CHAPTER 3

JOURNEYS AND JUNCTIONS: SPILLOVERS FROM MIGRATION AND REFUGEE POLICIES – ONLINE ANNEXES

Online Annexes 3.1–3.5 provide the definitions, data sources, methodology, additional results, and robustness tests to complement the discussion in the main text.

Online Annex 3.1. Definitions and Stylized Facts

This online annex provides the definitions and characteristics of the flows and policies covered in the chapter.[1]

Migration and Refugee Definitions

The chapter focuses on two categories of regular (authorized) cross-border human mobility: migrants and refugees.[2]

Migrant is a broad term, not defined in international law, often reflecting the common understanding of a person who moves away from their usual residence temporarily or permanently, and for a variety of reasons. In the statistical context, the United Nations Department of Economic and Social Affairs (UN DESA) defines international migrants as any person who changes his or her country of usual residence. For the purposes of this chapter, unless otherwise noted, the term migrant is used to refer to international migrants in line with the UN DESA definition and are distinguishable from refugees. As such, migrants are defined as people who choose to move across international borders not because of a direct threat of persecution, serious harm, or death, but exclusively for other reasons. The other reasons may be voluntary and/or economic in nature such as to improve their conditions by pursuing work (sometimes referred to as labor migrants) or education opportunities, or to reunite with family.

Refugees are persons forced to flee their countries of origin and are in need of international protection because of feared persecution, or a serious threat to their life, physical integrity or freedom in their country of origin—for example, due to armed conflict or violence. Being unable or unwilling to return to their country of origin, refugees are afforded protection under international law including the 1951 Refugee Convention and its 1967 Protocol. *Asylum seekers* are persons seeking international protection and is a term used in some countries for a person who is awaiting final determination of their refugee status or a complementary international protection status.[3] Not every asylum seeker is ultimately recognized as a refugee, but every refugee is initially an asylum seeker. Legally, the term refugee does not distinguish between those who have been formally recognized as refugees and those who have not. Therefore, the analysis contained in this chapter groups refugees, asylum

[1] For the purpose of this chapter, definitions related to human mobility were drawn from the terms as described in the UNHCR glossary of terms. For these terms and a broader set of key definitions related to human mobility, please visit www.unhcr.org/glossary..

[2] Irregular migration is not defined in international law, but it broadly covers the movement of persons that takes place outside the laws, regulations, or international agreements governing the entry into or exit from the State of origin, transit or destination. By the very nature of these flows being outside legal channels/pathways, severe data limitations and selection bias preclude the analysis of such flows.

[3] Asylum seeker can also refer to a person who has not yet submitted an application but may intend to do so or may be in need of international protection.

seekers, other people in need of international protection, stateless people, into the same "refugee" category.[4]

It is important to note that while countries manage *migrants* under domestic laws and processes, the protection of refugees and asylum processes fall under both domestic and international law.

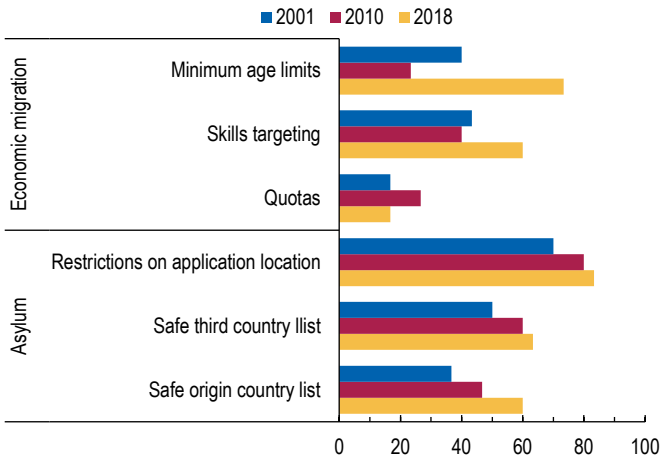
Forced displacement refers to movements of persons who have been forced or obliged to leave their places of habitual residence. The term includes refugees, asylum seekers, and other people in need of international protection as well as internally displaced people who have not crossed an internationally recognized border.

Policy Definitions

Reflecting the complex nature of cross-border human mobility and policy aims, migration and refugee related policies can take various forms. In line with policy measures included in the Immigration Policies in Comparison (IMPIC) dataset, the chapter's analysis focuses on the following main sets of measures.[5]

- *External eligibility and entry regulations*—these include policies to attract skilled workers/meet labor market needs, as well as asylum and refugee status determination procedures.
- *Internal regulations*—these include integration measures determining access to labor markets, public services, and broader economic and social rights.
- *Controls*—including policies focused on enforcement of internal and external regulations, including border management.

Online Annex Figure 3.1.1. Economic Migration and Asylum Requirements, Destination Economies
(Percent of economies with restrictive requirements)



Sources: Immigration Policies in Comparison; and IMF staff calculations.
Note: This figure focuses on specific eligibility requirements applied toward economic migrants and asylum seekers.

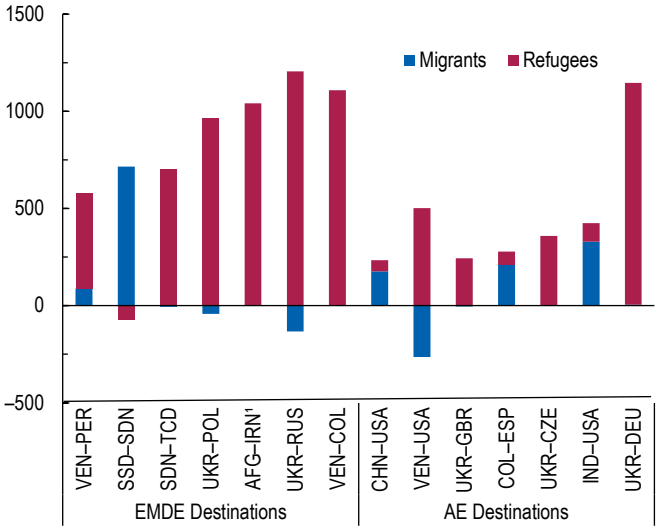
[4] This analytical categorization is closely linked to definitions of cross-border forced displacement.

[5] The IMPIC dataset includes information on the degree of restrictiveness of immigration policies for 33 OECD countries since 1980. For more information, see Helbling, and others (2017).

Migration and Refugee Trends

Figure 3.3 in the chapter showed the categorical composition of human mobility flows—divided between refugees and non-refugees—for the top destination economies. In general, emerging market and developing economies (EMDEs) host a larger share of refugees, who account for over half of total inflows in the average EMDE. Whereas the share of migrant inflows into advanced economies is considerably larger than for EMDEs. Looking at migrant and refugee flows for the largest corridors in the most recent set of data (Between 2015-2020), EMDE-to-EMDE corridors are the largest and are dominated by refugee flows (Online Annex Figure 3.1.1).

Online Annex Figure 3.1.2. Largest Bilateral Net Flows into AE and EMDE Countries, 2020–24
(Thousands)



Sources: United Nations Department of Economic and Social Affairs; United Nations High Commissioner for Refugees; and IMF staff calculations.
Note: Destinations reported using International Organization for Standardization (ISO) country codes. AE = advanced economy; EMDE = emerging market and developing economy.
[1]The figure assumes that the 2020 stock of about two million Afghan migrants in the Islamic Republic of Iran were reclassified as refugees.

Labor Market Outcomes

This online annex provides additional information on the labor market outcomes of migrants and refugees to gauge their integration prospects across destination economies. These integration properties are also used in the calibration of the model simulations, discussed in Section V of the chapter.

Micro datasets are used to examine the integration of low- and high-skilled migrants into the labor force in advanced economies and emerging market economies, by comparing their labor force participation rates and wages relative to natives. Where feasible, labor market outcomes are also broken down by category—migrants and refugees.

The Luxembourg Income Survey (LIS) Database, which compiles and harmonizes household surveys and includes migration modules in some cases, is used to compare labor force participation rates and wage differentials between foreigners and workers (Online Annex Figure 3.1.2, Panels 1-4). The household surveys included are Austria (2021), Belgium (2021), Colombia (2023), Canada (2020), Chile (2017), Denmark (2022), Spain (2022), France (2020), Germany (2020), Italy (2020), Netherlands (2021), Peru (2021), South Africa (2017), Sweden, (2021), United Kingdom (2021), United States (2023), Uruguay (2022). Elsewhere, the Labor Force Statistics for 2021–22 from Turkstat is used for Türkiye, and the ENOE database from INEGI for 2023-24 is used for Mexico. The data showing labor outcomes by category is from Eurostat, covering EU countries in 2021 and 2023; and for non-EU countries, refugee statistics are from UNHCR, covering multiple periods in the late 2010s.

Labor Force Participation

Online Annex Figure 3.1.2, Panel 1 shows the labor force participation rate gaps of foreign workers relative to natives, by skill. Negative values imply that labor force participation rates for foreigners are lower than for natives, which could be associated with labor market integration barriers. In most advanced economies, labor market participation rates are lower for foreigners than for natives, for both low and high-skilled workers. Emerging market and developing economies display some heterogeneity, with higher labor force participation rates among low-skilled foreigners, which could be absorbed quickly into the informal sector.

Online Annex Figure 3.1.2, Panel 3 shows labor force participation outcomes for foreign workers who have arrived within the last year, as "new" migrants and refugees are likely to face more barriers than incumbent foreigners. In advanced economies, labor force participation gaps relative to natives are generally larger for foreigners who have recently arrived. In emerging and developing economies labor force participation gaps are either negligible or slightly positive for the low-skilled.

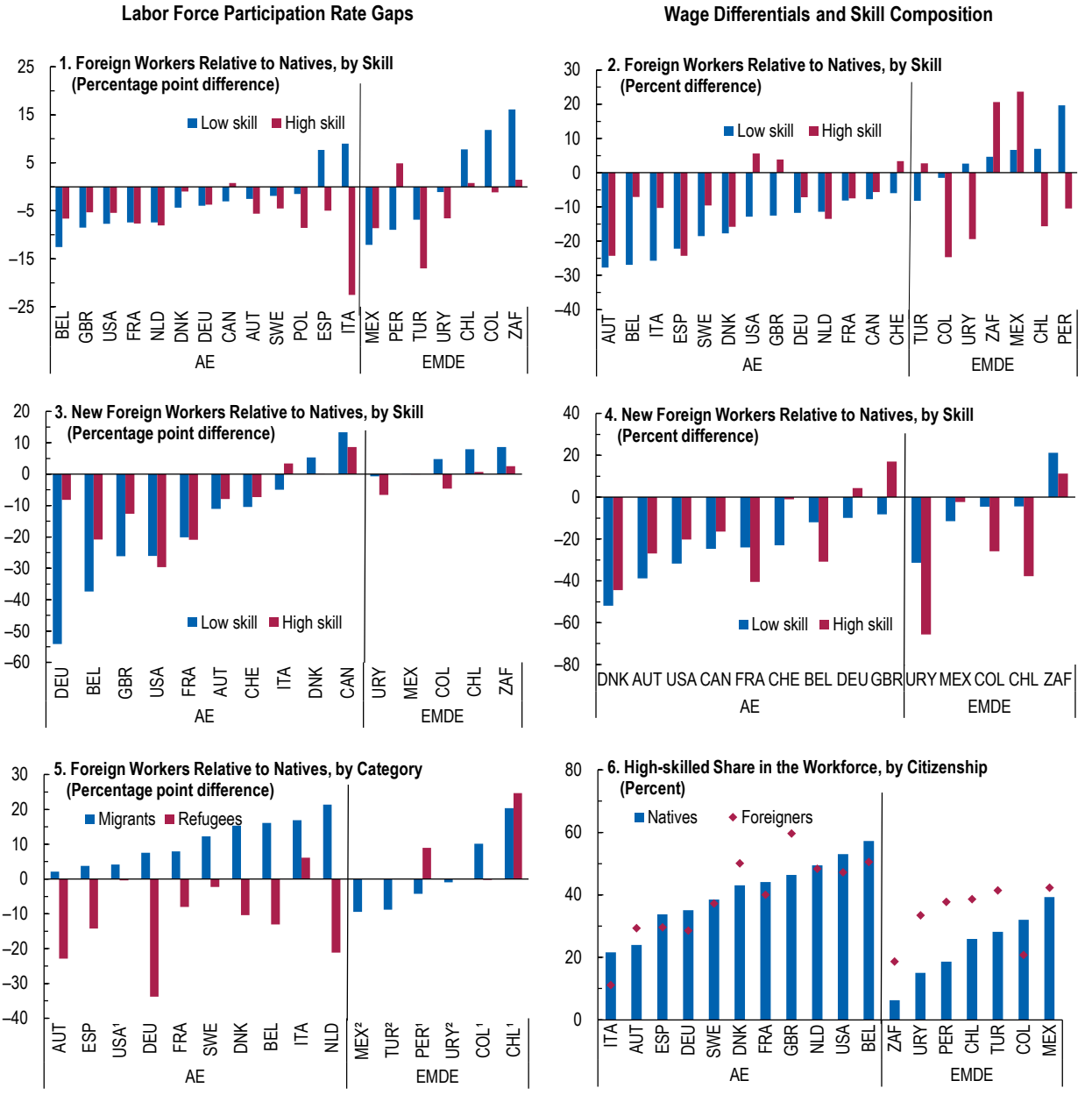
Online Annex Figure 3.1.2, Panel 5 shows labor force participation gaps for refugees and migrants in EU countries. Gaps are negative for refugees and positive for migrants, suggesting important barriers for the former and efficient integration and skills-matching for the latter. By construction, migrants are likely to be efficiently allocated and integrated where they are most needed.

For non-EU countries, labor force participation gaps for refugees are compared to those of the aggregate foreign workforce. The relatively favorable outcomes for low-skilled foreign workers and refugees in EMDEs could be suggestive of some substitutability in informal sectors and in formal sectors employing the less-educated.[6]

[6] This phenomenon has been documented in the case of Venezuelan refugees in Latin America (UNHCR (2024)).

Wage Differentials and Skill Composition

Online Annex Figure 3.1.3. Integration: Labor Market Outcomes of Migrants and Refugees



Sources: Eurostat; Integrated Public Use Microdata Series; Luxembourg Income Study; United Nations High Commissioner for Refugees; National Institute of Statistics and Geography; Turkstat; and IMF staff calculations.
Note: High-skilled individuals are defined as those with college education and above. AE = advanced economy; EMDE = emerging market and developing economy. Data labels in the figure use International Organization for Standardzation (ISO) country codes.
¹Calculations for migrants include all prime age foreign nationals.
²Data for refugees is not available.

The labor income differences between foreign workers and natives for the overall foreigner workforce are shown in Online Annex Figure 3.1.2, Panel 2, and for those who have recently arrived

in Online Annex Figure 3.1.2, Panel 4. Negative wage differentials are common for new and/or low-skilled foreign workers, whereas incumbent high-skilled foreigners earn more than natives in some economies—Mexico, South Africa, and the United Kingdom.

Positive wage differentials for high-skilled foreign workers appear to reflect differences in skills. In the United Kingdom, the share of high-skilled workers among foreigners is higher than for natives, in contrast to most other advanced economies in the sample (Online Annex Figure 3.1.2, Panel 6). This is also the case for emerging and developing economies.

Low-skilled foreign workers in some emerging market and developing economies do experience positive wage differentials relative to natives. This may capture the fact that within the non-college educated group, natives have lower years of education than foreigners. Moreover, for Latin America (IMF, 2022), there is some evidence that the wages of native workers with little education and engaged in informal work may drop slightly with large refugee inflows.[7] In contrast, negative gaps in Türkiye among the lower-skilled capture integration challenges, which are more severe for women—who tend to participate more in unpaid family work— and those who do not speak the language.[8]

Data limitations preclude examining the labor market outcomes of refugees according to their skills profile. Such data is important to gauge the severity of skills mismatches along humanitarian pathways. Data available for the United States from UNHCR indicates that, among refugees, labor force participation for the high-skilled is 20 percentage points higher than for the low-skilled, whereas wage differentials are negligible, with all refugees reporting hourly wage rates very close to the minimum wage.[9]

[7] See Caruso, Gomez, and Mueller (2021); Delgado-Prieto (2021); Peñaloza-Pacheco (2022); Lombardo and Peñaloza-Pacheco (2021); Santamaria (2020); and Bonilla-Mejía and others (2023) for evidence from Colombia; Olivieri and others (2021) for evidence from Ecuador; Morales and Pierola (2020) for evidence from Peru; and Shamsuddin and others (2022) and Zago (2022) for evidence from Brazil.

[8] See Dermici and others (2023).

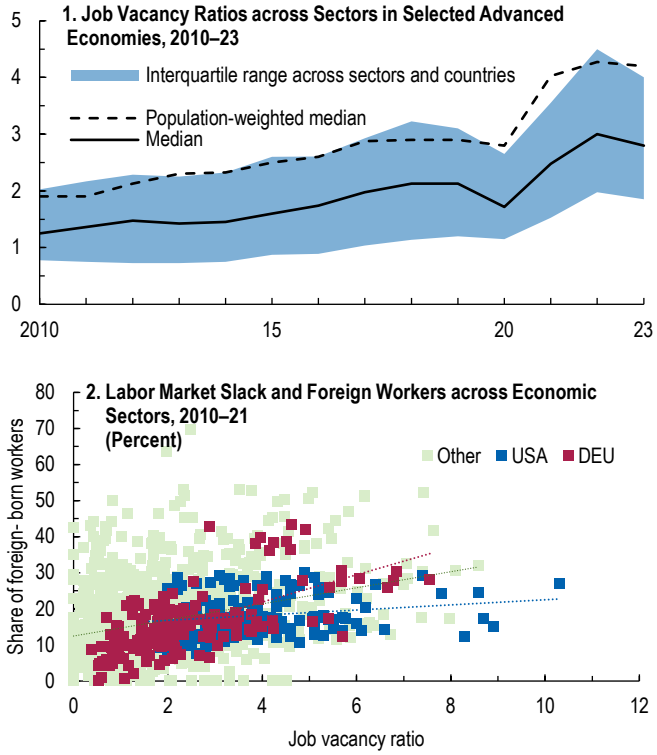
[9] The databases sourced from UNHCR correspond to the 2016, 2019 and 2022 Annual Survey of Refugees (ARS).

Online Annex 3.2. Skills Analysis

This online annex describes the methodology for the analyses of the role migrants play in mitigating labor market imbalances in advanced economies discussed in the chapter. The majority of migration flows into advanced economies are migrants, who are often pulled into these destination economies due to the prospect of better economic opportunities. However, advanced economies also stand to gain from hosting these migrants, as they can alleviate labor market imbalances due to aging and labor shortages, which have implications for fiscal pressures and inflation (Boxes 3.2 and 3.4).

Advanced economies have been experiencing broad-based and sustained labor shortages, as evidenced by the upward trend in the median and interquartile range of job vacancy ratios across countries and sectors (Online Annex Figure 3.2.1, panel 1). These ratios peaked at the onset of the Covid-19 pandemic but have remained elevated.

Online Annex Figure 3.2.1. Job Vacancy Ratios, Labor Market Slack and Foreign Workers, across Economic Sectors
(Percent)



Sources: Eurostat; Haver Analytics; Immigration Policies in Comparison; Luxembourg Income Study; and IMF Staff calculations.
Note: The countries included in the analysis are United States, United Kingdom, Germany, France, Austria, Belgium, Denmark, Italy, Ireland, and Sweden. Economic sectors follow the NACE 2 (or ISIC 4) classification.

With segmented labor markets, worker mobility may be low, and adjustments to shocks can be slow. However, immigrant workers can ease these pressures, as they can flow into sectors suffering shortages and away from declining sectors, given their higher elasticity to changing labor market conditions relative to natives (Borjas 2001). The intuition is that labor mobility costs—which entail leaving their occupation in their country of origin, requalification of skills, and overcoming institutional barriers—are already sunk for migrants but not for natives.[10]

Data indicates that job-vacancy ratios are positively correlated with the share of foreign-born workers across economic sectors over the 2010–21 period in select advanced economies—the European Union, the United Kingdom, and the United States. Yet, differences in the size of the correlation within countries exist (Online Annex Figure 3.2.1, panel 2). This may reflect the fact that

[10] Empirical evidence supporting this hypothesis is avilable for the United States (Borjas, 2001; Cadena and Kovak , 2016; Amior, 2019; Basso and Peri, 2020), Spain (Amuedo-Dorantes and de la Rica, 2010), Norway (Røed and Schøne, 2012), in United Kingdom (Dustmann, Frattini and Preston, 2013), and the Euro Area (Basso, D'Amuri, and Peri 2019).

additional barriers to entry and integration for migrants and refugees (over and above sunk costs of departures) vary across countries impeding their mobility to differing degrees.

The role of migration and refugee policy frameworks in affecting migrants' response to labor market conditions is estimated in the following regression:

$$\Delta ms_{cst} = \beta_0 + \beta_1 ms_{cs(t-1)} + \beta_1 \Delta jvr_{cst} + \beta_2 (\Delta jvr_{cst} \cdot mp_{c(t-1)}) + \beta_3 mp_{c(t-1)} + \mu_t + \gamma_s + \delta_{st} + \epsilon_{cst}.$$

Δms_{cst} is the anualized change in the migrant share in country c, sector s, and time t; Δjvr_{cst} is the annualized change in the job vacancy ratio at the country-sector level, and $mp_{c(t-1)}$ is the (lagged) migration policy indicator at the country level. Lagged values of the migrant share are included to control for serial autocorrelation. In addition, time, sector and sector-time fixed effects are included to account for global trends, time invariant sector-specific characteristics, and sector-specific labor market trends, respectively. The regression does not include country-fixed effects, because the within-country variation of migration policy indicators is very small over the sample period. Errors are clustered at the sector-time level, but the results are robust to clustering at the country-time level.

Online Annex Table 3.2.1.

Dependent Variable: Change in Migrant Employment Share	Labor Migration Policies			
	(1)	(2)	(3)	(4)
Change in JVR	-0.244	6.553**	-0.521	4.028*
	(0.349)	(2.590)	(0.360)	(2.084)
Lagged. Labor-Skills Targeting		6.053***		
		(1.919)		
(Lagged. Labor-Skills Targeting) x (Change in JVR)		-10.84**		
		(4.174)		
Lagged. Labor-Language Skills Requirement			-0.200	
			(1.025)	
(Lagged. Labor-Language Skills Requirement) x (Change in JVR)			4.378**	
			(2.053)	
Lagged. Labor-Equal Work Conditions Natives/Migrants				0.334
				(2.002)
(Lagged. Labor-Equal Work Conditions Natives/Migrants) x (Change in JVR)				-9.831**
				(4.780)
Constant	4.749***	1.780**	4.743***	4.443***
	(0.611)	(0.793)	(0.624)	(0.786)
Number of Observations	1,466	1,466	1,466	1,466
R^2	0.273	0.298	0.276	0.286
Sector-time Fixed Effects	YES	YES	YES	YES
Sector Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Within R^2	0.142	0.172	0.145	0.158

Source: IMF staff calculations.

Note: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

The migrant work share is calculated using Luxembourg Income Survey (LIS) household surveys, and job-vacancy ratios are obtained from the national statistics office for each country. Migration and refugee policy indicators are from IMPIC, whereby higher values entail more restrictive policies. Hence, $\beta_2 < 0$ implies that immigrant mobility is inhibited by tighter migration policies.

While the analysis tested all dimensions of migration and refugee policies, Online Annex Tables 3.2.1–3.2.2 only report statistically significant results. Among labor migration regulations, migrant mobility is found to be supported by frameworks that do not specifically target high-skilled workers and do not impose eligibility conditions on the hours and pay migrants must demand (Online Annex Table 3.2.1). On the other hand, regulations requiring knowledge of the native language support shifts towards a foreign workforce when labor shortages are large: $\beta_2 > 0$ in column (3).

Online Annex Table 3.2.2.

Dependent Variable: Change in Migrant Employment Share	Asylum Policies			
	(5)	(6)	(7)	(8)
Change in JVR	0.00557	0.616	1.053	1.272
	(0.382)	(0.421)	(0.745)	(0.893)
Lagged. Asylum-Free Movement	-0.489			
	(0.962)			
(Lagged. Asylum-Free Movement) x (Change in JVR)	-3.949*			
	(2.020)			
Lagged. Asylum-UNHCR Resettlement		2.551***		
		(0.740)		
(Lagged. Asylum-UNHCR Resettlement) x (Change in JVR)		-2.616*		
		(1.356)		
Lagged. Asylum-Eligibility			6.016***	
			(2.256)	
(Lagged. Asylum-Eligibility) x (Change in JVR)			-7.095*	
			(4.076)	
Lagged. Asylum-Security of Status				1.865*
				(0.945)
(Lagged. Asylum-Security of Status) x (Change in JVR)				-3.735*
				(1.894)
Constant	4.896***	4.376***	3.865***	4.202***
	(0.604)	(0.559)	(0.564)	(0.570)
Number of Observations	1,466	1,466	1,466	1,466
R^2	0.278	0.290	0.286	0.278
Sector-time Fixed Effects	YES	YES	YES	YES
Sector Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Within R^2	0.148	0.162	0.158	0.148

Source: IMF staff calculations.

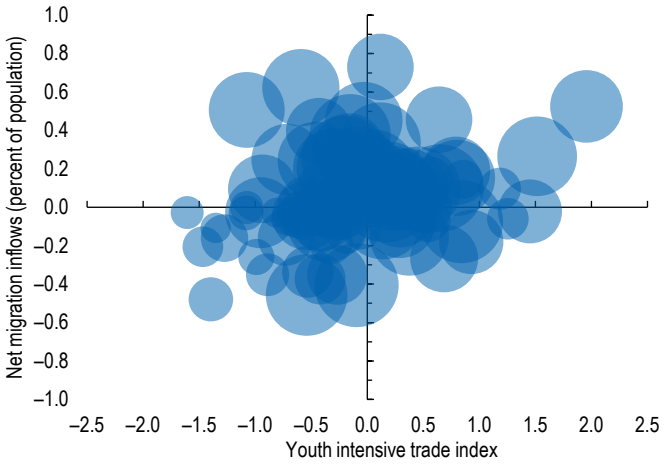
Note: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Some refugee policies also seem to play a role. Policies that explicitly support refugee mobility and integration—according to national law—or through the participation in UNHCR resettlement program are found to enhance foreign workers' ability to move towards sectors experiencing labor shortages (Online Annex Table 3.2.2). Several of these results are robust to jointly including all policy dimensions, as well as an indicator of enforcement of these regulations.

As discussed in Box 3.2, working age migrants can help ease fiscal pressures in aging advanced economies, while also supporting a more efficient allocation of labor. In particular, migrants from a relatively young origin economy facing more scarce opportunities can take-up opportunities in aging economies facing labor shortages in more youth-intensive activities. Online Annex Figure 3.2.3 shows that where demand for youth-intensive skills is higher, net migration flows also tend to be higher. Whether (younger) migrants can move to sectors where their skills are needed most, is influenced by migration policy framework, however (see Box 3.2).

Online Annex Figure 3.2.2. Youth Intensive Trade, Migration, and Aging



Sources: The World Bank, *World Development Indicators*; United Nations, Comtrade; and IMF staff calculations.
Note: The chart presents the correlation between youth-intensive trade and migration inflows. The bubbles represent age dependency ratios.

Following the methodology of Cai and Stoyanov (2016), youth-related skills are matched to the occupational composition of industries. The analysis exploits the industry-level youth-labor intensity. The variation in this intensity across sectors is primarily determined by occupational structure, reflecting varying demands for youth-specific skills and abilities. For this reason, the analysis first identifies skills linked to youth-labor, including physical abilities, communication, memory, and multi-tasking—which include divided attention and speed of closure. These youth-related skills are identified using granular data from O*Net (2023) at the occupation level. In a second step, the study uses principal components to construct an index for each ability group. Finally, to determine the youth intensity of occupations across industries, the analysis combines the derived youth-skills principal components with occupational structure data sourced from the Occupational Employment Statistics. The industry-level intensity in youth-skills allows for a comprehensive assessment of how youth-intensive different industries are, based on their occupational composition and the prevalence of youth-associated skills within those occupations.

To measure youth-intensive trade, the empirical analysis develops an index by combining sector-level indexes with Comtrade data at the HS4 level. The youth-intensive trade is measured as a size-weighted intensity of net exports, reflecting the revealed comparative advantage in youth-intensive sectors. This approach provides a quantitative measure of trade intensity in youth skills, enabling cross-sector and cross-country comparisons.

Online Annex 3.3. Gravity Model of Migration and Refugee Flows

This online annex provides the data, methodology, and robustness checks behind the structural gravity model used in the chapter to estimate the impact on a destination economy of migration and refugee policy changes by other countries.

The methodology and results section covers: i) the mapping of changes in migration and refugee policy indicators for a given destination economy onto effective changes in flows to that economy; and estimates and robustness checks of cross-border spillovers through ii) destination substitution, and iii) categorical substitution.

Data

The gravity model uses bilateral gross migration and refugee flows data from Abel and Cohen (2019), which covers 194 countries at five-year intervals from 1995 to 2020. This dataset is constructed using the UN DESA migration stocks data, supplemented with population birth and death rates to derive consistent estimates of bilateral gross migration flows over time. Robustness checks are conducted using migration stocks and net flows data from the UN DESA; refugee stocks and gross flows data from the UNHCR; and gross migration inflows for select key destinations from OECD.[11]

Migration and refugee policy measures are taken from the Immigration Policies in Comparison (IMPIC) project, which tracks regulations and controls across various migration categories—labor migration, family reunification, asylum/refugees, and migration for other reasons—for 33 OECD countries over the period 1980–2018 (Helbling and others 2017). These include both external (eligibility and entry requirements) and internal (integration) regulations, as well as controls that measure the enforcement of these regulations. The overall IMPIC indicator used is comprised of several sub-indices capturing different aspects of the migration and refugee policy framework.

A measure of *de jure* refugee-specific policies from the Dataset of World Refugee and Asylum Policies (DWRAP) covering 193 countries from 1952 to 2022 is also used. The dataset contains indicators that measures refugees' access to protection, services, livelihoods, movement, and citizenship and participation. Data on GDP, population, imports, free trade agreements and other time-invariant country characteristics come from CEPII.

While IMPIC is a comprehensive policy database with detailed indicators for migrant and refugee policies, the DWRAP has wider country coverage—notably for emerging market and developing economies—, and wider integration policy coverage. The DWARP index is linear and ranges from 0 to 1, with values closer to 1 representing less restrictive policies.[12] The DWRAP indicator also has subcategories, capturing entry barriers and integration policies separately.

[11] Refugee stocks include refugees, asylum seekers, other people in need of international protection, stateless people, and others of concern. The results are robust to the exclusion of the latter two categories.

[12] In contrast, for IMPIC variables higher values indicate stricter polices.

Measuring Effective Changes in Policy Barriers

Where non-linearities in migration and refugee policy indicators exist, it can be difficult to gauge changes in the stringency of policies. This is the case with the some IMPIC indicators including the overall index. Therefore, the magnitude of a tightening shock to this indicator for the average destination economy is determined by estimating the degree to which it deters migrants and refugees from flowing into that economy. Specifically, the correlation between destination-time fixed effects from a simple gravity framework ($\Omega_{d,t}$)—which captures the overall inward resistance to receiving migration and refugee flows in destination economy d—and policy barriers, is estimated as follows:[13]

$$\Omega_{d,t} = \exp\{\beta Policy_{d,t-5} + X_{d,t}\gamma + \delta_t + \gamma_d + \nu_{d,t}\} \qquad [1]$$

where $Policy_{d,t-5}$ is the policy barrier indicator, which is lagged to minimize endogeneity bias. β is the coefficient of interest, and $100 * (\exp(\beta) - 1)$ captures the percent increase (decrease) in bilateral migration flows associated with a one-standard deviation tightening in policy barriers. Equation (1) includes additional fixed effects to control for time trends—such as globalization—and country-specific characteristics. Other controls include initial GDP levels and population.

Online Annex Table 3.3.1 presents the results using the overall IMPIC indicator. A one standard deviation tightening in the IMPIC policy indicator in a destination economy is associated with, on average, a 19 percent decline in bilateral inflows to this economy over 5 years (column 4). Among destinations, the implied change in total inflows represents a 0.44 percent drop in the initial population for the median destination. For labor migration regulations, a one standard deviation tightening in the IMPIC subindex at destination is associated with an 18 percent decline in bilateral inflows within 5 years. For refugee policies—measured with either the IMPIC refugee subindex or the DWARP overall policy indicator— a one standard deviation tightening is associated with a 40 percent decline in bilateral refugee inflows over 5 years.[14]

[13] These destination-time fixed effects are obtained by estimating $Flow_{d,o,t} = \exp\{\mu_{d,t} + \theta_{o,t} + \alpha_{d,o} + \varepsilon_{d,o,t}\}$, and extracting $\Omega_{d,t} = \exp\{\mu_{d,t}\}$.

[14] The results for labor migration and refugee policies, not shown here, are available upon request.

Online Annex Table 3.3.1. Migration Policy and Migration Inflows

	(1)	(2)	(3)	(4)
Standardized Migration Policy (exp β)	0.730**	0.762	0.826*	0.813*
	(0.109)	(0.133)	(0.0896)	(0.102)
Implied Inflows Change (Percent)	-27**	-23.8	-17.4*	-18.7*
	(4.032)	(4.154)	(1.887)	(2.346)
Destination Fixed Effects	NO	YES	YES	YES
Destination-time Controls	NO	NO	YES	YES
Year Fixed Effects	NO	NO	NO	YES
Number of Observations	28,848	28,848	28,337	28,337

Source: IMF staff calculations.

Note: The table reports estimates from regressions where the dependent variable is the destination-year fixed effects from regressing, gross migration flows on a full set of interactive fixed effects, and the regressors include the respective migration policy index (standardized), lagged log GDP and log population. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Methodology and Results

Estimating Cross-border Spillovers through Destination Substitution

To estimate cross-border spillovers from changes in migration and refugee policies, a standard gravity model with a full set of interactive fixed effects (HDFE) is estimated as follows:

$$Flow_{o,d,t} = \beta Z_{o,d,t-1} + \theta X_{o,d,t-1} + \delta_{o,t} + \gamma_{d,t} + \phi_{o,d} + \varepsilon_{o,d,t} \quad [2]$$

where $Flow_{o,d,t}$ is the flow of migrants and refugees between two countries, measured as a share of the population in the origin economy. $X_{o,d,t}$ is a vector of controls, which includes the lagged dependent variable, lagged trade between countries o and d, and a bilateral trade agreement dummy; $\delta_{o,t}, \gamma_{d,t}, \phi_{o,d}$ are origin-time, destination-time, and origin-destination fixed effects. Destination and origin time fixed effects control for factors that affect the multilateral resistance, including migration barriers, as well as other push and pull factors. Dyad fixed effects capture factors pertaining to the bilateral relationship, for example, colonial ties, or a common language or border. Finally, $\varepsilon_{o,d,t}$ is an unobserved component idiosyncratic to the bilateral relationship that varies over time.

$Z_{o,d,t-1}$ is the shift-share ("Bartik") measure capturing a country's exposure to migration and refugee policies elsewhere ($Policy_{j,t-1}$), weighted by the lagged share of migrants moving from country o to other destinations j, $(w_{o,j,t-1})$, further interacted with lagged migration flows from country o to destination d $(Flow_{o,d,t-1})$:

$$Z_{o,d,t-1} = Flow_{o,d,t-1} \times \sum_{j \neq d} Policy_{j,t-1} \times w_{o,j,t-1},$$

By construction, the Bartik, $Z_{o,d,t-1}$, implies that countries with larger pre-established diasporas from country o, are more pre-disposed to receiving deflected flows from that country.

The predicted migration flows from equation (2) are then used to estimate economic spillovers using the local projection method:

$$lnY_{d,t} - lnY_{d,t-5} = \beta \widehat{Flow}_{d,t} + \theta X_{d,t} + \varepsilon_{d,t} \qquad [3]$$

where $Y_{d,t}$ represents GDP in the destination country d; $\widehat{Flow}_{d,t}$ are the predicted gross migration flows from equation (1); $X_{d,t}$ controls for the direct policy barrier, estimated latent factors, and lagged flows. Predicted flows are aggregated at the destination-economy level and normalized by its population size.

Online Annex Table 3.3.2 shows the results from estimating equation (2). A positive coefficient in column (1) implies that a one standard deviation tightening in policy barriers across other destinations, increases migration and refugee inflows by between 7 and 25 percent over a five-year period, depending on the policy dimension, targeted group, or destination economy (column 2). Among policies that affect migrants, external regulations play a greater role than internal regulations in redirecting flows across destinations—a one standard deviation increase in the stringency of migration external regulations across other destinations is associated with a 12 percent increase in migration inflows and output gains. Meanwhile, internal regulations, which cover integration policies, appear to be more prominent for refugee flows—a one standard deviation increase in the stringency of refugee internal regulations across other destinations is associated with an 11 percent increase in refugee inflows after five years.[15]

Online Annex Table 3.3.2. Spillovers From Third-party Policy Tightening

	Migration and Refugee Flows Spillovers		Economic Spillovers
	Coefficient	Predicted Percentage Change	Predicted GDP Impact
	(1)	(2)	(3)
Predicted by Overall Tightening	0.545*	9.21*	1.946*
	(0.237)	(4.005)	(1.080)
By Policy Area			
External Regulation	0.549**	9.40*	2.232**
	(0.224)	(3.835)	(1.100)
Internal Regulation	1.428***	24.7***	2.220**
	(0.367)	(6.348)	(1.084)
Control	0.372**	8.04**	1.932*
	(0.145)	(3.134)	(1.080)
By Targeted Group			
Migrants and Refugees	0.547**	10.18**	2.328**
	(0.21)	(3.908)	(1.088)
Refugees	0.642*	10.38**	1.980*
	(0.378)	(6.112)	(1.071)
By Country Group			
AE	0.540***	9.12***	4.599***
	(0.154)	(2.600)	(1.247)
EMDE	0.388**	6.55**	0.214
	(0.156)	(2.634)	(1.281)

Source: IMF staff calculations.
Note: Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Column (3) contains the predicted output effects from estimating equation (3). The results suggest that increases in inflows induced by tighter policies elsewhere generate output gains of about 2 percent after 5 years.

[15] Estimates broken down by both policy area and targeted group are available upon request.

Results are robust to the use of alternative data sources and estimation methods:

- Online Annex Table 3.3.3., presents results using migration and refugee (combined) stocks and net flows from UN DESA (1990-2020), annual gross migration inflows for OECD destination countries (1998-2021); and annual refugee stocks and gross flows from UNHCR (1990-2021).

Online Annex Table 3.3.3. Robustness across Different Data Sources

	Gross Flows (Baseline)	Stocks (UN)	Net Flows (UN)	Gross Flows (OECD)	Stocks (UNHCR)	Gross Flows (UNHCR)
	5-year	5-year	5-year	Annual	Annual	Annual
Migration Policy in Other Destinations	0.545**	0.640*	0.528*	0.701***	0.369**	0.451***
	(0.237)	(0.333)	(0.305)	(0.141)	(0.180)	(0.0773)
Economic Migrants and Refugees	Both	Both	Both	Both	Refugees Only	Refugees Only
Full Set of Interactive Fixed Effects	YES	YES	YES	YES	YES	YES
Weights in Bartik Measure	Gross Flows	Stocks	Stocks	Gross Flows	Stocks	Gross Flows
Policy Variable in Bartik Measure	Overall IMPIC	Overall IMPIC	Overall IMPIC	Overall IMPIC	Refugee IMPIC	Refugee IMPIC
Number of Observations	175,592	61,428	61,532	112,620	977,485	915,291
R^2	0.873	0.968	0.533	0.884	0.906	0.879

Source: IMF staff estimates.
Note: The table reports estimates from regressions in equation (1), where the dependent variable is either gross flows or stocks of migrants and/or refugees (as a share of initial population in origin country), sourced from data sources as indicated. Baseline regression uses gross migration flows from Abel and Cohen (2019), as discussed in the main chapter. The table also reports the percent increase in migration and/or refugee flows or stocks in response to one-standard-deviation tighter policy in other destination countries, for ease of comparison. Clustered (origin-destination) standard errors in parentheses.
*** *p<0.01,* ** *p<0.05,* * *p<0.1.*

- Online Annex Table 3.3.4., presents results using alternative estimation methods—Poisson Pseudo-Maximum Likelihood (PPML) and correlated common fixed effects (CCFE). The PPML approach is preferable when gross flows are the dependent variable, because it mitigates selection bias due to censored (zero) flows, although large corridors may be given more weight (Orefice 2015). The CCFE framework extends the fixed effects model to account for cross-sectional dependence, by including unobserved common shocks and allowing for heterogeneous responses to those shocks. In this framework, the role of domestic policy barriers alongside policies in other destination economies can be jointly examined (column 3). As expected, tighter domestic policies are associated with lower migration and refugee flows, whereas tighter

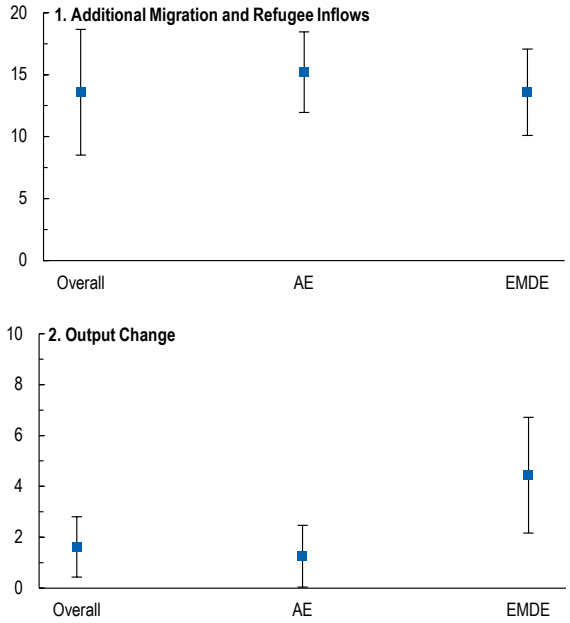
Online Annex Table 3.3.4. Robustness across Different Estimation Methods

	HDFE (Baseline)	PPML	CCFE
Migration Policy in Other Destinations	0.545**	0.665***	0.211***
	(0.237)	(0.201)	(0.0137)
Domestic Migration Policy			-0.156***
			(0.0130)
Number of Observations	175,592	50,587	166,162
(Pseudo) R^2	0.873	0.988	

Source: IMF staff estimates.
Note: PPML regression excludes outliers. Clustered (origin-destination) standard errors in parentheses.
*** *p<0.01,* ** *p<0.05,* * *p<0.1.*

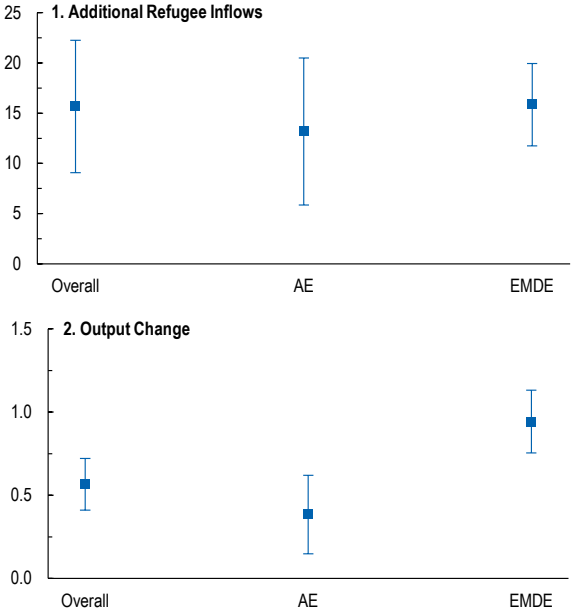
policies elsewhere have the opposite effect.

Online Annex Figure 3.3.1. Destination Substitution of Migrants and Refugees in Response to Stricter Refugee Policies in Other Destinations
(Cumulative percent change after five years)



Sources: Abel and Cohen (2019); Dataset of World Refugee and Asylum Policies; and IMF staff calculations.
Note: The whiskers show 90 percent confidence interval. AE = advanced economy; EMDE = emerging market and developing economy.

Online Annex Figure 3.3.2. Destination Substitution of Refugees in Response to Stricter Refugee Policies in Other Destinations
(Cumulative percent change after five years)



Sources: United Nations High Commissioner for Refugees; Dataset of World Refugee and Asylum Policies;and IMF staff calculations.
Note: The whiskers show 90 percent confidence interval. AE = advanced economy; EMDE = emerging market and developing economy.

Online Annex Figure 3.3.1, panel 1 shows that a one standard deviation policy tightening—a reduction in the DWRAP index of 0.15 across other destinations— is associated with a 14 percent increase in migration and refugee flows over 5 years. These results are broadly similar across country groups. Online Annex Figure 3.3.1, panel 2 shows the economic impacts from additional migration and refugee inflows driven by tighter policies in other destinations. A one standard deviation-increase in redirected migration and refugee flows—or about 0.88 percent of population—is associated with an output increase of 1.62 after 5 years on average, although the estimated impact is larger for emerging market and developing economies.

Since DWRAP captures refugee and asylum policies specifically, Online Annex Figure 3.3.2, panel 1 shows spillover estimates through destination substitution of refugee flows. A one standard deviation tightening in DWRAP by other destinations is linked to increases in refugee inflows of about 15 percent for both advanced and emerging market and developing economies. The associated output impacts are also positive Online Annex Figure 3.3.2, panel 2 with a one standard deviation increase in deflected refugee inflows being followed by output gains of 0.6 percent after five years. Again, these economic gains are higher for emerging market and developing economies.

Results for the different DWRAP subindices are shown in Online Annex Table 3.3.5. Since higher values in the DWARP represent looser policy barriers, the negative coefficients are qualitatively consistent with the estimates based on IMPIC variables. Estimates indicate that stricter integration

policies elsewhere— such as those related to citizenship and participation, and movement of refugees— increase migration and refugee inflows. On the other hand, the evidence for spillovers from changes in legal access is weaker or dominated by spillovers from integration policies (Column 4).

Online Annex Table 3.3.5. Migration Spillovers from Refugee Policies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bartik: Access	0.967***	0.953***	-0.660**	-0.486	0.954***	0.902***	0.491	-0.193
	(0.165)	(0.183)	(0.294)	(0.328)	(0.244)	(0.260)	(0.369)	(0.396)
Bartik: Services	-0.173	-0.101	0.0229	0.177	-0.202	-0.202	-0.212	-0.653*
	(0.123)	(0.129)	(0.208)	(0.218)	(0.137)	(0.252)	(0.208)	(0.379)
Bartik: Livelihoods	0.110	0.167	0.552	0.557	0.537	-0.397	0.135	0.314
	(0.281)	(0.273)	(0.457)	(0.467)	(0.376)	(0.405)	(0.576)	(0.714)
Bartik: Citizenship and Political Rights	-0.608*	-0.572*	-1.535***	-1.358***	-1.038***	-0.0795	-1.144***	-0.536
	(0.313)	(0.311)	(0.416)	(0.427)	(0.357)	(0.303)	(0.375)	(0.455)
Bartik: Movement	-1.240***	-1.217***	-1.061***	-1.028***	-1.155***	-1.037***	-0.717**	-2.140***
	(0.154)	(0.145)	(0.282)	(0.278)	(0.175)	(0.255)	(0.287)	(0.452)
Number of Observations	136,482	136,482	39,631	39,631	28,249	108,233	19,600	20,031
Method	HDFE	HDFE	PPML	PPML	HDFE	PPML	HDFE	PPML
Controls for Direct Policy	NO	YES	NO	YES	YES	YES	YES	YES
Sample	All	All	All	All	AE	AE	EMDE	EMDE

Source: IMF staff calculations.
Notes: Bartik indexes by policy area are based on DWRAP indexes by policy area. Regressions include interactive effects of destination-time, origin-time, and bilateral pair. Controls include two lags of bilateral migration flows, bilateral trade, and bilateral RTAs. When indicated, regressions control for heterogeneous impact of direct policy through lagged migration inflows. Robust standard errors in parentheses. AE = advanced economy, EMDE = emerging market and developing economy.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Estimating Cross-border Spillovers through Categorical Substitution

To assess spillovers through categorical substitution, a dynamic gravity model with a full set of interactive fixed effects is again estimated. The specification below is used to examine changes in *migration* policies in destination economies on *refugee* inflows.

$$Refugees_{o,d,t+h} = \beta_h Policy\ Ex_{o,d,t-1} + \theta X_{o,d,t-1} + \delta_{o,t+h} + \gamma_{d,t+h} + \phi_{o,d} + \varepsilon_{o,d,t+h} \quad [5]$$

The dependent variable $\left(Refugees_{o,d,t+h}\right)$ is the flow of refugees between two countries in $t+h$, measured as a share of the population in the origin economy. Moreover,

$$Policy\ Ex_{o,d,t-1} = Refugee\ Flow_{o,d,t-1} \times Policy_{d,t-1}\ ,$$

which captures the exposure of a specific destination o to changes in destination d's migration policy. The latter depends on initial network effects; that is, destination economies with larger pre-existing refugee inflows tend to be more impacted by their migration policies. The estimation is akin to a diff-in-diff approach, in which the counterfactual is determined by countries of origin with lower initial refugee flows to a specific destination. With this approach, destination-specific time trends linked to confounding factors are controlled for. $X_{o,d,t}$ is a vector of controls, including the lags of the dependent variable and lagged trade between countries o and d; $\delta_{o,t+h}, \gamma_{d,t+h}, \phi_{o,d}$ are origin-time, destination-time, and origin-destination fixed effects.

Predicted refugee flows from equation (5) are then used to estimate the output spillover effects in destination economies, using the local projection method:

$$\frac{lnY_{d,t+h} - lnY_{d,t-1}}{h} = \gamma_h \widehat{CFlow}_{d,t+h} + \theta_h X_{d,t+h} + \varepsilon_{d,t+h}, \qquad [6]$$

where $Y_{d,t+h}$ represents GDP in the destination country d after h years; $\widehat{CFlow}_{d,t+h}$ are the predicted cumulative gross refugee flows predicted from equation (5), measured as percent of the initial population in the destination ; $X_{d,t}$ controls for the indirect policy barriers, estimated latent factors, lagged flows, and lagged GDP.

The results in Online Annex Table [3.3.6] show that tighter migration policies increase refugee flows after 5 years. The associated output effects are positive in the short-to-medium term, due to integration frictions. All else equal, output gains appear wane over-time, potentially reflecting the transitory nature of some refugee movements. The results are qualitatively robust to using the PPML estimation approach.

Online Annex Table 3.3.6. Categorical Substitution

	(1)	(2)	(3)	(4)	(5)
Policy and Refugee Flows					
Method: HDFE					
Policy Exposure	1.304***	1.096***	0.745***	0.301**	0.411***
	(0.110)	(0.0874)	(0.0836)	(0.134)	(0.117)
Number of Observations	64,747	58,628	53,325	48,620	44,268
Method: PPML					
Policy Exposure	0.0216	0.362	0.553**	1.034***	2.595***
	(0.296)	(0.267)	(0.253)	(0.221)	(0.613)
Number of Observations	59,102	53,710	48,914	44,809	40,873
Years Ahead	1	2	3	4	5
Annualized Output Effects					
Standardized Policy-driven Refugee Flows	0.254***	0.195***	0.162***	0.118***	0.0623***
	(0.0597)	(0.0355)	(0.0260)	(0.0207)	(0.0179)
Number of Observations	3,346	2,513	2,341	2,200	2,074
Years Ahead	1	2	3	4	5

Source: IMF staff calculations.
Note: Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Online Annex 3.4. Structural Model of Migration and Inflation

This online annex provides details on the modeling used for the analysis in Box 4 on Immigration and Inflation.

Overview of the Model Structure

A New Keynesian model with capital accumulation and population growth extends the framework developed by Cheremukhin and others (2024) to quantify the effects of migration surges of the magnitude observed in the US after the COVID-19 pandemic.

In the baseline setup, the model has two types of agents. In line with the two-agent New Keynesian (TANK) literature, a share of the population is modeled as hand-to-mouth consumers and relatively low skilled, while the remainder of the population is modeled as relatively high-skilled savers who are relatively more complementary to capital than the low-skilled labor. The model is used to estimate the impact of immigration on inflation and wages, among other variables, across a set of six countries, and in the context of two scenarios. The first scenario focuses on a large influx of low-skilled workers. The second scenario focuses on a large influx of high-skilled workers.

The baseline calibration for the US follows the values proposed in Cheremukhin and others (2024). In addition, the model is calibrated to Australia, Canada, Germany, Mexico and South Africa by adjusting the wage skill premium, the capital income share, the steady state hours worked per person, the saver population share, the steady state inflation rate, and the steady state population growth rate. Online Annex Table 3.4.1 lists the ranges of these variables across countries, as well as their sources. Findings indicate that country characteristics do not alter results in either a qualitatively or quantitatively meaningful way (Figures 3.4.1 and 3.4.2).

Online Annex Table 3.4.1.

Parameter	Range	Source
Wage skill premium	0.4 - 1.2	LIS
Capital income share	0.47 - 0.72	National income statistics
Steady state hours worked per person (per year)	1340 - 2226	OECD (2022)
Steady state inflation rate (in percent)	2.0 - 4.5	National central banks
Steady state population growth rate (in percent)	0.2 - 13.0	UN (2015 - 2020)

Investment Dynamics and Capital-Skill Complementarity

In comparison to country-specific characteristics, simulation results are more sensitive to assumptions regarding investment dynamics and the complementarity between skills and capital. In the baseline specification, investment adjustment costs slow the response of the capital stock to changes in the labor force. This is especially true in the case of a large influx of high-skilled workers (with large complementarity with capital) where the incentive to invest in capital cannot be instantaneously implemented. The lag in capital adjustment creates a wedge between aggregate supply and demand, driving the inflationary response (Figure 3.4.1). While an influx of high-skilled workers initially depresses high-skilled wages, wage rates revert as the capital stock adjusts, thereby increasing the marginal product of high-skilled labor (Figure 3.4.2). In a counterfactual exercise where the capital stock is completely fixed, high-skilled wages do not recover as the marginal product of high-skilled labor remains muted.

Online Annex 3.5. Structural Model of Trade and Migration

This online annex provides details on the modeling framework reported in section V of the main chapter. The model is used to illustrate two types of policy experiments, calibrated to different historical episodes. The first experiment focuses on the targeted unilateral tightening of policies related to economic migrants, which highlights the role of all spillover channels— categorical, destination and origin substitution, and origin suppression—and their impact on natives and migrants within and across countries, and the associated output effects. In the second experiment, the role of international coordination is explored, underscoring whether and how regional efforts can yield better economic outcomes.

Some model parameters are common across the two experiments and are taken from the economic literature (Online Annex Table 3.5.1). However, there are also differences between the two policy experiments, as each uses data for a different region, and model parameters are calibrated to match observed trade and migration flows (Online Annex Table 3.5.2).

Online Annex Table 3.5.1.

Parameter	Value	Source
Elasticity of substitution between low- and high-skilled workers	4	Caliendo and others (2021)
Trade cost elasticity	4.5	Caliendo and others (2021)
Five-year discount factor	0.86	Caliendo and others (2021), adjusted for 5-year periods.
Migration cost elasticities (across all pathways and destinations)	1.7	Caliendo and others (2021), adjusted for 5-year periods.
Agglomeration elasticity governing changes in TFP relative to population size	0.2	Caliendo and others (2021)
Depreciation rate of capital (percent, annualized)	0.05	Caliendo and others (2021)

Online Annex Table 3.5.2. Data Sources

Variable	Data sources
Gross migration and refugee flows	*United Nations Global Migration Database* contains bilateral migration and refugee *stocks* for 238 countries and territories at 5-year windows for the period between 1990 to 2020. *Abel and Cohen (2019),* provide of gross migration *flows*, including outward, return, and transit flows. Estimates are available for 200 countries, at 5-year windows over 1990–2020.
Trade flows and total spending	*Eora Global Supply Chain Database* is a multi-region input-output matrix, covering 190 countries. Total expenditures and trade, including intermediate and final demand goods, are used in the calibration.
Labor income shares, capital returns, depreciation rate	*Penn World Table* 10.01
Characteristics of immigrants (foreign-born individuals) and natives in destination economies	The calibration requires data on skill premia, the labor income shares of foreign born individuals and natives, the skill composition of the stock of foreign born individuals and those arriving within the last five years, the nationality and labor force participation rates of all working-age foreigners and those arriving within the last five years. Recent household surveys containing information about migrants are used to compute these statistics, using the *Luxembourg Income Survey* (LIS) Database, which compiles and harmonizes household surveys to conduct cross-country comparisons, and selected other national data sources. Skill premia calculations are complemented with estimates from *Barro and Lee Educational Attainment* dataset (2021 update).
Migrants and refugees' integration	Labor force participation gaps and wage premia relative to natives, for both migrants and refugees are based on Brell and others (2020). Additional calculations for countries rely on *UNHCR* datasets and reports.
Naturalization rates	National immigration and statistics offices including *Eurostat and USCIS*. The probability of naturalization is calculated as the ratio of approved naturalization applications to total migrants, by category (economic migrant or refugee).

Overview of the Model Structure

The multi-country dynamic general equilibrium model used in the chapter extends the framework developed by Caliendo and others (2021, 2023) to quantify the effects of increases in trade and migration barriers. The model is saturated with exogenous migration and trade cost parameters which enable it to match observed gross trade and migration flows between economies (the latter also by type of individual, e.g., nationality and skill). As such, it captures in a reduced from way the importance of size, distance, common language, or colonial links (i.e., "gravitational forces") in determining the cross-border movements of both goods and labor between pairs of economies.[16] Trade costs comprise tariff and non-tariff barriers, with the latter modeled as iceberg costs. Similarly, migration barriers include policy and non-policy components.

The framework features forward-looking households—natives and migrants—who make decisions about consumption, and whether or not to relocate to a different country, conditional on the economic conditions and the policy stance observed across all economies. These households have different skills and nationalities and can choose between two alternative legal pathways for entry into another country: they can either relocate as a migrant or a refugee. These pathways differ in the speed of integration and potential skills mismatch in local labor markets. As observed in the data, refugees have lower labor force participation rates than migrants, and skill mismatches are more severe for high-skilled refugees (see Online Annex 3.1.).

Moreover, households of all nationalities and skills in a country are subject to idiosyncratic shocks that determine their decision to move.

- To model *integration opportunities* for migrants in a particular country, they are subject to a "naturalization shock", giving them citizenship and unrestricted access to the local labor market—such that their value function becomes that of a native. If naturalization does not occur, the migrant faces the choice to remain in their current location in the same category (economic migrant or refugee) or to return to their country of origin.
- To model *barriers to integration* for households that choose to relocate, the model allows for high-skilled migrants to be mismatched on arrival in the new destination economy. In this case, migrant households arriving in that period earn the same as the local low-skilled natives and the incumbent migrants. However, each period, there is a positive probability that mismatched households can transition back to high-skilled work. It is important to note that the probabilities of being mismatched on arrival and transitioning back to high-skilled work will depend on both the country and migration pathway. In other words, refugees will see higher mismatches and lower likelihood of transition to a high-skill job.

Production in this model takes as input both unskilled and skilled labor and capital structures. Each country also has a stock of immobile capital owners ("rentiers") who consume local goods and invest domestically to build capital structures, which they rent to local firms. Rentiers choose

[16] The role of relative income per capita in determining migration patterns in the model is captured in a more robust way than other gravitational forces because agents are assumed to migrate to maximize consumption, so a change in income in one destination attracts more migrants there.

investment in each period to maximize their present discounted value of consumption. In the long term, rentiers can change the capital stock though investment.

Economic outcomes over the short term are governed by two opposing forces: *agglomeration* and *congestion*. Agglomeration is a positive externality whereby a larger population increases total factor productivity and is meant to capture, in a reduced form way, both knowledge spillovers and increased entrepreneurship and innovation. Congestion captures the fact that capital takes time to build—and is effectively fixed in the short term. Therefore, an increase in the supply of labor can strain the use of capital structures, impacting prices and the returns to production factors in real terms. The net effect of both forces is that economies which experience an increase in labor supply initially see an increase in output alongside a decline in output per capita, as agglomeration is not strong enough to offset congestion initially. Over time, however, countries can take advantage of increases in the labor supply if they are able to build more capital structures, leading to higher output per capita in the long term due to higher agglomeration effects.

But there are also differences between the two policy experiments, as each simulation focuses on a different region, and model parameters must be calibrated the match observed trade and migration flows. The data sources used to calibrate the models is described below.

Targeted Unilateral Restrictions

For this policy experiment, the model is calibrated on historical episodes for three individual and three groups of economies—(i) large advanced destination economies; (ii) a set of origin economies for which humanitarian flows represents the bulk of outflows; (iii) a set of economies bordering the origin economies, and (iv) the rest of the world.

In this exercise, it is assumed that an advanced economy tightens labor migration policies targeting new and incumbent migrants from the origin economies, while keeping constant other policies and fundamentals. Raising barriers reduces economic migration flows by 20 percent relative to the baseline, for both high and low skill workers. Such tightening is equivalent to an increase of 0.3 standard deviations of the IMPIC labor migration regulations index (Table 3.6.3).[17]

[17] The Immigration Policies in Comparison (IMPIC) project provides a set of indices to measure immigration policies in the majority of OECD countries since 1980. The table illustrates that both the gravity global model and the calibrated model predict that an increase in IMPIC labor migration regulations is associated with a 70 percent decline in migration flows. Hence, the simulated 20 percent decline in economic migration would require introducing a barrier that is 0.3 standard deviations of the IMPIC labor migration regulations.

Online Annex Table 3.5.3. Tightening of Immigration Policies Equivalent to a 20 Percent Decrease in Economic Migration

	From Regressions		*From Model*		
	Inflows/pop (Percent)	Predicted Inflows per IMPIC std dev. (Thousands)	Predicted Inflows by Model (Thousands)	***Ratio Model to Gravity***	***Interpretation***
Z Pol*	-0.3	-6.5	-7.2	1.1	Tightening Required *(in Standard Deviations)*
From Bartik					
Impact Third-country **	0.1	0.3	0.2	1.1	Ratio of Migration Spillovers
		0.2			
Impact on Third-country GDP *(pp population share shock)*			0.1		
GDP Impact *(per pp population-share shock; percent)*	2.0		1.2	0.6	Ratio of Economic Spillovers

** This is new coming from ppml model using average of labor migration policies.*

*** Bartik estimates assume all other destinations tighten. The counterfactual in the structural model assumes unilateral tightening, where only Europe tightens migration policy, which is comparable to a 1.1 standard deviation increase in the IMPIC index.*

The within-country effects of this policy are assessed through aggregate real income effects, which capture comprehensive economic consequences of policy changes using income-weighted compensating variation. Individuals' compensating variation determines the amount of additional income (or cost) an individual would require to maintain their utility level prior to the policy change, expressed as a percentage of their initial income. By weighting these individual welfare effects based on each individual's share of total income in their respective country of residence, this measure can be understood as the compensation a country needs from the policy.

The assumed involuntary labor force participation rates and transition probabilities used in this version of the model rely on the stylized facts described in Online Annex 3.1.

International Cooperation

International cooperation is analyzed by considering counterfactual policies during two historical episodes of large forced displacement one of which is presented in the main text.

Given the focus on outcomes under international cooperation and the fact that a backward-looking analysis of historical episodes imposes stricter data requirements, the framework is simplified by assuming skill homogeneity and a single pathway as in the baseline Caliendo and others (2021) model. The capital stock in each location remains endogenous and responds to changes in the domestic real return on capital, accumulating through profit-maximizing consumption-savings decisions taken by domestic capital owners, as in Caliendo and others (2023).

Countries are aggregated into regions for model simulations with results presented in the chapter aggregating bordering and nearby emerging market and developing economies.

The baseline simulation uses data on both flows and economic outcomes from the start of the historical episodes through 2020 followed by a simulation until the model reaches steady state, under the assumption of constant fundamentals, as discussed in Caliendo and others (2021).

Counterfactuals consider the impacts at various horizons of alternate paths for migration and refugee policy barriers between the start of the episode and 2025. Three scenarios are considered for each episode, documented in Table 3.5.4. Whenever a country/region tightens policy, it is targeted at immigration from the relevant origin country. In all scenarios, countries/regions other than the Rest-of-World region which are not explicitly noted as tightening are assumed to accommodate more migrants and refugees such that total net emigration from the relevant origin country equal to that of the baseline between the start of the episode and 2025.

Online Annex Table 3.5.4. Shocks to migration policy

Scenario	Shocks
Large, non-bordering, advanced destination economy tightens	Large, advanced destiination economy tightens migration policy to reduce net inflows from the origin from 2010 through 2025 by 25 percent relative to baseline.
Bordering, emerging and developing destination economies tightens	Bordering, emerging and developing destination economies tighten policies to reduce net inflows from the origin from 2010 through 2025 by 25 percent relative to baseline.
Multilateral cooperation	Large, advanced destination economy tightens migration policy to reduce net inflows from the origin between 2010 through 2025 by 12.5 percent relative to baseline. Bordering emerging and developing destination economies tighten migration policy to reduce net inflows from the origin from 2010 through 2025 by 12.5 percent relative to baseline.

Additional details related to historical episode 1

Due to data limitations, the capital stock in each location is assumed to be at its steady state value during the 2000–20 period. This is achieved by setting the real return on capital to be equal to the value which keeps capital constant given capitalist's optimal investment condition, their discount factor, and the depreciation rate of capital.[18] The latter is computed from the Penn World Table as the mean depreciation rate for countries/regions during the sample period of 2000–20, and is equal to 0.045 in annualized terms.

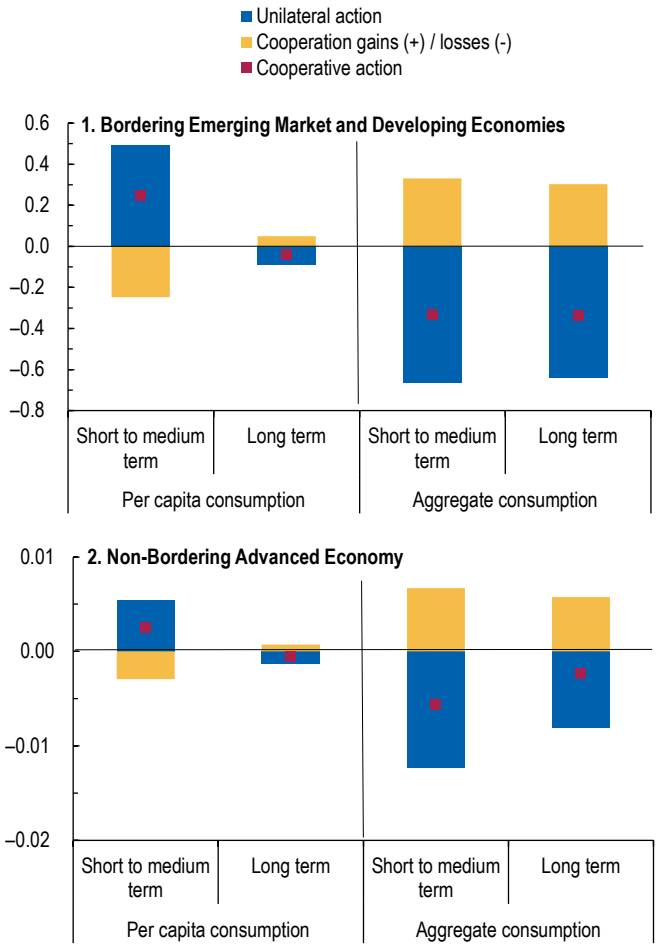
[18] The results are robust to instead inferring the rate of return of capital from data on investment and the model's optimal investment equation.

Historical episode 2

The real return on capital in each location are taken from the Penn World Table as the internal rate of return. The depreciation rate is taken from the Penn World Table and is equal to 0.04 in annualized terms.

Results are broadly similar to those reported in the main text analysis of the first forced displacement historical episode. The first two scenarios of unilateral tightening see a reduction in congestion in the short-to-medium term in the tightening country/region, boosting per capita consumption relative to the baseline (Figure 3.6.1). In the long term, as the capital stock adjusts to lower labor supply, per capita consumption declines, due to smaller agglomeration effects lowering total factor productivity. Aggregate consumption declines in the short-to-medium term, as the increase in per capita consumption is more than offset by the decline in the labor force. Lower investment amplifies the negative short-to-medium term impact on aggregate consumption, but this is offset by the unwinding of migration and refugee policies back to the baseline after 2025.

Online Annex Figure 3.5.1. Benefits of Regional Cooperation by Destination
(Change relative to baseline, percent)



Sources: Abel and Cohen (2019); Caliendo and others (2021); Eora Global Supply Chain Database; Penn World Table; United Nations, Global Migration Database; and IMF staff calculations.
Note: "Short to medium term" refers to results for 2025 while "Long term" refers to results in 2075.

The third scenario of international cooperation sees both sets of destinations accommodating more migrants and refugees than when undertaking unilateral actions. Relative to unilateral actions, both destinations experience more congestion in the short-to-medium term and stronger agglomeration effects in the long term (Figure 3.6.1, red squares). Aggregate consumption also declines by less over time due to the smaller decline in the labor force in both sets of destinations. As in the main text analysis, destination economies in this case can coordinate to choose policies which produce higher long-term benefits.

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