THE FUTURE OF MIGRATION TO EUROPE:

A SYSTEMATIC REVIEW OF THE
LITERATURE ON MIGRATION
SCENARIOS AND FORECASTS

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Effective migration management requires some degree of anticipation of the magnitude and nature of future flows. In response to these needs, two types of approaches have emerged in the literature in recent years: (a) migration forecasts, which provide quantitative estimates of future migration, and (b) migration scenarios, which develop different storylines and thereby emphasize flexibility of thought on future migration. This report presents the results of a systematic literature review of migration forecasts and scenarios. Over 200 relevant publications were screened to summarize the results of the studies and information about the context in which they were produced. The report outlines key definitions, methodological approaches and lessons learned from the evidence produced over the past several decades. It is a comprehensive overview that will be of interest to both scientists and practitioners who wish to navigate this growing field.

ACKNOWLEDGEMENTS

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ACRONYMS

EASO	European Asylum Support Office
ESPON	European Spatial Planning Observation Network
FES	Friedrich-Ebert-Stiftung
GEO	Global Environmental Outlook
GMF	Global Migration Futures project
GO-Science	United Kingdom Government Office for Science
IMI	International Migration Institute
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Commission (European Commission)
MPI	Migration Policy Institute
NIDI	Netherlands Interdisciplinary Demographic Institute
OECD	Organisation for Economic Co-operation and Development
SRES	Special Report on Emissions Scenarios
UNEP	United Nations Environmental Programme

EXECUTIVE SUMMARY

Background

- International migration has become one of the defining features of the early twenty-first century and is high on the policy agenda at both national and international levels. To effectively manage international migration, some degree of anticipation of what the magnitude and nature of future mobility will look like is necessary.

- Over the past decade, two approaches have been commonly applied that aim to predict future migration: (a) forecasts, which aim to provide quantitative estimates of future migration, and (b) scenarios, which emphasize strategic preparedness for and flexibility of thought on future migration.

Methodology

- To review existing approaches to predicting future migration and evaluate the state of the literature on this topic, IOM's Global Migration Data Analysis Centre (GMDAC) and the Netherlands Interdisciplinary Demographic Institute (NIDI) conducted a systematic literature review of international migration[1] scenarios and forecasts as part of the Horizon 2020-funded CrossMigration project.

- Relevant studies were retrieved from six websites, including digital libraries and web search engines, as well as bibliographic searches and consultations with experts. Both primary and grey literature were evaluated. The search, however, was limited to publications in English. Of the 660 relevant search matches, 21 migration scenario studies and 208 migration forecasting studies were selected and analysed.

Key results for European migration scenarios

- Migration scenarios are qualitative narratives about the future of migration that examine possible structural changes and their consequences for migration. They can be understood as thought experiments of the type "What if…?" Different methods exist, with scenarios most commonly developed by a group of experts engaging in systematic group discussions.

- Migration scenarios are a relatively recent approach but are clearly gaining momentum. Of the 21 migration scenarios reviewed, 20 were published in 2008 or later. Six were published in 2018 alone, the last year for which complete data is available.

- Interest in migration scenarios seems to be driven by policymakers. Almost two thirds of the scenarios included in the study were developed by national governments, the European Union and other international organizations. Many are the result of cooperation between policymakers and academia.

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[1]   The focus of the systematic literature review is international migration and not internal migration, except when specified otherwise.

- Migration scenarios seek alignment with the time horizons of broader political processes, such as the 2030 Sustainable Agenda for Development. As a result, most migration scenarios cover timespans of 10 to 20 years into the future.

- Migration scenarios build on the identification of key dimensions of change that are expected to shape future migration. Several dimensions are identified in the reviewed literature:

  (a) The degree of international cooperation and governance is found to be the most important of these dimensions. While more cooperation does not necessarily lead to less immigration to Europe (specifically, European Union countries), it is believed to be fundamental in creating an ordered and more efficient process.

  (b) Economic development, in Europe and elsewhere, is the second most frequently mentioned dimension. This reflects the belief of experts that differences in living standards and income potential will continue to drive migration to Europe. Economic development is also connected to social peace and political stability.

  (c) Environmental change and social developments, including shifts in public opinion, in European countries are other dimensions widely discussed in the studies as having major impacts on the future of migration.

- Rather than providing policymakers with quantitative estimates of future migration, the key benefit of migration scenarios is that they offer participants in the scenario development process a substantial learning and strategic mind-broadening experience. However, published scenario reports are limited in the way they can communicate these experiences to audiences and institutions that did not participate in the scenario development process.

- The scientific validity of migration scenarios hinges on their transparency about the scenario creation process and its participants. The degree to which such information is provided in the available literature varies substantially. Other potential quality criteria include internal consistency and the degree to which scenarios reflect existing evidence about the migration process.

Key results for global migration forecasts

- Like scenarios, migration forecasts are gaining momentum. Based on this review of 208 studies, interest started materializing in the 1980s and has continued to increase since then.

- Both scenarios and forecasts have proven insufficient or too inaccurate to be used as satisfactory bases for decision-making, especially in times of political change or external shocks. As a result, increasing emphasis is being placed on communicating the inherent uncertainty of migration scenarios and forecasts by explicitly referring to their degrees of uncertainty, which is a quantitative measure.

- Given the growing methodological sophistication and required background knowledge, migration forecasts are driven by experts in academia. Two thirds of forecasts are produced by them.

- Two broad traditions of migration forecasting can be distinguished: (a) those originating in demographic population projections and (b) those originating in economic explanatory forecasts of migration.

- In this review, the production of economic forecasts is often directly linked to political events, such as States joining or leaving the European Union. Their underlying approach is based on economic theories about the drivers of migration and applied to an econometric framework.

- In contrast, demographic projections of migration are often produced as part of general population projections. A majority of demographic studies with formal models for migration rely on some form of time series analysis to project future migration based on past patterns and drivers of population change.

- Censuses and official registers are the most common data sources for migration forecasts. More than half of the forecasts in this review rely on them.

- Few studies forecast migration for different migrant groups (i.e. humanitarian migrants, student migrants and so on). A major obstacle to forecasting migration by group is the insufficiency of available data and the disregard for short-term and irregular migrants by most data sources.

- Although the number of studies is still limited, innovative data based on social media traffic and search engine queries have gained increased attention and usage in recent years. These online platforms offer new solutions to well-known problems, including how to make data available for analysis much faster than traditional data sources and how to reach populations that are otherwise difficult to capture. However, they pose their own challenges, including a lack of data representativeness and potential ethical issues.

Conclusions

The systematic literature review provides policymakers and practitioners an accessible starting point for understanding the wealth of work about future migration to Europe. The results show that each approach has its respective weaknesses and no single method can be said to be the preferred one. Instead, future producers and users of migration forecasts should think carefully about their aims and then choose the most appropriate approach. Migration scenarios are a useful tool for a broader strategic reflection on future migration and its possible drivers. In contrast, forecasts are useful operational input for specific government body planning for the upcoming year. Both approaches produce inherently uncertain predictions. As a result, scenarios and forecasts should be taken as a tool to facilitate discussions about policy preparedness rather than uncovering the truth about what the future will hold.

1

INTRODUCTION

1. INTRODUCTION

The aim of this systematic review is to take stock of the state of the literature on international migration scenarios and forecasts and evaluate their development in a comparative manner. The review provides a comprehensive overview and guidance for academics, policymakers and others interested in international migration scenarios and forecasts. The first part focuses on qualitative migration scenarios and the second part on quantitative migration forecasts. The report begins with terminological clarifications, a short description of the methodology for the literature search (more details in Annex I), and a comparative overview of migration scenarios and forecasts. The main parts (5 and 7) of the report detail and analyse the results of the systematic literature review. Part 5 presents the results of the review of migration scenario studies, including a typology of migration scenarios and the various methodological approaches used in the studies. Part 7 presents the results for migration forecasts. The results include a discussion of available data sources, the strengths and weaknesses of available methods, and a review of the uncertainty related to forecasts.

2

DEFINITIONS

2. DEFINITIONS

Two broad approaches can be distinguished in assessing future migration: scenarios and forecasts. Both approaches can be used to make inferences about the future size and structure of migration to Europe. However, there are stark differences between these approaches that are often not well understood. Various terms describing the two approaches are often used interchangeably, adding to the lack of clarity. This section starts by setting clear definitions of the terms "scenario" and "forecast," which will be compared and contrasted throughout the report.

Scenarios are qualitative narratives about the future of migration that emphasize possible structural changes and their consequences for migration. A variety of qualitative and quantitative evidence are used to develop migration scenarios. However, scenarios hold no absolute claim to becoming reality. Instead, they can be understood as thought experiments of the type "What if…?" The aim of migration scenarios is to create alternate visions of the future that consider the multitude of factors that influence migration and their interactions (Vezzoli et al., 2017). Each scenario can be interpreted as one plausible vision of the future. Originating in the US Armed Forces, scenario-planning became known to the wider public through Royal Dutch Shell's use of it prior to the 1973 oil shock. Due to these origins, scenarios draw on a practitioner-driven, strategic and discursive methodology. The elaboration of scenarios, which often involve multiple steps, including surveys and workshops with a group of diverse participants, is an integral part of the approach. Scenario-planning can be situated within the field of strategic foresight, of which it is one of multiple possible methods (Wilkinson, 2017).

Forecasts, in this report, are used to describe all projections or predictions that produce a quantitative estimate of future migration. As such, "forecast" in this report is an umbrella term that spans different methods, including demographic projections, emigration survey analyses, econometric models, expert judgements and any combination thereof. While population projections are typically conditional on assumptions about mortality, fertility and migration rates – and therefore technically not meant to be predictions – they are still frequently interpreted as such (Bijak, 2011).[2] In contrast, predictions are explicitly designed to estimate future migration, for example, in anticipation of political changes such as European Union enlargement (which happens in phases). In most cases, forecasts follow a more data-driven, quantitative approach to making inferences compared to scenarios.[3] A typical output is the expected future stock of immigrants in a given country or the expected flow of migrants from one country to another. While forecasts were originally deterministic, much attention has been paid more recently to introducing measures of uncertainty (Bijak, 2011; Azose and Raftery, 2015; and Disney et al., 2015).

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[2]   Projections, as opposed to predictions, are "computations of future changes in population numbers, given certain assumptions about future trends in the rates of fertility, mortality, and migration" (Population Reference Bureau, 2001). Population projections are, thus, conditional on assumptions about the future development of migration. They are often prepared using variants of these assumptions – conventionally, a baseline, a high variant and a low variant.

[3]   One stream of migration forecasts (described in greater detail in later sections) works without data inputs. This is the case with population projections with an underlying simplistic assumption such as "zero/constant migration", and with Bayesian migration forecasts that rely on inputs from expert surveys.

Table 1.   Scenario versus forecast approaches in migration studies

	Migration scenarios	Migration forecasts
Best usage	Long-term strategic planning with uncertainties	Short-term operational planning
Approach	Qualitative narrative	Quantitative estimate
Accuracy of prediction	Low (because scenarios do not attempt to predict the future)	Low to middle
Type of migration	All types	Bound by data limitations (e.g. seasonal or irregular migrants are not captured in most data sources)
Time horizon	Approximately 10–20 years (A time horizon is often connected to key dates such as 2030.)	• Population projections: up to 100 years • Political forecasts (e.g. European Union enlargement): up to 20 years • Specific flows (e.g. asylum applicants): up to one year
Typical output	Storyline about the future state of migration and which developments will lead to that situation	Net migration in a given year and country
Producers	Practitioners from international organizations, the European Union or national governments, and academics, including demographers	Individual demographers and economists, and national statistical offices
Methodology	Often rely on a participatory, iterative process, but still a relatively less methodological foundation, since scenarios are typically practitioner-driven	Methodologically diverse, the most frequently used tools being: (a) Macrodemographic approaches, such as the cohort–component model; (b) Explanatory econometric models; (c) Bayesian models incorporating expert opinion; (d) Time series extrapolations
Uncertainty	Integral part of scenarios, but with no quantification of uncertainty	Possibility to incorporate measures of uncertainty, although most are still deterministic

	Migration scenarios	**Migration forecasts**
Main disadvantage	Unwieldy to communicate because of its narrative structure, may reflect the bias of participants and highly abstract	Rely on structural continuity and give false impressions of precision, and, as such, are subject to data limitations
Main advantage	Sensitize decision makers towards plausible long-term futures	Aim at an accurate prediction of the future, assuming stable trends

Note: The categories in this table are meant to give an overview of the differences between scenarios and forecasts. The diversity of approaches in use today means that the differences are often less clear-cut than presented in this table. For example, some scenarios use quantitative inputs and some recent population projections incorporate qualitative expert knowledge.

Source: Authors' elaboration based on the results of the systematic literature search.

3

METHODOLOGY

3. METHODOLOGY

The report presents the results of a systematic literature review of migration scenarios and forecasts conducted between May and August 2019. The author team designed two separate search strategies to obtain the most comprehensive and least biased overview of the literature in the two fields, migration scenarios and forecasts.[4] The search consisted of three steps:

(a) An extensive search through six websites (Web of Science, JSTOR, Science Direct, the search engines Google and Google Scholar, and the CROSS-MIG database);

(b) Screening of all bibliographies of the scenario studies in (a) and selected bibliographies of the forecast studies in (a) for more studies;[5]

(c) Consultations with a small group of experts, who were asked to review the inventory of studies and complement the list if necessary.

For literature on migration scenarios, six websites (enumerated in (a)) were searched using any of eight tailored search terms (depending on the functioning of the respective sites and the logical operators that they support). A total of 406 results were retrieved and screened and 53 migration scenario studies retained. During the second step of the search, the bibliographies of all 53 studies were screened, adding another 41 potentially relevant studies. Lastly, consultation with a small group of experts resulted in the inclusion of five more studies. The full texts of the total 99 migration scenario studies were evaluated. The most important evaluation criterion during the final selection was the operationalization of the term "scenario." Given the diversity of meanings attached to the term, 78 studies were dropped because their definitions of "migration scenario" did not coincide with that of the project's (refer to Part 3).[6] (Refer to Annex I for a detailed description of the search process.)

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[4]   While the authors aimed to design the literature search in the least biased possible way, some bias could not be avoided. Importantly, the restriction to English-language publications introduces bias against government publications, as they are commonly written in their own local languages.

[5]   Because of the large number of forecast studies retrieved in the first step, 111 in total (see Annex I), it was not feasible for the author team to review the bibliographies of each study. Instead, a selection of studies for bibliography review was made from the original list of 111. The selection process prioritized the most recent and most widely discussed publications and aimed for a balanced representation of various academic disciplines (demographic studies, economic studies, etc.).

[6]   Demographic studies comprise one stream of the literature that commonly uses the term "scenario" but attaches another meaning than the one adopted in this report. In many of these studies, scenarios are considered variants of population change of the type "low/middle/high". However, these demographic scenarios do not involve narrative storylines and are therefore dropped from the migration scenario review. If suitable, a demographic study is moved to the migration forecast review.

The search process for literature on migration forecasts was similar. Three websites (search engines Google and Google Scholar, and the digital library Web of Science) were searched using any of five search terms. Of the 254 search engine results matches, 93 were retained based on a screening of their titles, keywords and abstracts. A total of 18 studies were extracted from the scenario search (see previous paragraph) because they fit better conceptually as migration forecasts than migration scenarios. Selected bibliographies were then screened, which yielded an additional 82 migration forecast studies. In the third step of the search, experts reviewed the list thus far and recommended 15 more studies. Ultimately, 208 migration forecasts were included in the review. Figure 1 shows the number of scenario and forecast studies from each year of publication from 1946 to 2019. (A detailed description of the search process can be found in Annex I.)

Figure 1.   Number of migration forecast and scenario studies retrieved during the literature review, by year of publication
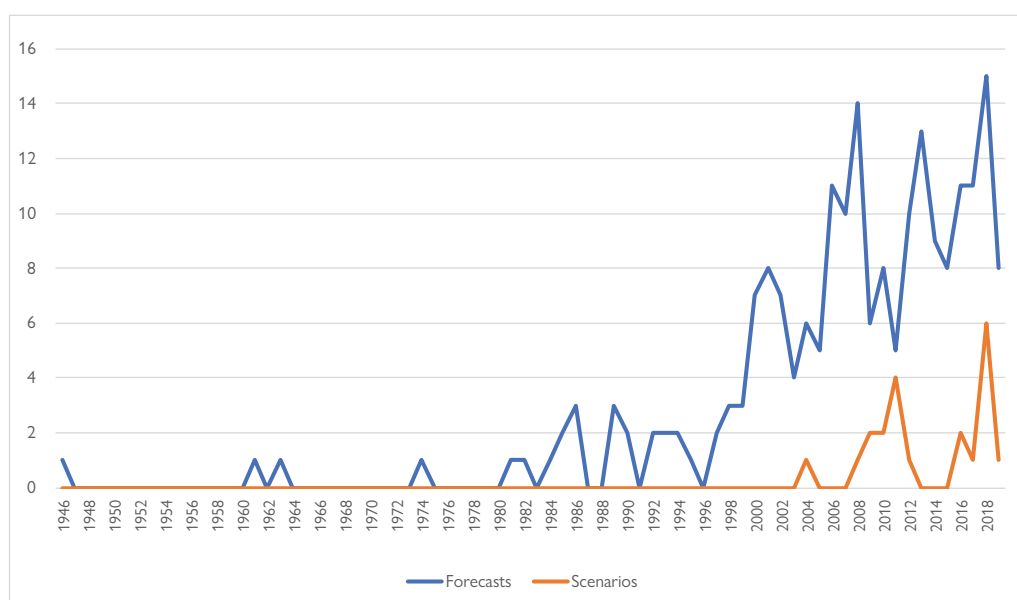
Note: The y-axis represents the number of studies published in a year. Note that the search was completed in August 2019, so that the number for 2019 does not represent the entire calendar year.

Source: Authors' elaboration based on the results of the systematic literature search.

4

RESULTS:
MIGRATION SCENARIOS

4. RESULTS: MIGRATION SCENARIOS

4.1. WHY NOW?

There is clearly a growing interest in being better prepared for the future of migration, with scenarios being a useful tool towards this aim. Developing scenarios for the purpose of migration-planning, however, has a relatively short history. Except for one early study using expert consultations to create scenario-like forecasts (Lachmanová and Drbohlav, 2004), all 21 migration scenario studies in this review were published in 2008 or later. The increasing popularity of migration scenarios coincides with a greater awareness of the factors and processes that potentially drive migration to Europe, such as environmental change and violent conflict. Most importantly, there is currently an understanding that future migration will come in unexpected ways and that preparedness will be essential for the well-being of Europe: "As we move from crisis management to finding long-term structural approaches to migration, a more proactive approach to managing […] migration is needed" (European Commission, 2019a, p. 1). European leaders have thus repeatedly emphasized the importance of becoming more proactive and "moving away from ad hoc solutions towards sustainable structures" (European Commission, 2019b, p. 2).

4.2. WHO DEVELOPS MIGRATION SCENARIOS?

As a result of the realization of the need for long-term approaches to managing migration, international organizations, such as the Organisation for Economic Co-operation and Development (OECD) and the European Union, are now among those leading the way in developing migration scenarios (Figure 2). In 2009, the OECD pioneered a type of migration scenario approach that is now the most commonly used and last released an updated report in 2016. Other scenarios have been developed by organizations whose missions are directly linked to migration management, including the European Union's border protection agency, Frontex (Ariely et al., 2011; and Frontex, 2016), IOM (2017) and the European Asylum Support Office (EASO) (2019). Within academia, the Global Migration Futures (GMF) project, based at the University of Oxford, stands out by having developed a dedicated scenario methodology for migration studies (de Haas et al., 2010). The methodology has been frequently used by other migration scenario studies in both academia and professional practice (see, for example: EU Policy Lab, 2018).

Figure 2.   Who develops international migration scenarios?
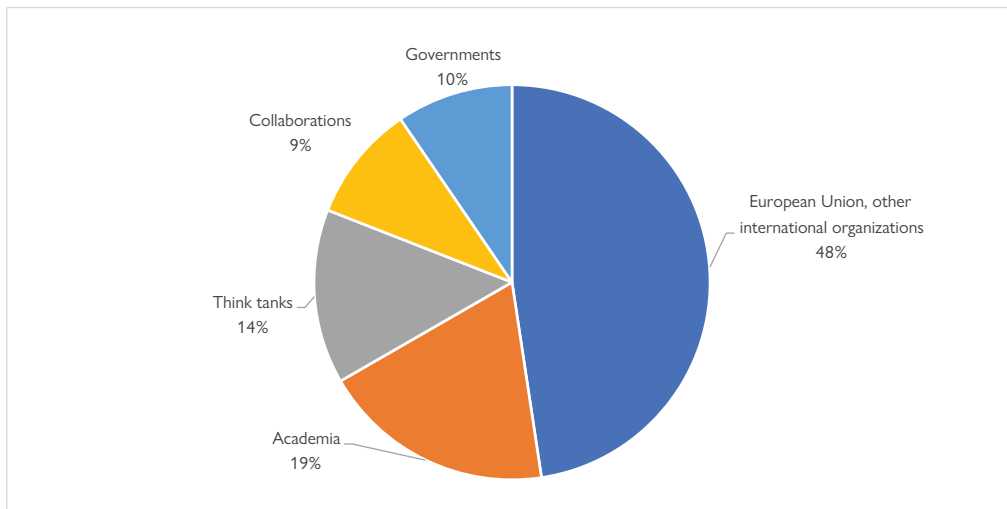
Source: Authors' elaboration based on the results of the systematic literature search.

4.3.   WHAT ARE THE TIME HORIZONS OF MIGRATION SCENARIOS?

Scenario studies build storylines and imagine chains of events leading up to a more or less distant future. A majority (8 out of 18) of the studies in this review use the year 2030 as a time horizon, often in reference to the 2030 Agenda for Sustainable Development (Figure 3). The scenarios therefore have a time frame of approximately 10 to 20 years. However, it is notable that scenarios with a focus on environmental change adopt longer time horizons, up to the year 2100 (Frühmann and Jäger, 2010). This is due to their setups being borrowed from existing scenarios on environmental change, namely, those developed in the Fourth Global Environmental Outlook (GEO), which leads up to the year 2050, and the Special Report on Emissions Scenarios (SRES), which spans to the year 2100. The lone scenario study with a demographic focus (European Spatial Planning Observation Network (ESPON) and the Netherlands Interdisciplinary Demographic Institute (NIDI), 2010) similarly adopts a longer time frame. The chosen time frame thus depends on the thematic literature that a scenario builds on, as well as the level of granularity with which developments are described.

Figure 3.   Time horizons of environmental migration scenario studies versus others
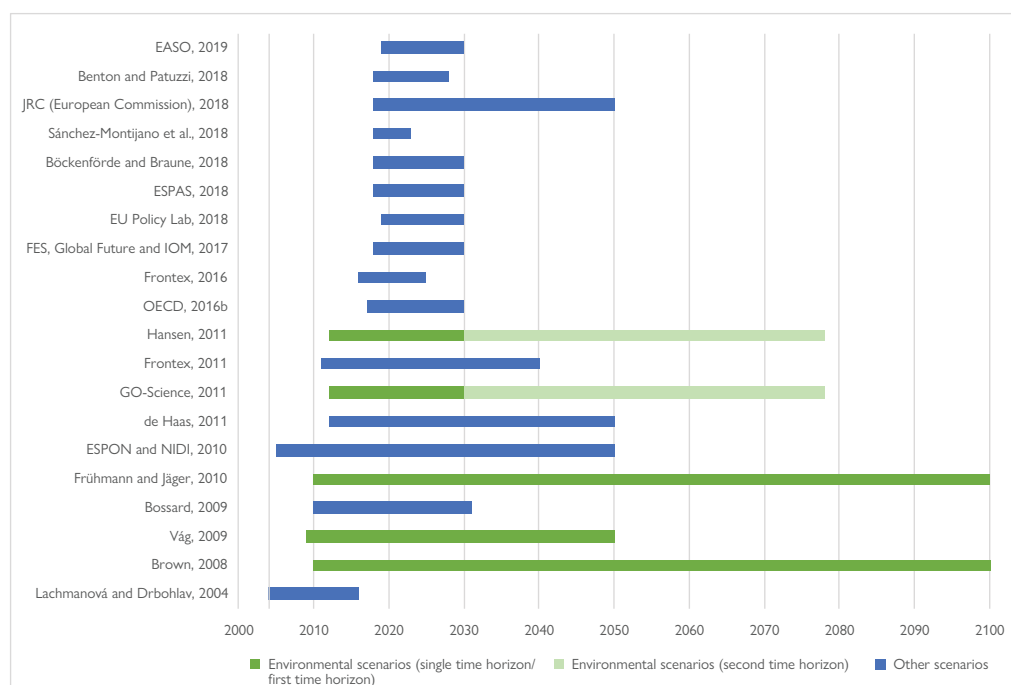
Note: The figure shows the start and end dates of the scenarios in each study (except for Goff et al. (2012), in which no time horizon is indicated). In some cases, the time horizon has to be inferred from the text. The green bars refer to migration scenarios with a major environmental component; the blue bars refer to all other scenarios. Bars with lighter-coloured sections (Hansen, 2011; and UK Government Office for Science (GO-Science), 2011) indicate that the scenarios have two time horizons. Both Hansen (2011) and GO-Science (2011) are outputs from the same project (Migration and Global Environmental Change: Future Challenges and Opportunities), but present separate scenarios.

Source: Authors' elaboration based on the results of the systematic literature search.

4.4.   WHAT TYPES OF MIGRATION SCENARIOS EXIST?

Three types of migration scenarios are distinguished in this review (Figures 4 and 5). The first comprise general-purpose scenarios that build comprehensive narratives about the future state of the world. The two OECD scenarios (OECD, 2016b and Bossard, 2009), one by Friedrich-Ebert-Stiftung (FES), Global Future and IOM (2017) and another by the EU Policy Lab (2018) fall under this category. The second type focuses on a particular region or country (beyond the common geographic focus, i.e. Europe, of all studies in this report). Lachmanová and Drbohlav (2004) explore European East–West migration; de Haas (2011) focused on Mediterranean migration; Goff et al. (2012), on Northern Africa; Böckenförde and Braune (2018), on Western Africa; and Sánchez-Montijano et al. (2018), on Turkey. All of these countries and regions are important areas of origin, given their geographic proximity to countries of the European Union and/or their historical ties with certain European Union countries, for example, the relationship formed between Germany and Turkey through their guest worker agreement and those between European powers and their former colonies in Western Africa. A third group of scenarios revolves around a thematic focus. Four studies (Vág, 2009; Frühmann and Jäger, 2010; United Kingdom Government Office for Science (GO-Science), 2011; and Goff

et al., 2012) focus on the connection between future migration and the environment. Also, four studies explore borders and security in connection with migration (Vág, 2009; Ariely et al., 2011; Frontex, 2016; and Goff et al., 2012). One study concentrates on humanitarian migrants (EASO, 2019), another on the structural changes in European labour markets and their impact on immigrant integration (Benton and Patuzzi, 2018), and yet another on demographic developments (ESPON and NIDI, 2010).

Figure 4.   Types of migration scenarios in the review
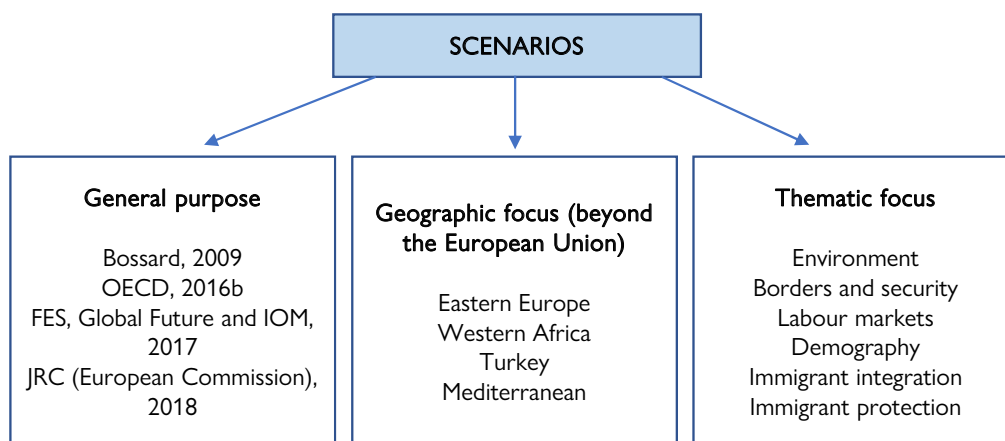
Note: The categories are not mutually exclusive. For example, Goff et al. (2012) present scenarios on climate-induced migration from Northern Africa to Europe and highlight their implications for security, thus combining two thematic foci.

Source: Authors' elaboration based on the results of the systematic literature search.

Figure 5.   Distribution of migration scenarios in the review, by type
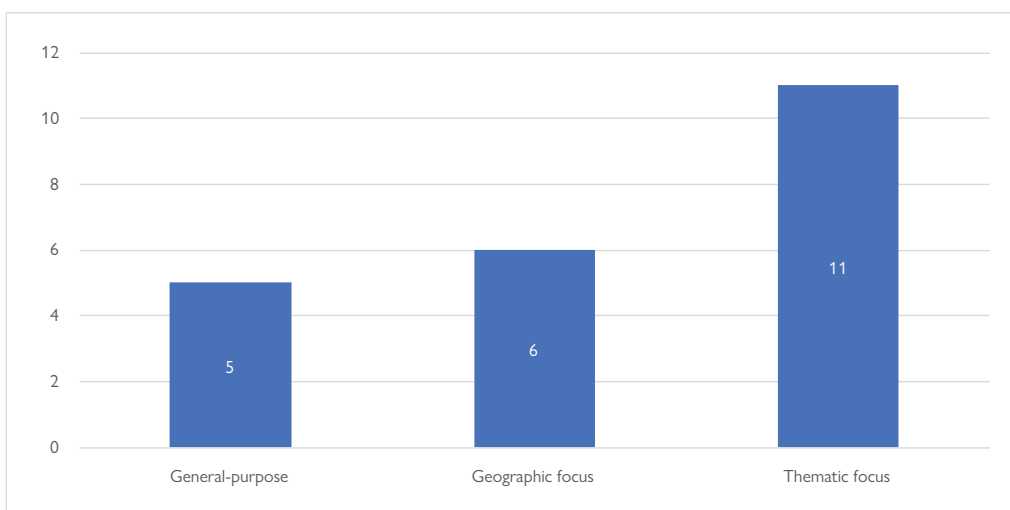
Note: The study by Goff et al. (2012) is counted twice because its focus is equally thematic and geographic.

Source: Authors' elaboration based on the results of the systematic literature search.

4.5.   MIGRATION DRIVERS IN SCENARIOS AND FORECASTS

In imagining the future of migration, scenario creators must think about what drives people to migrate today, and how these drivers could change in the future. Much policy interest and research has focused on this question (see, for example, Natale et al. (2018) for a comprehensive overview), and various academic disciplines and methodological approaches have produced alternative ways of thinking about the underlying reasons or motivations for migration. In narrative scenarios, migration drivers have a broad and dynamic meaning. Also, in contrast to quantitative models used in migration forecasts, scenarios do not require measuring and quantifying drivers of migration. This is particularly important when considering structural drivers of migration like environmental and climate change and global power balances, which can be challenging to measure. Furthermore, scenarios emphasize the context in which migration happens and explore how changes in this context and interactions between individual drivers influence migration patterns. A certain migration driver can increase migration flows in one situation, but very possibly decrease flows in another. For example, migration networks are generally thought to reduce migration costs by serving as a safety net for newly arrived migrants through financial, housing and/or employment assistance. Alternatively, in difficult economic times, migrants may "send (mis)information back home to influence others' decision[s] to migrate, […or] deliberately reporting lower earnings to relatives back home to provide disincentives for others to migrate" (Carlson et al., 2018, p. 548). Scenarios therefore emphasize the effects of interactions between migration-relevant variables, feedback mechanisms and the importance of context to understand why people migrate.

Figure 6 contrasts migration drivers in scenario studies with those in econometric models. (The fundamentals of econometric forecasts will be discussed in greater detail later. However, it is helpful to have a basic understanding of them early on, to clarify the distinct features of the scenario approach.) Econometric forecasts produce quantitative estimates of the relationships between observed migration and the variables that are believed to cause it (income differentials between countries of origin and destination, the presence of migrant networks, etc.). These variables (or drivers) need to be measurable and quantifiable to be included in the model. The previously mentioned report by the Joint Research Centre (JRC) of the European Commission provides a typical example of how econometric models interpret migration drivers: "The positive sign of GDP indicates that improving economic conditions in middle-income countries of origin are associated with increasing emigration from [those countries]." (Natale et al., 2018). Scenario studies also consider economic performance an important factor in explaining migration. However, instead of defining hard and fast rules, they show how relationships between variables are country-, time- and context-dependent. As Figure 6 illustrates, scenario and forecast studies often identify the same migration drivers but operationalize and interpret them differently, sometimes in conflicting ways.

Figure 6 illustrates different levels of migration drivers using examples from the reviewed studies. The micro level refers to an individual's personal characteristics (e.g. age and education level) and direct social setting (e.g. family situation). The meso level pertains to comparative characteristics or linkages between pairs of countries or regions, for example, wage differentials, shared languages and migration networks. (Note that community networks (as opposed to personal networks that operate at the micro level) are aggregate social relationships of members of a particular community (Bonfiglio, 2011).)[7] Finally, the macro level refers to structural factors that shape global developments, such as social, economic, cultural, technological and environmental changes.

Figure 6.   Selected migration drivers in scenarios and forecasts at the micro, meso and macro levels
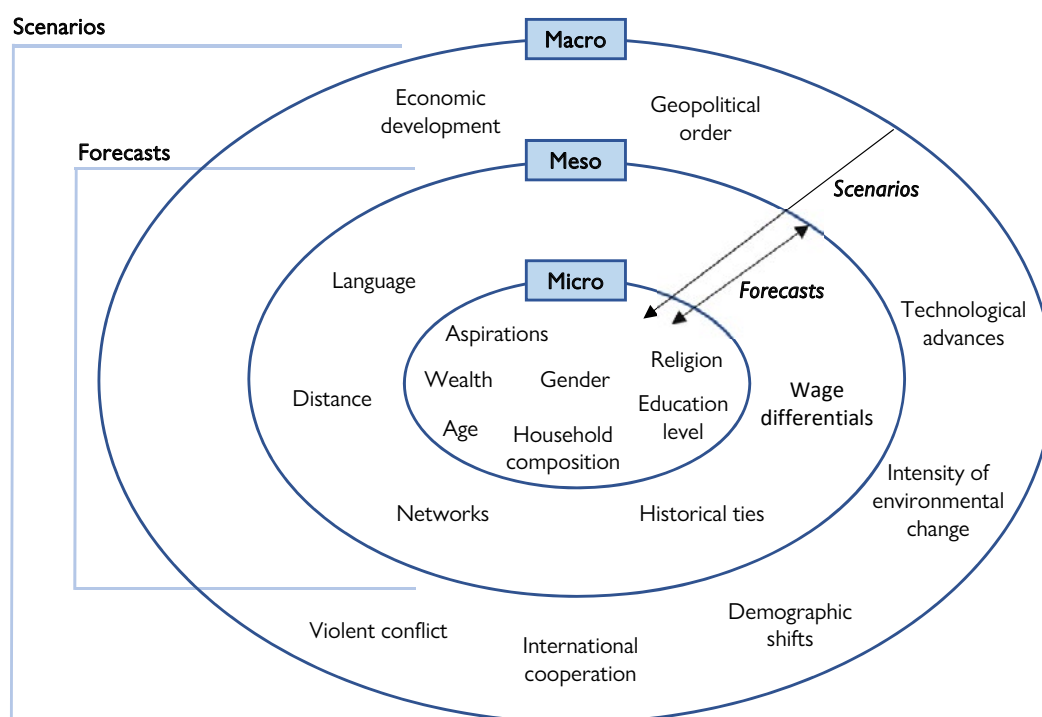
Note: This visualization does not show all possible migration drivers or determinants.

Source: Authors' elaboration based on the results of the systematic literature search.

Figure 6 shows that scenarios and forecasts differ fundamentally in two ways. First, they differ in the level they focus on and the breadth of inclusion of contextual factors. Scenarios tend to focus first on the macro context and from there deduce implications for the future of migration (Bossard, 2009; OECD, 2016b; and EU Policy Lab, 2018). The line of reasoning thus proceeds from the macro to the micro in mapping out a plausible future. In contrast, forecasts concentrate on drivers at the micro and meso levels and the quantification of their individual impact on migration patterns. The reasoning is thus confined at the micro and meso levels.

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7   Bonfiglio (2011, p.7) notes that the distinction between personal and community networks (she refers to them as "migrant network" and "migration network", respectively) is often ignored, which causes substantial conceptual confusion. Having a personal network means personally knowing someone in the destination country. A community network comprises other migrants at destination with whom one shares important characteristics, such as ethnicity, religion or place of origin, although they may not know each other personally. Quantitative approaches have traditionally studied community networks, whereas qualitative studies tend to study personal networks.

4.6. ALONG WHICH DIMENSIONS ARE MIGRATION SCENARIOS STRUCTURED?

Since most scenario studies approach the future of migration from a macro perspective, the individual-level drivers and intermediate-level factors that influence migration need to be structured around those lines. One common approach consists of selecting two dimensions represented by intersecting axes that create four quadrants, with each corresponding to one scenario (hence a total of four scenarios). The two variables are not independent, as in econometric models, but should rather be thought of as critical macro-developments that facilitate the comparison of the different scenarios relative to each other and to the two dimensions (de Haas, 2011; and FES, Global Future and IOM, 2017). In some cases, the dimensions are selected based on their perceived level of uncertainty (EU Policy Lab, 2018). This applies to studies that adopt the GMF approach developed by de Haas et al. (2010). Accordingly, if a dimension has a very high level of uncertainty, but at the same time is very important in predicting the future of migration, then structuring narratives according to different versions of that dimension will result in the most useful scenarios. Lastly, it should be noted that each of the dimensions can be looked at from the perspective of either the country of origin or the country of destination. For example, "economic growth" can be used in one narrative to refer to that in the European Union, and in another to describe the economic situation in a country of origin.

Of the 20 migration scenario studies included in the review, 13 clearly describe dimensions along which scenarios are developed. There is large variation in the elaboration of the storylines; Figure 7 shows which dimensions feature most prominently in the scenarios.

Figure 7. Frequency of dimensions
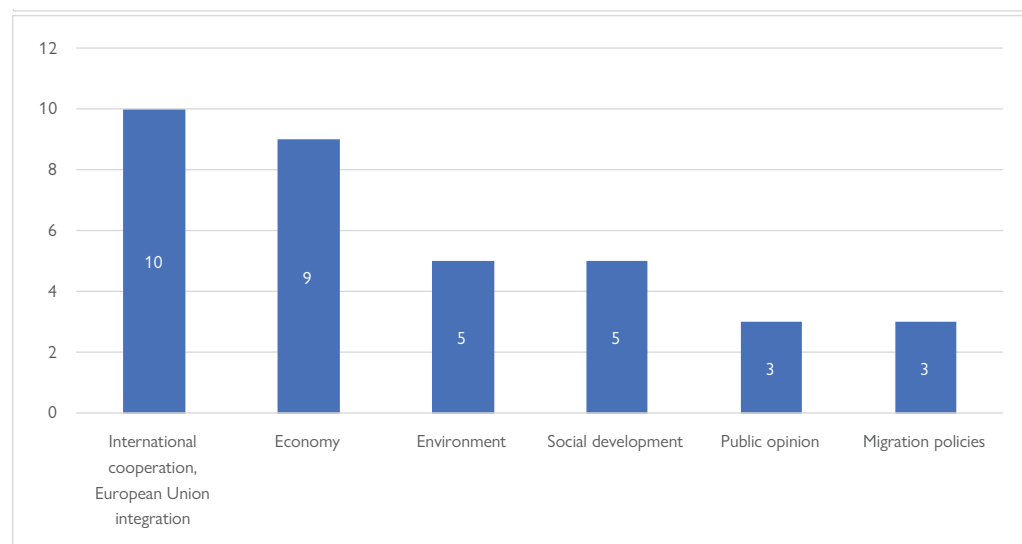
Source: Authors' elaboration based on the results of the systematic literature search.

Note: A storyline may consist of different aspects that correspond or belong to different dimensions. For example, the aspects "multilateral and inclusive governance" (EU Policy Lab, 2018) are attributed to the dimensions "international cooperation and European Union integration" and "social development."

4.6.1. International cooperation and European Union integration

Of the 21 migration scenario studies in this review, 10 consider the degree of international cooperation and European integration as one of the most decisive macro-developments determining the future of migration. In the scenario storylines, this dimension describes the degree to which countries cooperate on a range of policy areas – from the environment to trade and human rights. While more cooperation does not necessarily lead to less migration, it is thought to produce a smoother, more ordered migration process. There are also gradients to international cooperation. For example, cooperation between several heterogenous countries is potentially more challenging to attain than cooperation between two similar countries. In turn, cooperation between member States of the European Union could be relatively more feasible than large, multilateral agreements, which can be considered the most demanding and uncertain form of international cooperation (OECD, 2016a). While the dimension "international cooperation and European Union integration" potentially refers to cooperation in any part of the world, most scenarios put particular emphasis on the state of European integration. (In cases where the scenarios focus on a particular geographic region – for instance, Turkey, the Mediterranean or Western Africa – international cooperation is naturally interpreted as the degree of cooperation between the European Union and that region.) In the Frontex-funded study by Ariely et al. (2011), for example, one scenario describes the gradual breaking apart of the Schengen zone and the reinstatement of the European Union's internal borders. However, national border security and immigration agencies lack human and financial resources, which leaves their borders porous and eventually results in increasing levels of irregular migration. In contrast, one OECD scenario (Bossard, 2009) imagines a situation in which open-border policies have been expanded from covering only European countries to include all OECD countries, thus increasing movement of people within the OECD community.

4.6.2. Economic development

Nine studies feature economic development as one of the most defining issues driving future migration. Given the continuing influence of economic theory, particularly the neoclassical school of thought,[8] on migration studies and the recurring evidence from econometric studies, income differentials are considered one of the major drivers of migration. However, the studies adopt very different perspectives on the causes and consequences of economic growth. In one scenario, for example, imagined deteriorating economic conditions in Western Africa would lead to more poverty and social unrest. As a result, an increasing number of young people would try to move to Europe (Böckenförde and Braune, 2018). In another scenario, European Union member States struggle to find migrants willing to move to move there because other regions – particularly, Asia – have become more economically attractive destinations (EASO, 2019). The "economic development" dimension can be interpreted from the storylines as either economic development in a particular region, whether Europe or elsewhere, or economic convergence between Europe and other regions. As the aforementioned examples have shown, scenarios can also contradict each other – and they frequently do. This is not a flaw, but a logical consequence of the scenario approach, which aims to explore a wide range of possible futures.

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[8]   Neoclassical migration theory treats migration as a means to restore a distorted equilibrium. On the macroeconomic level, this implies migration flows between two countries that are characterized by a surplus in labour and capital respectively. On an individual level, migration would be the result of a cost–benefit analysis. (For more information, see, for example, Bijak (2011) or Howe and Jackson (2005).)

4.6.3. Environment

While only one study (Natale et al., 2018) has a dedicated dimension for the environment, it nevertheless occupies a prominent place in 5 of the 21 scenarios. Since the environment is considered to be closely connected to economic growth, the two are often combined and discussed as one dimension (i.e. the economy–environment dimension), for example, in ESPON and NIDI (2010, p. vi): "At one end of the economy–environment dimension, we envisage a situation where sustainable growth has been achieved through technical and social innovation. At the other end of the economy–environment dimension, we envisage a situation where the environmental challenges have not been met, and growth, as traditionally measured, has fallen." (ESPON and NIDI, 2010, p. vi). Six scenario studies published between 2008 and 2012 explored this link between migration and environmental change (Brown, 2008; Vág, 2009; Frühmann and Jäger, 2010; ESPON and NIDI, 2010; and GO-Science, 2011; and Goff, Zarin and Goodman, 2012). Besides their shared thematic focus, these studies (namely, SRES, of the Intergovernmental Panel on Climate Change (IPCC); and GEO, of the United Nations Environment Programme (UNEP)) have in common the fact that they draw on existing scenarios taken from the field of environmental change. Both the SRES and GEO environmental scenarios provide comprehensive narratives about the future state of the world that go far beyond environmental variables. In addition, they consider a range of structural factors affecting future migration, such as degree of international cooperation, cultural shift, population growth and technological advancement (IPCC, 2000; and UNEP, 2007). These environmental scenarios are therefore easily adoptable for migration scenario-building.

The connection between the environment and migration is discussed in various and sometimes conflicting ways, which highlights the difficulty of identifying all potential impacts of environmental change on migration. For example, GO-Science (2011, p. 9) notes the scenario wherein "environmental change is equally likely to make migration less possible as more probable." In contrast, Goff, Zarin and Goodman (2012) conclude that climate change is likely to lead to the forced migration of millions of Northern Africans.

4.6.4. Social development

The dimension "social development" describes domestic factors related to social peace, cohesion and capacity for immigrant integration. As with the environment, the impact of social development on migration is not straightforward and can be assessed from the perspective of either the country of origin or the destination country. In the scenario presented in EU Policy Lab (2018), for example, inclusive governance in European countries is discussed in connection with its potential impact on immigrant integration outcomes. Similarly, the OECD notes that a "failure to integrate effectively could lead to problems of political stability and social cohesion" (Bossard, 2009, p. 210). On the other hand, de Haas (2011) and Sánchez-Montijano et al. (2018) explore the impact that social development in countries of origin has on migration. De Haas (2011) argues that democratic reforms and, in particular, economic growth in Southern Mediterranean countries, along with other developments, could lead to lower levels of emigration towards Europe. In addition, social reforms in countries of origin have the potential of not only lowering immigration pressures, but also leading emigrants to return. Sánchez-Montijano et al. (2018) hold this view and notes that democratic reforms and political convergence between the European Union and Turkey could prompt highly skilled European Union citizens with Turkish roots or younger Turkish emigrants to return to Turkey.

4.6.5. Public opinion

Public opinion is discussed in 3 of the 21 migration scenario studies as being an important factor shaping future migration. The focus on public opinion is a more recent trend when comparing the scenarios over time, and it appears to be related to the rise of populist parties across Europe. For example, two of the scenarios in JRC (2018) imagine a future where populist parties continue to gain political power in Europe, fuelling further anti-immigrant sentiment. In FES, Global Future and IOM (2017), the public is envisioned to favour skilled, highly selective immigration, but opposes any form of international protection. In de Haas (2011, p. S68), xenophobic politics in Europe and the Maghreb are imagined to further propagate "popular beliefs about fundamental cultural cleavages between the Muslim and secular European cultures." On the other hand, as FES, Global Future and IOM (2017) emphasize, public opinion on migration is especially volatile and prone to drastic shifts in either direction. Uncertainty is therefore high, opening up the possibility for vastly different scenarios.

4.6.6. Migration policy

Three studies in this review feature migration policy as a decisive development that will shape future migration. This dimension is a continuum that stretches from very restrictive to fully open immigration policies. To be more specific, the scenarios in these three studies consider migration policies' degree of selectivity with regard to which migrant groups are targeted and allowed to enter, interaction with technological advances and the level at which they are formulated (mostly either national or international). In one OECD scenario, migration policies become more open and "flows of migration are determined largely by market forces, as migrants respond to variations in labour demand across the world" (OECD, 2016a, p. 262). Migration is thus imagined as becoming a more circular, fluid process with fewer hurdles. In one of the scenarios presented in FES, Global Future and IOM (2017, p. 49), countries set their own immigration policies, "but implementing them in the prevailing chaos seems irrelevant". The scenario therefore accounts for imperfect or even impossible implementation. Lastly, NIDI and ESPON (2010) examine migration policy scenarios at the most granular level: among European regions and cities. It is the only scenario study in the review that focuses on internal migration, and not only on international migration.

4.7. WHAT METHODS ARE USED TO DEVELOP MIGRATION SCENARIOS?

With the number of scenario studies growing, there is now a multitude of approaches that have been used to develop migration scenarios. However, the field of migration scenarios is still characterized by rather dispersed methodological foundations. This can be partly attributed to its origins in the practice-driven areas of military and business (de Haas et al., 2010), but also stems from the discursive process that scenario-building often involves. During workshops and interviews, for example, scenario-building teams encounter unforeseen challenges and modify their respective methodologies accordingly. Transparent and detailed documentation of the scenario development process is therefore key for the validity of any proposed scenario.

4.7.1. Participatory, discursive approaches to migration scenarios

Almost half of the scenario studies in this review involved external participants in the scenario creation process, such as migration scholars or policymakers. While different methodological approaches are available that involve the inclusion of external participants (such as the Delphi survey (see section 4.7.4)), one recent and comprehensive methodological guide for participatory scenario creation was developed by the Global GMF project.[9] It involves multiple steps that alternate between desk research and participatory elements (e.g. workshops, online surveys and interviews). After each event that involves external participants, the new input is collated and organized by the authors. The scenario-building process is communicative and flexible, requiring the methodology to evolve with the scenario team (both the authors and external participants). Another important characteristic of the GMF methodology is its focus on factors that are difficult to project into the future, such as geopolitical shifts or technological advances,[10] and whose potential impact on migration can be profound despite their lack of predictability. It would therefore be especially fruitful for scenario creators to focus on factors that combine a high level of uncertainty with a high-potential impact on migration. The focus on dimensions that are subject to a high level of uncertainty emphasizes the competitive advantage of scenarios over forecasts, for which it is difficult to capture contextual changes and first-time events. (Figure 8 shows an example of how factors were selected and organized in a scenario-building activity.)

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[9]   More information is available from the Migration Institute website: www.migrationinstitute.org/completed-projects/gmf.
[10] The question of how to deal with uncertainty naturally surrounds almost all forecast and scenario studies and is not unique to the GMF approach.

Figure 8. **Intermediate output from a scenario-building workshop: selecting factors by how uncertain and how impactful they are (International Migration Institute, 2011)**

Key uncertainties for scenario-building

Greatest impact

Greatest uncertainty

Economic growth in the European Union

European Union fragmentation and subregional bloc formation

Economic restructuring and liberalization versus more state distribution

European Union labour market regulations

Economic inequalities among European Union countries

European Union economic expansion

Violent conflict in European Union countries

Economic growth in the Middle East and North Africa

Economic growth in China

European Union migration policy

Economic growth in sub-Saharan Africa

Economic growth in the Russian Federation

Violent conflict in Middle East and North Africa

Xenophobia, racism and identity politics

Agricultural subsidies and policies

Violent conflict in the ex-Soviet bloc

Democratization in Middle East and North Africa

European nationalism

Integration of migrants in Europe

European Union monetary policy

Population surveillance

Violent conflict in sub-Saharan Africa

Socioeconomic status of minorities

Alternative technology and oil dependence; green versus carbon

Population growth and fertility rates

Water management

Source: International Migration Institute (IMI), 2001, p. 1.

Note: The red circle identifies factors that are at the same time the most uncertain and most impactful for future migration migration. The illustration is adapted from the IMI policy brief dated 8 July 2011, which documented the intermediary outputs of the scenario-building process. Stakeholders identified an initial list of factors with varying uncertainty for Europe in a workshop and the organizing team later refined and structured them.

FES, Global Future and IOM (2017) and the EU Policy Lab (2018) provide two good examples of transparent and well-documented migration scenario-building processes. Both follow an iterative process that involves a large range of stakeholders and focus on uncertainty rather than certainty. In FES, Global Future and IOM (2017), for example, 50 professionals from different fields were brought together to imagine plausible futures for migration. The process involved a scoping workshop wherein overarching principles were identified, interviews, two scenario-building workshops and one webinar. In the study by the EU Policy Lab (2018, pp. 20–21), "relative uncertainties for migration by 2030" are clearly listed and separately analysed for European Union and non-European Union countries.

There was large variation overall in the number of participants that the study authors brought together for the workshops, surveys and interviews. For the 21 migration scenario studies, 11 did not involve the direct participation of experts, policymakers or other external stakeholders.[11] The remaining 10 studies had participant numbers ranging from 15, as in Lachmanová and Drbohlav (2004), to 350, as in the case of the large-scale mixed-methods study by GO-Science (2011). However, even when the exact numbers remain unclear, it can be estimated from the descriptions that most of the studies that involved external participants (6 out of 10) had between 20 and 80. The composition of study participants, and even information such as names, occupations and affiliations, is fully revealed in 4 of the 21 studies, with another 2 studies providing the names and affiliations for a subgroup of the participants (i.e. the names of the Advisory Committee members and highlighted contributors in the case of the 2018 JRC study, and the names of the Steering Group members in the 2009 OECD report). Two studies opted to keep participants anonymous and instead offered statistical information on their backgrounds (namely, Lachmanová and Drbohlav, 2004; and ESPON and NIDI, 2010). Two other studies provided very little information on their participants' backgrounds (Ariely et al., 2011; and EASO, 2019). (Figure 9)

Figure 9.   Information provided on participants in the scenario creation process of the selected studies
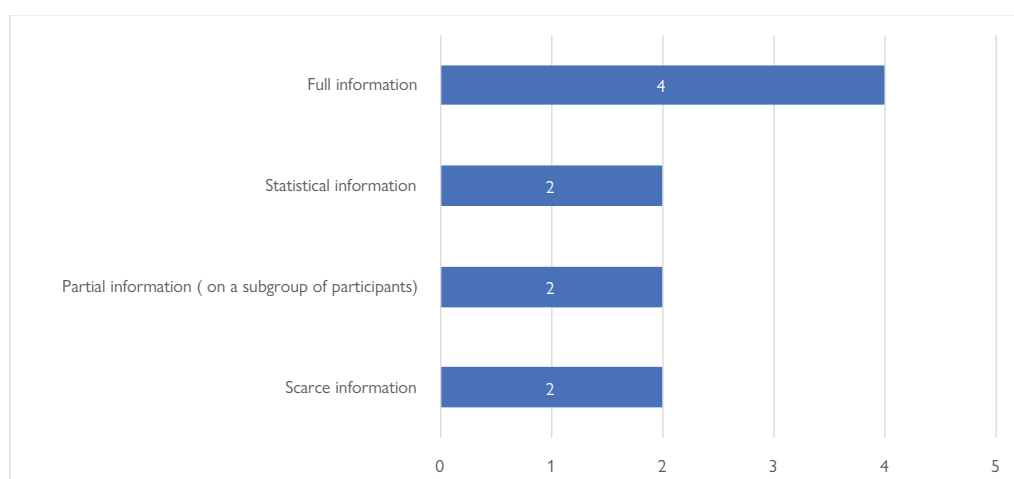
Source: Authors' elaboration based on the results of the systematic literature search.

Note: The data reflected in the figure covers only studies that utilized a participatory scenario creation process.

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[11]   Three studies that did not involve participants (Brown, 2008; Vág, 2009; and Frühmann and Jäger, 2010) used existing scenarios (i.e. the GEO and SRES environmental scenarios created by UNEP and IPCC) that were themselves created through participatory processes. (Refer to UNEP (2007) and IPCC (2000) for more information.)

One point repeatedly noted in the scenario studies is the substantial educational impact and mind-broadening effect of the scenario-building process on the research teams and participants. The challenge for scenario studies is how to extend these benefits to non-participants of the process – individuals and institutions alike. This is particularly difficult since the output of scenario studies are often lengthy storylines that require careful reading. Adequate presentation and visualization will therefore be important characteristics of scenarios that aim to make an impact.

Lastly, the participatory and iterative process underlying migration scenario creation requires a great amount of resources – organizational capacity, participants from a range of backgrounds, time spent organizing and attending multiple days of meetings and discussion, and more (Figure 10 shows how intensive the process can be). It took the IOM–FES joint team one and a half years to complete the process (from May 2016 to October 2017). It is evident that only few organizations have the capability for such an undertaking, and that they are most likely to be larger public or international institutions, such as bodies or agencies of the European Union or the United Nations. This fact is mirrored in the studies reviewed here: Among those that used a participatory approach, all but one were produced or funded by such institutions.

Figure 10. Typical participatory scenario creation process
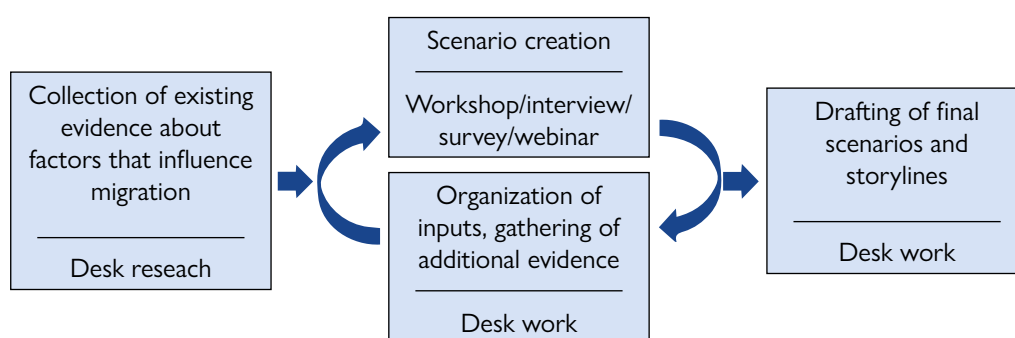
Source: Authors' elaboration based on the results of the systematic literature search.

4.7.2. Adaptation of existing scenarios

An alternative and more accessible approach for smaller institutions and universities involves adapting existing scenarios instead of developing scenarios from scratch. For example, Brown (2008), Vág (2009), and Frühmann and Jäger (2010), which explore the linkage between environmental change and migration, draw on the GEO and SRES scenarios developed by UNEP and IPCC, respectively, through extensive participatory processes. Because the two sets of scenarios focus on macro-contextual factors, it is relatively straightforward to incorporate migration into the scenarios. The GEO scenarios, for example, describe macro-developments such as the future state of international cooperation, long-term demographic developments, changes in the labour market structures and shifts in value systems (UNEP, 2007). All these factors are highly relevant, not only to the future of the environment, but also to that of migration. Therefore, the scenarios can be used either as they are (i.e. not in specific relation to migration) or examined in terms of what they imply for migration. Alternatively, the scenarios can be modified (Brown, 2008) or used as assumptions in computations (ESPON and NIDI, 2010).

4.7.3. Large-scale, mixed studies

The studies from two projects stand out as providing particularly comprehensive assessments of future migration that combines the scenario approach with other forms of qualitative and quantitative evidence: (a) ESPON and NIDI (2010) ("Demographic and Migratory Flows Affecting European Regions and Cities") and (b) GO-Science (2011) ("Migration and Global Environmental Change"). GO-Science has commissioned a total of 70 background studies and engaged with 350 experts from 30 countries worldwide to gather all types of available evidence. Some of these background papers explored migration drivers in detail (e.g. "Drivers of Migration in Drylands"), summarized the state of the science for various disciplines (e.g. "Frequency, Location and Severity of Extreme Events") or conducted case studies for specific regions (e.g. "New Urban Spaces in India"). Population projections, and forecasts of temperature and rainfall changes, among others, were used as direct inputs for the scenarios. Conversely, the four scenarios featured in the UK Government Office for Science (2011) report were used to guide the assumptions made for different projections. Similarly, ESPON and NIDI (2010) provides conventional demographic projections of the European population up to the year 2050. Then, in a second step, it applies a scenario framework to the individual components of their projections – namely, mortality, fertility, migration and labour force participation.

The two projects show that scenarios and forecasts need not be competing forms of foresight. With their respective advantages and shortfalls, it appears that a combination of both would provide a more complete picture of possible futures (Figure 11). Moreover, a forecast is usually more restrictive, given its numerous assumptions. In contrast, a migration scenario utilizes a broader and more permissive approach and can therefore serve as an umbrella framework for several individual forecasts.

Figure 11. Combining migration scenarios with scenarios from other fields, to be used as inputs for quantitative projections
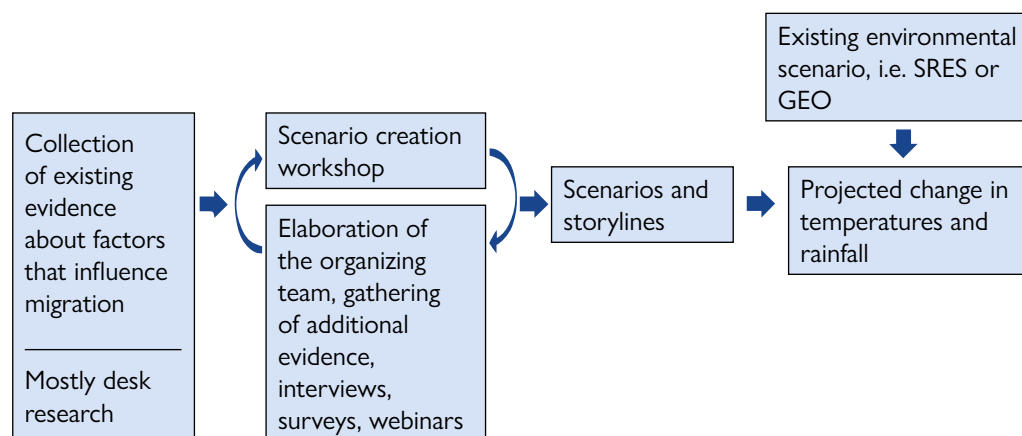
Source: Authors' elaboration. The visualization is based on the approach used to develop the scenario in GO-Science (2011).

Note: SRES and GEO are environmental scenarios produced by UNEP and IPCC.

4.7.4. The Delphi method

The Delphi method, although used in only one study in this review, is well-known and therefore worthy of a brief account.[12] In a nutshell, the Delphi method is an expert-led, interactive research method used to derive estimates of the future. Experts are asked to anonymously answer questionnaires in two or more rounds. Between each round, the experts receive feedback on each other's responses. They can then revise their responses and resubmit the questionnaire, usually leading to a convergence of responses (Helmer-Hirschberg, 1967). In Lachmanová and Drbohlav (2004), 15 migration experts from Czechia participated in a two-round Delphi survey. They were asked about future levels of East–West migration and what policy objective the European Union should pursue. Although the Delphi method is designed to reduce individual bias, its results are still always a reflection of the participants' world views, knowledge and imaginative capacity. There is thus a risk of producing overly conforming or conservative assessments of the future. In Lachmanová and Drbohlav (2004, p. 142), for example, the experts were quick to agree that "[t]here will be more or less the same volumes, structures, directions and determinants of migration as it was during the last 2 or 3 years". The Delphi method can be used on its own, as here by Lachmanová and Drbohlav, or as an input for scenarios and forecasts.

4.7.5. Other approaches

A notable approach that cannot be grouped together with the approaches already discussed was used in Frontex (2016). While the process generally resembled the interactive and iterative GMF methodology, Frontex employed computer software to aid the scenario generation process. After identifying key factors and possible developments for each of these factors, a software program was used to compute all possible combinations of future developments and then select the most plausible ones. The seven scenarios identified in this manner should thus display the whole range of "windows of possibilities" (Frontex, 2016, p. 44). The process is meant to be less biased, but it nonetheless needs review and validation by experts.

EASO (2019) also employed a methodology that was distinct from the GMF approach and others described thus far. In contrast to the other approaches, there was no ranking of influencing factors according to impact or degree of uncertainty; each of the 12 factors was given equal weight instead. The EASO scenario development involved six consecutive steps that used a combination of workshops, expert interviews and one online survey. The process began with an identification of influencing factors, each of which was itself projected into the future. However, the most salient feature of the study is its focus on migration actors, as their perspectives and deeply rooted assumptions take centre stage in the scenario creation process. Causal layered analysis, an academically recognized and theorized method, was adapted for actor analysis. In the end, the scenarios were developed by combining an analysis of the influencing factors with an analysis of the shaping actors.

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[12] A Delphi study may be classified as either a scenario or a forecast, depending on the specific design of the survey. For example, a Delphi study that asks experts solely about a (quantitative) point estimate of future migration, without creating a narrative storyline that accompanies it, is more similar to a forecast than a scenario, at least for the purpose of this report. A few more Delphi studies are therefore included in the forecast section of this report and will not be discussed at this point.

Lastly, it should be noted that some studies do not at all specify the methodological foundations of their scenarios (e.g. Hansen, 2011; European Strategy and Policy Analysis System (ESPAS), 2018; Benton and Patuzzi, 2018; and Sánchez-Montijano et al., 2018 fall under "Others" in Figure 12). This is problematic because scenarios are necessarily dependent on personal assumptions and uncertainties. Without a transparent process and documentation thereof, the soundness of scenarios cannot be judged, undermining their usefulness. For example, Hansen (2011, p. 5) states that "the EU will almost certainly survive the next 30–50 years". This might have seemed like a plausible assumption at the time of that report's writing. However, since then the European Union has undergone dramatic political turbulence and has notably seen the United Kingdom voting to leave the union. A better methodological foundation would have been helpful in challenging this assumption.

Figure 12. Methodological approaches of the scenario studies in the literature review
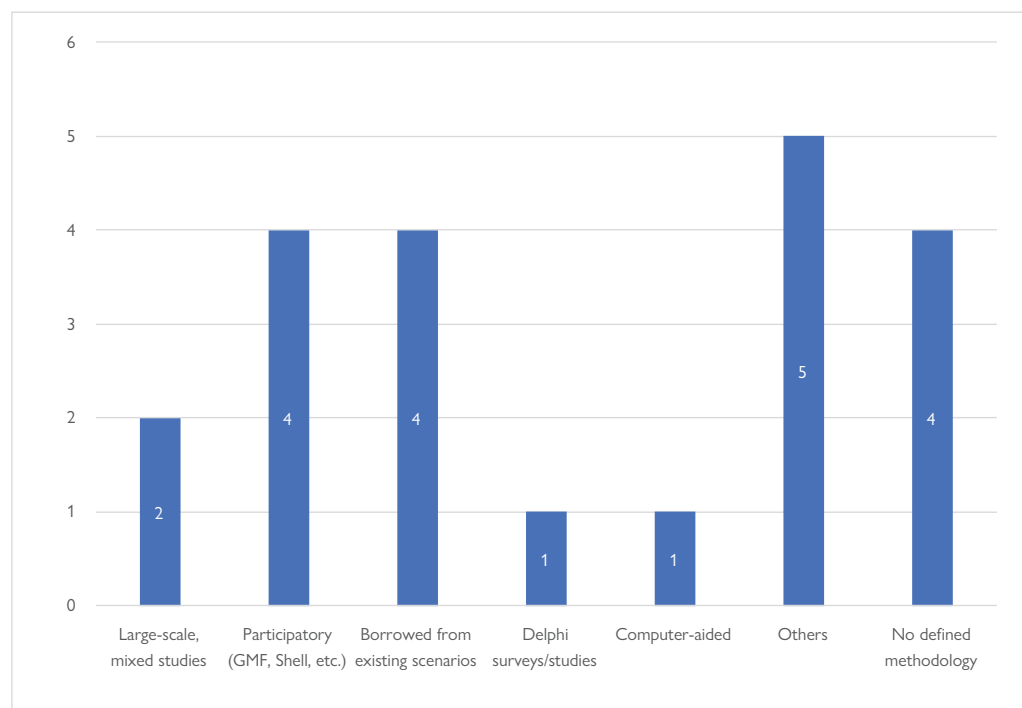
Source: Authors' elaboration based on the results of the systematic literature search.

5

INTERIM CONCLUSION:
MIGRATION SCENARIOS

5. INTERIM CONCLUSION: MIGRATION SCENARIOS

Migration scenarios are a relatively new approach to help prepare organizations and governments for future migration. Regardless, in only 10 years, major European and international actors, such the European Commission, the OECD, national governments and academic institutions, have all undertaken migration scenario exercises.[13] The increasing popularity of scenarios points toward a reckoning by policymakers that future migration is not likely to follow linear trends. From a historical perspective, it is in fact highly improbable that migration patterns of the past will be reproduced in the future. Technological advances, environmental change and shifting global power relations are all going to change the patterns of migration as we know them today. However, uncertainty is high and a multitude of different futures is plausible. The strength of migration scenarios is that they can put these uncertainties and discontinuities at the centre of attention and thereby facilitate long-term, high-level strategic decision-making.

Reviewing 21 scenarios studies produced since 2004, the systematic literature review reveals that two global developments are believed to be most influential in setting the course for future migration: (a) the degree to which countries cooperate on an international level, reaching multilateral agreements and defining common goals, and (b) the degree to which economic development reduces inequalities across geographic regions. The interaction between these two macro-developments and other factors will not only determine the size of future migration flows. It will also shape the mix of origin countries, the skills composition of future migration, social peace and public opinion.

Furthermore, the review has produced the following takeaways for potential scenario creators:

(a) A key challenge for scenario creators will be to share the substantial educational benefits with stakeholders and institutions that did not participate in the scenario creation process. This will require innovative approaches to communicating the narrative storyline of each scenario.

(b) The increasing availability of scenarios means that not every new study would need to build its own from scratch. Borrowing and adapting existing scenarios can be a fruitful, time- and money-saving alternative.

(c) When study authors do decide to develop a completely new scenario, transparency about the process and its participants is crucial to the validity of the scenario and potential policy recommendations that can be drawn from it. This is particularly important since scenarios are prone to reflecting the personal biases of its creators.

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[13]   It is important to note here that the literature search was conducted exclusively in English, which creates a bias towards non-English publications, especially those prepared by national governments and their agencies.

(d) Migration scenarios often overlap with other thematic areas such as regional studies, demography and environmental sciences. The scenario format should ideally communicate with these strands of the literature to feed into the evidence base.

(e) Lastly, the large-scale mixed studies in this review show that migration scenarios can be powerfully combined with other methodological approaches, particularly, quantitative forecasts.

In giving governments and other institutions the tools to prepare themselves better for the uncertainties that the future of migration holds, this systematic literature review has taken stock of existing efforts and evaluated them along the most important dimensions. This literature review is ultimately a reference and guide for future scenario creation projects.

6

RESULTS:
MIGRATION FORECASTS

6. RESULTS: MIGRATION FORECASTS

As previously described, migration forecasts, as opposed to migration scenarios, are quantitative assessments of future migration trends. This report evaluates both forecasts and projections.[14] Compared to migration scenarios, the literature on migration forecasts is more mature, meaning, there is a larger number of publications representing a greater degree of diversity, including in the adjacent literature contributing to methodological development. Broadly speaking, two streams of literature can be distinguished in the production of migration forecasts: demographic and economic forecasts. While demographers focus on migration mostly in the context of population projections, economists focus more frequently on the size and impact of future migration flows on labour markets and welfare.

6.1. WHO PRODUCES MIGRATION FORECASTS?

Immigration has been largely neglected in demographic projections for the past decades and took off in the economic literature only in the 1990s, with the discussions surrounding European Union enlargement (Booth, 2006). However, considering that natural population growth, that is, growth resulting from more births than deaths, is slowing or even reversing in majority of OECD countries (OECD, 2019b), both researchers and policymakers are shifting their attention towards migration.

Forecasts have become increasingly sophisticated and their development and application are clearly driven by experts, mostly from academia. This is reflected in the preponderance of the reviewed forecast studies (around two thirds of 208) produced by academia (Figure 13). At any rate, the numbers reported here must be interpreted with caution because the search design excludes any publication not written in English[15] (which is why most publications by national statistical offices are not reflected in the review). In contrast, the lingua franca of the academic world has been English for some time now, so that academic articles are more likely to be included in the review. With 40 forecast publications, international organizations are the second largest producer of forecasts. These includes international bodies such as Eurostat and the United Nations Population Division, the World Bank and the OECD. Think tanks and national governments come in last, with 17 and 16 studies, respectively. As noted previously, national governments are underrepresented due, in part, to the study's research design and to the fact that governments frequently turn to academia to translate and apply international research findings to local contexts. Among the think tanks and research institutes, the International Institute for Applied Systems Analysis, the Center for Strategic and International Studies and the Migration Policy Institute stand out as major producers of migration forecasts.

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14 For an explanation of the difference between forecasts and projections, refer back to Part 2. Definitions.
15 Refer to the Annex I for a detailed description of the literature search design and process.

Figure 13. Major producers of migration forecasts in the literature review
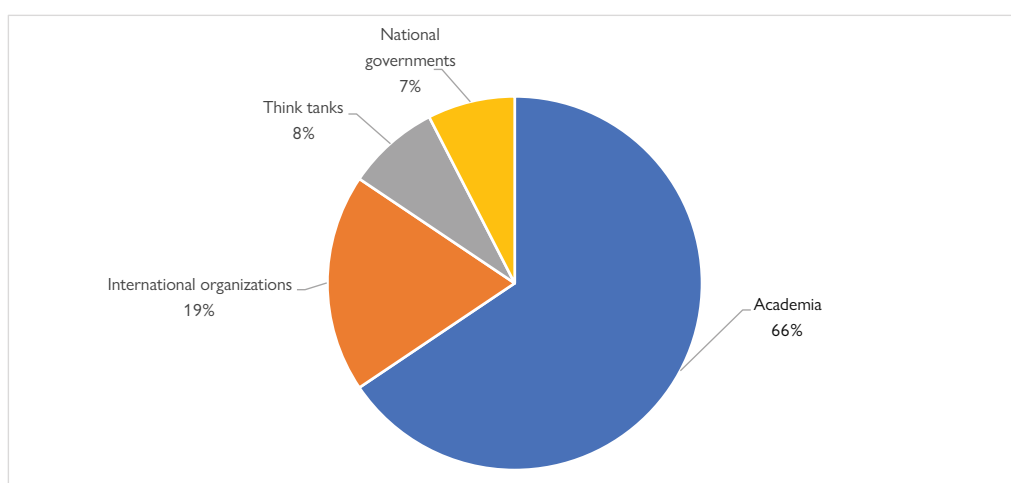
Source: Authors' elaboration based on the results of the systematic literature search.

6.2. WHERE ARE MIGRATION FORECASTS PUBLISHED?

Mirroring the dominance of academia among forecast developers, 50 per cent of the reviewed migration forecasts were published in peer-reviewed academic journals (Figure 14). The review shows that there is now a multitude of academic outlets that publish migration forecasts and related theoretical and methodological papers. Among them are prestigious journals like *Demography* (Smith, 1986; Azose and Raftery, 2015; and Wiśniowski et al., 2015), Nature (Simini et al., 2012), the *International Migration Review* (Kim and Cohen, 2010; Cappelen et al. 2014; Coleman, 1992; Salt, 1992; and Zolberg, 1989), the Journal of Forecasting (de Beer, 1993; Bijak et al., 2019; and Alho, 2008) and the *Journal of the American Statistical Association* (Isserman et al., 1985; Rogers, 1986; and Raymer et al., 2013). Furthermore, five books and four book chapters are dedicated to migration forecasts. Among them, two books stand out as providing particularly comprehensive accounts of migration forecasting: Raymer and Willekens's book on *International Migration in Europe: Data, Models and Estimates* (2008) and Bijak's Forecasting International Migration in Europe: A Bayesian View (2011). Besides journals and books, policy-driven research is clearly visible in the publication list. National statistical offices have their own dedicated teams that conduct research and frequently publish their findings in working papers and policy reports. However, there is a relatively stubborn gap between academic- and policy-produced forecasts in terms of methodology and level of sophistication. Cappelen et al. (2018, p. 948) note that "[as] recently as 2013, most official immigration projections still relied mainly on extending past immigration levels […]. A lack of formal migration forecasting models is the norm in international, as well as national, population projections." Overall, 20 per cent of the studies were published as policy reports. They address issues of immediate political relevance, such as the potential effects of Scottish independence (Shang et al., 2014), and ongoing work of practical relevance for planning, such as labour force projections (Hilgenstock and Kokczan, 2018). In individual cases, policy reports can draw a great amount of public attention and entail far-reaching consequences. The 2000 United Nations report, "Replacement Migration: Is it a Solution to Declining and Ageing Populations?", for example, was widely

criticized for proposing seemingly astronomical numbers of international migrants needed to prevent population decline and ageing (United Nations, 2000). In addition, it explored international migration as the sole remedy for ageing populations and shrinking workforces, ignoring crucial policy elements, including workforce participation, productivity and pension reforms (Coleman, 2002).

Figure 14. Main outlets for migration forecast studies in the literature review
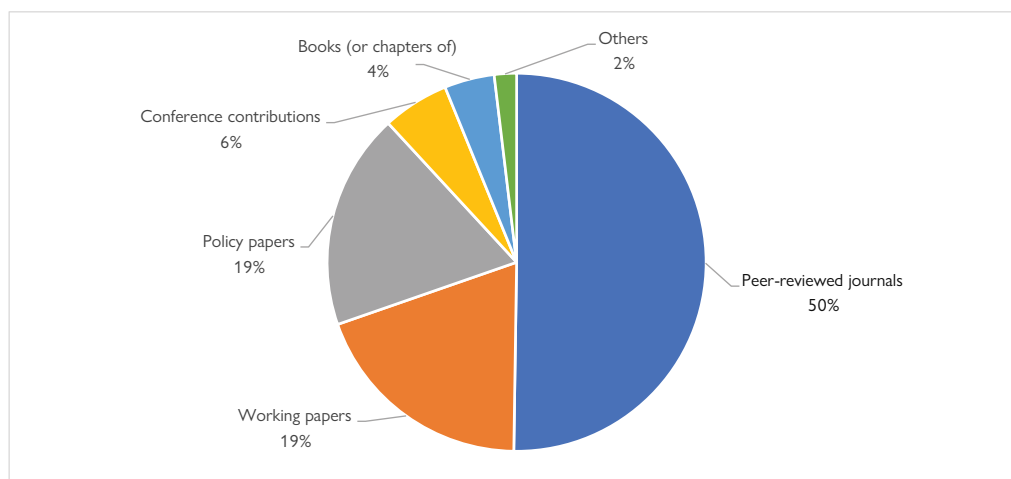
Source: Authors' elaboration based on the results of the systematic literature search.

Note: The category "Others" includes two PhD dissertations and two online articles. Note also that reports and working papers by national governments are not adequately captured by the search strategy because they are limited to English-language studies.

Overall, it should be noted that categories of academia and policy overlap significantly. Policy reports are often commissioned by international organizations but are prepared by academics at universities. National statistical offices have research teams working on migration forecasts for national governmental bodies that want to know what to expect about the future of migration in their respective countries. Parts of these studies also find their ways to academic conferences or international peer-reviewed journals. With a subject that is so relevant to policy such as future migration, it is no surprise that relevant research quickly finds its way to interested practitioners.

6.3. WHICH DATA SOURCES ARE USED?

Quantitative migration forecasts rely on data about past migration and define a set of assumptions on how they can be applied and extrapolated to the future. However, a lack of high-quality data, inconsistencies across countries, and different uses and definitions of key concepts lead to persistent uncertainty and estimation errors in migration forecasting. The challenges are long known and frequently discussed (see, for example: Kelly, 1987; OECD, 2005; Laczko, 2016; and Global Migration Group, 2017). International attempts, such as the 1998 United Nations recommendations for a statistical definition of international migrants and the 2007 European Union regulations on migration statistics, are gradually working to improve the situation (and, in the case of the United Nations recommendations, being revised at the moment). However, many of the early difficulties continue to pose problems (Nowok et al., 2006).

Migration forecasts (and migration data in general) are therefore built on an imperfect base. Even with an ideal model, errors would arise from data inconsistencies. Depending on the specific study purpose and research design, three general data types are available: (a) statistical and administrative data (such as censuses and official registers), (b) survey data (e.g. household surveys and migration surveys), and (c) innovative data sources (mobile phone records, social media information and Internet protocol addresses, among others) (Figure 15). Statistical and administrative data are by far the most common source for migration forecasts. More than half of all studies retrieved for this review used administrative data sources. These typically include censuses, population registers and other administrative data collected on an ongoing basis as part of routine operations of ministries or agencies. For example, information on the issuance of various types of visas, people using special travel schemes and border crossings fall under this category. Importantly, each of the sources has its own drawbacks relating to their timeliness, coverage and accuracy compared to "true" migration.[16] To project international migration, authors thus need to combine and possibly harmonize different sources. Since this is a tedious and intensive task, many draw on already existing data sets produced by international organizations and agencies like Eurostat (Eurostat, 2019), the OECD (OECD, 2019a and 2019b) or the United Nations (United Nations Department of Social and Economic Affairs, 2019). Academia has equally produced data sets on international migration. For example, Willekens (1994) proposes a methodology to build a European database combining different data sources. Raymer et al. (2013) suggest a Bayesian approach to the modelling of European migration.[17] Lastly, Abel and Sander (2014) compile data on bilateral flows between 196 countries from 1990 to 2010.

Survey data are another potential source for migration forecasts. The most common are regular household surveys, such as the European Union Labour Force Survey (e.g. Wiśniowski, 2013) or the American Community Survey (e.g. Molloy, 2011). They offer a rich background on personal characteristics and other potentially migration-relevant covariates such as family composition, income, occupation and aspirations for the future. However, limited sample sizes and high costs are important drawbacks. There are also migration-specific surveys, including surveys asking a population sample about their future migration intentions (Docquier et al., 2014; and Tjaden et al., 2018)[18] or the UK International Passenger Survey[19] (Armstrong and de Ven, 2016). However, as with previously discussed survey data, sample sizes are relatively small, costs are high and responses may be biased when inquiring about sensitive information such as reasons for migration. As a consequence, only 12 studies in the review rely exclusively on survey data. On the other hand, most of the 20 studies that use a combination of different data sources employ survey and administrative data together.

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[16] Visit the Migration Data Portal of IOM's GMDAC for a comparative evaluation of each of these sources: https://migrationdataportal.org/themes/migration-data-sources. Note, however, that the grouping of data sources on the GMDAC website and in this report overlap but are not identical. Disney et al. (2015) present a comprehensive evaluation of available data in the United Kingdom.

[17] Bayesian statistics, as opposed to the dominant school of frequentist statistics, understand probability as the degree of belief in an event occurring. Bayesian studies therefore do not need experiments to establish the probability of a given event becoming reality. Instead, it allows researchers to insert prior beliefs into their calculations. For example, Bayesian migration forecasts use personal assessments of migration experts as inputs for their calculations. These personal assessments are later updated with migration data (see, for example: Wiśniowski et al., 2013). Bayesian approaches have gained popularity in migration forecasts because they offer innovate ways to deal with the large amount of uncertainty connected to them, while also making use of different sources of information (i.e. expert opinion and migration data analysis).

[18] Migration potential surveys were particularly popular before the 2004 European Union enlargement. They have since then been increasingly criticized and less used.

[19] The UK International Passenger Survey interviews overseas migrants at all ports of entry to the country.

Figure 15. Distribution of data sources used in migration forecasts in the review
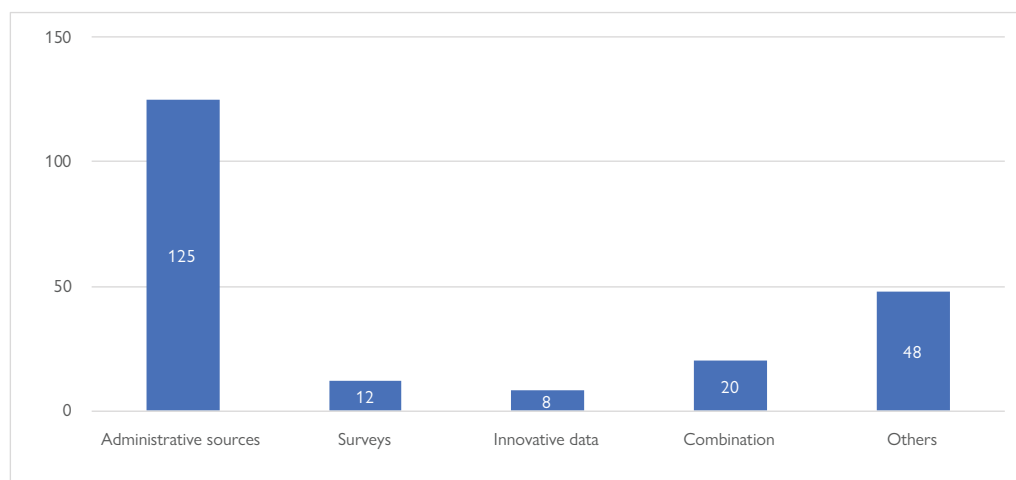
Source: Authors' elaboration based on the results of the systematic literature search.

Note: Studies in the category "Others" did not use data of past observations but are instead based on theoretical models. The category "Combination" refers mostly to studies that combine administrative and survey data. It also includes probabilistic migration forecasts that use expert surveys.

More recently, new data sources have been explored to monitor and predict migration using innovative data sources such as social media information or phone records. Eight studies are retrieved in the review, but attention and interest for them is clearly growing. The applications are manifold. For example, Zagheni et al. (2014) collected geo-located Twitter data to track movements within and across countries. Blumenstock (2012) used mobile phone data to measure internal migration in Rwanda. Böhme (2019) analysed online search keywords to predict international migration. The advantage of these types of new data is threefold. First, the data is much more timely than traditional data sources such as censuses, and could even be used to now-cast migration movements (Zagheni et al., 2018).[20] Second, the data is consistent across countries, given their origins in internationally operating companies and not national governments. Third, big data reveal a great level of granularity. They are not limited to movements between countries or administrative units and can show even minor movements during any given period. Short-lasting movements or circular migration are thus more easily captured. However, the new data sources also entail important drawbacks. One concern pertains to the privacy and ethical issues regarding the collection and analysis of many of these innovative data sources, particularly, social media data.[21] The most important drawback to these, however, is the lack of representativeness. Only a subset of the general global population uses Facebook, Twitter or any social media platform at all, making it difficult to draw general statements from the analysis of data gathered therein. Although a number of methods have been proposed to reduce bias (see, for example: Yildiz et al., 2017; and Wang et al., 2015), studies that rely on social media data, phone records, or Internet protocol addresses are still mostly a complement to conventional data sources.

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[20]   In that context, the European Commission and the IOM launched the Big Data for Migration Alliance in June 2018, which explores how big data can be used to monitor migration trends. (For more information on this initiative, visit https://ec.europa.eu/jrc/en/news/harnessing-new-data-sources-responsibly-effective-migration-policy.)

[21]   A range of institutions have proposed ethical guidelines to address issues of consent, anonymity and potential risks, among others (see, for example: Townsend and Wallace, 2017).

6.4. WHAT TYPES OF MIGRATION ARE FORECAST?

Migrants were being given little attention at the time demographic population projections started to be developed. Net migration (the difference between the number of immigrants and emigrants in one year) was simply considered to be the residual part of population change that could not be explained by births or deaths (Siegel and Hamilton, 1952).[22] In 1990, Rogers published his article, "Requiem for the Net Migrant", in which he sharply criticized the use of net migrants as a "nonexistent category of individuals" (p. 283), as the term hides important information about the relative size of emigration and immigration flows. Much has changed since then and migrants are now widely considered a crucial determinant of demographic change. However, a majority of projections reviewed in our search still does not distinguish between different motives underlying work, family, student and humanitarian migration, despite the fact that migration drivers are shown to have different effects on these groups (see, for example, JRC (2018), for a detailed analysis of migration drivers for each group).[23] A major obstacle to forecasting migration by group is the insufficiency of available of data (discussed previously) and the disregard for short-term and irregular migrants in most data sources. However, few demographic studies have attempted to forecast specific types of migration. An early exception is the 2003 project by the European Commission, "Analysis and Forecasting of International Migration by Major Groups", in which separate models were proposed for labour and asylum migration. De Beer (2008) similarly emphasizes the usefulness of distinguishing different types of immigration to improve the accuracy of projections. Most recently, Bijak et al. (2019) tested various possible forecasting approaches and concluded that the statistical characteristics of each flow (meaning, the stability of the flow and the length of available time series data) should determine the most suitable approach. For example, particularly volatile flows like asylum seekers should not be forecast using the same approach as stable flows like labour migrants. Furthermore, the respective degrees of uncertainty of each flow and their potential impact on policy should also be considered in forecasts.

In contrast to demographic population projections, econometric models based on explanatory theories of migration more commonly distinguish separate migration flows. While the majority is based on assessments of migration drivers (Natale et al., 2018), innovative approaches have also been developed for specific migrant groups. For example, Smith et al. (2008) use agent-based modelling to produce predictions about climate-induced migration, and Connor (2017) predicts forced migration by analysing online search data from Google.

6.5. MIGRATION DRIVERS IN FORECASTS

Causal migration forecasting using econometric models conventionally draw on a number of so-called migration "drivers", referring to push and pull factors of migration, such as wage differentials, geographic distance, networks and historical ties (e.g. Bauer and Zimmermann, 1999; Brücker and Siliverstovs, 2006; Bossard, 2009; and OECD, 2016b). These are partly adopted from migration theory and partly included in econometric models because of their statistical power.[24] However, drivers can only be considered in a

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[22] Population projections are conventionally based on three components: births, deaths and international migration. In these earlier studies, the numbers of births and deaths were known from official statistics. Births were added and deaths were subtracted from the population in a given base year. In contrast, migration was not observed and instead inferred from the difference between the calculated population size and the observed population size.

[23] Many studies do make a distinction between international and internal migration, and between in- and out-migration, but this shall not be the focus of this section.

[24] Models usually aim at including migration drivers that are statistically significant while building an overall parsimonious model. A parsimonious model achieves the desired level of explanation with as few predictors as possible.

model if they can be quantified. Fuzzier concepts such as "power relations" or "climate change" cannot be directly included, or at least not without finding a measurable proxy variable.[25] Furthermore, the data used as inputs for the model are necessarily historical, assuming that past relationships – say, between income differentials and migration flows – can be extrapolated to the future. Eventually, the arguments that can be derived from such analyses follow this format: "An increase of 10% in the income differential between two countries increases the number of migrants between the two countries by 3.1%, on average" (OECD, 2016a, p. 106). Underlying this interpretation is the ceteris paribus assumption that all factors not accounted for in the model do not change. However, given the limited number of control variables in econometric models and the overwhelming complexity of the real word, this assumption is difficult to maintain. Disney et al. (2015) evaluated the sensitivity of existing forecasting models and concluded that the typical migration drivers, like unemployment rates and gross national income, are prone to changing their impacts on migration across time and space. Furthermore, different types of migration respond differently to the drivers. "For example, migration for family reasons usually follows labour migration, which may be driven not only by the relative economic situation of the sending and receiving countries, but also by the existing networks in the receiving country" (Disney et al., 2015, p. 39). Despite these shortcomings, econometric models and their conceptualization of migration drivers have an intuitive appeal. With their modular structure, they allow users to inspect each driver individually and weigh them against each other. To make best use of them, econometric forecasts should have short time horizons (five years at most) and interpreted with careful attention to changing contexts that might diminish their validity.

6.6. FOUR GROUPS OF FORECASTING METHODS

Given the growing interest in migration forecasts, combined with an awareness of the shortcomings of each approach, there is now a multitude of available forecasting methods. The methods can be grouped along different criteria, and one recent approach is to distinguish between deterministic and probabilistic methods (see, notably, Bijak, 2011; and Disney et al., 2015). In another recent report, Sardoschau (2020) focuses on different types of quantitative models and forms three mainly three groups (Bayesian, gravity and structural equation models). For the purpose of the review, an intuitive, non-technical introduction will be given to each of the most commonly used methods.

6.6.1. Econometric models

The main difference between econometric models and other methods is its inclusion of covariates, that is, variables that researchers believe to be related to migration, such as income differentials and labour market performance.[26] Econometric models were originally used to verify economic theories about migration, but have increasingly gained popularity for forecasting as well. Thus, from the theory of migration "push" and "pull" factors were created models that aim to quantify the impact of each of these factors on future migration. For example, econometric models were a popular tool during the successive European Union enlargements in the 2000s to forecast migration to the older European Union member States (Bauer and Zimmermann, 1999; Sinn, 2000; Boeri and Brücker, 2001; and Dustmann et al., 2003). At any rate, the results of the numerous studies varied widely and proved rather accurate in retrospect (see, for example, Bahna, 2008 for an evaluation).[27]

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[25]   See above for a visualization of migration drivers in scenarios and forecasts.
[26]   There are approaches to migration forecasting that require large amounts of information individual data, like ethno-surveys and event-history analyses. However, these approaches are far less common than econometric models and will not be discussed here. For more information, see Massey (1987) and Rogers and Castro (1981).
[27]   The succeeding paragraph more broadly discusses the accuracy of migration forecasts have been in the past.

Despite their popularity, econometric models come with important drawbacks that potentially weaken their forecasting performance. The relationship between migration drivers and observed migration naturally needs to be estimated using historical data before it is applied to a future situation. This potentially introduces bias, especially when the estimation is performed on countries other than the ones targeted by the forecast. In Dustmann et al. (2003), for example, the parameters for future migration from Eastern Europe to the United Kingdom are derived from immigration data from a variety of other, mostly distant, countries such as India, South Africa and Yemen. Naturally, which parameters can be derived is not immediately obvious and the parameters are not directly applicable. Another criticism relates to the limited choice of explanatory variables for which there is often a lack of theoretical substantiation. As a result, most studies use similar sets of explanatory variables that are focused on economic drivers of migration. From a demographic perspective, this ignores major demographic determinants such as population size, population age structure and the dynamic population changes that are produced by migration (Kupiszewski, 2002).[28]

6.6.2. Migration intention surveys

Another approach to estimate future migration flows relies on survey information about migration intentions. Influential studies, such as the 1998 IOM report and the 2004 study by Krieger on the European Union accession of Central and Eastern European countries, typically choose this approach. Although it must be stressed that emigration intentions do not necessarily translate to actual emigration, emigration intention surveys can have advantages under certain conditions. For example, Tjaden, Auer and Laczko (2018) note the relatively high level of comparability of emigration intention data if they are collected in large, standardized surveys, such as the Gallup World Poll.[29] Furthermore, this type of survey can offer valuable information in the absence of migration flow data, particularly in non-OECD countries.

Nonetheless, emigration intention surveys come with major limitations. The most obvious and most important limitation of studies using this approach is that they are not forecasts but only assessments of *potential* migration. The foremost question therefore concerns the relationship between observed intentions and actual behaviour. Whether or not the intention materializes likely depends on a wide range of factors, including the emigration motive. For example, student mobility is more likely to materialize than migration among other groups (van Dalen and Henkens, 2008, p. 15). As a general estimate, van Dalen and Henkens (2008) estimate that 24 per cent of respondents in the Netherlands who stated an intention to emigrate actually emigrated within two years' time. Tjaden et al. (2018) estimate that roughly 1.3 out of 10 individuals from a European sending country who make emigration plans actually emigrate (to any other country, including outside of Europe). However, as mentioned above, the exact relationship between survey response and behaviour depends on many factors, including the exact wording of questions and the timing of the survey. For example, the questionnaire must make it explicit whether it refers to a hypothetical situation without any legal and practical barriers to migration, or whether the response should account for those restrictions (EIC, 2009). Furthermore, the intended length of stay should be considered, especially in situations where short-term or circular migration is a popular option for potential migrants, such as seasonal workers and students spending some time abroad. Lastly, surveys about migration intentions ignore the demand side of labour migration, that is, the extent to which receiving labour markets are able to absorb potential migrants.

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[28]   Gravity models used for migration forecasting partially address these criticisms but remain imperfect because they include demographic and geographic variables, such as population size and distance between countries, as time-invariant factors.

[29]   The Gallup World Poll is a company that commercially distributes survey data. It continually surveys 160 countries and asks respondents about various subjects, including migration intentions.

6.6.3. Argument-based forecasts

Argument-based forecasts are believed to be the most commonly used method for migration forecasts in official statistics and are usually treated as a component of population projections (Bijak, 2010). In these forecasts, an argument is basically an assumption about the future development of migration derived from a variety of qualitative and quantitative information but follow no strict rule on how to arrive at the assumption. In most cases, they are produced in three or more variants categorized as "low", "middle" or "high". Other frequent assumptions about future migration include:

(a) Zero migration;

(b) Constant migration;

(c) Continuation of historical migration trends;

(d) Convergence to historical or regional averages.

While assumptions might be right in a given context and country, it appears that simplistic assumptions like the ones above mask the uncertainty related to future migration. Most users interpret the "middle" variant often as the most likely projection, which cannot be said, given that the variants are not equipped with probabilities.

6.6.4. Time series extrapolations

Lastly, an important group of studies applies time series extrapolations to arrive at future estimates of migration. The autoregressive integrated moving average (ARIMA) model and its many variants are the most frequently used. Importantly, their strong theoretical foundation allows the construction of predictive intervals, which provide a direct visual indication of forecast uncertainty.

A weakness of time series extrapolation is its sole reliance on past data about migration. As discussed above, data sources for migration are still imperfect and likely to introduce bias into the forecasts. Moreover, even if data were correct, past trends, such as natural crises and political events, are regularly shaken through shocks.

To address this problem, Bijak (2009) proposed an approach that combined expert opinion with probabilistic time series. In a Bayesian framework, expert judgement can thus be included as a prior distribution of parameters that reflect knowledge about future events, for example, and then be combined with time series data.[30]

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[30]   For a comprehensive discussion of probabilistic methods and the combination of expert judgement and time series data, see: Bijak, 2010; and Raftery and Azose, 2013.

6.7.   HOW ACCURATE ARE MIGRATION FORECASTS?

Migration is notoriously difficult to foresee. History abounds with examples of vastly mistaken forecasts. In 1907, the Austrian researcher Emil Reich predicted that Germany's population would grow to 150 million in 1980 and reach 200 million by 2000. Given the context then, the predictions seemed plausible. However, in reality, Germany had a population of just 82 million in the year 2000. Another example are the forecasts of migration following the 2004 phase of European Union enlargement. Dustmann et al. (2003) estimated immigration to the United Kingdom would range from 5,000 to 13,000 immigrants per year until 2010. This was vastly underestimated. In 2004, the UK Office for National Statistics estimated that there were 167,000 individuals in the kingdom who were born in a country of the so-called "EU-8". In 2010, it estimated that number to be 819,000.[31]

The reason why migration is so difficult to forecast is the high degree of uncertainty that is attached to all elements of the forecasting process. In particular, one can distinguish three sources of uncertainty: (a) uncertainty about future events influencing migration, (b) uncertainty about the available evidence (i.e. data sources), and (c) uncertainty stemming from the model selected to forecast migration (for a comprehensive discussion of uncertainty in migration forecasts, see, for example: GMDAC, 2016; Disney et al., 2015; and Bijak, 2011). Various studies have addressed the different parts of uncertainty and evaluated the relative forecasting performance of various models (e.g. Alecke, Untiedt and Huber, 2011; Kupiszewski, 2002; and Bijak et al., 2019). However, no individual data source or modelling framework has proven to be clearly outperforming the others.

The degree of uncertainty becomes clear when comparing a recent migration forecast for selected European countries with observed numbers. Bijak and Wiśniowski (2009) applied a probabilistic time series model and combine it with expert opinion in a Bayesian framework. The chosen forecast model is thus one of the most methodologically advanced approaches currently available. It addresses and quantifies uncertainty, applies a statistical model with relatively few restrictions, and enhances the limited available data with expert knowledge.

Table 2 compares predicted and observed numbers of total yearly immigration for selected European countries. The estimates are based on time series data and cover forecast horizons of 9 to 11 years (see column 2). The fourth column shows the estimated average number of yearly immigration (the median estimate). Furthermore, predictive intervals are provided for the forecast, indicating the range into which 50 per cent of all possible outcomes are expected to fall.[32] Accordingly, the fifth column shows the lower and upper bounds of the 50 per cent predictive intervals. The observed values in column 5 are the numbers of total yearly immigration in 2016 (except for France for which the prediction year is 2015, see column 3) as retrieved from the official statistics at Eurostat. Lastly, column seven provides the decisive information in the table. It shows the differences between forecast and observed immigration, calculated by subtracting the estimated median value from the observed value. It should be noted however that the difference is not a calculation of forecast errors but rather an illustration of the degree of uncertainty that migration forecasts entail.

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[31]   Visit the website of the United Kingdom Office for National Statistics for the detailed numbers: www.ons.gov.uk/ peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdom bycountryofbirthandnationality.

[32]   In more technical terms, Bijak and Wiśniowski note (2009, p. 22): "Throughout this section, the predictions are presented in terms of central tendencies, which are medians from the respective predictive distributions. […] location parameters, such as medians or quantiles, are much more robust statistics than moment-based characteristics, for example, means or standard deviations, the latter being very sensitive to the presence of outlying observations."

Table 2.   Comparing immigration forecasts (Bijak and Wiśniowski, 2009) and reported flows (Eurostat, 2019) for selected European countries

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country	Years forecast	Forecast year	Median estimate (000s)[a]	50 per cent predictive interval[b]	Reported number of immigrants[c] (000s)	Deviation from median estimate[d] (000s)
Austria	9	2016	151.8	78.4 – 293.6	129.5	-22.3
Czechia	9	2016	135.9	52.0 – 348.0	64.1	-71.8
France	10	2015	300	180.0 – 509.0	363.9	63,9
Hungary	10	2016	22.2	12.5 – 38.2	53.6	31,4
Italy	11	2016	369.5	Up to 839	300.8	-68,7
Poland	9	2016	28.3	15.9 – 53.6	208.3	180
Portugal	10	2016	33.9	15.9 – 74.6	29.9	-4

Source: Bijak and Wiśniowski, 2009, pp. 23–25 (columns 1 to 5); and Eurostat, 2019 (column 6).

Notes: Total yearly immigration numbers are in the thousands. For a detailed description of how the forecasts were produced and which assumptions are involved, see: Bijak and Wiśniowski (2009). The entries marked in bold indicate that the number of immigrants reported by Eurostat lies of outside the 50 per cent predictive interval given in Bijak and Wiśniowski's forecast.

    a   The median immigration estimate reported here is taken from the study by Bijak and Wiśniowksi (2009).
    b   The predictive intervals reported here are taken from the study by Bijak and Wiśniowksi (2009). The authors also calculated 80 and 90 per cent predictive intervals. However, they argue that these intervals become too large "to offer any meaningful information for the forecast users" (Bijak and Wiśniowski, 2009, p. 25), especially over long time horizons.
    c   The number of immigrants reported here is taken from Eurostat (2019).
    d   The deviation of the reported number of immigrants from the median estimate is calculated by subtracting column (6) from column (4).

Figure 16 is an illustration of the comparison undertaken in Table 2. It shows the 50 per cent predictive intervals including their median estimates of immigration as blue boxes, and the observed number of immigrants as red dots. The figure clearly shows the different degrees of uncertainty attached to the forecasts: Italy stands out as having the largest degree of uncertainty with immigration in 2016 expected to lie anywhere between 167,700 and 839,000 new arrivals.[33] Regarding the high degree of uncertainty in the forecast for Italy, the authors note: "This is due to two major factors: A long and steady increase of migration observed in the past, and dramatic expectations of the experts resulting in much weight put by them on the explosive nature of the process" (Bijak and Wiśniowski, 2009, p. 24). When comparing the estimated and observed numbers of immigrants, the red dot lies below the median estimate (blue line in the box), thus indicating that the median forecast overestimated inflows by nearly 69,000.

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[33]   Note that the lower-bound estimate refers to the year 2015 and not 2016.

Figure 16. 50 per cent predictive intervals of yearly immigration (in thousands) by Bijak and Wiśniowski (2009) and observed immigration by Eurostat (2019)
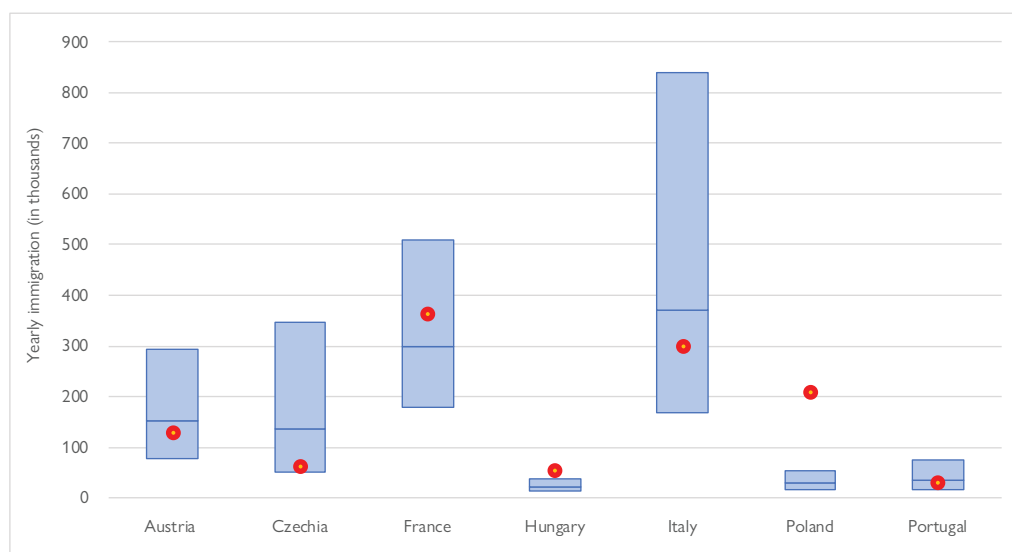
Note: The blue boxes represent the 50 per cent predictive intervals of the yearly total immigration estimates produced by Bijak and Wiśniowski (2009) and the blue line marks their median estimate. The red dots represent the observed number of immigrants as reported by Eurostat (2019). The year of the forecast is 2016 for all countries except France, for which it is 2015. The lower-bound estimate for Italy refers to the year 2015 and not 2016. (See Table 2 for a more detailed description.)

Source: Authors' visualization based on Bijak and Wiśniowski (2009, pp. 23–25) and Eurostat (2019).

In contrast, the predictive interval for immigration to Portugal in 2016 is much smaller (ranging from 15,900 to 74,600) and the median estimate also comes much closer to the observed number of immigrants. Poland represents yet another case. The forecast anticipates stable immigration and a relatively small degree of uncertainty indicated by the narrow predictive interval. However, when compared with Eurostat numbers, the median forecast appears to have largely underestimated future immigration. In particular, unexpectedly growing immigration from Ukraine to Poland in recent years increased inflows markedly.[34] As can be seen from these examples, each forecast produces imprecise results for different reasons – even when using advanced methods that combine time series analysis with subjective expert assessment, and even with seemingly stable trends.

A few more conclusions can be drawn from the comparison and from the study produced by Bijak and Wiśniowski (2009). One is that forecast uncertainty is rapidly increasing in some countries. This is in line with the intuitive and repeated finding that forecast errors also increase with forecast duration (Bijak et al., 2019; Shaw, 2007; and Alders et al., 2007). In Czechia, for example, immigration volumes are estimated to range between 52,000 and 348,000 in 2016 and then increase to between 42,200 and 715,000 in 2025 (Figure 16). Even if the forecasts indicate correct intervals, the extend of the range opens up questions of usefulness for practitioners and policymakers. Second, of the seven estimates, two are outside of the range of the 50-per cent predictive interval. Although the probability of real migration not being lower than the lower interval is only 0.75, two estimates, for Hungary and Poland, fall under this category. Third, the forecast model seems to perform overall better for the Western European countries in the paper than

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34   OECD (2016b, p. 290).

for the Eastern European countries. In their concluding section, Bijak and Wiśniowski (2009, p. 33) therefore note that "given the above conclusion on the [barely predictable] nature of migration, an attempt of its precise prediction in numerical terms is doomed to fail". Nonetheless, they recognize that predictive intervals can at least help to assess the degree of uncertainty underlying a forecast.

Figure 17. Yearly total immigration to Austria as predicted by Bijak and Wiśniowksi (2009) with predictive intervals, 2008–2025
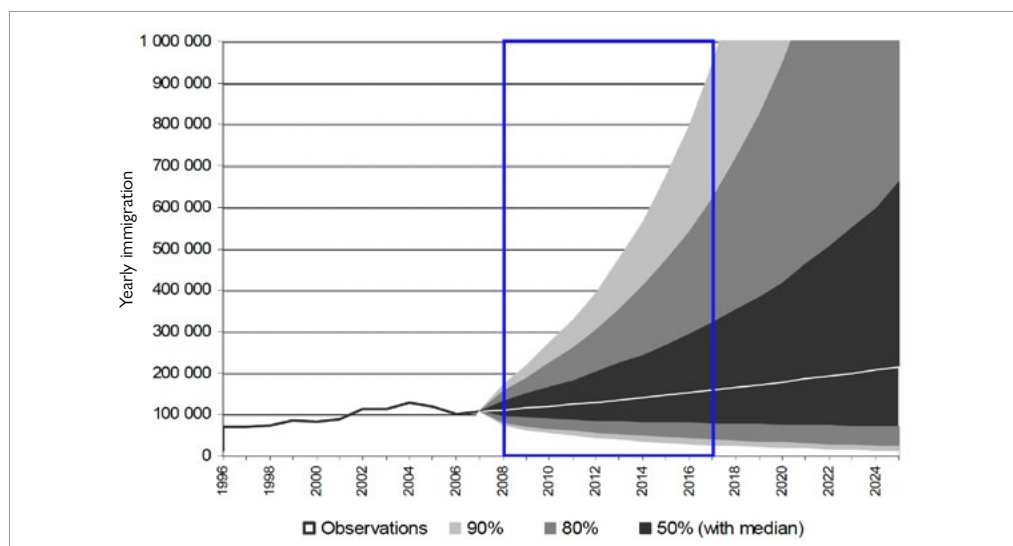
Source: Bijak and Wiśniowski, 2009, p. iii.

As a result of the inevitable uncertainty contained in migration forecasts, a stream of the literature is working on assessing ex-post forecasting errors, for instance, by comparing forecasts with observed migration (de Beer, 1997; Alecke, et al., 2001; Shaw, 2007; and Bijak et al., 2019). The unanimous conclusion is that errors are ubiquitous and that no approach can be determined to be the best. Each data source, migration stream and country have specific conditions to which the approach should be tailored. For users of forecasts, however, the implications are also important. First, users should understand forecasts as continuous process that needs adjustments and new input to remain relevant. Second, users need to be aware of the assumptions involved in the creation of forecasts and understand the limitations. Lastly, it is recommended that for specific policy areas that require forecasts as inputs, users should not refer to general-interest forecasts of migration. Instead, they are recommended to engage in a more promising, even if longer, process of creating a tailored estimate.

7

CONCLUSIONS

7. CONCLUSIONS

The aim of this systematic literature review is to take stock of the state of the literature on migration scenarios and forecasts and evaluate their development in a comparative manner. As shown, both scenario and forecast publications have seen important growth since the 1990s. One reason for this is the increasing importance that is certainly attached to the slowing or reversal of natural population growth in most developed countries and immigration becoming a crucial source for future population maintenance. Another reason is the public eye, which has repeatedly fixed its attention on migration in the past decades, be it during the successive European Union enlargement phases or during the more recent arrivals of asylum seekers in Europe.

For the purpose of this report, studies that anticipate future migration were grouped into two groups: scenarios and forecasts. The literature review has demonstrated that both groups contain substantial variety, and that the two groups can overlap. This is, for example, the case with forecasts that use qualitatively developed scenarios as inputs for their calculations. Migration scenarios have been created by a range of actors (academics, national governments, international organizations, and so on) using a range of methods (participatory approaches, Delphi surveys and adaptation of existing scenarios). Migration forecasts have also been produced by different actors but have a relative stronger anchorage among academics, particularly, demographers and economists. Their respective toolboxes are rich and cover, among others, causal forecasts, probabilistic projections and survey-based forecasts.

Importantly, the literature review has shown that each approach has its respective weaknesses and no single method can be said to be the preferred one. Instead, future producers and users of migration forecasts should think carefully about their aims and then choose the most appropriate approach. For example, if the goal is to engage an institution in an open discussion and challenge taken-for-granted assumptions, migration scenarios might be the right tool. In contrast, if the goal is to prepare the operations of a specific government body for the upcoming year, a quantitative forecast using extrapolations could be preferable. The systematic literature review, presented in this report, can be used as a starting point or background for understanding the wealth of work already done on the subject. As such, it can also be a starting point for future users in selecting and interpreting migration forecasts.

ANNEX I.
METHODOLOGY OF THE SYSTEMATIC LITERATURE REVIEW

The studies evaluated in this report were retrieved through a systematic literature search between May and August 2019. The methodology was adapted from Cochrane's Guidelines for Systematic Reviews of Interventions (Higgins and Green (eds.), 2011) and was designed to produce a rigorous inventory of relevant studies with minimal selection bias. Relevant literature was identified from three sources: websites, bibliographic searches (of website search results) and expert referrals. In a first step, a keyword search was conducted on four academic websites, namely, Web of Science, JSTOR, Science Direct, and CROSS-MIG, a newly established database for migration research. Furthermore, Google Scholar (Google's specialized search engine for scholarly literature) and Google (Google's general search engine) were searched for relevant entries. Two separate search strategies were developed for each of the thematic areas considered in Table A1.

Table A1. Search strategies for migration scenarios versus migration forecasts

	Migration scenarios	Migration forecasts
Date of publication	No time restriction	No time restriction
Geographic scope of study	At least partly covers the European Union	No restriction
Language of study	English	English
Type of source	Primary and grey literature	Primary and grey literature
Study design	Narrative scenarios that anticipate future international migration to Europe	Forecasts, projections and other studies that contribute to quantitative migration forecasts
Databases	Web of Science, JSTOR, Science Direct, Google (search engine), Google Scholar, CROSS-MIG (Note: JSTOR and CROSS-MIG did not reveal new records.)	Web of Science, Google, Google Scholar, CROSS-MIG

Initial search trials revealed that Google Scholar provided important additional coverage for the retrieval of scholarly articles after conventional search engines (Gehanno, Darmoni and Rollin, 2013). The general Google search engine proved valuable in retrieving grey literature, in particular, to find forecast studies that are not published in conventional academic outlets, but instead by international organizations or think tanks. While the importance of searching Google to retrieve grey literature has been recognized (Godin et al., 2015), the use of Google comes with challenges that are not encountered when using conventional academic databases. First, the sheer number of search results makes it impossible to screen them in their entirety. It was therefore decided that for both Google and Google Scholar, the first 50 results (equivalent to the first five pages) would be searched. Second, there is a lack of transparency in the search and ranking algorithms of Google. The best search strategy therefore turned out to be an iterative process that use one-word instead of nested search terms, as used on other databases. Search terms for the migration scenario search included "Europe", "migration" and "scenario." For the migration forecast search, they further included "forecast", "foresight", "predict", "anticipate", "project", "estimate", "21st century", "international", "flow" and "population."

After the database searches were completed, a bibliographic search was conducted. Due to the large number of retrieved studies, priority was given to the most recently published studies across a balanced representation of academic disciplines. The full texts of the studies were then reviewed and assessed against the selection criteria. For both the scenario and the forecast searches, only English-language entries were considered. A requirement for the scenario publications was that studies had to have a geographic scope of at least part of the European Union and used qualitative narratives in assessing future migration. For the forecast search, the scope was wider (due to more search terms used), with all studies selected having made quantitative contributions to the study of future migration. Screening revealed that some of the studies retrieved in the scenario search fit methodologically as forecasts and were therefore transferred accordingly. This step was necessary because the term "scenario" was used ambiguously to describe either a qualitative, narrative form of migration scenario or projection variants of demographic studies. After the inventory of studies was compiled, a final review of the scenario studies took place, dropping entries that did not fully meet the selection criteria. Lastly, a small group of leading experts were contacted to review the literature lists and suggest additional studies. Figures A1 and A2 describe the literature selection process step by step.

Figure A1. Migration scenario search process

	GOOGLE	GOOGLE SCHOLAR	WEB OF SCIENCE	SCIENCE DIRECT
STEP 1: DATABASE SEARCH	4 search terms 200 search results **42 results retained**	2 search terms 100 search results **7 results retained**	1 search term 56 search results **3 results retained**	1 search term 50 search results **1 result retained**
STEP 2: BIBLIOGRAPHIC SEARCH	27 bibliographic search results	13 bibliographic search results	1 bibliographic search result	0 bibliographic search results
STEP 3: EXPERT REFERRAL		5 expert referrals		

Screening of titles, abstracts and keywords

99 potentially relevant records

Full text screening: irrelevant studies deleted; duplicates consolidated; forecasts transferred

FINAL LIST: 21 RECORDS

Source: Authors' elaboration.

Note: Two additional online databases, JSTOR and CROSS-MIG, were searched. However, since no additional results were retrieved through them, they were not included in the flow chart. Due to the large number of results on Google and Google Scholar, it was decided that only the first 50 results would be searched. That is why the four Google searches yielded exactly 200 results.

Figure A2. Migration forecast search process

	GOOGLE	GOOGLE SCHOLAR	WEB OF SCIENCE
STEP 1: DATABASE SEARCH	2 search terms 100 search results **30 results retained**	2 search terms 100 search results **52 results retained**	1 search term 54 search results **11 results retained**
STEP 2: TRANSFER	**14 from Google migration scenario search**	**4 from Google Scholar migration scenario search**	**0 from Web of Science migration scenario search**
STEP 3: BIBLIOGRAPHIC SEARCH	**52 bibliographic results**	**22 bibliographic results**	**8 bibliographic results**
STEP 4: EXPERT REFERRAL		**15 expert referrals**	

Screening of titles, abstracts and keywords

FINAL LIST: 208 RECORDS

Source: Authors' elaboration.

Note: Due to the large number of results on Google and Google Scholar, it was decided that only the first 50 results would be searched. That is why the two Google searches yielded exactly 100 results. Transferred entries (Step 2) were retrieved during the scenario literature search but fit methodologically better into the forecast literature.

ANNEX II.
LIST OF REVIEWED MIGRATION SCENARIO PUBLICATIONS

Year	Author	Title
2004	Lachmanová, L. and D. Drbohlav	The probable future development of European East–West migration (the Delphi method revived)
2008	Brown, O.	Migration and climate change (IOM Migration Research Series, No. 31)
2009	Bossard, L.	The future of international migration to OECD countries
2009	Vág, A.	Scenarios of environmental change and migration
2010	European Spatial Planning Observation Network (ESPON) and the Netherlands Interdisciplinary Demographic Institute (NIDI)	Demographic and Migratory Flows Affecting European Regions and Cities Project final report
2010	Frühmann, J. and J. Jäger	Linking the Earth's future to migration: Scenarios of environmental change and possible impacts on forced migration
2011	de Haas, H.	Mediterranean migration futures: patterns, drivers and scenarios
2011	Hansen, R.	The European Union's role in migration up to 2030 and then, 2060
2011	Ariely, G.A., R. Warnes, J. Bijak and R. Landesman	Futures of borders: a forward study of European border checks
2011	UK Government Office for Science (GO-Science)	Migration and global environmental change: future challenges and opportunities
2012	Goff, L., H. Zarin and S. Goodman	Climate-induced migration from Northern Africa to Europe: security challenges and opportunities
2016	Frontex	Scenarios for migration, Europe and its external borders
2016	Organisation for Economic Co-operation and Development (OECD)	*Perspectives on Global Development 2017: International Migration in a Shifting World*
2017	Friedrich-Ebert-Stiftung, Global Future and IOM	*Tomorrow's World of Migration and Mobility*

Year	Author	Title
2018	Benton, M. and L. Patuzzi	Jobs in 2028: How will changing labour markets affect immigrant integration in Europe?
2018	Böckenförde, M. and E. Braune (eds.)	Prospective migration policy – scenario-building on relations between West Africa and Europe
2018	EU Policy Lab (European Commission)	The future of migration in the European Union: future scenarios and tools to stimulate forward-looking discussions
2018	European Political Strategy Centre (EPSC)	The future of migration and integration
2018	Natale, F., S. Migali and R. Münz	Many more to come? Migration from and within Africa
2018	Sánchez-Montijano, E., A. Kaya and M.K. Sökmen	Highly skilled migration between the EU and Turkey: drivers and scenarios
2019	European Asylum Support Office (EASO)	The future of international protection in EU+ 2030: a scenario study

ANNEX III:
LIST OF REVIEWED MIGRATION FORECAST PUBLICATIONS

Year	Author	Title
1946	Zipf, G.	The P1 P2/D hypothesis: On the intercity movement of persons
1961	Tarver, J.D.	Predicting migration
1963	Ter Heide, H.	Migration models and their significance for population forecasts
1974	Wilson, A.G. and P.H. Rees	Population statistics and spatial demographic accounts
1981	Rogers, A. and L.J. Castro	Model migration schedules
1982	Plane, D.A.	An information theoretic approach to the estimation of migration flows
1984	Straubhaar, T.	The accession of Spain and Portugal to the EC from the aspect of the free movement of labour in an enlarged common labour market
1985	Isserman, A.M., D. Plane, P.A. Rogerson and P.M. Beaumont	Forecasting interstate migration with limited data: a demographic–economic approach
1985	Greenwood, M.J.	Human migration: theory, models and empirical studies
1986	Smith, S.K.	Accounting for migration in cohort-component projections of state and local populations
1986	Rogers, A.	Parameterized multistate population dynamics and projections
1986	Harker, P.T.	The use of expert judgments in predicting interregional migration patterns: an analytic hierarchy approach
1989	Stambol, L.S. and K.Ø. Sørensen	Migration analysis and regional population projections
1989	Arnold, F.	Revised estimates and projections of international migration, 1980–2000
1989	Zolberg, A.R.	The next waves: Migration theory for a changing world
1990	Bulatao, R.A., E. Bos, P.W. Stephens and M.T. Vu	World population projections, 1989–90 edition: short-and long-term estimates
1990	Massey, D.S. and R.M. Zenteno	The dynamics of mass migration
1992	Salt, J.	The future of international labor migration
1992	Coleman, D.A.	Does Europe need immigrants? Population and work force projections
1993	de Beer, J.	Forecast intervals of net migration: the case of the Netherlands

Year	Author	Title
1993	Lutz, W.	The future of international migration
1994	Willekens, F.	Monitoring international migration flows in Europe: towards a statistical data base
1994	Champion, A.G.	International migration and demographic change in the developed world
1995	Salt, J. and A. Singleton	Analysis and forecasting of international migration by major groups
1997	de Beer, J.	The effect of uncertainty on migration on national population forecasts: the case of the Netherlands
1998	Sanderson, W.C.	Knowledge can improve forecasts: a review of selected socioeconomic population projection models
1998	Lee, R.D.	Probabilistic approaches to population forecasting
1998	IOM	Migration potential in Central and Eastern Europe
1999	Gorbey, S., D. James and J. Poot	Population forecasting with endogenous migration: an application to trans-Tasman migration
1999	Bauer, T. and K.F. Zimmermann	Assessment of possible migration pressure and its labour market impact following EU enlargement to Central and Eastern Europe
1999	Massey, D.S.	International migration at the dawn of the twenty-first century: the role of the state
2000	van der Gaag, N., E. van Imhoff and L. van Wissen	Internal migration scenarios and regional population projections for the European Union
2000	Fertig, M. and C.M. Schmidt	Aggregate-level migration studies as a tool for forecasting future migration streams
2000	Boeri, T. and H. Brücker	The impact of Eastern enlargement on employment and labour markets in the EU member states
2000	United Nations Population Division (UNPD)	Replacement migration: Is it a solution to declining and ageing populations?
2000	Arango, J.	Explaining migration: a critical view
2000	Sinn, H.W.	EU enlargement, migration, and lessons from German unification
2000	Lutz, W., P. Saariluoma, W.C. Sanderson and S. Scherbov	New developments in the methodology of expert- and argument-based probabilistic population forecasting
2001	Fertig, M.	The economic impact of EU enlargement: assessing the migration potential
2001	Chamie, J.	World population in the 21st century
2001	European Commission	The economic impact of enlargement
2001	Hille, H. and T. Straubhaar	The impact of EU enlargement on migration movements and economic integration, results and recent studies
2001	Alecke, B., P. Untiedt and G. Huber	What a difference a constant makes: How predictable are international migration flows?
2001	Weise, C., J. Bachtler, R. Downes, I. McMaster and K. Toepel	The impact of EU enlargement on cohesion
2001	Wallace, C.D.	Migration potential in Slovakia

Year	Author	Title
2001	Papapaganos, H. and P. Sanfrey	Intention to emigrate in transition countries: the case of Albania
2002	Sweeney, S.H. and K.J. Konty	Population forecasting with nonstationary multiregional growth matrices
2002	Hablicsek, L. and P.P. Toth	The role of international migration in maintaining the population size of Hungary between 2000–2050
2002	Disney, G.	Model-based estimates of UK immigration
2002	Jandl, M.	The estimation of illegal migration in Europe
2002	McDonald, P. and R. Kippen	Projecting future migration levels: Should rates or numbers be used?
2002	King, R.	Towards a new map of European migration
2002	Kupiszewski, M.	How trustworthy are forecasts of international migration between Poland and the European Union?
2003	Bruder, J.	East–West migration in Europe, 2004–2015
2003	Kupiszewski, M. and D. Kupiszewska	Internal migration component in subnational population projections in member states of the European Union
2003	Dustmann, C., M. Casanova, M. Fertig, I. Preston and C. Schmidt	The impact of EU enlargement on migration flows
2003	Alvarez-Plata, P., H. Brücker and B. Siliverstovs	Potential migration from Central and Eastern Europe into the EU-15: an update
2004	Melander, E. and M. Öberg	Forced migration: The effects of the magnitude and scope of fighting
2004	Wilson, T. and M. Bell	Comparative empirical evaluations of internal migration models in subnational population projections
2004	Keilman, N. and D.Q. Pham	Empirical errors and predicted errors in fertility, mortality and migration forecasts in the European Economic Area
2004	Castles, S.	Why migration policies fail
2004	Lutz, W. and J.R. Goldstein	Introduction: How to deal with uncertainty in population forecasting?
2004	Krieger, H.	Migration trends in an enlarged Europe
2005	van Wissen, L.J.G, N. Gaag, P. Rees and J. Stillwell	In search of a modelling strategy for projecting internal migration in European countries: demographic versus economic–geographical approaches
2005	Kancs, d'A.	Can we use NEG models to predict migration flows? an example of CEE accession countries
2005	Kupiszewski, D. and M. Kupiszewski	A revision of the traditional multiregional model to better capture international migration: the MULTIPOLES model and its applications
2005	Wilson, T. and P. Rees	Recent developments in population projection methodology: a review
2005	Willekens, F.	Biographic forecasting: bridging the micro–macro gap in population forecasting
2005	Howe, N. and R. Jackson	Projecting immigration: a survey of the current state of practice and theory

Year	Author	Title
2006	Alho, J., M. Alders, H. Cruijsen, N. Keilman, T. Nikander and D.Q. Pham	New forecast: population decline postponed in Europe
2006	Brücker, H. and B. Siliverstovs	On the estimation and forecasting of international migration: How relevant is heterogeneity across countries?
2006	Erzan, R., U. Kuzubaş and N. Yildiz	Immigration scenarios: Turkey–EU
2006	Brücker, H. and B. Siliverstovs	Estimating and forecasting European migration: methods, problems and results
2006	Raymer, J., A. Bonaguidi and A. Valentini	Describing and projecting the age and spatial structures of interregional migration in Italy
2006	Lutz, W. and S. Scherbov	Future demographic change in Europe: the contribution of migration
2006	Bijak, J.	Forecasting international migration: selected theories, models and methods
2006	Howe, N. and R. Jackson	Long-term immigration projection methods: current practice and how to improve it
2006	Massey, D.S.	Building a comprehensive model of international migration
2006	Lutz, W.	Towards building a comprehensive migration projections framework
2006	Zaiceva, A.	Reconciling the estimates of potential migration into the enlarged European Union
2007	Matysiak, A. and B. Nowok	Stochastic forecast of the population of Poland, 2005–2050
2007	Bijak, J., D. Kupiszewska, M. Kupiszewski, K. Saczuk and A. Kicinger	Population and labour force projections for 27 European countries, 2002–2052: impact of international migration on population ageing
2007	Shaw, C.	Fifty years of United Kingdom national population projections: How accurate have they been?
2007	Wilson, T.	The forecast accuracy of Australian Bureau of Statistics national population projections
2007	Alders, M., N. Keilman and H. Cruijsen	Assumptions for long-term stochastic population forecasts in 18 European countries
2007	Bijwaard, G.	Modeling migration dynamics of immigrants: the case of the Netherlands
2007	Lutz, W. and S. Scherbov	The contribution of migration to Europe's demographic future: projections for the EU-25 to 2050
2007	Stover, J. and S. Kirmeyer	DemoProj Version 4: a computer program for making population projections
2007	de Silva, W.I.	A population projection of Sri Lanka for the millennium, 2001–2101: trends and implications
2007	Skirbekk, V.F.	Report on methods for demographic projections at multiple levels of aggregation
2008	Kupiszewski, M.	International migration and the future of populations and labour in Europe
2008	Alho, J.	Aggregation across countries in stochastic population forecasts

Year	Author	Title
2008	Bijak, J., A. Kicinger, K. Saczuk, D. Kupiszewska, M. Kupiszewski and B. Nowok	Long-term international migration scenarios for Europe, 2002–2052
2008	Cohen, J.E., M. Roig, D.C. Reuman and C. GoGwilt	International migration beyond gravity: a statistical model for use in population projections
2008	Keilman, N.	European demographic forecasts have not become more accurate over the past 25 years
2008	Coleman, D.A.	The demographic effects of international migration in Europe
2008	Bijak, J., D. Kupiszewska and M. Kupiszewski	Replacement migration revisited: Simulations of the effects of selected population and labor market strategies for the ageing Europe, 2002–2052
2008	Hyndman, R.J. and H. Booth	Stochastic population forecasts using functional data models for mortality, fertility and migration
2008	Black, R., D. Kniveton, R. Skeldon, D. Coppard, A. Murata and K. Schmidt-Verkerk	Demographics and climate change: future trends and their policy implications for migration
2008	Bijak, J. and M. Kupiszewski	Population and labour force forecasts for selected European countries: assumptions and results
2008	Raymer, J. and F. Willekens	International migration in Europe: data, models and estimates
2008	Pijpers, R.	Problematizing the "orderly" aesthetic assumptions of forecasts of East–West migration in the European Union
2008	Smith, C., D. Kniveton, S. Wood and R. Black	Predictive modelling
2009	Borgy, V. and X. Chojmicki	Labor migration: macroeconomic and demographic outlook for Europe and neighborhood regions
2009	Bruni, M.	Demographic forecasts, migration and transition theory: a labor market perspective
2009	Ortman, J.M. and C.E. Guarneri	United States population projections: 2000 to 2050
2009	Barrell, R., S. Gottschalk, S. Kirby and A. Orazgani	Projections of migration inflows under alternative scenarios for the UK and world economies
2009	Bijak, J. and M. Kupiszewski	Forecasting of immigration flows until 2025 for selected European countries using expert information
2009	Coleman, D.A.	Migration and its consequences in 21st century Europe
2010	Bijak, J. and M. Kupiszewski	Bayesian forecasting of immigration to selected European countries by using expert knowledge
2010	Kim, K. and J.E. Cohen	Determinants of international migration flows to and from industrialized countries: a panel data approach beyond gravity
2010	Kancs, d'A. and J. Kielyte	European integration and labour migration

Year	Author	Title
2010	de Beer, J., J. Raymer, R. van der Erf and L. van Wissen	Overcoming the problems of inconsistent international migration data: a new method applied to flows in Europe
2010	Brunborg, H. and A. Cappelen	Forecasting migration flows from and to Norway using an econometric model
2010	Skarman, C., S. Andersson and A. Ljungberg	Model to forecast the re-immigration of Swedish-born persons
2010	Bijak, J.	Dealing with uncertainty in international migration predictions: from probabilistic forecasting to decision analysis
2010	Anjos, C. and P. Campos	The role of social networks in the projection of international migration flows: an agent-based approach
2011	Bijak, J.	*Forecasting International Migration in Europe: A Bayesian View*
2011	Stillwell, J. and M. Clarke (eds.)	*Population Dynamics and Projection Methods*
2011	Shin, H.B. and J.M. Ortman	Language projections: 2010–2020
2011	Molloy, R., C.L. Smith and A. Wozniak	Internal migration in the United States
2011	Wilson, T., E. Charles-Edwards and M. Bell	Australia's future net overseas migration: a survey of experts
2012	Raftery, A.E., N. Li, H. Ševčíková, P. Gerland and G.K. Heilig	Bayesian probabilistic population projections for all countries
2012	Okólski, M. (ed.)	*European Immigration: Trends, Structures and Policy Implications*
2012	Raymer, J., G.J. Abel and A. Rogers	Does specification matter? Experiments with simple multiregional probabilistic population projections
2012	Cohen, J.E.	Projection of net migration using a gravity model
2012	Bijak, J.	Migration assumptions in the UK national population projections: methodology review
2012	Simini, F., A.C. González, M. Maritan and A.L. Barabási	A universal model for mobility and migration patterns
2012	Blumenstock, J.E.	Inferring patterns of internal migration from mobile phone call records: evidence from Rwanda
2012	Zagheni, E. and I. Weber	You are where you e-mail: using e-mail data to estimate international migration rates
2012	Massey, D.S.	Towards an integrated model of international migration
2012	Findlay, A.M., D. McCollum, G. Abel, A. Wiśniowski and J. Bijak	A Delphi survey of immigration to the UK to 2060, with particular reference to environmental mobility
2013	Abel, G.J., J. Bijak, J.J. Forster, J. Raymer, P.W.F. Smith and J.S.T. Wong	Integrating uncertainty in time series population forecasts: an illustration using a simple projection model
2013	Raymer, J., A. Wiśniowski, J.J. Forster, P.W.F. Smith and J. Bijak	Integrated modelling of European migration

Year	Author	Title
2013	Strielkowski, W., K. Šárková and T. Żornaczuk	EU enlargement and migration: scenarios of Croatian accession
2013	Abel, G.J.	Estimating global migration flow tables using place of birth data
2013	Keogh, G.	Modelling asylum migration pull-force factors in the EU-15
2013	Calian, V.	Dynamical models for migration projections
2013	Dion, P.	An alternative projection model for interprovincial migration in Canada
2013	Sander, N., G.J. Abel and F. Riosmena	The future of international migration: developing expert-based assumptions for global population projections
2013	Muenz, R.	Demography and migration: an outlook for the 21st century
2013	Wiśniowski, A., J. Bijak, S. Christiansen, J.J. Forster, N. Keilman, J. Raymer and P.W.F. Smith	Utilising expert opinion to improve the measurement of international migration in Europe
2013	Abel, G.J., J. Bijak, A.M. Findlay, D. McCollum and A. Wiśniowski	Forecasting environmental migration to the United Kingdom: an exploration using Bayesian models
2013	State, B., I. Weber and E. Zagheni	Studying international mobility through IP geolocation
2013	Wiśniowski, A.	Bayesian modelling of international migration with labour force survey data
2014	Abel, G.J., S. KC and N. Sander	Examining the role of international migration in global population projections
2014	Raftery, A.E., L. Alkema and P. Gerland	Bayesian population projections for the United Nations
2014	Cappelen, Å., T. Skjerpen and M. Tønnessen	Forecasting immigration in official population projections using an econometric model
2014	Abel, G.J. and N. Sander	Quantifying global international migration flows
2014	Lowell, L.	Managing immigration: a review of some past projections
2014	Wiśniowski, A., J. Bijak and H. Shang	Forecasting Scottish migration in the context of the 2014 constitutional change debate
2014	Zagheni, E., V.R.K. Garimella, I. Weber and B. State	Inferring international and internal migration patterns from Twitter data
2014	European Migration Network	Ad hoc query on forecasting and contingency planning arrangements for international protection applicants
2014	Shang, H., J. Bijak and A. Wiśniowski	Directions of impact of Scottish independence on migration: a survey of experts
2015	Azose, J.J. and A.E. Raftery	Bayesian probabilistic projection of international migration
2015	Fertig, M. and M. Kahanec	Projections of potential flows to the enlarging EU from Ukraine, Croatia and other eastern neighbours
2015	García, A.J., D.K. Pindolia, K.K. Lopiano and L.J. Tatem	Modeling internal migration flows in sub-Saharan Africa using census microdata

Year	Author	Title
2015	Docquier, F. and J. Machado	Remittance and migration prospects for the 21st century
2015	Colby, S.L. and J.M. Ortman	Projections of the size and composition of the U.S. Population: 2014 to 2060
2015	Wiśniowski, A., P.W.F., Smith, J. Bijak, J. Raymer and J.J. Forster	Bayesian population forecasting: extending the Lee-Carter method
2015	Rees, N., P. Lomax and P. Boden	Alternative approaches to forecasting migration: framework and UK illustrations
2015	Disney, G., A. Wiśniowski, J.J. Forster, P.W.F. Smith and J. Bijak	Evaluation of existing migration forecasting methods and models
2016	Wiśniowski, A., J.J. Forster, P.W.F. Smith, J. Bijak and J. Raymer	Integrated modelling of age and sex patterns of European migration
2016	Hanson, G. and C. McIntosh	Is the Mediterranean the new Rio Grande? US and EU immigration pressures in the long run
2016	Wilson, T.	Can international migration forecasting be improved? The case of Australia
2016	García-Guerrero, V.M.	A probabilistic method to forecast the international migration of Mexico by age and sex
2016	Azose, J.J., H. Ševčíková and A.E. Raftery	Probabilistic population projections with migration uncertainty
2016	Vandresse, M.	Projection of internal migration based on migration intensity and preferential flows
2016	de Lima, P., S. Bernabè, R.L. Bubbico, S. Leonardo and C. Weiss	Migration and the EU: challenges, opportunities, the role of EIB
2016	Armstrong, A. and J. van de Ven	The impact of possible migration scenarios after 'Brexit' on the state pension system
2016	IOM's Global Migration Data Analysis Centre	Migration forecasting: beyond the limits of uncertainty
2016	Buettner, T. and R. Muenz	Comparative analysis of international migration in population projections
2016	Collmann, J., J. Blake and D. Bridgeland	Measuring the potential for mass displacement in menacing contexts
2017	KC, S. and W. Lutz	The human core of the shared socioeconomic pathways: Population scenarios by age, sex and level of education for all countries to 2100
2017	Docquier, F. and J. Machado	Income disparities, population and migration flows over the 21st century
2017	United Nations Population Division (UNPD)	*World Population Prospects: The 2017 Revision*
2017	Eurostat	Methodology for the migration assumptions in the 2015-based population projections
2017	Buettner, T. and R. Muenz	International migration projections: methodology brief
2017	European Asylum Support Office	Quantitative assessment of asylum-related migration: a survey of methodology
2017	Campos, R.G.	Migratory pressures in the long run: international migration projections to 2050

Year	Author	Title
2017	Dao, T.H., F. Docquier, M. Maurel and P. Schaus	Global migration in the 20th and 21st centuries: the unstoppable force of demography
2017	Pew Research Center	Europe's growing Muslim population
2017	Organisation for Economic Co-operation and Development (OECD)	Will migration help increase the educational level of the European labour force by 2030?
2017	Connor, P.	Can Google trends forecast forced migration flows? Perhaps, but under certain conditions
2018	Abel, G.J.	Non-zero trajectories for long-run net migration assumptions in global population projection models
2018	United Nations Population Division (UNPD)	Projected demographic effects of international migration, 2015–2050
2018	Azose, J.J. and A.E. Raftery	Estimating large correlation matrices for international migration
2018	Raymer, J. and Wiśniowski, A.	Applying and testing a forecasting model for age and sex patterns of immigration and emigration
2018	Etling, A., L. Backeberg and J. Tholen	The political dimension of young people's migration intentions: evidence from the Arab Mediterranean region
2018	Curiel, R.P., L. Pappalardo, L. Gabrielli and S.R. Bishop	Gravity and scaling laws of city-to-city migration
2018	Azose, J.J. and A.E. Raftery	Estimation of emigration, return migration, and transit migration between all pairs of countries
2018	Buettner, T. and R. Muenz	Modeling alternative projections of international migration
2018	Hilgenstock, B. and Z. Koczan	Storm clouds ahead? Migration and labor force participation rates in Europe
2018	Rigaud, K.K., A. de Sherbinin, B.R. Jones, J.S. Bergmann, V.W.C. Clement, K.J. Ober, J. Schewe, S. Adamo, B. McCusker, S. Heuser and A. Midgley	Groundswell: preparing for internal climate migration
2018	Derer, P.	Population growth will make it harder to meet EU climate goals, while stable or declining populations will help cut greenhouse gas emissions in the EU
2018	Vespa, J., D.M. Armstrong and L. Medina	Demographic turning points for the United States: population projections for 2020 to 2060
2018	Willekens, F.	Towards causal forecasting of international migration
2018	Joint Research Centre (European Commission)	Demographic and human capital scenarios for the 21st century: 2018 assessment for 201 countries
2018	Organisation for Economic Co-operation and Development (OECD)	Can we anticipate future migration flows?
2019	Arranz, A.O.	Predicting migration in Ireland: a gravity model approach

Year	Author	Title
2019	Lutz, W., G. Amran, A. Belanger, A. Conte, N. Gailey, D. Ghio, E. Grapsa, K. Jensen, E. Loichinger, G. Marois, R. Muttarak, M. Potancokova, P. Sabourin and M. Stonawski	Demographic scenarios for the EU – migration, population and education
2019	United Nations High Commissioner for Refugees (UNHCR)	*Projected Global Resettlement Needs 2020*
2019	The Overpopulation Project	New policy-based population projections for the European Union, with a consideration of the environmental implications
2019	Bijak, J., G. Disney, A.M. Findlay, J.J. Forster, P.W.F. Smith and A. Wiśniowski	Assessing time series models for forecasting international migration: lessons from the United Kingdom
2019	Scottish Expert Advisory Group on Migration and Population	UK immigration policy after leaving the EU: impacts on Scotland's economy, population and society
2019	Böhme, M., A. Gröger and T. Stöhr	Searching for a better life: Predicting international migration with online search keywords
2019	Willekens, F.	Evidence-based monitoring of international migration flows in Europe

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