as a fixed number of asylum seekers that the country j can host (in a given year t) and $\bar{Z}_{ij}$ represents the slots (or visas) that applicants from origin i are eligible to. The number of accepted applications from origin i in j depends on (*i*) country j's hosting capacities $\bar{Z}_j$, (*ii*) a destination-specific preference parameter for origin i, α_{ij}, and (*iii*) its share in the total asylum population of destination j, $L_{ij}/\sum_{i \neq j} L_{ij}$.

Substituting equation (33a) in equation (32), the bilateral acceptance rate can be written as:

$$a_{ij} = \frac{Z_{ij}}{\sum_{i \neq j} L_{ij}} \; . \tag{34}$$

Note that from equation (32), we can recover the average acceptance rate of country j. We have that:

$$a_{ij} = \frac{A_{ij}}{L_{ij}} \tag{35a}$$

$$\iff \sum_{i\neq j} a_{ij} L_{ij} = \sum_{i\neq j} A_{ij} \tag{35b}$$

$$\iff \frac{\sum_{i\neq j} a_{ij} L_{ij}}{\sum_{i\neq j} L_{ij}} = \frac{A_j}{\sum_{i\neq j} L_{ij}} \tag{35c}$$

$$\iff a_j = \frac{A_j}{\sum_{i\neq j} L_{ij}} \tag{35d}$$

where $\sum_{i\neq j} A_{ij} = A_j$ and equation (35d) is identical to equation (3) used in the baseline model of Section 2.

The bilateral notation in equation (33b), beyond accounting for bilateral heterogeneity in the acceptance rates as observed in the data, further allows us to consider additional bilateral policy instruments. Destination j could decide to increase the number of asylum applications it can accept, $\hat{Z}_j = \bar{Z}_j + Z_j^a$, while keeping the distribution of these additional visas constant across origins. In this case, each origin gets a share of $\lambda_{ij} = \alpha_{ij} \times L_{ij} / \sum_{i\neq j} L_{ij}$ of the new slots Z_j^a.[31]

Alternatively, the new slots could target a subgroup of origins. Assume that, upon the emergence of a humanitarian crisis in country l, the destination j decides to allocate $\hat{Z}_{lj}$ new slots to asylum seekers from this country. The updated total number of available slots is thus: $\hat{Z}_j = \bar{Z}_j + \hat{Z}_{lj}$. The bilateral number of visas allocated to each origin i by destination j becomes:

$$\hat{A}_{ij} = \hat{Z}_j \times \hat{\lambda}_{ij} = \bar{Z}_j \times \lambda_{ij} = A_{ij},\ \forall i \neq l \tag{36a}$$

$$\hat{A}_{lj} = \hat{Z}_j \times \hat{\lambda}_{lj} > A_{lj}\,. \tag{36b}$$

As an alternative policy, destination country j can choose to reallocate the same number of slots, $\bar{Z}_j$, differently across origins. Suppose that it decides to favor origin l, such that $\gamma_{lj} = \lambda_{lj}(1+\theta)$ with $\theta > 0$. Suppose also that destination j keeps the visas allocated to the other origin countries proportional to their benchmark distribution. The share each country $i \neq l$ receives from the existing number of visas becomes:

$$\gamma_{ij} = \frac{\lambda_{ij}}{\sum_{i\neq l} \lambda_{ij}} \times \big(1 - \lambda_{lj}(1+\theta)\big)\bar{Z}_j. \tag{37}$$

E.2 Simulation results

We start by showing on the left panel of Figure E.1 that adding the five Balkan countries to the Swedish list, while accounting for bilateral acceptance rates, has the same quantitative effects (represented by circles) than the direct effect unveiled with unilateral acceptance rates (represented by squares on Figure 4a). This equivalence also holds for the redirection effects for untargeted origins represented on the right panel of Figure E.1 that can be compared to those on Figure 4b. We further provide detailed results for Finland, an alternative destination in Figure E.2. Redirection effects from the five affected countries vary across destinations depending on their

[31] A similar reasoning applies when a destination decreases the number of slots or lowers the allocation towards specific countries.

relative attractiveness, as discussed in Section 5.2. Note that the results using the bilateral framework are quantitatively identical to the ones displayed on Figure 5.

As discussed in the previous Section, modeling bilateral acceptance rates allows to account for additional bilateral policies. To exploit this extension further, we simulate a scenario in which, besides adding the five Balkan countries to the list, Sweden also reduces the number of visas (or, alternatively, the hosting capacities) it allocates to these origins by 50%. Hence:

$$\hat{A}_{i,SWE} = \bar{A}_{i,SWE} \times 0.5 \quad \forall j = \{ALB, BIH, MKD, MNE, SRB\} \tag{38a}$$

$$\hat{A}_{ij} = \bar{A}_{ij} \quad \forall j \neq \{ALB, BIH, MKD, MNE, SRB\}. \tag{38b}$$

This additional policy strongly strengthens the decrease in acceptance rates for asylum seekers from the five Balkan countries and thereby magnifies the redirection of their applications from Sweden to alternative destination countries. The average reduction in applications from the five countries in Sweden more than doubles and oscillates between 50 and 60%, depending on the year. The related diverted applications move to other destination countries, such as Finland (Figure E.2), where the increase in applications more than doubles in most years. Finland is a particularly attractive alternative destination between 2002 and 2009, while redirection effects tend to decrease thereafter. The larger diversion of asylum seekers from the five safe countries make Sweden an even more attractive destination for untargeted origin countries. As a consequence, the increase in applications from untargeted origins more than doubles in Sweden as shown on the right panel of Figure E.1. This stronger relative attractiveness of Sweden implies that alternative destinations receive less applications from untargeted origins, as highlighted on the right panel of Figures E.2 for the case of Finland.

In a last counterfactual policy experiment, we assume that beyond the inclusion of the five Balkan countries on the list, Sweden reduces the resources dedicated to them by 50% but, in contrast to the previous scenario, redistributes the related visas among untargeted origins, in proportion to their relative importance among asylum applicants to the country. Thus:

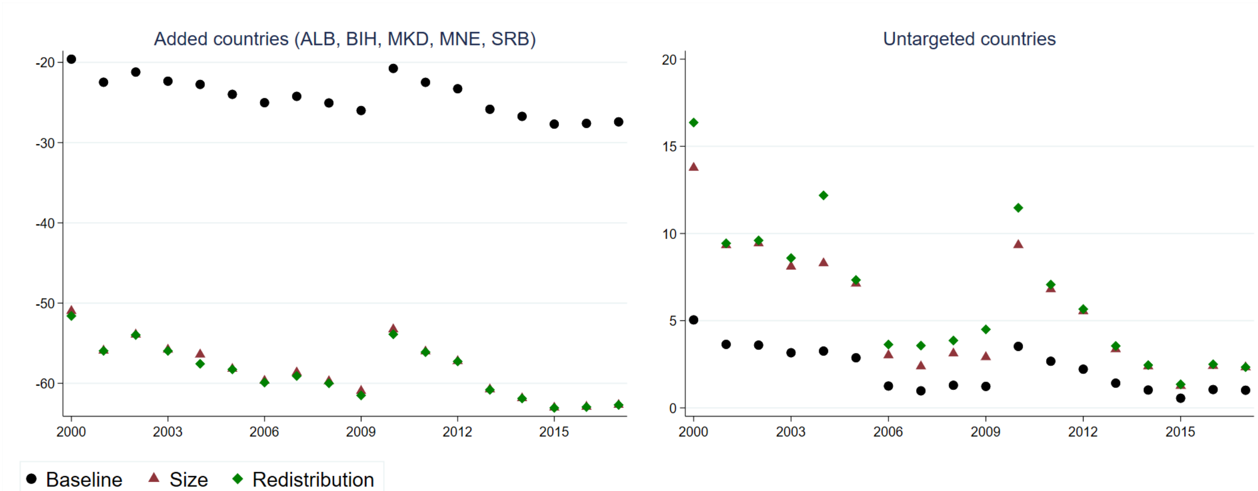
$$\tilde{A}_{i,SWE} = \bar{A}_{i,SWE} \times 0.5 \quad \forall j = \{ALB, BIH, MKD, MNE, SRB\} \tag{39a}$$

$$\tilde{A}_{i,SWE} = \bar{A}_{i,SWE} + \tilde{A}_{i,SWE} \times \hat{\lambda}_{ij} \quad \forall j \neq \{ALB, BIH, MKD, MNE, SRB\}, \tag{39b}$$

where $\hat{\lambda}_{ij}$ represents the share of origin i among the applications of untargeted origin countries to Sweden. Figure E.1 shows that this redistribution barely affects applications from the five listed countries. The minor additional decrease in their applications is entirely due to spillover effects driven by the larger increase in applications from untargeted origins. As highlighted in the right panel of Figure E.1, the additional visas redistributed among untargeted countries strengthens the attractiveness of Sweden. Applications from untargeted countries in Sweden therefore increase relative to the previous scenario (i.e., without the visa redistribution) each year, albeit at varying intensity. By contrast, applications from the safe countries increase more strongly in alternative destinations. The left panel of Figure E.2 illustrates the effect of the additional policy in Finland. Conversely, applications from untargeted origins are further reduced in Finland compared to the previous policy shock (Figure E.2).

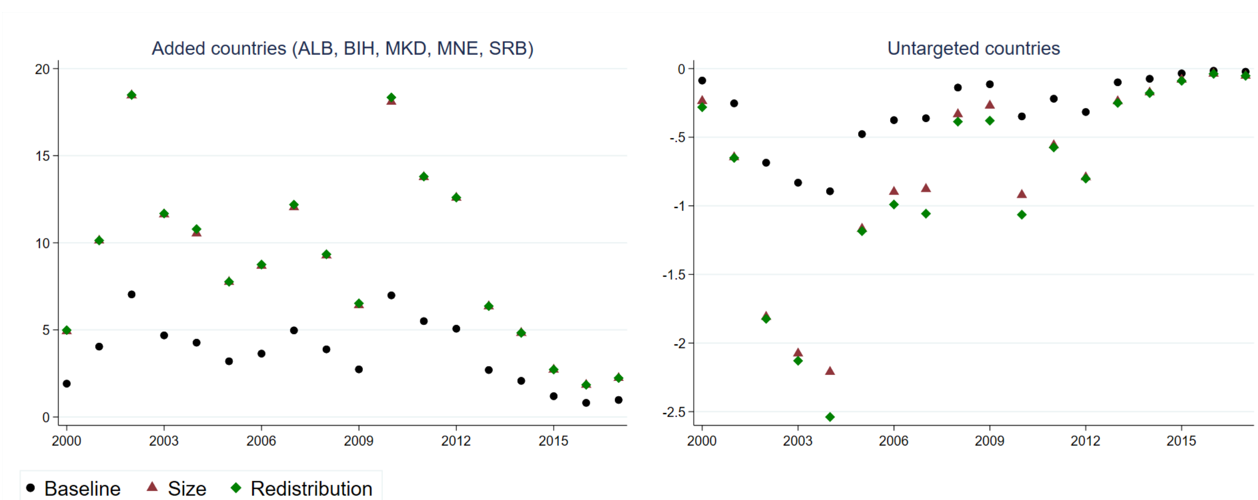
In sum, combining the implementation of a safe country list with a toughening of the access to the refugee status leads to a larger deterrent effect on asylum applications from directly affected countries (the five Balkan origins) which redirect more to alternative destinations. This, in turn, increases the attractiveness of Sweden relative to other destinations for untargeted origin countries.

Figure E.1: Direct and redirection effects observed for Sweden



Note: Figure E.1 shows the impact of adding five Balkan countries to Sweden's list of safe countries on asylum applications in Sweden under three extensions of our model: i) accounting for bilateral acceptance rates, ii) reducing visas for individuals from affected origin countries and iii) redistributing visas across other origin countries. The left panel shows the average change in yearly asylum applications from the affected origins in Sweden (in %). The right panel shows the average change in yearly asylum applications from untargeted origins in Finland from untargeted origins in Sweden (in %).

Figure E.2: Redirection effects in Finland



Note: Figure E.2 shows the impact of adding five Balkan countries to Sweden's list of safe countries on asylum applications in Finland under three extensions of our model: i) accounting for bilateral acceptance rates, ii) reducing visas for individuals from affected origin countries and iii) redistributing visas across other origin countries. The left panel shows the yearly average change in asylum applications from the affected origins in Finland (in %). The right panel shows the average change in yearly asylum applications from untargeted origins in Finland (in %).

F Extension: Endogenous number of asylum applicants

A change in asylum policies in a destination country could affect the number of individuals who decide to leave their origin country in order to seek protection abroad. To account for this additional channel, we extend our baseline model by endogenizing the number of asylum seekers N_i from each origin i (assumed to be exogenous in our benchmark model). Asylum policies can affect the likelihood to emigrate in complex ways and it is empirically challenging to quantify this interaction. In this section, we endogenize the number of emigrants from country i through a simple function which accounts for differences in the weighted average acceptance rates between a counterfactual scenario and the baseline equilibrium. Consequently, the number of individuals from country i applying for asylum depends on the change in conditions at each destination (w_j, a_j) and bilateral migration costs (c_{ij}). Specifically, we define:

$$N_{it}^c = N_{it} \times \left(1 + \alpha \times \frac{W_{it}^c - W_{it}}{W_{it}}\right) \tag{40}$$

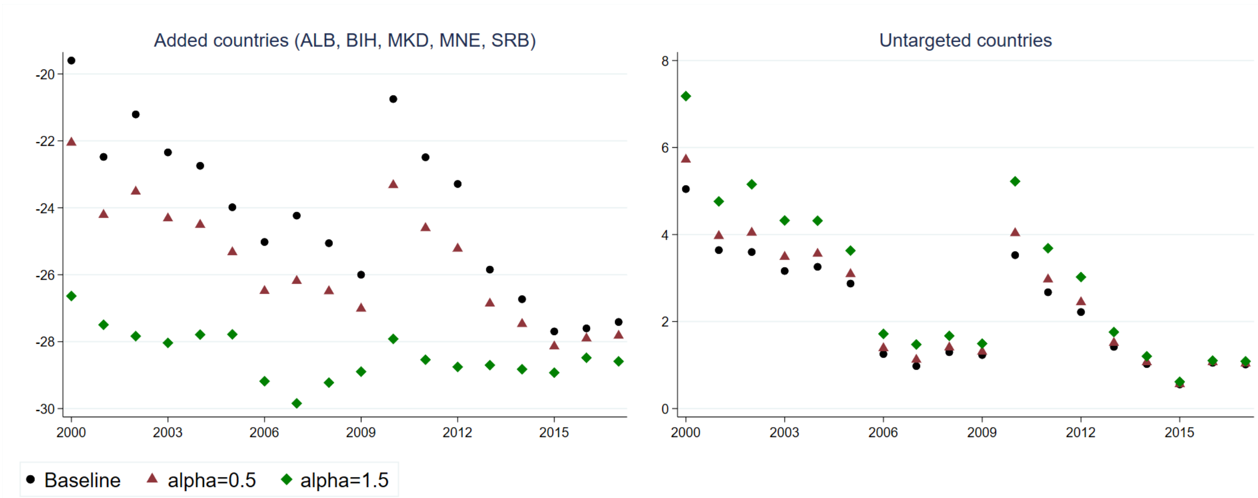
where $\alpha \geq 0$ measures the magnitude of the spillover effect from the change in the weighted acceptance rates on the number of emigrants from origin i. Note that adding country i on a safe country list reduces (*ceteris paribus*) the weighted average acceptance rate (and hence utility) that an individual from that origin can expect (i.e., $W_{it}^c - W_{it} < 0$). This, in turn, reduces the number of emigrants $N_{it}^c < N_{it}$ in equation (40). Through the spillover effects of asylum applications on acceptance rates across all destinations, the number of emigrants is affected across all origins.

We simulate this extension using the scenario from Section 5 in which Sweden adds five Balkan countries to its safe country list and compare it with the baseline case characterized by an exogenous number of asylum seekers (emigrants). In the absence of empirically estimated reference values, we use $\alpha = 0.5$ and $\alpha = 1.5$ to highlight the importance of the magnitude of this additional externality on bilateral asylum applications. Note that $\alpha = 1$ reintroduces the IIA assumption, given that spillover effects on W_i cancel out. The left panel of Figure F.1 confirms that the number of asylum applications from targeted countries in Sweden is reduced compared to the baseline scenario (for which $\alpha = 0$). A higher α thereby mechanically strengthens the spillover effect on outflows from affected origin countries. The lower asylum applications from these countries to Sweden generate a positive externality on applications from other origins, which increase more than in the benchmark simulation.

The safe country list reduces the number of targeted asylum seekers because not migrating becomes a utility maximizing choice for some individuals affected by the policy change. As shown on the left panel of Figure F.2 for the case of Finland, the redirection effects for individuals from the directly targeted countries are mitigated. In particular, when α is high, the number of individuals who decide not to leave the origin country might be so high that asylum applications from the affected origin countries decrease even in non-directly affected destinations (e.g., Finland). This, in turn, can generate spillover effects on untargeted origins, increasing applications in the related corridors compared to the baseline scenario, as highlighted on the right panel of Figure F.2.

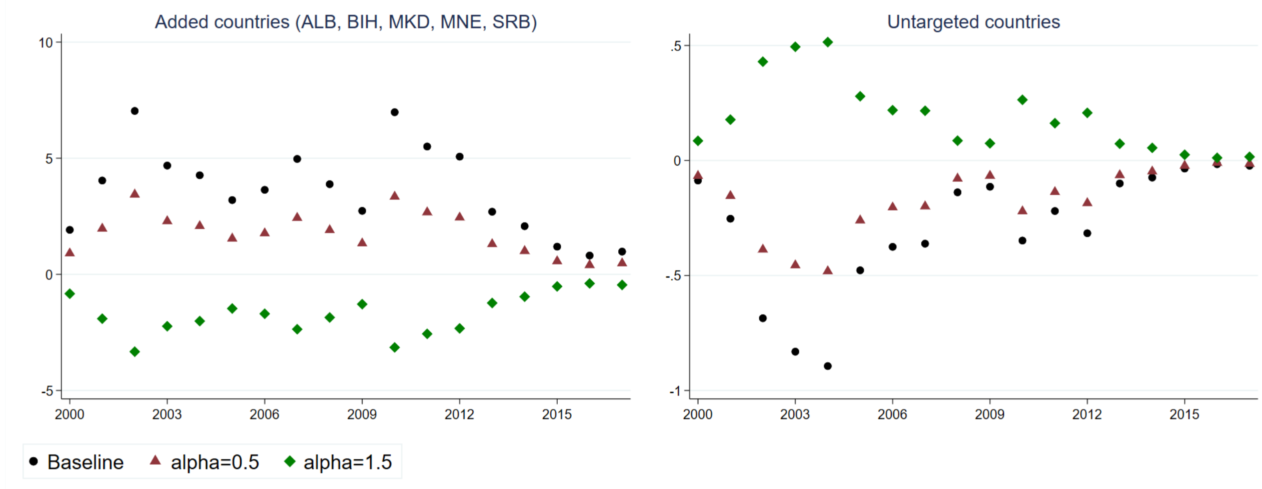
Accounting for spillover effects of the asylum policy reduces the total number of asylum seekers from affected countries between 0 and 5% (left panel of Figure F.3) when $\alpha = 0.5$. With $\alpha = 1.5$, they change between -13.8 and +0.3%, depending on the year (left panel of Figure F.4). The spillover effects triggered by lower asylum applications from Balkan countries materialize through higher outflows from most origins, with effects ranging from -0.1% to +0.7%, depending on the year and the value of α (see the right panel of Figures F.3 and F.4). The decrease in asylum seekers from some untargeted origins might seem counter-intuitive. However, asylum seekers from targeted countries relocate across destinations (including their origin country) thereby influencing the acceptance rate of all destination countries. Higher acceptance rates might attract more asylum seekers from other origins, which then reduce acceptance rates at destination. In case the spillover effects are sufficiently large and occur in an important destination country for a given origin country, the total number of asylum seekers of that indirectly affected country can be lower than in the baseline simulation.

Figure F.1: Direct and redirection effects observed for Sweden



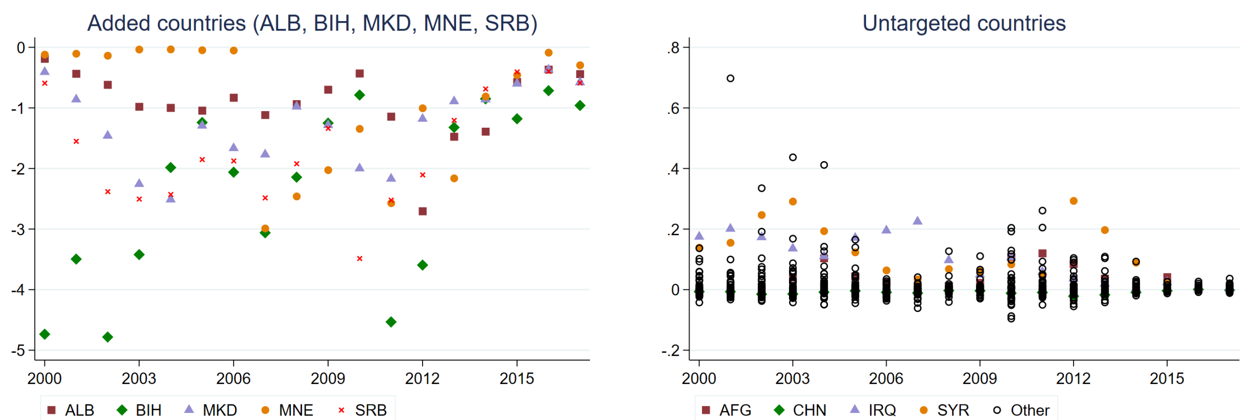
Note: Figure F.1 shows the impact of adding five Balkan countries to Sweden's list of safe countries on asylum applications in Sweden under two alternative calibrations of the model's extension with an endogenous number of total asylum applications. The left panel shows the average change in yearly asylum applications from the five targeted countries in Sweden (in %). The right panel shows the average change in yearly asylum applications from untargeted origins in Sweden (in %).

Figure F.2: Redirection effects in Finland



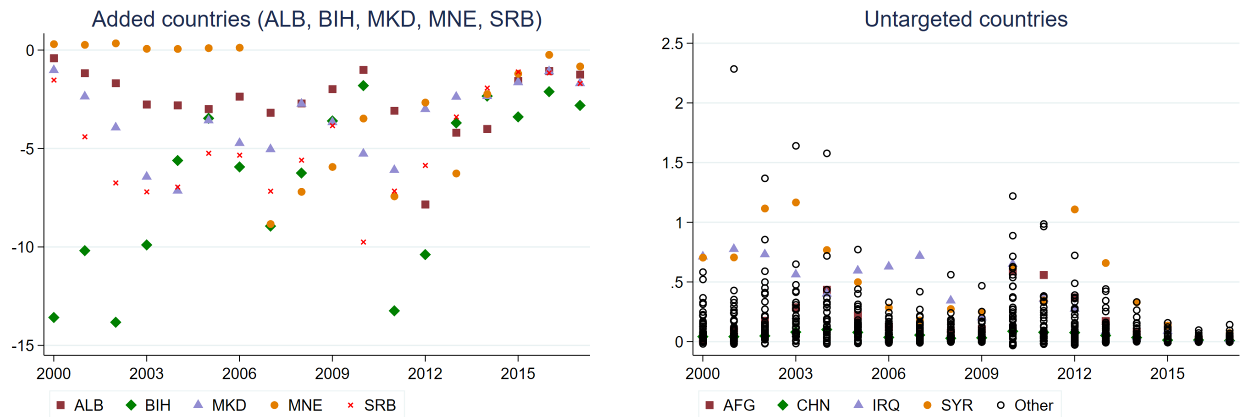
Note: Figure F.2 shows the impact of adding five Balkan countries to Sweden's list of safe countries on asylum applications in Finland under two alternative calibrations of the model's extension with an endogenous number of total asylum applications. The left panel shows the average change in yearly asylum applications from the five targeted countries in Finland (in %). The right panel shows the average change in yearly asylum applications from untargeted origins in Finland (in %).

Figure F.3: Total asylum applicants (with $\alpha = 0.5$)



Note: Figure F.3 shows the impact of adding five Balkan countries to Sweden's list of safe countries on the total number of asylum applications using the model's extension with an endogenous number of total asylum applications ($\alpha = 0.5$). The left panel shows the yearly change in asylum applications from the five targeted countries (in %, in all destination countries). The right panel shows the yearly change in asylum applications from untargeted origins (in %, in all destination countries, for the top 50 origin countries).

Figure F.4: Total asylum applicants (with $\alpha = 1.5$)



Note: Figure F.4 shows the impact of adding five Balkan countries to Sweden's list of safe countries on the total number of asylum applications using the model's extension with an endogenous number of total asylum applications ($\alpha = 1.5$). The left panel shows the yearly change in asylum applications from the five targeted countries (in %, in all destination countries). The right panel shows the yearly change in asylum applications from untargeted origins (in %, in all destination countries, for the top 50 origin countries).