

# ARE WE FACING REGIONAL DEPOPULATION IN SERBIA? A subnational population projection

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# Main objectives

- ❖ To present and interpret **population projections at the district level** in Serbia in order **to consider the effects** of the potential implementation of recently adopted **policy measures in the area of birth stimulation** (Birth Promotion Strategy), as well as the **effects of expected** socio-economic changes related to the country's **accession to the European Union** in the coming period.
- ❖ To offer an **alternative to the official sub-national population projection** given their known methodological shortcomings

# Conceptual framework of the projection

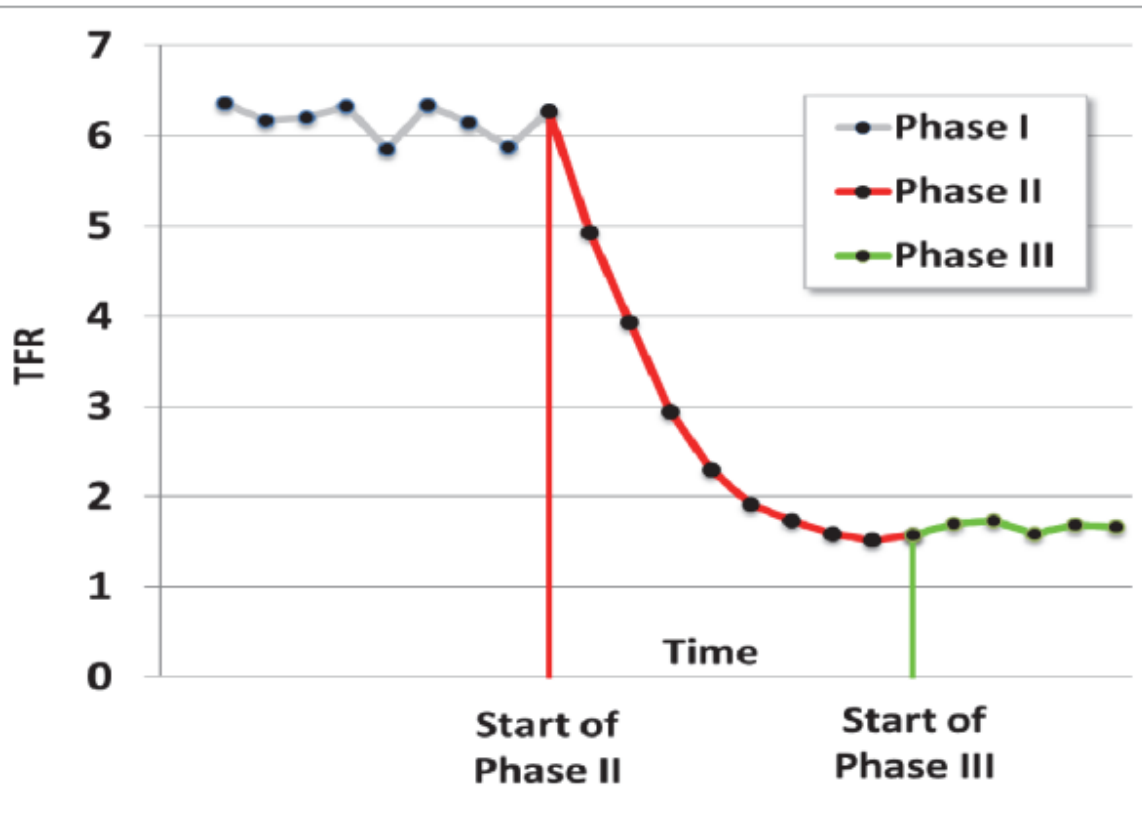
- Projection time horizon: 2018-2050
- **Two different scenarios in terms of fertility** hypothesis were made to express uncertainty
- **Expected (reference) scenario:** the most likely trajectory from the prediction interval derived by running **the UN WPP2019 model** at district level
- **Optimistic scenario:** realization of the goals defined in the current **Birth Promotion Strategy** (TFR 1.70–1.85 in 2035, and 1.85–2.1 in 2050 across districts)
- Mortality and migration hypotheses – the same in both scenarios
- Initial age and sex population structure by SORS was corrected by including an estimate of the balance of international migration between 2011 and 2018

# Theoretical background and the model

- The UN model allows each country to reach its target total fertility rate based on its own as well as the experience of other low-fertility countries that have experienced fertility recovery (TFR of 1.75 by 2050 in Southern Europe)
- Demographic transition theory, Diffusion of innovations theory
- Migration cycle concept a specific interpretation of the “pull and push” migration theory (Fassmann and Reeger 2012)
- The EU membership is Serbia's strategic goal – a pivotal point in the migration transition hypothesis

# Phases of fertility transition

the crux of the UN WPP population projection model



**Phase I:** High-fertility, pre-transition phase. Not modelled.

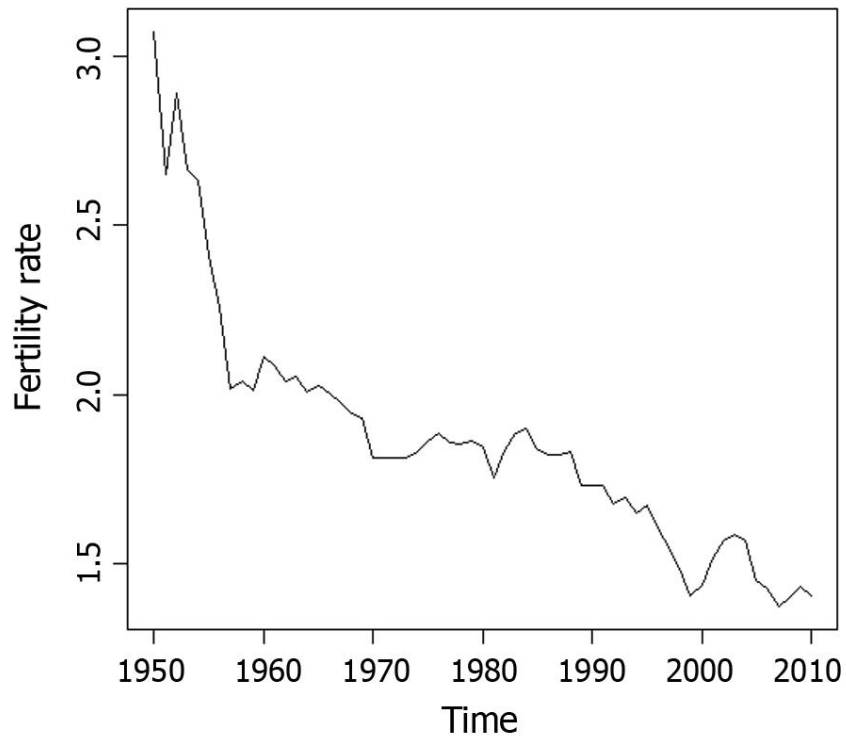
**Phase II.** Fertility transition phase, modelled by double-logistic function using a Bayesian hierarchical model.

**Phase III.** Low-fertility, post-transition phase, modelled with a first-order auto-regressive time series model, AR(1), in a Bayesian hierarchical framework.

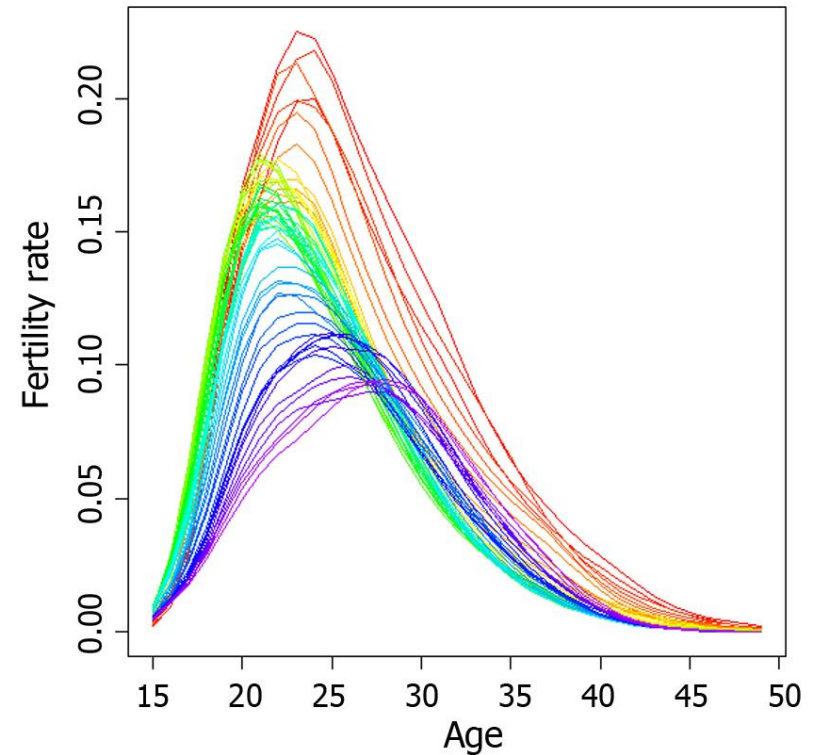
# Fertility rates in Serbia, 1950-2011

- total and age-specific -

## Total fertility rate

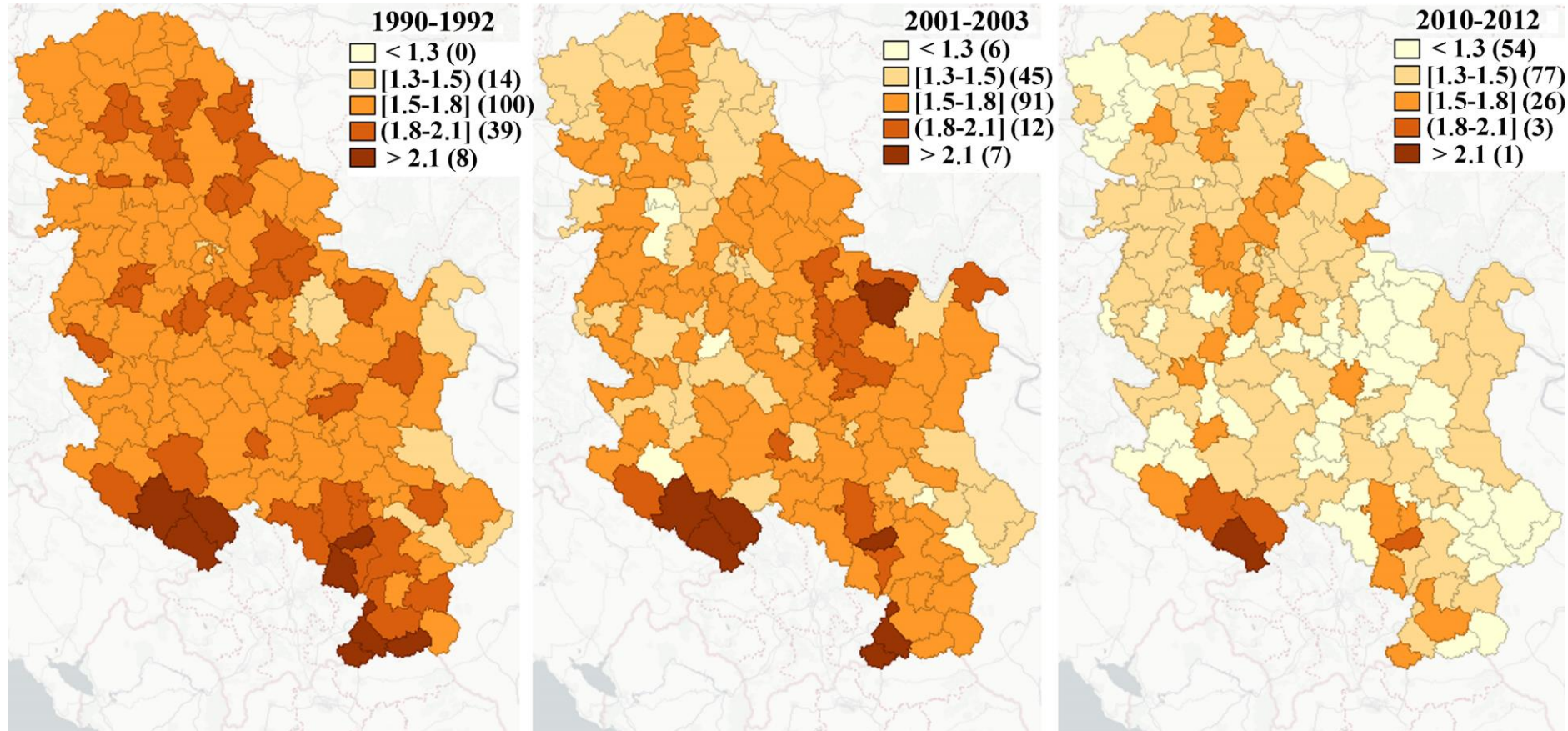


## Smoothed age-specific rates



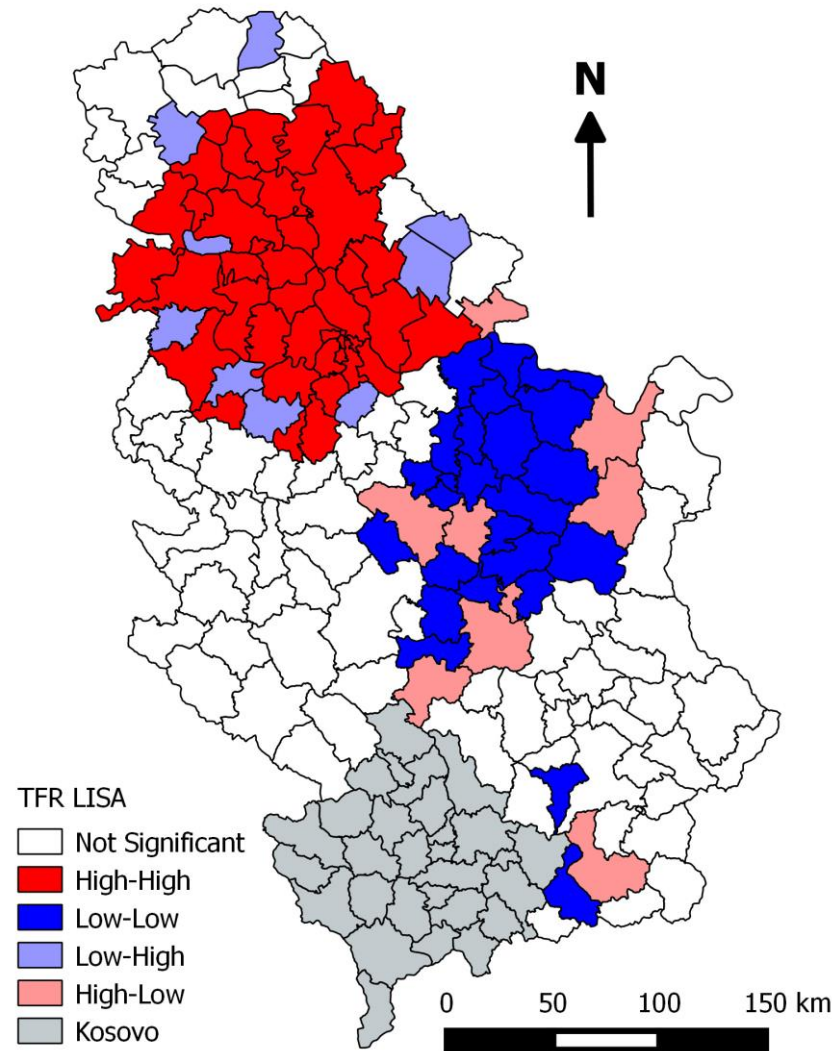
# Total Fertility Rate in Serbia at LAU-2 level (municipality)

– three-year average around the census year –



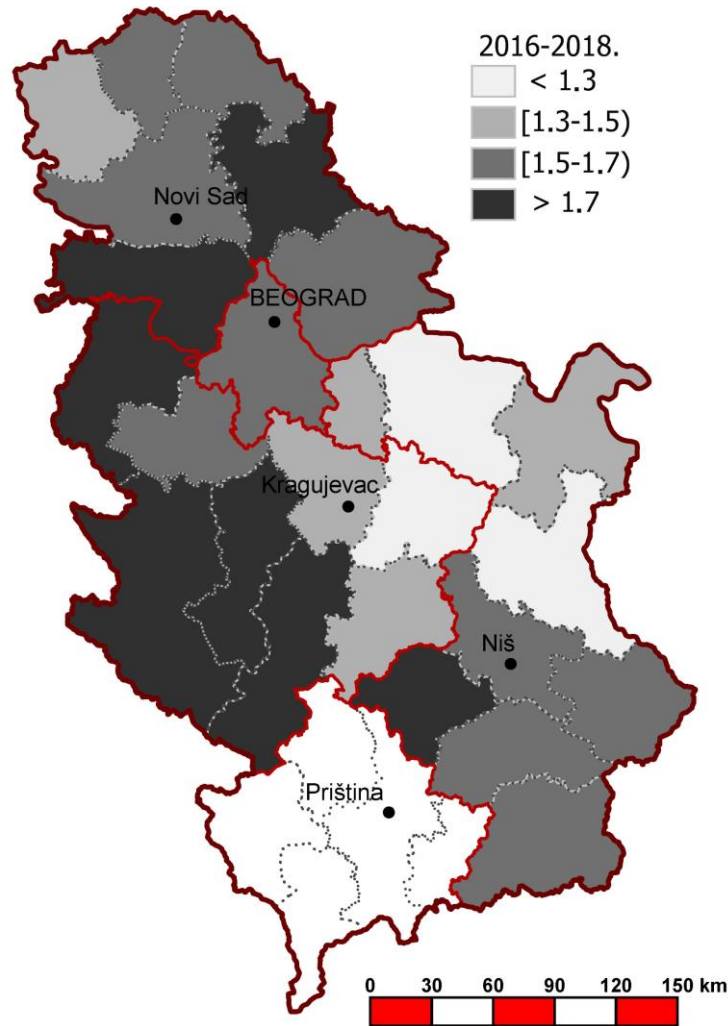
# Total Fertility Rate in Serbia at LAU-2 level:

– LISA cluster map of percentage difference for the period 2002–2011 –





# Total fertility rate in Serbia across districts – average for 2016-2018 –

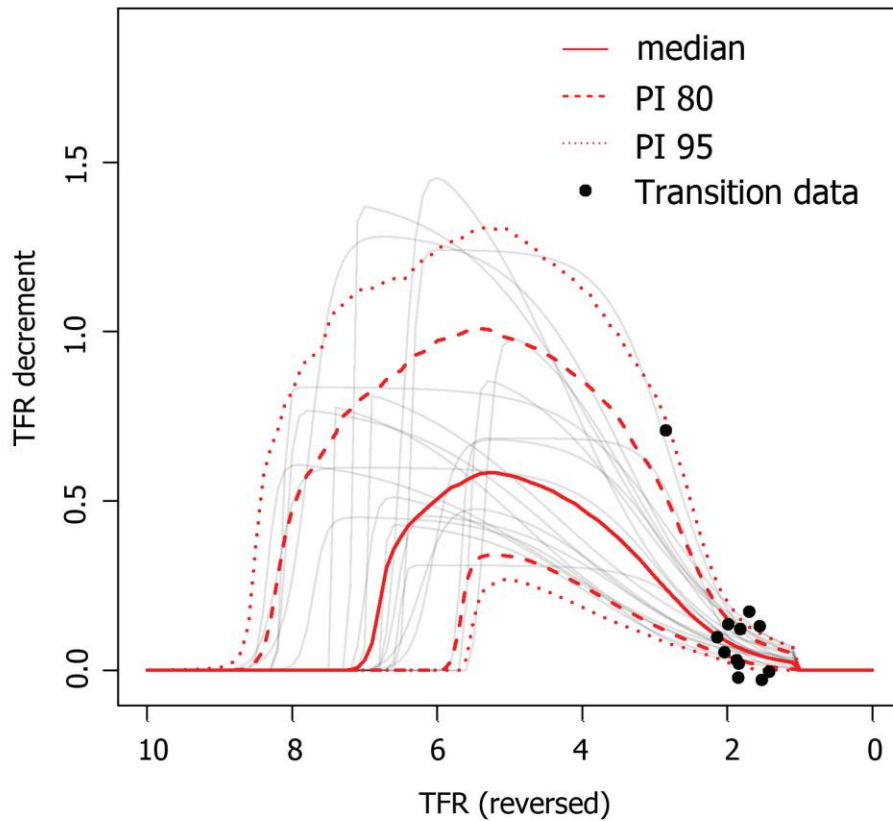


Source: author's calculations based on the data by the Statistical Office of the Republic of Serbia

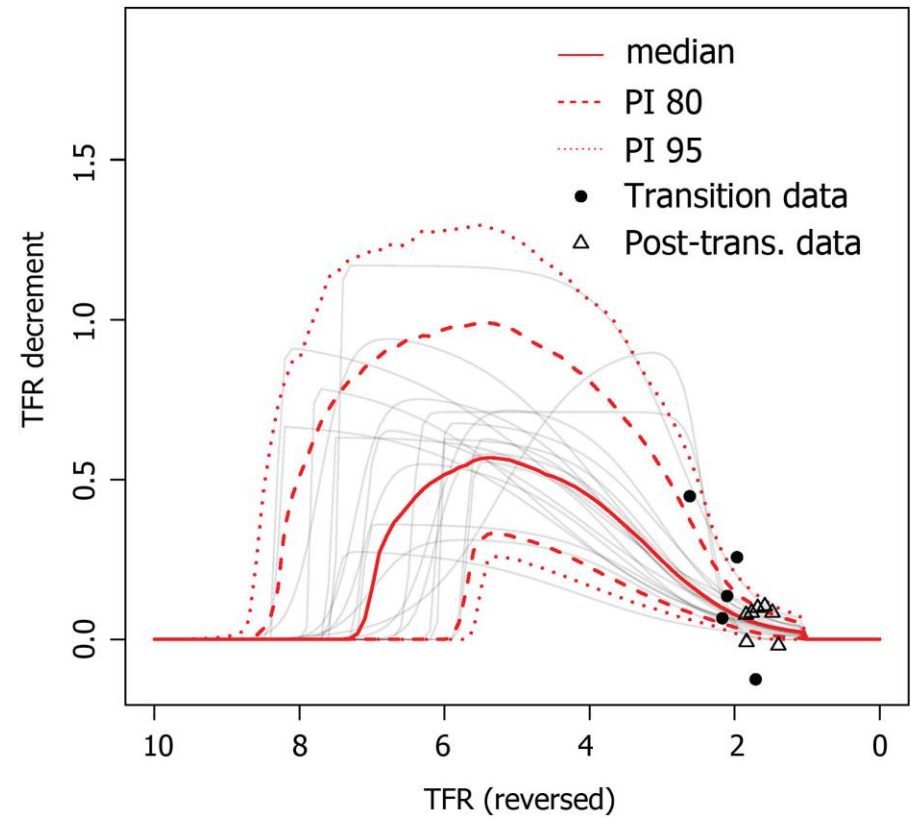
# Fertility transition in Serbia by regions

– Double logistic curve of decrements in TFR 1950-2017 -

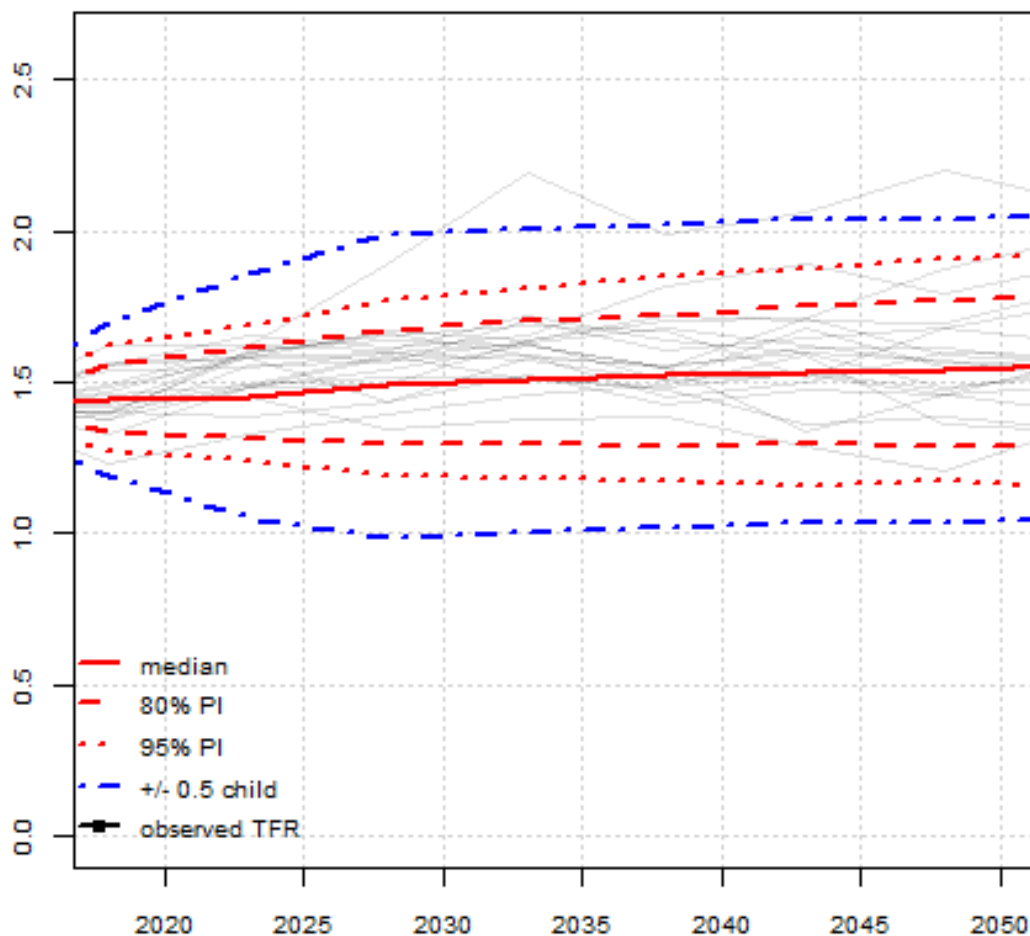
## Southern regions



## Northern regions

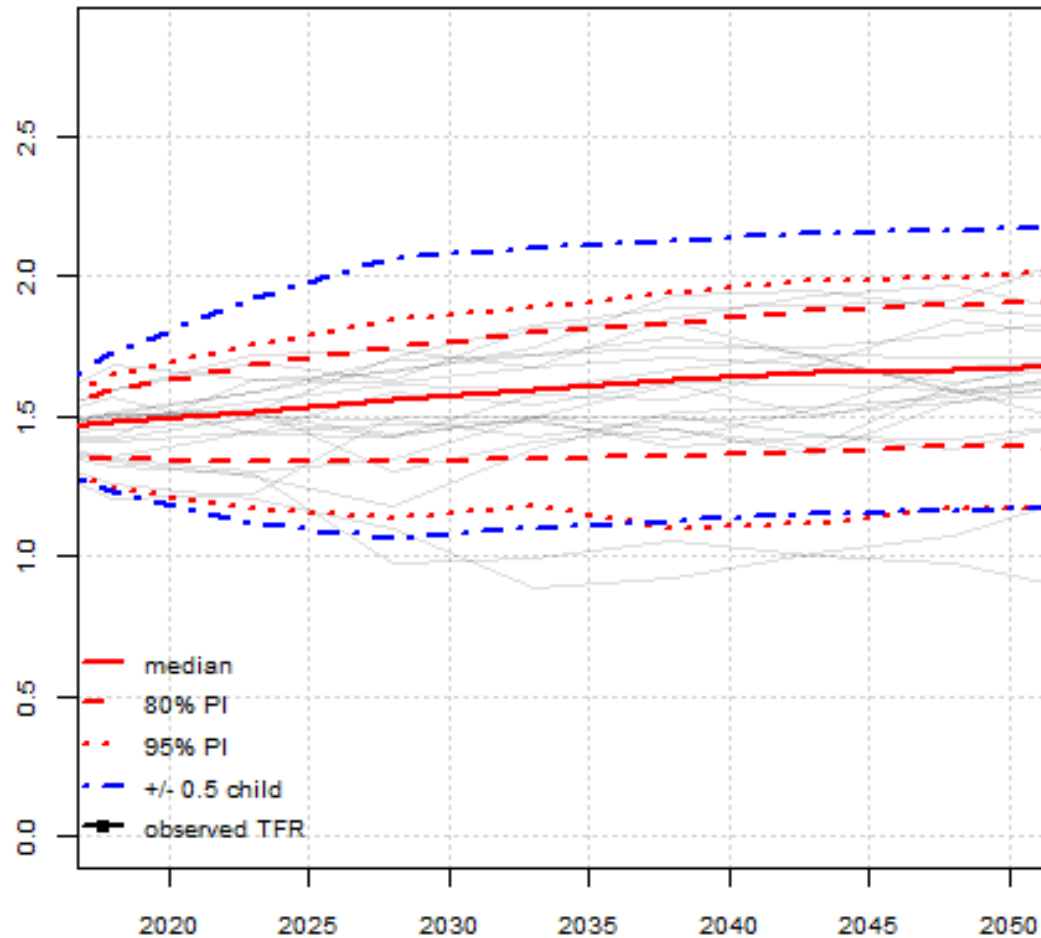


# Total fertility rate, 2018-2050: Below national average - probabilistic model -



Source: author's calculations based on the UN WPP2019 model.

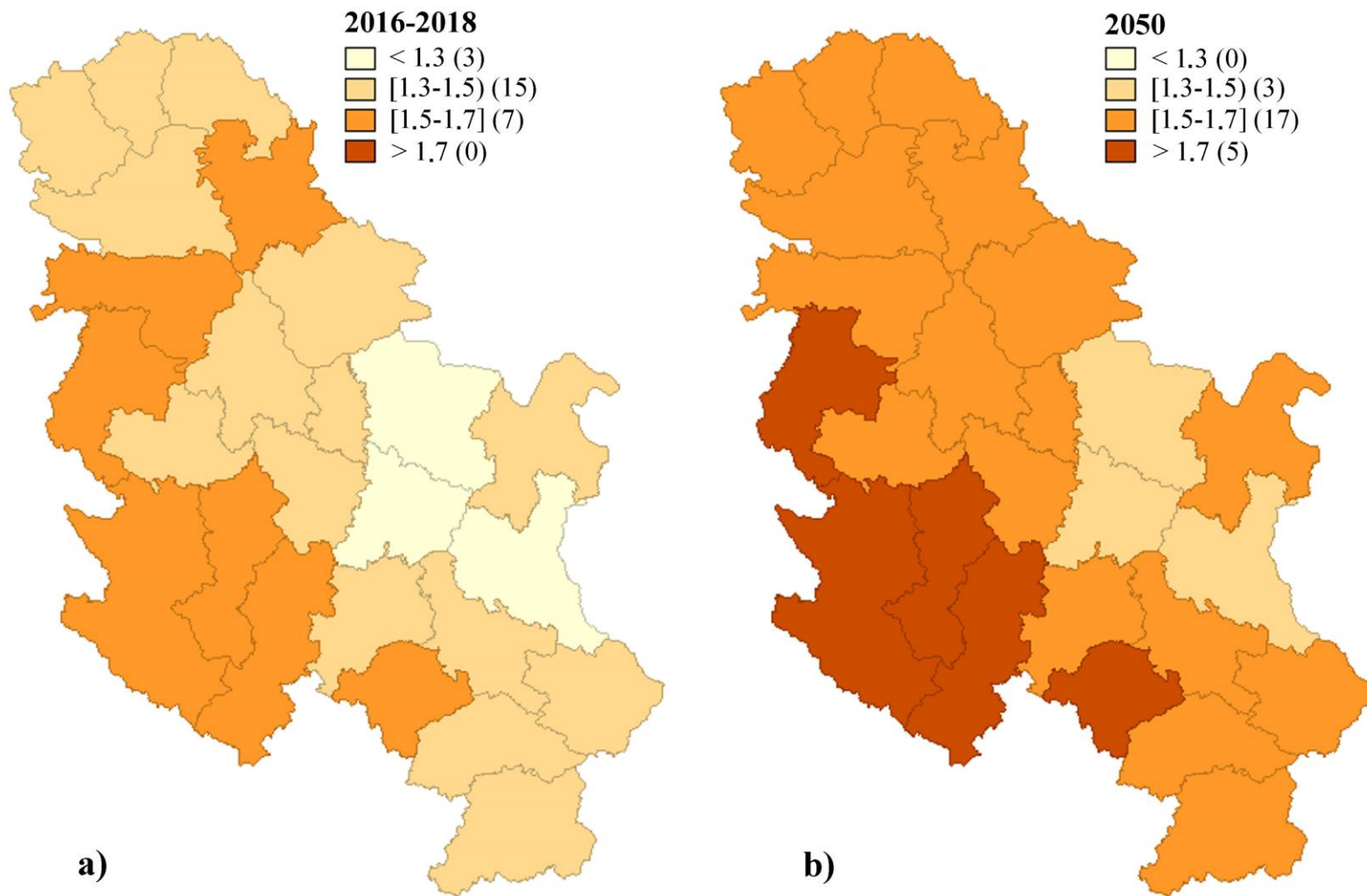
# Total fertility rate, 2018-2050: Above national average - probabilistic model -



Source: author's calculations based on the UN WPP2019 model.

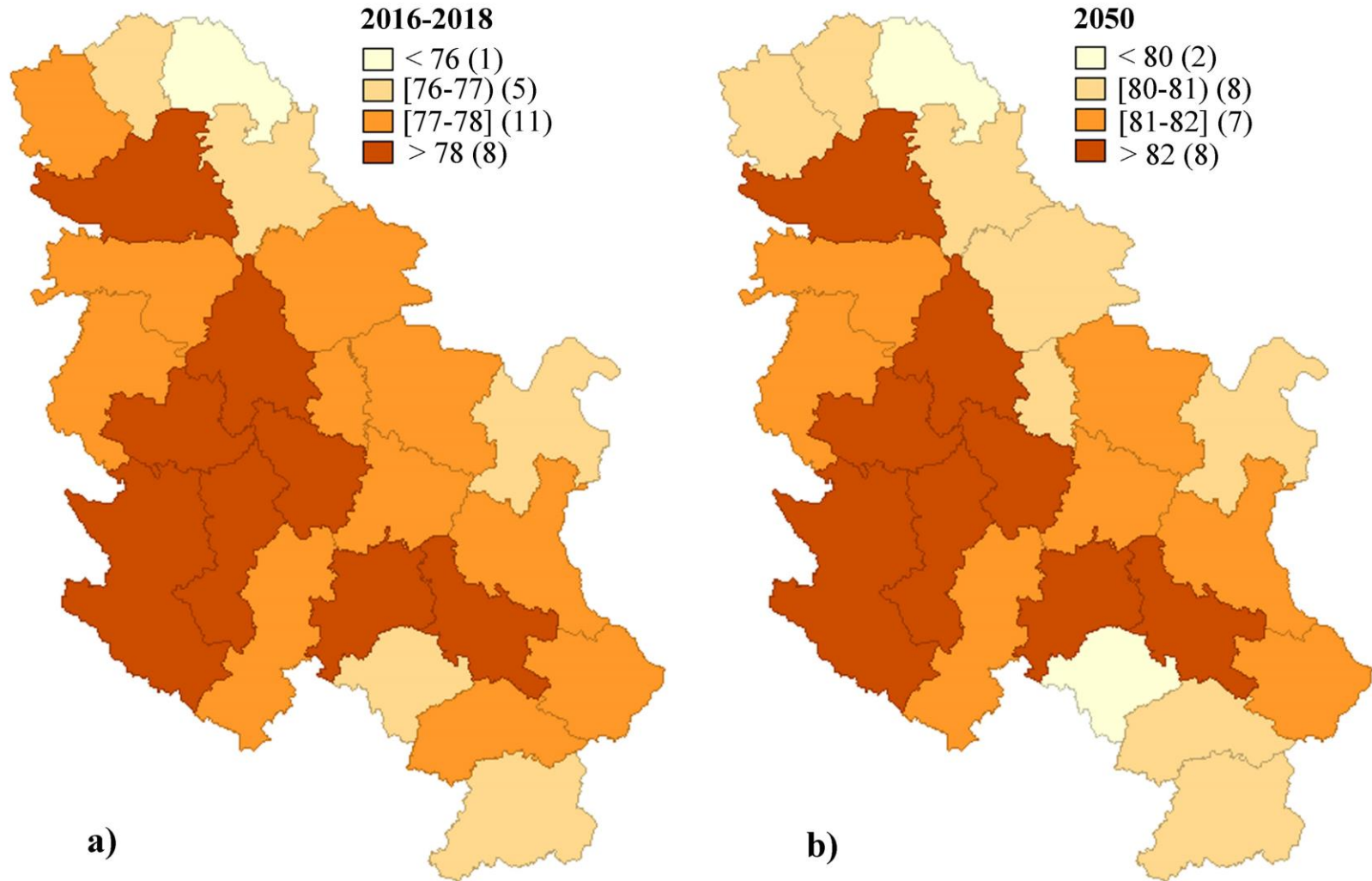
# Total fertility rate across districts of Serbia

– a (registered avg. 2016-18), b (UN model for 2050) –



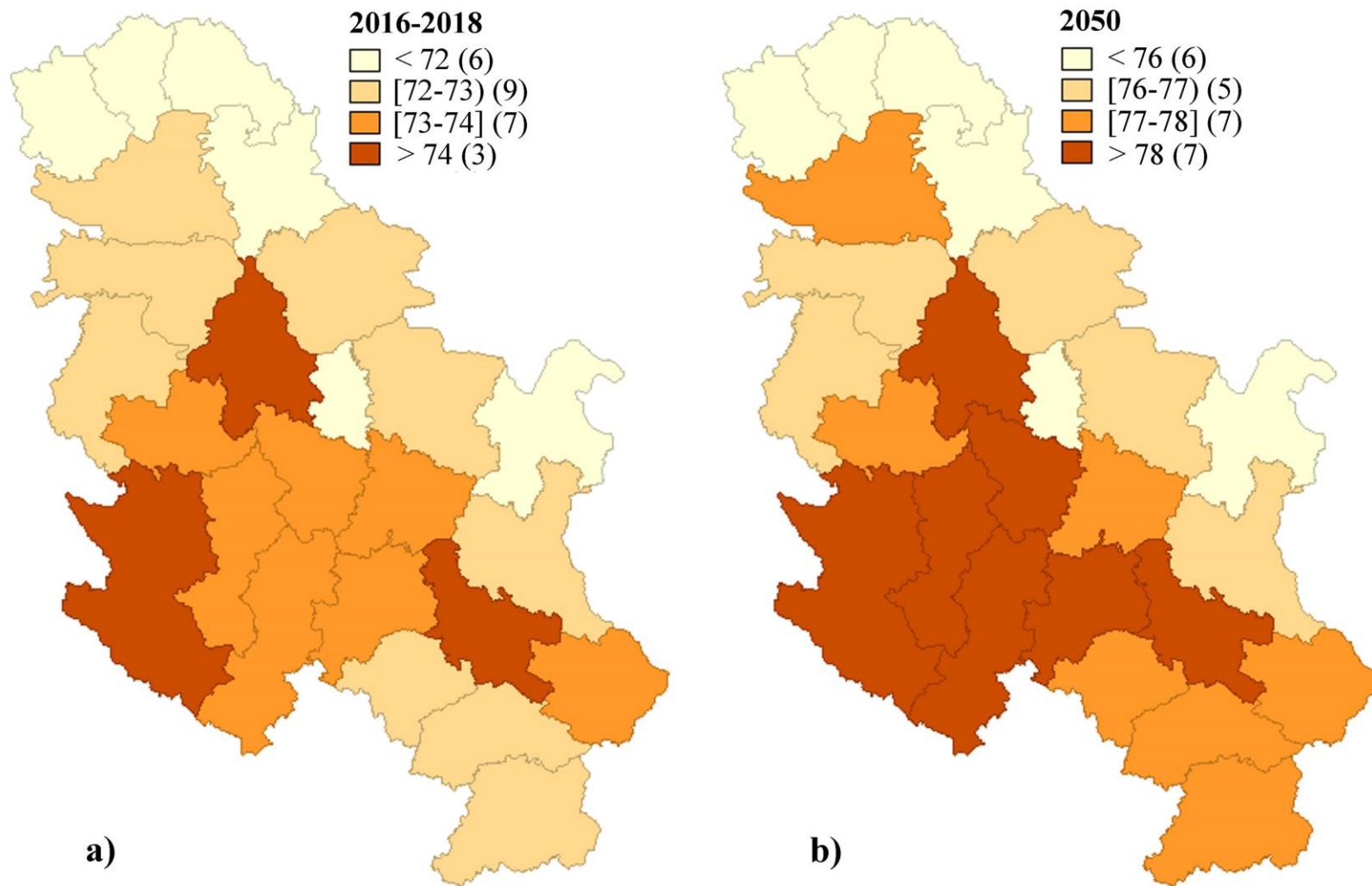
# Life expectancy at birth for women across districts of Serbia

– a (registered avg. 2016-18), b (UN model for 2050) –



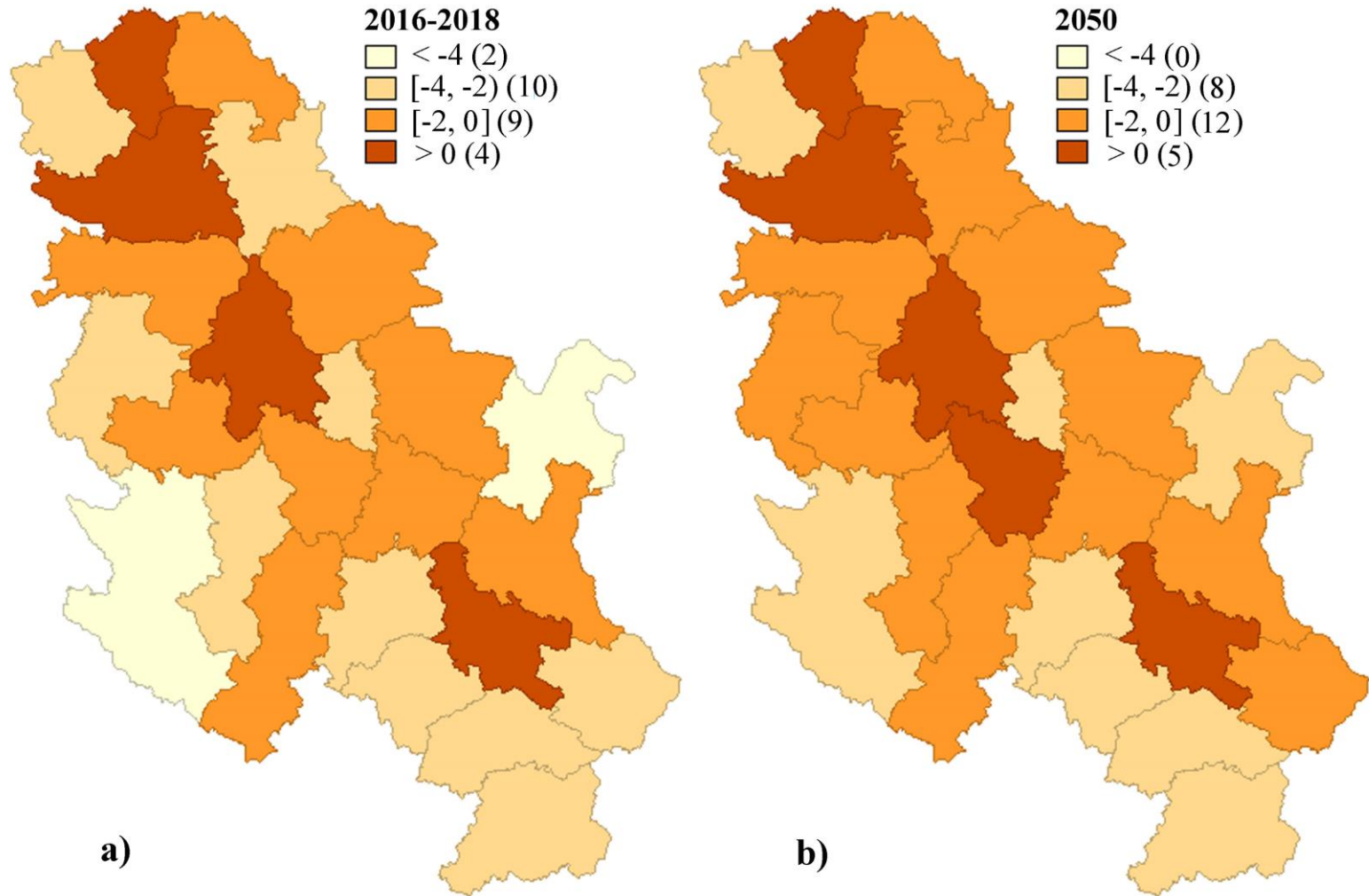
# Life expectancy at birth for men across districts of Serbia

– a (registered avg. 2016-18), b (UN model for 2050) –



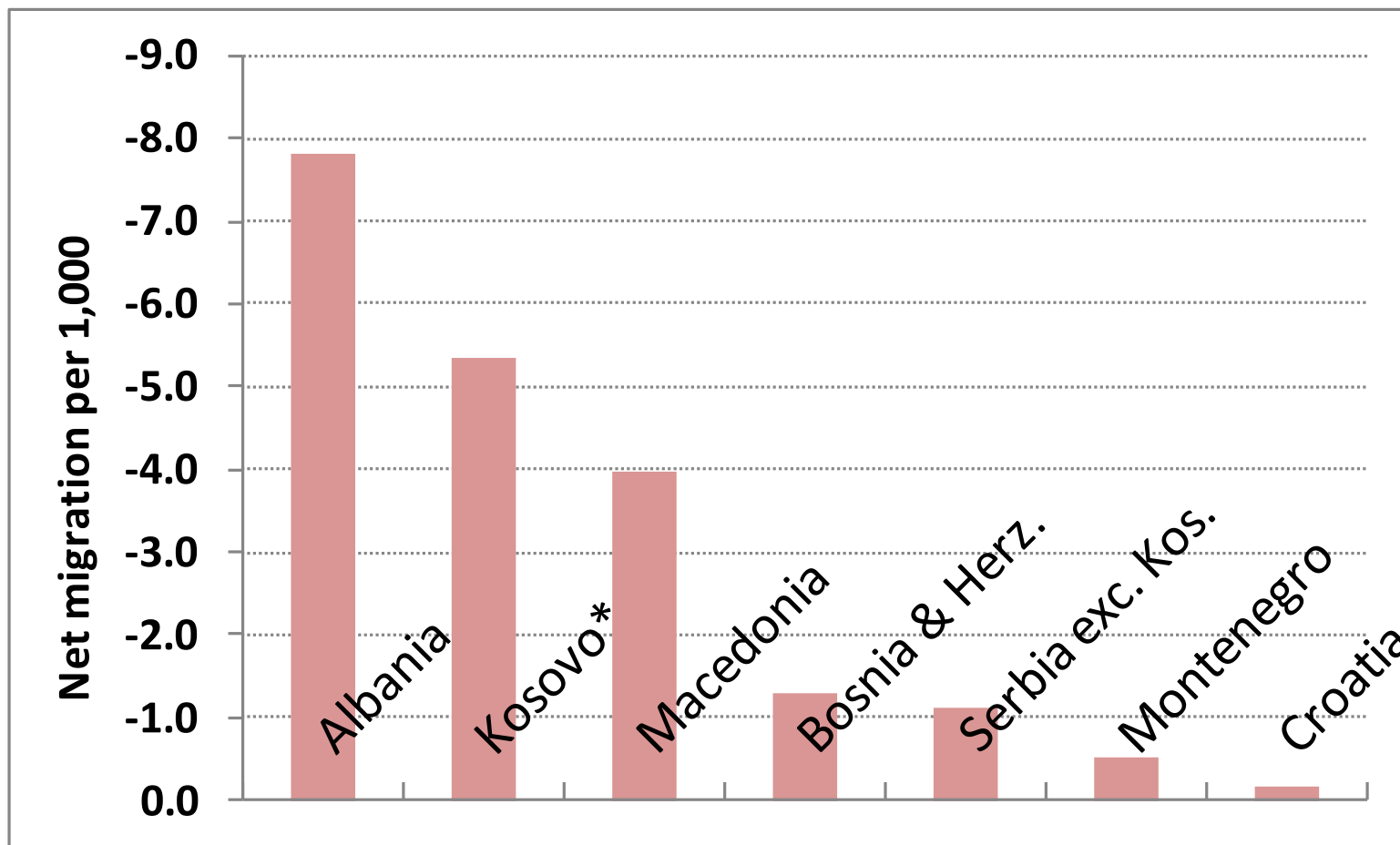
# Net internal migration rate (per 1,000 pop.) across districts of Serbia

– a (registered avg. 2016-18), b (expected in 2050) –





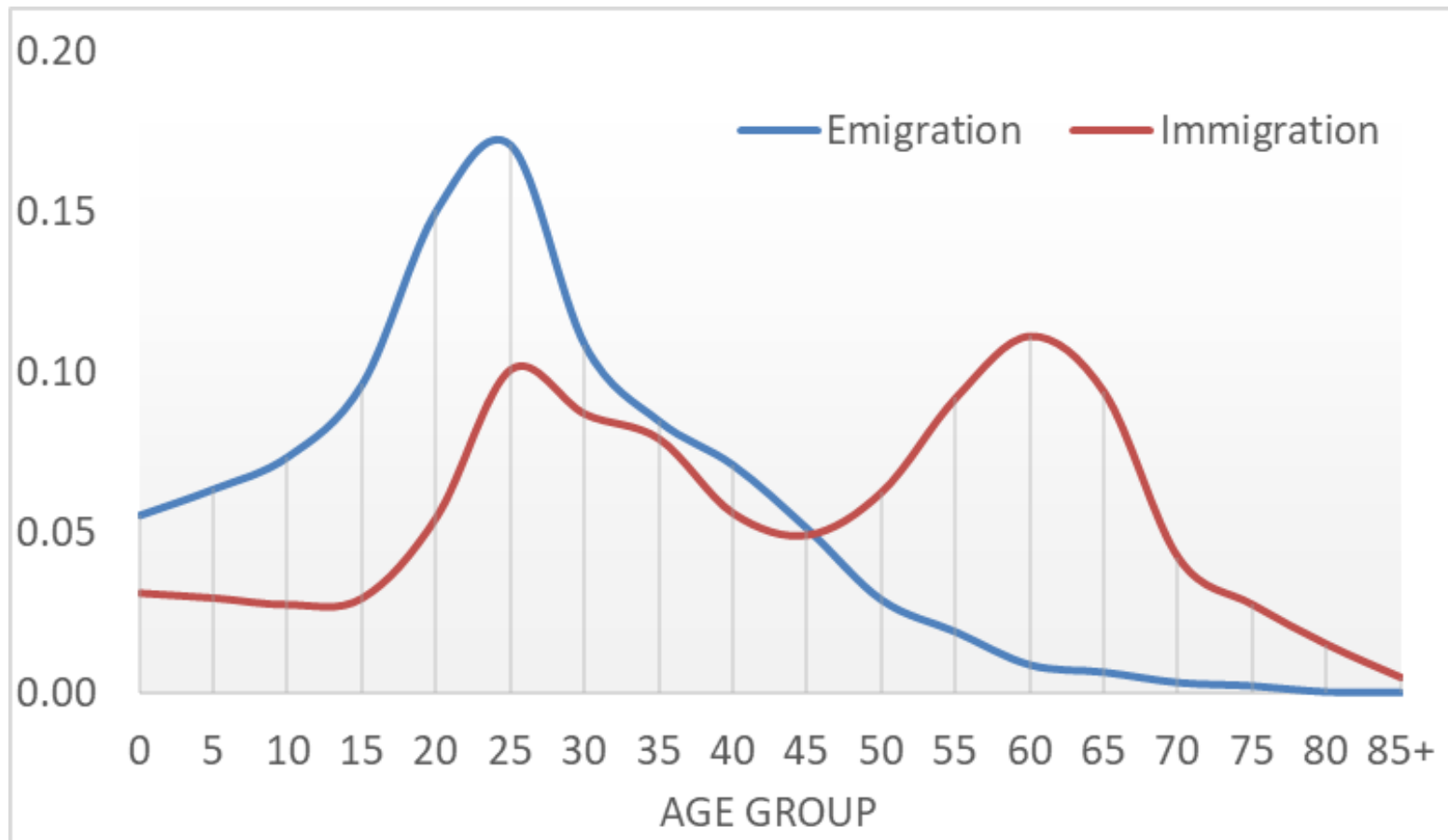
## Annual net migration balance with the EU (per 1,000) avg. 2009-2011



\*Under United Nation's Security Council Resolution 1244/99

Sources: Eurostat online database, OECD Stat Extracts database, national statistical offices (Kupiszewski et al. 2012).

# Current age patterns of in/out migration flows in Serbia – 2015-2017 average –

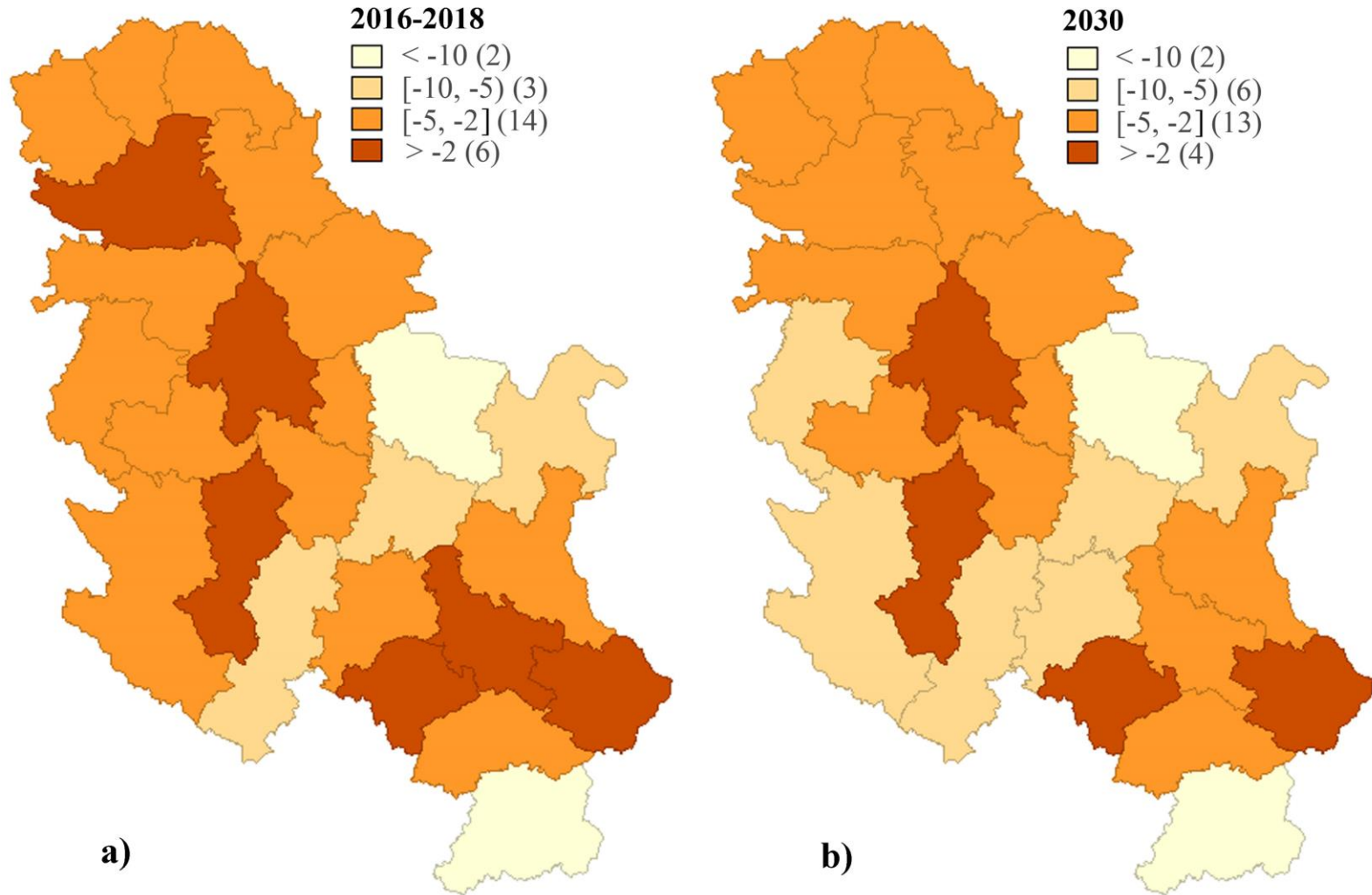


# Migration cycle concept: Austrian example

<i>Stages</i>	<i>Temporal (example Austria)</i>	<i>Quantitative dimension</i>	<i>Public perception</i>	<i>Legal measures</i>
Initial	Until the late 1950s	International immigration remains the exception, emigration is dominating	The public does not perceive immigration, at best only emigration	No specific immigration policies at hand, if at all, emigration is regulated
Intermediate	1960 up to approximately 1994	Emerging immigration becomes more important than emigration, but is still related to cyclic phenomena, high fluctuation of balances	Immigration becomes part of the public discourse when economy is declining and the labour market is closing	Oscillating between liberalisation and tightening of political measures
Adaptation	After 1994	Immigration is a constant phenomenon, high fluctuations are over	Slowly growing acceptance	Differentiated legislation with a multitude of 'channels of immigration'

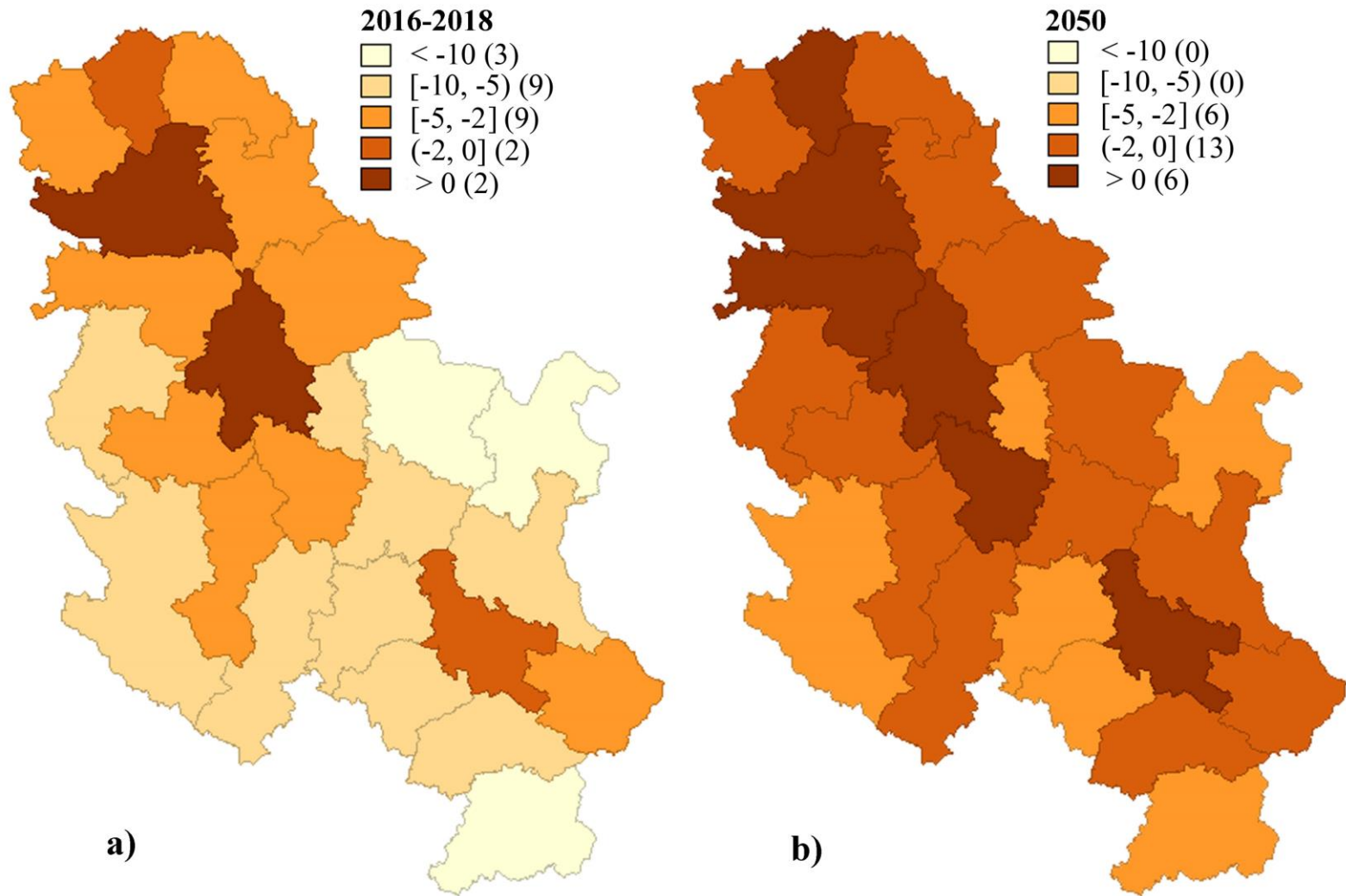
# Net international migration rate (per 1,000 pop.), districts of Serbia

– a (estimated avg. 2016-18), b (expected in 2030) –



# Net migration rate (per 1,000 pop.) across districts of Serbia

– a (estimated avg. 2016-18), b (expected in 2050) –



# Main projection results – expected scenario

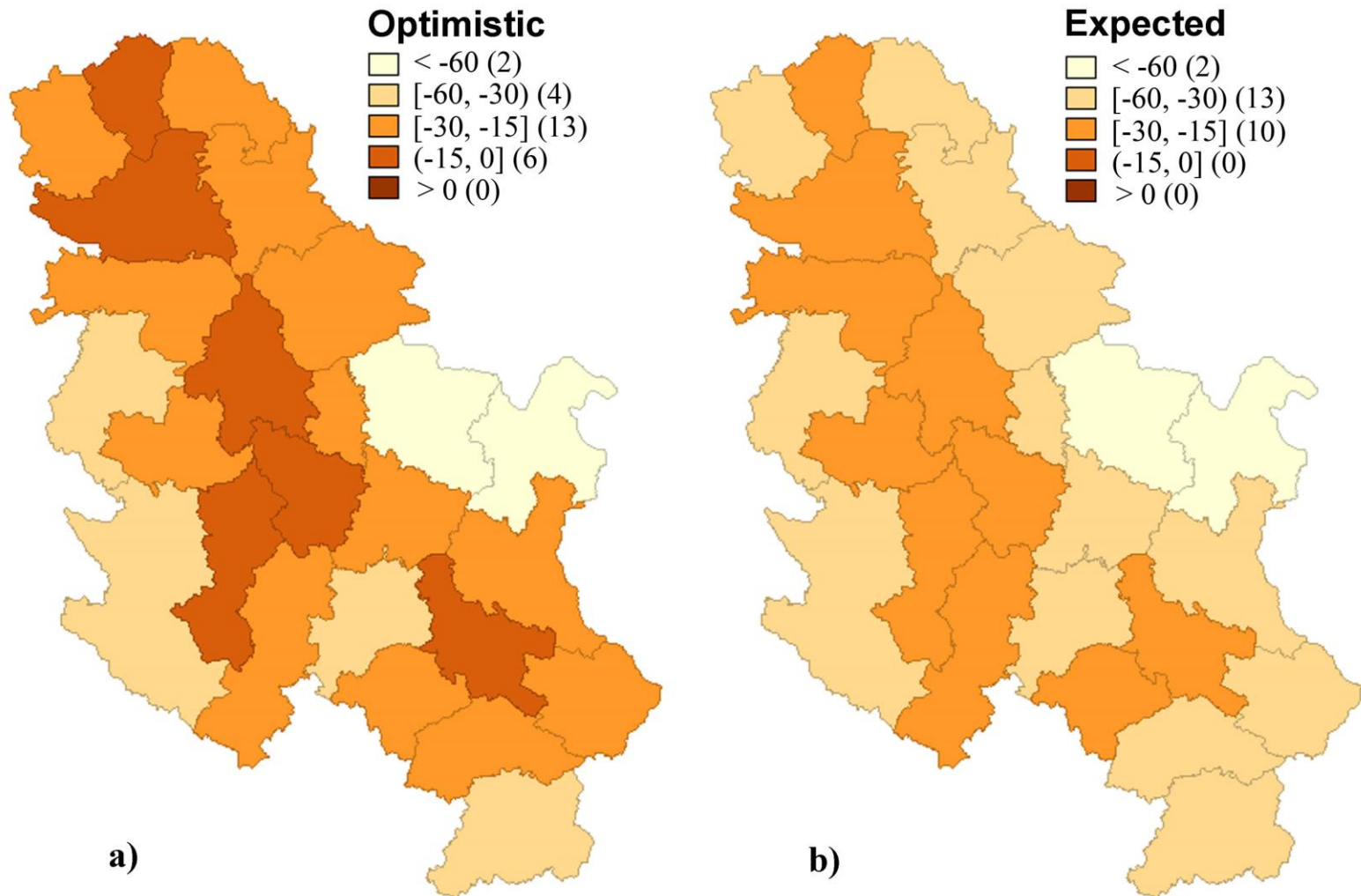
- The 2018 population size of Serbia (6,842,940) would be reduced by almost two million or by 30.4% until 2050
- The decrease in the Belgrade region would be just 4.5%, and in the Vojvodina region - 27.8%. In both southern regions, the decrease would be much higher - 48% in South and East Serbia, and 42.2% in Šumadija and Western Serbia
- The most prominent loss of population (over 50%) is expected in the area of traditional emigration – in the districts of Braničevo and Bor, by over 75% compared to their present population size
- Apart from Belgrade, the population reduction below the national average - only in four districts with the largest city centres, which are not characterized by a negative balance of internal migration during the projection
- Expected decline in working-age population by mid-century: 57.2% in the South and East Serbia region, and 52.8% in the Šumadija and Western Serbia region versus 36.8% in the Vojvodina region and 14.4% in the Belgrade region
- The number of working-age persons per one person over 65 years of age in Serbia is projected to decrease by 41.1%, from the current 2.9 to 1.7 in 2050.

# Main projection results – optimistic scenario

- A significant increase in the current total fertility rate by 2050 compared to the “expected scenario” would mitigate the reduction of the total population by only 173 thousand in 2050
- Realization of the Birth Promotion Strategy could be interpreted as unlikely if evaluated by the UN model – the likelihood of TFR scenario is below 10% by 2030, and 5% by 2050 in all districts
- Even such an unlikely scenario would not significantly affect the highly emigrant districts in the east of the country
- Yet, the fall in the number of live births in Serbia by 2050 would be far smaller than in the expected scenario, only 14.7% versus 32.4%
- Already by 2035, the number of districts projected to have a minimal decrease in live births (below 15%) would be six in the optimistic scenario versus none in the expected scenario
- After 2035, six districts would even experience an increase in the number of live births according to the optimistic scenario compared to only two according to the expected scenario.

# The change in the number of livebirths 2035/2018 (%)

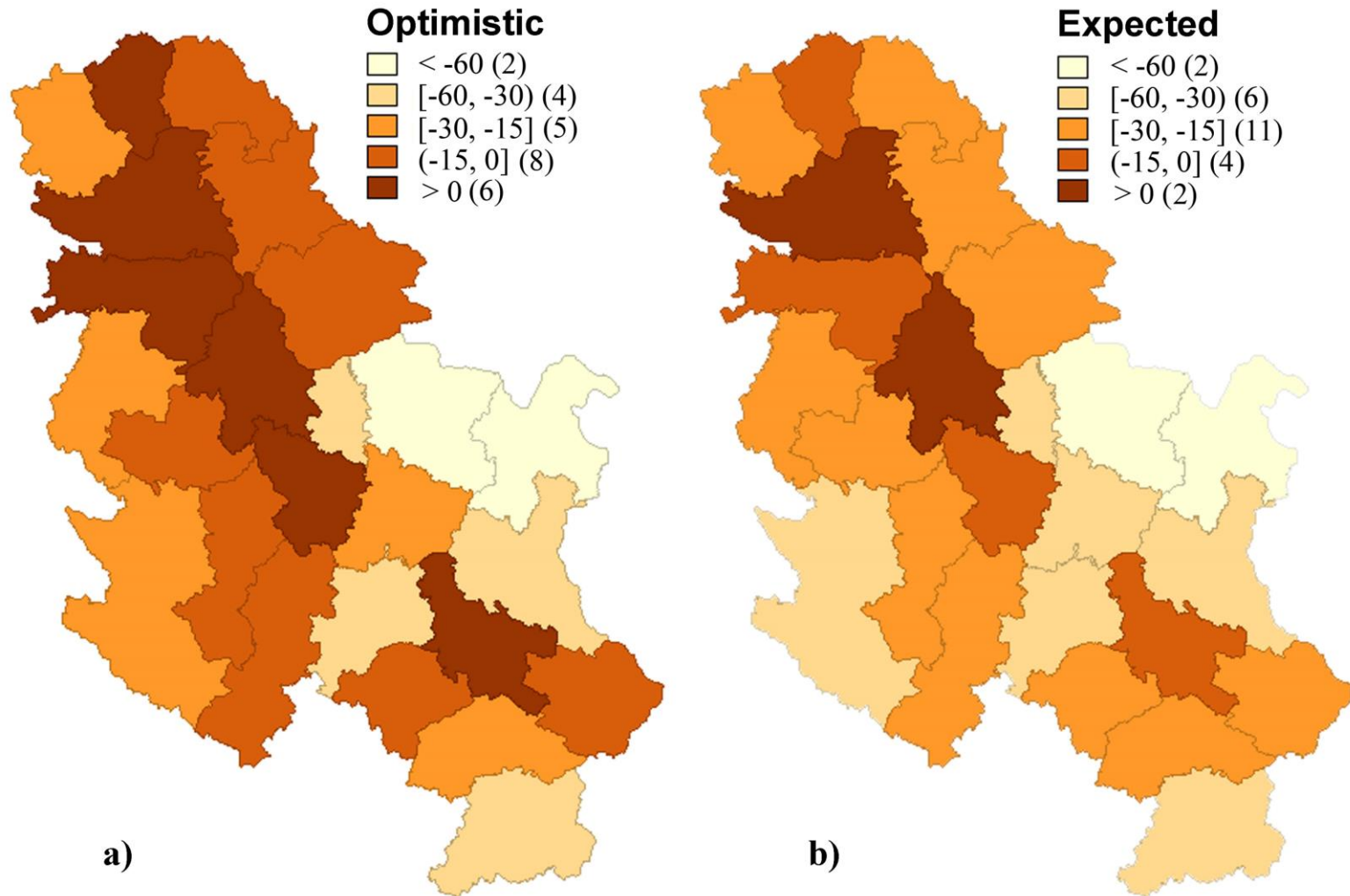
– (a) optimistic scenario, (b) expected scenario –





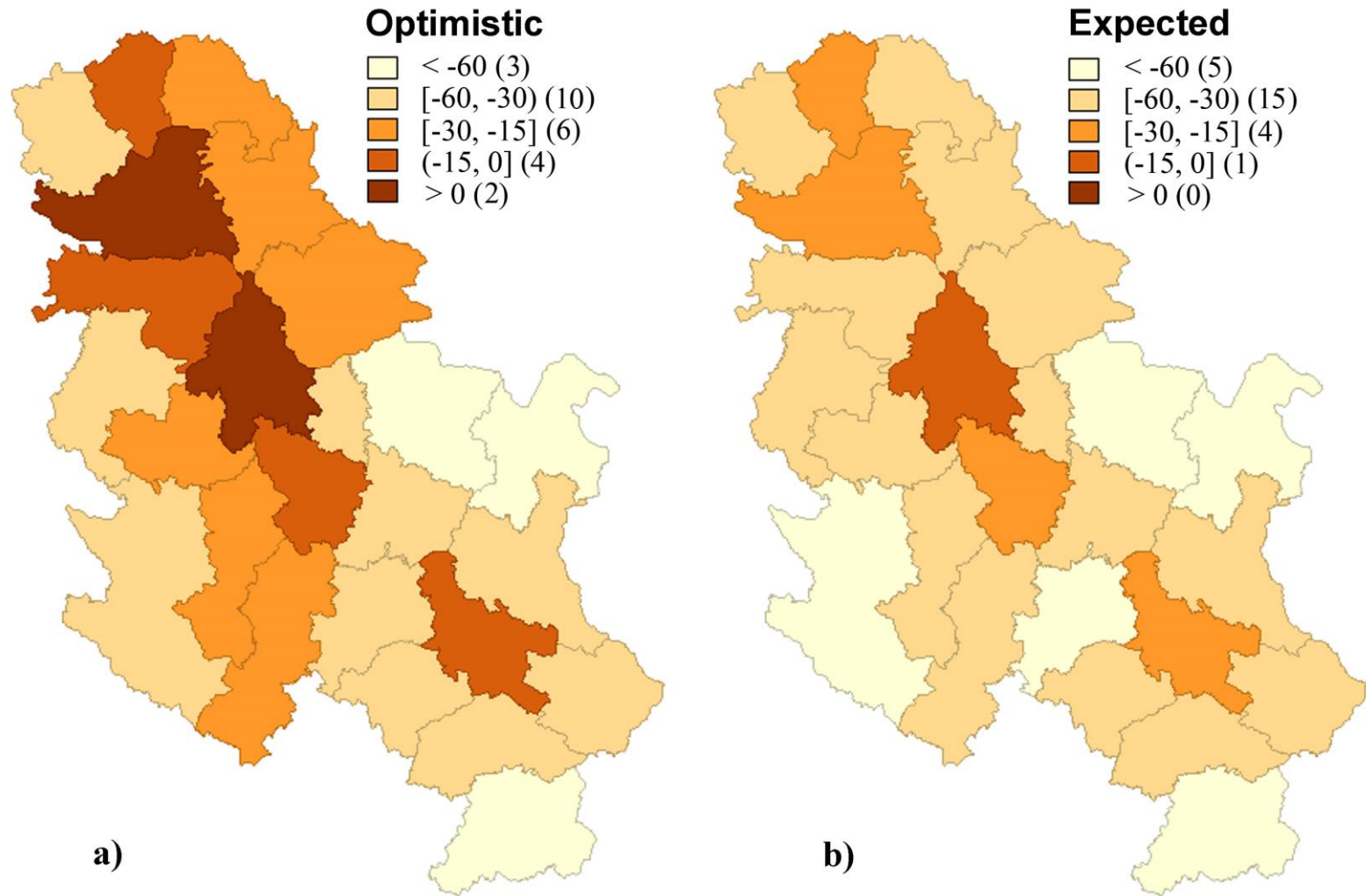
# The change in the number of livebirths 2050/2035 (%)

– (a) optimistic scenario, (b) expected scenario –



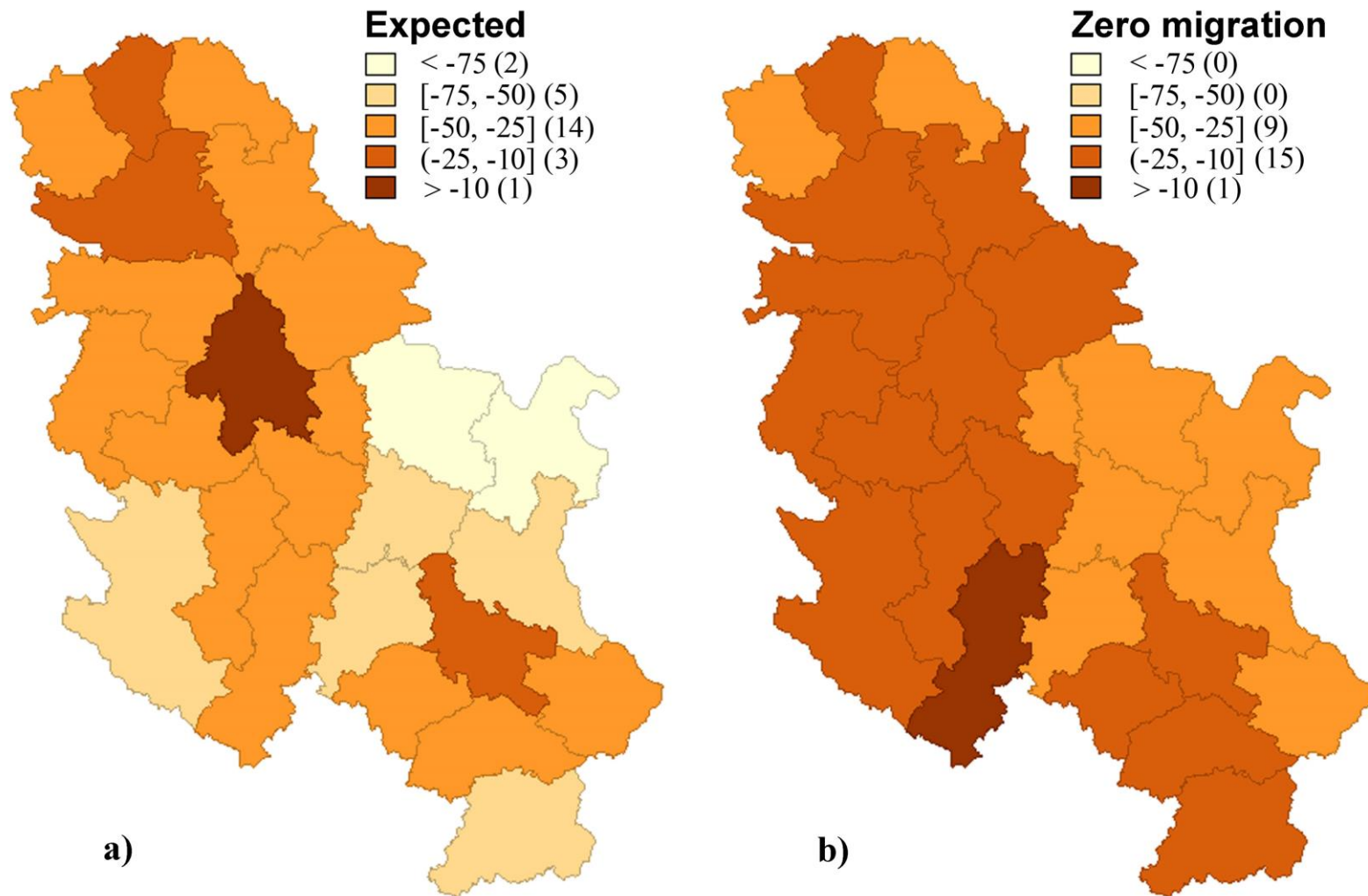
# The change in the number of livebirths 2050/2018 (%)

– (a) optimistic scenario, (b) expected scenario –



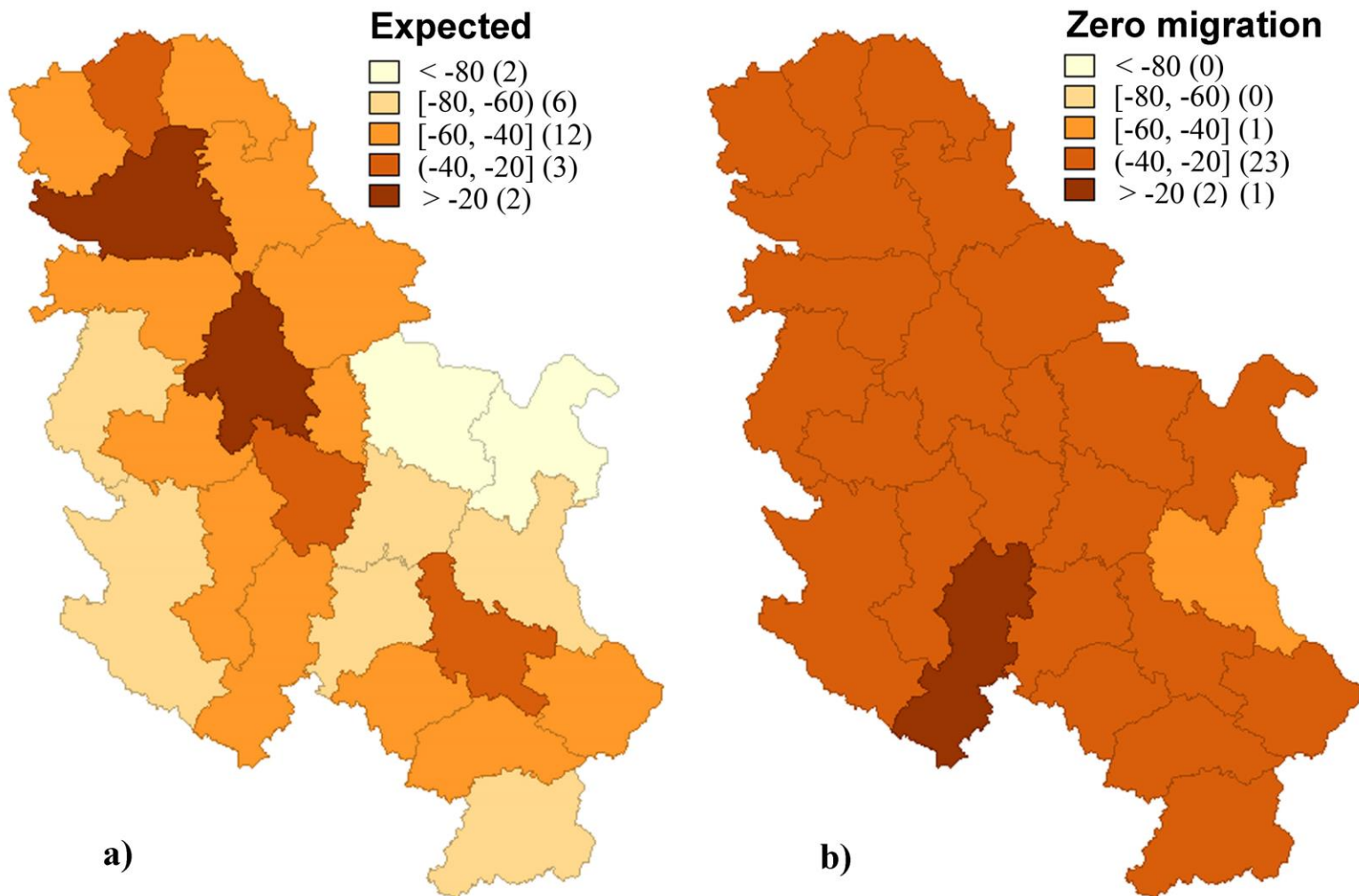
# The change in total population 2050/2018 (%)

– (a) expected scenario, (b) zero-migration scenario –



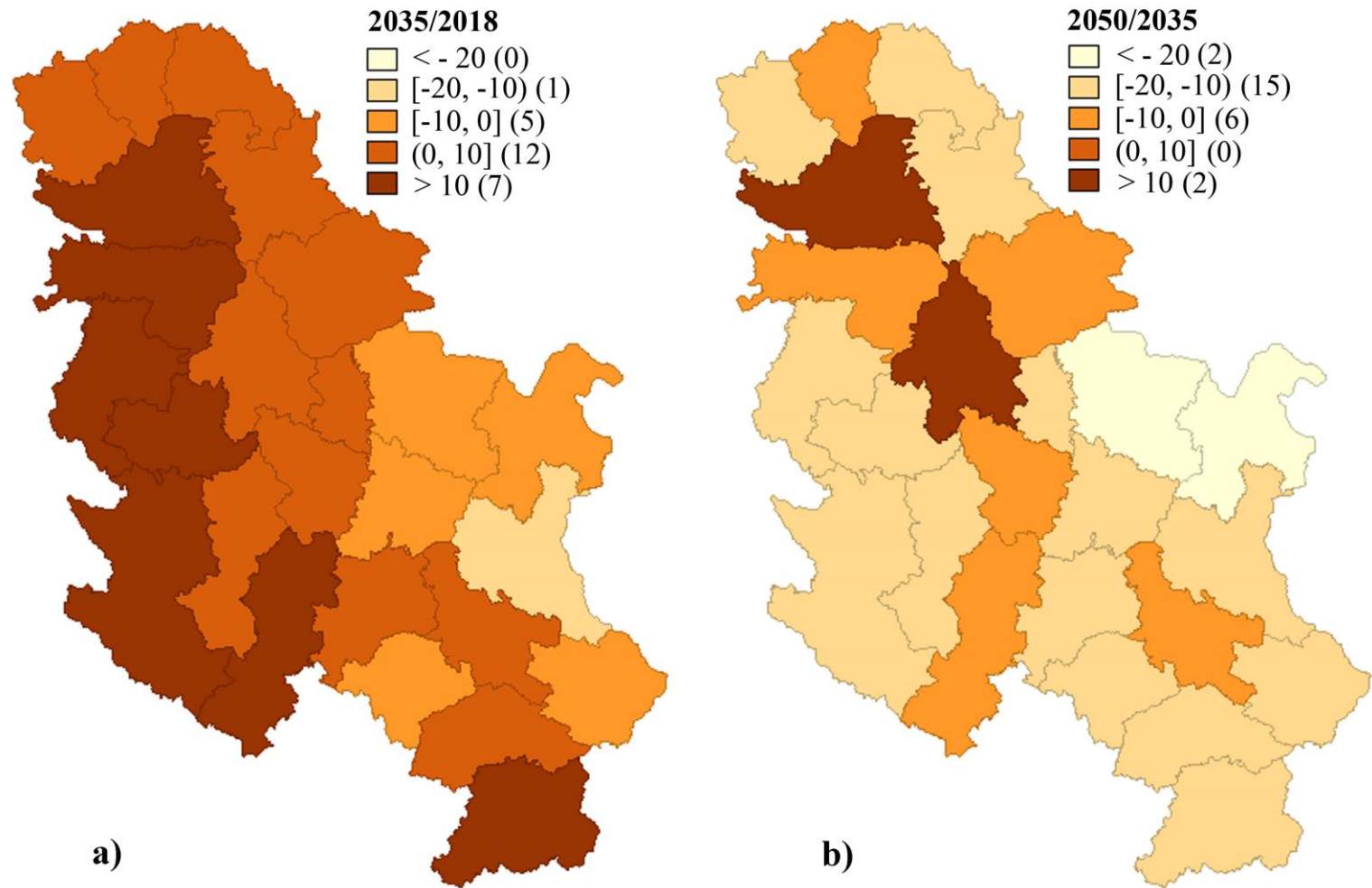
# The change in working-age (20-64) population 2050/2018 (%)

– (a) expected scenario, (b) zero-migration scenario –

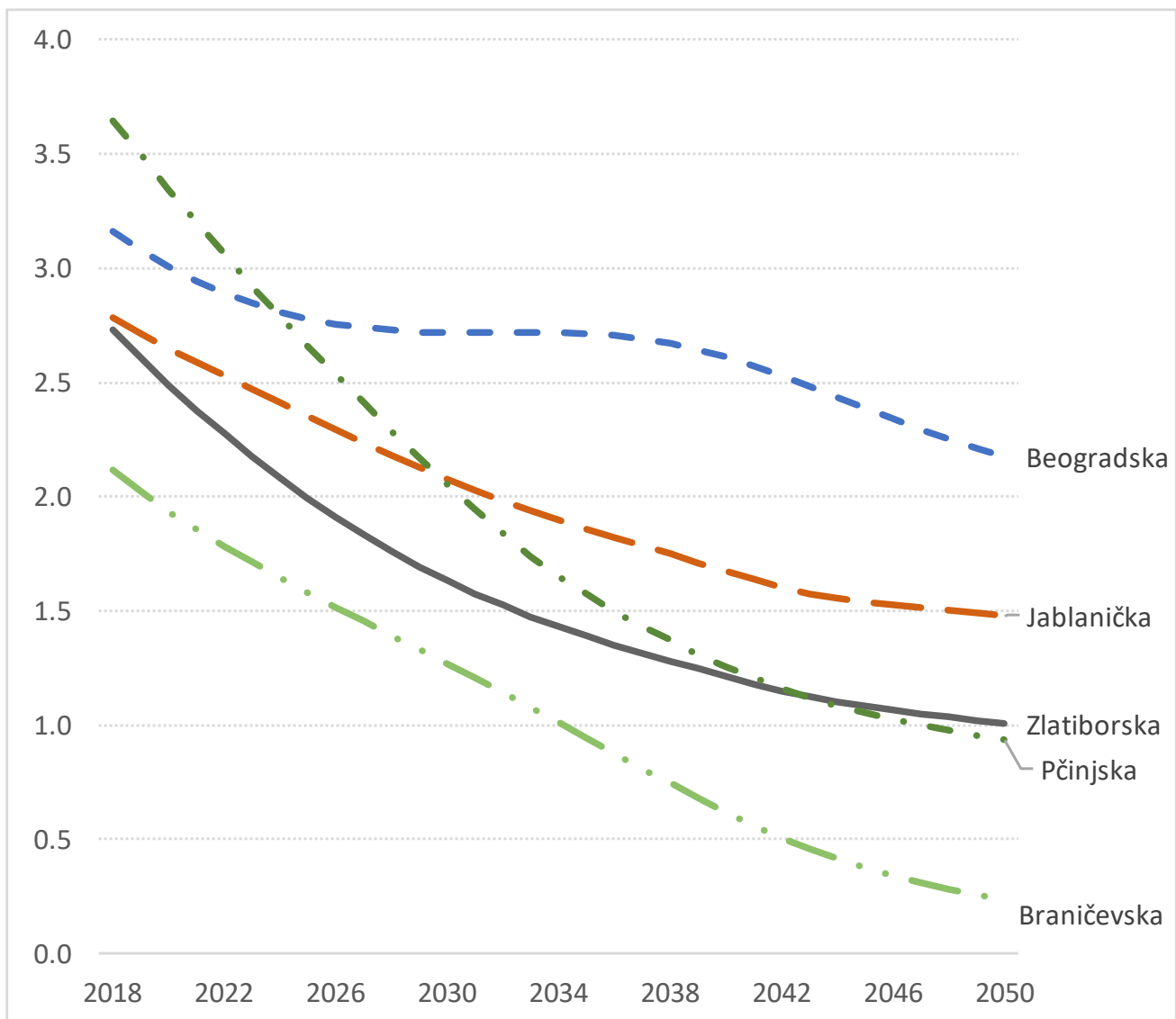


# The change in the number of elderly (65+)

– (a) 2035/2018 (%), (b) 2050/2035 (%) –

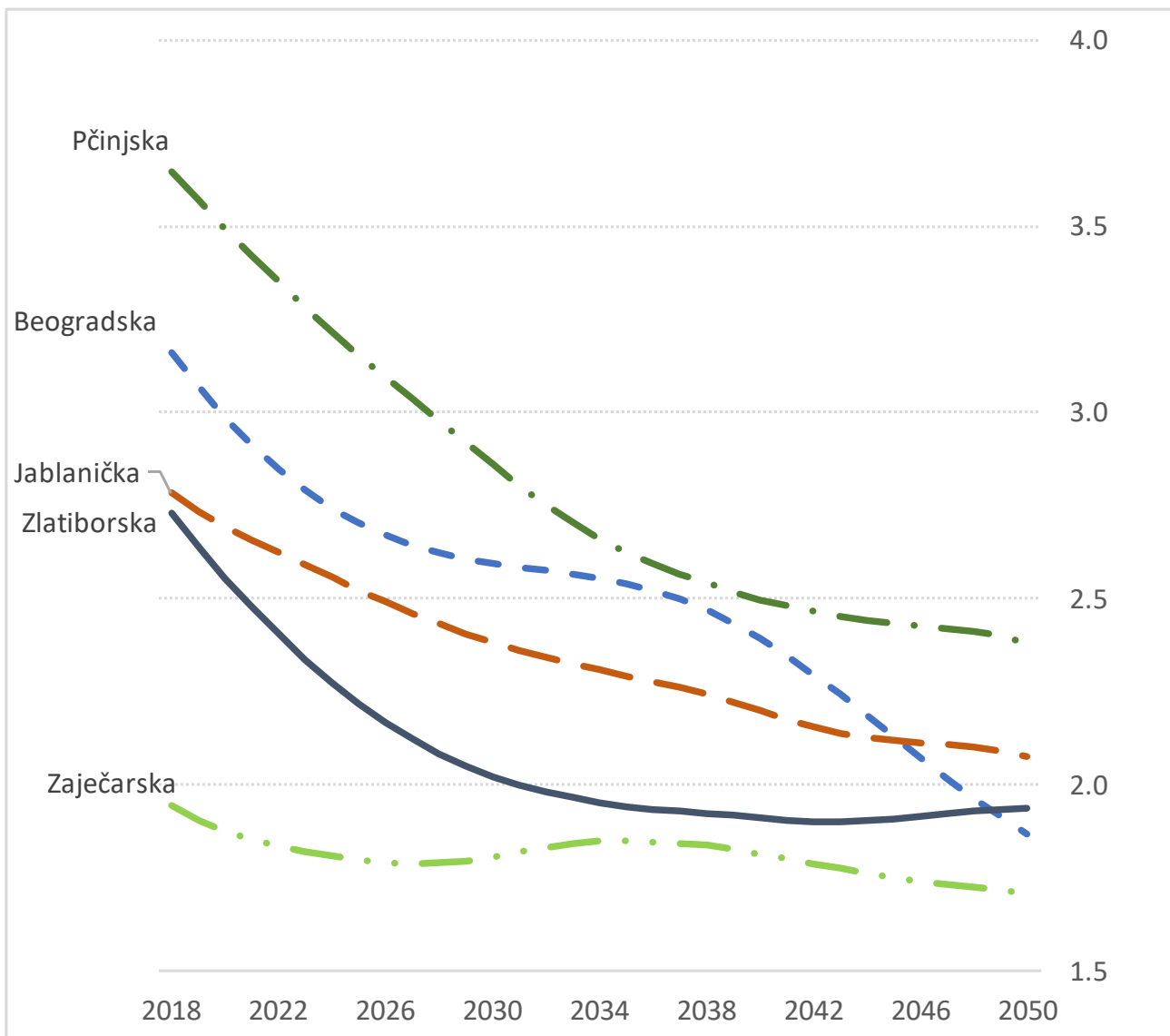


# The number of working-age persons (20-64) per one person over 65 years of age – expected scenario



Source: author's calculations

# The number of working-age persons (20-64) per one person over 65 years of age – zero-migration scenario



Source: author's calculations

## Forecast of total population by regions and districts according to two projections

- From the viewpoint of the UN model, the realization of the forecasted TFR in the official projection is more probable compared to the optimistic scenario
- Yet, the forecasted population of Serbia in 2041 is higher by 28.5% in the medium variant of the official projection than in the optimistic scenario, and smaller by only 139 thousand than the official population estimate of Serbia
- Remarkable optimism of the official projection points to the migration assumption, which completely neglected Serbia's current emigration profile
- The difference between the two projections is most striking in districts whose demographic development depends essentially on the migration component

Region/District	SORS 2011–2041		Projection 2018–2050			
	Middle var.	Zero migrat.	Expected scenario		Optimistic scenario	
	2041	2041	2041	2050	2041	2050
<b>Republic of Serbia</b>	<b>6,824,556</b>	<b>6,136,010</b>	<b>5,220,133</b>	<b>4,765,915</b>	<b>5,312,813</b>	<b>4,938,690</b>
Vojvodina region	1,713,943	1,617,476	1,439,578	1,323,886	1,470,203	1,380,155
Šumadija and West S. r.	1,852,195	1,756,020	1,268,556	1,083,576	1,287,645	1,118,001
South and East S. r.	1,275,827	1,289,500	910,071	757,837	929,241	789,466
Belgrade region/district	1,982,591	1,473,014	1,601,928	1,600,616	1,625,724	1,651,068



# Summarizing

1. The projected decrease in the population of Serbia, probably by almost one third until 2050 is the first and most important message
2. The two southern regions could lose almost half of their population, while some districts in the east could experience even more dramatic population loss
3. Despite a significant increase in total fertility rate by 2050, envisaged by the Birth Promotion Strategy, a striking decline in total population is inevitable
4. Resurgence in the number of live births can be expected only in districts along the Danube-Morava corridor (the most developed and populous urban centres) even in the optimistic scenario
5. Measures in the field of migration policy are urgent
6. Official population projections are unreasonably optimistic; their further improvements should be devoted to the issue of migration

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