



GS4S Working paper series (D7.3)
Working paper no. 1

Skills-oriented migration in the Western Balkans:

Linking workers' migration aspirations to skill shortages in destination and origin countries

This working paper is part of the Horizon Europe project GS4S - Global Strategy for Skills, Migration and Development (gs4s.eu).

Project deliverable: D7.3 in T3.3

Authors: Pascal Beckers, Mahdi Ghodsi, Ksenija Ivanović, Sandra Leitner, Friedrich Poeschel, Alireza Sabouniha

Reviewers: Colleen Boland, Michael Landesmann, Jessica Hagen-Zanker

Language editor: Marcus O. Turner

Suggested citation (APA): Beckers, P., Ghodsi, M., Ivanović, K., Leitner, S., Poeschel, F., & Sabouniha, A. (2024). Skills-oriented migration in the Western Balkans: Linking workers' migration aspirations to skill shortages in destination and origin countries. *Global Strategy for Skills, Migration and Development (GS4S)*. <https://doi.org/10.5281/zenodo.14163620>



Skills-oriented migration in the Western Balkans: Linking workers' migration aspirations to skill shortages in destination and origin countries

Pascal Beckers*, Mahdi Ghodsi**, Ksenija Ivanović*, Sandra Leitner**, Friedrich Poeschel***, Alireza Sabouniha**

Abstract:

This paper examines the impact of labour shortages on migration aspirations and destination preferences among individuals from Albania, Bosnia and Herzegovina, and Serbia. Using a two-stage Heckman selection model, we analyse data from the OeNB Euro Survey and the World Bank's STEP Measurement Program. The results indicate that labour shortages significantly influence migration decisions: individuals are more likely to aspire to migrate if there is a shortage of workers in their occupation in the aspired destination countries, while shortages in their home country reduce migration aspirations. These findings suggest that both origin and destination countries should consider labour market conditions when formulating migration policies. For destination countries, highlighting demand for specific skills can attract needed workers, while Western Balkan countries should address the education-labour market mismatch to mitigate local shortages. Policy co-ordination between regions is crucial to manage migration flows and address skill gaps without exacerbating local shortages.

Keywords: migration drivers, migration aspirations/desires, destination decision, choice model

JEL Code: F22, O15

Acknowledgement: This paper is part of the Horizon Europe project GS4S - Global Strategy for Skills, Migration and Development (gs4s.eu). The broad line of inquiry in this paper had initially been suggested by Isilda Mara. The funding from the European Union is gratefully acknowledged. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union, Horizon Europe or the Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

* Radboud University, Institute for Management Research, Department of Geography, Planning and Environment, Heyendaalseweg 141, 6525 AJ Nijmegen, The Netherlands, www.ru.nl/en/imr. Emails: pascal.beckers@ru.nl, ksenija.ivanovic@ru.nl

** The Vienna Institute for International Economic Studies - wiiw, Rahlgasse 3, A-1060 Vienna, Austria, www.wiiw.ac.at. Emails: ghodsi@wiiw.ac.at, sandra.leitner@wiiw.ac.at, sabouniha@wiiw.ac.at

*** The European University Institute. Migration Policy Centre, Robert Schuman Centre for Advanced Studies, European University Institute. Via delle Fontanelle 19, 50014 Fiesole, Italy: friedrich.poeschel@eui.eu.





Contents

1.	Introduction.....	3
2.	Literature review.....	5
2.1.	Factors affecting migration decisions.....	6
2.1.1.	Macro-level determinants.....	6
2.1.2.	Meso-level determinants.....	7
2.1.3.	Micro-level determinants.....	8
2.2.	Migration decisions in the Western Balkans.....	9
3.	Data sources, labour shortage indicators and methodology.....	11
3.1.	Data sources and labour shortage indicators.....	11
3.1.1.	OeNB Euro Survey.....	12
3.1.2.	World Bank STEP Skills Measurement Program: labour shortage in the Western Balkan countries.....	13
3.1.3.	Labour shortage in EU destination countries.....	14
3.2.	Methodology.....	15
3.2.1.	First stage: probit model.....	15
3.2.2.	Intermediary stage: exclusion restriction and Inverse Mills Ratio.....	16
3.2.3.	Second stage: conditional logit model (McFadden's Choice Model).....	17
4.	Descriptive statistics.....	20
5.	Estimation results.....	21
5.1.	First stage: aspiration to migrate.....	21
5.2.	Second stage: destination choice.....	23
6.	Summary and concluding remarks.....	29
	References.....	30
	Appendix.....	36





1. Introduction

Shortages of qualified staff in certain occupations have become a major challenge for policy makers across European Union (EU) countries. This challenge has a wider economic dimension as firms struggle to meet demand when hiring becomes difficult and, as a consequence, prices of goods and services may rise. For example, skill shortages in construction can contribute to making housing increasingly unaffordable. A skill shortage in information technology (IT) occupations can limit EU countries' ability to be future-ready and embrace the megatrend of digitisation. There is also a political dimension: staff shortages in care and medical professions could necessitate the rationing of essential services for the population. This might first affect services in the countryside and thereby reinforce a rural-urban divide that undermines social coherence.

In the debate about how to address such skill shortages, recruiting skilled migrants often features very prominently. With this objective, EU countries have adjusted their migration policies in recent years, notably by introducing shortage lists that simplify the entry procedures for migrants from outside the EU whose occupation is on the list, or by awarding extra points in point-based migration systems¹ to applicants with skills in shortage occupations. The relatively new global skills partnerships, or Talent Partnerships in the EU context, seem to be particularly prevalent in shortage occupations and, although the volume of migration through these partnerships has remained low, they could become a central policy instrument to address skill shortages through migration.²

However, it is less clear whether shortages also generate a significant interest among potential migrants. The idea that potential migrants move to EU countries to work in shortage occupations might fail in practice, for several reasons. Most people don't want to migrate, so not everyone with a shortage occupation will want to leave the country. Although wages in the shortage occupation may be much higher in some EU countries than in origin countries, they could be still higher in other occupations that migrants then prefer, or in another destination country where the occupation is not in shortage. Potential migrants might not always be aware of the demand for their skills abroad. Those working in occupations that are generally in high demand, such as the medical professions, might instead benefit from demand for their skills in their own country. The role of shortages is particularly delicate in the case of global skills partnerships: shortages in destination countries need to pull potential migrants into the training element of these partnerships, but must not create or exacerbate shortages in the origin country, as this would lead the origin country to lose interest in the partnership.

This paper empirically examines the role of shortages for individual migration aspirations across nine occupational groups, three origin countries in the Western Balkans, and all EU destination

¹ Points-based migration systems are being implemented in several EU countries, such as Germany (the Opportunity card) or Austria (the Red-White-Red Card scheme). The system also exists in the UK since 2021.

² In a 2022 communication, the European Commission presented three pillars of the sustainable EU policy on legal migration: legislative, operational and forward-looking (Attracting Skills and Talent to the EU, 2022). The operational pillar refers extensively to Talent Partnerships as 'one of the key aspects of the external dimension of the New Pact on Migration and Asylum', alongside the development of the EU Talent Pool (Attracting Skills and Talent to the EU, 2022; The New Pact on Migration and Asylum, 2020).





countries plus the United Kingdom. Shortages in destination countries and in origin countries are taken into consideration. The paper therefore investigates in a broad set-up whether key preconditions for migration as a response to skill shortages hold in practice, and it contributes to the study of migration aspirations, in relation to which the influence of shortages has thus far received scant attention. From the results of the analysis, it emerges that individuals aspiring to migrate are significantly more interested in destination countries where their occupation is in shortage, while a shortage in their own country can significantly reduce their migration aspirations.

The migration corridor between Western Balkan (WB) countries and the EU/UK appears particularly well-suited to examine the role of shortages. Located in the immediate vicinity of the EU and often facing high unemployment rates despite the rising educational attainment of the workforce, the WB region has seen substantial outward migration to the EU in recent years. Skill shortages have consequently also arisen there, and high-quality firm-level data on shortages exist for Albania, Bosnia and Herzegovina, and Serbia. These three countries are among the main origin countries for regular labour migration to the EU.

According to EC statistics³ on residence permits – statistics on first permits issued during the year – in 2022, new residence permits in the EU for work amounted to 1,241,093 (36% of total new residence permits). Around 21,000 first residence permits for employment reasons were issued in 2022 to citizens of Albania, nearly 26,700 to citizens of Serbia, and more than 30,000 to citizens of Bosnia and Herzegovina, according to Eurostat. This was more than for citizens of the US (18,100), China (20,600) or the UK (13,300). Migrants from Turkey, Russia and Brazil received between 30,000 and 40,000 new residence permits for work in EU countries, but the only countries whose citizens received substantially more such permits (above 40,000) were Ukraine, Belarus, India and Morocco. The numbers were also considerable for two smaller WB countries: citizens of North Macedonia obtained some 11,600 first residence permits for employment reasons, and citizens of Kosovo* 19,800.

Surveys (such as Balkan Barometer 2023: Public Opinion) have shown that interest in migration to the EU is widespread in WB countries, and this paper focuses on patterns in these migration aspirations to examine the role of shortages. Migration aspirations are known to differ from migrations that ultimately materialise, notably because – among a variety of potential reasons – many who wish to work abroad find themselves unable to secure a job offer there (Docquier et al., 2014). This constraint might hardly apply to those working in shortage occupations. alongside Given that such constraints on migration, as well as migration policies and administrative capacities of destination countries, effectively favour certain potential migrants in ways that are

³ Can be found on Eurostat website on residence permits: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Residence_permits_statistics_on_first_permits_issued_during_the_year#First_residence_permits_by_reason.

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ opinion on the Kosovo declaration of independence.





poorly observed, migration aspirations may be better suited for analysing the role of shortages than actual migrations.

The paper proceeds as follows. Section 2 reviews the existing literature on the study of migration aspirations and on migration from the Western Balkan region. The data sources as well as the empirical methodology of the analyses are set out in Sections 3.1 and 3.2, respectively, while some descriptive statistics are provided in Section 4. A detailed presentation of the results from our empirical analyses is offered in Section 5, before Section 6 concludes with the main insights.

2. Literature review

The question of ‘migrant selectivity’ – i.e. why and under what circumstances some people wish and decide to migrate (temporarily or not) – has become increasingly relevant (Hagen-Zanker and Hennessey, 2021, p. 7). Today, approaches ranging from sophisticated neoclassical models to theories looking at intangible factors behind migration aspirations and decisions⁴ aim to offer insights into *who* migrants are. A succinct reflection on some of these theories and studies (Figure 1) is necessary to identify research gaps and variables to consider in analysing migration aspirations. Inspired by comprehensive reviews by Kuhnt (2019)⁵ and Hagen-Zanker (2008), as well as the sharp critical reflection on the literature by Arango (2002), this section first looks at broader academic and grey literature to distinguish between macro-, meso- and micro-level factors influencing migration aspirations and decisions. It then applies a geographic focus and examines literature on emigration from the Western Balkan (WB) region in both English and Serbo-Croatian. The review - including 52 publications in total - shows that in light of recent migration *decisions* in the region, understanding migration *aspirations* (especially of the young and highly skilled) has become an important point of interest. However, significant research gaps remain in understanding emigration determinants and how these are affected by labour shortages.

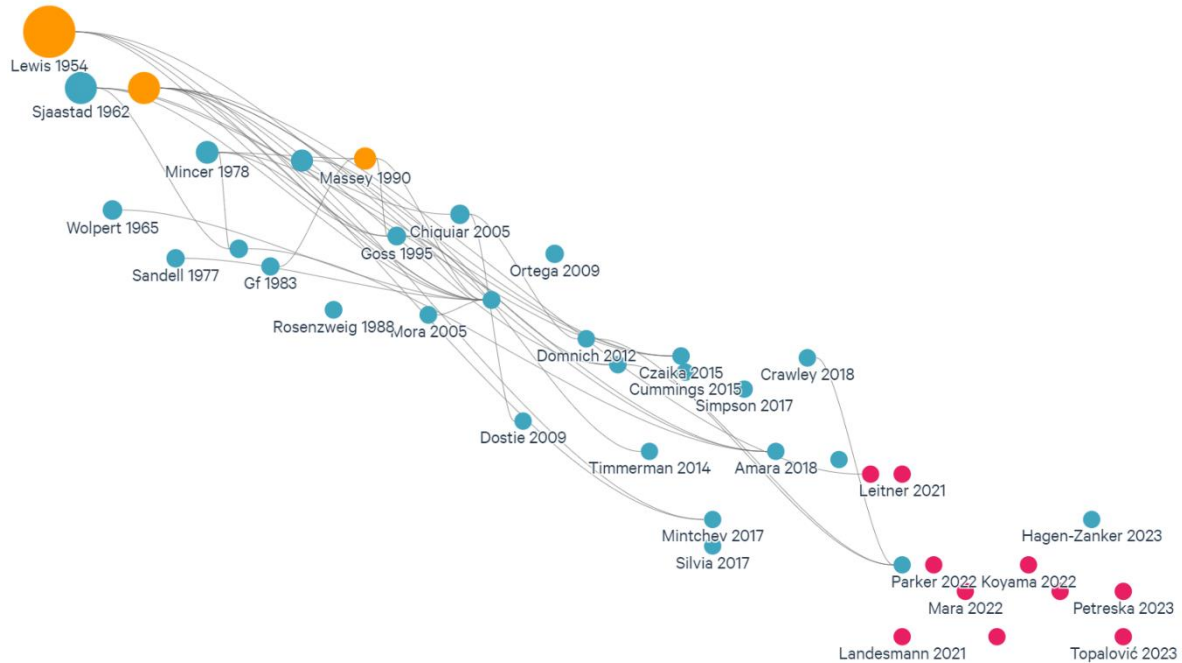
⁴ Economic migration is a “stepwise process” that includes the formation of migration aspirations (Carling et al., 2024, p. 4). However, as mentioned in Section 1, an *aspiration* to migrate may not always result in the *decision* to migrate (e.g. due to financial and administrative constraints or the inability to find a job). Thus, migration aspirations should be understood as different from and preceding migration decisions (actual migrations). However, distinguishing between *factors* that shape the two is not straightforward. For example, neoclassical approaches on macro, meso and micro scales deal explicitly with migration decisions, but their key considerations, such as comparing expected earnings upon moving with those at home, also imply and shape migration aspirations. Thus, to develop a comprehensive and relevant approach to studying migration aspirations in the Western Balkans, this review embraces the blurry line between determinants of migration aspirations and decisions, and considers both literatures together.

⁵ Kuhnt based the review on a framework by Timmerman et al. (2014), according to which ‘*perceptions and the migration aspirations are formed by macro-, meso- and micro-level determinants*’ (Kuhnt, 2019). Kuhnt also emphasises the importance of dealing with interactions between the three levels.





Figure 1. Illustrative map of literature



Source: Prepared by authors, using *Litmaps*. The map shows a selected list of relevant literature included in this review, where papers are colour-coded in line with their structure: blue denotes broader literature on (factors behind) migration aspirations and decisions, including papers on destination preferences and migrant selectivity; red denotes literature dealing specifically with the Western Balkans, and illustrates how academic interest in migration determinants has recently increased. Lines on the map show connections between different articles; publications with a broader scope (e.g. from the field of development economics) that have influenced a significant number of referenced articles have been marked, for clarity, in green. Circle size reflects the number of citations, which are linearly interpolated.

2.1. Factors affecting migration decisions

2.1.1. Macro-level determinants

Starting with the macro-level⁶ determinants of migration aspirations and decisions, early neoclassical theories of economic development introduced and established *income* as a critical driver of migration. According to this logic (Lewis, 1954; Ranis and Fei, 1961), people from countries with abundant labour (and low wages) migrate in search of greater earnings; migration thus becomes a convergence mechanism for wages of comparable labour across countries (Lewis,

⁶ As defined by Kuhnt, the macro level refers to the context affecting individuals in each country (2019, p. 5). Despite broader debates on the decreasing significance of nation states, such a definition remains relevant in this context, as most policy/legal factors hindering or facilitating migration originate from national frameworks and processes.





1954). Another influential approach⁷ is the two-sector model by Harris and Todaro, which views rural-urban migration as a result of differences in workers' *expected* earnings (Harris and Todaro, 1970), dependent on average income and – importantly – the likelihood of finding a job (Arandarenko et al., 2020, p. 1155). These theoretical foundations have become more sophisticated over time and. They have also been studied extensively using empirical evidence (e.g. Czaika, 2015; Amara and Jemmali, 2018), as noted by Kuhnt (2019, p. 10).

The focus on income-related variables as drivers of migration has not lost relevance. Today, if not taken for granted, income and similar factors are studied within the broader category of wealth and labour market opportunities at home and abroad, and financial resources are understood to both incentivise *and enable* people to move. The existing literature confirms that livelihood/economic opportunities in absolute and (especially) relative terms are a powerful 'pull' factor for migration (e.g. Clark, Hatton and Williamson, 2007; Ortega and Peri, 2009; Kuhnt, 2019, p. 10). It is thus vital to understand and compare opportunities across countries⁸ and to include (to the extent possible) the impact of different factors that influence an individual's disposable income, such as access to social protection programmes or subsidies (Hagen-Zanker and Himmelstine, 2013; Rosenzweig and Wolpin, 1988). Although better economic opportunities abroad can be a significant 'pull' factor, individuals with fewer resources have a harder time migrating (e.g. Cummings et al., 2015; Kuhnt, 2019, p. 10). This point does not solely refer to financial resources, but it encourages the study of individuals' savings or other forms of financial security as variables influencing migration aspirations, as in this analysis.

Macro-level factors affecting migration aspirations go well beyond wealth-related variables. Kuhnt systematically considers the literature on violence and conflict, human rights violations, institutions, the welfare state and fragility, poverty and development, migration governance and policies, environmental change and threats, and development-induced displacement, all of which play a significant role in aspirations and decisions to migrate (Kuhnt, 2019, pp. 6-14).

2.1.2. Meso-level determinants

In addition to the broader context, migration is significantly affected by existing meso-level factors at the community and household levels (Kuhnt, 2019, p. 15). Starting with the latter, much has been written on the impact of family on migration aspirations and decisions. Hagen-Zanker (2008, p. 12) argued that a distinction should be made between approaches that see migration as a family decision (e.g. Sandell, 1977; Mincer, 1978), and those that shed light on the impact of family on individual choices (e.g. Harbison, 1981; Dustmann et al., 2023). However, all suggest that migration depends on family factors (such as the number and age of children), emphasising the necessity to include related variables where possible. This discussion was further developed by Stark and Bloom (1985), which saw migration as household utility maximisation, introduced the

⁷ Hagen-Zanker's review offered additional examples of early macro theories of migration, including the dual labour market theory (Piore, 1979) and the world systems theory (Wallerstein, 1974). As she argued, these have their own sets of problems and fail to recognize individuals' agency (Hagen-Zanker, 2008).

⁸ This comparative approach to understanding socio-economic differences has been implemented to a limited extent in the literature on the WB region, as discussed herein.





notion of risk optimisation, and, for the first time, linked migration with its possible effects, such as remittances (Hagen-Zanker, 2008, pp. 12-16; Arandarenko, 2022, p. 104). In addition to family, determinants of migration exist at the community level, too. These include – among others – existing migration and social networks, cultural contexts (including migration culture, language and historical context), migration infrastructure and institutions, technology (Goss and Lindquist, 1995; Hagen-Zanker and Hennessey, 2021; Kuhnt, 2019; Massey, 1990), or colonial ties (Czaika & De Haas, 2017).

2.1.3. Micro-level determinants

Finally, a significant role in migration aspirations and decisions belongs to *personal* factors such as education, age and location preferences. In his prominent neoclassical human capital theory,⁹ Sjaastad challenged the approaches focusing solely on wage differences across space (Sjaastad, 1962, p. 87) and approached migration as an individual investment *decision*. In his model – which, in true neoclassical fashion, is based on questionable assumptions – discounted returns of migration are compared with its financial and non-financial (opportunity¹⁰ and psychological) costs; an individual moves when the former outweighs the latter (Sjaastad, 1962, p. 83). Sjaastad thus emphasised the role of personal factors and characteristics in labour migration. For example, he argued that younger workers may have less work experience but that ‘their longer life expectancy increases the present value of returns to additional investment, relative to the older group’ (Sjaastad, 1962, p. 88). His focus on *the individual* is an important legacy. It has contributed to the extensive literature on migrant selectivity, i.e. the relation between migration and individuals’ health, education, and other observable or unobservable characteristics (Chiquiar and Hanson, 2005; Domnich et al., 2012; Dostie and Léger, 2009; Nakosteen and Zimmer, 1980). In addition, particular attention has been paid to individuals’ destination preferences, which draw on a range of factors including people’s perceptions of what makes a “Good country” (e.g. Crawley and Hagen-Zanker, 2018).

The ‘pros and cons’ approach allows for infinite expansion of cost and benefit categories, and so has become immensely influential as underlying reasoning in various micro- *and* macro-level theories¹¹ – even those far from neoclassical economics where this is most prominent across scales. In a review of academic and grey literature on the role of subjective and intangible factors in migration decision making in middle- and low-income countries, Hagen-Zanker and Hennessey (2021) went beyond dominant approaches. As the authors reiterated, dominant strands – namely (i) neoclassical models (and especially their simpler versions where individuals make ‘cold-hearted’ decisions with perfect information), and (ii) historical-structuralist approaches, where migration results from and reinforces socio-economic inequalities, while migrants’ agency is ignored – remain deeply flawed (Hagen-Zanker, Hennessey and Mazzilli, 2023, pp. 349-350).

⁹ Other micro approaches emerged at the time. An early framework developed by Lee (1966) was the first to identify a variety of push and pull factors influencing migration decisions on an individual level; however, it was criticised for being ‘barely a theory’ (Hagen-Zanker, 2008, p. 9).

¹⁰ Opportunity costs refer to missed opportunities resulting from a particular decision.

¹¹ Sjaastad’s theory was further developed to address some of its shortcomings (see Fischer et al., 1997; Hagen-Zanker, 2008, p. 10), but its neoclassical logic is notable in the works of many authors (e.g. Simpson, 2017; Wolpert, 1965).





Hagen-Zanker and Hennessey reviewed 182 ‘niche’ studies of how (i) imagination, (ii) emotions and feelings, (iii) beliefs and values and (iv) personality traits such as risk-taking affect migration-related aspirations and decisions. This literature shows that *the tangible* and *the intangible* work together in migration outcomes, highlighting that correcting the ‘skewness in the literature towards tangible factors’ is necessary (Ibid., p. 354). Nonetheless, it can be argued that, while neoclassical assumptions such as rationality or access to complete information have been weakened if not abandoned over time, especially in relation to the study of migration aspirations, Sjaastad’s simple yet powerful cost-benefit logic remains relevant to this day.

2.2. Migration decisions in the Western Balkans

The scope and nature of (net) emigration from WB countries (i.e. migration decisions) have motivated new efforts to understand the determinants of migration aspirations. Although emigration from the region started in the 1960s, the profile of those leaving has changed. Recent thematic literature and the media emphasise the problem of ‘brain drain’ – emigration (notably to the EU)¹² of the young and highly educated/skilled. Many fear the significant negative implications of brain drain for local development (Koyama, 2022; Parker et al., 2022; Topalović and Hampel, 2023), and evidence of this problem has already been found in Albania, Bosnia and Herzegovina, and Kosovo (Leitner, 2021). Using a new cohort approach, the study by Leitner confirmed that it is mostly the young – those in their early to mid-20s and early 30s – who move abroad (Ibid., pp. 14-15). She also found that ‘net emigration in the region occurs mainly among the medium- and low-educated’ (Ibid., p. 5), which challenges the fixation on brain drain. This inadequacy of focus on the “best and brightest” is reiterated in the context of Serbia in a report by Arandarenko (2022). Nonetheless, it has become increasingly clear that studying *why* people wish and choose to leave is necessary. This greater awareness is evident in an increasing number of related papers over the years, as well as in efforts to develop national strategies for economic migration (e.g. in Serbia). The focus so far has mainly been on studying the causes of migration, not its effects.

The literature on determinants of emigration from WB countries strongly points towards labour market factors such as (youth) unemployment and lower wages as essential drivers of migration aspirations; it also highlights other macro factors such as political (in)stability, the rule of law, or differences between education systems among countries.¹³ Using a qualitative approach in a study of North Macedonia, a group of authors found that the perceived lack of economic opportunities, cultural tightness¹⁴ and institutional instability are decisive push factors for potential emigrants; the sense of community and responsibility encourages them to stay (Parker et al., 2022). Topalović and Hampel (2023) conducted a quantitative analysis. They used a wide array of indicators – such

¹² Internal economic migration is also common and increasingly considered in the WB region (Arandarenko et al., 2020).

¹³ Education systems are often compared based on well-established indicators such as PISA scores. However, at a micro level, how students perceive and value their higher education experience at home has also been found to influence their migration decisions (see, for example, Petreska et al., 2023). Studying this link is especially important in regions where brain drain is a significant concern.

¹⁴ Cultural tightness is defined as ‘the strength of social norms and degree of sanctioning within society’ (Gelfand et al., 2006, p. 1226). In the referenced study on North Macedonia, the concept was used to discuss the “perceived close-mindedness” and rigid cultural norms (accompanied by strong behavioural expectations) in the society as a push factor for migration of the young and educated (Parker et al., 2022, p. 78).





as GDP per capita, average nominal monthly earnings, government effectiveness, the share of youth NEET (not in employment, education or training), average PISA (Programme for International Student Assessment) results, the unemployment rate (and also the unemployment rate of the highly educated) and political stability – to perform a hierarchical cluster analysis including WB and EU countries, followed by regression analysis (Topalović and Hampel, 2023, pp. 2303-2304). Such an approach reiterated the relevance of labour market opportunities, political stability, and education in migration outcomes, emphasising the extent to which WB countries lag behind EU member states. Another econometric study further reiterated the point, explaining the relevance of wage and human capital gaps between WB countries and the EU15 (Mara and Landesmann, 2022). As previously discussed, such studies of relative performances are crucial for understanding ‘push’ and ‘pull’ factors of migration, although disentangling the two forces can be challenging.

Focusing further on possible labour market factors behind emigration to the EU,¹⁵ Arandarenko’s study of Serbia highlighted what is already well-established: the EU needs the WB workforce. Following its recovery from the Great Recession, the EU – with its ageing population – increasingly needs workers (Arandarenko, 2022, pp. 108-109). Arandarenko also highlighted an exciting aspect. Old EU member states try to satisfy their labour market needs by first recruiting workers from newer member states, as this is easier for them (Ibid., p. 109). However, as he elaborates, Serbian emigration to old member states (especially Germany and Austria) has been significantly facilitated by family connections; the existence of a long-standing diaspora is relevant (Ibid., p. 109).¹⁶ This finding links current trends with the early days of emigration from the region, when those leaving were mainly unskilled and looking for work. It also underlines the necessity to study meso-level determinants of migration (e.g. household size, the presence of relatives abroad and more broadly transnational networks) in addition to macro indicators of labour market opportunities and micro characteristics such as age or level of education.

What seems missing in the existing literature on migration aspirations in the WB is a strong, explicit link with labour market shortages in different sectors. As referenced above, numerous theories study the broad spectrum of reasons behind the decision to move or stay. These theories are slowly but increasingly making their way to the WB context, which is closely tied to EU needs. Nonetheless, while economic opportunities (both at home and elsewhere) or lack thereof have consistently been recognised as a vital driver of emigration, and there is information on labour shortages in EU countries, little has been done to *link* emigration aspirations in WB to labour shortages (or excesses) in different occupations in local and EU economies (e.g. Medić et al., 2022). Such research is relevant considering that (i) labour shortages in WB and EU countries often exist for similar occupations, and (ii) in some WB countries, both high unemployment rates and high labour shortages are prevalent for certain occupations (for Serbia, see Medić, Aleksić and

¹⁵ For example, see also Migali and Natale, 2017.

¹⁶ ‘Austria, the second most important destination for Serbian migrants among OMS, is a paradigmatic example – the total number of first-time visas issued declined from 5,288 in 2015 to 3,764 in 2019, with the share of family visas in total first-time visas growing from 55% to 61% over the same period’ (Arandarenko, 2022, p. 109).





Petronijević, 2022, p. 12). This is a possible result of the established mismatch between the education system and labour market needs (Nguyen and Reyes, 2019).

The lack of studies on the link between emigration and labour market needs is partly a consequence of severe problems with data availability, as noted by many observers. Starting with migration decisions themselves, it is virtually impossible to know how many people have moved over the years; most people do not deregister from their home municipality when moving abroad (*Economic Migration Strategy of the Republic of Serbia for 2021-2027*, 2020).¹⁷ Similarly, in some cases, it is difficult to estimate to what extent the decision to move has been ‘permanent’, and there is little or no data on circular migrants. Local labour market needs are largely unknown. Occasional employer surveys shed light on the status quo and future needs in WB economies, but these are sporadic and not readily comparable across countries. Instead, labour force surveys are often used to estimate the status quo, but they rarely offer insight into specific sectors and occupations. All things considered, it is understandably challenging to estimate the relationship between emigration aspirations and decisions on the one hand and labour shortages on the other. However, it is evident that in some cases, such as healthcare, the situation is particularly severe (Mara, 2023). This analysis aims to help fill in the research gap and make the link between migration aspirations in the WB and local and EU labour shortages across occupations.

3. Data sources, labour shortage indicators and methodology

In this section, we describe our approach to analyse migration preferences and destination selections. In line with Heckman (1976, 1979), we use a two-stage procedure to account for the selection of sample members who have a wish to migrate, along with their preference for a particular location. In order to achieve this, a probit model is used in the first stage of the study to look at the factors that influence people’s willingness to move. The first stage yields the Inverse Mills Ratio (IMR), which is utilised in the second stage, using a conditional logit model, to analyse destination preferences among those who have expressed a desire to relocate. This methodology enables us to explore the factors driving migration aspirations and destination preferences, while we correct the estimation for the sample selection bias for those who chose their desired destination after expressing their aspirations to migrate.

3.1. Data sources and labour shortage indicators

In this section, we review the different data sources we used for analysis. These include the OeNB Euro Survey, the World Bank employer-based STEP labour shortage data in WB countries, and the Eurostat labour shortage data in EU countries.

¹⁷ Arandarenko pointed out challenges in estimating the number of migrants and the dangers of misinterpreting existing figures (Arandarenko, 2022).





3.1.1. OeNB Euro Survey

Our analysis primarily uses data from the 2019 OeNB Euro Survey¹⁸ of the Oesterreichische Nationalbank (OeNB), which contains information on migration desires, preferred destinations and other individual-level characteristics of respondents. Conducted in collaboration with Gallup, the survey engages national statistics offices as intermediaries. This regular survey in Central, Eastern and Southeastern Europe (CESEE) collects unique data on cash management, savings habits and debt, while also capturing participants' economic assessments, expectations and experiences. Since its inception in autumn 2007, the survey was conducted semi-annually in spring and autumn until 2014 and has been conducted annually in autumn since 2015. Each survey wave involves interviewing 1,000 randomly selected individuals per country, ensuring the samples are representative of the population aged 15 and above by sex and regional distribution. For our analysis, we use data for three WB countries: Albania, Bosnia and Herzegovina, and Serbia.

For our analysis, Question 100 of the survey is important. In this question, the interviewee was asked:

Question 100: Ideally, if you had the opportunity, would you like to move to another country?

1. **Yes, I would like to move permanently.**
2. **Yes, I would like to move temporarily.**
3. **No, I would prefer to stay in my country.**

In the first stage of our estimation, the dependent variable is derived from the responses to Question 100. Specifically, if an individual selects either of the first two responses, we interpret this as an aspiration (readiness, preference) to migrate. Therefore, the dependent variable takes a value of 1 for either of these responses and 0 otherwise. For those expressing a willingness to migrate (indicated by selecting response 1 or 2 to Question 100), Question 101 then inquires about their desired destination from a comprehensive list of options (See Table 1).

Table 1: The list of desired destinations for migration

European Countries	Non-European Countries
Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta,	Argentina, Australia, Brazil, Canada, Chile, Israel, New Zealand, South Africa and the United States.

¹⁸ Some of the data used in this analysis are derived from the OeNB Euro Survey and have been provided by the OeNB solely for research purposes. These data have been obtained from the OeNB under special contractual arrangements and are available from the author(s) only subject to certain conditions. The public website of the survey can be found at: <https://www.oenb.at/en/Monetary-Policy/Surveys/OeNB-Euro-Survey.html>





Montenegro, Netherlands, North Macedonia,
Norway, Poland, Portugal, Romania, Russia, Serbia,
Slovakia, Slovenia, Spain, Sweden, Switzerland,
Turkey, Ukraine and the United Kingdom.

Sources: OeNB Euro Survey in 2019.

3.1.2. World Bank STEP Skills Measurement Program: labour shortage in the Western Balkan countries

In addition to the individual-household data collected from the 2019 OeNB Euro Survey, we also construct three different labour shortage indicators in the *origin* countries, which vary by occupation, and use them in the first stage of the two-stage Heckman model. For this purpose, we use microdata from the World Bank employer-based STEP (Skills Towards Employment and Productivity) Skills Measurement Program,¹⁹ from the following surveys:

- Albania – STEP Skills Measurement Employer Survey 2017 (Wave 4)
- Bosnia and Herzegovina – STEP Skills Measurement Employer Survey 2016-2017 (Wave 3)
- Serbia – STEP Skills Measurement Employer Survey 2015-2016 (Wave 3)

In these surveys, employers were asked whether they had encountered any of the following three problems when trying to hire labour for each one-digit ISCO-08 occupation in their firms in the last three years: (1) there were no or few applicants; (2) applicants lacked the required skills; (3) applicants lacked the required work experience. Based on these three responses, three separate labour shortage indicators are calculated for each one-digit ISCO-08 occupation, as follows:

$$\text{ratio}_{jc} = \sum_i (Y_i^\theta = 1) \left(\frac{\text{employment}_{ijc}}{\text{employment}_{ic}} \right) \left(\frac{\text{employment}_{ijc}}{\text{employment}_{jc}} \right) \text{ where } \theta \in \{\text{shortage of labour, skilled labour, experienced labour}\} \quad (1)$$

where i refers to the firm, j to the one-digit ISCO-08 occupation, and c to the country of origin. The first term, $Y_i^\theta = 1$ represents the condition where there is a specific difficulty, θ , for hiring in firm i (i.e. no or few applicants; applicants lacked the required skills; applicants lacked the required work experience). The second term represents the proportion of occupation j in firm i 's

¹⁹ The World Bank's STEP Skills Measurement Program (STEP) is the first ever initiative to measure skills in low- and middle-income countries. The employer-based survey is designed with five modules, which aim to assess: the structure of the labour force; cognitive skills, behaviour and personality traits, and job-relevant skills that are currently being used, as well as skills employers look for when hiring new workers; provision of training and compensation by employers; the level of satisfaction with the education; skills training available in the labour force. The public website of the survey can be found at: [The STEP Skills Measurement Program \(worldbank.org\)](https://www.worldbank.org/step)





total employment. It captures the relative importance of occupation j in firm i in a country. A high ratio implies that a significant share of firm i 's workforce is dedicated to occupation j , which could signify a critical role in the firm. Conversely, a low ratio suggests that occupation j might not play a significant role in firm i , potentially indicating a lower reliance on occupation j compared with other occupations. The third term represents the proportion of firm i 's employment in occupation j compared with the total employment in occupation j in the country. It captures the relative reliance of occupation j in firm i . A high value suggests that firm i is a major employer of occupation j , which could imply that firm i has a significant influence on the labour market dynamics of occupation j . Conversely, a low value indicates that firm i employs only a small fraction of workers in occupation j , suggesting that the labour market for occupation j is diverse and less influenced by the hiring practices of firm i . The calculated indicators capture the difficulty in hiring for each occupation in each firm in each country of origin (i.e. Albania, Bosnia and Herzegovina, Serbia), considering the relative importance of the occupation in the firm, the reliance on the occupation of the firm, and the presence of specific hiring difficulties. They each represent the overall level of labour shortage and capture the specific nature of the encountered shortage. A higher value indicates a greater level of labour shortage or difficulty in hiring for the specific occupation in firms. $ratio_{jc}$ shows the share of firms that encountered difficulty in hiring labour, skilled labour and experienced labour for ISCO-08 occupation j in country c in year t in the World Bank STEP Program in WB countries (Albania, Bosnia and Herzegovina, and Serbia).

3.1.3. Labour shortage in EU destination countries

In the second stage of the estimation, we also use a country-level labour shortage indicator in the destination country. To do so, we rely on the change in the job vacancy rate (JVR) by one-digit ISCO-08, which we calculate based on the Eurostat data on employment by one-digit ISCO-08 and by one-digit NACE Rev.2²⁰ and the Eurostat data on job vacancy rates by one-digit NACE Rev.2.²¹ To determine the JVR by occupation, we adjust the industry-specific JVR, using employment data from Eurostat. The JVR by occupation is calculated as follows:

$$JVR_{jct} = \sum_i (JVR_{ict}) \left(\frac{employment_{ict}}{\sum_i employment_{ict}} \right) \left(\frac{employment_{ijct}}{employment_{ict}} \right) \quad (2)$$

Here, i refers to the one-digit industry at NACE Rev.2, j to occupation (ISCO-08 one-digit), c to country and t to time. The first term, JVR_{ict} , is the job vacancy rate of industry i in country c at time t . The second term is the employment share of industry i in country c at time t and is used to correct for the disproportionate distribution of employees across industries in each country. The third term is the employment share of each occupation j in industry i in country c at time t . The implicit assumption here is that larger occupational groups have a higher demand for more employees (of the same occupation) and therefore also have more job vacancies. The summation

²⁰ Source: Ifsa_eisn2

²¹ Source: jvs_a_rate_r2





of the product of these three terms gives JVR_{jct} , the job vacancy rate of occupation j in country c at time t . In the next step, based on the JVR_{jct} , we make a three-year average annual growth rate between 2017 and 2019. Finally, we construct a binary indicator that takes the value 1 if the average annual growth rate is positive and 0 otherwise. When the indicator is 1, it indicates the presence of an increased labour shortage in the corresponding country and occupation.

Table A6 lists all variables that are included in our analysis, including individual characteristics (e.g. age and gender), household characteristics (e.g. size and ownership status), as well as macroeconomic factors (e.g. labour shortage by occupation in origin and destination country).

3.2. Methodology

Because of selection issues, we use a two-stage Heckman procedure. Specifically, in the first stage, we identify the factors that influence an individual's aspiration to migrate. In the second stage, we examine the characteristics of those who have aspired to migrate and explore the determinants of their choice of host economy.

3.2.1. First stage: probit model

In the first stage of our analysis, we employ a probit model suggested by Bliss (1934a, 1934b) to examine the determinants of individuals' desires to migrate. Y_i denotes the binary indicator variable for the desire to migrate, taking the value 1 if individual i expresses a desire to migrate and 0 otherwise. X_i represents the vector of individual demographic and socio-economic characteristics. The probability $Pr(Y_i = 1 | X_i)$ is modelled as a function of X_i through the cumulative distribution function (CDF) of the standard normal distribution, denoted as follows:

$$\begin{aligned}
 Pr(Y_i = 1 | X_i) &= \Phi(X_i\beta) \\
 &= \Phi\left(\beta_0 + \beta_1 \text{gender}_i + \beta_2 \text{age}_i + \beta_3 \text{education}_{\text{med}_i} + \beta_4 \text{education}_{\text{high}_i} \right. \\
 &\quad + \beta_5 \text{occupation}_{\text{group}_i} + \beta_6 \text{unemployed}_i + \beta_7 \text{married}_i + \beta_8 \text{head}_i \\
 &\quad + \beta_9 \text{size}_i + \beta_{10} \text{child}_{0-18_i} + \beta_{11} \text{relative}_i + \beta_{12} \text{tie}_i + \beta_{13} \text{saving}_i \\
 &\quad \left. + \beta_{14} \text{shortage}_{\text{origin}_i}^\theta + \beta_{15} \text{shortage}_{\text{origin}_i}^\theta \times \text{occupation}_{\text{group}_i}\right) \quad (3)
 \end{aligned}$$

where $\theta \in \{\text{shortage of labour, skilled labour, experienced labour}\}$

The vector X_i includes individual/household demographic of individual i and socio-economic characteristics of the country in which the individual i resides, and finally a set of variables capturing labour shortages in the country of origin (see Table A6). gender_i is a binary variable that indicates the respondent's gender, with a value of 1 if the individual identifies as female, and 0 if identifies as male. age_i represents the age of the respondent, $\text{education}_{\text{med}_i}$ and $\text{education}_{\text{high}_i}$ represent the respondent's highest level of education, categorised as medium and high based on the International Standard Classification of Education (ISCED 1997) classification (with low as the reference group). $\text{occupation}_{\text{group}_i}$ refers to the individual's current or previous occupation,





grouped into four categories: **managers/professionals (as the reference category), clerks, craft workers and manual workers**. $unemployed_i$ reflects whether the respondent is unemployed, with a value of 1 indicating unemployment, and 0 otherwise. $married_i$ denotes the marital status of the respondent, taking a value of 1 if married, and 0 otherwise. $head_i$ indicates whether the respondent is the head of the household, with a value of 1 if yes, and 0 otherwise. $size_i$ denotes the size of the household. $child_{0-18_i}$ indicates whether the household has children aged 0-18 or not, with a value of 1 indicating yes, and 0 otherwise. $relative_i$ indicates whether the respondent has a close family member who lives or works abroad, with a value of 1 if yes, and 0 otherwise. tie_i signifies whether the household owns both a car and a house/apartment, with a value of 1 if yes, and 0 otherwise. $saving_i$ represents whether the household income exceeded its expenses over the last 12 months, with a value of 1 if yes, and 0 otherwise. $shortage_{origin_i}^{\theta}$ are the three *origin-country* labour shortage indicators related to labour shortage in general, labour shortage of skilled workers, and labour shortage of experienced workers (see Section 3.1.2 above and see Table A6). They vary by the respondent's country of origin and occupation. We also interact each of the three labour shortage indicators with the occupational group variable $shortage_{origin_i}^{\theta} \times occupation_{group_i}$ to determine whether the importance of labour shortages – as a determinant of the aspiration to migrate – differs across occupations. Furthermore, in additional econometric specifications, we also interact the labour shortage indicators and occupational group variables with gender to identify any heterogeneity stemming from the gender of individuals.

3.2.2. Intermediary stage: exclusion restriction and Inverse Mills Ratio

To address the issue of potential sample selection bias in the second-stage model, where we analyse the choice of destination among individuals who expressed an aspiration to migrate, we employ a two-stage Heckman model. As mentioned in the literature (Gronau 1974; Lewis 1974; Heckman 1976, 1979), this bias arises because the dependent variable is not observed for all individuals, owing to a selection mechanism. Specifically, individuals who express a desire to migrate may differ systematically from those who do not, not only in their migration aspirations but also in characteristics that affect the choice of destination. This discrepancy leads to potential sample selection bias, where certain individuals are more likely to be included in the sample, based on unobservable factors that also influence the choice of destination. To address this issue, we employ a two-stage Heckman model (albeit in a modified form, owing to the nature of our dependent variable in the second stage) that consists of a choice of destination rather than a binary/continuous outcome. The primary idea behind the Heckman model is to incorporate an exclusion variable in the first stage, which captures factors influencing selection into the sample (migration desire) but not the outcome of interest (destination choice). Identifying a suitable exclusive variable is often challenging. After considering various candidate variables, the 'tie' variable is constructed based on whether the household owns both a car and a house/apartment. It is hypothesised to influence individuals' aspirations to migrate by reflecting their level of attachment to (or 'anchoring' in) their current country of residence. Households with both a car and a house/apartment are assumed to have stronger ties to their current location, making them less likely to desire migration. Additionally, ownership of both a car and a house/apartment may indicate a certain level of stability and satisfaction with current living conditions, further reducing





the likelihood of desiring migration. Therefore, the ownership of these assets is unlikely to directly impact their choice of destination once the decision to migrate has been made, making the 'tie' variable a plausible exclusion restriction in our analysis. However, it is important to acknowledge the complexity of the 'Tie' variable as an indicator of attachment to one's current country of residence, which serves as our preferred exclusive variable. Specifically, wealthier households, which are more likely to own such assets, may also find it easier to bear the costs of migration and potentially have better employment prospects abroad. This wealth dynamic could influence migration decisions in ways that are not fully captured by the 'Tie' variable. Additionally, the presence of these assets might not disincentivize migration if the aspiration is temporary, as they provide a safety net for return. Although these aspects represent notable limitations, addressing them fully is beyond the scope of this study.

To address the sample selection bias, we calculate the Inverse Mills Ratio (IMR), symbolised as λ , and add it as an additional explanatory variable in the second stage of our analysis. The IMR is defined as:

$$\lambda_i = \frac{\phi(X_i\beta)}{\Phi(X_i\beta)} \quad (4)$$

where ϕ represents the probability density function of the standard normal distribution and Φ represents the cumulative distribution function of the standard normal distribution.

3.2.3. Second stage: conditional logit model (McFadden's Choice Model)

Choice models utilising the Random Utility Model (RUM) are typically derived under the assumption that the decision maker behaves in a utility-maximising manner (Train, 2009). In the realm of migration decision making, RUM serves as a foundational framework for understanding how individuals choose from among a set of destination countries. In this model, individuals (denoted as $i = 1, 2, \dots$) can choose from a alternative destinations in set A . Each destination a offers a utility U_{ia} to individual i , comprising both an observed component V_{ia} and an unobserved random component ϵ_{ia} . Mathematically, this can be expressed as:

$$U_{ia} = V_{ia} + \epsilon_{ia} \quad (5)$$

Here, the observed component V_{ia} is typically represented as a linear function of observed data vectors. The unobserved component ϵ_{ia} follows a random distribution, with its specific form being contingent on the choice model employed. The probability P_{ia} that individual i selects alternative a from the A alternatives is contingent on the utility of alternative a being the highest among all alternatives. This probability is expressed as:



$$P_{ia} = Pr(U_{ia} > U_{ib} \text{ for all } b \neq a) \quad (6)$$

Under the assumption of random utility maximisation, P_{ia} can be formulated as an integral involving the distribution of the unobserved component ϵ_i . Here, $I(\cdot)$ denotes the indicator function, which is equal to 1 when the expression inside the parentheses holds true, and 0 otherwise.

$$P_{ia} = \int I(\epsilon_{ia} - \epsilon_{ib} > V_{ib} - V_{ia} \text{ for all } b \neq a) f(\epsilon_i) d\epsilon_i \quad (7)$$

The conditional logit model suggested by McFadden (1974) – also known as McFadden’s Choice Model – is firmly grounded within the RUM framework, where individuals opt for the alternative (in this case, the migration destination) that promises the highest utility. In McFadden’s Choice Model, the observed component of utility is represented as:

$$V_{ia} = W_{ia}\alpha + Z_i\delta_a + c_a \quad (8)$$

Here, α signifies the coefficients for W_{ia} , a vector of alternative-specific variables; δ_a represents the coefficients for Z_i , a vector of case-specific variables; and c_a denotes the alternative-specific intercepts. In McFadden’s Choice Model, the probabilities of alternatives are given by:

$$P_{ia} = \frac{e^{V_{ia}}}{\sum_{j=1}^A e^{V_{ij}}} \quad (9)$$

Therefore, the ratio for the probability of alternative a to the probability of alternative b is:

$$\frac{P_{ia}}{P_{ib}} = \frac{e^{V_{ia}}}{e^{V_{ib}}} \quad (10)$$

Because this ratio is independent of the probabilities of any of the other alternatives, the Independence of Irrelevant Alternatives (IIA) principle is satisfied. This principle stipulates that the relative probabilities of two alternatives remain unaffected by the characteristics of other alternatives. Introducing a new alternative should not alter the relative attractiveness of existing alternatives, thereby maintaining consistency in choice probabilities. IIA is a mathematical consequence of the formulation of McFadden’s Choice Model. Inserting Equation 8 into Equation 5 models the utility in McFadden’s Choice Model as:

$$U_{ia} = W_{ia}\alpha + Z_i\delta_a + c_a + \epsilon_{ia} \quad (11)$$



To estimate Equation 11, we transform the data into a long format such that for each individual who indicated an aspiration to migrate in the first step, there are three observations, one for each of the alternatives the individual could have chosen. Then we index the set of unordered alternative observations for each individual i by a (i.e. from 1, 2, ..., 23) as we have 23 destination choices (see Table 3). We therefore have a destination indicator y_{ia} for the alternative (migration destination) chosen by the i -th individual. $y_{ia} = 1$ if individual i chooses destination a and $y_{ia} = 0$ otherwise. By the definition of y_{ia} , owing to the structure of the survey), we observe $y_{ia} = 1$ for the selected destination and $y_{ia} = 0$ for the not-selected destinations. The independent variables in the second stage are grouped into two main categories: case-specific Z_i and alternative-specific W_{ia} . Case-specific is the part of the list of variables that captures the characteristics of the individual who expressed a migration aspiration in the first stage. We employ the same list of explanatory variables as in the first stage, except for the tie_i variable, which is the exclusive variable that we believe determines the migration aspiration but does not determine the choice of destination. Additionally, we insert the IMR, λ_i , to adjust for the selection bias. For the alternative-specific factors, we use a binary indicator of shortage of labour in the destination. This binary variable is constructed based on the three-year growth rate of adjusted job vacancy rate by one-digit ISCO-08 occupation group in the destination country in the EU, between 2017 and 2019. When the growth rate is positive, the indicator value is 1, and it reflects a labour shortage situation (see Section 3.1.3 and see Table A6).

In general, we estimate the destination information in three specifications chosen from the results of the first-stage estimations. First, we bring the specification which uses the labour shortage indicator in the origin country, then we use the specification which uses the skilled-labour shortage indicator, and finally, we employ the specification which uses the experienced labour shortage indicator. As mentioned earlier, δ_a represents the coefficients for Z_i , which has 23 elements for each destination choice, as $\delta_a = (\delta_1, \delta_2, \delta_3, \dots, \delta_{23})$. We must fix one of the elements of δ_a to be the zero vector to normalise the location; it serves as a base, and we interpret the results relative to this base. In our analysis, we set Germany as the reference destination, owing to its popularity (see Table 3). Therefore, the second stage of our methodology is as follows, where the alternative chosen by individual i is the one that maximises utility:

$$\begin{aligned}
 U_i = & \alpha_1 \text{shortage}_{\text{destination}_i} + \delta_{1k} \text{gender}_i + \delta_{2k} \text{age}_i + \delta_{3k} \text{education}_{\text{med}_i} & (12) \\
 & + \delta_{4k} \text{education}_{\text{high}_i} + \delta_{5k} \text{unemployed}_i + \delta_{6k} \text{married}_i + \delta_{7k} \text{head}_i \\
 & + \delta_{8k} \text{size}_i + \delta_{9k} \text{child}_{0-18_i} + \delta_{10k} \text{relative}_i + \delta_{11k} \text{saving}_i \\
 & + \delta_{12k} \text{shortage}_{\text{origin}_i}^\theta + \delta_{13k} \lambda_i + c_k + \epsilon_i
 \end{aligned}$$

$$\text{where } k \in \left\{ \begin{array}{l} \text{AT, BE, BG, CY, CZ, DK, EL, ES, FI, FR, HR,} \\ \text{HU, IE, IT, LU, MT, NL, PT, RO, SE, SI, UK} \end{array} \right\}$$

where $\theta \in \{\text{shortage of labour, skilled labour, experienced labour}\}$





4. Descriptive statistics

Table 2 shows the migration aspirations of respondents in the three origin countries. The sample is balanced, with roughly one-third of it originating from each country. Overall, about two-thirds of the sample has no migration aspirations, but one-third does. A notable difference in migration aspirations is visible between the countries. Migration aspirations are substantially higher in Albania (47.0%) than in Serbia (32.2%) and Bosnia and Herzegovina (22.0%).

Table 2 – Migration aspirations in the three origin countries

Origin country	No		Yes		Total	
	Frequency	Share	Frequency	Share	Frequency	Share
Albania	389	53.0%	345	47.0%	734	34.4%
Bosnia and Herzegovina	499	78.0%	141	22.0%	640	30.0%
Serbia	514	67.8%	244	32.2%	758	35.6%
Total	1,402	65.8%	730	34.2%	2,132	100.0%

Sources: OeNB Euro Survey in 2019; authors' calculations.

Table 3 shows the destination country preferences for respondents with migration aspirations (one-third of the total sample). As discussed, the destination country matrix includes 22 EU countries plus the UK. By far the most popular destination country is Germany, which is selected as the preferred destination by 39.7% of the sample. At some distance behind, other popular destinations are Greece (7.5%), France (7.3%), Sweden (6.6%), Austria (6.4%), the UK (6.0%), Italy (5.5%), Denmark (4.3%), Belgium (3.3%), Slovenia (3.2%) and the Netherlands (3.0%). The other destination countries figure only marginally.

Table 3 – Destination country preferences for respondents with migration aspirations

Destination	Frequency	Share
Germany	290	39.70%
Greece	55	7.50%
France	53	7.30%
Sweden	48	6.60%
Austria	47	6.40%
United Kingdom	44	6.00%
Italy	40	5.50%
Denmark	31	4.30%
Belgium	24	3.30%
Slovenia	23	3.20%
Netherlands	22	3.00%
Malta	10	1.40%
Spain	7	1.00%
Finland	7	1.00%
Croatia	7	1.00%





Cyprus	5	0.70%
Ireland	4	0.60%
Luxembourg	4	0.60%
Bulgaria	3	0.40%
Czechia	2	0.30%
Portugal	2	0.30%
Hungary	1	0.10%
Romania	1	0.10%
Total	730	100.0%

Sources: OeNB Euro Survey in 2019; authors' calculations.

The summary statistics for all variables included in this paper's analyses are found in Tables A5 and A7. These include the characteristics of the individual respondents and their households, as well as the variables relating to labour shortages in the origin and destination countries.

5. Estimation results

5.1. First stage: aspiration to migrate

Table 4 presents the econometric results of the first stage, including the three labour shortage indicators across skill groups in the origin countries, interacted with skill groups. Table A1 in the Appendix presents the marginal effects of the variables given in Table 4. According to the results of Table 4, an individual's age has a negative relationship with the aspiration to migrate. According to the results of Table A1, this means that, with each year older an individual becomes, the probability that they will decide to migrate decreases by 1.1 percentage points.

When the size of the household increases by one person, the probability of an individual who is living in that household deciding to migrate increases by about 2.1 percentage points across all models in Table A1. Many other variables do not show any statistically significant relationship: marital status, medium-level education, being the household head, being unemployed, and having children have no significant relationship with the desire to migrate.

However, the positive coefficient of the high education level dummy becomes statistically significant (at the 10% level of statistical significance) in some models when we include dummies for the level of their skills. This suggests that the effects of education on the decision to migrate are underestimated when the skill level of individuals is not controlled for.

Females are 3.7 percentage points less likely than males to migrate. As the descriptive statistics of the sample of analysis presented in Table A5 in the Appendix shows, the mean of gender is 0.45 (hence a slightly larger proportion of males). Whether the respondent has a close family member who lives or works abroad has a statistically significant and positive relation with their desire to migrate abroad. In fact, having relatives abroad increases the probability of migration by more than 13 percentage points across all models. Whether the household owns both a car and a house/apartment, the 'tie' variable, has a negative coefficient that is statistically significant at the





1% level in almost all models. Hence, having a tie decreases the probability of wanting to migrate by 6.5 percentage points. Although this variable is statistically significantly important for the aspiration to migrate, it is not necessarily important for the choice of the destination country, satisfying the exclusion restriction condition in the second stage as discussed above. Having excess savings decreases the probability of wanting to migrate by 8.9 percentage points.

Two out of three labour shortage indicators in the respondent's country of residence have statistically significant coefficients that are negative. The coefficients suggest that for each one-unit increase in the shortage of skilled labour in the ISCO occupation group of the migrant, the probability to migrate decreases by 42.7 percentage points. Furthermore, a one-unit increase in the shortage for experienced labour sees the probability of wanting to migrate decrease by 38.2 percentage points.

In columns M1a, M2a, and M3a of Table 4, we add dummy variables indicating whether the survey respondent belongs to one of the four occupational groups: (1) managers/professionals (ISCO-1 to ISCO-3); (2) clerks (ISCO-4 and ISCO-5); (3) craft workers (ISCO-6 and ISCO-7); and (4) manual workers (ISCO-8 and ISCO-9). Managers/professionals is used as the reference category and thus its coefficient is not included in the table. According to model M1a in Table 4, the probability of wanting to migrate is higher for clerks than for managers/professionals. When we add these categorical dummy variables in M1a, the variable on shortages in the number of job applicants becomes statistically significant at the 10% level, which indicates the importance of identifying the occupation of individuals in making shortages in the number of job applicants relevant. This means that after controlling for the occupation of the individual, the shortages in the origin country that are occupation-specific would become statistically significant. In addition, the coefficient for tertiary education (level 3) also becomes statistically significant at the 10% level after adding these categorical dummy variables. In model M2a, when we include the shortage in skilled labour, the craft workers group has a statistically significantly different relationship with the probability of aspiring to migrate compared with the benchmark managers/professionals group. When we include the shortage in experienced labour in the estimation of model M3a, clerks and craft workers receive positive coefficients that are statistically significant at the 10% and 5% levels, respectively.

In columns M1b, M2b and M3b of Table 4, we interact the categorical variables of occupational groups with the labour shortage indicators in the country of origin of the applicant to see how they react differently across these groups compared with the benchmark group of managers/professionals. The results in column M1b show that a labour shortage in the number of applicants for clerks would increase the probability of aspiration to migrate compared with the benchmark, which is statistically significant at the 5% level. Furthermore, a labour shortage in the number of applicants for craft workers would also increase the probability of aspiration to migrate compared with the benchmark, which is statistically significant at the 10% level. Interestingly, the interaction of shortages in skilled labour and experienced labour with category groups of occupation has no statistically significant coefficients in models M2b and M3b, respectively. Therefore, what matters is the shortages in the number of applicants, rather than shortages in skilled and experienced labour. Furthermore, the results show that relative to





managers/professionals, the two medium-skilled occupations (clerks and craft workers) respond more strongly to labour shortages in the number of applicants, or they would prefer to migrate more (relative to the reference group) despite a labour shortage in the home country for their occupations.

In Table 5, we present the results on the correlation between labour shortages in the country of origin, varying by the gender of the respondents, and the probability of aspiration to migrate. While the results for other variables remain consistent with those in Table 4, interacting gender with the shortage indicators does not reveal any difference in the effects of labour shortages on male versus female respondents. However, the interactions between gender and the binary variables indicating the occupation group of the respondent reveal interesting results. Although manual workers' coefficients were not statistically significant in the models discussed prior to these models, they receive negative coefficients that are statistically significant at the 5% and 1% levels in models with interaction terms with female dummies. Specifically, the interacted variable of female with manual workers still yields statistically insignificant coefficients. This suggests that the effect of being a manual worker on the dependent variable does not differ significantly for females compared with the benchmark (managers/professionals). In other words, the negative effect of being a manual worker on the aspiration to migrate is mainly driven from male manual workers.

Table A2 shows the marginal effects from the probit estimation of the migration decision (first stage), with interactions between shortage and gender, and skill groups and gender. In Table A2, we observe that the marginal effect of being in the manual workers group becomes statistically significant at the 10% level, which was not the case in the model presented in Table A1, where gender was not interacted with this group variable. The major effect of such a negative correlation between the manual workers group variable and the aspiration to migrate is generated through males in this group.

Furthermore, the results presented in Table 5 indicate that clerks were more willing to migrate than the benchmark group of managers/professionals, as shown in Table 4. However, in model M1a, the coefficient of the interaction between female and clerks is equal to the coefficient of clerks alone. This suggests that females and males in this group have similar aspirations to migrate. Craft workers prefer to migrate more than the benchmark group (managers/professionals), at a statistically significant level of 5%. The interaction between female and craft workers has an insignificant coefficient. Thus, the positive significant coefficient is mainly driven by the male respondents in this occupational group.

5.2. Second stage: destination choice

Table 6 shows the estimation results of the McFadden's Choice Model of migration destination aspiration in the second stage, where the Inverse Mills Ratio (IMR) is retrieved from model M2 of Table 4, where the coefficient of shortage in skilled applicants is statistically significant. The coefficient of IMR is statistically significant in many columns of Table 6, which indicates the selection bias for those aspiring to migrate. Tables A3 and A4 in the Appendix present similar





results for the second stage, while taking the IMR from models M1 and M3 of Table 4. The most important variable of interest in the second stage is the shortage of labour in the destination country that is calculated as described in Equation (2). This binary variable varies across occupations and countries and has a value of 1 when the average annual growth in job vacancy rate of occupation j in country c in the past three years is positive. When the variable is 1, it indicates the existence of labour shortages in that country and occupation. The variable has a positive coefficient equal to 0.552, which is statistically significant at 5% level. This suggests that, when the JVR in an occupation in a country increases, the probability of choosing that country as the destination of migration by the survey respondent increases. The number 0.552 means that the odds of choosing a location where they face a labour shortage in the occupation of the individual are about 1.737 ($\approx e^{0.552}$) times larger or 73.7% higher than an alternative destination without labour shortages in that occupation.

In all these tables, Germany, as the most attractive host for respondents, is considered as the benchmark country and the coefficients of all variables in each column that is named after each destination country should be interpreted in comparison with Germany. For instance, the coefficient of household size in Table 6 for Austria is 0.425, which indicates that as the number of household members increases by one, the probability of a household choosing Austria over Germany is 1.530 ($\approx e^{0.425}$) times higher, or in other words that the odds of choosing Austria as a destination over Germany increase by a factor of approximately 53%. Therefore, it can suggest that individuals in larger families would prefer to migrate to Austria rather than to Germany. Other variables, however, do not have any significant and distinctive influence on the choice of destination between Germany and Austria.

However, for a country such as Greece (EL), which is the second most popular aspired destination, more variables are statistically significant. For instance, older persons prefer Greece over Germany, as the coefficient for age is positive and statistically significant at the 5% level. Respondents with higher levels of education are more likely to prefer Germany over Greece, as the coefficients for education levels two and three are negative and statistically significant at the 10% and 1% levels, respectively. France (FR) is the third most popular aspired destination. However, none of the coefficients for France is statistically significant, at least at the 5% level. Sweden (SE) is the fourth most popular aspired destination, and several variables have statistically significant coefficients for Sweden. For example, an unemployed person is less likely to choose Sweden over Germany, and a person with relatives abroad is also less likely to choose Sweden over Germany.





Table 4 – The probit estimation of migration aspiration (first stage), interactions between shortages and skill groups

	M1	M2	M3	M1a	M2a	M3a	M1b	M2b	M3b
Age	-0.037*** (0.0026)	-0.037*** (0.0027)	-0.037*** (0.0026)	-0.036*** (0.0027)	-0.037*** (0.0027)	-0.037*** (0.0027)	-0.037*** (0.0027)	-0.037*** (0.0027)	-0.037*** (0.0027)
Household size	0.068** (0.031)	0.065** (0.031)	0.068** (0.031)	0.069** (0.031)	0.062** (0.031)	0.065** (0.031)	0.067** (0.031)	0.063** (0.031)	0.066** (0.031)
Marital status = 1	0.081 (0.082)	0.076 (0.083)	0.079 (0.083)	0.077 (0.082)	0.072 (0.083)	0.075 (0.083)	0.075 (0.083)	0.068 (0.083)	0.071 (0.083)
Education level = 2	0.064 (0.10)	0.11 (0.10)	0.10 (0.10)	0.062 (0.10)	0.11 (0.10)	0.11 (0.10)	0.061 (0.10)	0.12 (0.10)	0.11 (0.10)
Education level = 3	0.14 (0.11)	0.15 (0.11)	0.13 (0.11)	0.23* (0.13)	0.25* (0.13)	0.26** (0.13)	0.23* (0.13)	0.24* (0.13)	0.25* (0.13)
Household head = 1	0.0054 (0.075)	0.033 (0.075)	0.021 (0.075)	0.015 (0.075)	0.043 (0.075)	0.034 (0.075)	0.0063 (0.075)	0.050 (0.075)	0.038 (0.075)
Unemployed = 1	0.012 (0.094)	0.029 (0.095)	0.031 (0.095)	0.019 (0.095)	0.041 (0.095)	0.046 (0.095)	0.032 (0.095)	0.041 (0.095)	0.042 (0.095)
Child 0-18 = 1	0.014 (0.087)	0.0039 (0.088)	0.0060 (0.088)	0.019 (0.087)	0.0048 (0.088)	0.0075 (0.088)	0.024 (0.088)	0.0044 (0.088)	0.0094 (0.088)
Gender = 1	-0.12* (0.070)	-0.12* (0.069)	-0.13* (0.069)	-0.11 (0.070)	-0.11 (0.070)	-0.12* (0.070)	-0.12* (0.070)	-0.11 (0.070)	-0.11 (0.070)
Relative abroad = 1	0.41*** (0.067)	0.41*** (0.067)	0.42*** (0.067)	0.41*** (0.068)	0.41*** (0.068)	0.42*** (0.068)	0.42*** (0.068)	0.41*** (0.069)	0.42*** (0.068)
Tie = 1	-0.21*** (0.074)	-0.17** (0.075)	-0.19** (0.074)	-0.20*** (0.076)	-0.17** (0.076)	-0.18** (0.076)	-0.20*** (0.075)	-0.17** (0.077)	-0.19** (0.076)
Positive saving = 1	-0.29*** (0.076)	-0.30*** (0.077)	-0.30*** (0.077)	-0.29*** (0.076)	-0.30*** (0.077)	-0.29*** (0.077)	-0.30*** (0.077)	-0.29*** (0.078)	-0.29*** (0.078)
Shortage in number of applicants	0.74 (0.48)			0.81* (0.49)			-2.50 (1.78)		
Shortage in skilled applicants		-1.38*** (0.36)			-1.49*** (0.38)			-0.26 (1.10)	
Shortage in experienced applicants			-1.23*** (0.38)			-1.45*** (0.40)			-0.96 (1.39)
Clerks				0.23** (0.12)	0.14 (0.12)	0.22* (0.12)	-0.14 (0.21)	0.40* (0.25)	0.37 (0.25)
Craft workers				0.20 (0.13)	0.23* (0.12)	0.30** (0.13)	-0.13 (0.23)	0.38 (0.25)	0.23 (0.28)
Manual workers				0.21 (0.14)	0.14 (0.14)	0.22 (0.14)	0.047 (0.34)	0.45 (0.28)	0.28 (0.29)
Clerks # shortage in number of applicants							3.86** (1.91)		
Craft workers # shortage in number of applicants							3.29* (1.97)		
Manual workers # shortage in number of applicants							1.18 (3.65)		
Clerks # shortage in skilled applicants								-1.66 (1.26)	



Craft workers # shortage in skilled applicants									-0.93 (1.25)
Manual workers # shortage in skilled applicants									-2.07 (1.62)
Clerks # shortage in experienced applicants									-1.06 (1.52)
Craft workers # shortage in experienced applicants									0.13 (1.56)
Manual workers # shortage in experienced applicants									-0.46 (1.68)
Constant	0.95*** (0.20)	1.22*** (0.20)	1.22*** (0.21)	0.71*** (0.23)	1.03*** (0.24)	0.97*** (0.24)	1.07*** (0.30)	0.82*** (0.30)	0.92*** (0.32)
Observations	2132	2132	2132	2132	2132	2132	2132	2132	2132
Pseudo R-squared	0.139	0.144	0.142	0.141	0.145	0.145	0.142	0.146	0.145
AIC	2317.6	2305.3	2309.6	2319.4	2307.0	2309.3	2321.3	2310.5	2313.6
BIC	2396.9	2384.6	2388.9	2415.7	2403.3	2405.6	2434.6	2423.8	2426.9

Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01.

Table 5 – The probit estimation of migration aspiration (first stage), interactions between shortage and gender, and skill groups and gender

	M1	M2	M3	M1a	M2a	M3a
Age	-0.037*** (0.0026)	-0.037*** (0.0027)	-0.037*** (0.0027)	-0.036*** (0.0027)	-0.037*** (0.0027)	-0.037*** (0.0027)
Household size	0.068** (0.031)	0.065** (0.031)	0.069** (0.031)	0.069** (0.031)	0.061** (0.031)	0.065** (0.031)
Marital status = 1	0.084 (0.082)	0.076 (0.083)	0.078 (0.083)	0.070 (0.082)	0.065 (0.083)	0.067 (0.083)
Education level = 2	0.063 (0.10)	0.11 (0.10)	0.11 (0.10)	0.063 (0.10)	0.11 (0.10)	0.12 (0.10)
Education level = 3	0.14 (0.11)	0.15 (0.11)	0.13 (0.11)	0.23* (0.13)	0.25* (0.13)	0.26** (0.13)
Household head = 1	0.0058 (0.075)	0.032 (0.075)	0.025 (0.074)	0.0023 (0.076)	0.029 (0.076)	0.021 (0.075)
Unemployed = 1	0.012 (0.094)	0.029 (0.095)	0.033 (0.095)	0.021 (0.095)	0.043 (0.095)	0.048 (0.095)
Child 0-18 = 1	0.013 (0.087)	0.0039 (0.088)	0.0062 (0.088)	0.023 (0.087)	0.0087 (0.088)	0.012 (0.088)
Gender = 1	-0.21* (0.11)	-0.14 (0.14)	0.0047 (0.15)	0.18 (0.16)	0.20 (0.16)	0.19 (0.16)
Relative abroad = 1	0.41*** (0.067)	0.41*** (0.067)	0.42*** (0.067)	0.41*** (0.068)	0.41*** (0.068)	0.42*** (0.068)
Tie = 1	-0.21*** (0.074)	-0.17** (0.075)	-0.19** (0.074)	-0.21*** (0.076)	-0.17** (0.076)	-0.19** (0.076)



Positive saving = 1	-0.29*** (0.076)	-0.30*** (0.077)	-0.30*** (0.077)	-0.28*** (0.076)	-0.29*** (0.077)	-0.29*** (0.077)
Shortage in number of applicants	0.26 (0.63)			0.82* (0.49)		
Gender = 1 # shortage in number of applicants	1.01 (0.96)					
Shortage in skilled applicants		-1.43*** (0.46)			-1.52*** (0.38)	
Gender = 1 # shortage in skilled applicants		0.11 (0.71)				
Shortage in experienced applicants			-0.93** (0.47)			-1.49*** (0.40)
Gender = 1 # shortage in experienced applicants			-0.73 (0.74)			
Clerks				0.41** (0.16)	0.32** (0.16)	0.39** (0.16)
Gender = 1 # clerks				0.41** (0.16)	0.45*** (0.16)	0.53*** (0.16)
Craft workers				0.39** (0.18)	0.33* (0.18)	0.41** (0.18)
Gender = 1 # craft workers				-0.30 (0.21)	-0.32 (0.21)	-0.31 (0.21)
Manual workers				-0.39** (0.19)	-0.41** (0.19)	-0.42** (0.19)
Gender = 1 # manual workers				-0.32 (0.23)	-0.34 (0.22)	-0.32 (0.22)
Constant	1.00*** (0.20)	1.22*** (0.21)	1.16*** (0.21)	0.55** (0.25)	0.87*** (0.25)	0.82*** (0.25)
Observations	2132	2132	2132	2132	2132	2132
Pseudo R-squared	0.140	0.144	0.143	0.142	0.147	0.146
AIC	2318.5	2307.2	2310.6	2321.3	2308.4	2310.6
BIC	2403.4	2392.2	2395.6	2434.6	2421.7	2423.9

Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01.



Table 6 - McFadden's Choice Model of migration destination aspiration in the second stage, lack of skilled applicants in the origin country

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	
Destination-related variable																								
Shortage of labour in destination = 1	0.552*** (0.163)																							
Individual-related variables		AT	BE	BG	CY	CZ	DK	EL	ES	FI	FR	HR	HU	IE	IT	LU	MT	NL	PT	RO	SE	SI	UK	
Inverse Mills Ratio		-0.357 (2.652)	-1.581 (3.588)	-9.268 (13.97)	16.30*** (5.738)	152.8*** (32.83)	-0.980 (3.998)	6.795** (2.663)	-3.642 (6.856)	2.613 (3.055)	-4.734 (3.291)	-4.211 (5.183)	269.6*** (12.52)	-15.92* (8.370)	-0.522 (3.483)	-3.341 (7.135)	13.60*** (4.673)	2.937 (3.228)	31.81*** (9.450)	-9.535 (10.59)	5.269** (2.562)	-6.074 (4.688)	4.523 (3.198)	
Age		-0.00741 (0.0661)	-0.0138 (0.0950)	0.0644 (0.280)	0.517*** (0.188)	2.953*** (0.593)	0.0318 (0.103)	0.174** (0.0680)	-0.0276 (0.166)	-0.135 (0.0896)	0.103 (0.0760)	0.0822 (0.133)	7.493*** (0.355)	0.265 (0.183)	0.0146 (0.0872)	0.0513 (0.189)	0.420*** (0.123)	-0.0884 (0.0847)	0.950*** (0.256)	0.868** (0.371)	0.115* (0.0644)	0.104 (0.114)	-0.141* (0.0797)	
Household size		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marital status = 1		0.425** (0.193)	-0.259 (0.243)	-0.0242 (0.299)	-0.0543 (0.491)	4.261*** (1.032)	-0.227 (0.240)	0.415*** (0.153)	0.966** (0.483)	-0.136 (0.346)	-0.117 (0.160)	-0.465 (0.407)	20.10*** (1.061)	-1.507** (0.693)	-0.204 (0.176)	1.065*** (0.264)	0.516* (0.302)	0.0616 (0.227)	0.250 (0.453)	5.897*** (0.626)	-0.303* (0.183)	0.530*** (0.190)	0.220 (0.164)	
Education level = 2		0.293 (0.448)	1.419* (0.740)	5.040*** (1.137)	0.440 (1.084)	17.27*** (3.777)	1.626** (0.662)	-0.245 (0.491)	1.547* (0.849)	0.357 (0.997)	0.595 (0.408)	0.826 (1.166)	74.74*** (4.239)	-0.235 (1.026)	-0.274 (0.530)	-1.324 (0.981)	0.0322 (0.439)	-0.0413 (0.630)	3.413*** (0.778)	7.831*** (1.961)	-0.375 (0.499)	-0.662 (0.575)	0.163 (0.572)	
Education level = 3		0.987 (0.680)	0.00406 (0.666)	-0.685 (1.857)	-1.203 (0.967)	39.31*** (6.308)	0.362 (0.734)	-0.863* (0.443)	-0.271 (1.243)	0.676 (0.766)	-0.865* (0.499)	-0.827 (0.725)	21.67*** (1.425)	1.378 (1.942)	0.122 (0.484)	-0.426 (0.600)	-0.938 (0.870)	-1.210* (0.624)	0.361 (0.707)	5.396*** (1.965)	0.291 (0.587)	-0.447 (0.811)	0.756 (0.483)	
Household head		0.893 (0.690)	0.499 (0.686)	0.536 (0.677)	-0.955 (1.202)	18.63*** (4.650)	0.652 (0.712)	1.779*** (0.527)	0.291 (1.071)	0.748 (0.541)	-0.107 (0.527)	-2.127* (1.263)	19.25*** (2.128)	1.815 (1.838)	-0.381 (0.543)	-0.452 (0.581)	-0.353 (0.949)	0.0278 (0.610)	2.246 (1.753)	0.978 (1.445)	0.128 (0.650)	-0.423 (0.961)	1.211** (0.491)	
Unemployed = 1		-0.336 (0.407)	0.0442 (0.504)	-2.145 (1.668)	1.621** (0.821)	14.87*** (4.648)	-0.378 (0.481)	-0.292 (0.347)	1.331 (0.880)	0.391 (0.960)	-0.550 (0.366)	1.778** (0.773)	13.52*** (2.507)	-1.383 (0.990)	1.082** (0.445)	1.458*** (0.561)	1.937*** (0.668)	0.509 (0.569)	-0.0741 (1.173)	12.50*** (2.709)	0.142 (0.363)	-0.564 (0.632)	-0.564 (0.415)	
Child 0-18 = 1		-0.310 (0.444)	-1.037 (0.791)	25.15*** (0.938)	0.248 (1.056)	34.03*** (2.681)	-0.437 (0.660)	-1.100** (0.513)	25.07*** (0.513)	25.94*** (0.513)	-0.888* (0.496)	-0.154 (0.906)	8.762*** (2.871)	26.01*** (0.722)	1.561*** (0.567)	24.99*** (0.637)	1.126 (0.820)	-1.456 (1.068)	23.09*** (0.967)	32.86*** (1.219)	-1.147** (0.562)	0.322 (0.618)	1.467** (0.647)	
Gender = 1		-0.639 (0.505)	0.0108 (0.544)	-1.788** (0.795)	1.116 (1.377)	15.53*** (3.823)	-0.619 (0.539)	0.234 (0.405)	0.911 (0.812)	-0.790 (0.948)	-0.401 (0.521)	0.221 (1.119)	51.21*** (2.835)	2.543*** (0.814)	0.676 (0.531)	1.081 (0.761)	-0.377 (0.833)	0.182 (0.666)	0.802 (1.945)	7.887*** (1.870)	-0.292 (0.515)	0.211 (0.577)	-0.781 (0.501)	
Relative abroad = 1		-0.363 (0.492)	-0.0469 (0.602)	-1.090 (1.705)	0.0844 (1.007)	27.07*** (6.643)	0.0651 (0.563)	0.263 (0.435)	0.247 (0.968)	0.492 (0.598)	-0.269 (0.475)	-1.457 (0.966)	52.27*** (2.733)	1.092 (1.262)	0.0572 (0.493)	1.025 (1.523)	-0.368 (0.839)	1.338** (0.671)	-3.110* (1.712)	4.714*** (1.247)	0.452 (0.347)	0.562 (0.754)	0.00661 (0.415)	
Positive saving = 1		-0.473 (0.801)	-0.653 (1.030)	-2.217 (3.320)	5.209** (2.031)	37.65*** (8.648)	-0.877 (1.207)	-0.773 (0.740)	-0.301 (1.722)	0.527 (1.185)	-1.432 (0.893)	-0.994 (1.269)	61.52*** (3.185)	-3.135 (2.087)	-0.461 (0.947)	-1.254 (2.750)	1.135 (0.974)	0.406 (1.020)	9.465*** (3.007)	8.854*** (2.364)	-1.725** (0.804)	-1.335 (1.389)	1.091 (0.880)	
Shortage of labour (origin)		-0.539 (0.749)	1.248 (0.820)	18.02*** (3.253)	-0.938 (1.365)	12.65** (5.387)	1.261 (0.873)	1.246* (0.678)	2.177 (1.576)	-0.752 (1.179)	1.295 (0.835)	1.151 (0.844)	40.97*** (2.384)	15.69*** (1.719)	-0.0855 (0.781)	1.980 (1.222)	-3.343* (1.889)	-1.368 (1.068)	-2.996** (1.286)	37.10*** (2.255)	-0.0544 (0.743)	2.339** (1.069)	1.378** (0.677)	
Observations	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790

Robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01.



6. Summary and concluding remarks

This paper investigates the role of labour shortages in influencing the migration aspirations and destination preferences of individuals from three WB countries – Albania, Bosnia and Herzegovina, and Serbia – towards EU countries and the UK. We employ a two-stage Heckman selection model to first identify the determinants of migration aspirations and then analyse the choice of destination among those who express a desire to migrate. The analysis uses data from the OeNB Euro Survey and the World Bank's STEP Measurement Program, incorporating labour shortage indicators from both origin and destination countries.

Our findings reveal that labour shortages significantly impact migration aspirations. Specifically, individuals are more likely to express a desire to migrate if their occupation is in shortage in the destination country. Conversely, a shortage of skilled or experienced labour in the origin country tends to reduce migration aspirations. This suggests that individuals may weigh the prospects of employment in their home country against the opportunities abroad when making migration decisions. Additionally, the probability of choosing a specific destination increases if there is positive JVR growth in the relevant occupation within that country, highlighting the pull factor of labour demand in destination countries.

Policy implications from these results are significant for both origin and destination countries. For destination countries within the EU and the UK, policies that highlight and communicate the demand for specific occupations may enhance the effectiveness of attracting skilled migrants. Developing robust frameworks such as EU Talent Partnerships can help in systematically addressing skill shortages while managing the socio-economic impacts on both origin and destination countries. An online portal like the EU Talent Pool, proposed by the European Commission in November 2023, can allow potential migrants to learn about labour shortages in the EU and guide their migration aspirations.

For WB countries, there is a need for policies that address the mismatch between education systems and labour market needs (ETF, 2021) in order to reduce domestic labour shortages. Additionally, co-operation with EU countries to ensure that migration policies do not exacerbate local skill shortages could benefit both regions. Enhancing local opportunities and addressing the causes of brain drain can mitigate the loss of young and skilled workers, thereby supporting sustainable development in these countries.



References

- Amara, M., & Jemmali, H. (2018). Deciphering the Relationship Between Internal Migration and Regional Disparities in Tunisia. *Social Indicators Research*, 135(1), 313–331. <https://doi.org/10.1007/s11205-016-1487-y>
- Arandarenko, M. (2022). Chapter 4: Migration, Skills and The Labour Market. In *Human development in response to demographic change*. UNDP Srbija. <https://hdr.undp.org/rs/wp-content/uploads/2023/05/Chapter4-Migration-Skills-and-The-Labour-Market-e1.pdf>
- Arandarenko, M., Corrente, S., Jandrić, M., & Stamenković, M. (2020). Multiple criteria decision aiding as a prediction tool for migration potential of regions. *European Journal of Operational Research*, 284(3), 1154–1166. <https://doi.org/10.1016/j.ejor.2020.01.046>
- Arango, J. (2000). Explaining Migration: A Critical View. *International Social Science Journal*, 52(165), 283–296. <https://doi.org/10.1111/1468-2451.00259>
- Balkan Barometer 2023: Public opinion. (2024). [Analytic report]. Regional Cooperation Council. <https://www.rcc.int/pubs/168/balkan-barometer-public-opinion-2023>
- Bliss, C. I. (1934a). The method of probits. *Science*, 79(2037), 38–39. <https://doi.org/10.1126/science.79.2037.38>
- Bliss, C. I. (1934b). The method of probits – a correction. *Science*, 79(2053), 409–410. <https://doi.org/10.1126/science.79.2053.409>
- Carling, J., Hagen-Zanker, J., & Weisner, Z. (2024). *New insights on the causes of migration* (MIGNEX Reports). https://www.mignex.org/sites/default/files/2024-04/d067-mignex-report-causes-of-migration-digital_0.pdf
- Chiquiar, D., & Hanson, G. H. (2005). International Migration, Self-Selection, and the Distribution of Wages: Evidence from Mexico and the United States. *Journal of Political Economy*, 113(2), 239–281. <https://doi.org/10.1086/427464>
- Clark, X., Hatton, T. J., & Williamson, J. G. (2007). Explaining U.S. Immigration, 1971–1998. *Review of Economics and Statistics*, 89(2), 359–373. <https://doi.org/10.1162/rest.89.2.359>
- Crawley, H., & Hagen-Zanker, J. (2018). Deciding Where to go: Policies, People and Perceptions Shaping Destination Preferences. *International Migration*, 57(1). <https://doi.org/10.1111/IMIG.12537>
- Cummings, C., Pacitto, J., Lauro, D., & Foresti, M. (2015). Front Matter. In *Why people move: understanding the drivers and trends of migration to Europe* (pp. 2–2). ODI. <http://www.jstor.org/stable/resrep49672.1>



Czaika, M., & De Haas, H. (2017). Determinants of Migration to the UK. Migration Observatory Briefing, COMPAS, University of Oxford. <https://migrationobservatory.ox.ac.uk/wp-content/uploads/2016/04/Briefing-Determinants-of-Migration-17-1.pdf>

Czaika, M. (2015). Migration and Economic Prospects. *Journal of Ethnic and Migration Studies*, 41(1), 58–82. <https://doi.org/10.1080/1369183X.2014.924848>

De Jong, G. F., & Gardner, R. W. (Eds.). (1981). *Migration decision making: Multidisciplinary approaches to microlevel studies in developed and developing countries*. Pergamon Press. <https://doi.org/10.1016/C2013-0-03428-7>

Docquier, F., Peri, G., & Ruysen, I. (2014). The cross-country determinants of potential and actual migration. *International Migration Review*, 48, S37–S99.

Domnich, A., Panatto, D., Gasparini, R., & Amicizia, D. (2012). The “healthy immigrant” effect: Does it exist in Europe today? *Italian Journal of Public Health*, 9(3). <https://doi.org/10.2427/7532>

Dostie, B., & Léger, P. T. (2009). Self-selection in migration and returns to unobservables. *Journal of Population Economics*, 22, 1005–1024. <https://doi.org/10.1007/S00148-008-0235-2>

Dustmann, C., Fasani, F., Meng, X., & Minale, L. (2023). Risk Attitudes and Household Migration Decisions. *Journal of Human Resources*, 58(1), 112–145. <https://doi.org/10.3368/jhr.58.3.1019-10513R1>

Economic Migration Strategy of the Republic of Serbia for the period 2021-2027. (2020). https://www.minrzs.gov.rs/sites/default/files/2021-02/ENG_%20Strategija%20ekonomske%20migracije%202021-2027-30_10%20%28002%29.pdf

European Commission. (2022). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Attracting skills and talent to the EU (COM(2022) 494 final). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2022:657:FIN>

European Commission. (2020). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: On a New Pact on Migration and Asylum (COM/2020/609 final). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A609%3AFIN>

ETF (2021), ‘Youth disengagement and skills mismatch in the Western Balkans’, European Training Foundation (ETF) Working Paper, Turin. [02_youth_western_balkans_final.pdf](https://www.ETF.europa.eu/~/media/ETF/Working_Papers/02_youth_western_balkans_final.pdf) (europa.eu)

Everett, S. L. (1966). A theory of migration. *Demography*, 3, 47–57.





Fischer, P. A., Martin, R., Straubhaar, T., Hammar, T., Brochmann, G., Tamas, K., & Faist, T. (1997). *Should I stay or should I go? International migration, immobility and development*. Berg Publishers.

Gelfand, M. J., Nishii, L. H., & Raver, J. L. (2006). On the nature and importance of cultural tightness-looseness. *Journal of applied psychology*, 91(6), 1225-1244. <https://doi.org/10.1037/0021-9010.91.6.1225>

Goss, J., & Lindquist, B. (1995). Conceptualizing International Labor Migration: A Structuration Perspective. *International Migration Review*, 29(2), 317-351. <https://doi.org/10.1177/019791839502900201>

Gronau, R. (1974). Wage comparisons – A selectivity bias. *Journal of Political Economy*, 82(6), 1119-1143. <https://doi.org/10.1086/260267>

Hagen-Zanker, J. (2008). *Why do people migrate? A review of the theoretical literature* (Maastricht Graduate School of Governance Working Paper No. 2008/WP002). SSRN. <https://doi.org/10.2139/ssrn.1105657>

Hagen-Zanker, J., & Hennessey, G. (2021). *What Do We Know about the Subjective and Intangible Factors That Shape Migration Decision-Making?* (PRIO Paper). PRIO.

Hagen-Zanker, J., Hennessey, G., & Mazzilli, C. (2023). Correction to: Subjective and intangible factors in migration decision-making: A review of side-lined literature. *Migration Studies*, 11(2), 361-361. <https://doi.org/10.1093/migration/mnad005>

Hagen-Zanker, J., & Himmelstine, C. L. (2013). What do we know about the impact of social protection programmes on the decision to migrate. *Migration for Development*, 2(1), 117-131. <https://doi.org/10.1080/21632324.2013.778131>

Harbison, S. F. (1981). Family Structure and Family Strategy in Migration Decision Making. In *Migration Decision Making* (pp. 225-251). Elsevier. <https://doi.org/10.1016/B978-0-08-026305-2.50014-0>

Harris, J., & Todaro, M. (1970). Migration, Unemployment and Development: A Two-Sector Analysis. *American Economic Review*, 60(1), 126-142.

Heckman, J. J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables. *Annals of Economic and Social Measurement*, 5(4), 475-492.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153-161. <https://doi.org/10.2307/1912352>

Koyama, Y. (2022). Emigration from Serbia and depopulation. *Ekonomске Ideje i Praksa*, 47, 1-29. <https://doi.org/10.54318/EIP.2022.YK.337>





Kuhnt, J. (2019). Literature review: Drivers of migration. Why do people leave their homes? Is there an easy answer? A structured overview of migratory determinants (Discussion Paper No. 9/2019). Deutsches Institut für Entwicklungspolitik (DIE). <https://doi.org/10.23661/dp9.2019>

Lee, E.S. (1966), 'A theory of migration', *Demography*, Vol. 3(1), pp. 47-57.

Leitner, S. M. (2021). Net migration and its skill composition in the Western Balkan countries between 2010 and 2019: Results from a cohort approach (Policy Notes and Reports No. 47). The Vienna Institute for International Economic Studies (wiiw).

Lewis, W. A. (1954). *Economic Development with Unlimited Supplies of Labour*. The Manchester School, 22(2), 139-191. <https://doi.org/10.1111/j.1467-9957.1954.tb00021.x>

Lewis, H. G. (1974). Comments on selectivity biases in wage comparisons. *Journal of Political Economy*, 82(6), 1145-1155. <https://doi.org/10.1086/260268>

Mara, I. (2023). Health Professionals Wanted: The Case of Health Professionals from Western Balkan Countries to Europe. *Central and Eastern European Migration Review*, 12(2), 33-52. <https://doi.org/10.54667/CEEMR.2023.24>

Mara, I., & Landesmann, M. (2022). Basic relationships between human capital, migration and labour markets in the Western Balkans: An econometric investigation. *International Migration*, 61(1), 184-204. <https://doi.org/10.1111/IMIG.13025>

Massey, D. S. (1990). Social structure, household strategies, and the cumulative causation of migration. *Population Index*, 56(1), 3-26. <https://doi.org/10.2307/3644186>

McFadden, D. L. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in Econometrics* (pp. 105-142). Academic Press.

Medić, P., Aleksić, D., & Petronijević, V. (2022). The analysis of the labour market and labour force needs in the context of migration governance. *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)*. https://ceves.org.rs/wp-content/uploads/2023/06/Analiza-potreba-trzista-rada-i-radne-snage-u-kontekstu-upravljanja-migracijama_ENG.pdf

Migali, S. and F. Natale (2017), 'The determinants of migration to the EU: evidence from residence permits data', Publications Office of the European Union, Luxembourg. <https://doi.org/10.2760/486072><https://doi.org/10.2760/486072>

Mincer, J. (1978). Family Migration Decisions. *Journal of Political Economy*, 86(5). <https://doi.org/10.3386/W0199>

Nakosteen, R. A., & Zimmer, M. (1980). Migration and income: the question of self-selection. *Southern economic journal*, 46(3), 840-851. <https://doi.org/10.2307/1057152>



Nguyen, T., & Reyes, G. (2019). Labor Market for Growth. The World Bank. <https://thedocs.worldbank.org/en/doc/501621577293868352-0080022019/original/SRBCEMLaborMarketforGrowthwq.pdf>

Oesterreichische Nationalbank. (n.d.). OeNB Euro Survey. Retrieved from <https://www.oenb.at/en/Monetary-Policy/Surveys/OeNB-Euro-Survey.html> (Unpublished raw data received on May 21, 2024). [https://doi.org/10.1017/CBO9780511805271Ortega, F., & Peri, G. \(2009\). The Causes and Effects of International Migrations: Evidence from OECD Countries 1980-2005 \(w14833; p. w14833\). National Bureau of Economic Research. <https://doi.org/10.3386/w14833>](https://doi.org/10.1017/CBO9780511805271Ortega,F.,%20Peri,G.(2009).TheCausesandEffectsofInternationalMigrations:EvidencefromOECDCountries1980-2005(w14833;p.w14833).NationalBureauofEconomicResearch.https://doi.org/10.3386/w14833)

Parker, K. A., Hester, E. B., Geegan, S., Ciunova-Shuleska, A., Palamidovska-Sterjadovska, N., & Ivanov, B. (2022). Reflections on the Emigration Aspirations of Young, Educated People in Small Balkan Countries: A Qualitative Analysis of Reasons to Leave or Stay in North Macedonia. *Central and Eastern European Migration Review*, 11(1), 69-84. <https://doi.org/10.54667/CEEMR.2022.07>

Petreska, N., Prodanova, J., & Kocarev, L. (2023). Should I Leave My Country? Higher Education Value Shaping Students' Satisfaction and Brain Drain Aspirations in Western Balkans. *SAGE Open*, 13(4), 21582440231208770. <https://doi.org/10.1177/21582440231208770>

Piore, M. J. (2009). *Birds of Passage*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511572210>

Ranis, G. & John C. H. Fei. (1961). A Theory of Economic Development. *The American Economic Review*, 51(4), 533-565.

Rosenzweig, M. R., & Wolpin, K. I. (1988). Migration selectivity and the effects of public programs. *Journal of Public Economics*, 37(3), 265-289. [https://doi.org/10.1016/0047-2727\(88\)90042-4](https://doi.org/10.1016/0047-2727(88)90042-4)

Sandell, S. H. (1977). Women and the Economics of Family Migration. *The Review of Economics and Statistics*, 59(4), 406. <https://doi.org/10.2307/1928705>

Silvia, M., & Fabrizio, N. (2017). The determinants of migration to the EU: evidence from residence permits data. <https://doi.org/10.2760/486072>

Simpson, N. (2017). Demographic and economic determinants of migration. *IZA World of Labor*. <https://doi.org/10.15185/IZAWOL.373>

Sjaastad, L. A. (1962). The Costs and Returns of Human Migration. *Journal of Political Economy*, 70(5), 80-93.

Stark, O., & Bloom, D. E. (1985). The new economics of labor migration. *The American Economic Review*, 75(2), 173-178.





Timmerman, C., Clerck, H. M.-L. D., Hemmerechts, K., & Willems, R. (2014). Imagining Europe from the Outside: The Role of Perceptions of Human Rights in Europe in Migration Aspirations in Turkey, Morocco, Senegal and Ukraine. In N. Chaban & M. Holland (Eds.), *Communicating Europe in Times of Crisis* (pp. 220–247). Palgrave Macmillan UK. https://doi.org/10.1057/9781137331175_10

Topalović, A., & Hampel, D. (2023). Causes of the “brain drain” Problem in Selected Western Balkan Countries. *Wseas Transactions on Business and Economics*. <https://doi.org/10.37394/23207.2023.20.198>

Train, K. E. (2009). *Discrete choice methods with simulation*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511805271>

Wallerstein, I. (2011). *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century* (1st ed.). University of California Press. <http://www.jstor.org/stable/10.1525/j.ctt1pnrj9>

Wolpert, J. (1965). Behavioral aspects of the decision to migrate. *Papers in Regional Science*, 15(1), 159–169. <https://doi.org/10.1111/j.1435-5597.1965.tb01320.x>



Appendix

Table A1 – The marginal effects from the probit estimation of migration decision (first stage), interactions between shortages and skill groups

	M1	M2	M3	M1a	M2a	M3a	M1b	M2b	M3b
Age	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)
Household size	0.021** (0.010)	0.020** (0.010)	0.021** (0.010)	0.021** (0.010)	0.019** (0.010)	0.020** (0.010)	0.021** (0.010)	0.020** (0.010)	0.020** (0.010)
Marital status = 1	0.025 (0.025)	0.023 (0.025)	0.024 (0.025)	0.024 (0.025)	0.022 (0.025)	0.023 (0.025)	0.023 (0.025)	0.021 (0.025)	0.022 (0.025)
Education level = 2	0.020 (0.031)	0.033 (0.030)	0.032 (0.031)	0.019 (0.030)	0.034 (0.030)	0.034 (0.030)	0.019 (0.030)	0.037 (0.030)	0.034 (0.030)
Education level = 3	0.045 (0.036)	0.046 (0.035)	0.039 (0.035)	0.073* (0.041)	0.078* (0.041)	0.081** (0.041)	0.072* (0.042)	0.074* (0.041)	0.076* (0.041)
Household head = 1	0.002 (0.023)	0.010 (0.023)	0.006 (0.023)	0.005 (0.023)	0.013 (0.023)	0.011 (0.023)	0.002 (0.023)	0.015 (0.023)	0.012 (0.023)
Unemployed = 1	0.004 (0.029)	0.009 (0.029)	0.010 (0.030)	0.006 (0.029)	0.013 (0.030)	0.014 (0.030)	0.010 (0.030)	0.013 (0.030)	0.013 (0.030)
Child 0-18 = 1	0.004 (0.027)	0.001 (0.027)	0.002 (0.027)	0.006 (0.027)	0.001 (0.027)	0.002 (0.027)	0.007 (0.027)	0.001 (0.027)	0.003 (0.027)
Gender = 1	-0.037* (0.021)	-0.037* (0.021)	-0.040* (0.021)	-0.034 (0.022)	-0.033 (0.021)	-0.036* (0.021)	-0.036* (0.021)	-0.033 (0.021)	-0.034 (0.021)
Relative abroad = 1	0.132*** (0.022)	0.130*** (0.022)	0.134*** (0.022)	0.133*** (0.022)	0.131*** (0.022)	0.135*** (0.022)	0.135*** (0.022)	0.131*** (0.022)	0.136*** (0.022)
Tie = 1	-0.065*** (0.023)	-0.053** (0.023)	-0.059** (0.023)	-0.064*** (0.024)	-0.051** (0.024)	-0.056** (0.024)	-0.063*** (0.023)	-0.052** (0.024)	-0.059** (0.024)
Positive saving = 1	-0.089*** (0.022)	-0.091*** (0.022)	-0.091*** (0.022)	-0.087*** (0.022)	-0.089*** (0.022)	-0.087*** (0.022)	-0.091*** (0.022)	-0.086*** (0.022)	-0.087*** (0.022)
Shortage in number of applicants	0.229 (0.149)			0.251* (0.152)			0.022 (0.237)		
Shortage in skilled applicants		-0.427*** (0.110)			-0.459*** (0.116)			-0.446*** (0.125)	
Shortage in experienced applicants			-0.382*** (0.116)			-0.447*** (0.40)			-0.382*** (1.39)
Clerks				0.071** (0.034)	0.042 (0.034)	0.063* (0.033)	0.067* (0.034)	0.038 (0.035)	0.052 (0.037)
Craft workers				0.059 (0.036)	0.071* (0.036)	0.091** (0.036)	0.052 (0.037)	0.067* (0.037)	0.076* (0.040)
Manual workers				0.064 (0.043)	0.042 (0.042)	0.066 (0.041)	0.046 (0.044)	0.034 (0.043)	0.057 (0.045)



Observations	2,132	2,132	2,132	2,132	2,132	2,132	2,132	2,132	2,132
k_margins	0	0	0	0	0	0	0	0	0
numeric	0	0	0	0	0	0	0	0	0
is_xb1	0	0	0	0	0	0	0	0	0
deriv1	1	1	1	1	1	1	1	1	1
j1_1	0	0	0	0	0	0	0	0	0
j2_1	0	0	0	0	0	0	0	0	0
outcomeIsEq1	0	0	0	0	0	0	0	0	0
k_predict	1	1	1	1	1	1	1	1	1
k_by	1	1	1	1	1	1	1	1	1
k_at	0	0	0	0	0	0	0	0	0

Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01.

Note: Because the marginal effects of variables are presented here, the interaction terms between the variables are not included in this table (but are provided in the main estimation results presented in Table 4).

Table A2 – The marginal effects from the probit estimation of migration decision (first stage), interactions between shortages and gender, and skill groups and gender

	M1	M2	M3	M1a	M2a	M3a
Age	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)
Household size	0.021** (0.010)	0.020** (0.010)	0.021** (0.010)	0.021** (0.010)	0.019** (0.010)	0.020** (0.010)
Marital status = 1	0.026 (0.025)	0.023 (0.025)	0.024 (0.025)	0.021 (0.025)	0.020 (0.025)	0.020 (0.025)
Education level = 2	0.019 (0.031)	0.033 (0.030)	0.032 (0.030)	0.019 (0.030)	0.034 (0.030)	0.035 (0.030)
Education level = 3	0.043 (0.036)	0.046 (0.035)	0.040 (0.035)	0.072* (0.041)	0.078* (0.041)	0.081** (0.041)
Household head = 1	0.002 (0.023)	0.010 (0.023)	0.008 (0.023)	0.001 (0.023)	0.009 (0.023)	0.007 (0.023)
Unemployed = 1	0.004 (0.029)	0.009 (0.029)	0.010 (0.030)	0.006 (0.029)	0.013 (0.030)	0.015 (0.030)
Child 0-18 = 1	0.004 (0.027)	0.001 (0.027)	0.002 (0.027)	0.007 (0.027)	0.003 (0.027)	0.004 (0.027)
Gender = 1	-0.037* (0.021)	-0.037* (0.021)	-0.040* (0.021)	-0.036* (0.021)	-0.034 (0.021)	-0.037* (0.021)
Relative abroad = 1	0.131*** (0.022)	0.130*** (0.022)	0.135*** (0.022)	0.133*** (0.022)	0.131*** (0.022)	0.135*** (0.022)
Tie = 1	-0.065*** (0.023)	-0.053** (0.023)	-0.059** (0.023)	-0.065*** (0.023)	-0.053** (0.024)	-0.058** (0.023)



Positive saving = 1	-0.088***	-0.091***	-0.091***	-0.085***	-0.087***	-0.086***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Shortage in number of applicants	0.223			0.253*		
	(0.148)			(0.152)		
Shortage in skilled applicants		-0.426***			-0.467***	
		(0.110)			(0.115)	
Shortage in experienced applicants			-0.391***			-0.460***
			(0.116)			(0.123)
Clerks				0.079**	0.050	0.071**
				(0.034)	(0.034)	(0.033)
Craft workers				0.067*	0.078**	0.098***
				(0.036)	(0.036)	(0.036)
Manual workers				0.072*	0.050	0.074*
				(0.042)	(0.042)	(0.041)
Constant						
	2,132	2,132	2,132	2,132	2,132	2,132
Observations	0	0	0	0	0	0
k_margins	0	0	0	0	0	0
numeric	0	0	0	0	0	0
is_xb1	1	1	1	1	1	1
deriv1	0	0	0	0	0	0
j1_1	0	0	0	0	0	0
j2_1	0	0	0	0	0	0
outcomesEq1	1	1	1	1	1	1
k_predict	1	1	1	1	1	1
k_by	0	0	0	0	0	0

Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01.

Note: Because the marginal effects of variables are presented here, the interaction terms between the variables are not included in this table (but are provided in the main estimation results presented in Table 5).



Table A3 - McFadden's Choice Model of migration destination decision in the second stage, using the IMR from the model in the first stage that includes lack of applicants in the origin country

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)				
Destination-related variable																											
Shortage of labour in destination = 1	0.544*** (0.155)																										
Individual-related variables		AT	BE	BG	CY	CZ	DK	EL	ES	FI	FR	HR	HU	IE	IT	LU	MT	NL	PT	RO	SE	SI	UK				
Inverse Mills Ratio		-0.750 (2.358)	-4.518 (2.812)	-13.74 (12.58)	-0.386 (4.891)	79.45*** (18.18)	-3.004 (2.807)	-	7.584*** (2.034)	-4.340 (5.737)	-1.235 (2.501)	-	5.251*** (2.485)	-6.080* (3.559)	89.23*** (11.92)	-11.15* (6.619)	-3.435 (2.522)	-5.900 (4.050)	6.830** (3.365)	-0.538 (2.522)	3.317 (9.485)	-	-	33.47*** (6.329)	6.847*** (1.996)	-4.537 (4.216)	-0.723 (2.518)
Age		0.00276 (0.0624)	0.0633 (0.0756)	0.188 (0.279)	0.0985 (0.165)	1.345*** (0.251)	0.0208 (0.0796)	0.205*** (0.0572)	0.00630 (0.146)	-0.0427 (0.0788)	0.122** (0.0615)	0.138 (0.0944)	2.591*** (0.397)	0.145 (0.132)	0.0919 (0.0678)	0.122 (0.117)	0.251*** (0.0930)	0.00501 (0.0705)	-0.142 (0.246)	-0.362** (0.161)	0.161*** (0.0536)	0.0743 (0.107)	-0.0121 (0.0706)				
Household size		0.436** (0.183)	-0.310 (0.210)	-0.102 (0.421)	-0.501 (0.517)	-0.0288 (0.471)	-0.262 (0.214)	0.350*** (0.134)	-0.939** (0.442)	-0.235 (0.347)	-0.0841 (0.139)	-0.412 (0.421)	26.01*** (1.113)	-1.408** (0.702)	-0.249* (0.146)	1.007*** (0.183)	0.231 (0.259)	-0.0442 (0.183)	-0.946* (0.554)	4.231*** (0.656)	-0.277 (0.171)	-	0.424** (0.206)	0.0719 (0.155)			
Marital status = 1		0.293 (0.454)	1.258* (0.693)	4.580*** (1.290)	-0.462 (0.798)	7.498*** (1.882)	1.507** (0.634)	-0.311 (0.486)	1.581* (0.938)	0.185 (0.972)	0.532 (0.407)	0.777 (1.268)	40.35*** (6.209)	0.197 (0.974)	-0.416 (0.511)	-1.411 (0.900)	-0.221 (0.463)	-0.209 (0.583)	1.663*** (0.569)	-	8.271*** (1.118)	-0.478 (0.511)	-0.637 (0.568)	-0.0848 (0.561)			
Education level = 2		0.955 (0.647)	0.0447 (0.551)	-0.264 (1.321)	-1.831* (1.048)	29.39*** (5.059)	0.343 (0.700)	-0.457 (0.411)	-0.289 (0.825)	0.258 (0.668)	-0.655 (0.542)	-0.411 (0.624)	46.69*** (2.028)	2.706 (3.360)	0.171 (0.444)	-0.0827 (0.761)	-1.502** (0.723)	1.509** (0.638)	-1.272** (0.627)	-	4.510*** (1.071)	0.681 (0.657)	0.0812 (0.858)	0.406 (0.431)			
Education level = 3		0.867 (0.627)	0.519 (0.594)	0.768 (1.212)	-2.067 (1.540)	12.87*** (4.399)	0.615 (0.682)	1.385*** (0.521)	0.221 (0.737)	0.358 (0.639)	0.104 (0.554)	-1.720 (1.165)	46.28*** (2.365)	2.771 (2.877)	-0.319 (0.489)	-0.147 (0.479)	-0.970 (0.819)	-0.235 (0.589)	-0.577 (1.298)	1.897** (0.820)	0.484 (0.686)	0.0949 (0.929)	0.840* (0.439)				
Household head		-0.335 (0.414)	0.0969 (0.500)	-2.019 (1.500)	0.836 (0.704)	14.19*** (4.887)	-0.347 (0.490)	-0.0521 (0.358)	1.430 (0.956)	0.252 (0.933)	-0.453 (0.361)	-1.569* (0.865)	-11.17*** (3.438)	-1.375 (1.015)	-1.067** (0.422)	1.907*** (0.407)	1.464*** (0.686)	0.405 (0.534)	-1.127 (1.655)	9.758*** (2.014)	0.299 (0.362)	0.890 (0.739)	-0.700* (0.391)				
Unemployed = 1		-0.298 (0.449)	-1.039 (0.792)	25.12*** (0.796)	0.0346 (1.093)	25.96*** (1.216)	-0.448 (0.647)	-0.974** (0.479)	24.93*** (0.647)	26.02*** (0.501)	-0.848* (0.506)	-0.0403 (0.860)	12.92*** (2.625)	25.84*** (0.661)	1.637*** (0.575)	24.46*** (0.566)	0.809 (0.786)	-1.589 (1.052)	-1.589 (0.761)	23.50*** (1.149)	-1.052* (0.563)	0.526 (0.571)	1.564** (0.627)				
Child 0-18 = 1		-0.663 (0.502)	-0.0919 (0.537)	-1.836** (0.923)	0.984 (1.219)	8.587*** (2.878)	-0.694 (0.543)	0.0756 (0.409)	0.769 (0.876)	-0.823 (1.006)	-0.461 (0.523)	-0.0260 (1.180)	52.87*** (5.691)	2.672*** (0.982)	0.539 (0.532)	0.786 (0.860)	-0.390 (0.812)	0.113 (0.679)	0.654 (2.768)	8.442*** (1.095)	-0.442 (0.510)	0.106 (0.622)	-0.874* (0.497)				
Gender = 1		-0.318 (0.487)	0.202 (0.619)	-0.738 (1.811)	1.463 (1.032)	19.43*** (6.163)	0.118 (0.519)	0.394 (0.425)	0.525 (0.978)	0.691 (0.541)	-0.213 (0.452)	-1.236 (0.937)	45.33*** (2.413)	0.754 (1.114)	0.275 (0.457)	1.139 (1.189)	-0.0155 (0.825)	-1.131* (0.637)	-1.247 (2.515)	5.813*** (0.879)	0.618* (0.349)	0.514 (0.766)	0.350 (0.402)				
Relative abroad = 1		-0.572 (0.708)	-1.412* (0.831)	-3.155 (2.962)	0.940 (1.299)	22.70*** (6.268)	-1.404 (0.940)	-0.960 (0.620)	-0.601 (1.542)	-0.458 (1.187)	1.558** (0.692)	-1.474 (0.925)	18.97*** (3.051)	-1.928 (1.546)	-1.209 (0.736)	-1.845 (1.784)	-0.295 (1.311)	-0.465 (0.888)	16.10*** (3.160)	-13.15*** (1.591)	2.114*** (0.661)	-0.891 (1.274)	-0.221 (0.760)				
Positive saving = 1		-0.493 (0.701)	1.809*** (0.681)	16.29*** (1.833)	2.226 (1.420)	5.642*** (1.662)	1.632** (0.687)	1.405** (0.587)	2.210* (1.321)	-0.00912 (0.986)	1.368** (0.688)	1.530* (0.791)	7.510*** (2.439)	15.52*** (1.463)	0.503 (0.663)	2.595** (1.262)	-1.812 (1.394)	-0.741 (0.944)	3.058*** (1.144)	38.38*** (1.824)	0.208 (0.674)	2.049** (0.959)	-0.347 (0.599)				
Shortage of labour (origin)		0.148 (2.428)	-5.401 (3.701)	-3.413 (15.82)	4.941 (5.740)	26.42*** (3.346)	-2.404 (3.346)	-7.179*** (2.402)	2.444 (5.967)	-1.582 (6.255)	-5.191* (2.912)	-4.809 (6.225)	211.5*** (12.23)	6.104 (7.794)	8.555*** (2.740)	-24.99** (10.39)	-4.986 (8.137)	-2.001 (3.381)	-6.010 (8.207)	42.13*** (7.021)	-3.416 (2.380)	-5.379 (3.353)	-3.096 (2.283)				
Observations	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790

Robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01.



Table A4 - McFadden's Choice Model of migration destination aspiration in the second stage, using the IMR from the model in the first stage that includes lack of experienced applicants in the origin country

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	
Destination-related variable																								
Shortage of labour in destination = 1		0.540*** (0.160)																						
Individual-related variables	AT	BE	BG	CY	CZ	DK	EL	ES	FI	FR	HR	HU	IE	IT	LU	MT	NL	PT	RO	SE	SI	UK		
Inverse Mills Ratio	-0.0819 (2.547)	-1.281 (3.352)	-8.489 (12.54)	14.35** (5.792)	-416.6*** (26.87)	-0.764 (3.741)	-7.061*** (2.371)	-2.829 (6.611)	3.015 (2.741)	-4.797 (2.960)	-3.412 (4.574)	267.2*** (11.69)	-12.04* (6.755)	-0.691 (3.212)	-2.903 (6.865)	14.29*** (4.409)	3.390 (3.151)	27.44* (14.01)	3.928 (9.890)	-5.041** (2.354)	-5.403 (4.351)	3.330 (3.033)		
Age	-0.0137 (0.0633)	-0.0216 (0.0893)	0.0494 (0.249)	-0.456** (0.178)	6.867*** (0.590)	-0.0366 (0.0969)	0.176*** (0.0604)	-0.0465 (0.158)	-0.145* (0.0811)	0.102 (0.0680)	0.0649 (0.119)	7.398*** (0.323)	0.176 (0.155)	0.0230 (0.0803)	0.0436 (0.182)	0.424*** (0.115)	-0.0936 (0.0824)	-0.807** (0.369)	-1.433*** (0.359)	0.109* (0.0591)	0.0864 (0.106)	-0.109 (0.0755)		
Household size	-0.418** (0.194)	-0.240 (0.252)	0.0185 (0.328)	-0.0421 (0.432)	3.283*** (0.240)	-0.212 (0.148)	0.450*** (0.148)	-0.933* (0.496)	-0.104 (0.365)	0.156 (0.156)	-0.418 (0.415)	20.94*** (1.064)	-1.442** (0.639)	-0.181 (0.177)	0.979*** (0.229)	0.598* (0.312)	0.116 (0.233)	0.242 (0.321)	-5.514*** (0.670)	-0.295 (0.181)	-0.515*** (0.187)	0.210 (0.165)		
Marital status = 1	0.306 (0.447)	1.432* (0.739)	5.102*** (0.930)	0.251 (1.015)	97.60*** (4.923)	1.643** (0.654)	-0.208 (0.478)	1.580* (0.888)	0.373 (0.993)	0.559 (0.397)	0.931 (1.212)	78.50*** (3.733)	-0.0577 (1.009)	-0.308 (0.542)	-1.273 (0.926)	-0.0611 (0.451)	-0.0521 (0.647)	3.404*** (0.991)	-	5.983*** (1.887)	-0.367 (0.502)	-0.640 (0.572)	0.0856 (0.572)	
Education level = 2	1.035 (0.666)	0.0159 (0.683)	-0.583 (1.802)	-1.319 (0.979)	-109.5*** (3.093)	0.384 (0.747)	-0.981** (0.417)	-0.151 (1.238)	0.619 (0.717)	-0.972** (0.483)	-0.628 (0.765)	24.65*** (1.550)	1.074 (1.781)	0.189 (0.493)	-0.432 (0.562)	-0.846 (0.830)	-1.115* (0.640)	0.275 (1.022)	-1.684 (2.008)	0.329 (0.591)	-0.380 (0.808)	0.716 (0.501)		
Education level = 3	0.925 (0.652)	0.455 (0.653)	0.602 (0.560)	-1.392 (1.193)	-103.1*** (3.118)	0.634 (0.704)	-1.804*** (0.512)	0.451 (1.073)	0.604 (0.524)	-0.172 (0.499)	-1.921 (1.217)	-21.95*** (1.592)	1.876 (1.664)	-0.421 (0.535)	-0.583 (0.544)	-0.629 (0.974)	-0.427 (0.626)	1.154 (2.053)	4.335*** (1.655)	0.200 (0.619)	-0.286 (0.895)	1.026** (0.497)		
Household head	-0.333 (0.409)	0.0475 (0.508)	-2.120 (1.668)	1.533* (0.876)	57.84*** (2.509)	-0.376 (0.484)	-0.308 (0.339)	1.405 (0.876)	0.359 (0.970)	-0.562 (0.359)	-1.725** (0.784)	12.37*** (2.223)	-1.220 (0.929)	-1.090** (0.442)	1.515*** (0.568)	2.041*** (0.712)	0.529 (0.590)	-0.663 (1.569)	9.490*** (2.670)	0.183 (0.365)	0.651 (0.640)	-0.623 (0.410)		
Unemployed = 1	-0.295 (0.445)	-1.030 (0.797)	-27.11*** (0.893)	0.336 (1.015)	-125.3*** (4.683)	-0.413 (0.657)	-1.171** (0.469)	26.93*** (0.556)	-27.78*** (0.521)	-0.932* (0.497)	-0.0602 (0.899)	9.072*** (2.536)	-27.87*** (0.675)	-1.525*** (0.575)	26.80*** (0.632)	1.249 (0.804)	-1.375 (1.088)	24.95*** (0.933)	32.78*** (1.241)	-1.137** (0.561)	0.329 (0.627)	-1.466** (0.651)		
Child 0-18 = 1	-0.627 (0.507)	0.0489 (0.539)	-1.718** (0.804)	1.131 (1.370)	120.1*** (4.865)	-0.598 (0.544)	0.240 (0.400)	0.890 (0.854)	0.890 (0.982)	-0.353 (0.508)	0.163 (1.139)	51.57*** (2.513)	2.514*** (0.705)	0.732 (0.541)	1.092 (0.727)	0.213 (0.808)	0.919 (0.664)	-4.517*** (2.423)	-0.287 (1.713)	0.214 (0.514)	-0.757 (0.578)			
Gender = 1	-0.389 (0.496)	-0.0967 (0.602)	-1.169 (1.765)	0.166 (0.914)	107.2*** (3.585)	-0.105 (0.575)	0.262 (0.426)	0.194 (0.980)	0.376 (0.596)	-0.272 (0.462)	-1.536 (0.955)	54.49*** (2.670)	0.833 (1.235)	0.0354 (0.494)	0.974 (1.550)	-0.402 (0.838)	-1.408** (0.682)	-3.323 (2.755)	4.096*** (1.181)	0.446 (0.347)	0.543 (0.758)	0.0344 (0.421)		
Relative abroad = 1	-0.390 (0.788)	-0.563 (0.987)	-2.072 (3.239)	4.850** (2.117)	-110.2*** (7.158)	-0.798 (1.187)	-0.914 (0.684)	-0.0695 (1.715)	0.676 (1.153)	-1.484* (0.835)	-0.790 (1.236)	62.67*** (3.122)	-2.332 (1.894)	-0.430 (0.922)	-1.065 (2.627)	1.476 (1.021)	0.599 (4.331)	-10.74** (1.021)	7.928*** (2.540)	-1.692** (0.772)	-1.188 (1.337)	0.864 (0.878)		
Positive saving = 1	-0.592 (0.728)	1.207 (0.774)	-18.66*** (1.369)	-0.553 (1.302)	63.65*** (5.790)	1.227 (0.830)	1.267** (0.627)	2.015 (1.597)	-0.824 (0.771)	1.277* (0.828)	1.043 (1.430)	-41.79*** (3.082)	-16.81*** (1.430)	-0.0458 (0.736)	1.901* (1.134)	-3.340* (1.806)	-1.405 (1.060)	-1.802 (1.876)	36.74*** (2.391)	-0.104 (0.714)	2.202** (1.007)	-1.141* (0.661)		
Shortage of labour (origin)	-0.567 (2.656)	-3.153 (4.434)	-1.928 (6.474)	-14.08*** (4.748)	487.3*** (27.23)	-2.246 (3.567)	4.936* (2.627)	1.441 (5.090)	-6.342* (3.280)	1.955 (3.045)	0.297 (5.025)	232.2*** (12.97)	12.66 (9.445)	-6.066* (3.587)	-7.663* (4.234)	-17.41*** (6.636)	8.860** (3.956)	-27.97** (11.52)	38.35*** (9.440)	1.895 (2.896)	3.678 (4.560)	-7.198* (3.737)		
Observations	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790	16,790

Robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01.



Table A5 – The descriptive statistics of the main determinants of migration aspirations and destination, separation by the aspiration to migrate

Variables	Total sample					Aspiration to migrate = Yes					Aspiration to migrate = No				
	Observations	Mean	Standard deviation	Min.	Max.	Observations	Mean	Standard deviation	Min.	Max.	Observations	Mean	Standard deviation	Min.	Max.
Individual characteristics															
Gender = 1	2,132	0.45	0.50	0	1	730	0.43	0.50	0	1	1,402	0.46	0.50	0	1
Age	2,132	46.98	14.21	18	89	730	40.26	11.51	18	68	1,402	50.47	14.23	18	89
Education level = 1	2,132	0.14	0.35	0	1	730	0.11	0.31	0	1	1,402	0.15	0.36	0	1
Education level = 2	2,132	0.58	0.49	0	1	730	0.56	0.50	0	1	1,402	0.59	0.49	0	1
Education level = 3	2,132	0.28	0.45	0	1	730	0.33	0.47	0	1	1,402	0.25	0.43	0	1
Managers/professionals = 1	2,132	0.15	0.36	0	1	730	0.15	0.36	0	1	1,402	0.15	0.36	0	1
Clerks = 1	2,132	0.24	0.42	0	1	730	0.26	0.44	0	1	1,402	0.22	0.42	0	1
Craft workers = 1	2,132	0.43	0.50	0	1	730	0.42	0.49	0	1	1,402	0.43	0.50	0	1
Manual workers = 1	2,132	0.18	0.39	0	1	730	0.17	0.37	0	1	1,402	0.19	0.39	0	1
Unemployed = 1	2,132	0.13	0.33	0	1	730	0.14	0.35	0	1	1,402	0.12	0.32	0	1
Marital status = 1	2,132	0.73	0.45	0	1	730	0.69	0.46	0	1	1,402	0.75	0.44	0	1
Household head	2,132	0.54	0.50	0	1	730	0.51	0.50	0	1	1,402	0.56	0.50	0	1
Household characteristics															
Household size	2,132	3.25	1.40	1	8	730	3.48	1.30	1	8	1,402	3.13	1.44	1	8
Child 0-18 = 1	2,132	0.40	0.49	0	1	730	0.49	0.50	0	1	1,402	0.35	0.48	0	1
Relative abroad = 1	2,132	0.28	0.45	0	1	730	0.35	0.48	0	1	1,402	0.24	0.43	0	1
Tie=1	2,132	0.69	0.46	0	1	730	0.69	0.46	0	1	1,402	0.69	0.46	0	1
Positive saving = 1	2,132	0.24	0.43	0	1	730	0.19	0.40	0	1	1,402	0.26	0.44	0	1
Labour shortage in the origin															
Shortage in number of applicants	2,132	0.09	0.07	0.003	0.243	730	0.10	0.07	0.003	0.243	1,402	0.09	0.06	0.003	0.243
Shortage in skilled applicants	2,132	0.17	0.09	0.018	0.282	730	0.16	0.09	0.018	0.282	1,402	0.18	0.08	0.018	0.282
Shortage in experienced applicants	2,132	0.19	0.08	0.017	0.355	730	0.18	0.08	0.017	0.355	1,402	0.19	0.09	0.017	0.355
Labour shortage in the destination															
Shortage in the destination = 1	-	-	-	-	-	730	0.72	0.45	0	1	-	-	-	-	-

Sources: OeNB Euro Survey for 2019; Eurostat; World Bank STEP Program; authors' calculations.



Table A6 - Variables and their definitions

Variable	Definition
Individual characteristics	
Age	The age of the respondent.
Marital status	The marital status of the respondent (1 if married, 0 otherwise).
Education level	The highest level of education attained by the respondent according to the International Standard Classification of Education (ISCED 1997) classification: (1) low education level (pre-primary or primary education: ISCED-0-ISCED-1); (2) medium education level (lower or upper secondary education or post-secondary non-tertiary education: ISCED2-ISCED3-ISCED4); (3) high education level (first or second stage of tertiary education: ISCED5-ISCED6).
Household head	Binary whether the respondent is the head of the household (1 if yes, 0 otherwise).
Unemployed	Binary whether the respondent is unemployed (1 if unemployed, 0 otherwise).
Gender	Binary for the gender of the respondent (1 if female, 0 otherwise).
Household characteristics	
Household size	The size of the household.
Relative abroad	Whether the respondent has a close family member who lives or works abroad (1 if yes, 0 otherwise).
Child 0-18	Whether the household has children aged 0-18 (1 if yes, 0 otherwise).
Tie	Whether the household owns both a car and a house/apartment (1 if yes, 0 otherwise).
Household income exceeds expenses - 12 months savings	Whether the household income exceeded its expenses over the last 12 months (1 if the household income exceeded its expenses, and 0 otherwise).
Origin country variables	
Occupation	The current or past occupation of the respondent based on the International Standard Classification of Occupations (ISCO-08): (1) managers (ISCO-1); (2) professionals (ISCO-2); (3) technicians and associate professionals (ISCO-3); (4) clerical support workers (ISCO-4); (5) service and sales workers (ISCO-5); (6) skilled agricultural, forestry and fishery workers (ISCO-6); (7) craft and related trades workers (ISCO-7); (8) plant and machine operators, and assemblers (ISCO-8); (9) elementary occupations (ISCO-9).
Occupational group	The occupational group of the respondent (ISCO-based): (1) managers/ professionals (ISCO-1, ISCO-2 and ISCO-3); (2) clerks (ISCO-4 and ISCO-5); (3) craft workers (ISCO-6 and ISCO-7); (4) manual workers (ISCO-8 and ISCO-9).



Shortage of labour

The ratio of firms encountering difficulty in hiring labour owing to lack of labour for each of the nine ISCO-08 occupations in the World Bank STEP Program in Western Balkan countries (Albania, Bosnia and Herzegovina, and Serbia). The ratio is adjusted by employment shares and aggregated by country and occupation.

Shortage of skilled labour

The ratio of firms encountering difficulty in hiring skilled labour owing to lack of skilled labour for each of the nine ISCO-08 occupations in the World Bank STEP Program in Western Balkan countries (Albania, Bosnia and Herzegovina, and Serbia). The ratio is adjusted by employment shares and aggregated by country and occupation.

Shortage of experienced labour

The ratio of firms encountering difficulty in hiring experienced labour owing to lack of experienced labour for each of the nine ISCO-08 occupations in the World Bank STEP Program in Western Balkan countries (Albania, Bosnia and Herzegovina, and Serbia). The ratio is adjusted by employment shares and aggregated by country and occupation.

Destination country variables

Shortage of labour

A binary variable based on the three-year growth rate of the adjusted job vacancy rate (JVR) for each of nine ISCO-08 occupations in the destination country in the EU, between 2017 and 2019. The adjusted JVRs are calculated by reweighting the JVR by country and industry by considering the employment shares. This binary indicator takes a value of 1 if the growth rate is positive, and 0 otherwise. When the indicator is 1, it indicates the presence of a labour shortage in the corresponding country and occupation.

Sources: OeNB Euro Survey for 2019; Eurostat; World Bank STEP Program.



GS4S Working paper series (D7.3)

Working paper no. 1

Skills-oriented migration in the Western Balkans: Linking workers' migration aspirations to skill shortages in destination and origin countries

About GS4S

GS4S seeks to better understand global skills shortages in selected sectors (Digital, Care and Construction) and strengthens evidence-based and multi-level policies on labour migration governance. The project provides new knowledge on alternative and equitable ways for addressing skills shortages in six regions (EU, EEA, Western Balkan, Middle East and Northern Africa, West Africa, and South/South-East Asia).

www.gs4s.eu



Funded by
The European Union