Migration Forecasting—Significance and Approaches

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Migration is defined as the permanent change in an individual's usual residence. Forecasting migration is an important requisite for population forecasts or for planning in fields that depend on the future size and structure of the population, such as economics, epidemiology, social insurance, or infrastructure. As migration is the most volatile of all demographic components, its modeling is especially difficult. International migration can be modeled and forecast very differently; users should be familiar with the flaws and strengths of these different approaches.

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International migration is a global phenomenon with a current estimate of 281 million people globally being counted as migrants, defined as living outside one's country of origin, with an increasing tendency [1]. Reasons for migration are diverse, and classically defined by Lee [2] into the two categories of push and pull factors, with the first being factors repelling individuals from their region of origin, such as violent conflicts, poor nutritional and health standards, lack of work, or restrictions to freedom of speech. Pull factors instead are those attracting individuals to a specific region, such as better opportunities in employment or education, or better climatic circumstances. Issues arising from international migration differ very much between countries witnessing mostly negative net migration (origin countries) in comparison to those with regular positive net migration (target countries (the notions actually address the origin and the target country associated with one specific migration. We, however, borrow them here to characterize groups of countries)). The first case is low- to middle-income regions, i.e., large parts of Latin America, Africa, Asia, and Eastern Europe. The latter case is high-income regions, i.e., Western Europe, North America, Oceania, or Western Asia [1]. Whereas migration outflows from origin countries are often characterized by the loss of young and qualified individuals (brain drain), which then hampers the development of these countries [3], high inflows to the target countries are sometimes seen as problematic if the migrants originate from less developed and less egalitarian countries, in which case the migrants are perceived as a threat to security or the social systems of the target country by critics [4]. On the backhand side, migration can be seen as a chance. Outflows from origin countries might release tensions on the labor markets there if there is an oversupply of the labor force, which may lead to higher burdens on social systems. In the target countries, inflows by young migrants can be interpreted as a potential stabilizer for the age structure of the population and supply a potential labor force [4]. These societies, in most cases, are affected by a demographic transition, marked by low fertility and decreasing mortality rates, which then leads to aging and depopulation if not averted by immigration [5].

Forecasting is a crucial element of demographic research, with research institutes, political institutions, and enterprises being dedicated to this field since at least the mid-19th century (see, for instance, the historical account in [5]). The three main drivers of national population forecasting are fertility, mortality, and international migration, with the latter being special in the sense that it is the most volatile demographic component [5] and is significantly influenced by sudden events, such as violent conflicts, which are themselves in many cases unpredictable [5][6]. Since population forecasting is an indispensable basis for planning in, for example, economics, infrastructure, health, education, or social insurance [7], sound migration forecasting approaches are of considerable importance. Therefore, users of migration projections (regarding the distinction between forecasts and projections, see, for instance, [7]) should be well aware of their respective assumptions and accompanying limitations. Our contribution aims to present and discuss different approaches for readers who are unfamiliar with the practice of migration forecasting. As an important case study for the further implementation of migration forecasts in economic planning, we show how different migration projection approaches influence population and labor market projections. Our example focuses on Germany as the most populous country of the European Union (EU) [8], which has been an important destination country for migrants since the end of World War II (see Section 3). Our conclusions apply qualitatively to other countries as well, however.

For decades, Germany's official statistics have shown a positive migration balance (see Section 3)—with only a few exceptions. Germany has been a low-fertility country since the early 1970s, defined as having a total fertility rate below replacement level [9]. This, in turn, is associated with a process of natural negative population growth and aging [5]. The consequences of this process are becoming noticeable in the labor market, because, unlike in the past, the domestic potential labor force is no longer growing [10]. Against this backdrop, institutions such as the German Council of Economic Experts (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung—SVR) (see, e.g., ref. [11]) and the Deutsche Bundesbank [12] discuss the risks to the economy and the social security systems associated with skill shortages due to changing demographics. The public debate is currently characterized by hopes of acquiring skilled labor from abroad on the one hand and by fears of security risks caused by high immigration levels on the other hand, especially since the refugee crisis of 2014–2016 [13][14][15].

The questions to be answered in this respect include how much immigration would be necessary from a labor market perspective and what level of immigration Germany can expect in the future. Concerning the first question, the scientific literature does not agree on this point. In particular, opinions differ regarding whether the domestic labor reserves and trends in digitization will be able to compensate for the decrease in the potential labor force associated with changing demographics [16][17][18][19]. Additionally, the development of the demand for labor [19] and the ability of the economy to adapt to changes in the basic conditions via the wage–price mechanism must also be taken into account (e.g., ref. [20][21]). The effect of population aging, in contrast, is consistently seen as leading to a substantial decrease in the population of working age if there is no immigration. This will create diverse problems for the labor market and the social security system [5][22][23][24]. Previous population studies on Germany or the EU in general that examined the target immigration threshold needed to stabilize certain socially relevant indicators (such as the old-age dependency ratio) concluded that an extremely high level of net immigration would be required [25][26]. For example, to maintain the so-called support ratio, the reciprocal of the old-age dependency

ratio, at a steady level, the United Nations (UN) calculated that Germany would need average net immigration of 3.4 million persons per year in the period from 1995 to 2050. This could well be difficult for society to deal with, considering the public debate surrounding the immigration of refugees since 2015 [27]. If, on the other hand, the target value is defined as a level of immigration that holds the size of the working population constant, then the annual net immigration according to the UN study would be just under 460,000 migrants. More recent estimates find that net immigration of about 400,000 persons would be required for a constant potential labor force [19]. From a labor market perspective, Brücker et al. [28] see a clear need for a constant or only slowly shrinking potential labor force. This leads to the second question of what immigration level Germany can expect in the future. The present study addresses this important question, as the projections available for Germany differ considerably concerning the expected level of migration. This is, above all, due to issues of methodology, as we will demonstrate.

Next to the overall discussion of previous approaches in migration forecasting, the focus of our paper is to illustrate how different modeling approaches in international migration forecasting impact the outcome of population forecasts and, as an important case study, labor market forecasts building on these population forecasts. We will show with a simple example of Germany how approaches commonly used by most statistical offices can lead to improbable results and flawed implicit assumptions by comparison of migration flow predictions and their resulting assumptions on migration rates. Moreover, we will stress the importance of a stronger focus on emigration modeling and the connection between emigration and immigration, which are both rather underinvestiged in the literature—with the connection between emigration and immigration being typically completely ignored in migration forecasts.

In the next chapter, we therefore first examine selected approaches for projecting migration. Section 3 describes the development of migration in Germany since the 1960s. The historical context serves to explain the problems involved in such projections and the determinants of migration processes. The subsequent Section 4 illustrates the effect of different simulation models on selected indicators of population trends. Finally, we discuss the results of our study in the context of migration policy and conclude with an outlook.

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