

FUTURE MIGRATION  
SCENARIOS FOR EUROPE

Report

# Migration scenarios and their demographic impacts for the EU member states



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Report

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Report

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## Executive summary

This deliverable both analyses the output for each migration scenario projected in Task 4.3 separately and compares different scenarios over time.

At the total EU level FUME scenarios projected similar total population counts with small differences. The highest EU population in 2050 is projected by Scenario B - Recovery in Europe, stagnation in developing countries at around 518.8 million, and the lowest population is projected by No migration scenario at 387.2 million inhabitants. At national level, population sizes and compositions of the member states and the UK show more variability. Some countries are expected to experience sharp population decline at all FUME scenarios while others experience population growth. In the case of zero migration, all member states are expected to experience population decline, albeit at different paces.

Migration flow composition in FUME scenarios is driven by the economical migration model presented in Deliverable 4.2 (D 4.2) and takes into account the size of diaspora and economic factors. Therefore, no surprising new origin-destination country pairs are emerging. However, when future migration flows are broken down by educational attainment the ranking of sending countries change in some cases, such as in France and Spain.

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# 1. Introduction

This deliverable aims to analyze the output of FUME migration scenarios projected in Task 4.3 according to the methodology presented in Deliverable 4.3. Migration is an interest of many disciplines in social science such as geography, demography, sociology and economy. This diversity is also evident in the FUME project. For example, Work Package 5 (WP5) dealt with the spatial modeling of migration from a geographical perspective, and WP 6 had a sociological and social policy perspective. On the demography side, projecting the future population and migration has been achieved in several steps and tasks which spread over several work packages and required contribution of various researchers from several project partner institutions. The required data was collected in WP2, scenario narratives were constructed in WP3 and future population and migration were projected in WP4. The specific objective of this report is to investigate the demographic impacts of each scenario for EU member states.

Migration research has gained a lot of interest over the last decade as it is increasingly becoming an important driver of population change in developed countries which are characterized by low fertility and mortality. Migration can be a result of population change in origin countries, and can change the population structure in migrants sending countries, however, in this report we adopt the destination country perspective and focus on the changes in the size and composition of population in EU member states and the United Kingdom (UK) under different migration scenarios. Direct and indirect impacts of migration have long been studied by social scientists. These impacts include the impacts of migration on local labour market for economists, on population change and ageing for demographers and on public health professionals, and on integration of migrants for political scientists.

Immigration directly contributes to the population growth and population composition of a country. The characteristics of migrant populations impact all three main components of population. Hence, FUME population and migration do not only project the total size of populations but also sizes of subpopulations by age group, sex, educational attainment, and country of birth.

Fertility, mortality and migration outcomes in a population are all determined by the age structure of the population. It is expected that societies with a large proportion of a young population will continue to grow in the near future due to large number of births and low mortality rates. Similarly, Rogers, Raquillet and Castro (1978) showed that migration rates are strongly driven by age, with the highest migration rates are expected for younger people in working age groups looking for opportunities in other countries.

Additionally, there is a large volume of published studies describing the role of education on fertility and mortality rates. In general, higher educated women are having fewer children than their less educated counterparts, and the life expectancy of higher educated people are usually higher than lower educated people. The relationship between education and migration is not as straightforward, while some countries (e.g., Gulf states) attract less educated male migrants, other countries (e.g., Canada and Australia) attract higher educated people.

Another important dimension in FUME population and migration scenarios is the country of birth. Country of birth determines migrants' demographic behavior especially in the first years of arrival. These differences, especially the fertility rates of migrant women, converge to their counterparts'

demographic behavior (Fargues, 2011). One explanation of differential demographic rates between migrant and native population is that the origin and destination countries may be at different levels of demographic transition. However, previous FUME research (D4.3) found no significant differences in fertility and mortality rates between migrants and natives when they controlled for educational attainment.

Age, sex, educational attainment/skill level and origin of migrant populations are also determinants of their integration to the labour market. Especially, in societies that experience aging and negative natural growth, a large inflow of migrants would decrease age dependency ratio (population younger than 15 and older than 65 / population between 15-64).

In the next two sections we provide a short summary of FUME migration scenarios and how they are quantified. Sections 4 and 5 present the scenario results at the EU and national levels, respectively. Finally, we finish with conclusions in Section 6.



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## 2. FUME scenarios

In this section we provide a short description of FUME scenarios. More detailed information is available in previous deliverables D4.2, D4.3 and D4.4.

### Benchmark scenario

Identical to Shared Socio-economic Pathways 2 (SSP2) scenario from Koch & Leimbach (2022), including the COVID pandemic shock but not the Ukraine war.

### Short-war scenario

Same as benchmark scenario but using the IMF estimate (International Monetary Fund, 2022) until 2027, then linear transition over 5 years back to SSP2 growth rates.

### Scenario B - Recovery in Europe, stagnation in developing countries:

Same as short-war scenario, but instead of all countries transitioning to SSP2, European countries transition towards the SSP in which they have the highest growth rates; while developing countries (including emerging economies) transition towards the SSP in which they have the lowest growth rates. These might be different SSPs for different countries. All other countries (e.g. USA, Australia etc.) transition towards SSP2.

### Scenario C - Rise of the East:

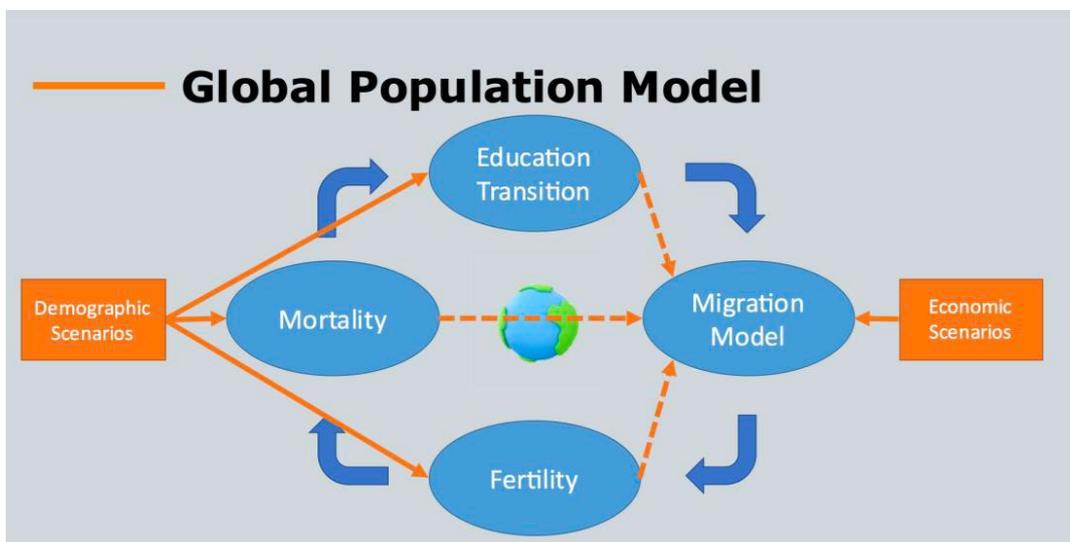
Same as Scenario B, but opposite: European countries transition towards the SSP in which they have the lowest growth rates; while developing countries (including emerging economies) transition towards the SSP in which they have the highest growth rates. All other countries (E.g. USA, Australia etc.) transition towards SSP2.

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### 3. Quantifying national scenarios

FUME cohort component population projection model is developed in Task 4.3 and presented in deliverable 4.3. The migration projection model is developed in Task 4.2 and presented in D 4.2. A visual representation of two models is shown in Figure 1.

Figure 1. Coupling of cohort component population projection model and the migration model



## 4. The EU

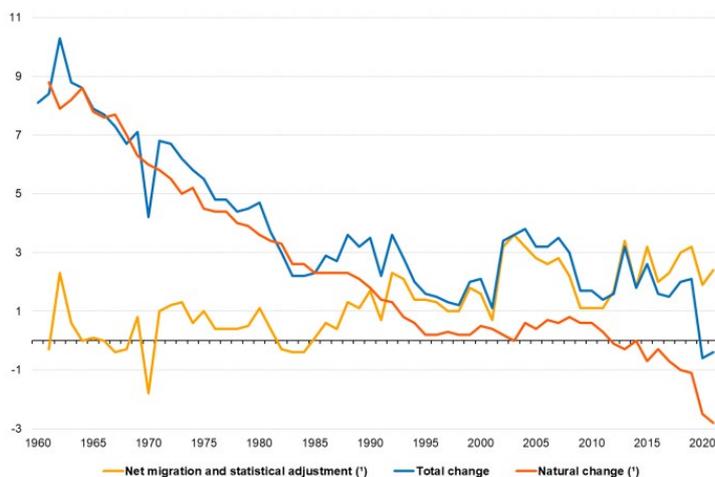
The total population in the 27 EU member states has increased around 8 million people since 2011 and was estimated at 446.8 million on 1 January 2022 (Eurostat, 2023). As shown in Figure 1, the increase in the population size can be attributed to migration, as natural population change – the difference between births and deaths – remained negative throughout the period. As a matter of fact, the estimated population on 1 January 2022 was 172 thousand fewer people than the previous year (Eurostat, 2023). Specifically, without international migration, the EU would have been experiencing population decline since 2011. Undoubtedly, for EU member states international migration will continue to be a key driver of population change in the next decades. In the remaining of this section we present the change in population size and composition in the EU member states according to different FUME scenarios.

As mentioned in the previous section, FUME projected future migration flows and population sizes by age, sex, education and country of birth under five different scenarios. Figure 3 compares the size of the total EU population projected applying FUME scenarios. It can be seen from the Figure that as expected the lowest population is projected under the No Migration scenario, at 387.2 million, a decrease of more than 100 million people in population in 30 years. Results of the other four scenarios are found similar to each other with visible differences after 2035.

The highest total population is projected by Scenario B - Recovery in Europe, stagnation in developing countries at around 518.8 million inhabitants. A possible explanation for this high result is the expected discrepancies in economic developments between countries in this scenario narrative. The economic stagnation and population growth and possible increase in unemployment rates, as a result of former two factors, is expected to increase the pressure to migrate from developing countries. At the same time, as suggested by the aspirations and capabilities migration model (Haas, Castles, and Miller 2020) improvements in education, communication, and faster and cheaper transportation links increase both the capabilities and aspirations to emigrate from developing countries. On the demand side, economic recovery in Europe may increase the need for migrant workers and as a result may offer better conditions and become more attractive for migrants.

Figure 2. Population change by component (annual crude rates), EU, 1960-2021 (per 1000 persons)

Source: Figure 3 in Eurostat 2023.



Note: Excluding French overseas departments up to and including 1997. Breaks in series: 1991, 1998, 2000-01, 2008, 2010-12, 2014, 2015, 2017, 2019, 2021 and 2022.

(\*) 1960: not available.

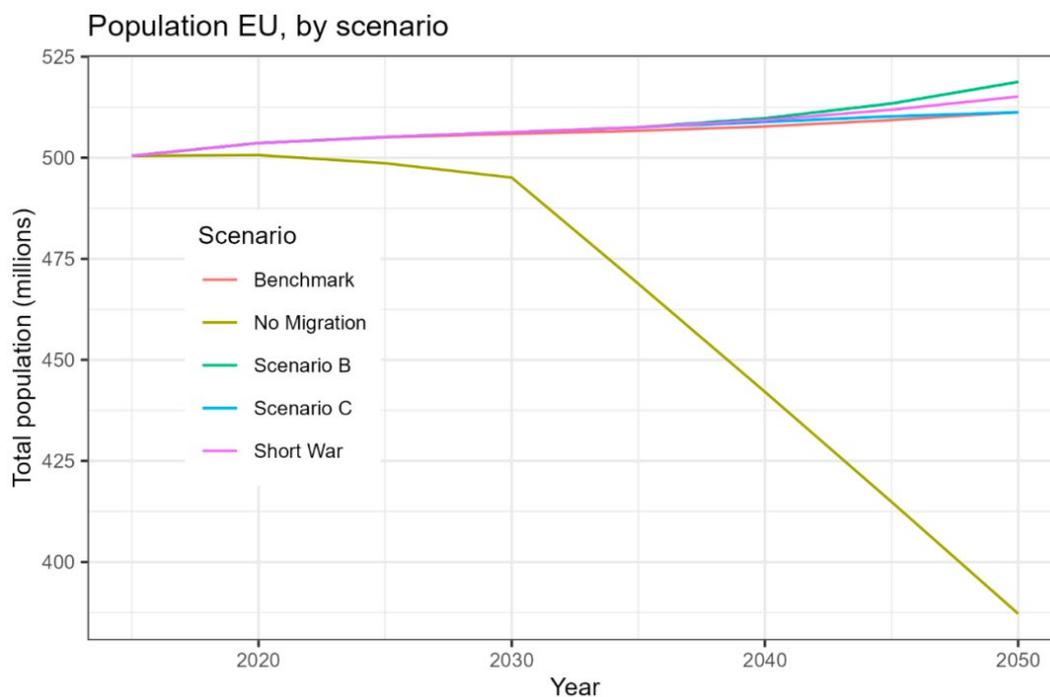
Source: Eurostat (online data code: demo\_gind)

An asymmetric situation is projected in Scenario C - Rise of the East which assumes that the economy of the EU member states, and other developed countries will be stagnating while developing countries and countries with emerging economies are experiencing an economic recovery. Under Scenario C it is expected the total EU population to reach around 511.2 million people. In this scenario it is assumed that the GDP of these countries are increasing towards the GDP of developed countries, resulting in a shrinkage in the economic discrepancies between the two world regions. In other terms, contrary to the previous scenario, the pressure to migrate is decreasing in developing and traditionally migrant sending countries while both the attractiveness and the demand for migrants are decreasing in the EU. However, it should be kept in mind that socio-economic improvements in developing countries will continue to increase capabilities and aspirations to migrate of the young population until a more comprehensive and equal opportunities are achieved in the world. In the quantification of this scenario the migration rates and flows are calculated lower than the other scenarios (except No Migration scenario) due to the specifications of the migration model. However, it is possible that such a scenario would cause higher emigration flows.

The projected total EU population in the Benchmark scenario is almost identical to the total population projected in the Scenario C. However, there are some country level and subnational level differences which are presented in the remaining of this deliverable and in D.4.3 Regional migration and population scenarios.

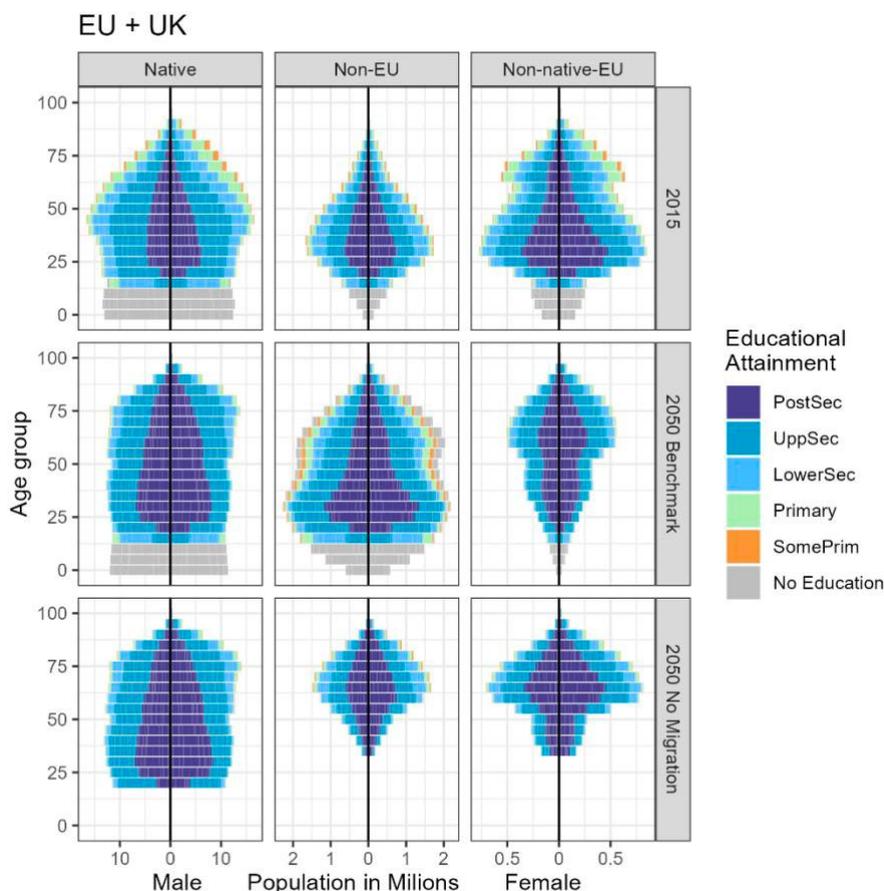
Finally, the Short war scenario results in a total population between Scenario B, and Scenario C and Benchmark scenarios. This observed difference is due to the future economic assumptions used in the migration model, which assumes a slower economic growth until 2027 and an increase afterwards.

Figure 3. Total EU member states and the UK population according to FUME scenarios



As mentioned before the population and migration are projected by age, sex, education and country of birth. In Figure 4, we present the population composition of 27 EU member states and the UK by age, sex, education, and broad region of birth in 2015 (base year), and the projected composition according to the Benchmark and No migration scenarios in 2050. The upper row of the figure shows the population composition in 2015 for the native, non-EU born and Non-native but born in another EU country populations. Both migrant groups have a younger age pyramid than the native population. The second row shows the projected composition in 2050 according to the Benchmark scenario, where a significant change in the native population structure (compared to the 2015 population) is visible with a higher proportion of population in the older age groups. There are also differences in the projected migrant population pyramids. Both the number of non-EU migrants and their proportion of population in older age groups are increased. However, the size of non-native-EU born migrant population is decreased and the population pyramid shows signs of aging for this group. Finally, in the last row, no migration scenario, we see a significant decrease in the size of migrant population with very small proportion of migrants at working age groups. As the children of migrants born in the destination country are recorded as the native-born population, there are no reported migrants in younger age groups. Appendix A presents population pyramids comparing different scenarios for EU regions<sup>1</sup>.

Figure 4. Distribution of the population in EU28 by age, sex, and educational attainment by broad region of birth in 2015 and 2050 for two scenarios (no migration and benchmark migration)



<sup>1</sup> Western Europe: Austria, Belgium, France, Germany, Luxembourg, Netherlands. Northern Europe: Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden, UK. Eastern Europe: Bulgaria, Czechia, Hungary, Poland, Romania, Slovakia  
Southern Europe: Croatia, Greece, Italy, Malta, Portugal, Spain, Slovenia. Western Asia: Cyprus

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## 5. Member States

### 5.1 Changes in population size

Whereas the total EU population was estimated to slightly decrease in 2021, the change in population size was not evenly distributed across the member states. Some member states experienced population growth while others experienced population decline. Similarly, in FUME population and migration projections, the size and direction of the population change is unique to each member state. The differences in natural change stems from differences in birth and mortality rates as well as the education and country of birth composition of the resident population. The differences in migration flows relate to the size of the diaspora in the country and economic factors such as the GDP and the wages as explained in detail in D4.2.

Figures 5 and 6 show the ratio and projected ratio of foreign-born population in EU member states in 2015 and 2030, respectively. There are few notable differences in two maps such as the increases in Austria and in Spain.

Figure 7 gives further insight into the change in population size relative to its 2015 population size for each of the 27 EU member state and the UK according to FUME scenarios. Similar to the total EU population projections four FUME scenarios show similar total population sizes for most of the countries. Notable differences are in Ireland, Estonia, Luxembourg, Malta and Cyprus, where the largest population size is achieved by Scenario B – Recovery in Europe. Thirteen countries are projected to have population decline in all scenarios. These countries are, from highest decline to lowest decline in Scenario B, are as follows: Bulgaria (around 25% of 2015 population), Hungary, Romania, Croatia, Poland, Greece, Lithuania, Latvia, Germany, Slovakia, Czechia, Portugal and Italy (around 5% of 2015 population).

There are also country level differences in projections with regards to the No migration scenario. While all countries are expected to experience population decline, Ireland and Luxembourg are expected to have less than 10% decrease.

In Figure 8 we present the projected population size of each country to provide a more detailed view of the differences between scenarios. It can be seen from the figure that the population in some countries will decline or increase by several hundreds of thousands even the proportional changes are small. For example, the population of Ireland is expected to increase more than 2 million people and population of Germany is expected to decrease by around half a million people according to the Scenario B.

Figure 5. Foreign-born population in EU member states and in the UK in 2015

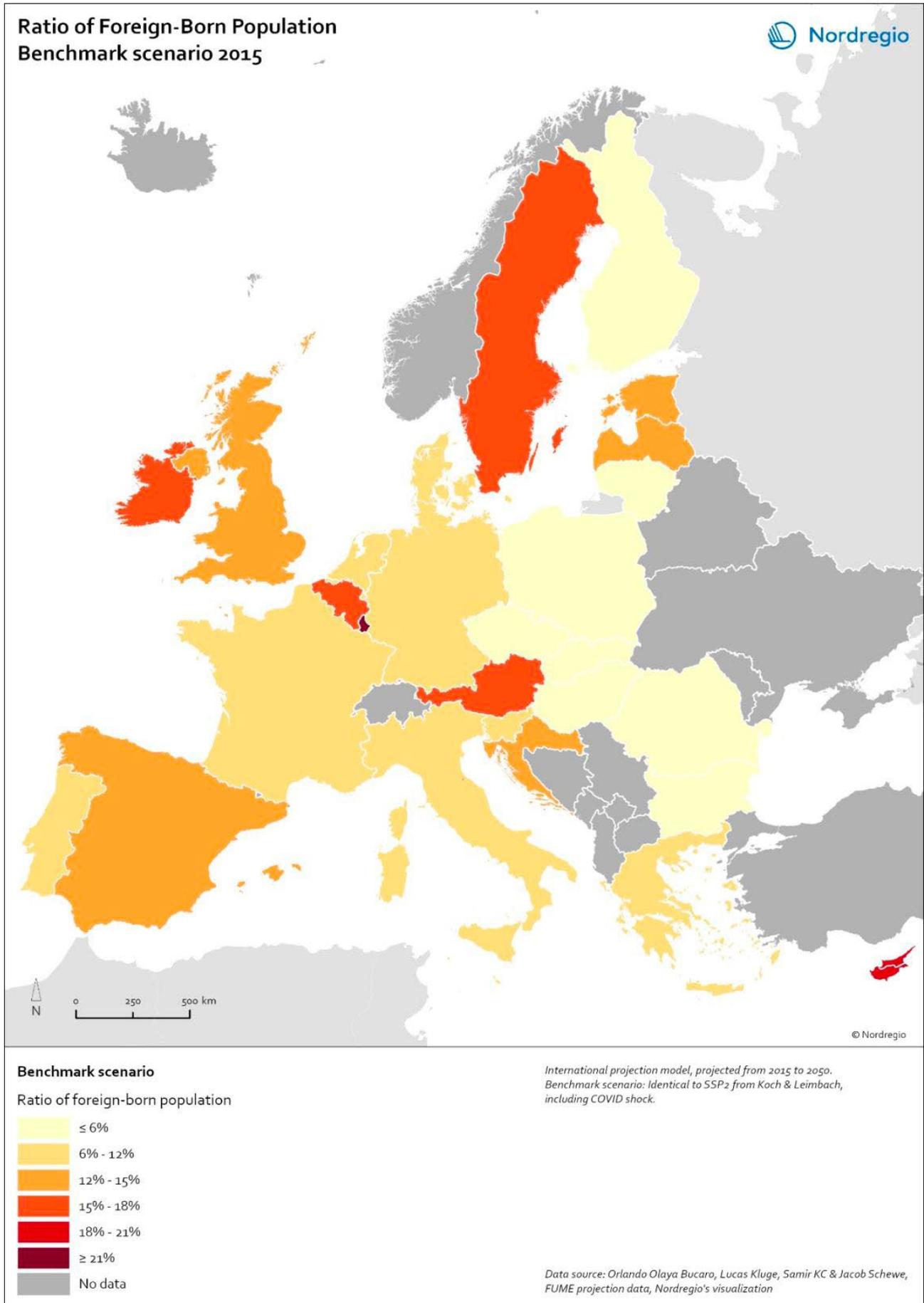


Figure 6. Foreign-born population in EU member states and in the UK in 2030 according to the Benchmark scenario

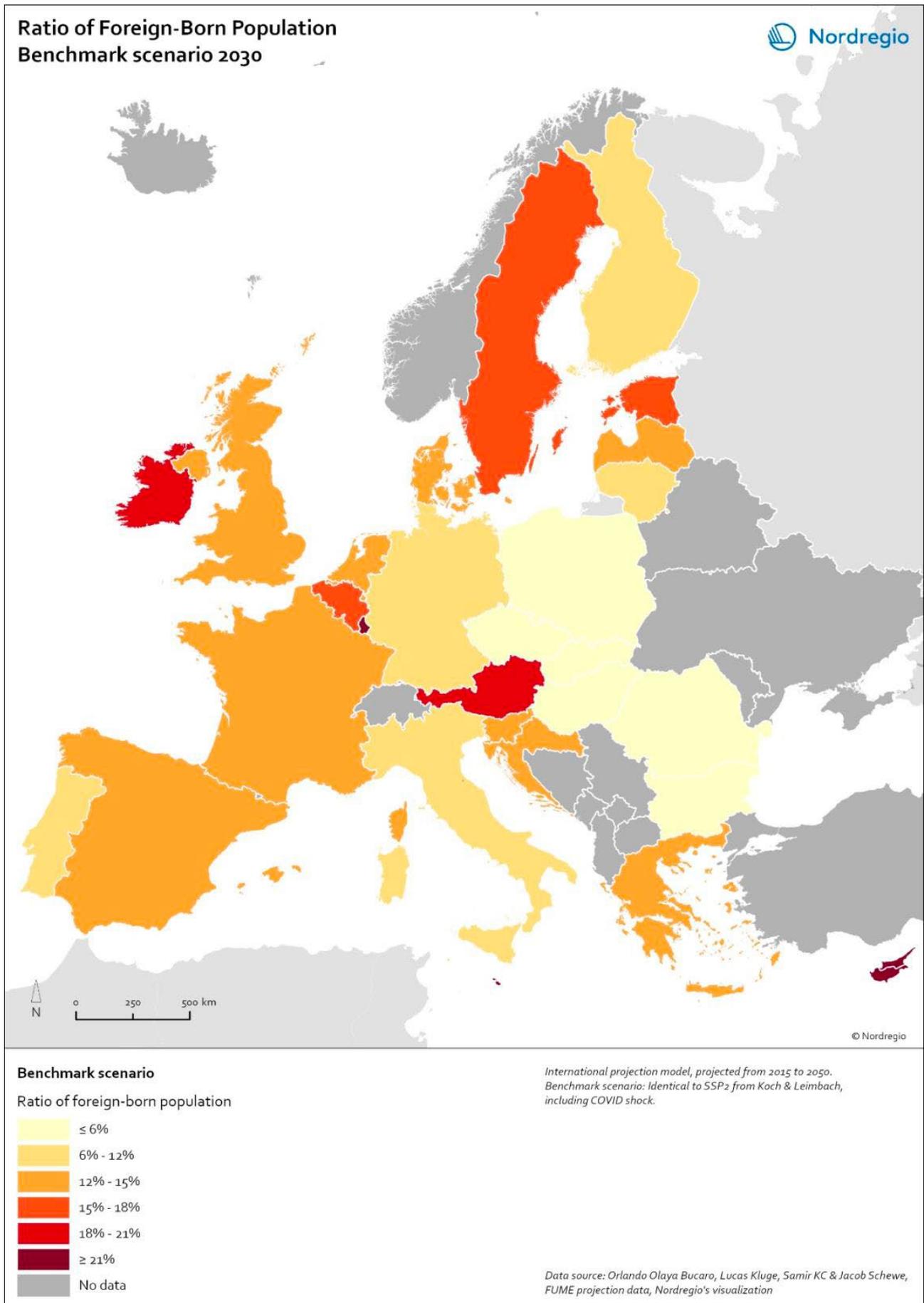


Figure 7. Relative population change in 27 EU member states and the UK

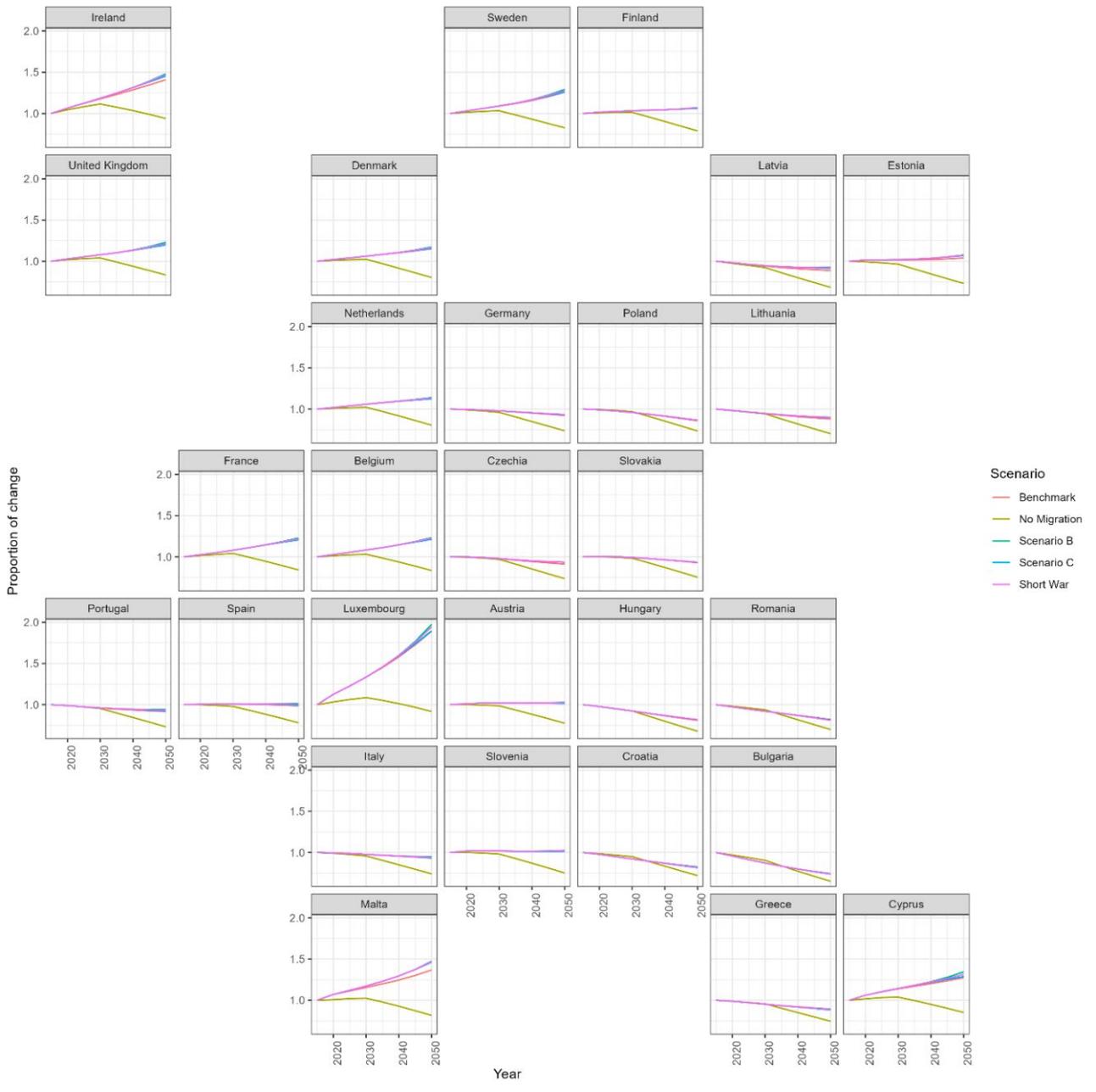
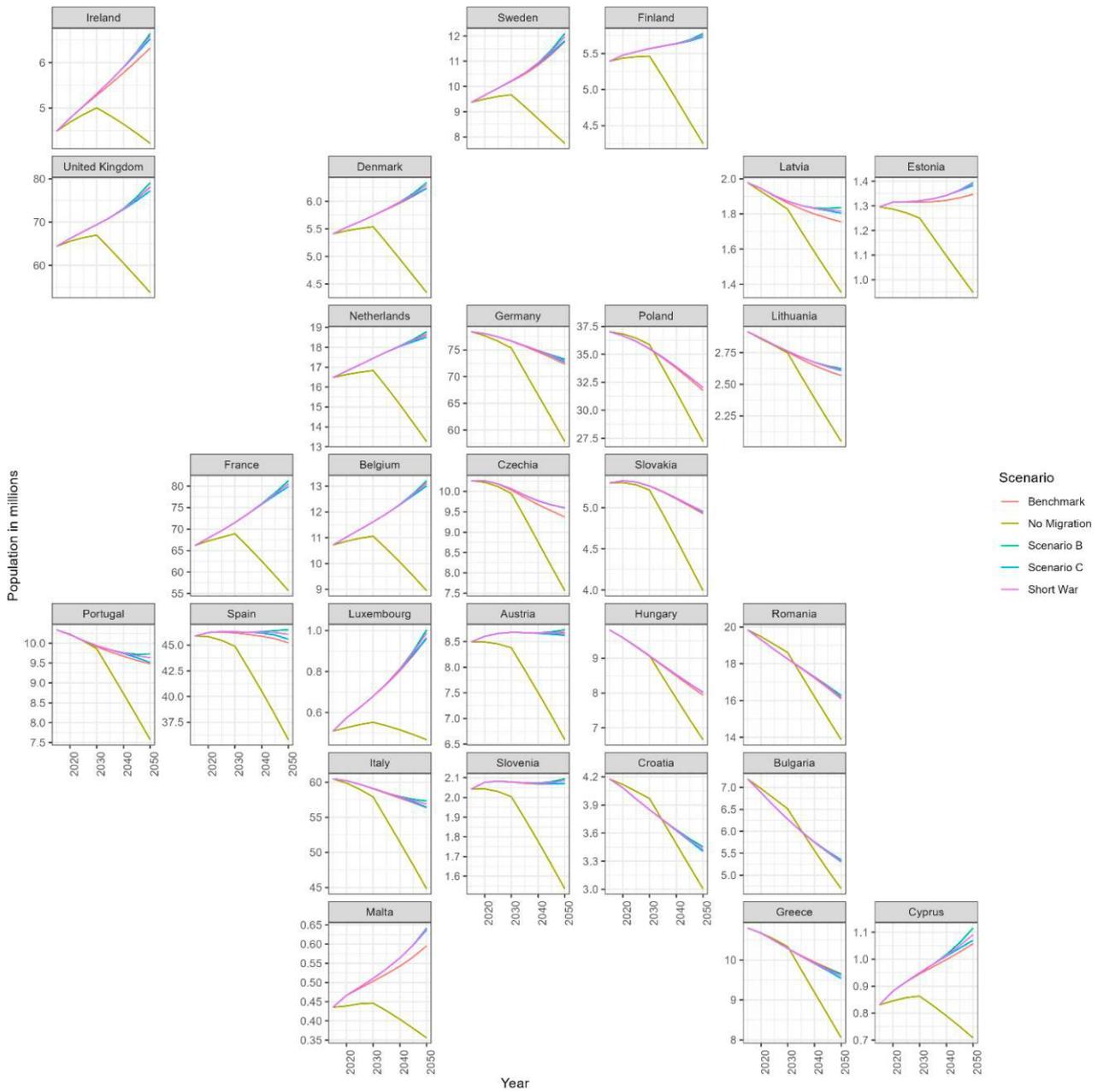


Figure 8. Total population in 27 EU member states and the UK

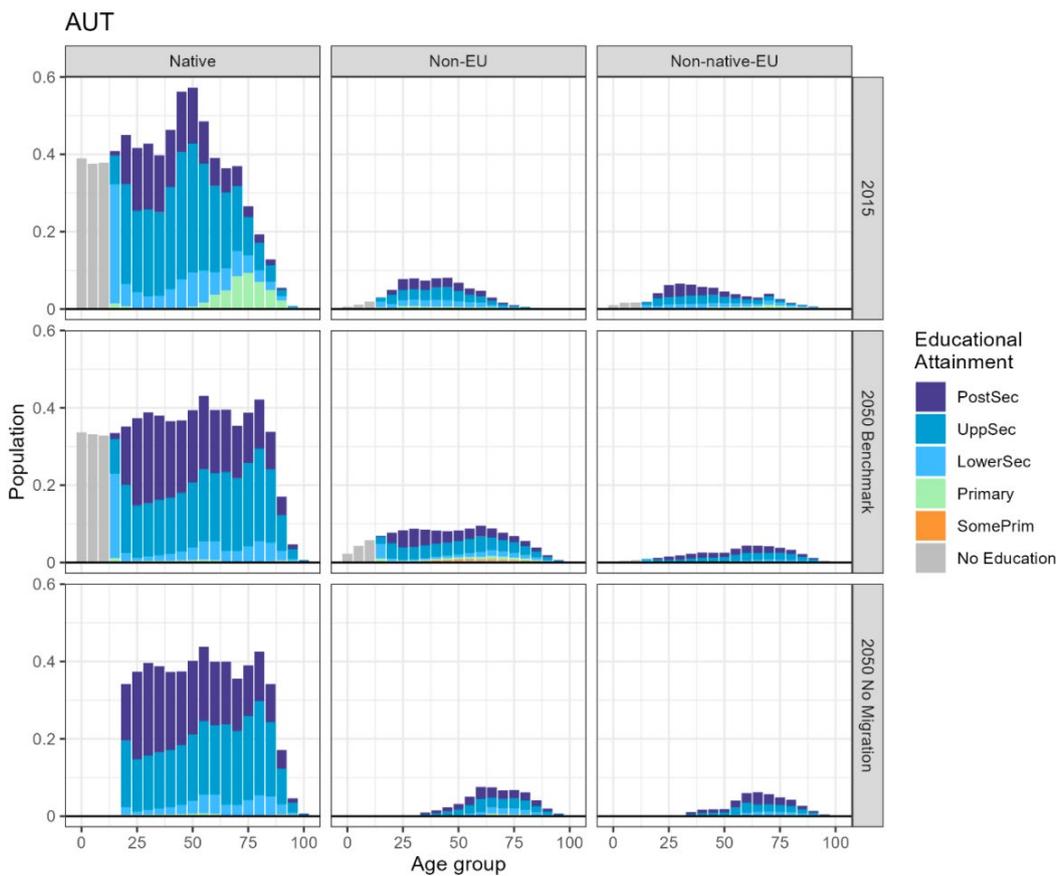


## 5.2 Population composition

Projected total population sizes by different scenarios are useful, however they only provide a limited view of the future of a country. Therefore, in this subsection we first investigate FUME scenario results broken down by age group, educational attainment, and broad region of birth, as FUME scenarios do not show any significant differences in sex distribution of migrants. Then we present the hypothetical population pyramids in 2050 under difference FUME scenarios for all EU member states and the UK.

We present projected population counts for Austria in Figure 9 and the rest of the EU member states in Appendix. At country level, Austria's projected native population in 2050 shows an aging population structure in both Benchmark and No migration scenarios. The main differences between two scenarios are the age distributions of the migrant populations. Under the assumptions of the Benchmark scenario a significant proportion of the migrants from non-EU countries are within working age groups (15-64), whereas this population, who could support the economic activities in the country, are missing in the No migration scenario. Another difference between two scenarios is the educational attainment distribution of the non-EU born migrants. In the Benchmark scenario slightly more migrants are in lower education levels compared to the No migration scenario which may affect their health outcomes especially at older ages.

Figure 9. Age distribution of Austria by broad region of birth



The next three figures present the population pyramids in 2050 based on three scenarios: No migration (Figure 10), Benchmark scenario (Figure 110 and Scenario B (Figure 12)). Because migrants constitute only a small proportion of the population at national level, the differences between scenarios are not very visible for many countries. However, there are some educational distribution differences for example in Luxembourg and in Sweden. Figure 13 further presents projected population in 2050 by region of birth and educational attainment according to the Benchmark scenario.

Figure 10. Population pyramids, No migration 2050

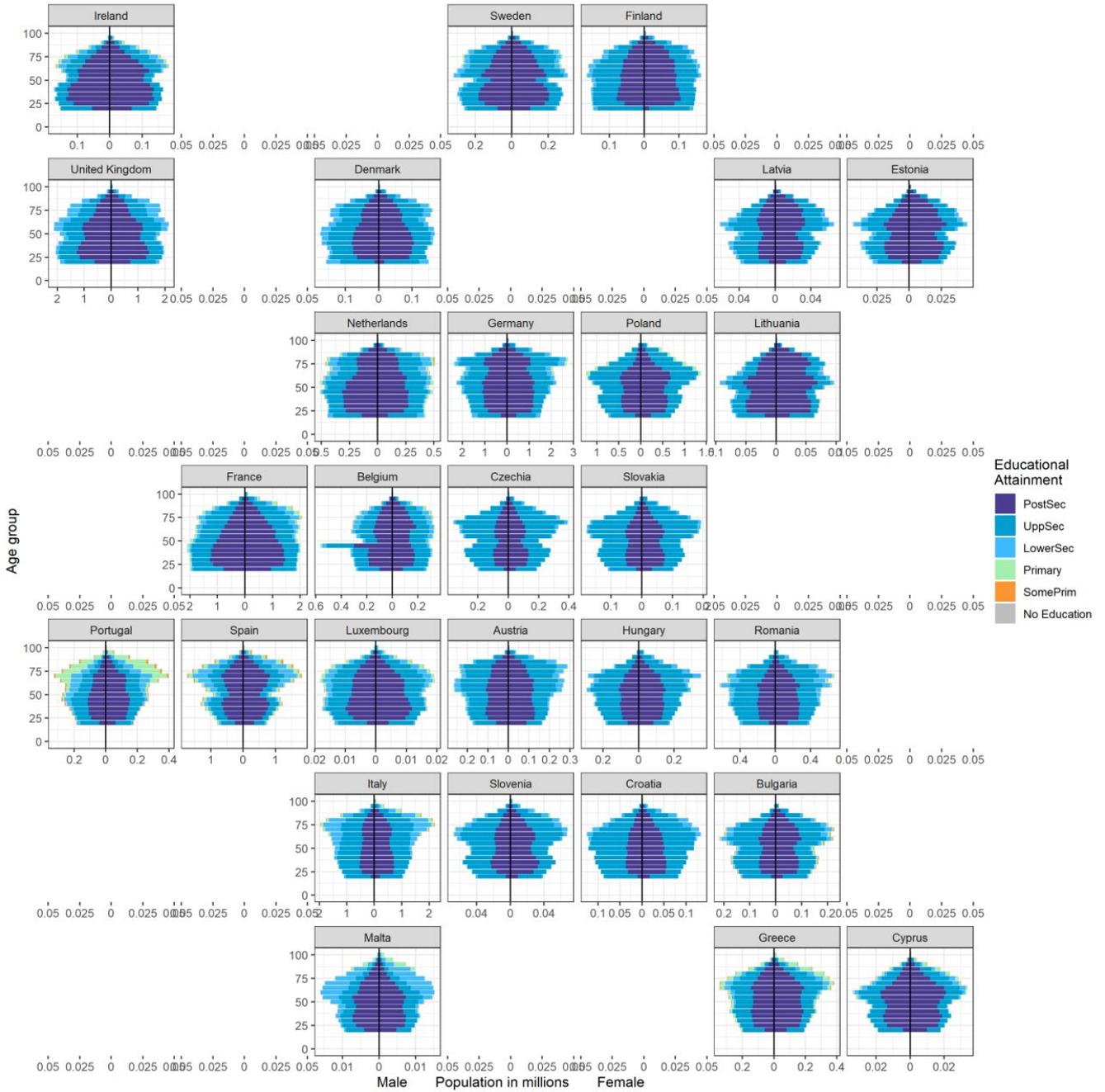


Figure 11. Population pyramids, Benchmark scenario 2050

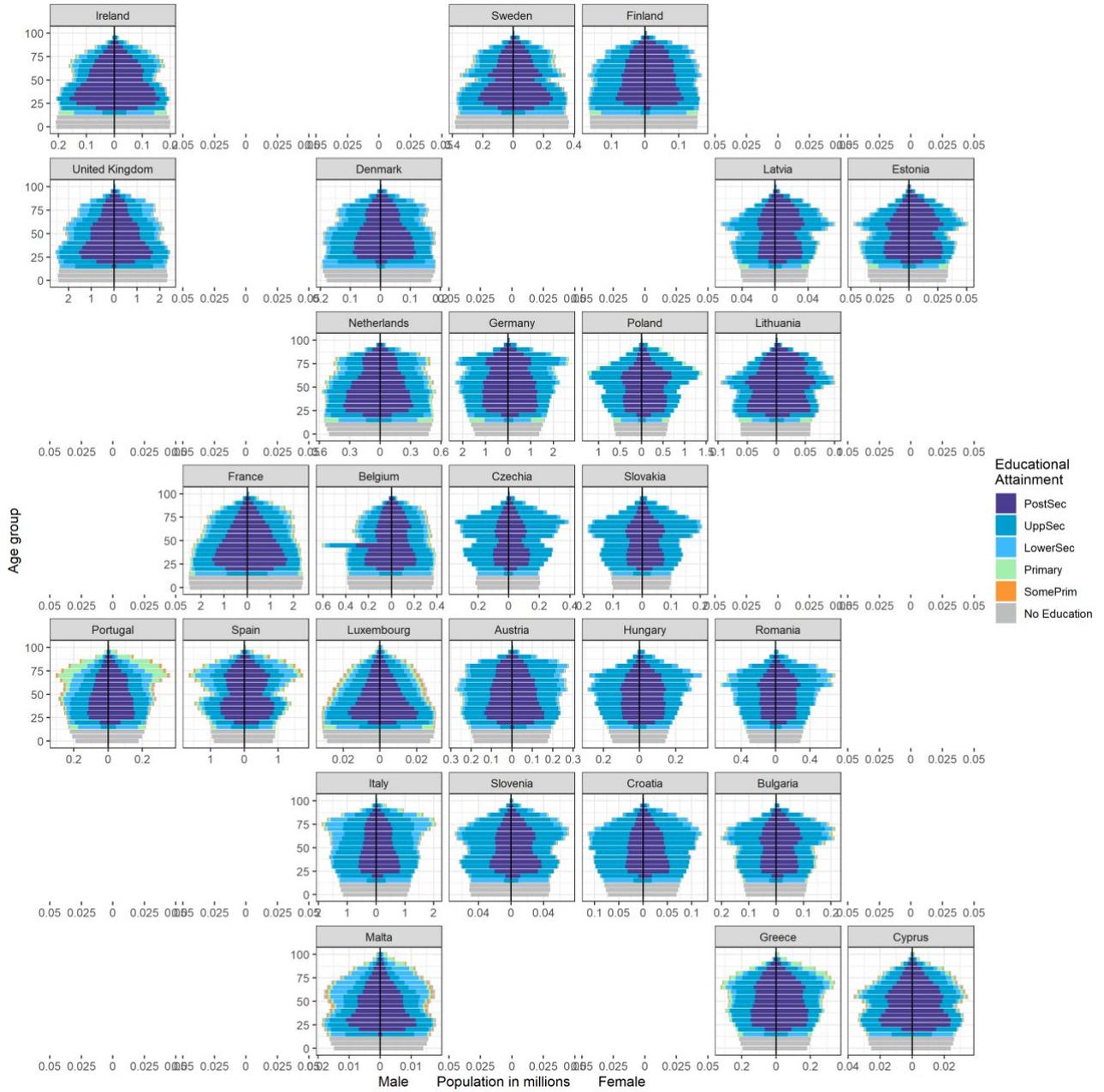


Figure 12. Population pyramids, Scenario B

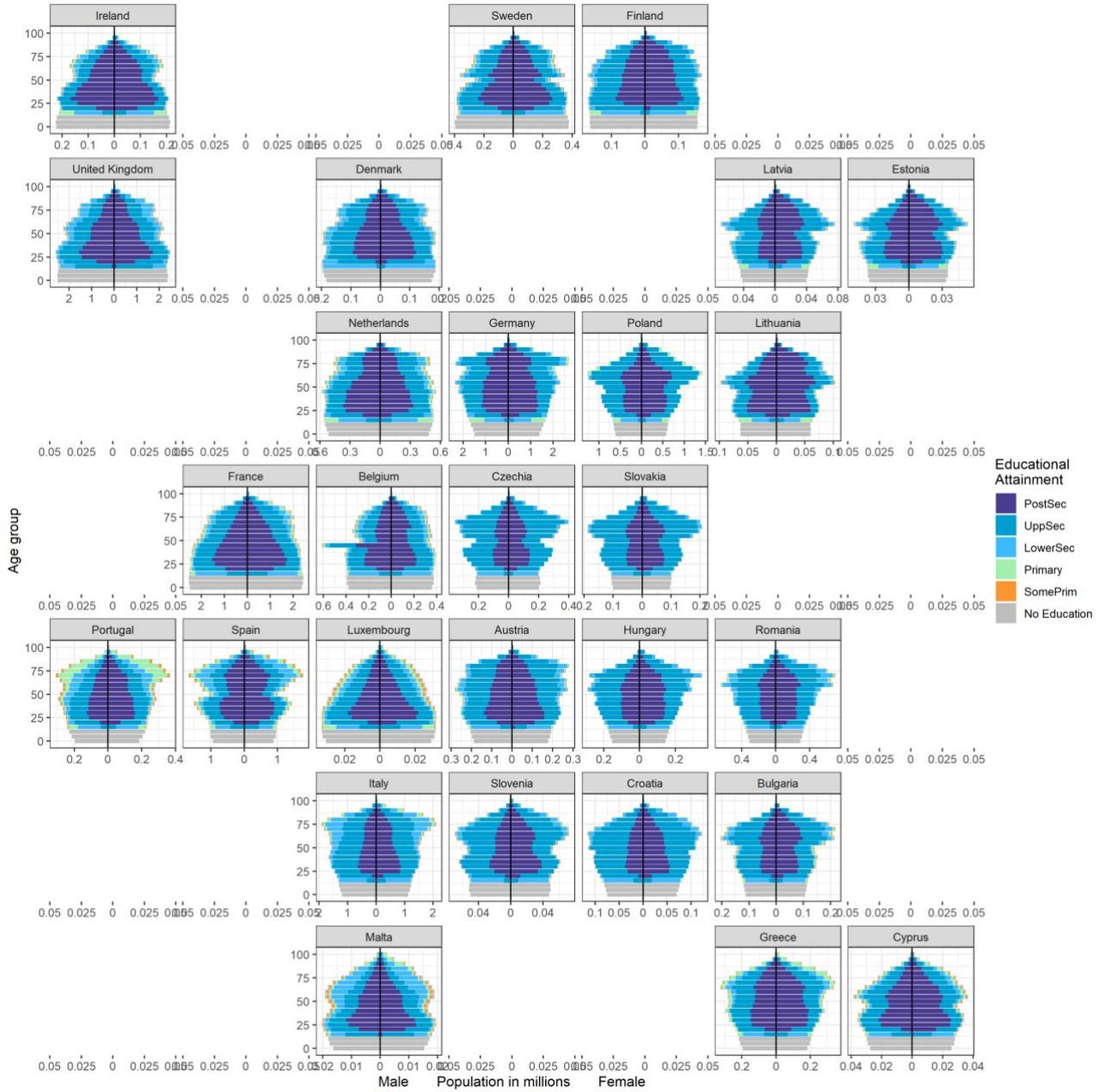
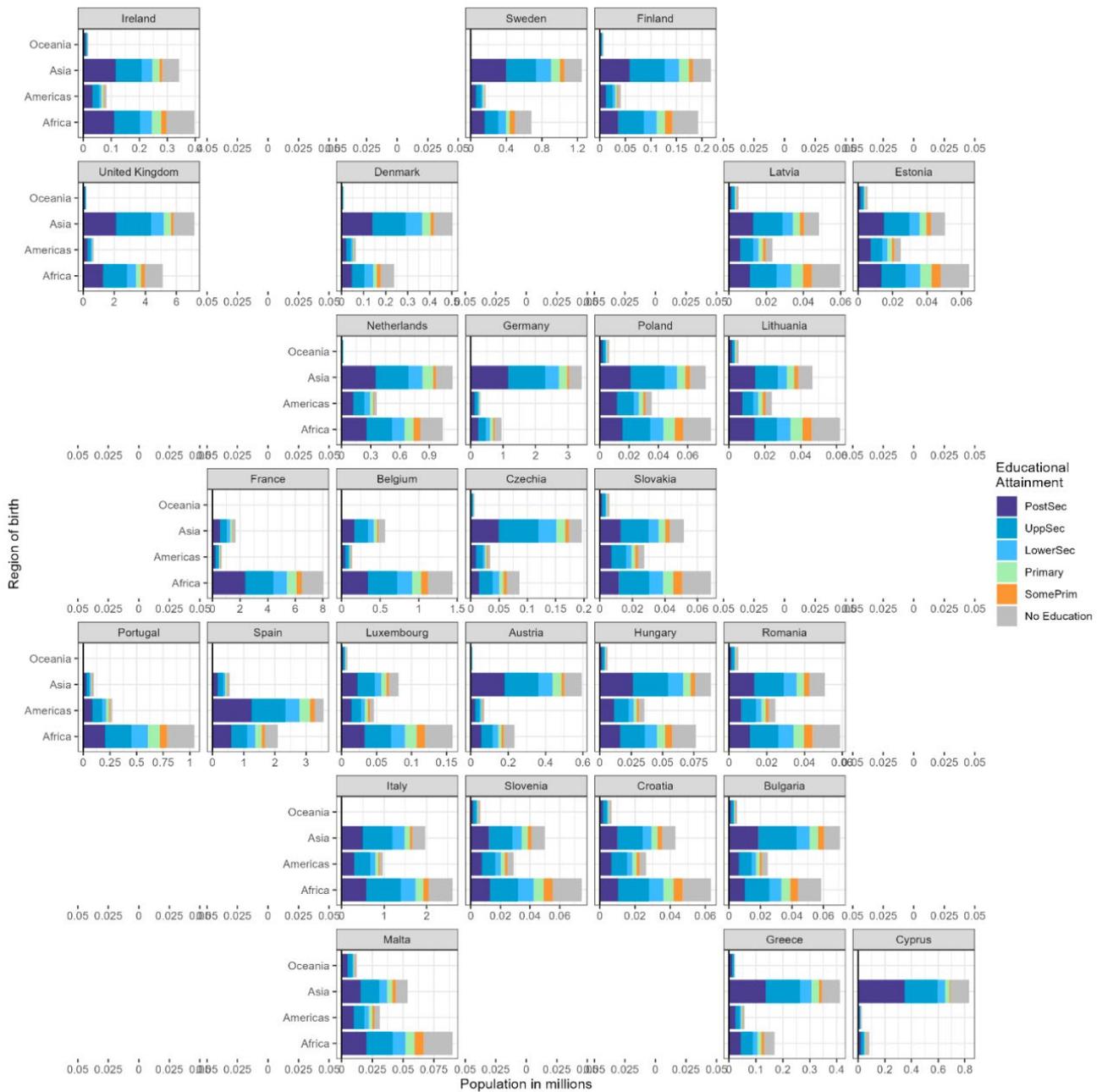


Figure 13. Projected population (in millions) in 2050 by region of birth<sup>2</sup> and educational attainment<sup>3</sup> according to Benchmark scenario



<sup>2</sup> Except Europe

<sup>3</sup> No education level also includes migrants under the age 15.

### 5.3 Migration flows by region of birth and educational attainment

As mentioned in Introduction, country of birth is an important factor in vital rates and the differences between natives' and migrants' population narrows down over time when educational attainment is considered. Figure 14 presents projected migration flows between 2045-2050 from all world regions to EU member states and the UK according to Benchmark scenario. The figure shows that the largest projected flows are from Sub-Saharan Africa and Northern Africa to France, and Latin America and Caribbean to Spain. Figure 15 presents the migration flows in the same period for the same scenario with EU destination countries grouped into broad regions. Destination regions do not include migration flows to other European countries in the region but only to EU member states.

Figure 14. Migration flows to EU member states and the UK from all world regions between 2045-2050, Benchmark Scenario

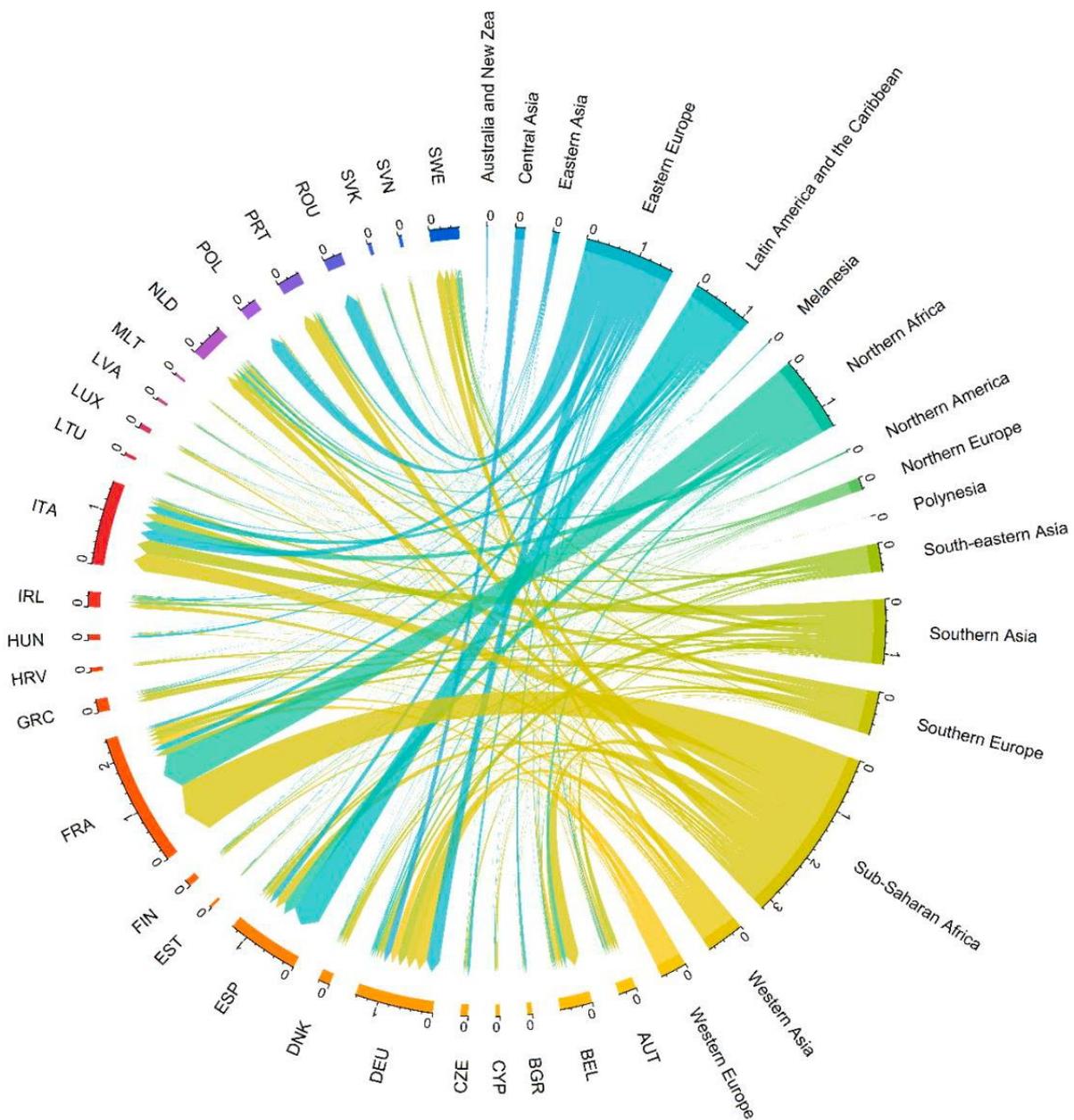
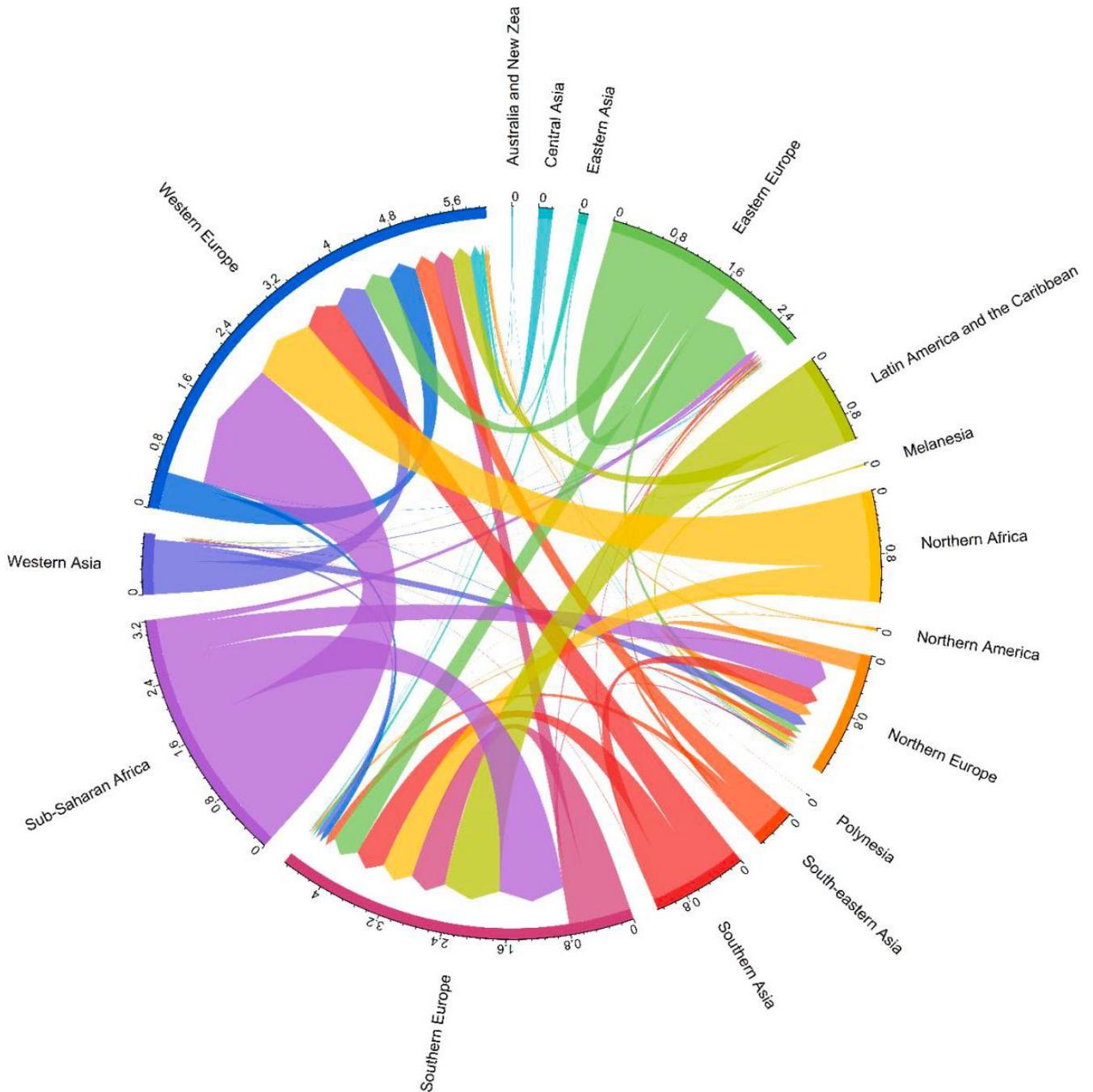


Figure 15. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario



The following six figures further break down the flows by educational attainment. The no education category plotted in Figure 16 includes all Under 15 migrants, therefore need to be carefully assessed. Migration flows in lower educational attainment categories show similar results to all flows shown in Figures 14 and 15. For some countries that receive mostly less educated migrants, the origin of high volume migrants change in Upper secondary (Figure 20) and post secondary (Figure 21). For example, France has largest flows from Sub-Saharan Africa region for migrants with highest lower secondary education. However, the largest migration flow of post secondary educated migrants to France are from Northern Africa. Similarly, in Spain the share of migrants from Latin America and Caribbean region increases in higher educational attainment groups.

Figure 16. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario, No education (Under 15 and No Education)

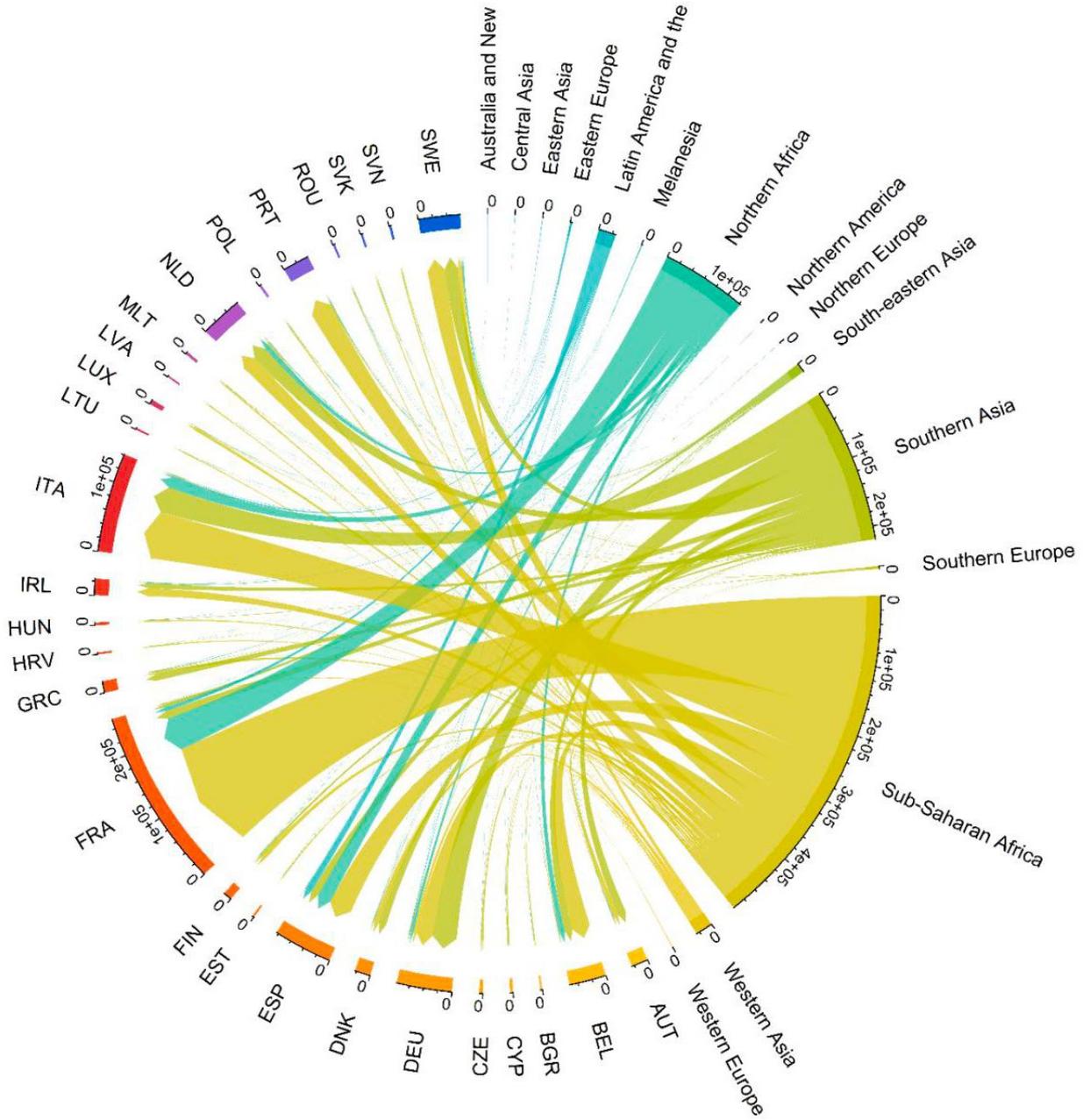


Figure 17. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario, Some primary education

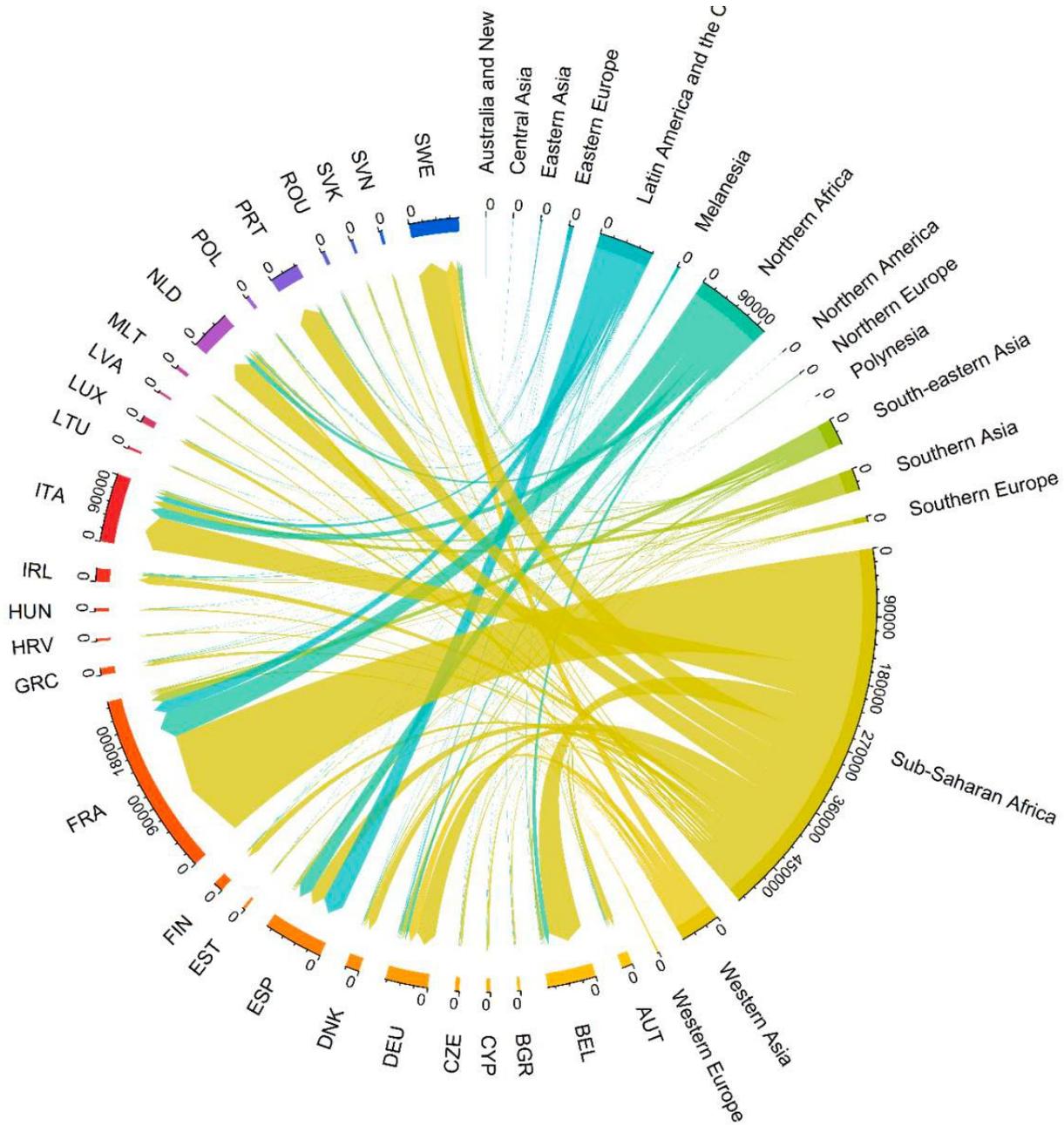


Figure 18. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario, Primary education

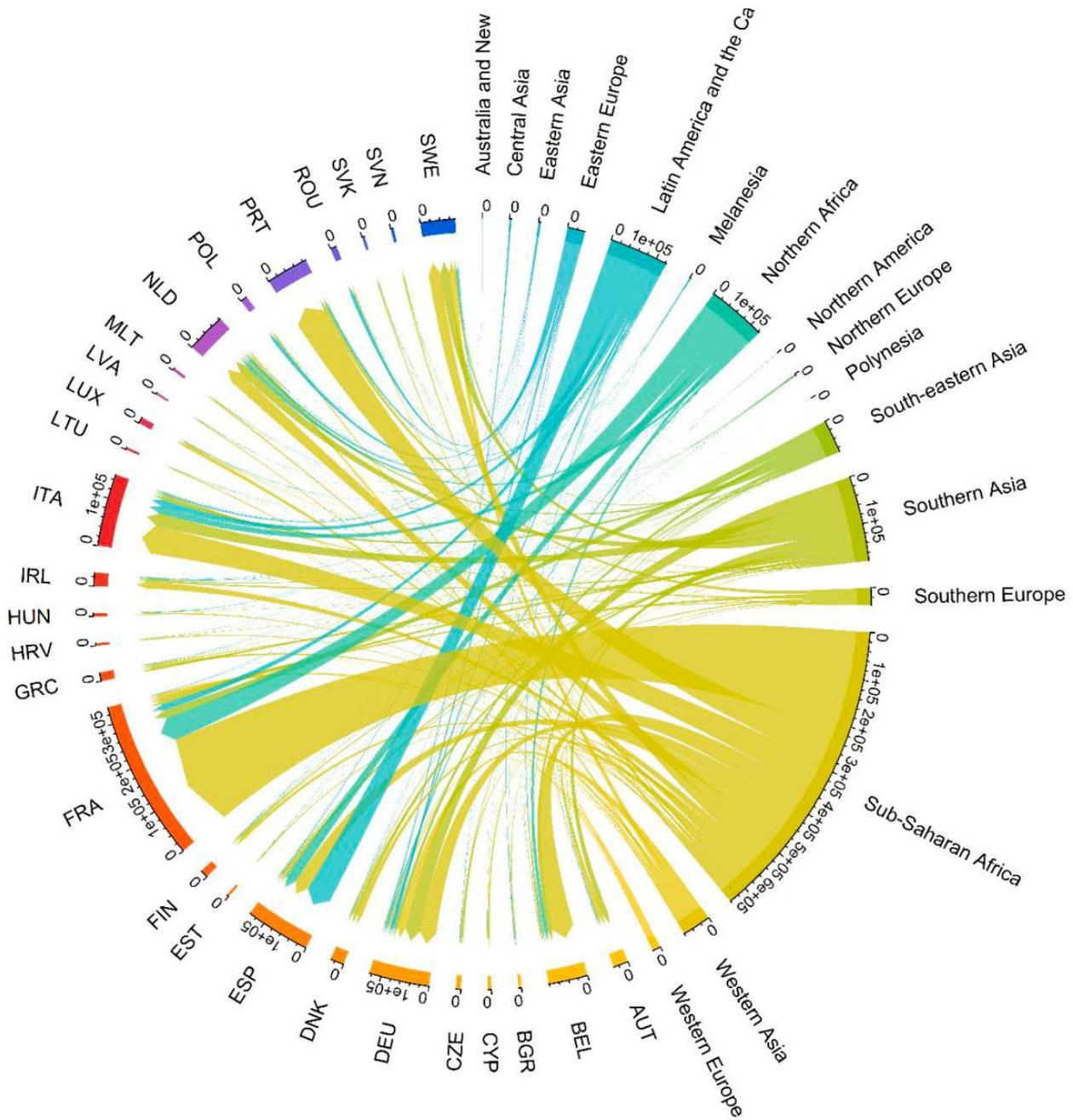


Figure 19. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario, Lower secondary education

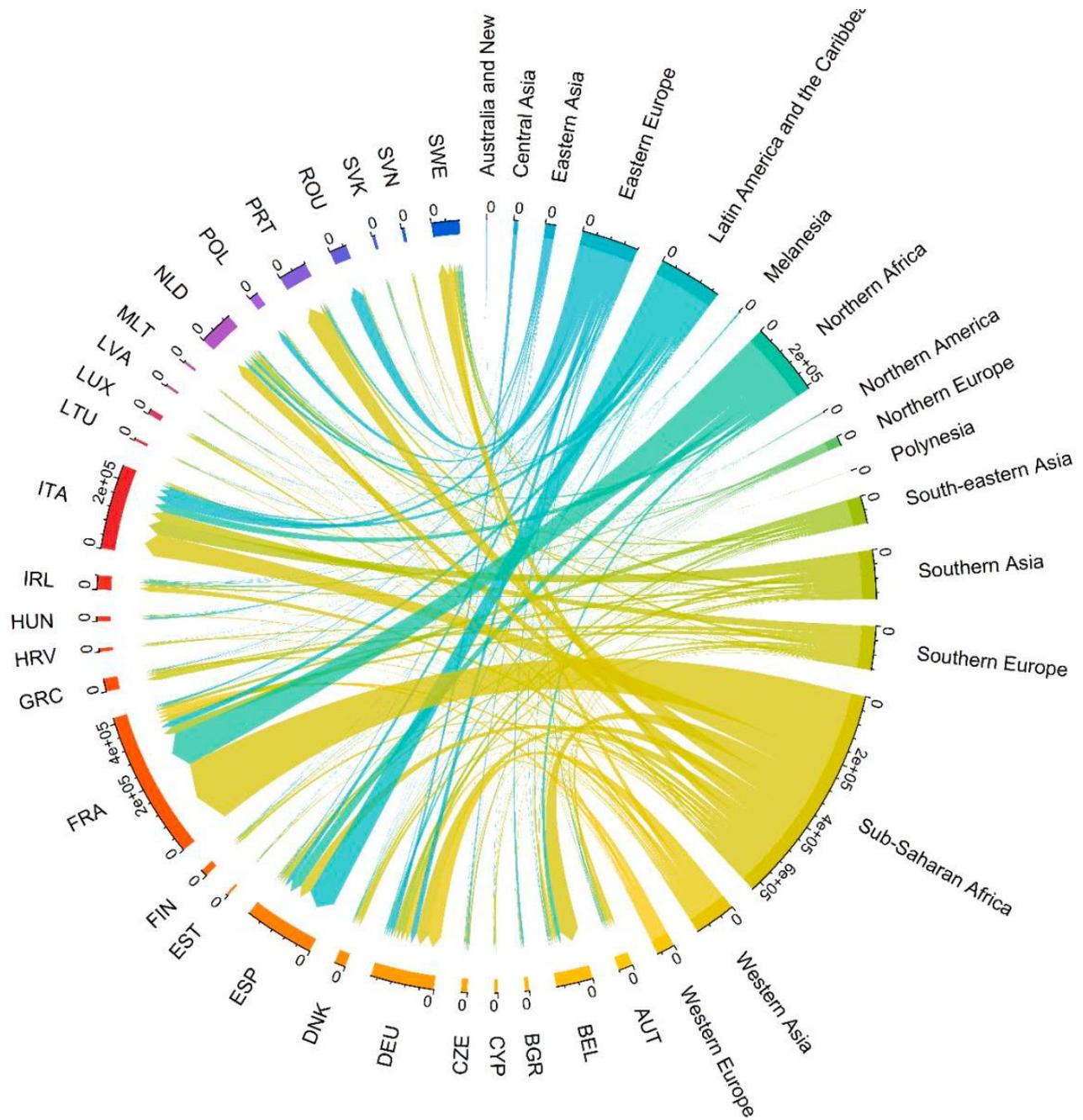


Figure 20. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario, Upper secondary education

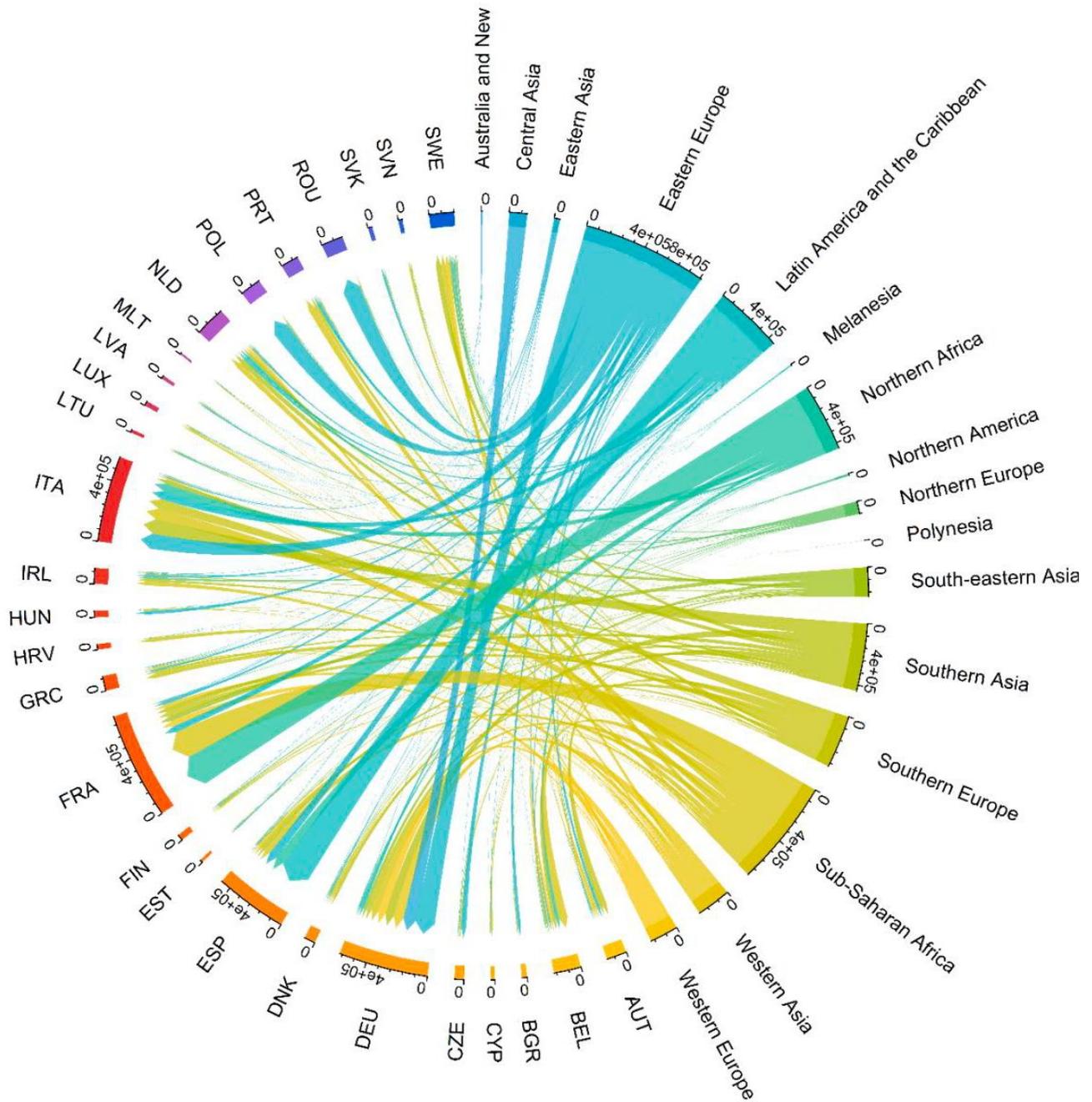
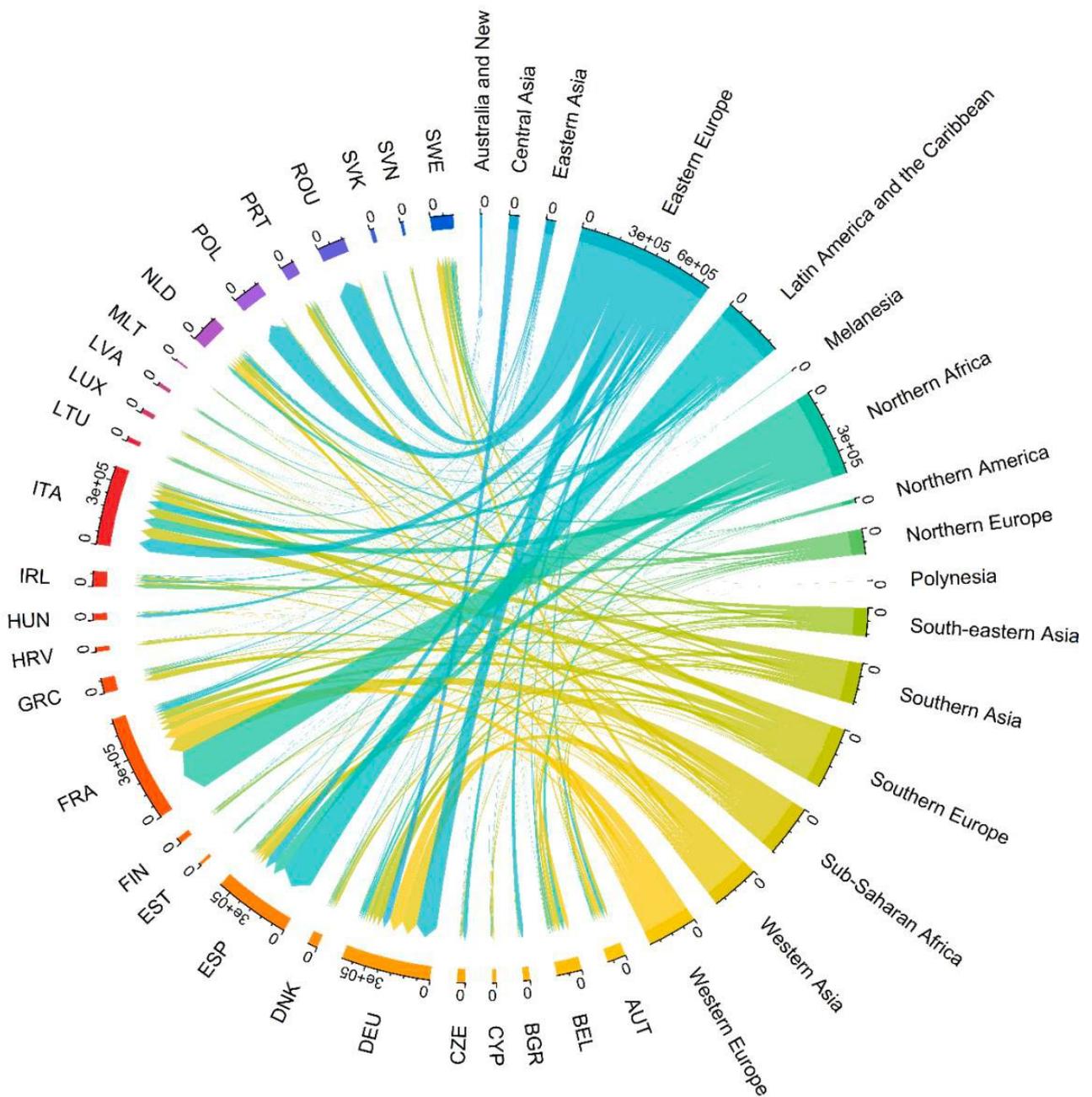
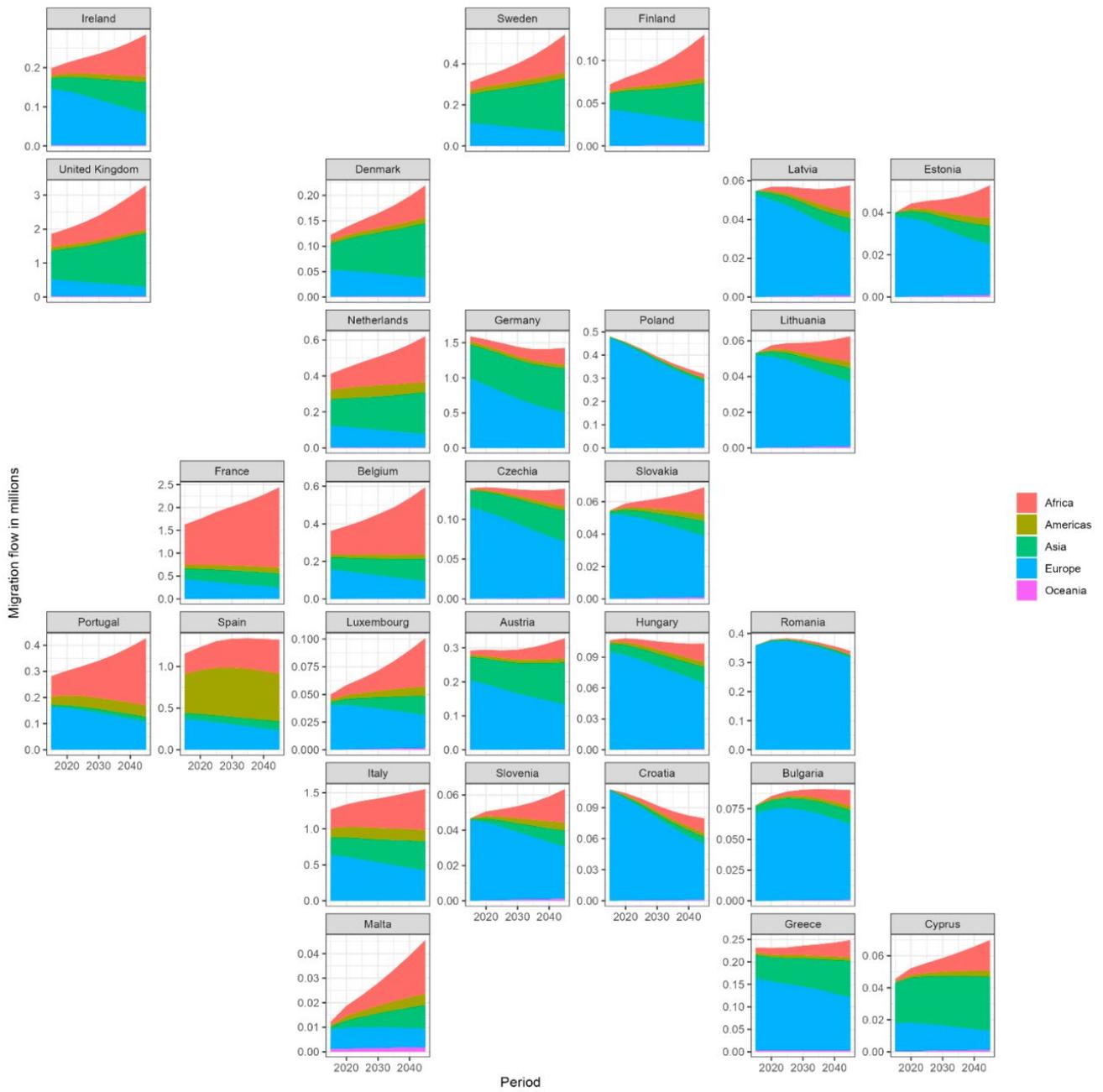


Figure 21. Migration flows to EU regions from all world regions between 2045-2050, Benchmark Scenario, Post secondary education



Finally, we present the trends of migration flows by broad region of birth according to the benchmark scenario. Almost in all destination countries migration flows from Europe decreases over time. One explanation for this decrease could be the declining Europe population. In a similar vein, migration flows from Sub-Saharan Africa are showing increasing trends. This increase can also be explained by the expected population growth in the region and the economic discrepancies between regions.

Figure 22. Migration flows between 2020-2025 and 2045-2050 by broad region of birth according to the Benchmark scenario



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## 6. Conclusion

In this report we presented the results and comparisons of FUME scenarios both at the total EU level and national level. At the total EU level scenarios resulted in similar total population counts with small differences. The highest EU population in 2050 is projected in the by Scenario B - Recovery in Europe, stagnation in developing countries at around 518.8 million, and the lowest population is projected by No migration scenario at 387.2 million inhabitants. At national level, population sizes and compositions show more variability. Some countries are expected to experience sharp population decline while others experience population growth. In the case of zero migration, the population of all member states are expected to decline, at different paces.

Migration flow composition in FUME scenarios is driven by the economical migration model and takes into account the size of diaspora and economic factors. Therefore, there are no surprising results when it comes to the origin- destination pairs. However, when broken down by educational attainment the ranking of sending countries change in some cases, such as in France and Spain.

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# Appendix A Regions

Figure A1: Western Europe

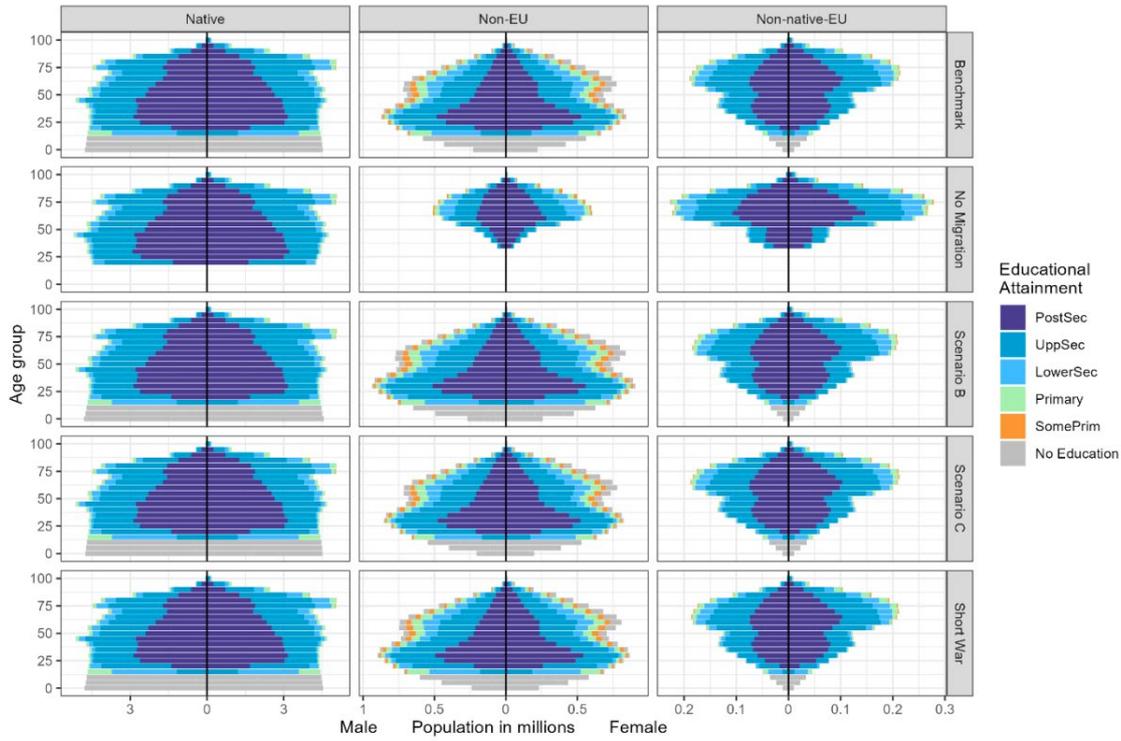


Figure A2: Northern Europe

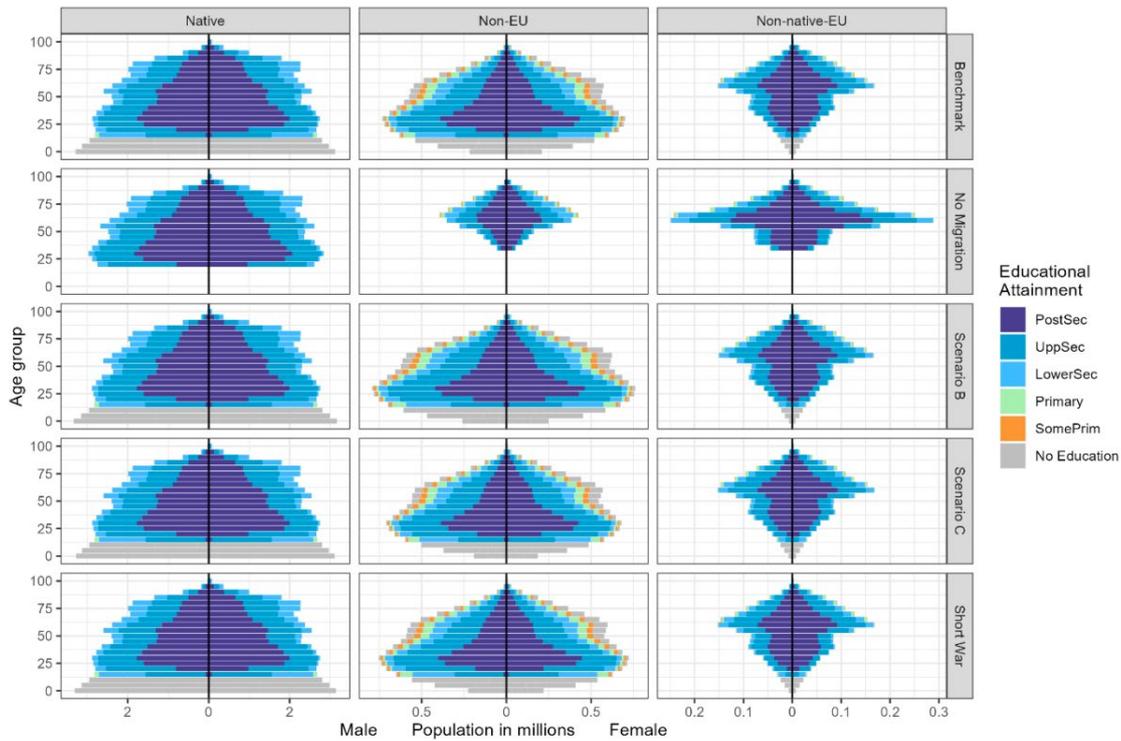


Figure A3: Southern Europe

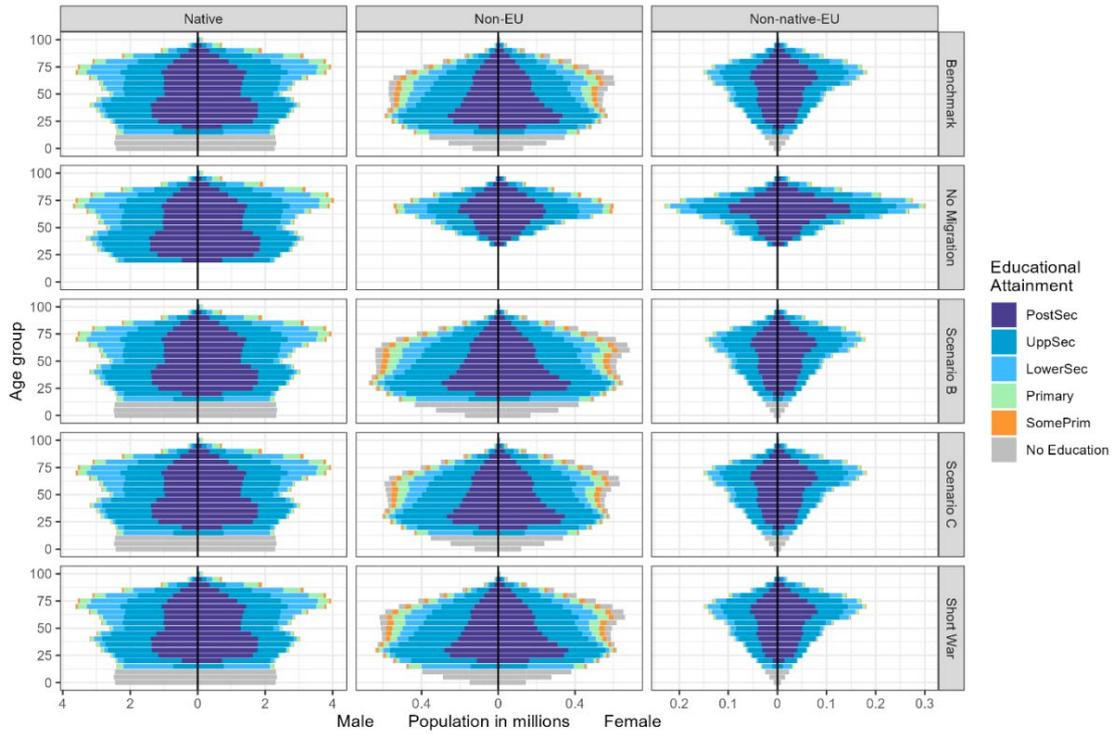


Figure A4 Eastern Europe

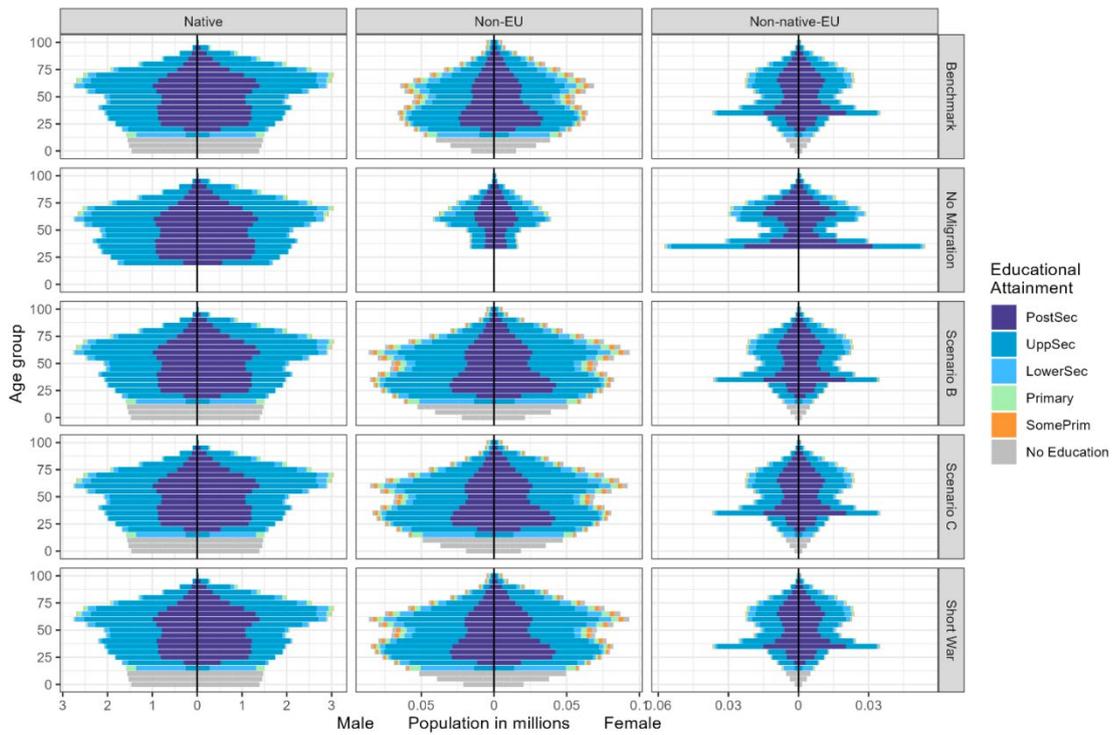
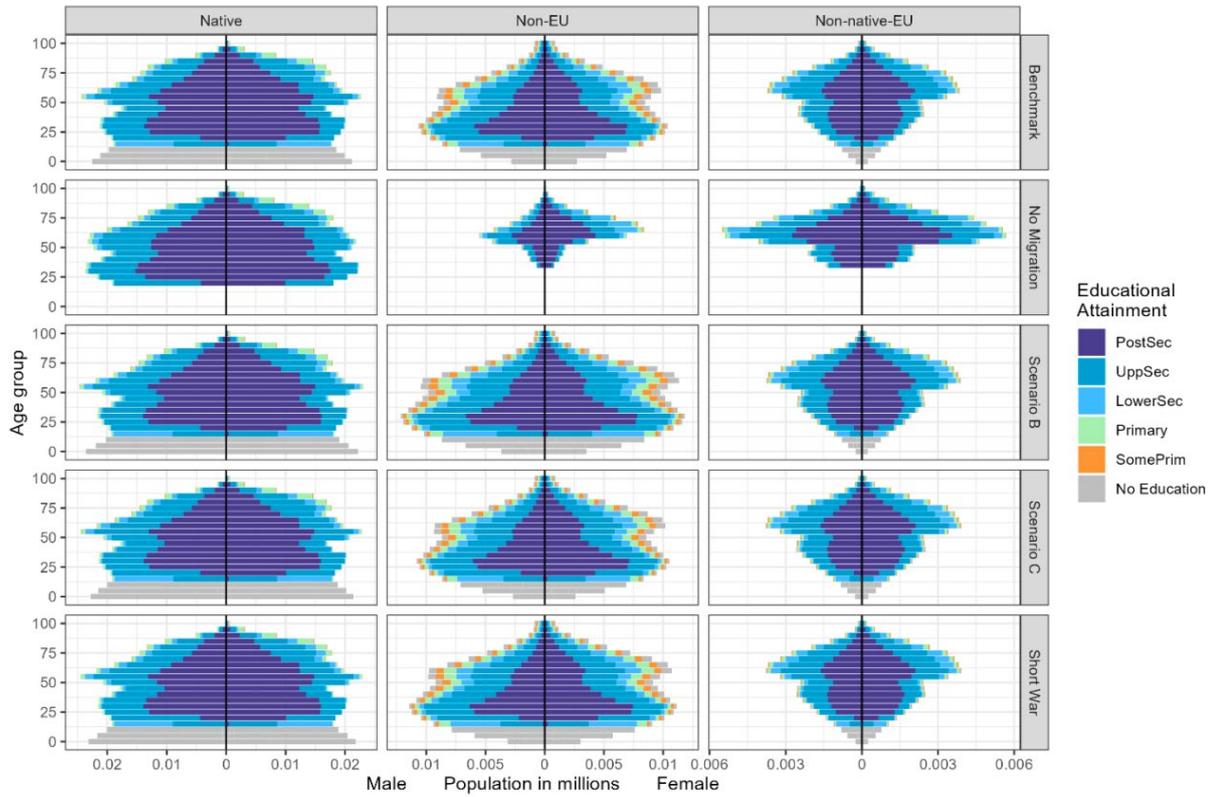
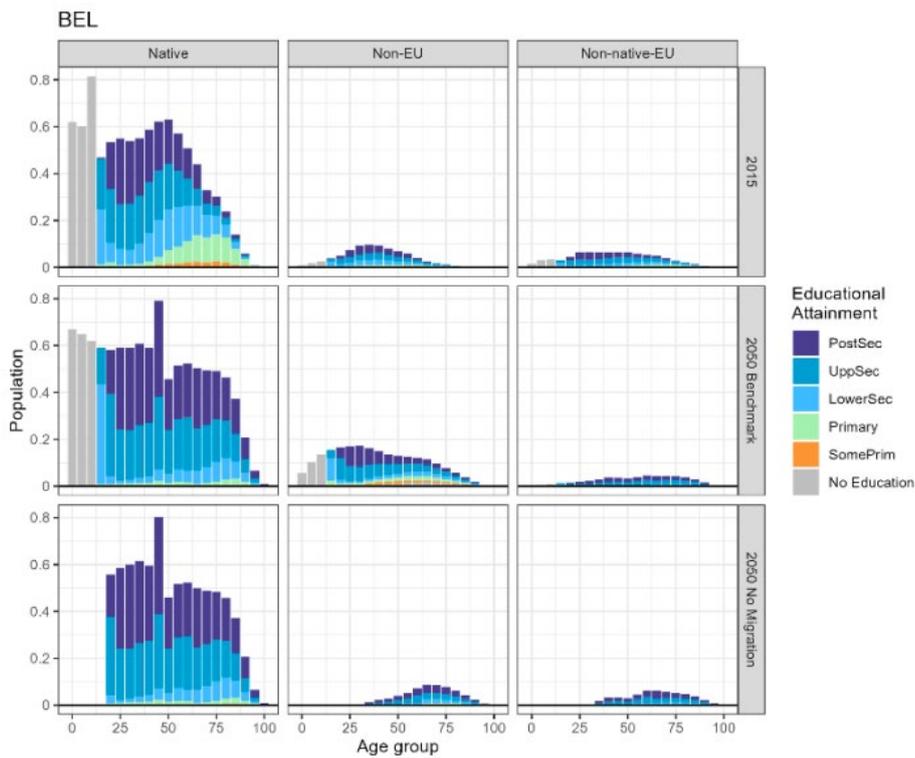


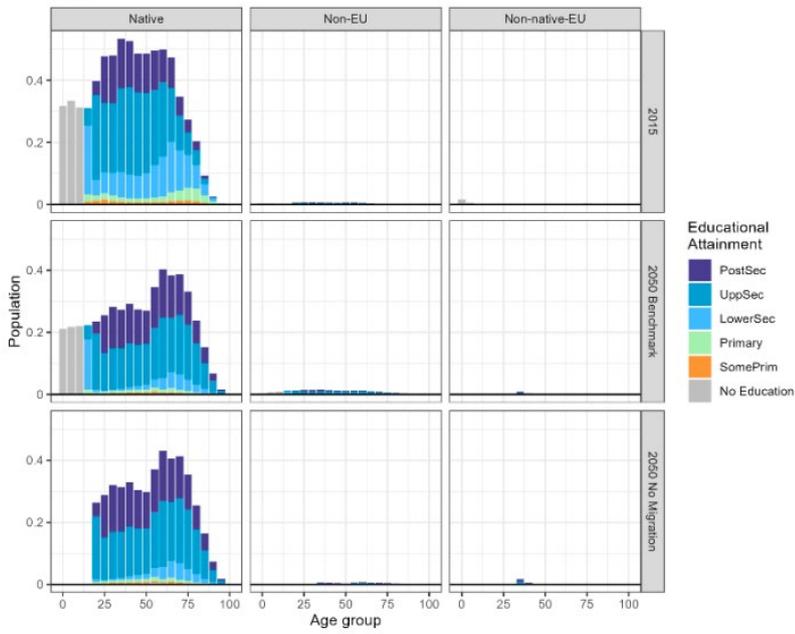
Figure A5 Western Asia (Cyprus)



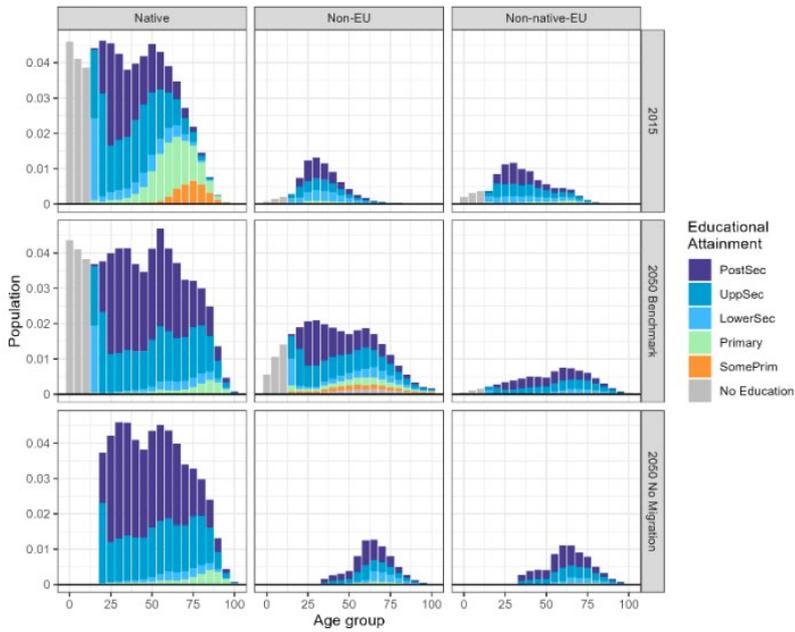
## Appendix B



BGR



CYP



CZE

