
Deliverable 10.3
**History of changes**

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<tr>
<th>Version</th>
<th>Date</th>
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<tr>
<td>1.0</td>
<td>28 July 2023</td>
<td>First version submitted as official deliverable to the EC</td>
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**Suggested citation**


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Cover photo: iStockphoto.com/Guenter Guni.
1 Introduction

This document serves as the user guide to QuantMig Migration Scenarios Explorer, a web tool developed in collaboration with Geodata and accessible at the QuantMig webpage (http://quantmig.eu/data_and_estimates/scenarios_explorer/). The web tool makes the outputs of the QuantMig-Mic population projection simulations for 31 European counties accessible in a user-friendly and visually attractive manner. QuantMig Migration Scenarios Explorer is a dynamic tool which allows users to visualise the demographic and labour force composition of populations of 31 EU+ countries1 from 2020 to 2060. Scenarios selected for the web tool are a subset of 29 scenarios produced by the project. The web tool features the Baseline scenario, which serves as a benchmark, and 14 high-migration events scenarios which simulate Short high-migration events and Persistent high-migration events from seven world regions into the EU+ countries. Selected scenarios model high-migration events corresponding to the twice-in-a-century frequency of occurrence and illustrate well the diversity of demographic futures in EU+ countries. They show more pronounced demographic and labour force impacts than the 14 scenarios of migration events with once-in-a-decade frequency of occurrence which are not implemented in the model and serve as sensitivity analysis. For more detail on scenario-making and the implementation of scenarios into the microsimulation model see Marois et al. (2023). The main results from all 29 simulated scenarios, including scenarios not included in the QuantMig Migration Scenario Explorer, are summarised in Potančoková et al. (2023a), and also accessible as an open dataset from the Zenodo repository as of August 2023 (Potančoková et al. 2023b).

In addition to country-specific results, the web tool includes summaries for EU27, EU+ (total of all simulated countries) and non-EU27 countries (United Kingdom, Iceland, Norway and Switzerland) simulated in the model to facilitate the use of the outputs by the users interested to see results for EU27 or other aggregates. Web tool also goes beyond the raw model outputs by giving the user an access to indicators derived from raw model output data and presented at pages 4 and 5.

The design and some functionalities of QuantMig Migration Scenarios Explorer are inspired by the Wittgenstein Centre’s Human Capital Data Explorer (Wittgenstein Centre for Demography and Global Human Capital 2018)2 but adapted to the specific needs of QuantMig.

The QuantMig Migration Scenarios Explorer web tool has 5 pages: Page1-Introduction and brief description of the tool, Page2-Immigration flows, Page3-Population pyramids, Page4-Indicators, Page5-Maps. This document serves as a user guide to Pages 2 to 5 of the tool. The user guide showcases functionalities and provides specific examples. The following sections of this document are embedded in the first page of the web tool to be directly accessible by the user. Sections below are explaining how to produce customised charts and download results for each page with data visualisations.

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1 The 27 European Union countries (EU27 as of 2020), the United Kingdom, Iceland, Norway and Switzerland.

2 Page 2: Immigration flows

This page is useful to visualise the different immigration flows before exploring the results of QuantMig migration scenarios. The scenarios differ in migration assumptions into the EU+ countries and you can investigate these differences in future migration dynamics using this page of the web tool. Please bear in mind that the scenarios are not predictions but what-if scenarios that simulate specific migration situations for the sake of the assessment of their demographic and labour force impacts.

Using this page, you can see the immigration flows into the EU+ in the Baseline, Short-high migration event and Persistent-high migration event scenarios from different origins outside EU+ for periods starting in 2020-24 and ending in 2055-2059. Demographers use assumptions to simulate future dynamics of European populations. These immigration assumptions are not prediction of future migration. In the Baseline scenario, we assume continuation of the past trends and you can see how this would look for immigration from specific world regions: East Asia, Latin America, North Africa, Other Europe, Sub-Saharan Africa, South and South-East Asia and West Asia. In the high migration events scenarios, we simulate one high migration event from one specific world region – imagining what would happen if a crisis would trigger a higher immigration to Europe, such as we have seen in the recent past from Syria or Ukraine. High migration events in these scenarios would increase immigration from one specific world region by a number of immigrants corresponding to the frequency of twice-in-a-century migration event (see Bijak (2023) for the details on statistical modelling of rare migration events used in this web tool. You can see this when you compare Baseline immigration flows and migration flows from the same region in another scenario.

Short-high migration event scenarios simulate a situation of higher immigration from a specific world region lasting for one calendar year during 2025-29.

Persistent-high migration event scenarios imagines that after the high migration event immigration from that world region remains elevated for a decade and during that decade gradually decreases.

Why do I see Baseline scenario by region of origin of immigrants?

In the model, there is only one Baseline scenario, but to facilitate comparisons between the scenarios, the selection options in the “Immigration flows scenario show” Baseline + region combinations. This is because Short-high migration event and Persistent-high migration event scenarios alternate immigration from one single region of origin. Immigration from all other world regions remains the same as in the Baseline scenario. To give an example: Persistent-high migration scenario from Latin America uses immigration flow from Latin America into a country/EU+ and immigration flows from all other world region are the same as in the Baseline scenario. If you wish to see total immigration flows from all rest of the world regions in the Baseline or any other scenario, go to the Indicators page and select Immigration from outside EU+.

How can I create a chart showing immigration assumptions?

1) Start with choosing a “Destination country” using a drop-down menu. In fact, you can also see immigration flows into the EU27 or a total for all 31 countries we simulated scenarios for:
2) Then choose, immigration flows from the world region(s) and scenarios you are interested by ticking options in “Immigration flows scenarios”. To understand the logic of the scenarios we recommend by first selecting all three scenarios for the same world region – this way you will see the Baseline scenario flows to which you can compare how much higher is immigration projected in the Short-high and Persistent-high migration scenario for that region.
3) To better understand the differences between the scenarios you can mouse over the “i” symbol to see the scenario description and the underlying narrative before you make your selection.

4) After selecting both above-mentioned parameters, you can generate the chart by pressing the command “Generate Chart” to produce the plot and a table including values. Note that the table is displayed at the bottom of the page.

The chart shows projected immigration flows from a region of origin into a destination country for 5-year periods. The starting year of each period is displayed on the X-axis, i.e. 2020 indicates total immigration flow for the period 2020-2024, and so on. Y-axis shows the number of immigrants, which is total immigration for all 5 years, not an annual average.
## Immigration Flows to Spain

The chart below illustrates the immigration flows to Spain over a 5-year period. The data is categorized into different scenarios and periods.

### Immigration Flows Scenario:
- Baseline from Latin America
- Baseline from Other Europe
- Baseline from Sub-Saharan Africa
- Persistent-high migration event from East Asia
- Persistent-high migration event from North Africa
- Persistent-high migration event from South and South-East Asia
- Short-high migration event from East Asia
- Short-high migration event from North Africa
- Short-high migration event from South and South-East Asia
- Short-high migration event from West Asia
- Short-high migration event from Sub-Saharan Africa

### Chart Details:
- Y-axis: Flow (in units)
- X-axis: 5 Year Period
- Lines represent:
  - Blue: Baseline from Latin America
  - Red: Persistent-high migration event from Latin America
  - Orange: Short-high migration event from Latin America

### Data Table:

<table>
<thead>
<tr>
<th>Period</th>
<th>Value</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 - 2025</td>
<td>98533</td>
<td>Baseline from Latin America</td>
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<td>2025 - 2030</td>
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<td>2030 - 2035</td>
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<td>Baseline from Latin America</td>
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</tbody>
</table>

**Select All**, **Invert Selection**, **Unselect All**

**Generate Chart**, **Reset Chart Zoom**

**Download as CSV**, **Download as PNG**
5) You can download the chart using “Download as PNG” and you can also save the underlying data displayed in the chart in CSV format by clicking “Download as CSV” option.
6) When the chart is generated, the description of the scenarios in the chart selection are displayed at the bottom of the page, below the table:

**Immigration flows to Spain**

<table>
<thead>
<tr>
<th>Period</th>
<th>Value</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
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<td>971230</td>
<td>Baseline from Latin America</td>
</tr>
</tbody>
</table>

**Immigration flows scenario information**

**Baseline flows**

Immigration from the rest of the world regions into the EU+ continues with the same intensity as in the second decade of 21st century and immigrants from specific world regions will be attracted mainly towards those EU+ countries where compatriots from that given region have migrated to in the past and where the existing migration networks can support them. The actual immigration volumes from the world regions into EU+ countries are derived by applying the average emigration rate from a region A into the EU+ during 2011-2019 onto projected young population in each world region. We assume that the war against Ukraine will continue beyond 2023 and the conflict will cease by 2025, resulting in return of 50% of the refugees back to Ukraine. Emigration of native-born EU+ born persons born outside the EU+ varies with respect to the immigration scenario and is modelled through average emigration rates by country of residence and place of birth.

**Persistent high migration event from Latin America**

The initial short high migration event from Latin America - which corresponds to the frequency of occurrence twice in a century - is followed by a gradually declining immigration from that region for another decade. After a decade immigration from Latin America continues as in the baseline scenario. The persistence in migration is envisaged because of the initial event's effect on establishment of migration networks, subsequent family reunifications and chain migration, as well as due to persistence of migration drivers stimulating immigration from the origin countries. Elevated migration flows thus take place between 2027 and 2026. Immigration from all other world regions follows the baseline scenario.

**Short high migration event from Latin America**

An immigration event from Latin America into the EU+ countries with the frequency of occurrence twice in a century taking the modelled immigration corresponding to 50th quantile of Pareto distribution, Björk (2023), and this event takes place for one calendar year within the 5-year period 2025-2029. Immigration from all other world regions follows the baseline scenario. Before and after the extreme event immigration from Latin America returns to the level of the baseline scenario. Such an event can be an outcome of humanitarian or natural disasters with temporary migration and high probabilities of return which can be resulting from a speedy policy reaction to the crisis that provoked high immigration.
3 Page 3: Population pyramids

Here you can create population pyramids showing population diversity by place of birth, educational attainment and labour force status according to different QuantMig migration scenarios.

How can I create pyramids showing characteristics of population in different migration scenarios?

1) In the first dropdown menu, “Destination country” you can select the EU+ country where you want to visualise results. Results are also available for EU+, EU27 and UK+EFTA states as a whole.

2) In the second dropdown menu, “Immigration flows scenario”, you are allow to select the scenario for which you wish to visualise results.

3) In the third dropdown menu, “Grouping type”, select the dimension you wish to see as the main variable in the pyramid:
   - Education: Below secondary (completed lower secondary education of lower attainment: ISCED 1-2), Secondary (completed upper secondary education, ISCED 3), Post-secondary (university and non-university higher education, ISCED4-8)
   - Labour status: Active (active in the labour force, include employed and job-seekers) and Inactive
(not participating in the labour force)

- **Region of Birth**: East Asia, Latin America, North Africa, Other Europe, Sub-Saharan Africa, South and South-East Asia, West Asia, North America and Oceania.

You can display or hide a legend of the categories corresponding to the selected variable using the command “Display legend” tick box, above the graph.

**If you want to produce a pyramid for the total population** including only one of these dimensions, as described in this point, go directly to point 5 and generate the chart. However, if you want to produce a pyramid for specific groups, check point 4.

4) You can add another dimension to the chart using “**Advanced options**”. After selecting the main variable in the “Grouping Type”, you can filter results shown in the pyramid according to the categories of the other two dimensions. For instance, if you had selected education as the main variable, you can use categories within the other two variables to filter by one or more specific groups of “Region of birth” (e.g., the native-born or the population born in East Asia) or “Labour status.”
Let’s illustrate the functioning of “Advanced options” with three examples:

A. How can I visualise the labour market status of the population born in North Africa?

In this case, after selecting labour market status as “Grouping variable”, you deselect all the options, except North Africa within Region of birth in “Advanced options”.

B. Now, let’s go a step further and produce a population pyramid with the same parameters as in example 1 above but only showing labour force status of North Africans with post-secondary education. You should use the above-mentioned “Grouping variable” and filter of Region of birth, but you need to deselect the categories below secondary education and secondary education in “Advanced options” within the variable Education, see the snapshot below.

If you want to see the labour force status of all post-secondary educated Africans in your country and scenario of choice, you select both regions of birth – North Africa and Sub-Saharan Africa.
C. **How can I see educational composition of immigrants born outside the EU+ who are active in the labour force?** To produce this population pyramid, select Education as “Grouping variable”. Then, in “Advanced options”, deselect the active population within Labour status and deselect the native-born (population born in the country of residence) and EU+ (individuals born in EU+ countries-EU27, UK, Switzerland, Island and Norway, excluding the native-born) and keep all other origins, since the population shown in the plot will be the aggregation of all groups selected in “Advanced options” (i.e., all regions of birth outside EU+-East Asia, Latin America, North Africa, etc).
5) After selecting the parameters of interest, press the command “Generate Chart” to produce the chart and a table including values.
6) Using the command “Copy input to fields across” you copy and paste your selections between both population pyramids (right and left).
7) To see change over time, use the slider “Year”.

Population pyramid for France, with Baseline Immigration flows

Population

Population
8) You can download the data you selected for the chart in CSV format. You can also save the chart you created as PGN file using the commands “Download as CSV” and “Download as PNG” respectively.
4 Page 4: Indicators

This page displays temporal change in analytical indicators visualised in line charts. To showcase demographic impacts of QuantMig migration scenarios you can explore indicators representing the demographic composition, population diversity, labour force, education and gender gap in different countries, scenarios and for total population, foreign-born (includes population born outside the EU+ and population born in another EU+ country than the selected Destination country) and population born outside the EU+.

1) In the first dropdown menu, “Place of birth” you can select the population group for which you want to show indicators (Total, Foreign-born or Born outside EU+).
2) The dropdown menu “Indicator” contains all the indicators that can be displayed in the chart, grouped by types: Population Composition, Labour Force, Education, Gender and Migration.

3) In the Destination countries drop down menu, you can also select EU+, if you wish to see results for the total of all 31 simulated countries, or EU27 or UK+EFTA(UK, Iceland, Norway and Switzerland).
4) Using “Immigration flows scenarios” you select for which you want to visualise the indicator. The selection adds lines into the chart. You can add or remove as many scenarios as you want in your chart. You can also use “Select all scenarios”, “Invert selection” or “Unselect all” buttons.

A legend can be displayed or hidden using the command “Display legend”, located above the chart once you have generated it.

5) Using the command “Copy input to fields across” you copy and paste the parameters into the chart in the panel on the right side.
6) Press the command “Generate Chart” to produce the chart and a table including values.
7) You can save your chart using “Download as PNG” option below the chart. You can also download the data underlying your chart in CSV format using “Download as CSV” option.
8) You can find definition of the indicators in the “Indicator information” at the bottom of the page.

**Indicator information**

**Working age population (15-64)**
Population from 15 to 64 year-old.
5 Page 5: Maps

This page shows maps of the same indicators as the Indicators page, representing the demographic composition, population diversity, labour force, education and gender gap.

1) Maps can be generated for total population, foreign-born (includes population born outside the EU+ and population born in another EU+ country than the selected Destination country) or population born outside the EU+. You select the population in the first dropdown menu, “Place of birth”:

2) The dropdown menu “Indicators” contains all the indicators that can be displayed in the maps, grouped by types: Population Composition, Labour Force, Education, Gender and Migration.

3) Use the dropdown menu “Immigration flows scenario” to select the scenario for which you want to create the map.
4) Then press the command “Generate Chart” to produce the map and a table including values (located below the map).
5) Clicking the command "Copy input to fields across" you copy and paste your selection from the left panel into the panel on the right.
6) Select the “Year” using the time bar above the chart.
7) Download the data in CSV format and a PGN file including the maps using the commands “Download as CSV” and “Download as PNG”, respectively.
8) You can find “Indicator information” at the bottom of the page.

**Indicator information**

- **% foreign-born**
  - Percentage of inhabitants who were born abroad.

- **Mean age**
  - Average age of the population calculated as the arithmetic mean.
References


