European Commission

JRC TECHNICAL REPORT

Scenarios of labour force participation and employment integration of immigrants in the EU: demographic perspective

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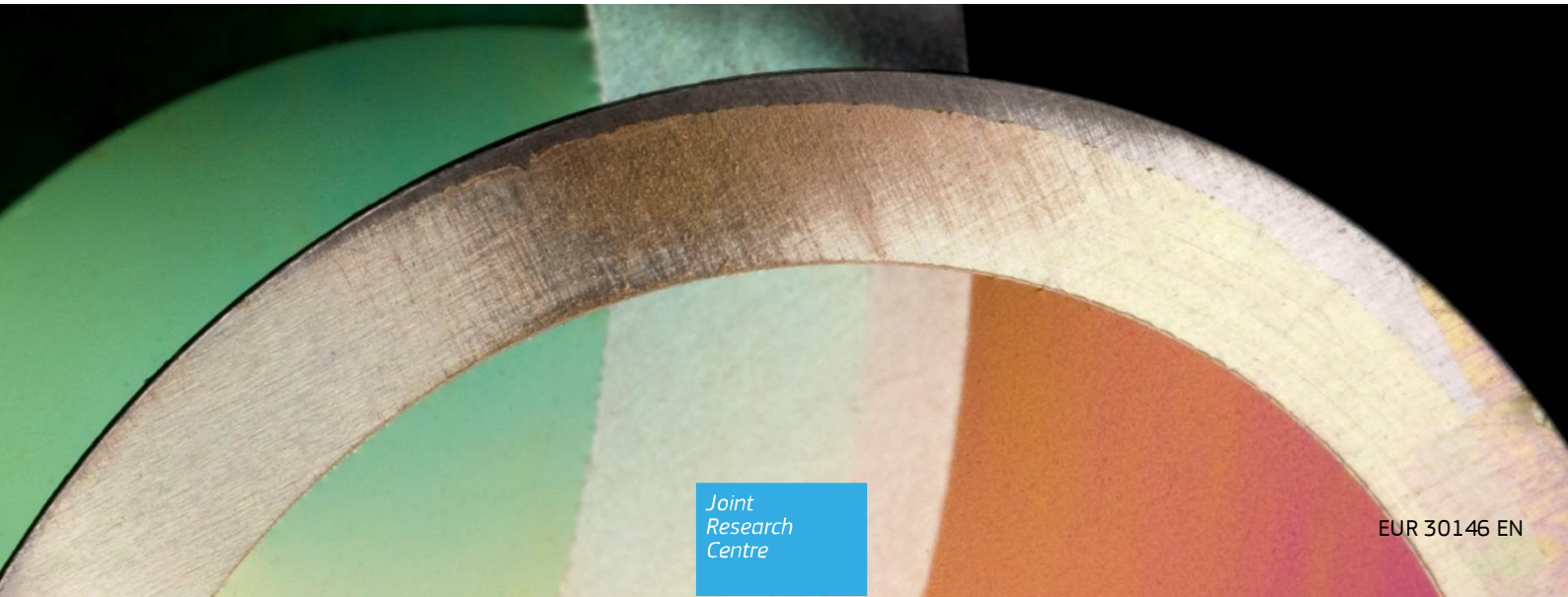
2020



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EU Science Hub
https://ec.europa.eu/jrc

JRC118865

EUR 30146 EN

PDF	ISBN 978-92-76-17407-3	ISSN 1831-9424	doi:10.2760/021884
Print	ISBN 978-92-76-17406-6	ISSN 1018-5593	doi:10.2760/86077

Luxembourg: Publications Office of the European Union, 2020

How to cite this report: G. Marois, M. Potančoková, *Scenarios of labour force participation and employment integration of immigrants in the EU: demographic perspective*, EUR 30146 EN, European Union, Luxembourg, 2020, ISBN 978-92-76-17407-3, doi:10.2760/021884, JRC118865.

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Acknowledgements

We are grateful to Laurent Aujean (DG HOME) for his valuable comments.

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Abstract

This report presents the microsimulation model developed for multidimensional population projections. It contains a concise description of the model's specifications coupled with a detailed description of its labour force and employment modules. The report also presents scenarios of economic integration of immigrants from the third countries and a summary of the scenario assumptions. Demographic modelling is based on analysis of the existing gaps in labour force participation and employment using Labour Force Survey data. We look at two dimensions of economic integration of immigrants – labour force participation and employment. At fixed demographic trends and labour force and employment of EU-born, we can evaluate the impact of improved, continued or worsened economic integration of immigrants in the EU and in individual member states. Our results illustrate that integration policies should not focus only on addressing barriers to employment for the job seekers of migrant background. Activation policies are highly relevant in the contexts where labour force participation of immigrants is lower than among the native-born.

1 Introduction

This report presents the microsimulation model developed for multidimensional population projections. It contains a concise description of the model's specifications coupled with a detailed description of its labour force and employment module. The report also presents scenarios of economic integration of immigrants [1] from the third countries and a summary of their assumptions. Detailed parameters of each module can be found in the appropriate sections within the CEPAM-Mic software.

The population projections are realized using a microsimulation model called CEPAM-Mic that allows the study of alternative scenarios and their consequences for future population trends in the European Union (at aggregate level as well as at the level of individual Member States). The model was built at IIASA within the scope of the Centre of Expertise on Population and Migration (CEPAM) project, a partnership between the Joint Research Centre (JRC) of the European Commission and the International Institute for Applied Systems Analysis (IIASA). This collaborative effort has been designed to assess the longer-term implications of migration and population related challenges. Population ageing and smaller labour force on the horizon are among the most acute demographic challenges EU will have to cope with in the coming decades. CEPAM-mic model allows analysing the implications of various immigration flows – in terms of their volume and composition – and their implications on population level indicators as well as on EU's labour force. EU-level results of scenarios that envisaged alternative migration situations in terms of size, educational composition and labour force activity of immigrants have been published in Lutz et al. (2019), section 3 "Impacts of migration on the EU labour force".

The ad-hoc scenarios presented in this report have been developed in collaboration with DG HOME B1 unit on Legal migration and integration. This work extends the previous exercise by adding also the dimension of employment on top of labour force participation. The scenarios were designed in dialogue with DG HOME B1 and reflect their specific policy needs. This technical report focuses rather on the documentation of the CEPAM-mic labour-force and employment module and presents a few selected EU-level results from the five scenarios.

[1] We consistently use the term immigrant for the third country nationals.

2 CEPAM-mic projection microsimulation model

Microsimulation is an alternative approach to the deterministic macro-level population projection models that use aggregate level data to project future population dynamics. In microsimulation the modelling is based on individual level data. The baseline population consists of individual actors whose individual characteristics represent composition of a given population across chosen dimensions. These individual actors are exposed to the risk of events relevant to their state – death, birth of a child (which generates a new actor inside the model), relocating to a different EU country, leaving to a non-EU country, achieving next level of education, entering or exiting the labour market and so on. Immigrants from non-EU countries enter the model with a set of individual characteristics and are subjected to risk of the events mentioned above. This population is simulated in continuous time and the transitions between the states are determined stochastically.

Microsimulation allows for including a larger set of dimensions than the standard multistate population projection models in which handling more than three-four dimensions becomes challenging. Handling multiple variables and states is more flexible in microsimulation.

The microsimulation projection model used for this research allows the study of alternative scenarios of migration and their consequences for future population and labour supply trends in the European Union. It is developed in the Modgen language, which is a microsimulation programming language developed by Statistics Canada, integrated into the Microsoft Visual Studio C++ environment (Bélanger and Sabourin 2017). The model is built following the framework proposed by Belanger et al. (Bélanger et al. 2019) to study population changes in a context of relatively high immigration and low fertility. CEPAM-Mic can thus dynamically project the population for EU28 member states under several socioeconomic and ethnocultural dimensions. Its base population counts 13 variables:

- age[2]
- sex
- country of residence (28 EU Member States as of 2019)
- student status (student, not student)
- labour force participation (active, inactive)
- employment (employed, unemployed)
- age at immigration[3]
- region of birth (11 broad regions[4])
- duration of residence (6 categories[5])
- education level (3 categories[6])
- education of the mother (3 categories[7])
- religion (4 categories[8])
- language (3 categories[9])

The use of microsimulation becomes necessary given the large number of categories in each of these dimensions or variables. Indeed, microsimulation is a powerful tool that can replace traditional multistate projections when the number of dimensions becomes large (Van Imhoff and Post 1998) and also allows for the use of complex statistical models to project life-course transitions and events. This microsimulation model is characterized by the stochastic simulation of individual life courses. Simultaneous simulation of individual life courses allows the model to dynamically update the risks of various events based on an individual's state values, and further allows interactions between actors (see Table 1 for an overview). CEPAM-mic model utilizes the interaction to model intergenerational transmission of education by linking child's characteristics to those of the mother. Thus, one's educational attainment (for example a risk to achieve high education) does not

[2] The model runs in continuous time; 5 year age groups are used in the output.

[3] The variable generation status is derived from the age at immigration. The categories of this variable are the real age. Then we create 3-categories more general categories of the variable for the generation status: G1 – immigrants who arrived as adults, G1.5 – immigrants who arrived as children (by age 15), and G2 – descendants of immigrant parents.

[4] Except where the country of birth and residence are the same: EU-15; NMS-13; Europe Outside EU-28; North Africa; Other Africa; Near Middle East; East Asia; South South-East Asia; North America; Australia Oceania; Latin America

[5] Except where the country of birth and residence are the same: 0 to 4 years; 5 to 9 years; 10 to 14 years; 15 to 19 years; 20 to 24 years; 25+ years

[6] Low (ISCED 2 or lower), Middle (ISCED 3), High (ISCED 4 or higher)

[7] Same as above

[8] Christian; Muslim; No religion; Other

[9] Official Language in Country of Residence, Other EU official language, Other languages

depend only on one's individual characteristics (indicated in Table 1) but also on the educational attainment of one's mother. Some events, such as fertility for example, are determined by a larger set of status variables that are influential for the variation of fertility rates, others, such as mortality, by a smaller set of variables. Data availability for the statistical models and especially lack of comparable data for all EU28 countries sets limits to the interlinkages that can be captured and incorporated in the model.

Table 1: Overview of the events modelled in CEPAM-mic and their determinating status variables

Events	*Age*	*Sex*	*Place of residence*	*Place of birth*	*Age at immigration*	*Duration of stay (immigrants)*	*Language*	*Religion*	*Education*	*Mother's education*	*Methods to estimate parameters*
Fertility	X		X	X	X	X			X		Vital statistics, logit regression
Mortality	X	X	X						X		Vital statistics
Domestic migration	X	X	X								Population estimates, O/D matrices
Emigration	X	X	X								Population estimates
Language used at home					X	X	X				Survival curves
Religion	X	X	X					X			O/D matrices
Educational attainment	X	X	X	X			X	X		X	Ordered logit regression
Labour force participation	X	X	X	X	X	X			X		Logit regression
Employment	X	X	X	X	X	X			X		Logit regression

Source: authors.

Microsimulation methods are also very flexible in the sense that they allow the creation of scenarios[10] combining different hypotheses concerning the future evolution of the stochastic parameters that drive the component of population changes (Van Imhoff and Post 1998; Spielauer 2010).

A detailed description of the different modules that make up CEPAM-mic is available elsewhere (see Bélanger et al. 2019 for the framework; Marois, Sabourin, and Bélanger 2019a; 2019b for the education module and the labour force module; Potančoková and Marois (forthcoming) for the fertility module). In the next section we summarize in a nutshell the different components of the model, starting with the base population.

2.1 The base population

As mentioned previously, the baseline population is structured by 13 variables. However, there is no single data source (a survey or a census microdata files) that would contain all these variables and for all 28 EU member state. Therefore, we could not create the base population stock from a single data source, but we had to triangulate several surveys and integrate the information from them.

The main data source is European Labour Force Survey (LFS) as it includes all projected variables, except for religion and language spoken at home. For this reason and also the fact that its size is relatively large compare

[10] Scenario is in this case defined as a combination of assumptions across the projection components (variables). Assumption specifies future value of a component or a parameter.

to other surveys, LFS is used as the main data source to build the base population and also to estimate several parameters of the microsimulation model. Although relatively large, the sample sizes of the LFS vary from country to country. Given the importance of analyzing the behavior of population groups which can sometimes be relatively small, it was useful to pool two years of the survey to increase accuracy and reduce the Monte Carlo error. Each record from these surveys is therefore an individual (an actor) in the microsimulation model (n=8,148,874). In addition, microdata from waves 1 to 7 of the European Social Survey (ESS) were used to impute the missing variables, religion and language spoken at home, in the base population. Imputation was done using polytomous logistic regressions in the MICE package in R (van Buuren and Groothuis-Oudshoorn 2011).

Compared to census data, LFS seems to measure some variables less well. In particular, the immigrant population of some countries seems to be significantly underestimated, which led us to calibrate the LFS data using European census data and other sources. The microdata set is thus calibrated in three steps: in the first step, the base population is reweighted to match the 2011 European census by country, age, sex, educational attainment, and place of birth (where available); in the second step, the base population is reweighted to match the religion distribution by country and sex (Hackett et al. 2015); the third and final step occurs during the projection where the population is calibrated on the 2015 EUROSTAT population counts by country of residence, age and sex[11] that is further combined with Wittgenstein Center's estimates on education composition of the corresponding population groups (WIC 2019).

2.2 Mortality module and assumptions

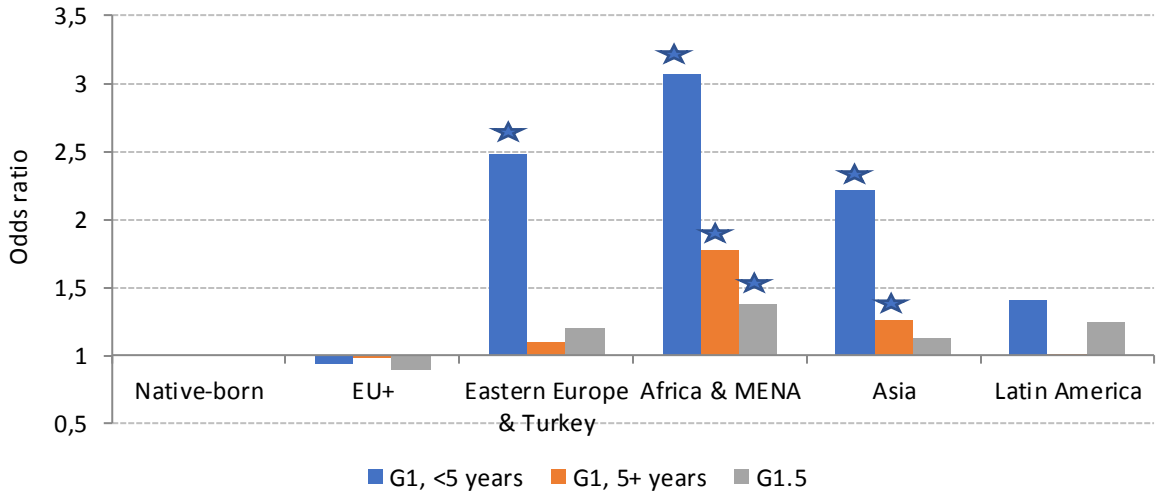
Mortality rates by age, sex and educational attainment are taken from Lutz et al. (2018). Future trends for these rates were set combining statistical models with experts judgement (Caselli et al. 2014). Continuous improvement in life expectancy at birth is assumed with long-term regional convergence, exceeding 90 years in most European countries by 2060. Differentials in life expectancy (at the age of 15) between the low and the high educated is, however, kept constant at about 4 years for females and 6 years for males.

2.3 Fertility module and assumptions

Using a simplified variant of the own-children method on pooled annual LFS data 2011-2015, differentials by age, country, education, student status (with an interaction with age), region of birth, age at immigration, and duration of stay were estimated using logit regression models (Potančoková and Marois 2018). Outcomes (see figure 1) show higher fertility for immigrants (generation 1 (G1)) from some regions such as Sub-Saharan countries, Middle East, and North Africa (MENA). The fertility is also higher for recent immigrants, but tends to converge towards the levels of native-born population with increasing duration of stay. For immigrants arrived during childhood (generation 1.5), fertility levels fall between that of their parents and of the natives.

[11] EUROSTAT table: demo_pjan

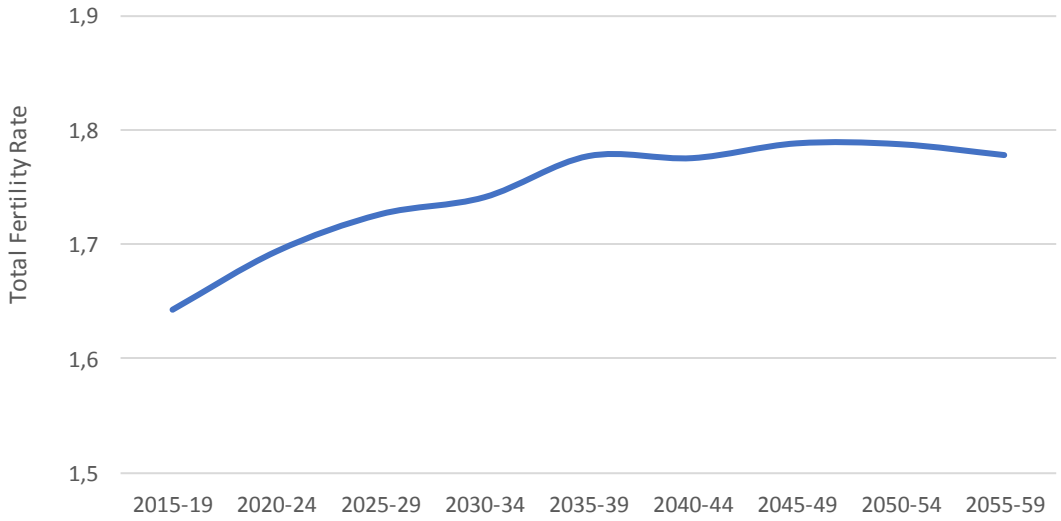
Figure 1: Odds ratios of giving birth by region of origin, generational status and duration of stay, native-born = reference category



Note: Statistically significant results marked by asterisk
Source: authors.

The parameter for the student status reduces fertility for women that are still in full time education (OR=0.123). Parameters for the student status and the immigration variable are then contrasted to the weighted population average. These adjusted parameters are then added to the base age-, education-, and country-specific fertility rates from Lutz et al. (2018), which values were determined after a large expert survey in the field of fertility studies (Basten, Sobotka, and Zeman 2014). Experts assumed slightly increasing fertility for majority of EU countries due to the ongoing process of fertility postponement. These assumptions on overall fertility level in the EU countries in hand with the changing population composition by educational attainment (increasing share of post-secondary educated due to the assumed education expansion) and nativity status (see migration assumptions below) and at current differentials result in an increased total fertility rate from 1.64 in 2015-19 to 1.78 in 2055-59 (see figure 2) for the whole EU28.

Figure 2: Projected total fertility rates (TFR) for EU28 in the baseline scenario, 2015-2059



Source: Potančoková and Marois 2019.

To allow greater flexibility in the development of migration assumptions, international immigration, which in the context of this research corresponds to that from non-European countries (i.e. the third countries), is treated separately from other migration movements, either international emigration to outside the EU or migration between EU countries (termed intra-EU mobility in this report[12]).

Out-migration parameters were estimated in three steps. First, the intensity of out-migration is determined by computing country-level out-migration rates by sex and country of residence from the average number of out-migrants between 2013 and 2016 (Eurostat table: migr_emi2) divided by the average population aged 20-34[13] during the same period. In a second step, age-specific out-migration rates are derived within the microsimulation model as follows: first, country-level out-migration rates are applied to the projected population aged 20-34 to get the expected number of out-migrants in a given period. The number of out-migrants is then distributed according to age using a Rogers-Castro age schedule (Rogers and Castro 1981). Finally, the age-specific out-migration rates are obtained by taking the ratio of out-migrants to the population, by age, sex and country of residence. Out-migration rates in the simulation are recalculated every five years.

During the simulation, out-migrants may either move within the EU, and are assigned a new country of residence, or they can leave the EU, in which case their simulation is terminated. The proportion of out-migrants leaving the EU is derived from Eurostat tables on emigration according to region of destination (table: migr_emi3nxt). Origin-destination matrix for intra-European mobility were derived using updated estimates for the period 2009-2016 of Raymer et al.'s (2013) Bayesian estimates of intra-EU mobility. Country-specific calibration factors are then calculated from a preliminary simulation for the period 2013-2016 in order to get the same number of entrances by country than what was estimated by Eurostat for the same period. These calibration factors are kept constant for the rest of the projection.

International immigration is treated as a separate component and the model allows great flexibility on assumptions about the future flow of immigrants and their characteristics. Since the model does not project the rest of the world population, the size of future immigrant cohorts is an exogenous component and the annual number of immigrants by country is directly entered as a parameter. In this report, we refer to the baseline scenario with the following assumption of immigrants derived from the Eurostat data on the average number of international immigrants into the EU countries observed during the period 2013-2016. In order to correct the exceptionally high immigration inflows during the peak of the so-called refugee crisis in 2015-2016, we have adjusted the extreme values for Austria and Germany, and the flow of 2016 for Greece. The number of international immigrants arriving into EU in a 5 years period is thus assumed at nearly 10 million. This number of international immigrants is assumed to remain constant for all periods until the projection horizon in 2060. The immigrants are distributed into the EU Member states according to the respective shares in the 2013-2016 Eurostat data and the resulting overall flows are presented in Table 2.

[12] The initial estimates pertain to moves of EU residents between the EU Member States.

[13] The age group 20-34 was chosen as the exposure for the rate because majority of out-migrants are in that age at migration. Using whole population as an exposure yields distorted rate.

Table 2. Assumptions on the number of international immigrants (born outside EU28) (5 years inflow)

Host country	Baseline volume
AT	223,597
BE	263,245
BG	84,909
CY	31,609
CZ	96,489
DE	1,991,155
DK	188,434
EE	16,409
ES	1,100,676
FI	85,108
FR	1,101,813
GR	99,462
HR	37,968
HU	114,329
IE	174,873
IT	1,057,411
LT	37,193
LU	9,348
LV	20,310
MT	34,791
NL	397,853
PL	466,226
PT	55,871
RO	147,265
SE	469,441
SI	51,148
SK	6,348
UK	1,630,214
EU28	9,993,490

Source: authors.

Characteristics of recent immigrants in the base population are used as a basis to determine the characteristics of future immigrants in the simulation. Through reweighting, it is possible to change the immigrant distribution

according to age, sex, education, place of birth, religion, and language in each country. This report presents only one assumption concerning the educational attainment of immigrants in the baseline scenario[14], which supposes that future immigrants will have the same educational attainment as recent immigrants who arrived into the EU between 2001-2011 (estimated from the immigrants in the base population) (table 3).

Table 3. Educational attainment of immigrants to the EU at age 25-44 in the baseline scenario

Scenario	Educational attainment		
	Low	**Medium**	**High**
Baseline	40%	27%	34%

Source: authors.

2.4 Language spoken at home and religious affiliation

CEPAM-Mic also projects two ethno-cultural characteristics whose future evolution is highly dependent on immigration: religion and language spoken at home. At birth, religious affiliation and language spoken at home are taken directly from the mother, and are subsequently allowed to change during the life course. Adults can change their religious affiliation over the life course. Transition rates for religious affiliation[15] are taken directly from the PEW projections on religion (Hackett et al. 2015). Life course transition rates for language spoken at home are based on model schedules (Sabourin and Bélanger 2015) calibrated using data from the European Social Survey.

2.5 Educational attainment module and assumptions

The education module of CEPAM-Mic is exhaustively described in (Marois, Sabourin, and Bélanger 2019a). In summary, CEPAM-Mic includes three levels of educational attainment[16]:

(1) Low: Lower secondary or less (no education, ISCED 0, 1 and 2);

(2) Medium: Upper secondary completed (ISCED 3; i.e. completed upper secondary);

(3) High: Postsecondary (ISCED 4 and higher; i.e. post-secondary).

The highest level of education that an individual will reach over the life course is set probabilistically at birth (or at arrival for immigrants who arrived during childhood) using parameters estimated from an ordered logit regression. The model explicitly considers the influence of personal characteristics and the highest educational attainment of the mother. Sex- and country-specific cohort parameters are also included and extrapolated to establish assumptions for future cohorts. The model equation is thus formulated as follows:

Eq. 1 $$\ln\left(\frac{E_{ij}}{1-E_{ij}}\right) = \beta_{0j} + \beta_{1j}Ct_i + \beta_{2j}Cr_i + \beta_{3j}(Ct_i * Cr_i) + \beta_{4j}X_i + \beta_{5j}Z_i$$

Where

- E_{ij} is the probability that an individual i reaches level of education j, where j equals High or Medium;
- Ct is the country of residence;
- Cr is a discrete variable for birth cohorts (1940-44=1; 1945-49=2, …, 1975-1979=8);
- X is a set of sociocultural variables;
- Z is the highest educational attainment of the mother.

[14] Besides the baseline scenario (termed Central scenario in Lutz et al. (2019), several other scenarios which vary the assumptions on the volume and educational composition of the immigrants from the third countries were developed for the CEPAM projected and presented in Lutz et al. (2019).

[15] We consider the following four categories based on self-reported religious affiliation: Christians, Muslims, Unaffiliated and Other religion

[16] The categories correspond to ISCED 2011 classification which was implemented in LFS from 2014 onwards. Older years use ISCED 1997 classification.

Sociocultural variables include language spoken at home, religion, and region of birth. As such, the education module implements differentials in the educational pathways for children with an immigrant background as well as for different social classes as reflected by the education of the mother. The analysis of the parameters showed that the mother's education is a strong predictor of children's future educational attainment, while sociocultural variables, such as being Muslim (especially for women) or speaking a non-European language at home decrease the odds of getting postsecondary education. These findings are consistent with the existing studies on intergenerational transmission of educational achievements (Heath and Brinbaum 2007; Hirschman 2001; Riphahn 2003; Shavit, Yaish, and Bar-haim 2007).

In all scenarios of this paper, parameters β4 and β5 are kept constant throughout the projection, while country-specific cohort trends (β0 to β3) are extrapolated over the time span of the projection. This in effect means that we assume continuation of the education expansion into the future. For postsecondary is capped at 90%, in accordance to other international projections of educational attainment (Wolfgang Lutz et al. 2018; Wolfgang Lutz, Butz, and KC 2014).

Individuals are set as student starting from age 5 until the age of graduation from the highest completed level (but at most to age 29). The age at graduation is determined for all levels using Eurostat distributions by ISCED levels for the latest graduated cohorts (2013-2014). The modeling of education thus allows distinguishing, for each individual at each projection step, a) the highest level of educational attainment that will be reached during the life course, b) the current level of education, and c) whether or not the individual is still in schooling.

3 Labour force participation and employment modules

3.1 Labour force participation module

The labour force participation module is described in detail in Marois et al. (2019b) and selected results at the EU level were presented also in Lutz et al. (2019, Chapter 3) and Marois et al. (2019c). The module is applied to individuals aged between 15 and 74. When a change occurs to the characteristic of an individual (age, education, duration of stay, etc.), the module determines probabilistically whether or not he/she participates in the labour force. The labour force participation status is imputed through a Monte-Carlo experiment in which a random number is compared to the probability of being active: a successful trial means that the simulated individual is active. Parameters are estimated from sex- and country-specific logit regressions on a binomial variable representing participation in the labour force, using pooled data from the 2010 to 2015 EU Labour Force Survey (LFS, annual files). Equation 2 below describes the modeling of labour force participation (P):

Eq.2 $\text{logit}(P) = \beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 YEAR + \beta_4 (AGE * EDU) + \beta_5 (AGE * YEAR) + \beta_6 (EDU * YEAR) + \beta_7 (AGE * EDU * YEAR) + \beta_8 IMMIG + \beta_9 (IM15 * EDU)$

Where:

- $\beta_0 + \beta_1 + \beta_2 + \beta_4$ capture the joint effect of age and education on labour force participation rates[17]. Education is divided into 3 categories:
    1. Low (L): Lower secondary or less (no education, ISCED 0, 1 ,and 2);
    2. Medium (M): Upper secondary completed (ISCED 3);
    3. High (H): Post-secondary (ISCED 97: 4, 5A, 5B and 6; ISCED 2011: 4, 5, 6, 7, 8);
- $\beta_3 + \beta_5 + \beta_6 + \beta_7$ capture the age and education specific trends in labour force participation;
- β_8 is a set of parameters for an immigration variable (IMMIG) combining place of birth[18], age at arrival and duration of stay. The variable is divided into five categories:
    1. Born in EU28;
    2. Born outside EU28, arrived before the age of 15;
    3. Born outside EU28, arrived after the age of 15, duration of stay < 5;
    4. Born outside EU28, arrived after the age of 15, 5 <= duration of stay < 10;
    5. Born outside EU28, arrived after the age of 15, 10 <= duration of stay;

• β9 is a set of parameters estimating the labour force returns on education for migrants born outside the European Union and who arrived at the age of 15 or above (IM15).

Using β0 to β7, we estimated probabilities of participating in the labour force by sex, education and country of residence (net from the immigration variable), and using the cohort development approach (Loichinger 2015), we computed entry and exit rates to build a labour force participation life table for a synthetic cohort. The life table is then used to derive future net future labour force participation rates by age, sex and educational attainment. These net labour force participation rates enter the model as assumptions). The estimated future net labor force participation rates show a notable increase in the participation rates of the population aged 50 to 74, in particular for women. In this report, one assumption is used concerning future trends in participation rates: entry and exit rates estimated with the method described above are kept constant throughout the projection.

In addition to the sex differential, regression models also account for another important source of inequalities with respect to the labour force participation, as they explicitly take into account differentials between EU28-born and foreign-born as well as the integration process through parameters for the duration of stay (β8). It should be kept in mind that only legal immigration is considered.

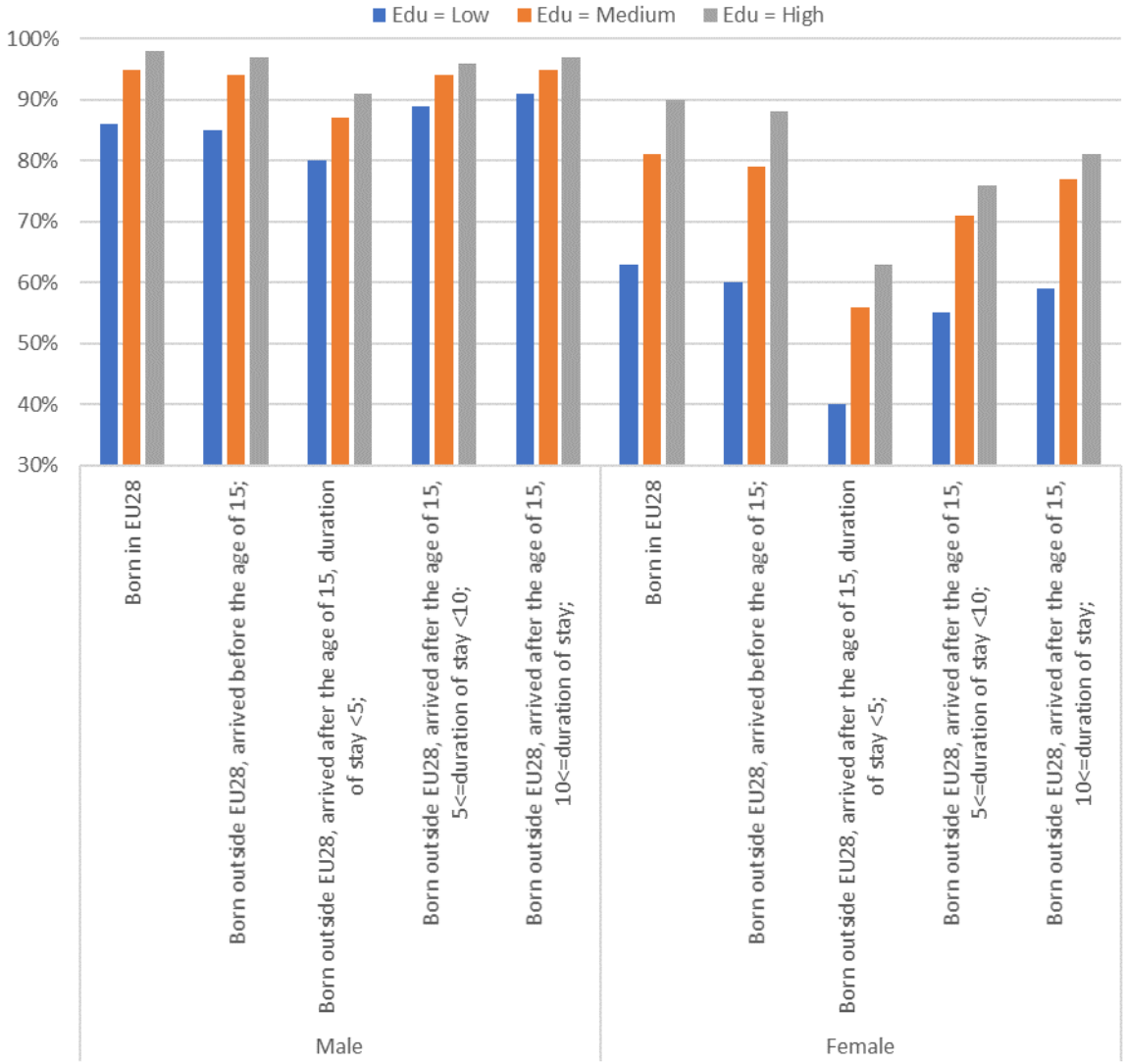
The figure 3 below shows the labour force participation rates derived from β8 and β9 (for the age group 35-39) for all EU countries. For men, labour force participation for immigrants born outside the EU is lower at their arrival than for EU-born individuals (a gap of 6 percentage points for low educated, 8pp for medium and 7pp for high educated), but it improves with the number of years spent in the host country. After 10 years, the

[17] The LFS does not provide information on labour force participation rates in the UK for the age group 70-74. It was assumed to be half of the value observed for the age group 65-69 for each education level.

[18] For Germany, the question on the country of birth is not asked in the LFS. We use the nationality as a proxy to distinguish EU28 migrants from international immigrants.

labour force participation rates of male immigrants are close to the rates of EU-born individuals (even slightly higher for low educated), and this holds true in most high immigration countries.

Figure 3: Labour force participation rates derived from equation 2 by education levels, sex, and immigrant status, EU28, 2010-2015 (age=35-39)



Source: authors, based on analysis LFS data 2010-2015.

For women, the gap compared to female EU-born is wider and is never completely closed. Among low educated recent immigrants, the participation rates is 23 percentage points lower compared to EU-born women (40% vs. 63%). After 10 years, their participation rates, though improving, are still below the rates of EU-born (59%). For highly educated women born out of the EU the pattern is similar pattern but the gap to the EU-born women is wider after 10 years (81% vs 90%) compared to low-educated women (59% for non-EU-born compared to 63% for EU-born). This is because the effect of education is smaller for immigrants, especially for women. These lower returns on education could be partly explained by lower quality degrees in source countries, as well as by cultural differences in the definition of gender roles (Inglehart and Norris 2003; Antecol 2000). Reasons for immigration may play a role and one could expect higher labour force participation rates among immigrants coming as students or on economic grounds. In contrast, one can expect lower labour force participation rates, at least in the first years after immigration, among female immigrants arriving on family reunification grounds because in their case migration and family formation are directly interlinked. Studies on fertility outcomes of immigrants show elevated fertility rates in the first year after migration particularly for those arriving for family

reunification (Rosero-Bixby et al. 2011; Mussino and Strozza 2012). A decision to have a child shortly after the arrival into the host country can also be linked to poor employment prospects in the destination country (Kulu and Milewski 2007).

Labour force participation rates of immigrant women do not reach the level of natives in any of the countries that host larger immigrant populations. Gender inequity in terms of labour force participation appears to be an issue affecting immigrant women more strongly than EU-born women, which supports the double disadvantage theory (Boyd 1984; Ballarino and Panichella 2017). These results are also consistent with evidences gathered in the U.S.by Antecol (2000) and in Europe by Pessin & Arpino (2018) concerning the role of cultural background in labour force integration: for some source regions, persistent gender gaps resist explanation based on socio-economic or institutional factors alone.

Large regional variations are, however, observed within the EU. In Denmark, where immigration inflows are dominated by asylum seekers and family reunification immigrants (Liebig 2007), the situation even appears to deteriorate with time for male immigrants, as β8 drops from -1.078 for recent immigrants to -1.692 admitted more than ten years ago. In contrast, Spain emerges as a special case, with no clear differences in LFPRs between male immigrants and native-born population / men.

3.2 Employment module

The employment module is a recent addition to CEPAM-Mic implemented on specific request by DG Home B1 unit on Legal migration and integration. The module is conceived in the same manner as the labour force participation module and the parameters are only applied to the active population. Cohort effects are, however, not considered which implies that net rates by age stay constant. Constant scenarios allow evaluating long-term effects of policy actions that would influence economic integration off immigrants. Only individual characteristics of immigrants are considered and not the contextual factors or feedback effects. In real world these contextual factors, such as economic cycles etc., matter for unemployment rates and not only on individual characteristics and willingness to work. The data source is also the pooled data of the annual EU Labour Force Survey 2010 to 2015, and again only legal immigration is considered. The equation for the modeling is as follow:

Eq.3 $\text{logit}(E) = \beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 (AGE * EDU) + \beta_4 IMMIG + \beta_5 (IM15 * EDU)$

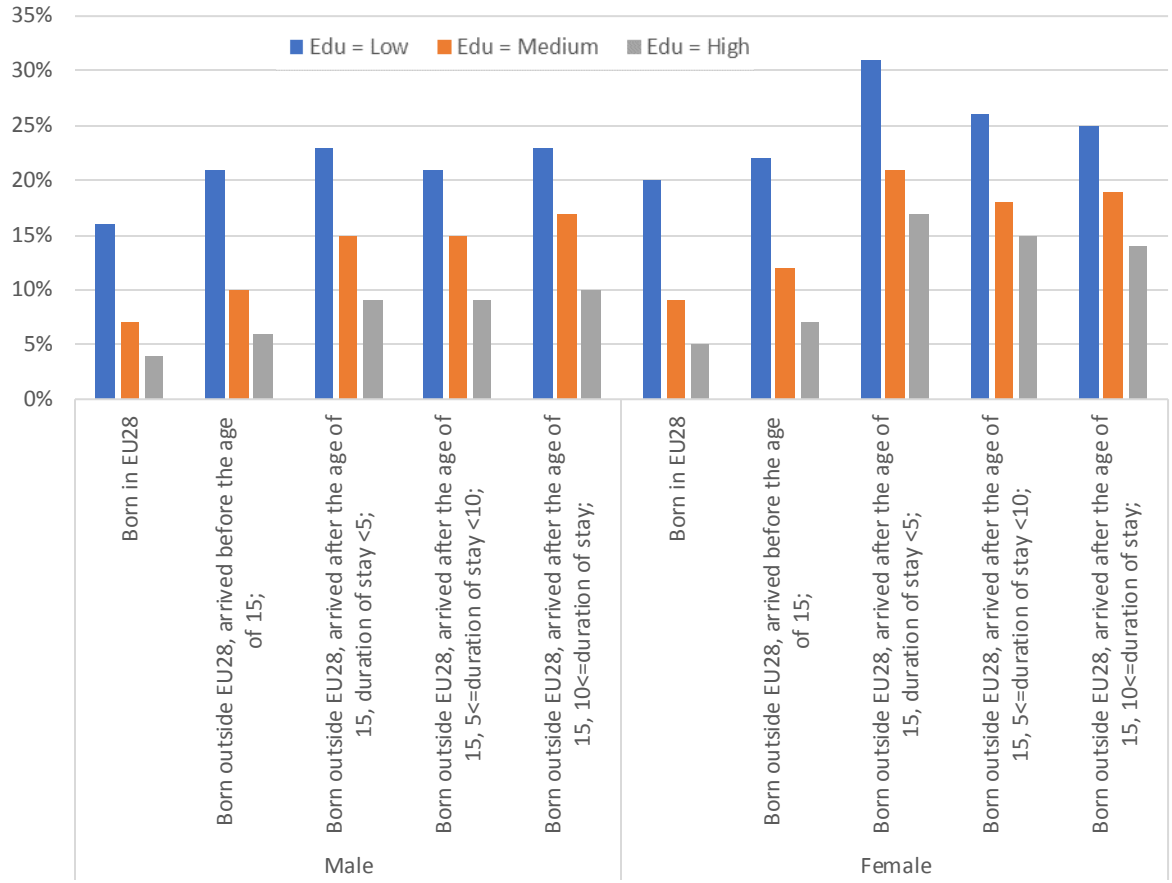
Where:

- β_0 + β_1+ β_3 capture the joint effect of age and education on employment rates.
- β_4 is a set of parameters for an immigration variable (IMMIG) combining place of birth[19], age at arrival and duration of stay. The variable is divided in five categories:
- β_5 is a set of parameters estimating the employment returns on education for migrants born outside the European Union and who arrived at the age of 15 or above (IM15).

The equation is applied separately to each sex- and country- specific combination, thus allowing to capture their specific dynamics. The figure 4 presents the unemployment rates derived from parameters of equation 3, which summarize the integration dynamic of immigrants for the whole EU28 by.

[19] For Germany, the question on the country of birth is not asked in the LFS. We use the nationality as a proxy to distinguish EU28 migrants from international immigrants.

Figure 4: Unemployment rates derived from equation 3 by education level, sex, and immigrant status, EU28, 2010-2015 (age=35-39)



Source: authors, based on analysis LFS data 2010-2015.

Four main highlights stand out from Figure 4. First, unemployment rates of immigrants are much higher than those of EU-born, and, second, unlike in the case of labour force participation rates there is no evidence of improvement with the duration of stay. After 10 years of stay, the unemployment rates of immigrants with medium or high level of education remain more than double the rate of EU-born. This is true for both genders and holds for all levels of education. Second, unemployment rates are particularly high for male immigrants who arrived during childhood and attained only low level of education. Their unemployment rate is about 7 percentage points higher than natives' ones with the same level of education (23% vs. 16%). The unemployment rates of female immigrants who arrived during childhood and for male immigrants arrived during childhood and attained medium or high level of education are also higher than those of EU-born but the gap is narrower. Third, the positive effect of education on employment rate holds for both EU-born immigrants from outside EU, but it is less pronounced for migrants than for EU-born. The unemployment rate for EU-born with a high level of education is about four times lower than the rate of their low-educated counterparts (for both men and women, but at different levels of unemployment). Among immigrants that live in EU since more than 10 years the gradient holds as well but the unemployment rate of highly educated is only about half of the low educated. In other words, high education brings less advantage in terms of higher employment to immigrants than for the native-born. Fourth, in general, women tend to have higher unemployment rates than men. This is true for all groups, including native-born population.

The integration dynamic differs widely among countries. In terms of unemployment, the integration of immigrants in Sweden is particularly problematic for both men and women. After 10 years of stay, unemployment rates for highly educated immigrants are still about 3 times higher than of native-born. In Greece, differentials between immigrants and natives are much lower, not because immigrants are better integrated, but because unemployment of native-born are particularly high in the years under study.

We built the assumptions on future employment using the parameters from the logit regression presented in equation 3. These assumptions are formulated with respect to future labour force participation and employment

rates as well as the differential in these rates between the immigrants vs. EU-born. Therefore, we specify four assumptions on baseline, high, low and gender equal future employment, as listed below:

1. The **baseline integration** assumes continuation of parameters β_8 and β_9 from equation 2 and β_4 and β_5 of equation 3 throughout the projection. In other words, this assumption supposes no change in the integration of immigrants in labour force and employment compared to what was observed in recent years.
2. The **high integration** variant assumes that parameters for immigrants (β_8 and β_9 from equation 2 and β_4 and β_5 from equation 3) converge to 0 for all countries by 2040. This assumption thus progressively removes the disadvantage of immigrants in the labour force and employment. By 2040, for a same country, age, gender, and level of education immigrants and natives would have the same labour force participation rates and the same unemployment rates.
3. The **low integration variant**, in contrast, presents a hypothetical situation of a deterioration of the labour force participation and employment rates of immigrants. β_8 and β_9 from equation 2 are assumed to converge by 2040 for all countries to those of Denmark in 2010-2015, which is the country in the EU where those parameters are the lowest (see parameters in table 4 and table 5). For employment, parameters β_4 and β_5 from equation 3 converge to those observed in Sweden, which is the high-immigration country with the biggest gap between immigrants and natives.

Table 4. Value of parameters β_8 (eq.2) and β_4 (eq.3) used as convergence point in 2040 for the low integration assumption

	Value of β_8 (Denmark)		**Value of β_4 (Sweden)**	
	Women	**Men**	**Women**	**Men**
Born in EU28	Ref	Ref	Ref	Ref
Born outside EU28, arrived before the age of 15;	-0.272	-0.301	-0.589	-0.710
Born outside EU28, arrived after the age of 15, duration of stay <5;	-1.078	-1.638	-1.877	-1.706
Born outside EU28, arrived after the age of 15, 5<=duration of stay <10;	-1.421	-1.236	-1.595	-1.520
Born outside EU28, arrived after the age of 15, 10<=duration of stay;	-1.692	-1.422	-0.903	-1.016

Table 5. Value of parameters β_9 (eq.2) and β_5 (eq.3) used as convergence point in 2040 for the low integration assumption

	Value of β_8 (Denmark)		**Value of β_4 (Sweden)**	
Education level	**Women**	**Men**	**Women**	**Men**
Low	0.681	0.865	Ref	Ref
Medium	0.314	0.235	-0.104	-0.101
High	Ref	Ref	-0.574	-0.336

3.3 Scenarios of labour force integration of immigrants

Immigration policies and policy actions can be aimed at influencing, among other aspects, the following three dimensions of immigration into the EU: the volume of immigration, the socioeconomic composition of migrants, or the extent to the integration of newcomers. Up to date, international migration is managed by national governments and is not coordinated at the EU level[20]. Our stylized scenarios envision a set of what-if situations and focus on long-term effects of economic integration of immigrants in terms of their labour force participation and employment[21]. The results section of this report then evaluates the effectiveness of integration using these stylized 'what if' scenarios. All scenarios share the same assumptions (in terms of group-specific parameters) for fertility, mortality, intra-EU mobility[22], educational attainment, language spoken at home and religious switching but vary in the combination of assumptions of labour force participation and employment of immigrants. Entry and exit labour force participation rates of EU-born population are fixed net of migration in order to show the effect of varied rates for immigrant population. We build four scenarios that combine assumptions on economic activity (labour force participation), or willingness to work, with actual employment rates. Table 6 summarizes the scenarios and their demographic and labour force assumptions.

Table 6: Summary of scenarios and assumptions

Component	1-Baseline	2-High integration	3-Low integration	4-High employment
Fertility	Slight increase in the TFR from about 1.6 in 2015-19 to 1.78in 2055-60 Constant differential between the native-born and immigrants			
Mortality	Continuous improvement in life expectancy			
Educational attainment	Past trends continue, constant parameters for sociocultural characteristics			
Volume of immigration	About 10 million from outside the EU every 5 years			
Educational composition of immigrants	Same as recent immigrants (baseline)			
Labour force participation of migrants	Baseline	High integration variant	Low integration variant	Baseline
Employment of international immigrants	Baseline	High integration variant	Low integration variant	High integration variant
Labour force participation trends	Constant exit and entry rates net from migration			
Intra-EU mobility	Average rates of 2013-2016			
Language and religion shift	Baseline rates			

1. **The baseline scenario** presents a business as usual situation, an EU where labour force participation rates and employment rates of both EU-born and foreign-born population stay as they were in the recent past.

2. High integration scenario envisages the best of the worlds – the highest labour force participation and employment rates of immigrants follow the best performing EU countries as described in the parameters section above. This most optimistic scenario can be seen as upper limit, the parameters are explained in the previous section.

[20] With an exception of asylum and the proposed Common European Asylum System (CEAS).

[21] We are aware that other dimension of economic integration, such as wage inequalities, skills and so on can be considered but due to data availability we considering only the two mentioned dimensions.

[22] Intra-EU mobility continues as in the recent past, with the same in and out-migration rates between the countries. The resulting flows change depending on the population size and age composition. In the model, immigrants and EU-born population have the same propensity to move within the EU.

3. Low integration scenario follows the worst possible situation and follows the worst labour force participation and employment rates among the EU countries and combines the two into a lower limit scenario. In this scenario, the economic integration of immigrants deteriorates in all EU countries.
4. High employment scenario helps to understand purely the effect of high employment rates of immigrants. The activity (labour force participation) rates remain all EU Member states constant as of the recent years until 2060 but we model a situation of the highest observed employment rates of immigrant in all these countries.

The four scenarios described above thus combine a set of three trajectories (variants[23]) of labour force participation rates (baseline, high and low integration) with three variants of assumed trajectories of employment rates for foreign-born population (baseline, high and low integration) at fixed labour force participation rates and employment rates of EU-born population, and at fixed inflow of cca 10 million non-EU immigrants per each 5 year period. The immigrant flow has identical educational and age composition. This allows us to evaluate the impact of improved or worsened access to labour market and employment net of compositional changes of the immigrant flow. The most optimistic, high scenario combines high labour force participation with high employment of immigrants, in contrast to low integration scenario that combines low labour force participation with low employment, and so on.

[23] Scenario and variant are not the same. Scenario is a combination of assumptions on several dimensions of the model. We have prepares several sets of assumptions for some of the dimensions – in this case labour force activity and employment. These sets are termed variants (high, low, baseline).

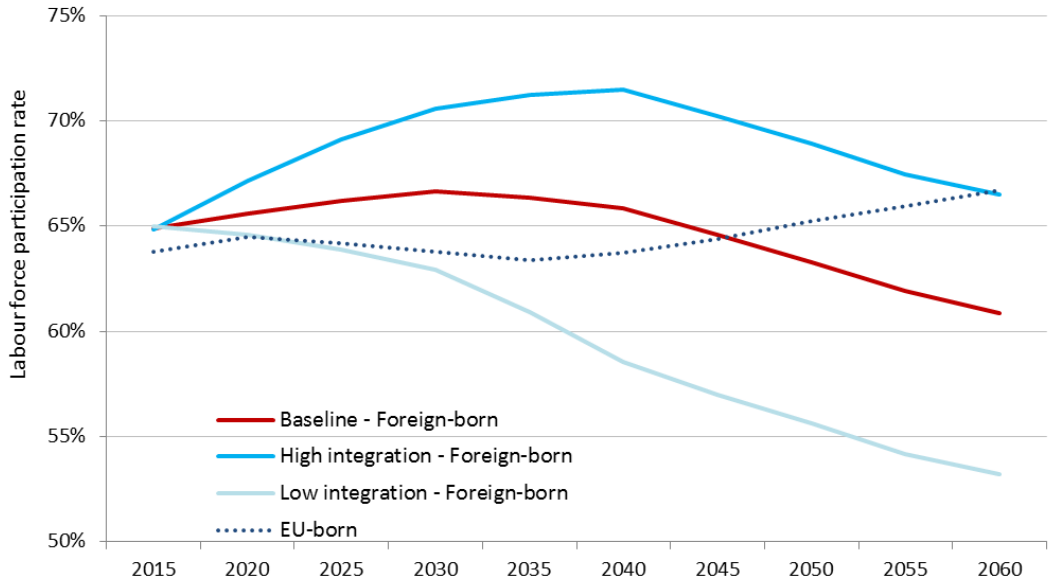
4 Results

4.1 Labour force participation and unemployment rates of foreign and EU-born population

We first compared the assumed trajectories of labour force participation and unemployment rates for EU-born and foreign-born population in the EU28 by 2060[24]. The trajectories of labour force activity rates for EU population age 15-74 years are plotted in Figure 5. The presented overall rates are based on age-specific assumptions as explained in earlier sections and these trajectories differ for individual Member States, depending on country-specific participation rates for native-born and foreign-born populations. Looking at EU average, the labour force participation rates (LFPR) of EU-born population follow in all scenarios the same trajectory and they increase from 64% in 2015 to 67% in 2060. Age-specific age patterns of labour force participation and sizes of older age groups versus younger ones explain the curve seen in Figure 5 (dotted line). The increasing proportion of the older population (65-74) among the working age population (15-74) drives the light decline of the overall LFPR towards 2035 because this age group has low labour force participation. The increase after 2035 is associated particularly with higher labour force participation of women among the 55-74 and the growth of the highly educated – among the younger but as well among the older age groups – because highly educated men and women have the highest labour force participation rates.

For foreign-born, the high integration variant (used on High integration scenario) represents an increase from 65% in 2015 (thus 1pp higher than the EU-born), peaking at 72% in 2040 followed by a gradual decrease to 66% in 2060. In the baseline variant (used in Baseline and High employment scenarios) LFPR follows a similar trajectory as in the high variant but at a lower activity level: starting at 65% in 2050, peaking at 67% in 2040 and declining to 61% in 2060. In the low integration variant (used in Low integration scenario) the labour force participation rates gradually decline to 53% in 2060. The initial increase in the first years is explained by the boost of young immigrants of prime working age to the existing stock in the EU. Because labour force participation increases with the duration of stay in the country, the inflow of new young immigrants drives the increase in the overall labour force participation rate of the immigrant population in the EU. The ageing of this immigrant stock is driving the declining overall labour force participation rate of foreign-born and this becomes apparent after 2040.

Figure 5: Labour-force participation rates of EU28 population age 15-74 in high, low and baseline variants, 2015-2060

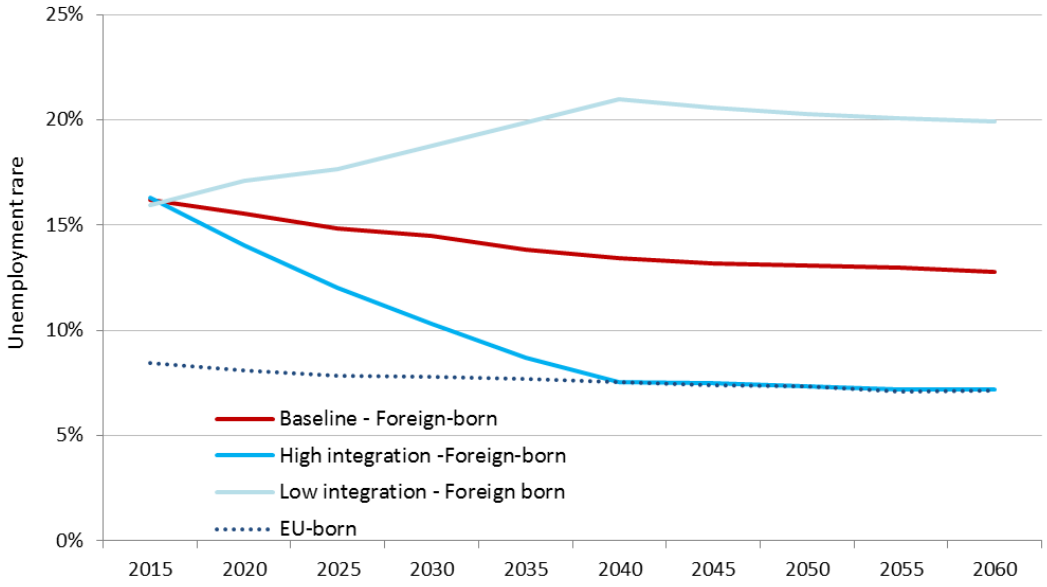


Source: authors.

[24] This report presents the results for the EU. Country-specific results are available on request in a form of structured dataset.

Figure 6 plots the trajectories of unemployment rates of working age population (15-74 years) , derived from three variants of assumptions on employment rates (described in earlier sections). Again, the figure presents EU average rate for working age population 15-74, but the assumptions are country specific. For EU-born population, the unemployment rate declines from 8.5% in 2015 to 7.1% in 2060. The foreign-born population in the EU has in 2015 almost double the unemployment rate (about 16%) than the EU-born (8.5%). In the high integration variant (used in High integration and High employment scenarios) we assume that the employment rates of foreign-born and EU-born converge in 2040. Therefore, in our high variant the unemployment rate of the foreign-born population drops to 7.5% in 2040 (EU-born level) and continues to decline to 7.1% in 2060. In the low integration variant (used in Low integration scenario) we assume worsening employment of immigrants and therefore the unemployment rate of foreign-born population exceeds 20% in 2040 and thereafter declines to slightly below this level in 2060. In the baseline variant (used in baseline scenario) the unemployment rates of foreign-born decline less rapidly as in high variant to 12.8% in 2060 (5.6pp higher than in high employment variant).

Figure 6: Unemployment rates of EU28 population age 15-74 in high, low and baseline variants, 2015-2060



Source: authors.

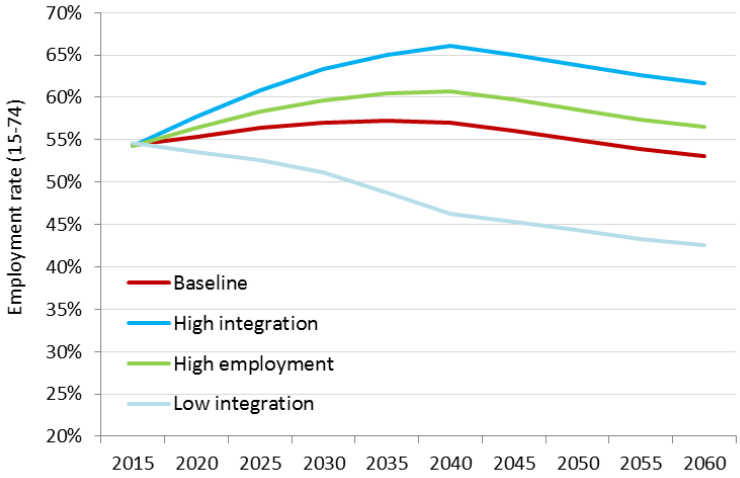
4.2 How does economic integration of immigrants affect the overall employment rate?

Economic integration is no doubt of great importance to life quality of immigrant families and communities as well as for social cohesion. It is also positively associated with better inclusion into the host society, faster acquisition of host-countries' language and with other aspects of social and cultural integration. Besides these positive aspects for the immigrant population, higher economic activity and employment of immigrants benefits host societies' economies. With our stylized scenarios of economic integration of immigrants, at fixed labour force participation rates and employment rates for the EU-born we can explore such effects for illustration of the impact of improved or worsened integration. To be able to evaluate such effect, we keep the size and composition of immigrant flows, as well as a number of demographic variables, the same across all scenarios. The model accounts for structural changes in EU-born and foreign-born populations and is purely labour supply driven. We do not project changes in employment rates within a broader economic context and in relationship to possibly changing demand for labour that may arise due to changing nature of work, digitalization and automation. Here the focus is on the effect of various economic integration trajectories of immigrants from outside the EU on employment rate of total (economically active) population.

We start with comparing the results for two scenarios that use the same baseline assumptions on labour force participation rate (LFPR): baseline, High employment. To sum up, the baseline scenario combines the baseline

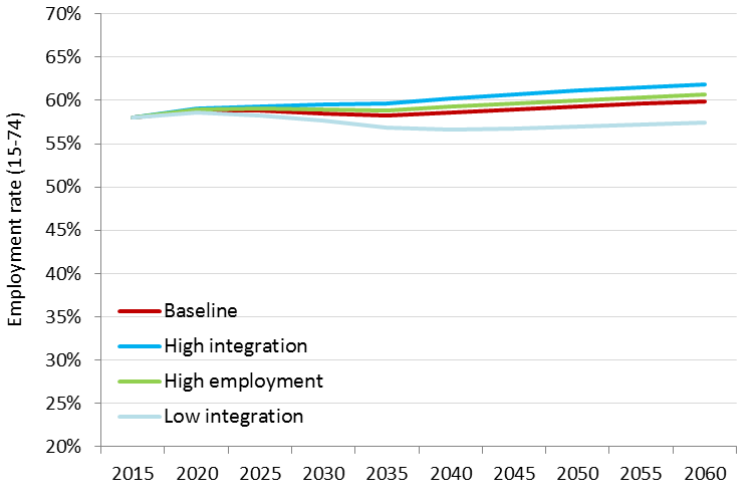
economic participation rate with baseline employment for immigrants, High employment scenario combines the baseline activity rate with high integration variant of employment rates (which reach the level of EU-born by 2040). Figure 7 depicts employment rates of foreign-born (age 15-74) in the EU in all four scenarios.

Figure 7: Employment rates of foreign-born population (age 15-74) in the EU in four integration scenarios, 2015-2060



Source: authors.

Figure 8: Employment rates of total population (age 15-74) in the EU in four integration scenarios, 2015-2060



Source: authors.

In the baseline scenario the employment rate first increases from 58% to 58.8% in 2020, followed by a small decline to 58.3% in 2030 and then a more rapid increase to 59.9% 2060. High employment scenario shows a bit more steady increase to 60.7% in 2060 because immigrants gradually reach employment rate of their EU-born counterparts The difference between the Baseline and High employment scenarios illustrates the effect of improved employment of immigrants to the level of the EU-born population. Closing of the gap between immigrants' and EU-born employment rates by 2040 thus increases the overall employment rate compared to the Baseline scenario by 1.17% (0.1pp) in 2040 and by 1.32% (0.8pp) in 2060.

The very optimistic High integration scenario imagines that not only employment gap between the immigrants and EU-born closes by 2040, but that the gap in labour force participation closes as well. In other words, more immigrants would be willing to participate in the labour force and they will face no disadvantage in finding a job compared to their EU-born peers. In such case, the overall employment rate in the EU would be boosted by 2.8% (1.6pp) in 2040, resp. 3.4% (2pp) in 2060, compared to the baseline scenario.

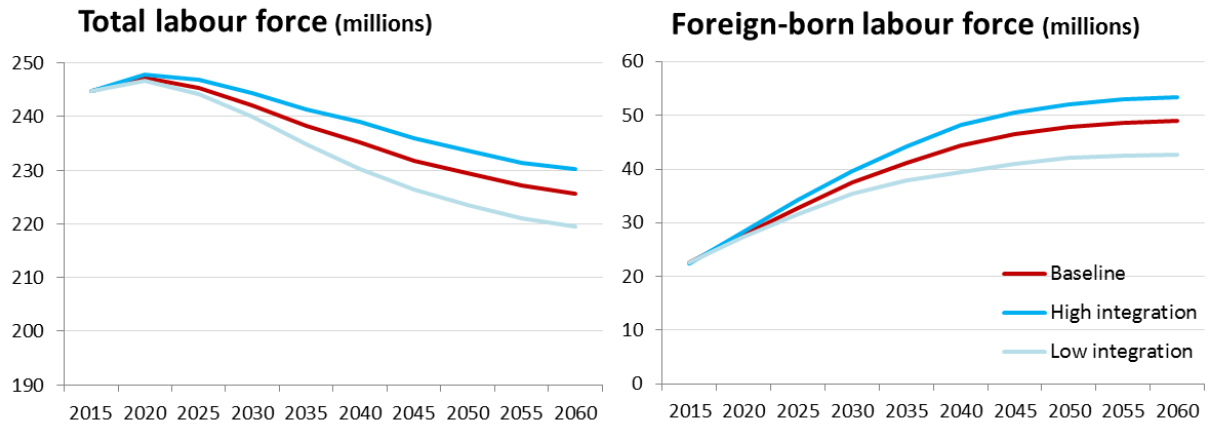
In a hypothetical situation that the labour market in the EU would not be able to absorb the same volume of immigrant as in the previous scenarios, the overall employment rates would remain below the 2015 level in the long-run. The very pessimistic Low integration scenarios assumes that the labour force participation of immigrants would decline to the lowest observed among the EU MS in 2015, and those in labour force would face increased barriers to employment (following the lowest observed employment rates among the EU MS in 2015). In such case the overall EU employment rate would hit the bottom of 56.6% in 2040 and it would not recovered to 2015 level by 2060.

4.3 Total labour force and employed population in the EU28 by 2060

Because of the past demographic developments marked by low fertility and because of long-term momentum of these changes that are deeply ingrained in the age composition of EU's population, the size of EU's labour force is going to decline in the following decades after peaking sometime between 2015-2020. Our previous research has demonstrated that population ageing and decline in some of the Member States is unavoidable and smaller (but better educated) labour force a certainty unless immigration substantially increases in future (Lutz et al 2019). Lutz et al 2019, however, did not present the results specifically for foreign-born population. In this section, we summarise the main future trends in labour force size and the size employed working age population separately for foreign-born and total population in the EU according to several stylized demographic scenarios until 2060.

Under our projection assumptions, total labour force in the EU would peak at around 2020 at about 248 million. Under the baseline scenario, which assumes the volume and composition of immigrants into the EU mimicking the trends observed in the recent past, and if labour force participation rates of foreign-born do not improve in future and remain at 2015 levels - the total labour force in the EU would count about 226 million in 2060. It would be 20 million smaller compared to 2015, with a larger share of older workers. In contrast, the size of foreign-born labour force would gradually increase from about 22.5 million in 2015 (cca 9% of total EU labour force) to nearly 49 million in 2060 in baseline scenario. This number can be about 4.5 million higher if labour force participation increased (High integration scenario, Figure 9). In case the labour force participation would deteriorate to the worst example seen in the EU recently, the foreign-born labour force size could be more than 6 million smaller in 2060 compared to baseline scenario. Nothing else changed, this would reduce the overall EU labour force by the same amount and it would count little less than 220 million in 2060. Lutz et al 2019 (Chapter 3) further show that the labour force dependency ratio[25] would increase from 1.08 in 2018 to 1.33 in our baseline scenario by 2060. Better economic integration that would increase labour force participation rates of immigrants to the best observed in the EU in the recent past would result in only slightly lower ratio of 1.26 dependents per 1 person in labour force.

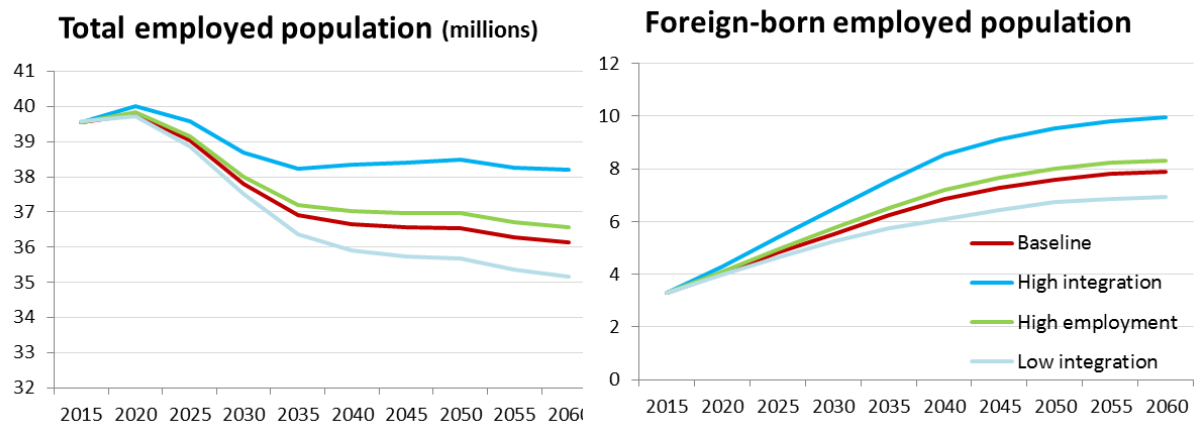
Figure 9: Total and foreign-born labour force size in the EU in 2015-2060, by projection scenario



Source: authors.

[25] The ratio of economically inactive (i.e. dependants) to economically active population.

Figure 10: Total and foreign-born employed population size in the EU in 2015-2060, by projection scenario



Source: authors.

The total numbers of the projected size of employed population (age 15-74) would be, naturally, smaller than the labour force, which also includes job seekers. The baseline scenario with fixed employment rates shows a decline from 222 million workers in the EU in 2015 to 206 million in 2015 (Figure 10). As a result of our migration assumptions, the total employed foreign-born population more than doubles in the baseline scenario from the estimated nearly 19 million workers in 2015 to 43 million in 2060 (Figure 10). The High employment scenario increases the projected number of workers by 2.7 million in 2060 when we compare it to the baseline scenario. The most optimistic, High integration scenario (where the immigrants have the same activity and employment rates as native-born) tops up the baseline scenario estimate by 6.9 million workers. In contrast, worsening economic integration of immigrants shows smallest increase in the foreign-born employed population, at 34 million in 2060.

5 Discussion and conclusions

Successful economic integration of immigrants is of high importance as it fosters also their social, linguistic and cultural inclusion and improves the quality of life of migrants, their families and empowers communities. Immigrants' better economic integration is highly needed also against the backdrop of the unavoidable future smaller labour force sizes in the EU overall and in practically all Member States. Integration policies and approaches vary greatly across the EU as they are grounded in the local context and because of great variety in the size and composition of resident foreign born-populations, volumes of recent immigrants and their diversity in terms of their reasons to migration, countries of origin, demographics, education and skills.

EU overall, and majority of EU's Member States, can expect declining labour force size and increasing dependency ratios and this process will accelerate in the coming decades because of the past demographic trends. There will be more dependents (children, elderly, economically inactive of working age) per one economically active by 2060 than today. At the same time, a gap in labour force participation between the immigrants and EU-born exists in most EU member states. This gap is larger for female immigrants. For men, labour force participation rate reaches similar levels to natives after 10 years of stay, while it stays way lower for women. Another important result of the LFS data analysis is that while the gap in labour force participation between EU-born and foreign-born closes with their longer presence in the country, this is not the case for the gap in employment. This means that immigrants face barriers to employment even after having resided in the host country for at least a decade. This is particularly true for low educated male immigrants. Our study does not further analyse the reasons for these gaps and their persistence, but we instead imagine different hypothetical trajectories of closing, persistence or widening of these gaps.

The scenarios in this report ask what would be the long-term consequences on EU's labour force if the disadvantaged standing of immigrants persisted or what if it improved. We have explored through a set of styles scenarios – holding the demographic trends same for all of them – long-term effects of different trajectories of economic integration of immigrants from non-EU countries on EU's future labour force. We have expanded our previous work on economic activity by including employment. These scenarios are not predictions but are crafted to demonstrate and evaluate the magnitude of the impact, focusing on long-term consequences of possible policy options. The baseline scenario is used as reference as it represents business as usual – trends continued. One can see the effect of improved economic integration (High employment, High integration and Gender equality for immigrants) or worsened economic integration when juxtaposed to the baseline scenario. The presented scenarios are conceived in a way that the low and high integration look at the most optimistic and the most pessimistic situation (based on 2010-2015 data) and can be seen as limits within which other possible trajectories fall within.

We find that at the same immigration size and composition, the High integration scenario reduces the projected decline of the employed population by about 50% compared to the baseline scenario, while the low integration almost doubles the pace of the decline. The projected labour force sizes should be interpreted with caution because in order to demonstrate the effects of integration we fix labour force participation and employment for the EU-born, otherwise the interpretation of the results would be biased by other trends. This means that we are excluding any potential future improvements in labour force participation and employment among the EU-born, which is unlikely due to the already observed trend of increasing female labour force participation (especially among the younger cohorts) and also with respect to the projected educational expansion (highly educated are more active in the labour force).

As previously emphasized, we focus on supply of labour driven by structural changes in potential labour force and we do not aim to simulate economic context, labour demand or changes in employment due to economic cycles. Also, there are no feedback effects included and labour force activity and employment depend purely on individual characteristics. We also assume no "discounting" of advantage of higher education during the projected continued educational expansion, meaning that highly educated immigrant will have the same chance to find employment in future although the overall EU labour force will be much better educated than today. Further, we do not look at skills only at education and, due to data existing data gaps, we do not differentiate between different migrant types. Extension in the direction of differentiating between different types of migrants based on their reasons for migration (economic vs family immigrants or asylum seekers) is conditional on better data availability.

The analysis of LFS data showed great variety in labour force integration of immigrants across Member States. Our one-suits-all assumptions on convergence towards EU-born labour force participation, therefore, result in worsening integration trajectories in a number of countries where immigrants actually have higher activity and employment rates (Czech Republic) or have higher activity rates but face high unemployment (such as in Greece

or in Italy). Another things to bear in mind is that the analysed LFS data pertain to 2010-2015 and the gaps in labour market access some countries may have arisen due to specific situation during the past economic crisis, especially if the access to social protection and welfare differs for EU-born vs. immigrants.

One important key message of this study is that integration policies should not focus only on addressing barriers to employment for the job-seekers of migrant background. Activation policies are highly relevant in the contexts where labour force participation of immigrants is lower than among the native-born. Indeed, the High integration scenario shows much better outcomes than the High employment scenario at the EU level and for vast majority of MS. The latter is particularly important when thinking of better access to the labour market for women.

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List of abbreviations and definitions

CEPAM-Mic Microsimulation model developed for multidimensional population projections. The model was built at IIASA within the scope of the Centre of Expertise on Population and Migration (CEPAM) project, a partnership between the Joint Research Centre (JRC) of the European Commission and the International Institute for Applied Systems Analysis (IIASA)

ISCED International Standard Classification of Education

LFPR Labour force participation rate. The rate is dividing the number of people actively participating in the labor force by the total number of people eligible to participate in the labor force.

LFS EU-Labour Force Survey

MS EU Member States (as of 2013-2019)

Immigrants Persons born outside EU-28 and residing in EU's MS

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KJ-NA-30146-EN-N

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doi:10.2760/021884

ISBN 978-92-76-17407-3