



Evolution Scenarios of Migration Dynamics under Long-term Socio-economic, Demographic and Environmental Trends

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MAGYC: The MAGYC (**Migr**Ation **G**overnance and **AsY**lum **C**risis) project seeks to assess how migration governance has responded to the recent “refugee crises” and has since been influenced by it, and how crises at large shape policy responses to migration. This four-year research project (2018–2022) brings together twelve international partners: the Hugo Observatory from the University of Liège (Coordinator), Sciences Po, the University of Economics in Bratislava, the GIGA institute of Global and Area Studies, Lund University, the IDMC, SOAS University of London, the University of Milan, the Lebanese American University, the University of Macedonia, Sabanci University, IfPO/CNRS.

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MAGYC WORKING PAPER

ABSTRACT

Based on the estimates of structural and environmental drivers of migration in the previous deliverables of this workpackage, this deliverable aims to provide a modest contribution to these migration predictions with a compromise approach combining both forecasting and scenarios. In particular, it adopts a forecasting approach based on existing scenarios on the main drivers of migration, also utilizing the work conducted so far on the various drivers of migratory flows and crisis level migration waves from origin countries. In addition to taking the demographic and economic determinants of migration as the basis of the projections as identified by Sohst et al. (2020), this deliverable will incorporate the environmental determinants through the minimalist and maximalist scenarios. The results of the projections until the year 2100 indicate that under negative conditions regarding development and especially climate change, very high level of mobility is possible as early as the year 2050 and will follow an upward trend afterwards. The difference in terms of the total number of migrants is starking especially between the two extreme climate change scenarios and the downward trend in migration numbers after 2075 entirely disappears for the pessimistic climate change scenarios. Furthermore, the range of countries affected by this crisis level out migration are very diverse in terms of their geographical location and development levels. All in all, the relative importance of either direct or indirect effects of climate change are relatively a lot more important on mobility as compared to development, which should have major policy implications.

Introduction

Predicting migration is not an easy task due to the limitations in data availability and data registry methods as well as our limited ability to foresee exogenous shocks such as disasters or intra state or interstate conflict. As a result, despite the advances in predicting other population dynamics, progress in forecasting migration remained limited. There is not much one can do about the potential exogenous shocks except for considering various scenarios regarding the drivers through which they would impact migration such as economic growth, population dynamics, or climate change, which is one way this deliverable attempts to remedy this shortcoming. When it comes to data availability issues on the other hand, the previous deliverables of this workpackage utilized the most recent and reliable data sources to estimate migration based on past indicators, to lay the groundwork for this deliverable.

Rather than making point estimations with several different confidence levels, projections will be based on different scenarios with the drivers of migration being the main parameters. Put differently, the origin- and destination-country specific factors identified by models 1&2 above in making projections about migration will be used. Making predictions about all those factors is beyond the scope of this study; hence we will be using estimations provided by respectable studies (both academic literature and non-academic sources). In doing this, two main dimensions will be taken into consideration. One dimension of the scenario building will refer to structural determinants incorporating demographic and socio economic drivers of migratory flows, while the second dimension will refer to the environmental dimension, to be added by the third deliverable of this work package. In particular, for

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population projections, the scenarios generated by the population division of the Wittgenstein Center on age, sex and education, which are based on 550 surveys and regional workshops (Samir and Lutz 2014) will be utilized for the estimations in this work package. These are called the SSP1 scenarios and range from sustainability to fragmentation, from inequality to conventional development. As to the climate change scenarios, the most optimist and most pessimist scenarios of the forecasts of CMIP5 project for temperature and precipitation anomalies for the years of 2050, 2075 and 2100 are utilized.

In the remainder of this deliverable, first, the extant literature on migration forecasts will be reviewed and different approaches to forecasting will be illustrated. Consequently, the last step of the three step estimation approach identified in the methodological paper (D.1.1) will be adopted. To this end, first the selected scenarios regarding the drivers of migration will be explained and the way they are measured will be illustrated. Following that, based on the trends and correlations explored between these drivers and migration flows for the time period of 1960-2015, forecasts will be made. Taking advantage of the benefits of the forecasting method enabling medium and long term projections, migration forecasts will be made for the years 2050, 2075, and 2100. After these forecasts, Finally, the concluding remarks will reflect on the value added of this approach and directions for future research.

Projecting Migration

Making predictions regarding migration flows is highly important to provide information to policy makers and canvas global strategies for increased adaptation and resilience. At the same time, they are increasingly difficult for a number of reasons. First, there are multicausal mechanisms driving migration and potential shocks in migration drivers such as droughts, wars, or disasters. According to Sander et al. (2014) forecasting migration is difficult, mostly due to a lack of underlying transition theory and adequate baseline data. Third,

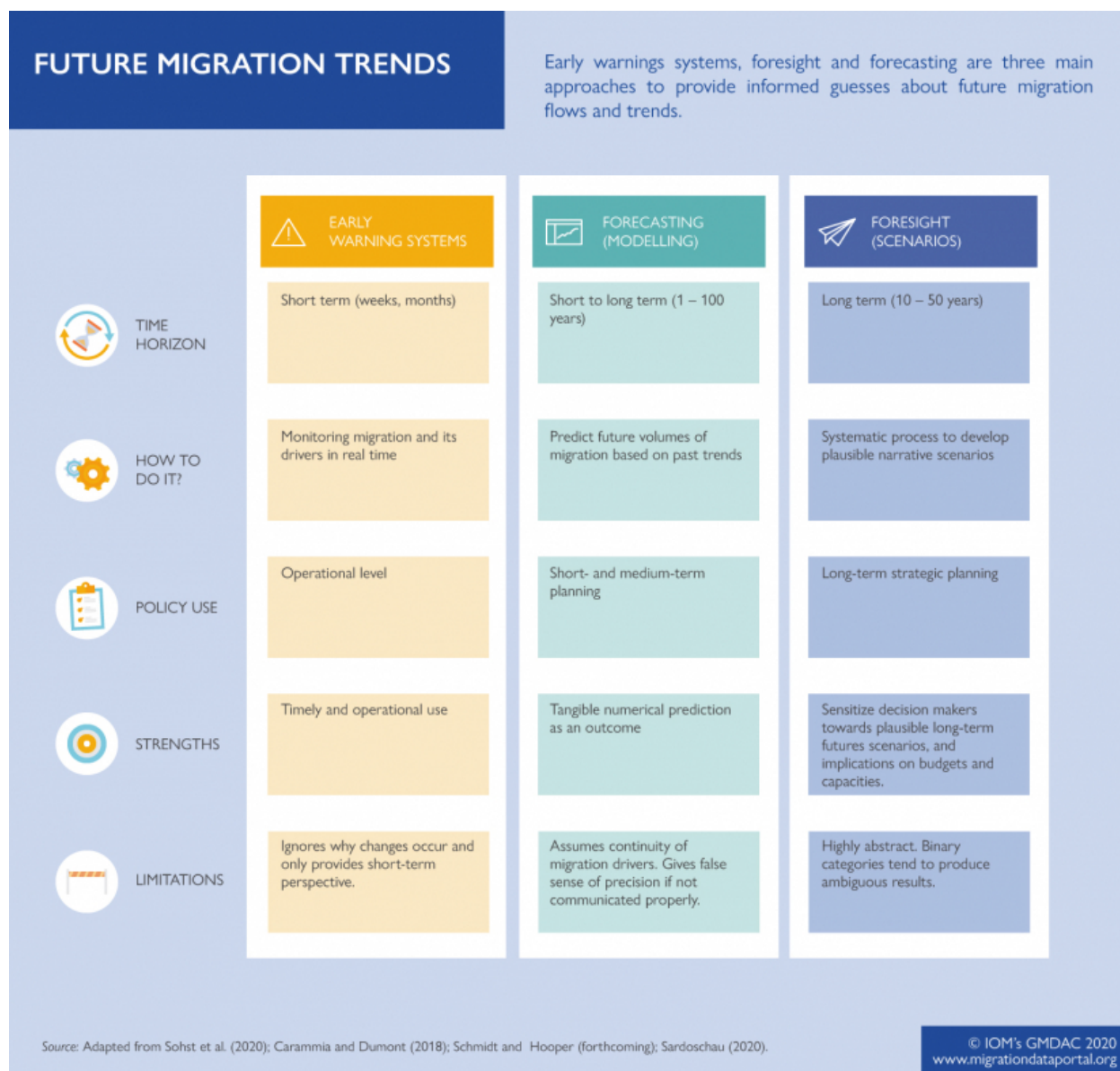
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despite the high degree of sophistication in measuring and modeling fertility and mortality in population projections, measurements and models of geographic mobility are rather limited due to limitations of the data. Still, the contribution of migration to policy and planning next to fertility and mortality is too important to ignore as any failure to capture human mobility also taints the reliability of population forecasts (Bijak 2016).

Many recent approaches to these predictions rely on available data sources such as censuses or expert evaluations. Three main approaches are early warnings systems (Bijak et al., 2017), foresights/scenarios ((Bijak, 2011; Disney, 2015) and forecasting which aim to provide informed guesses about future migration flows and trends (Vezzoli et al., 2017; De Haas et al. 2010).

The following figure, compiled by the Migration Data Portal illustrates the diverging logics and focus on these different methods in relation to the time horizon they target, the methodologies they use, the use of the results they generate for the political actors, their main strengths and potential limitations. As shown, forecasting allows for both short to long term predictions, inherently assumes the continuation of existing trends whether linear or non linear such as GDP, produce tangible numerical values. However this precision with numbers should not be taken to reflect absolute reality due to the very dependence on past estimation. Foresights on the other hand allow for long term planning and are highly open as to possible outcomes and alternatives, albeit with less concrete and precise outcomes as compared to forecasting.

Figure 1: Different Migration Projection Methods Compared



In their meta-analysis, Sohst et al. (2020) identify 21 migration scenario studies and 208 migration forecasting studies in the literature. Regarding the former, they illustrate that migration scenarios build on the identification of key dimensions of change that are expected to shape future migration and argue that rather than providing policymakers with quantitative estimates of future

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migration, the main benefit of the scenario approach lays in their ability to offer participants in the scenario development process a substantial learning 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. Regarding the forecasts on the other hand, two broad traditions of migration forecasting are present: (a) those based on demographic population projections and (b) those originating in economic explanatory forecasts of migration. Nonetheless as argued by the authors, neither scenarios nor forecasts have proven to be sufficient or accurate estimations, to be used as satisfactory bases for decision-making, especially in times of political change or external shocks.

The Workpackage 1 of the MAGYC project aims to provide a modest contribution to these migration predictions with a compromise approach combining both forecasting and scenarios. In particular, it adopts a forecasting approach based on existing scenarios on the main drivers of migration, also utilizing the work conducted so far on the various drivers of migratory flows and crisis level migration waves from origin countries. In addition to taking the demographic and economic determinants of migration as the basis of the projections as identified by Sohst et al. (2020), this deliverable will incorporate the environmental determinants through the minimalist and maximalist scenarios.

Existing projections of migration

Several national and international agencies forecast migration. Of these, three institutions are known to produce regular short and long term forecasts of migrations, namely Wittgenstein Center, UNDP and USCB. According to Howe and Jackson (2004) despite the lack of migration theory with many of these forecasts, looking at the very long term, it may be possible to identify connections between immigration and other social, economic, and political variables that can be projected with some confidence.

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Researchers at the Vienna Institute of Demography, combining expert opinion and forecasting, project global flows of international migrants for five-year period for 2015-60 for three different scenarios. According to their estimations, the number of international migrants in those decades will remain almost constant, reaching a peak in 2040-45 and then a slight decline (Sander et al., 2013). As summarized by Migration Data Portal of IOM, according to the lower scenario of WIC, the number of international immigrants will be 29 million the five-years interval, 33 million for the medium scenario and, 50 million for the higher. When the medium scenario is considered, it is projected that 8 million of these international migrants will be destined to Europe and North America respectively during 2055-60; 5 million to West Asia; 4 million to Africa; 3 million to the former Soviet Union countries; and approximately 1 million to Oceania, Latin America, East Asia, South-East Asia and South Asia.

In their comparison of WIC gross migration figures with UNPD's net emigration projections Buetner and Muenz (2016) total net migration figures for the world remain relatively stable between 13.7 million and 16.6 million people for each five-year interval, except the first and last periods. With regards to the receiving countries, Buetner and Muenz (2016) illustrate that both USCB and UNPD foresee the United States as a net receiving country for the whole projection period, but USCB assumes an increase in net immigration for the United States, while the UNPD assumes a largely constant net immigration level.

While the magnitude of the number of immigrants differ, all three projections point out to Both USCB and UNPD assume that the United States will remain a net receiving country for the whole projection period. In terms of the sending countries, all three expect China, India, and Bangladesh to be in top three with above 10 million immigrants.

Data and Methods

Measurement of Scenario Specifications

Earlier deliverables of this workpackage estimated migration flows and critical level migration flows since 1960 using Abel (2019) stock to flow conversions. Deliverable 1.3 focused on the socioeconomic/structural determinants, while D1.4 expanded on the role of the demographic factors and finally D.1.5 incorporated environmental drivers into the estimates. As this forecasts will be based on the past estimates of migration, the scenarios to be used are based on the exact measures of the available independent variables as in the previous models.

With regards to the socio economic drivers of migration, following Lutz et al. (2018) scenarios are defined in line with the the narratives of the SSPs (Shared Socioeconomic Pathways) which are widely used in the global change research community. The specific assumptions of each of these scenarios are as follows:

SSP 1: Sustainability scenario assumes a world, making relatively good progress toward sustainability, with ongoing efforts to achieve development goals while reducing resource intensity and fossil fuel dependency. The population component of SSP1 is named “Rapid Development” and assumes rapid increases in life expectancy, a sharp decline in fertility rates especially in those countries high on this indicator and hence a lower world population as well as a wider societal access to education as foreseen by Sustainable Development Goals. (Migration levels were assumed to be medium for all countries under this SSP)

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SSP2: Middle of the road scenario which assumes that fertility and mortality continuing their recent trends at a medium level, the Global Education Trend education scenario, with some progress toward achieving development goals including historic reductions in resource and energy intensity, and slowly decreasing fossil fuel dependency.

SSP 3: Fragmentation or Stalled Development scenario which is the opposite of sustainability. Stalled demographic transition is foreseen with low fertility in OECD countries and high in medium and low income groups. At this scenario mortality rates are high, access to education is low. In this divided world, uneven economic development is the norm and despite expanding population the migration component of this scenario which will be initially omitted assumes low migration due to security threats and tightened border controls.

Regarding the climate scenarios, according to Burzynski et al (2018) 'There is strong evidence that the global mean surface temperature of the world has increased since the beginning of the 19th century, and that the process has accelerated since 1980. Temperatures are expected to increase by 1 to 3°C over the 21st century, and recent studies suggest that, once adding an increment from storm surge, the sea level is expected to rise by 1 to 2 metres by 2050 (e.g., Rigaud et al., 2018). Global warming and sea level rise are two major ingredients of long-term climate change, which will change ecosystems and affect several economic outcomes such as productivity, health, drudgery of work, conflicts, and more (see Dell et al., 2014). Damages will vary across space because the economic effects of temperature are nonlinear (i.e., initial temperature matters) and countries are heterogeneously exposed to sea-level rise. Low-latitude countries that have contributed the least to climate change will be the most adversely affected. Hence, migratory pressures, both internal and international, will presumably be strongest in poor countries and are sometimes portrayed as a first-order adaptation mechanism to climate change.

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For scenarios of climate impacts, the forecasts of CMIP5 project for temperature and precipitation anomalies for the years of 2050, 2075 and 2100 are utilized. These are calculated exactly the same way as the measurements of Deliverable 1.5. Furthermore, CMIP5 is reported by the Climate Change Knowledge Portal of the World Bank¹ and it is the fifth iteration of a globally coordinated experiment collection using a previously agreed-upon suite of Representative Concentration Pathways – RCPs (Moss et al. 2010), which represent different possible future radiative forcing scenarios through a selected evolution of distinct emissions and land-use change. Previously (up to CMIP3), these scenarios were called emission scenarios as presented in the Special Report on Emission Scenarios – SRES (Nakicenovic and Swart 2000), e.g., SRES scenarios A2, A1FI, A1B, B1. The scenarios considered here are the RCP-2.6, RCP-4.5, RCP-6.0 and RCP-8.5. The different numbers next to the RCPs represent the global mean radiative forcing in watts per square-meter achieved in each of the scenarios by the year 2100. For example, RCP2.6 represents a very strong mitigation scenario, RCPs4.5 and 6.0 represent intermediate stabilization pathways, and RCP8.5 assumes the continuous increase in greenhouse gas emissions.²

Dependent Variables and Estimation Approach

As demonstrated in the previous working papers (D1.1, D1.3, D1.4, and D1.5), Abel's estimations of flow data derived from bilateral flow tables estimates from sequential bilateral stock data via birthplace specific flow tables (Abel 2017: 817) are used for the past values of the dependent variable. This dataset

¹ <https://climateknowledgeportal.worldbank.org/>

²

https://climateknowledgeportal.worldbank.org/themes/custom/wb_cckp/resources/data/CCKP_Meta_data_Final_January2021.pdf

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provides a very long time span to base our predictions on and ranges from the year range 1960-65, to 2010-2015 and covers all global migration flows³.

To construct the dependent variables of this study, Abel's flow data is first accumulated for each sending country based on outflows in gross numbers from an origin country, by summing up flows to all destinations from a given origin country. Two different dependent variables are constructed with this data, with the first one capturing all flows from the country (all flows one to the other for the dyadic version) and a binary crisis/critical level migration variable, which is discussed thoroughly in the following section.

Regarding the crisis level migration, conceptually, it is defined as 'very high flows from a country which could potentially cause a governance crisis in the origin as well as the recipient country as a result of their critically high number'. As it has been argued in D.1.3, this critical size is either as a high portion of the origin country population (determined as five percent), or as a nominally high number to create a sizable impact on the recipient country.⁴ Finally, in order not to exclude similarly sized flows from countries with a high population, their flows were included even though this number was below the 5 percent of their large populations as in the cases of China and India. The flows to be included were determined based on the mean rate of the 5 percent group, which was

³ These flow estimations utilize the changes over time in bilateral migrant stock sizes for estimations of flows. Abel's log linear models, a form of Poisson regression model used to predict or explain count variables, in this case number of flows, where each of the parameter values are obtained using the known marginal sums and diagonal cells in stock tables with iterative proportional fitting. These parameters for Abel (2017)'s method of imputation along with his use of three versions of UN stock data along with Özden et al.(2011)'s World Bank data enable a sensitive and comprehensive approach both geographically and temporally in estimating the missing values/gaps of flows. At a two-stage estimation, first flows over 10 year periods with alternative combinations of gender, demographic and stock data are predicted followed by an estimation of 5 year period flows between 1960 and 2015.

⁴ As countries with very small populations could also end up in this new variable which would not really have a 'crisis' effect, flows below 100 thousand people were excluded from each five year interval, which were a very small share of the 5 % group (i.e for one of the highest flow years, 1995-2000, these constituted 0,036 percent of the group total of over 11 million migrants).

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about 200 thousand people per five year intervals . All outflows from countries exceeding this number were included in the crisis variable as well.

In terms of estimation, following the standard diagnostics such as multi collinearity, heteroscedasticity and unit roots, as well as Hausmann tests for the choice of random or fixed effects, the model specification is determined as fixed effects models with robust standard error, clustered at the country level, that allow for intra-group correlation. The first step aims to reveal the origin specific dynamics with cross sectional panel models estimated for all three dependent variables. The second relies on the bilateral flows as the dependent variable to also focus on recipient countries. This time, Abel's flow data will be utilized as consisting of country dyads. This is important in creating a base gravity model to identify the main destinations of the flows which are outlined in detail in the previous section.

Estimations of Migratory Flows as the Base Model

With the previous deliverables, in order to statistically test the role of the structural environmental drivers on migration flows and crisis level flows different fixed effects time series models had been estimated with robust standard errors are clustered at the country level, that allow for intra-group correlation. The first set of these models focused on flows from the origin countries, while the second set incorporated estimations based on the dyadic dataset with the usual controls of the gravity models such as distance between the countries in the dyad, colonial links, common languages etc.

The equations for these models were as follows:

EQUATION for FLOW MODELS (both flow & crisis):

$$Y_{it} = \alpha + \beta X_{it} + D_t + u_i + \varepsilon_{it}$$

where:

Y_{it} = dependent variable (LNflow or Crisis_Dummy)

α = constant

X_{it} = vector of (the model specific set) explanatory variables

β = coefficients vector

D_t = year dummies

ε_{it} = error term

As the scenarios to be utilized are not available for many of the variables in gravity models and to be consistent with the widespread practice of forecasting on outflows or net outflows, the estimates will be based on origin country models. Unfortunately, due to the data limitations on independent variables and five year intervals in the migration flow variable, these models did not have the best model fit. In other word, the outflow models' power of explaining the variations in migratory flows were limited, which is likely to reflect on the forecasts derived from these models. Still, given the available data sets and maintaining the ambition to estimate migratory flows globally, this approach was the best available option.

Forecast for six scenarios

The forecasts of migration for different structural and environmental drivers are based on the Deliverable 1.5 of this workpackage. The forecasts are estimated based the outflows from origin countries as this is also how crisis level migrations are defined as. The baseline model in Appendix A incorporates the nonlinear effect of GDP, demographic characteristics such as the population of the country and the urbanization rate⁵ of the country, environmental drivers of temperature and precipitation anomalies. Furthermore, as climate related

⁵ In the ssp scenarios, specific rates for urbanization were not available for the entire projection periods. For the period to 2075 there is no available urbanization scenario, therefore instead of basing our forecasts to model 6 in the appendix, they are estimated based on model 3 without urbanization as an indicator.

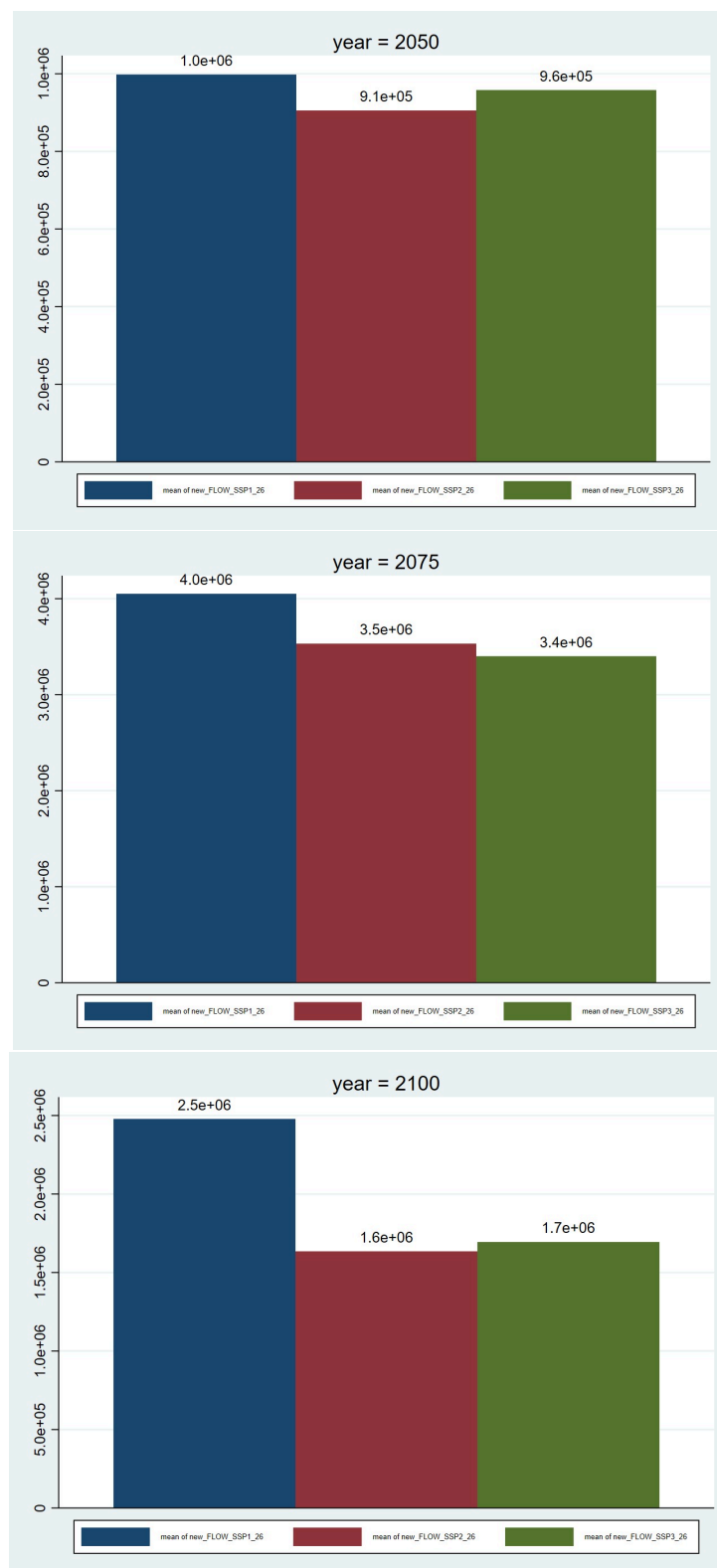
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drivers tend to have an indirect/interactive effect on mobility, the base model incorporates their interaction with GDP and urbanization rates⁶.

The following first set of figures illustrate the forecasts made from this base model with the different SSP scenario values plugged into the coefficients in order to predict the level of migration projecting to years 2050, 2075, and 2100. The climate change indicators are kept at the lowest possible level with the 2,6 emission rates across the world being achieved, which is the most optimistic scenario regarding the effects of the climate change.

⁶ Some future scenarios incorporate education into their projections. The impact of education was initially incorporated into the models estimating current migration drivers in Deliverable 1.4 and was measured as average years of per capita education in each country. However despite being the best estimate, data for this variable was scattered, leading to major loss in degrees of freedom and exclusion of a considerable number of countries from the models. Furthermore, extant scenarios measure this variable differently as primary and secondary school enrollment rates which makes it impossible to incorporate to the baseline model. As a result it was not included as an indicator at the forecasting stage.

Figure 2: Migration Projections for SSP1 SSP2 and SSP3 scenarios with 2.6 emissions



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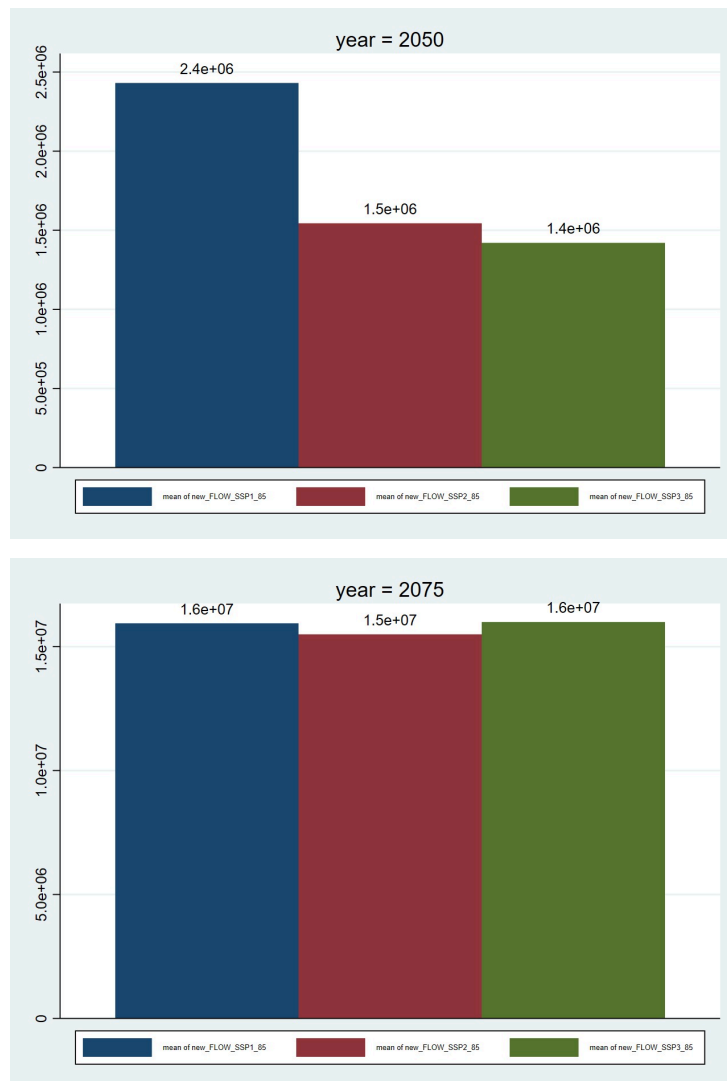
As seen across the three figures, after an initial increase from 2050 to 2075 in overall migration flows, the migration rates decline for the year 2100. This is consistent with many other projections as forecasts tend to emphasize the long term equilibrium effects. In terms of the origins with the highest number of outflows, China and India are the top two followed by the US, Philippines, Zimbabwe and Malawi for the first projection year and SSP1 but they change to China followed by Malawi and India and then by Zambia and Mozambique, which foresees a more unequal and fragmented world where stalled development is the norm.

With regards to the different scenarios of SSP incorporating economic growth, urbanization, and population demographics, for 2050 and 2070, the differences across them are not drastic. This implies that regardless of the development scenario, flows will follow an upward trend until 2075. However for 2100 middle of the road and stalled development scenarios elicit lower numbers of migrants. This could be due to the high migration from the lesser developed countries in the earlier years and/or remaining relatively low income groups unable to migrate.

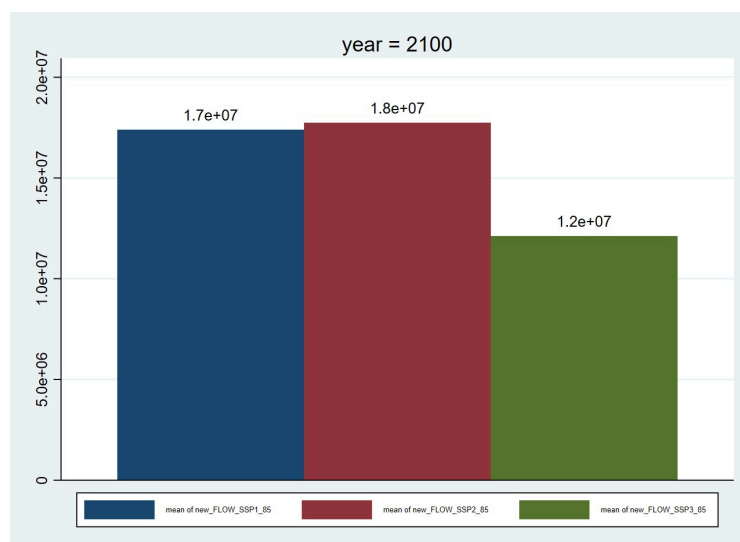
The best comparison of these numbers can be achieved with incorporating high emission (8.5), very negative climate change scenario into our forecasting. As stated earlier, this forecasting exercise hopes to merge the socioeconomic scenarios with climate scenarios. Therefore, the most pessimistic climate scenario is also projected. The following three figures illustrate the forecasting results for the respective three time periods for SSP1, SSP2, and SSP 3 development scenarios. The first visible result is the remarkable increase in the number of international migrants around the world for this period. As this is the most pessimistic climate scenario, the majority of the world population is on the move, desertification rates are very high making these lands uninhabitable and most of the islands are under water and all their populations outmigrate.

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Figure 3: Migration Projections for SSP1 SSP2 and SSP3 scenarios with 8.5 emissions



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For the first forecasting year of 2050, different SSPs seem to matter in regards to migration outcomes still, where sustainable development results in highest international mobility. This is perfectly consistent with the past estimates of the previous models where the low GDP rates were correlated with immobility. This pattern disappears for the forecasts regarding 2075, and for all development scenarios extreme migration outcomes are the norm. Furthermore, they are ten times more than the 2050 figures. This indicates the considerably higher importance of climate change for mobility, when the most negative scenario is considered. Similar to the low emission forecasts, for the year 2100, the stalled development scenario results in lower mobility as compared to other scenarios possibly due to the same reasons. For the SSP1 and SSP2 scenarios, the migration figures are even higher than 2075, indicating dramatic level of movement around the world. This is quite contrary to the optimistic climate scenario where we could see a downward trend in mobility after 2050.

With regards to the source countries of this migration, for the the SSP1 2050 scenario, the usual top two of China and India are followed by the more developed countries of United States and Japan. The island country Indonesia follows top four and precede Zimbabwe, Russia, Nicaragua and Honduras. As seen some of the top source countries change as a result of the negative climate effects on them as early as 2050. The ranking is comparable for the

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2075 projection where the top countries are joined by Guatemala, Chile and Zambia. For the projection year 2100 of SSP1 on the other hand, Bangladesh is back in the ranking followed by Phillipines, Ethiopia, Thailand and the island states of Japan, and the UK.

For the 2050 projections with the SSP2 scenario, the country rankings are quite similar but the stalled development scenario of the same year results in a different set of countries where countries such as Malawi, EL Salvador, and Mozambique make it into the top ten countries where most migrants are originated. The first two SSP scenarios for the 2075 project very similar countries as sending immigrants namely, India, China, US and Indonesia, to be followed by Mozambique, Malawi, Zambia, Guatemala and Zimbabwe; however for the last SSP scenario, countries such as Spain and Chile make it to the highest sending list.

Discussion on the findings and conluding remarks

Based on the estimates of structural and environmental drivers of migration in the previous deliverables of this workpackage, this deliverable aimed to provide a modest contribution to these migration predictions with a compromise approach combining both forecasting and scenarios. In particular, it adopted a forecasting approach based on existing scenarios on the main drivers of migration, also utilizing the work conducted so far on the various drivers of migratory flows and crisis level migration waves from origin countries. In addition to taking the demographic and economic determinants of migration as the basis of the projections as identified by Sohst et al. (2020), this deliverable will incorporate the environmental determinants through the minimalist and maximalist scenarios.

What do the obtained results of the forecast tell us regarding future migratory crisis? First and foremost, the projections indicate that under negative conditions regarding development and especially climate change, very high level of mobility is possible as early as the year 2050 and will follow an upward

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trend afterwards. The difference in terms of the total number of migrants is starking especially between the two extreme climate change scenarios and the downward trend in migration numbers after 2075 entirely disappears for the pessimistic climate change scenarios. Furthermore, the range of countries affected by this crisis level out migration are very diverse in terms of their geographical location and development levels. All in all, the relative importance of either direct or indirect effects of climate change are relatively a lot more important on mobility as compared to development, which should have major policy implications.

Still, the forecasts should be approached by caution and as suggested by Sohst et al. (2020) 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. We are not only constrained by the existing data sources and the models that we estimate based on them, but there are also high uncertainties associated with predicting migration such as asylum flows rooted in unpredictable events such as external shocks, wars, economic crisis etc, The current analysis incorporates most movements that can be extracted by census data including voluntary migration and asylum flows, still many irregular forms of migration are potentially not accounted for in the census data, at least not in the short run.

Finally, one recent shock, the global Covid-19 pandemic is not accounted for in these sets of predictions as the analysis of the past data excludes migration flows after 2020. Nevertheless, based on the current relationship between economic development and migration as well as the welfare reducing effects of the pandemic across the world, a few potential effects can be presented. First, in the short run, due to the prolonged restrictions the borders even in the most liberal border regimes such as in the European Union or halting of asylum processes in many gatekeeper states, the immediate effect as also observed has been a shrinking of number of immigrants. Nevertheless, in the medium run, the welfare reducing effects of the pandemic especially in low

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and middle income countries is likely to have visible effects on migratory flows. Following the reverse U-shaped relationship pattern between economic development and mobility, migration flows from middle income countries which witnessed an economic downturn, loss of jobs, welfare, education etc is likely to result in higher rates of migration from these countries, while the populations in low income countries potentially being more impoverished and hence unlikely to find the resources to migrate.

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Appendix A Past estimates of migration outflows taken form Table 6 from Deliverable 1.5 as the basis of forecasting

“Table 6: Slow onset drivers conditional on urbanization and economic growth”

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
LN Population	0.6580*** (0.0358)	0.6512*** (0.0372)	0.6567*** (0.0378)	0.6392*** (0.0395)	0.6352*** (0.0392)	0.6405*** (0.0403)
Landlocked_orig	0.0631 (0.1740)	0.0522 (0.1749)	0.0820 (0.1771)	0.1312 (0.1805)	0.1148 (0.1775)	0.1323 (0.1802)
LNGDPpc	0.5617 (0.4235)	0.5015 (0.4324)	0.6546 (0.4377)	0.4886 (0.4692)	0.4344 (0.4730)	0.4639 (0.4792)
LNGDPpc * LNGDPpc	-0.0391 (0.0250)	-0.0358 (0.0256)	-0.0460* (0.0264)	-0.0431 (0.0272)	-0.0384 (0.0272)	-0.0420 (0.0276)
temp_anomaly		-0.2576 (0.2098)	-1.0044 (1.4504)	-1.1422 (1.4368)	-0.3069 (0.4388)	-1.3797 (1.8851)
LNGDPpc * Temp_anomaly			0.0936 (0.1707)	0.1186 (0.1691)		0.1655 (0.2777)
Prec_anomaly		0.0100 (0.2995)	-3.5185* (2.0602)	-3.5870* (2.0611)	-1.1480 (0.7579)	-2.7972 (2.5724)
LNGDPpc * Prec_anomaly			0.4103* (0.2357)	0.4194* (0.2362)		0.2518 (0.3928)
Urbanization				0.0096* (0.0051)	0.0086* (0.0050)	0.0100** (0.0051)
Urbanization * Temp_anomaly					0.0027 (0.0070)	-0.0031 (0.0116)
Urbanization * Prec_anomaly					0.0216* (0.0120)	0.0119 (0.0202)
1965.period	-0.0537 (0.1815)	-0.0839 (0.1816)	-0.1014 (0.1810)	-0.1049 (0.1811)	-0.1138 (0.1811)	-0.1119 (0.1810)
1970.period	0.2347 (0.2032)	0.2047 (0.2035)	0.1945 (0.2010)	0.1829 (0.2003)	0.1671 (0.2023)	0.1738 (0.2021)
1975.period	0.2851 (0.2326)	0.2676 (0.2337)	0.2619 (0.2321)	0.2383 (0.2305)	0.2203 (0.2326)	0.2295 (0.2330)
1980.period	0.2019 (0.2380)	0.2206 (0.2392)	0.1824 (0.2355)	0.1339 (0.2311)	0.1225 (0.2341)	0.1215 (0.2330)
1985.period	0.1499 (0.2308)	0.1669 (0.2326)	0.1434 (0.2316)	0.0781 (0.2305)	0.0741 (0.2321)	0.0706 (0.2313)
1990.period	0.4052* (0.2083)	0.4848** (0.2110)	0.4480** (0.2094)	0.3644* (0.2100)	0.3586* (0.2140)	0.3520* (0.2127)
1995.period	0.4148** (0.2051)	0.4881** (0.2129)	0.4600** (0.2119)	0.3647* (0.2164)	0.3609* (0.2193)	0.3564 (0.2181)
2000.period	0.2995 (0.2051)	0.3780* (0.2119)	0.3539* (0.2073)	0.2538 (0.2063)	0.2399 (0.2097)	0.2418 (0.2099)
2005.period	0.3207 (0.2006)	0.4057* (0.2098)	0.3814* (0.2079)	0.2831 (0.2083)	0.2757 (0.2095)	0.2736 (0.2092)
2010.period	0.2470 (0.2024)	0.3454 (0.2158)	0.3138 (0.2125)	0.2085 (0.2132)	0.2102 (0.2153)	0.2017 (0.2142)
Constant	-1.6168 (1.9682)	-1.2653 (2.0105)	-1.8995 (2.0388)	-0.8905 (2.2059)	-0.6428 (2.2036)	-0.7970 (2.2328)
Observations	1,545	1,523	1,523	1,523	1,523	1,523
R-squared	0.389	0.385	0.386	0.388	0.388	0.388
Number of countries	178	175	175	175	175	175

Robust standard errors, adjusted for country clusters, in parentheses

*** p<0.01, ** p<0.05, * p<0.1