Modelling foreign labour inflows using a dynamic microsimulation model of an ageing country - Slovakia

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Motivation

- By 2050, the total dependency ratio (ratio of population aged 0–14 and 65+ per 100 population 15–64) is projected to increase sharply in Europe (by 24.8 percentage points). The total dependency ratio for Africa is projected to decrease by 18.7 percentage points (UNDESA 2017)

- The labour supply is going to decline in all EU countries, with implications for the national states – negative demographic dividend? (Bloom and Canning 2000, 2003)

- Working immigration is already becoming an important source of economic growth (Kahanec and Zimmermann 2010)

- Slovakia is one of the fastest ageing countries in the EU
  - Are we going to be able to attract the amount of people?
  - What should be the structure of the inflowing persons?

Manpower requirement modelling

- Employment in sectors based on an equilibrium model (Parnes, 1962)

- MRM type of models were developed in various countries
  - for an overview see: Hughes (1993), Heijke (1994), OECD (1994), Heijke et al. (1998) and Neugat, M., Schömann, K. (Eds), (2002)

- Expansion and replacement demand for labour (Willems and de Grip, 1993)
  - RD can be seen *as a job opening arising because of people leaving the workforce* (CEDEFOP, 2012)
  - ED is the change in total employment in the occupation/sector
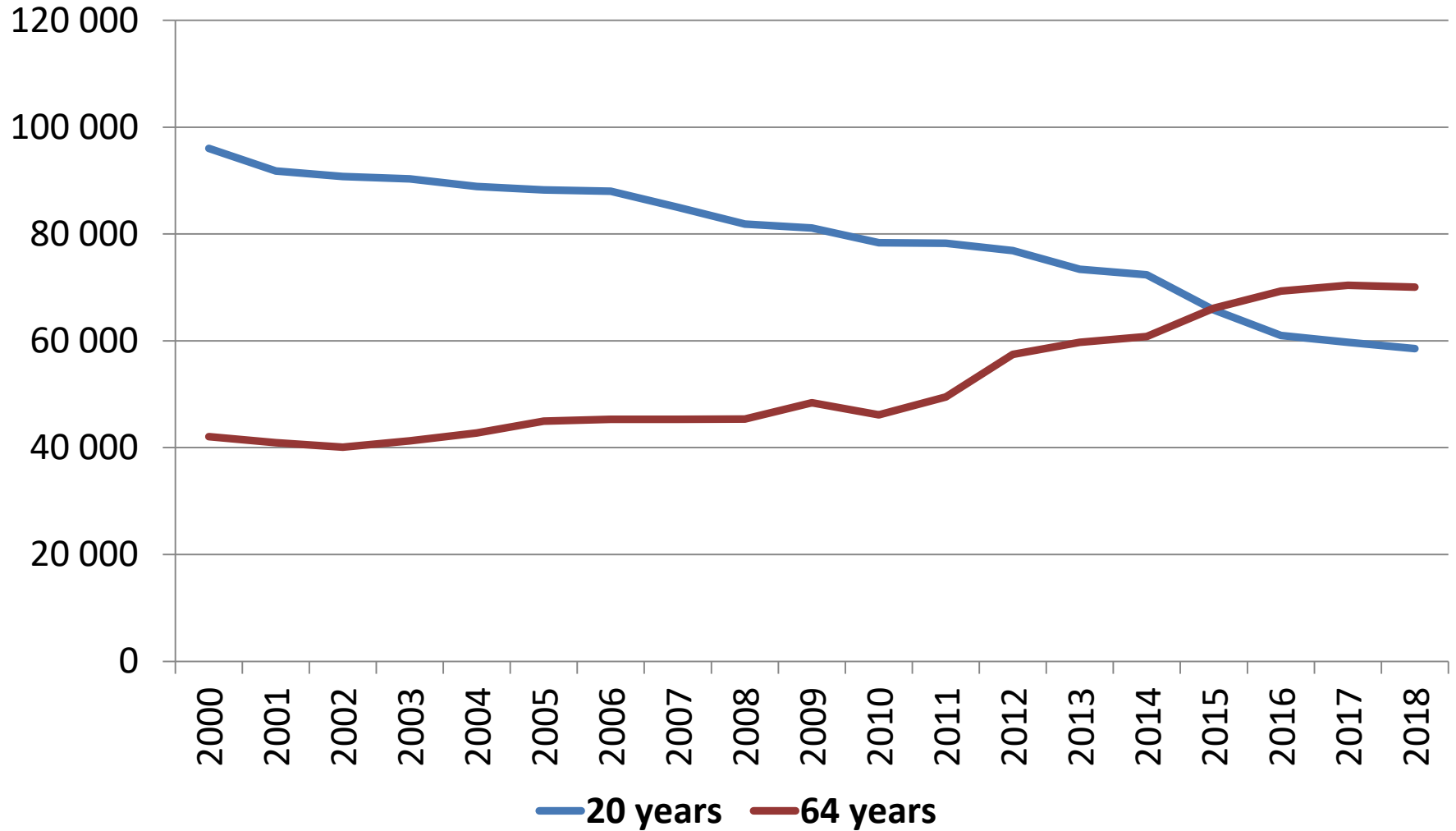
Stock of immigrants employed in Slovakia
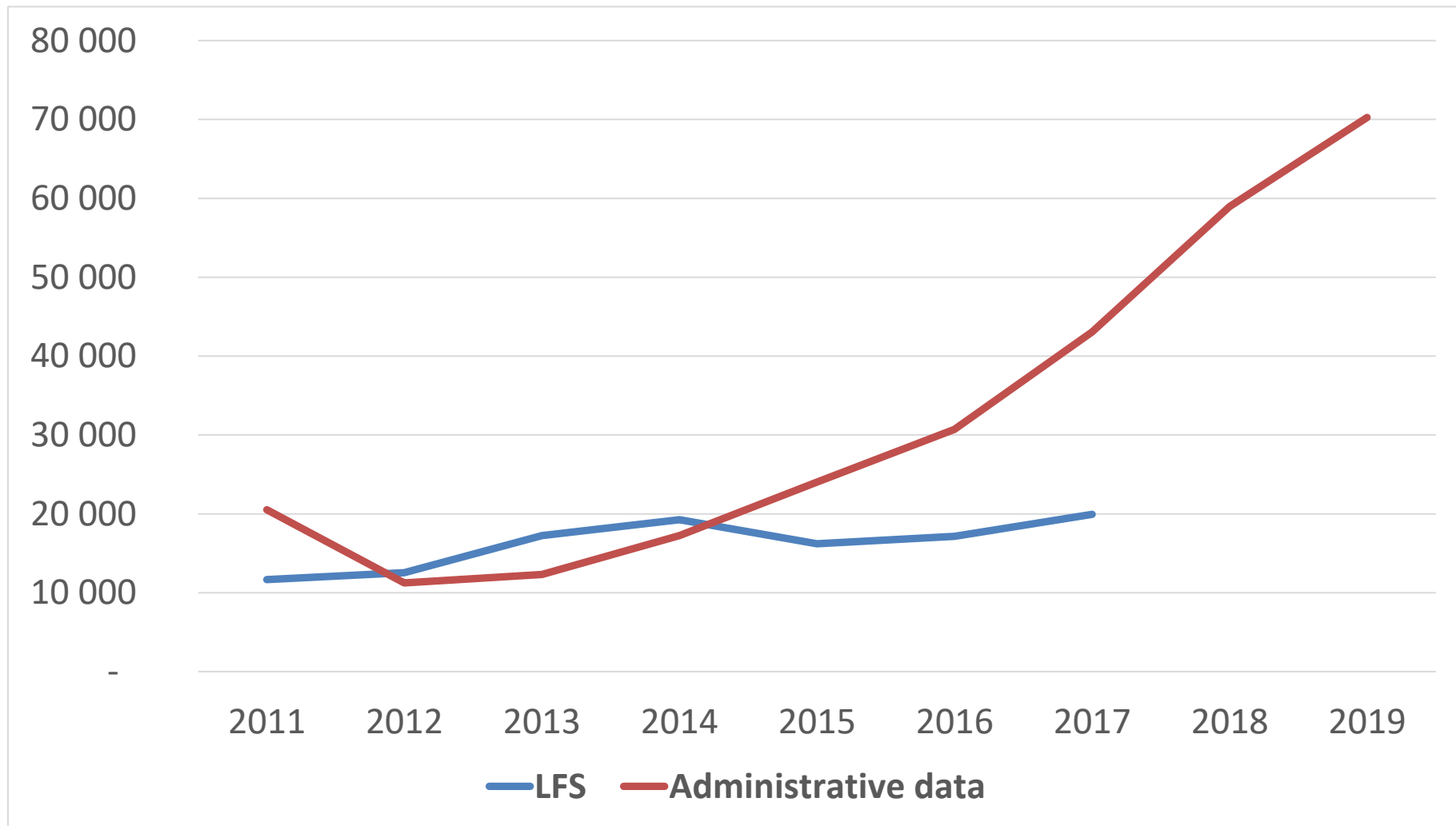
Immigrant => born outside Slovakia
Source: EU-LFS; Administrative data on registered foreign workers

Slovak population age cohorts
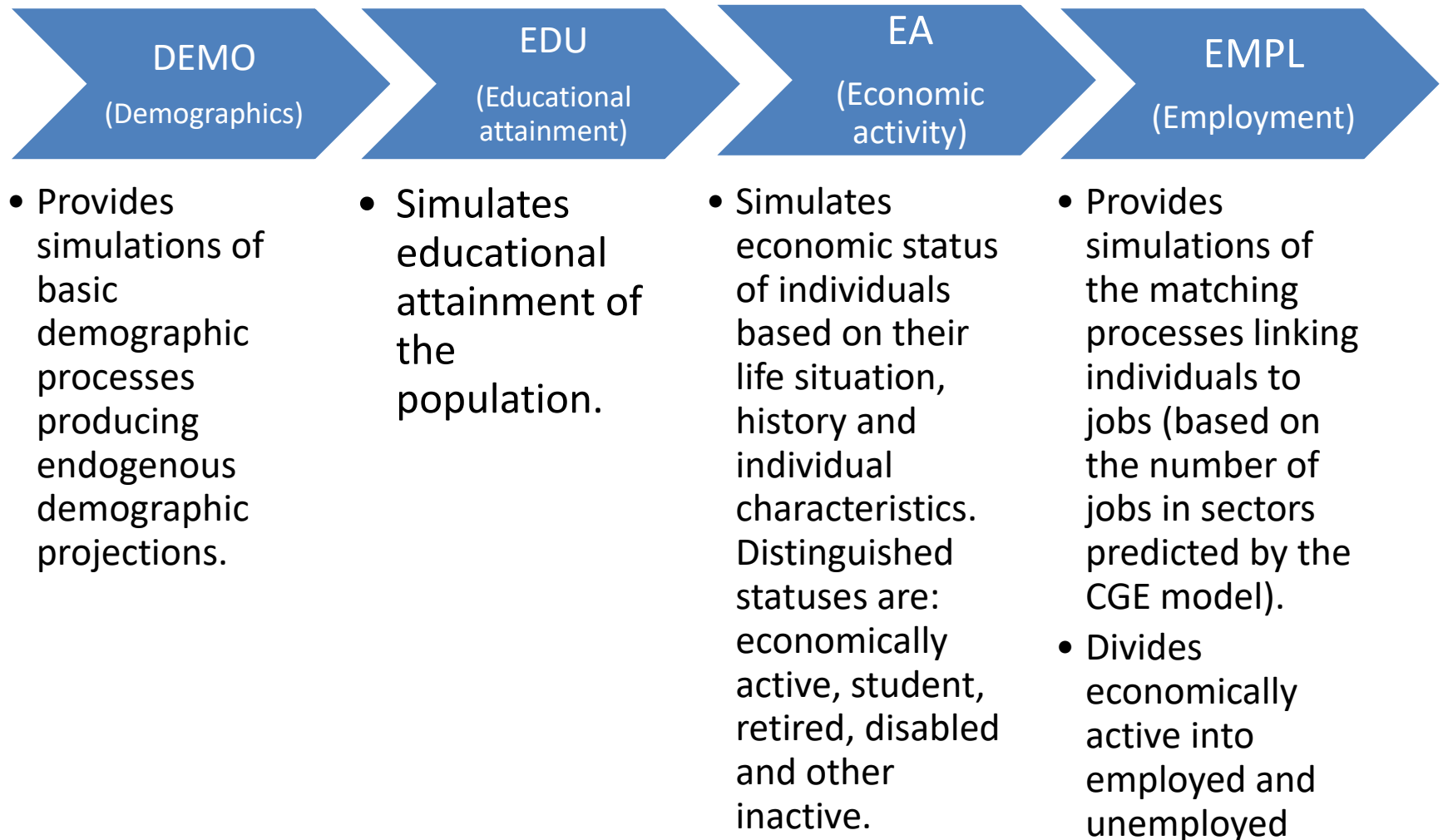# (20 versus 64 years old)

Source: Eurostat (demo_pjan)

Model VZAM

- Combined model: Macro (econometric) - Microsimulation

- Demand side (Macroeconomic):
  - Integrated econometric Input-Output model (Cambridge Econometrics 2014 – E3ME)
    - predictions of employment in economic sectors

- Supply side is a dynamic microsimulation model built in LIAM2:
  - EU-Labour Force Survey (EU-LFS)
    - 2011 in the now-casting variant
  - Demographic predictions
  - CENZUS data

Structure of VZAM_microsim – supply side

DEMO (Demographics)

- Provides simulations of basic demographic processes producing endogenous demographic projections.

EDU (Educational attainment)

- Simulates educational attainment of the population.

EA (Economic activity)

- Simulates economic status of individuals based on their life situation, history and individual characteristics. Distinguished statuses are: economically active, student, retired, disabled and other inactive.

EMPL (Employment)

- Provides simulations of the matching processes linking individuals to jobs (based on the number of jobs in sectors predicted by the CGE model).
- Divides economically active into employed and unemployed

Module DEMO

- Birth
  - age-specific fertility rates
- Death
  - age-specific mortality rates

- No Migration is modelled in the demographics
  - We assume zero net-immigration in the first step

Module EDU

- Education level
  - 5 levels

- Education field
  - up to 10 fields within each level

- Reproduces educational structure of the age-group 30-34 in the initial simulation period

Module EA

- Students (under the level specific graduation age)
- Retired
  - Older than retirement age
    - not working retired
  - Early retired
    - (probit on early retired aligned by age)
  - Working retired
    - (probit on working retired aligned by age)

- Disabled
    - (probit on disability aligned by age)
- Other inactivity
    - Maternity (deterministic)
    - probit on other disability to align the total share of disabled

- Economically active
  - Not in any identified form of inactivity

Module EMPL

- Those who are economically active and were employed in the previous period are re-assigned to the same sector (branch of economic activity*occupation) where they were employed in the previous period

- „Sectoral score" the probability score of being employed in that sector is estimated to sort individuals

- Sectors are filled with workforce in the order based on average wage in a three-step matching process

Employment in a shrinking sector

- Expansion demand+Replacement demand < 0

- Individuals employed in the sector in the previous period keep their job
- Those with the lowest „sectoral score" are cut out to the level provided by the macro model
- Redundant employees from the previous period are assigned to the pool of unemployed

Employment in a growing sector

- Expansion demand+Replacement demand > 0

- Individuals employed in the sector during the previous period keep their job

- Surplus jobs are filled in from the pool of unemployed based on a matching function

Matching

- Sector specific scores are calculated for each individual based on: gender, age, education, employment history, ...

- Sectors are filled in the order based on their average income

- Matching is done in three steps/waves (60/80/100)

- Educational level and field is taken into account when allocating disposable „unemployed" into sectors, only allowing to fill in education already present in the sector

- Only 60 percent of the pool of unemployed is allowed to get employment in the subsequent period
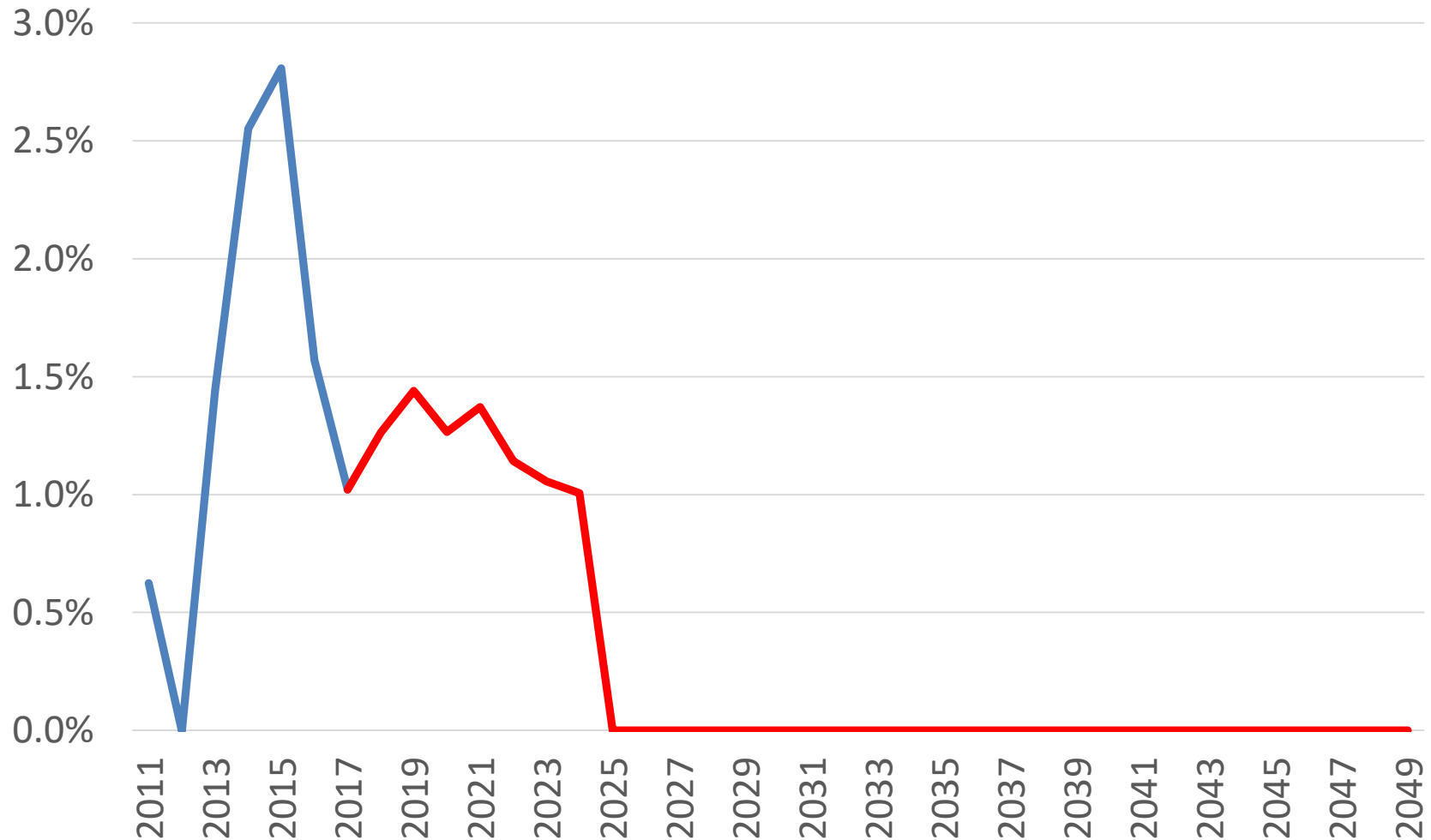
Immigration

- All the unmatched „jobs" are being filled in with immigrants (foreign workers)

- Attributes of immigrants:
    - Economic sector and occupation is known from the macro model
    - Gender and education is „cloned" from existing immigrants in the sector
    - Age is imputed based on the observed age structure of recently inflowing immigrants
    - Length of stay is estimated based on administrative data

Stock of employed immigrants, by educational level

Source: Administrative data, VZAM_microsim – Nowcasting variant
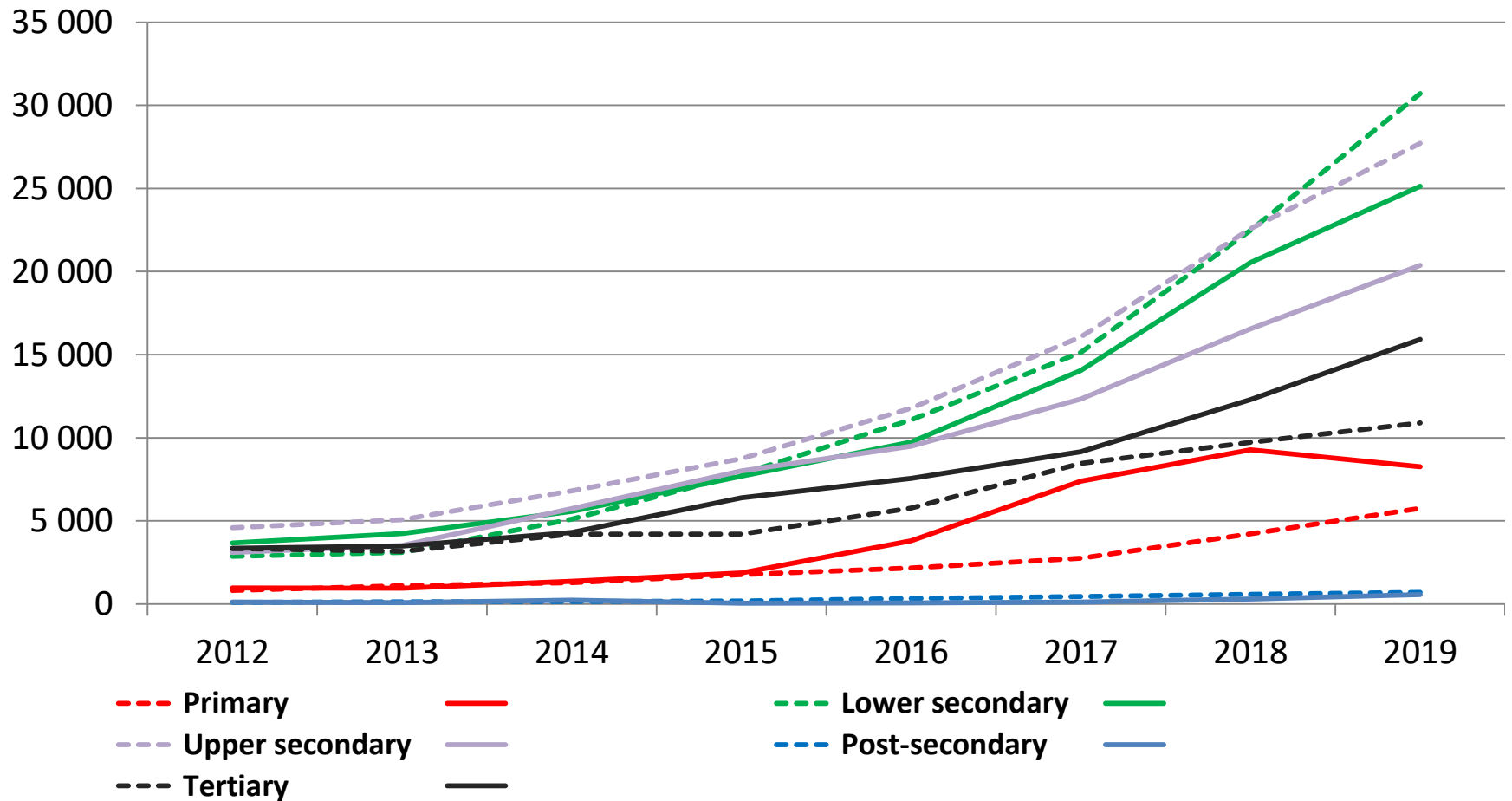
Main macroeconomic assumption
Growth in employment
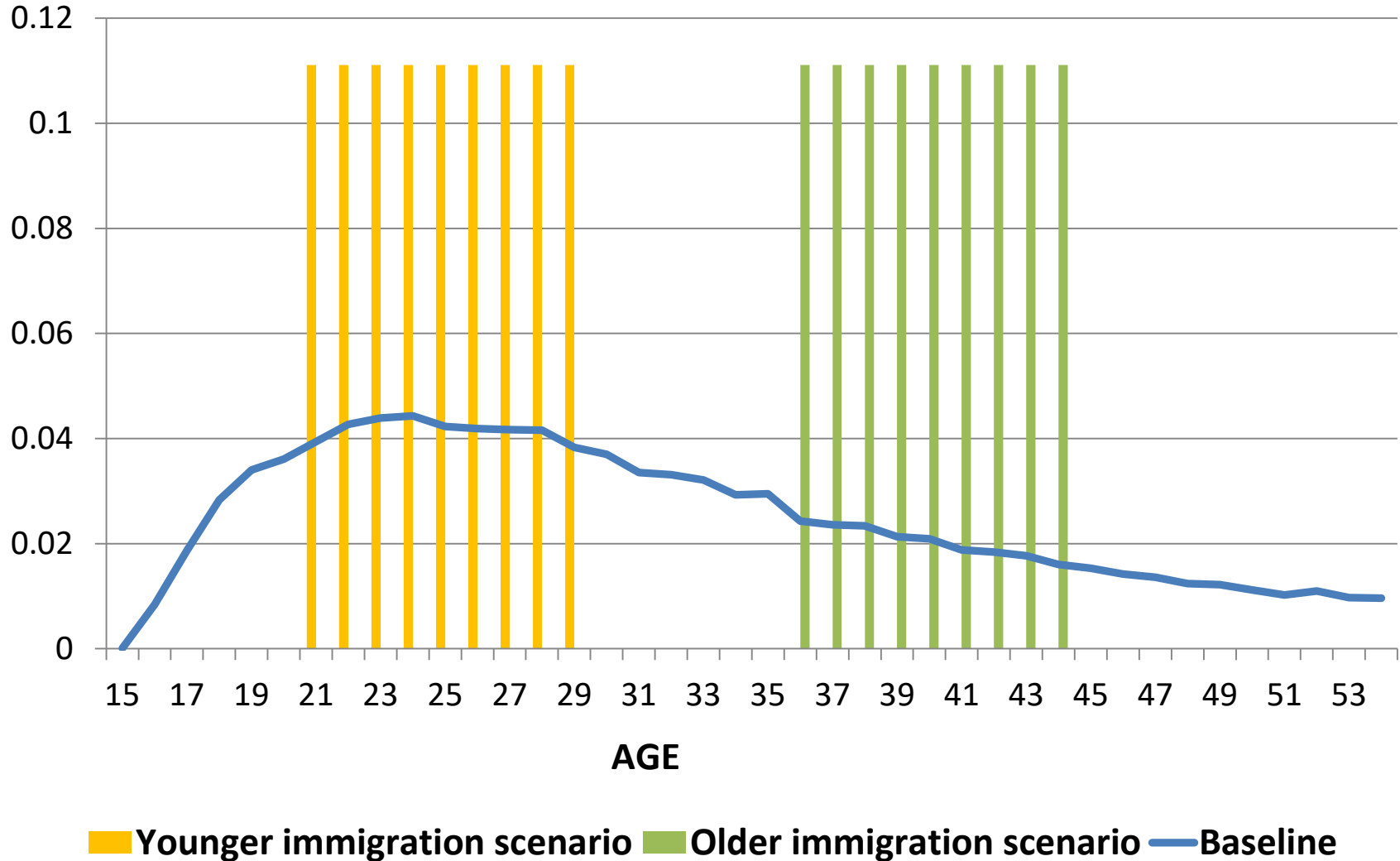## (Expansion demand for labour)

Scenarios

- Baseline

- Dynamic retirement age
  - RA shifting at the pace of life-expectancy

- Short-stay immigration
  - 10 p.p. increase in the share of leaving immigrants

- Younger immigration
  - Immigrants aged between 21-29

- Older immigration
  - Immigrants aged between 36-44
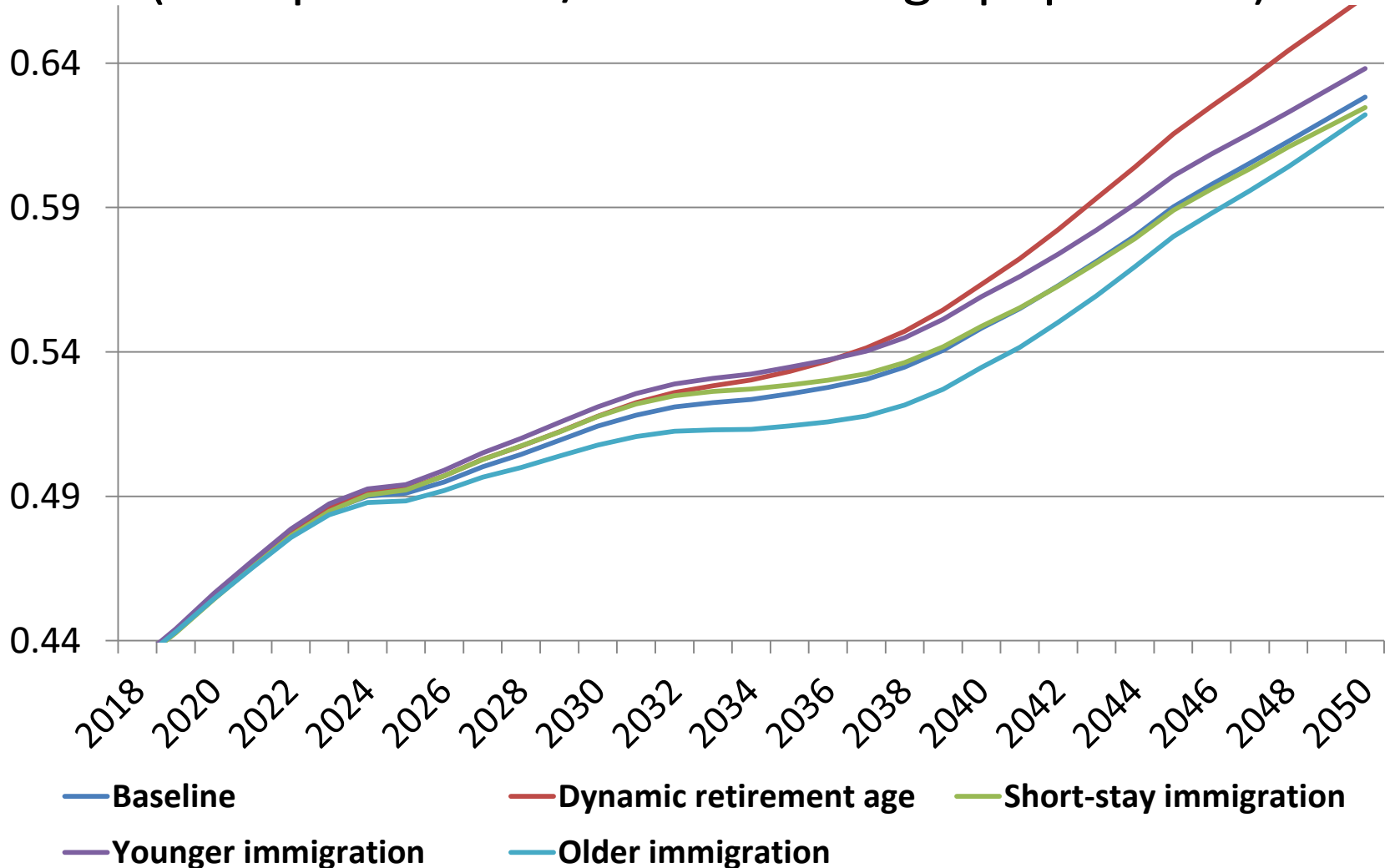
Share of leaving immigrants

Years of stay
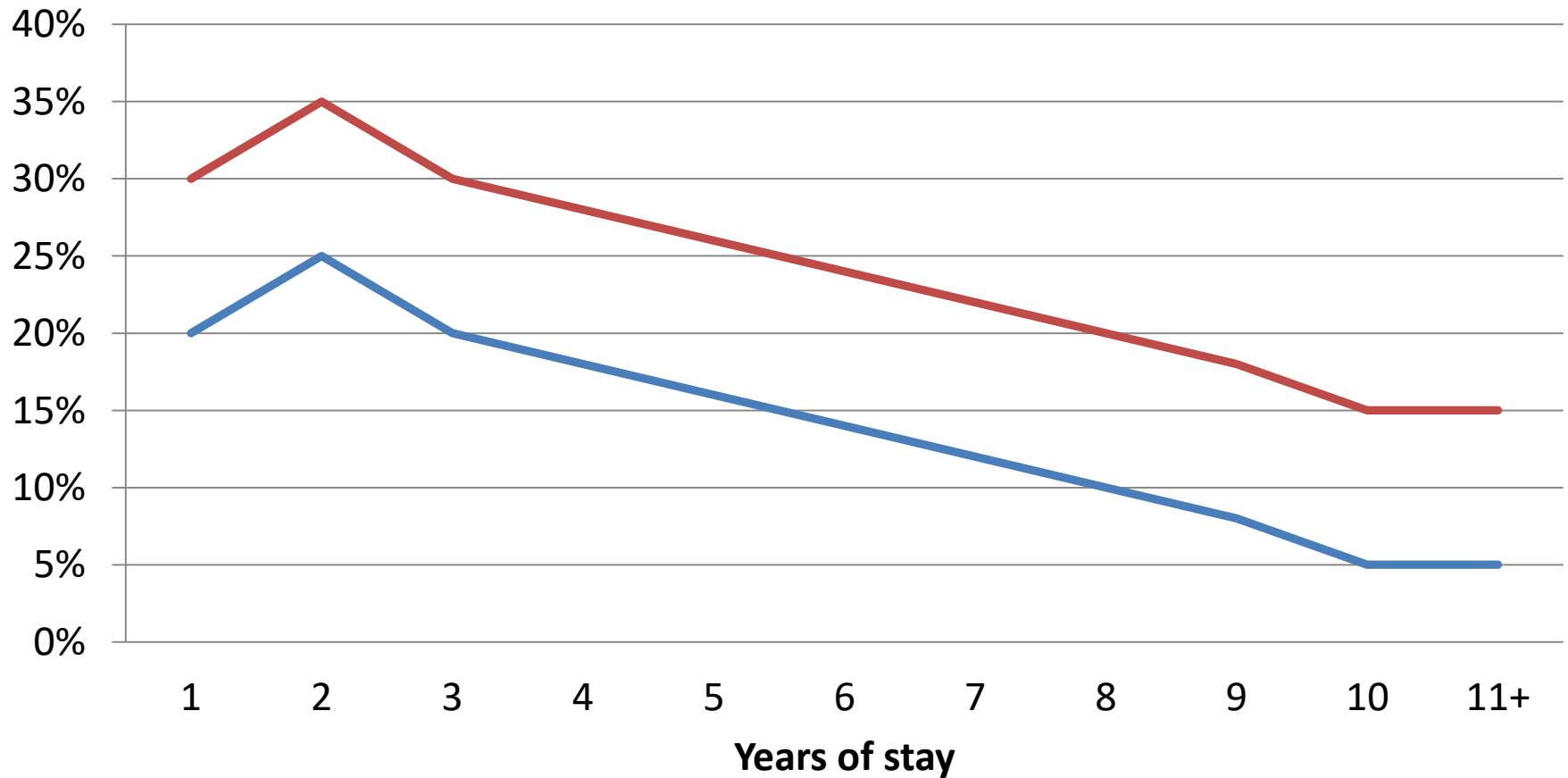
Baseline —— Short-stay immigration scenario

Source: Administrative data

Age distribution of employed immigrants

Legend: **Younger immigration scenario** **Older immigration scenario** **Baseline**

Source: Administrative data

Dependency ratio
(Non-productive/Productive age population)

Legend: Baseline, Dynamic retirement age, Short-stay immigration, Younger immigration, Older immigration

Source: VZAM_microsim

Inflow of working immigrants

Legend:
- **Baseline**
- **Dynamic retirement age**
- **Short-stay immigration**
- **Younger immigration**
- **Older immigration**

Source: VZAM_microsim
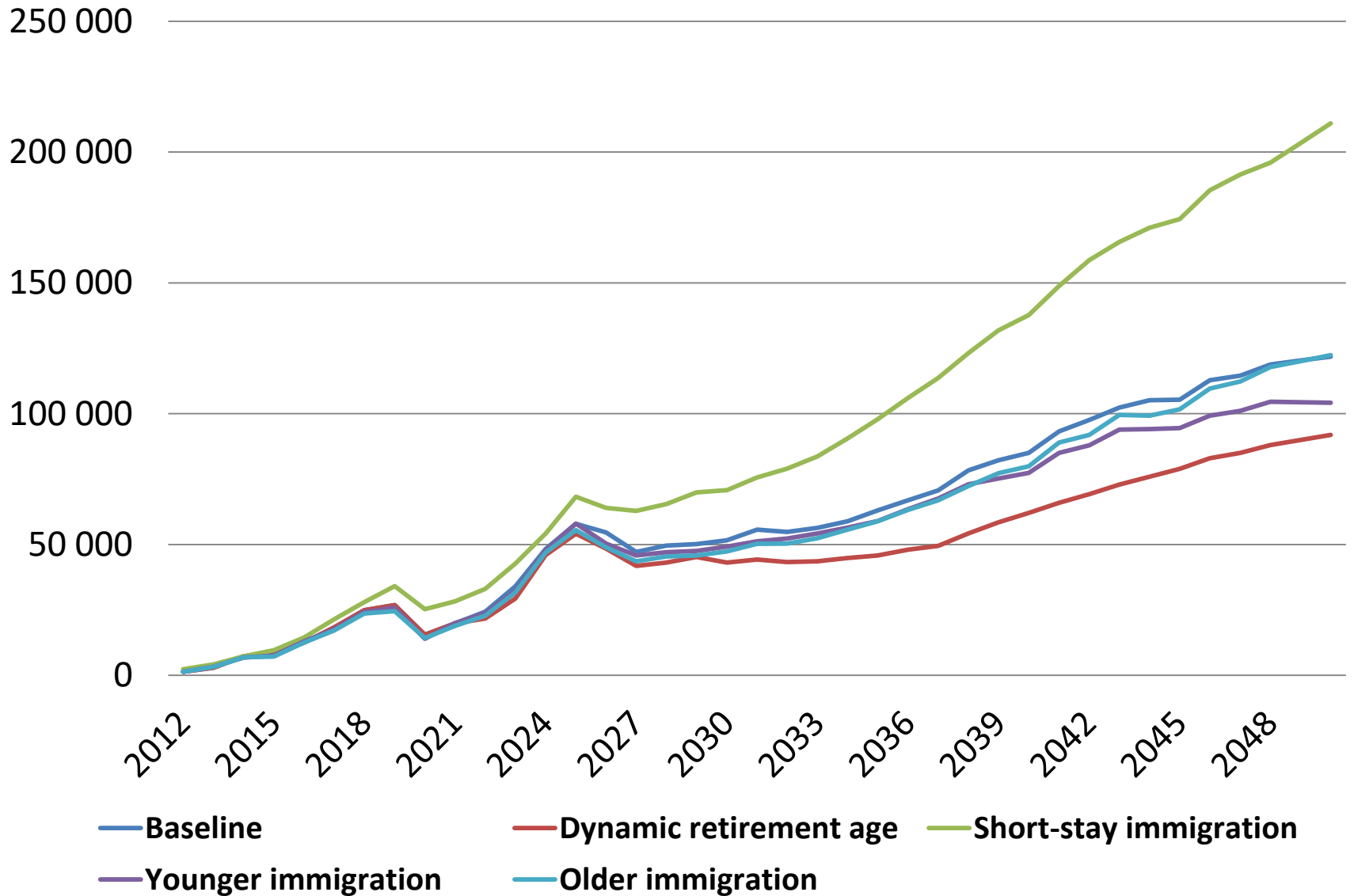
Number of workers in need of replacement (without leaving immigrants)

Legend:
- Graduates
- Baseline
- Dynamic retirement age
- Short-stay immigration
- Younger immigration
- Older immigration
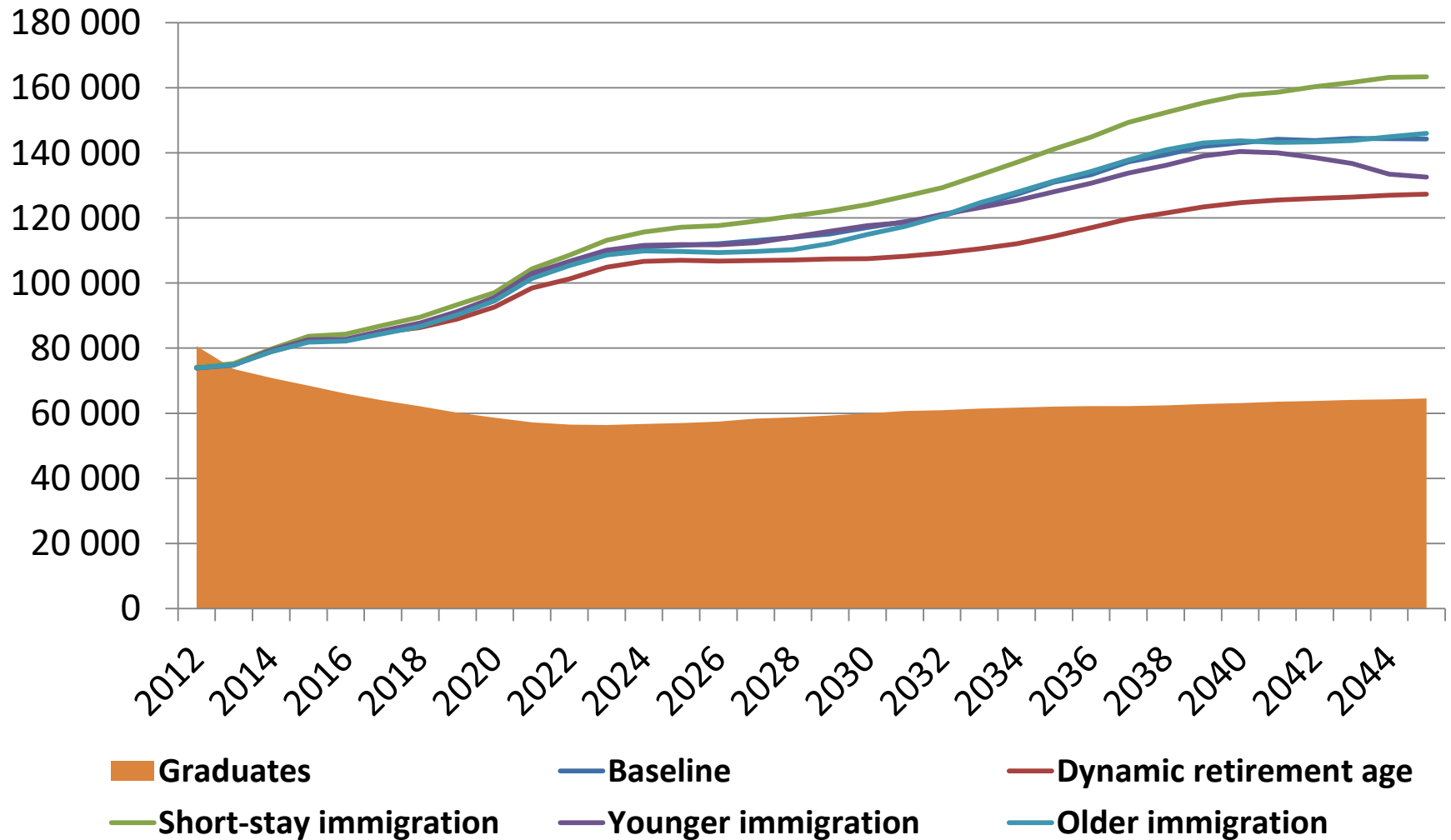
Number of workers in need of replacement (including the leaving immigrants)

Legend:
- **Graduates**
- **Baseline**
- **Dynamic retirement age**
- **Short-stay immigration**
- **Younger immigration**
- **Older immigration**

Source: VZAM_microsim
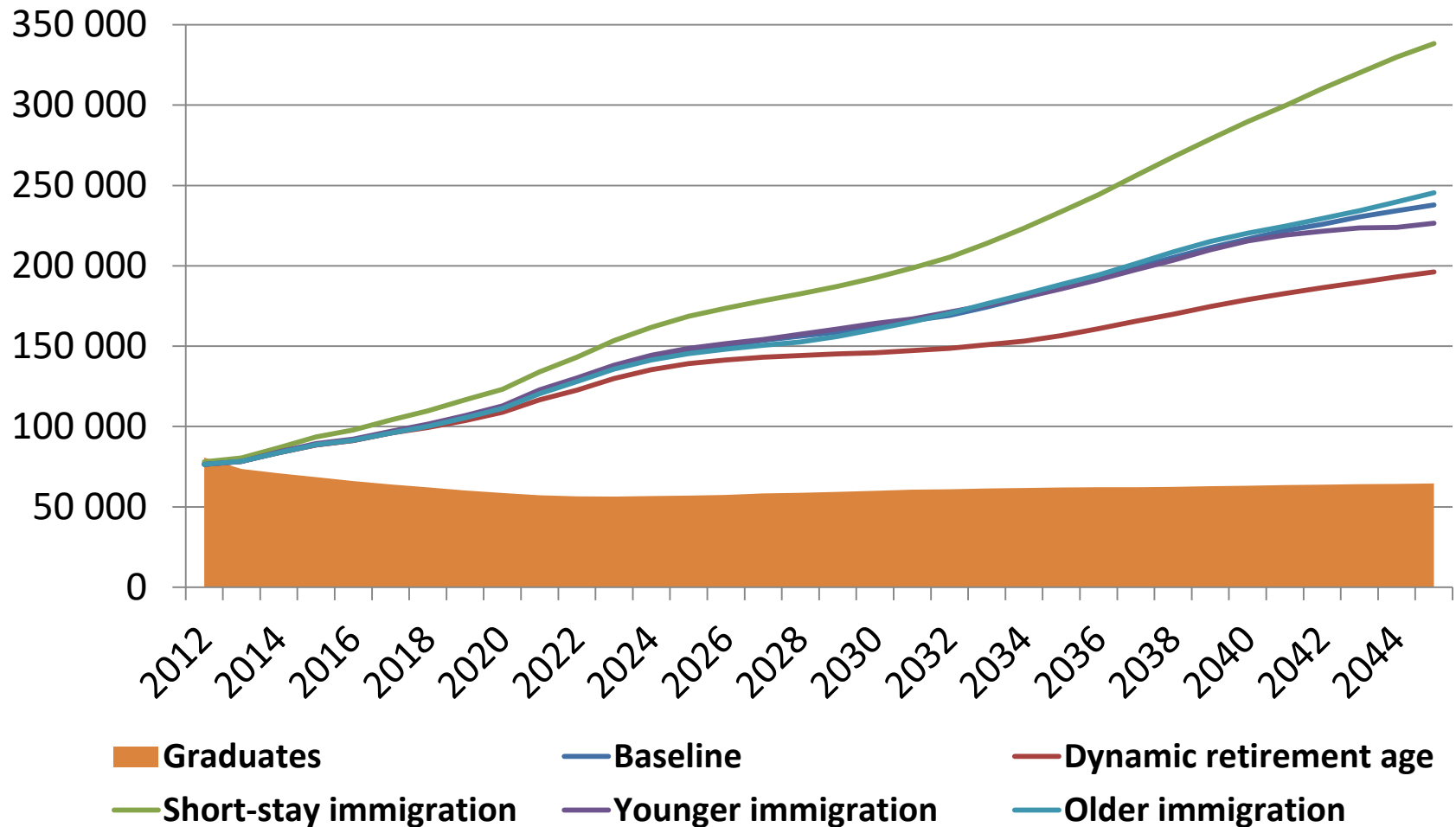
Conclusions

- Labour demand driven prediction of immigrant inflow has potential to predict the structure of working immigrants in terms of education

- Our modelling approach allows to make scenarios on the **age structure** and **length of the stay** of immigrants, as well as retirement age shifts

- Such scenarios may produce information useful in setting up a targeted immigration policy, as both (age structure, as well as the length of stay) may be influenced by policy measures.
  - retirement age shifts (in the case of Slovakia) provides a partial compensation for the impact of ageing
  - the length of stay appears to have a significant impact on the indicators of interest
  - the contribution of the age structure of immigrants is a function of the length of their stay

International relevance

- Ageing societies have limited options in preventing the decline of their labour force

- Ageing is an universal pattern observable in the whole EU

- Steering the inflow of immigrants is one of the policy measures mitigating the impact of ageing

Thank you
Ďakujeme

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