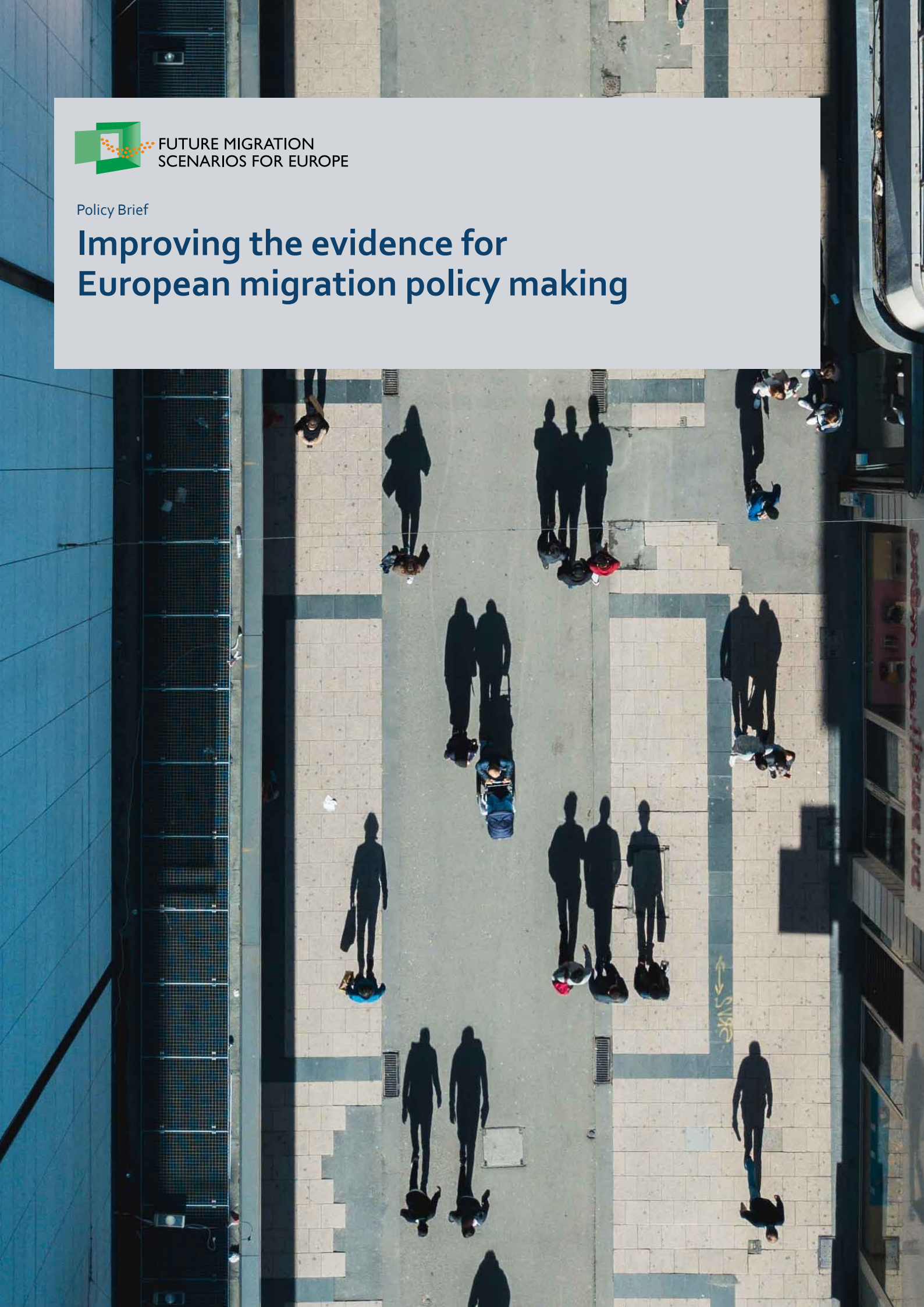
FUTURE MIGRATION
SCENARIOS FOR EUROPE

Policy Brief

Improving the evidence for European migration policy making



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Improving the evidence for European migration policy making

ISBN 978-91-8001-068-9
DOI 10.5281/zenodo.8013345

Funded by the EU Horizon 2020 Programme under Grant ID 870649

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Cover photo: Aurelien Romain/Unsplash.com
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Introduction

Migration is an important driver of population change in the European Union. Since 2011, the population in the 27 EU member states has increased by around 8 million people. This increase has been entirely due to migration since natural population change – the difference between births and deaths – was negative during this period. In other words, without international migration, the population in the EU would have declined during the past decade.

International migration will also be a key factor for demographic developments in the future. Projections about future migration flows to, within, and from Europe are therefore important for future policy making. Knowing the expected size and composition of migration flows can help policy makers design strategies for rural and urban development, public service provision, labour market issues, and integration.

The Horizon 2020 project 'Future migration scenarios for Europe (FUME)' focuses on understanding the patterns, motivations, and modalities of migration at multiple geographical scales, from international through regional to the local, and on developing possible future scenarios of migration to Europe. These scenarios shall improve our understanding of the complexity and diversity of migration – and support migration policies, integration measures, labour market and cohesion policies at different governance levels.

This is the second of two policy briefs that summarize key findings of the FUME project. The first policy brief highlights why people from origin countries decide to migrate and which factors influence their decision on where to go. It also presents qualitative scenarios which describe possible future socio-economic trajectories in Europe and their implications for migration trends. This second policy brief synthesizes central results from quantitative migration and population projections that were produced as part of the FUME project. The projections model future migration flows to and within the EU and project the population in EU member states at an unprecedented level of detail, including by age, sex, level of education, and country of origin. In addition, FUME projections cover various spatial levels, from the international to the national to the local. This policy brief also describes how emerging big data sources were used to gain a better understanding of migration flows. It concludes by highlighting key messages and recommendations.

Picture: Sokha Michael/Unsplash.com

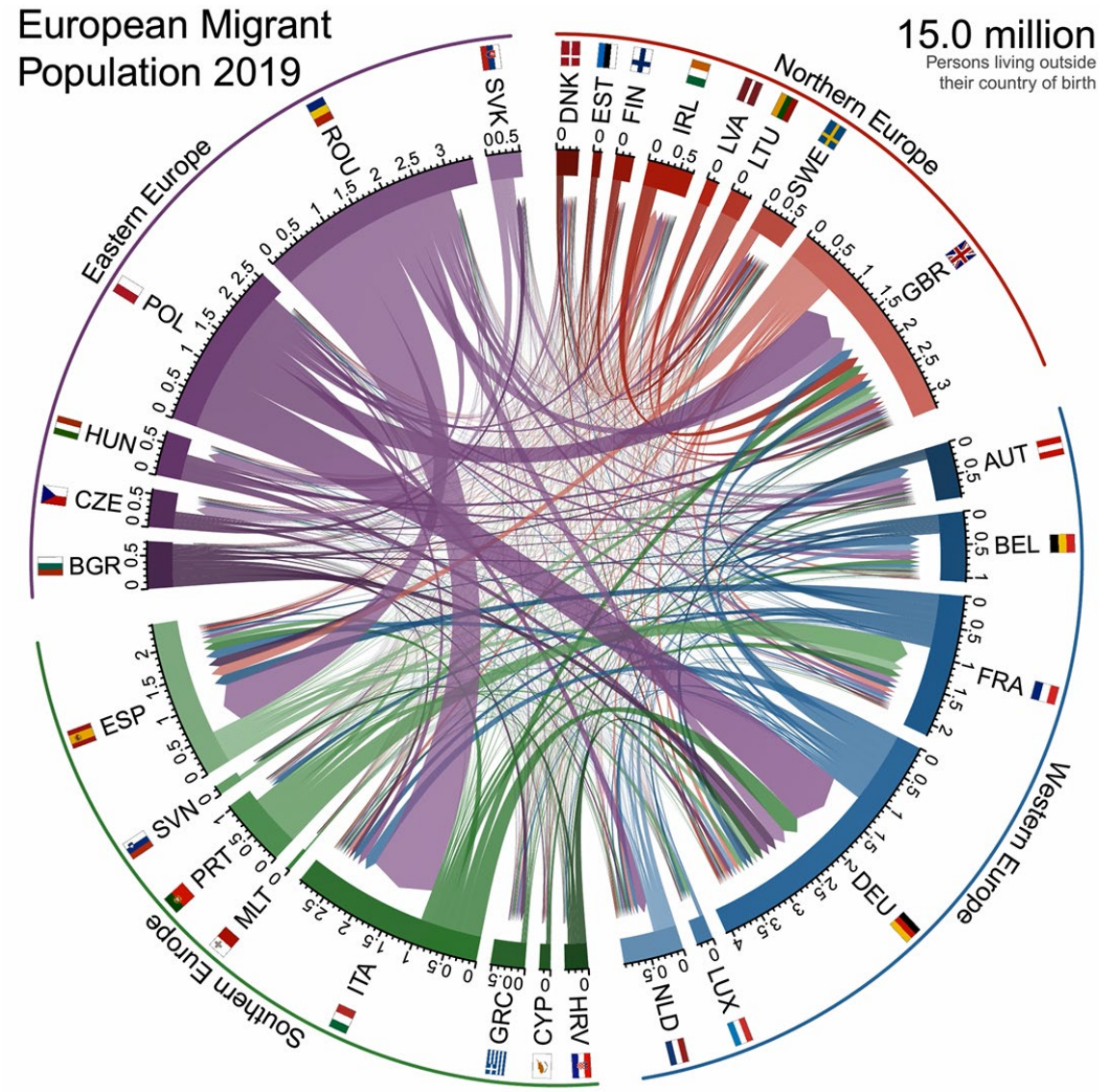
How can big data improve our understanding of migration trends to and within Europe?

Up-to-date information on the nature and extent of migration is important for policymaking. Nonetheless, timely and accurate statistics on the number of immigrants who move to and within the EU, as well as the number of emigrants who leave the EU, are not always readily available. Official migration statistics from national statistical offices and Eurostat are often published with a time lag of one to two years. The statistics also have varying levels of accuracy and comparability since different national statistical offices in the EU use various mechanisms to collect migration data. Underreporting of migrants and missing values also create challenges. Due to these different issues, official migration statistics only provide a partial picture of migration patterns in Europe.

The FUME project analysed how large quantities of data derived from social media ('big data') can be used to complement traditional data sources and refine our knowledge of migration trends. FUME researchers explored the potentials of the Facebook Advertising Platform and Google Trends, the latter an online resource that summarises big data from Google searches. Even though these data are not free from shortcomings and biases, an obvious advantage is their almost instantaneous availability, allowing for much more rapid analyses than has been possible with more traditional data sources. FUME researchers developed statistical models that can integrate traditional migration statistics, based on census data, register data or survey data, with these big data sources. The combination of these various data sources opens new possibilities to provide near real-time estimates ('nowcasts') of changes in migrant stocks and flows in the EU.

Figure 1 shows an example of the results that can be obtained with the new models. The chart represents the estimated stock of intra-EU migrants in the EU member states and the UK in 2019. It is based on census data, official administrative data submitted to Eurostat, data from the Labour Force Survey and Facebook. An animated version of this figure, showing changes in migration stock between 2011 and 2019, is also available on the FUME website. The width of each chord indicates the size of the migrant stock (in millions), while the arrowhead points to the country of residence. The colour represents the region of origin. These new estimates of migrant stocks show that Romania and Poland are the two most important sending countries in the EU, with 2.5 and 3 million migrants from these countries living in another EU member state or the UK. Germany and the United Kingdom are the most important receiving countries of EU migration, each being home to around 2.6 million EU migrants.

Figure 1. Intra-EU migrants: Stocks of migrants in the EU that originate from another EU member state (in millions, 2019)
Source and copyright: Wiśniowski, Aparicio-Castro and Yildiz (2023).



How will migration flows to Europe develop in the future, and how will this influence demographic trends in the EU member states?

Predicting future migration flows and their impact on population dynamics in Europe is challenging. Some drivers of migration are difficult to foresee, such as wars, natural disasters, and economic or political shocks. Other factors that influence migration trends are more predictable but have so far not been systematically considered in existing projection models. Such factors include natural population change which may create migration pressures in sending countries or demand for labour migrants in receiving countries. In addition, differences between wages and income in origin and destination countries as well as the size of migrant communities in destination countries (diasporas) are known to influence migration flows but have so far not been systematically included in migration models.

One of the main objectives of FUME has been to improve our capacity to model future migration flows, and to estimate the impacts of migration on population dynamics in Europe at different spatial levels. To achieve this, FUME researchers developed two novel and innovative models:

• First, a dynamic model of global bilateral migration flows (hereafter: FUME migration model) which projects migration bilaterally between all countries of the world and distinguishes between outmigration, transit migration and return migration. The model also captures the effects of age and education on migration propensity, and accounts for the influence of natural population change, income differentials between sending and receiving countries, as well as diaspora communities, on migration flows. It also considers that such influences may change over time. The FUME migration model is therefore a powerful tool to estimate the impact of possible future socio-economic trends on international migration.

• Second, a multi-dimensional demographic cohort-component model (hereafter: FUME population model) which can project European populations at national level by age, sex, level of educational attainment and country of birth. This model incorporates the migration flows that are projected with the FUME migration model.

Together, these two models offer opportunities to project migration and population trends in Europe at an unprecedented level of detail. As part of the FUME project, migration flows and population trends in the EU member states and the UK were projected from 2015 to 2050. Six scenarios were calculated, as described in Box 1.

Box 1: Population projection scenarios in FUME

The FUME projection scenarios are based on the Shared Socio-Economic Pathways (SSPs), a set of scenarios that were developed by the climate change research community (Dellink et al.2017, Koch and Leimbach 2023, O'Neill et al. 2017) as well as on qualitative narratives developed as part of the FUME project. Among the following six scenarios, three scenarios ('Rise of the East', 'Recovery in Europe' and 'Intensifying global competition') are directly derived from the FUME narratives, while the other three were defined as reference scenarios.

Benchmark scenario: This scenario is identical to SSP2, a "Middle of the Road" scenario which assumes that social, economic, and technological trends will follow historical patterns in the world. Inequalities in development and income between different world regions will persist and the world will only make slow progress towards achieving sustainable development goals. The impacts of the Covid-19 pandemic are considered in this scenario, but not the effects of the war in Ukraine.

Ukraine-war scenario: This scenario is like the Benchmark scenario but uses International Monetary Fund growth rate estimates until 2027 (International Monetary Fund 2022). For the years 2027 to 2032, a linear transition back to growth rates assumed under the Benchmark scenario is assumed.

Recovery in Europe scenario: This scenario is identical to the Ukraine-war scenario with the exception that European countries transition towards the SSP in which they have the highest growth rates after 2027. Developing countries and emerging economies, by contrast, are assumed to transition towards the SSP in which they have the lowest growth rates. These might be different SSPs for different countries. Industrialized countries outside of Europe are assumed to transition towards SSP2.

Rise of the East: This scenario assumes the opposite development as defined in the Recovery in Europe scenario. European countries transition towards the SSP in which they have the lowest growth rate after 2027, while developing countries and emerging economies transition towards the SSP in which they have the highest growth rates.

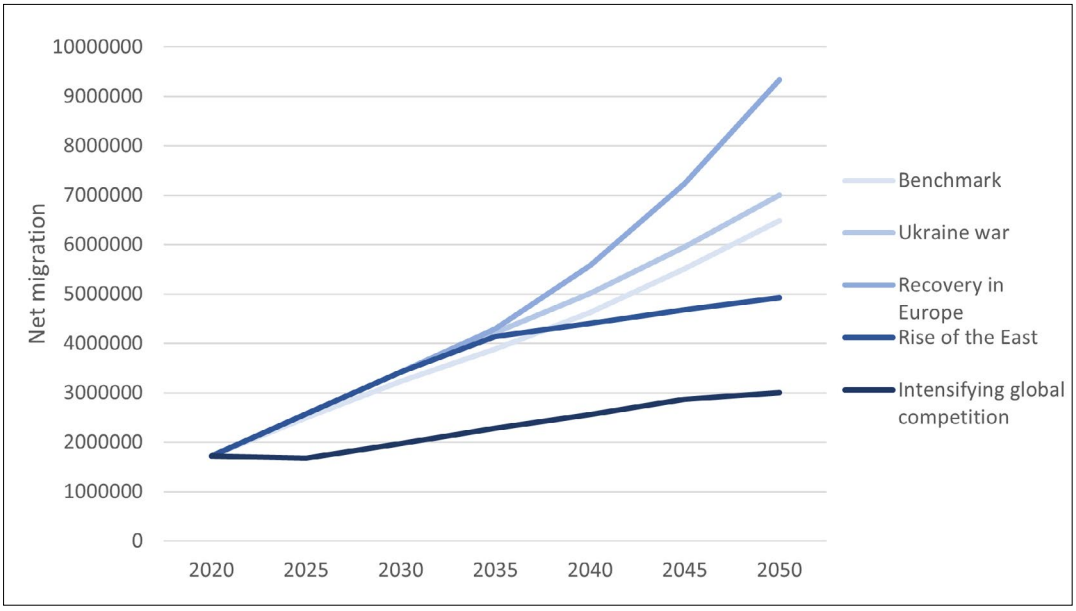
Intensifying global competition: This scenario is like the Ukraine-war scenario, but it assumes an economic 'catching-up' trend of poorer countries. Concretely, it is assumed that countries with a projected gross domestic product per capita (GDPc) below 15.000 USD in 2040 will linearly transition to 15.000 USD in 2040 and afterwards grow with SSP2 growth rates. All other countries will grow in the same way as in the Ukraine-war scenario.

No migration scenario: In this purely hypothetical scenario, it is assumed that no migration to, from or within Europe will occur in the future. This scenario serves to highlight the contribution of migration to demographic growth.

Figure 2 shows expected migration trends to the EU (including the United Kingdom) that were estimated with the FUME migration model under the six FUME scenarios. While a further differentiation into immigration, emigration, and transit migration as well as disaggregation by age, sex, country of birth and education is possible, here we focus on net migration numbers (i.e., the difference between the number of immigrants and emigrants).

Figure 2 shows that net migration numbers will increase in the future under all scenarios that were calculated. In other words, more migrants will come to the European Union than move away, and this difference will grow over time. The largest net migration numbers can be expected under the 'Recovery in Europe' scenario which assumes strong economic growth in the EU, leading to increases in the demand for foreign labour. Simultaneously, this scenario assumes low growth rates in developing countries and emerging economies, creating larger inequalities. By contrast, the lowest – but still positive – net migration numbers are projected in the 'Intensifying global competition' scenario. This scenario assumes that the economies in poorer world regions will catch up with Europe and grow strongly, reducing migration pressures from these countries. Nonetheless, even under this scenario, net migration numbers are assumed to increase from 2020 levels and remain at a consistently higher level than today.

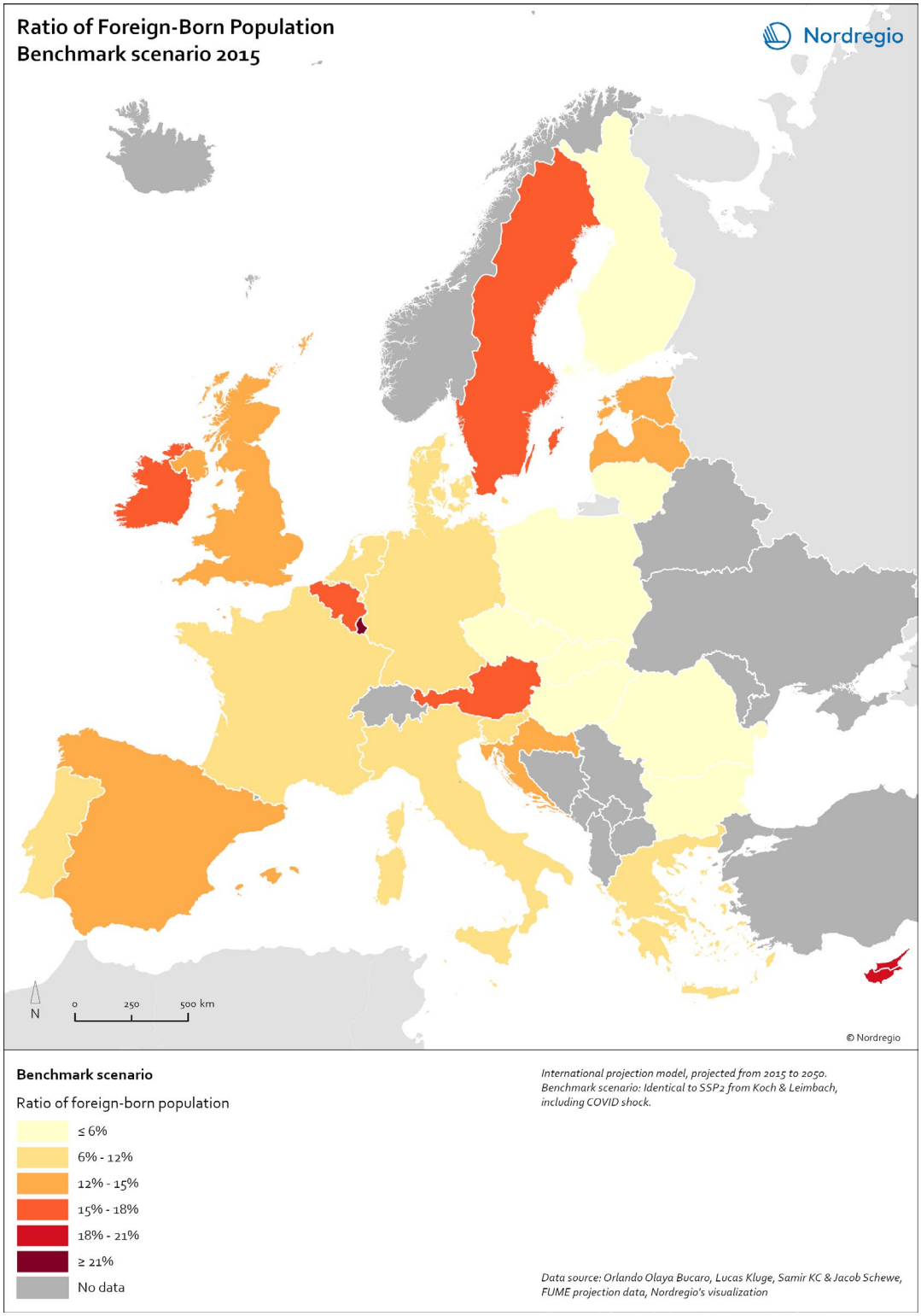
Figure 2: Future net migration numbers in Europe (EU and UK), 2020-2050, under various scenarios
Source: Own visualization based on data generated by the FUME migration model.



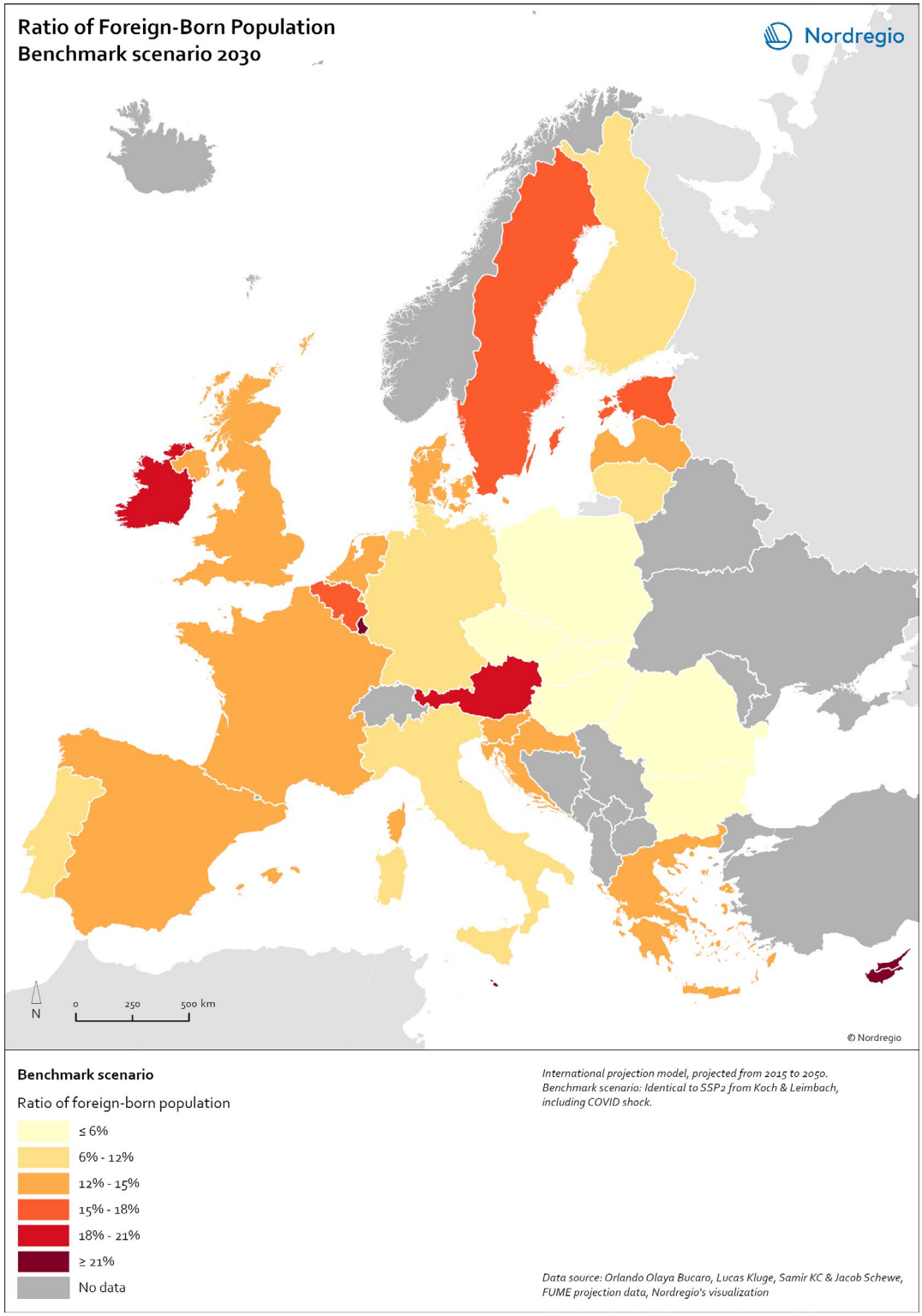
Future immigration, emigration and transit migration trends will influence population trends in Europe. They will, amongst others, affect levels of population growth or decline, population ageing, and they will increase the diversity of European populations. Figure 3 provides one example of such impacts that can be analysed with FUME population projection data. It shows the share of foreign-born people among the total population in the EU member states and the UK, both in 2015 and according to the benchmark scenario in 2030.

The countries that were home to the largest share of foreign-born people in 2015 were Luxembourg, Cyprus, Sweden, Belgium, Ireland, and Austria (left panel). In all these countries at least 15% of the population were born abroad. By 2030, Estonia will also belong to this group of countries. The proportion of the population born abroad will also visibly grow in several other European countries such as France, the Netherlands, Slovenia, Greece, and Finland. Nonetheless, in the Benchmark scenario, the proportion of foreign-born residents will remain below 15% in these countries.

Figure 3: Foreign-born population as a share of the total population, by country (2015 and projection for 2030, benchmark scenario)
Source: Maria Bobrinskaya, Nordregio map based on population and projection data generated by the FUME population model.



Since FUME projection data distinguish by age, sex, country of birth and education, the projection results also provide detailed socio-demographic information on the composition of migrant groups in each European country until 2050. All detailed projection results will be made available on a digital platform in the near future. Key projection results, a story map visualising migration trends, and other publications are available on the FUME project page.



What are the implications of projected migration trends for European regions and cities?

Population projections often focus on national-level population trends. Projections at regional level are also frequently conducted by Eurostat and some national statistical institutes, but these usually do not provide information on the composition of the population by country of birth or educational attainment. Nonetheless, information about possible future population trends at regional and local level, including insights into future migration flows, the settlement of migrants and population composition, are important for urban and rural planning, infrastructure development and resource allocation. Such information can also inform policies to counteract socio-spatial segregation.

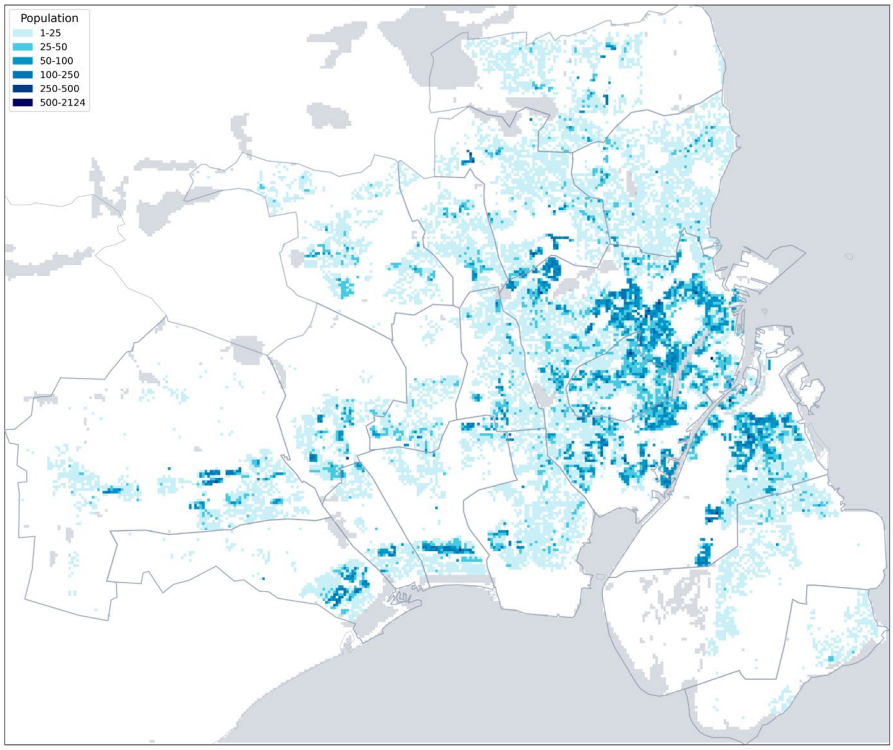
The FUME project has developed sub-national population projection models and used machine learning techniques to project the population in selected European regions and cities by age, sex, level of education and country of birth, building on the FUME population model results (see above). The project has focused on four city regions – Amsterdam, Copenhagen, Krakow and Rome – and projected population trends at regional and 100mx100m grid level.

The projections show that internal and international migration play an important role for population development in the four cities until 2050. In Amsterdam, the local population size will decline in the absence of future migration. In Krakow, the population declines in all projected scenarios, but future migration limits the decline. In Copenhagen and Rome, international migration is likely to lead to stronger population growth than would occur otherwise. In all four cities, there are strong differences in the development of various migrant groups. For example, in Copenhagen and Amsterdam migrant populations coming from other EU countries are projected to decline, while migrant communities originating from the Middle East and Africa are likely to increase in size. Since the population projections at regional level also focus on internal migration, they are also able to capture urbanisation and counter-urbanisation trends in each country.

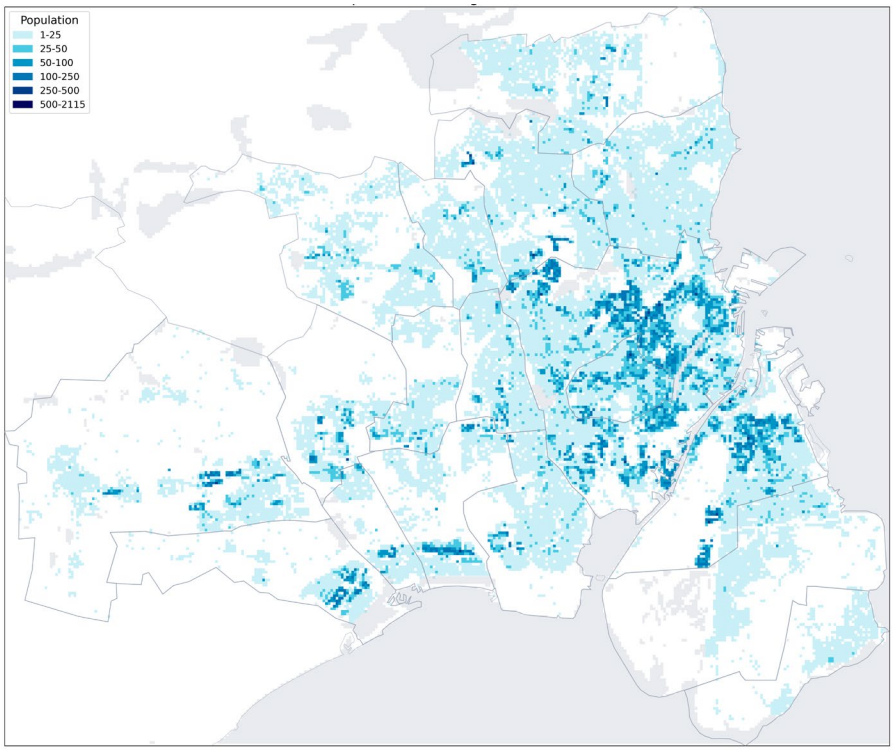
Figure 4 shows the spatial distribution of foreign-born residents living in the Capital Region of Denmark, with the first panel showing residential patterns in 2020, and the second panel showing the projected distribution under the benchmark scenario in 2030. Like many other European cities, Copenhagen has experienced rapid population growth in recent years, and international migration has been a key component driving this trend. Many neighbourhoods in the Capital Region have become much more diverse, especially in Copenhagen municipality and Frederiksberg (Figure 4, Panel a). In 2030, foreign-born Copenhageners will likely still cluster in the same neighbourhoods. Nonetheless, the projection shows that immigrants will live in many more neighbourhoods across the Capital Region, including in many areas where currently no immigrants live, as especially new development areas might be attractive for immigrants to settle in (Figure 4, Panel b). The population in the Capital Region of Denmark will therefore become diverse throughout.

Figure 4: Foreign-born population living in the Capital Region of Copenhagen
Source: Marina Georgati, Maps created for the FUME project based on Data from Statistics Denmark.

a) 2020



a) 2030 (benchmark scenario)



Key policy messages

Based on FUME research, several key messages emerge.

Immigration to Europe will continue. According to all scenarios that were calculated with the FUME migration and population models (except the hypothetical 'no migration' scenario) the EU will remain a region with positive net migration in the future, with more people moving to the EU than emigrating. European societies will therefore become more diverse and policy makers should plan accordingly.

Migration is key for future demographic developments in Europe. In the absence of future migration, the population in Europe is projected to decline in the future, and processes of population ageing would occur at an even faster rate. Future immigration to Europe can buffer trends of population ageing and population decline may be avoided, depending on the size of future immigration flows.

Migration is highly volatile. Migration flows are influenced by wars, pandemics, economic and other crises that are difficult to predict. Policy makers should expect and plan for volatile migration trends in the future, including temporary spikes in migration in crisis situations, and ensure that the needs of migrants can be met. A focus on creating resilient reception and integration systems is required. European cities need to be able to absorb sudden increases in migration that are driven by global crises in the future. This includes a better mapping of publicly owned housing and properties that could be used to host migrants in case of urgent need.

Climate change may become a more important factor for migration trends in the future. Research currently suggests that migration triggered by climate change is a rather marginal phenomenon. Nonetheless, if climate change leads to greater inequality between world regions, affects economic growth potentials and income opportunities in less developed countries, this may influence migration flows in the future, at regional but potentially also at a more global level.

There is a lack of reliable migration statistics. Despite its importance for demographic development in Europe, we face challenges in measuring and analysing migration trends. Migration is notoriously hard to capture with statistics, since some migration is undocumented, and definitions of migrants and migration change over time and may differ across institutions and countries. Circular and temporal forms of migration are particularly poorly captured by existing data sources. Traditional migration statistics based on register, survey or census data are also often published with delay, often have their own deficiencies, and may not always be available for all EU member states. To improve our knowledge of migration flows and migrant populations, new forms of data emerging from social media platforms such as Facebook or Twitter can be used. These data have the advantage that they are instantly available. Nonetheless, these big sources of data have disadvantages as well. For example, they face selection bias since not all migrants actively use social media.

More efforts and funding are therefore needed to combine different types of migration statistics. A combination of newer and more traditional data sources is required to improve our knowledge of migration trends. A collaboration between researchers, statistical offices and policy makers is needed to make more progress in this area. Increased efforts should also be placed on unifying and harmonizing migration registration systems across Europe. Border statistics that document often rapidly changing migration pressures at EU's borders need to be improved as well. Recent experiences in the context of the Ukraine war have shown that it is possible to move fast, combine data sources, and accelerate coordination between relevant institutions and authorities to gain a better overview of rapidly changing migrant flows. Even though some progress has been

made to better capture migration to and from Ukraine, there is a lot of room for improving and combining data sources to also capture migrant stocks and flows from other world regions.

Nowcasting of migration will become more important. The war in Ukraine has led to one of the largest displacements of people since the Second World War. This experience powerfully shows that migration trends can change rapidly in crisis situations. In such contexts, it is important that information about shifting migration flows and estimations of the number of arrivals can be provided at very short notice, so that public authorities and civil society can react and mobilize support. Methods to 'nowcast' migration flows, as they have been developed and tested in the FUME project, can help to provide this type of information. Nowcasting measures use large data sources such as Facebook data to indicate almost in real time where and when people move. Further support and funding should be allocated to develop these methods and make them available and applicable in future economic, environmental, or political crisis situations that may lead to rapid shifts in migration flows.

Build on the experiences gained in welcoming and integrating refugees from Ukraine. After the start of the war in Ukraine, millions of Ukrainians, especially women and children, crossed borders into neighbouring countries and the European Union. Political actors at different levels of governance, civil society organisations, businesses and private citizens quickly stepped up, mobilized, and coordinated various kinds of support measures to welcome and host the refugees. For the first time ever, the European Union activated the Temporary Protection Directive which granted Ukrainian arrivals direct rights of residence and the right to work in the member states. While the support provided has been described as unprecedented, there were also many challenges to tackle, e.g., in terms of finding accommodation and jobs for the large number of refugees. The experiences gained in managing the sudden arrival of displaced persons from Ukraine and in addressing the challenges in the process should be considered valuable in case of future humanitarian crisis situations.

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