THE STRUCTURE AND FUTURE OF HUNGARY'S POPULATION

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MAIN FINDINGS

» The country's population decreased by over 200,000 individuals between the two most recent population censuses (2001 and 2011); however, according to the Hungarian Central Statistical Office (HCSO), the population loss between 2001 and 2017 could be more than 400,000.

» One reason for the shrinking population is natural decrease, which means that the number of deaths exceeds the number of births. Although the number of deaths has decreased and the number of births has increased in recent years, the balance still shows a natural loss of 30,000 annually. The other reason for the population decline is the increasing rate of emigration by Hungarian citizens in recent years, which cannot be compensated for by the positive migration balance of foreign citizens.

» According to population projections, the country's population will continue to decrease. The high variant predicts that – with high fertility, a positive migration balance and high life expectancy at birth – the decreasing tendency will moderate, leaving a population of about 9 million. According to the most likely (medium or basic) variant, Hungary's population will drop to 7.75 million by 2070 – or to 6 million according to the unfavourable scenario (low variant).

» The share of male infants is about 51–52%. In 2011, this gender disparity levelled out at the age of 45. According to the basic variant of the projection, in 2040 the two sexes will be in balance at 53 years, and at 61 years by 2070. In 2011, the number of women exceeded the number of men by half a million. By 2070, this difference will have shrunk significantly to just over 100,000, in favour of women.

» On average, women live longer than men, and consequently their proportion within the population increases with age. In 2011, while the share of the two sexes barely differed in the age group 50–64, more than 63% of the over-65 population were women; however, this will decrease to 55% by the end of the period (according to the basic variant).

» The difference in life expectancy at birth between men and women is becoming smaller with every passing year. In 2011, the difference was 7.5 years; by 2070, it will be only 4.8 years (according to the basic variant).

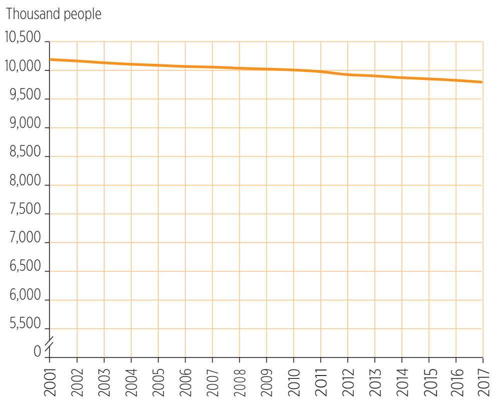
» Between 2001 and 2017, while the proportion of children decreased from 16.6% to 14.5%, the share of the elderly increased from 15.1% to 18.7%. The share of the population aged over 65 has exceeded the share of children ever since 2005, with the ageing index being 130% in 2017.

» In 2011, for every four individuals aged 15–64, there was one aged 65 or over. According to the basic variant, the old-age dependency ratio will stabilize at approximately 50%; however, in the event of an unfavourable scenario, the ageing index could even reach 250% by 2070.

POPULATION: PAST AND PRESENT

The population of Hungary has shown a decreasing tendency for over 35 years. The decline was initially due to a low fertility rate; however, since 2000 it has been further influenced by increasing emigration. Population decline is typical not only of Hungary: according to Eurostat data, the population of Eastern Europe has decreased by 4.5% since 1990 – though Hungary's population has declined more significantly (5.5%). There was a population loss of over 200,000 between the two most recent population censuses in 2001 and 2011; however, according to data from the Hungarian Central Statistical Office (HCSO), by 2017 the decline since 2001 could already be in excess of 400,000 (*Figure 1*).

Figure 1: Population size of Hungary, 2001–2017



Source: HCSO, Demographic Yearbooks.

After the change of regime, there was a gradual alteration in demographic patterns.[1] They became similar to those of Western European countries. This was most apparent with regard to establishing a family and childbearing. Younger individuals put off having children, which meant that mothers started to have their first child later in life.

This paradigm shift occurred swiftly and during a fairly short period. Its demographic consequences were a decreasing and eventually low fertility and number of births. Children from young mothers were missing from the annual number of births. These missing births were not compensated for by the increasing fertility of 'older' women during the 1990s; it was only after the turn of the millennium that this came to be (more or less) the case. (HCSO 2011: 2)

In Hungary in 2016, the average age at which women gave birth to their first child was 27.8 years; Italy was the EU Member State where women waited longest before giving birth to their first child (at an average age of 31).

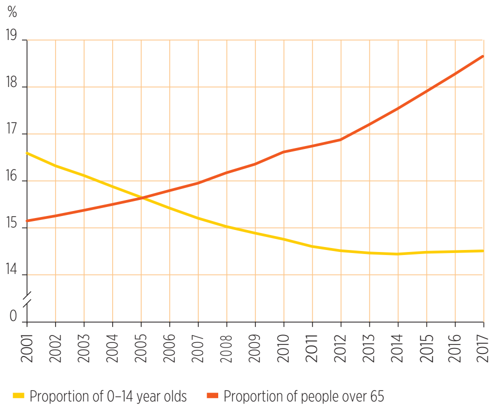
The total fertility rate in Hungary decreased steadily until 2004, reaching 1.27 in 2003; it then fluctuated a bit until 2011, when it hit an all-time low of 1.23. Since then it has risen gradually, reaching 1.5 in 2017.

The decreasing population of Hungary amplifies the process of demographic ageing. Both the *average age of the population*[G] and the proportion of the elderly are increasing, while the share of younger age groups is decreasing. In 2001, the average age of men was 37.1 years and of women – 41.1 years. By 2017, the average ages had increased by 3.1 years and 3.3 years, respectively.

The number of individuals aged 65 or over rose from 1.54 million to 1.83 million between 2001 and 2017, and their share of the population increased from 15.1% to 18.7%. Meanwhile, the share of children dropped from 16.6% to 14.5%. Ever since 2005, the proportion of the population aged 65 and over has exceeded the proportion of children (*Figure 2*); thus, the *ageing index*[G] is over 100%.

[1] For more details, see Spéder (2006).

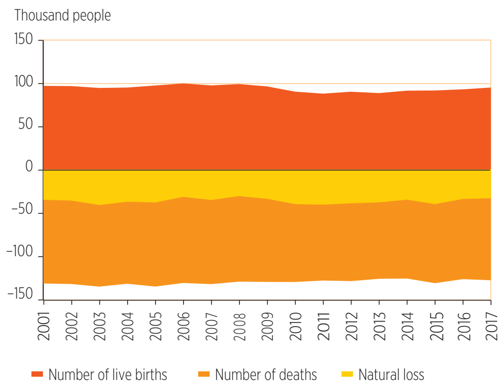
Figure 2: The proportion of children and old population, 2001–2017



Source: HCSO, Demographic Yearbooks.

The number of births has been below 100,000 a year since 1998. It dropped to under 90,000 in 2011, but since 2014 has been over 90,000 a year. The number of deaths has been declining, despite a sharp increase in the share of the elderly due to increasing life expectancy at birth (since 2001, life expectancy has risen by over four years for men and by just about three years for women).

Figure 3: Number of live births and deaths, and the changes in natural population loss with changes in natural population loss, 2001–2017



Source: HCSO, Demographic Yearbooks.

WHAT DOES THE FUTURE HOLD?

The effect of changes in the components of the demographic processes can only be felt over the long term: a decrease or increase in the number of births, and changes in mortality have little or no impact from one year to the next. But Hungary's continuous population loss that started 35 years ago – and consequently the decreasing number of *women of childbearing age*[G] – has the long-term effect of keeping reproduction at a low level.

This chapter presents the prospective size of the population by sex. As well as outlining the long-term forecasts for its composition by age, it sets out the criteria for the projection. A *population projection*[G] is a kind of 'what-would-happen-if' calculation, based on various scenarios. It therefore requires assumptions regarding potential changes in births, deaths and migration: these constitute the framework for future hypotheses. Analysis of previous trends, consideration of the opinion of experts and comparison of Hungary to other countries with similar development trajectories all help to establish various hypotheses. Traditionally three assumptions are made with regard to the components of a projection: the medium variant indicates the most feasible and realistically likely future change at the given time, while the low and the high variants establish the extreme boundaries for the change at the time when the projection is made (Hablicsek 2003).

The projection was made using the cohort component method, as recommended by the UN. First, we present the results regarding the components of *population change*[G] – namely, the number of live births, mortality and the balance of international migration. The projection is based on various assumptions regarding future fertility, mortality and migration.

The fertility assumption relates to the total fertility rate (TFR). The low, medium and high scenarios define the range within which the actual number of births is expected to fall.

In the case of mortality, assumptions are made regarding life expectancy at birth. The low, medium and high scenarios define the range within which the actual lifespan is expected to fall.

In the case of international migration, assumptions relate to the migration balance of Hungarian and foreign citizens: that is, the difference in the number of immigrants and emigrants. Once again, we use three scenarios – a low, a medium and a high variant – which will be discussed later in detail.

By combining the three different fertility, mortality and migration hypotheses – and assuming they all apply simultaneously – we are able to establish three different projection variants: we took the medium value for the medium variant, the low value for the low variant and the high value for the high variant.

Breaking slightly with convention, we made four projection models – creating one without migration, for the sake of comparison. This scenario was achieved by altering the medium variant in such a way that we excluded migration entirely: that is, we were not interested in what would happen if there were no emigrants or immigrants.

Information on the exact size of the population and its composition by sex and age is available from population census data. Between population censuses, information on population size and composition can be gathered using vital *statistics*[G] (number of births, number of deaths, migration within the country, migration across the borders of the country). We take the end-of-year population size; add to it the number of births; subtract the number of deaths; and modify it according to the balance of international migration.

The population projection presented here is based on the 2011 population census, since HCSO statistics take into consideration the officially registered migration data when calculating the population, which overestimates its real size. The *population estimation*[G] is calculated using a positive migration balance for the period between 2011 and 2017, as opposed to the migration balance based on data from the UN and mirror statistics (foreign and Hungarian citizens together) – a figure that has been negative since 2010 (see chapter on 'International migration').

In what follows, we present the results of Hungary's population projection until 2070 in terms of the size of its population and its composition (by sex and age), based on data from the 2011 population census.

THE MAIN SCENARIOS FOR DEMOGRAPHIC CHANGE

The basic variant (*Table 1*) shows moderate, yet realistic, changes in the demographic processes. The increase in life expectancy is lower than its potential maximum; however, the number of births is higher than the potential minimum. This indicates an improvement in the *old-age dependency ratio*[G] over the long term, and a more moderate decrease in the number of working-age individuals within the total population. The more moderate emigration of Hungarian citizens and the stagnating positive migration balance of foreign citizens together result in an immigration surplus, which has a positive effect on both population size and composition by age. All in all, the basic model paints a moderately favourable picture of the population development of the country. It is noteworthy that – alongside positive

Table 1: Scenarios for the population projection: the basic variant

Index	2016	2020	2040	2070
Total fertility rate	1.49	1.65	1.65	1.65
Life expectancy at birth, men	72.4	73.2	77.8	83.5
Life expectancy at birth, women	79.2	80.0	83.7	88.3
Balance of international migration (Hungarian citizens)	–22,700	–20,000	–10,000	–10,000
Balance of international migration (foreign citizens)	13,339	15,000	15,000	15,000
Net migration	–9,361	–5,000	5,000	5,000

Source: HCSO Demographic Yearbooks; author's calculations.

developments in such structural factors as standard of living, lifestyle and health maintenance – the hypothesis is based on stable family and healthcare policies, which yield significant and long-lasting results in terms of life expectancy.

The low and the high variants show the potential minimum and maximum population size, with regard to total population, population groups and the number of births and deaths (*see Table 2* for certain values). Thus, the variants indicate future population developments over time in the shape of a widening funnel.

The variant excluding migration is basically identical to the hypotheses used in the basic model, with the minor difference that both the Hungarian and the foreign migration balances are zero; consequently, this variant is not presented in a table.

Table 2: Scenarios for the population projection: the low variant and the high variant

Low variant

Index	2016	2020	2040	2070
Total fertility rate	1.49	1.45	1.45	1.45
Life expectancy at birth, men	72.4	73.0	76.7	81.4
Life expectancy at birth, women	79.2	79.5	82.3	85.5
Balance of international migration (Hungarian citizens)	–22,700	–30,000	–22,000	–20,000
Balance of international migration (foreign citizens)	13,339	12,500	12,500	12,500
Net migration	–9,361	–17,500	–9,500	–7,500

High variant

Index	2016	2020	2040	2070
Total fertility rate	1.49	1.67	1.80	1.80
Life expectancy at birth, men	72.4	73.2	78.6	85.5
Life expectancy at birth, women	79.2	80.0	84.5	90.3
Balance of international migration (Hungarian citizens)	–22,700	–10,000	–5,000	–5,000
Balance of international migration (foreign citizens)	13,339	15,500	20,000	20,000
Net migration	–9,361	5,500	15,000	15,000

Source: HCSO Demographic Yearbooks; author's calculations.

JUSTIFICATION FOR HYPOTHESES

Total fertility rate

There are significant differences among European countries regarding the number of children. Practically every country has a fertility rate of below 2.1, the value necessary for natural reproduction – and it is unlikely that Hungary (or any European country) will reach or exceed this level.

Researchers all agree that there have been three major stages in the historical development of fertility. The first stage featured a period when the fertility rate was high (above 5). The second stage was a period of transition and declining fertility. And the third stage is typified by low fertility, with a value below the required level for reproduction. These models have been investigated by several researchers in Europe (Lutz 2007; Lutz et al. 2006).

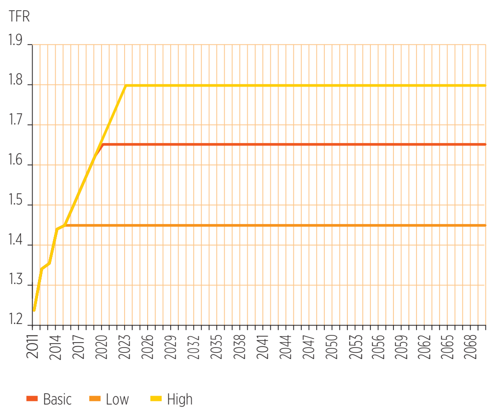
In the *basic variant* of the projection for Hungary, the total fertility rate increases steadily – but even in the long term does not reach 2.1, the replacement level. Within a few years, depending on economic development, social welfare and family policies, the average number of children will be 1.65. The basic variant follows the scenario according to which we assume that the TFR will continue to increase moderately, following the typical trend witnessed in other post-socialist countries (the other three Visegrád countries – Czech Republic, Poland and Slovakia – the Baltic states and Slovenia) during a 10-year period that lasted from the lowest fertility rate to the economic crisis (1998–2007), when the annual rate of increase was 0.044. The fertility rate will continue to rise by this amount until it reaches the average value for the Central and Eastern European countries (1.65); at that point it will cease to increase and will remain at 1.65.

The *low variant* is based on unchanging fertility. In this scenario we assume that the fertility rate does not change during the period considered, and remains at a level equal to the average value (1.45) of the past 10 years in the German-speaking countries (Germany, Austria, Switzerland). Following its short-lived increase (TFR was 1.49 in 2016 and 1.5 in 2017), willingness to give birth will stabilize at the value typical of the mid-1990s and 2015 (1.45).

In the case of the *high variant,* we assume that Hungary's fertility rate will follow those of countries with a high fertility rate (France, Finland, Sweden, Denmark), and will increase to the 10-year average of those countries (1.8). According to this hypothesis, that value will be reached when the average age of childbearing reaches the average age of childbearing in countries with high fertility (31 years) – i.e. in 2023 – and will then stabilize at 1.8. The annual rate of increase until 2023 will be 0.04.

Family policies play a significant role in all the different hypotheses. Such measures have heavily influenced past changes in annual fertility. Demographic and family policies will continue to have an impact on changes in fertility, although their effect and their intensity will vary considerably, according to the different social classes.

Figure 4: Hypotheses for total fertility rate, 2011–2070



Source: HCSO HDRI 2018.

WHAT IF THE FERTILITY RATE WERE 2.1?

If the fertility rate increased by 0.044 annually, it would reach 2.1 (the required level for natural reproduction) by 2031, and the annual number of births would exceed 100,000 (considering life expectancy at birth and the migration balance of the basic variant). Since the size of the population is influenced by all three demographic components (birth, death, migration), there would still be a dip between 2037 and 2045, due to the lack of women of childbearing age. This would continue until 2046, when the trend would start to be reversed, and the population would stabilize by 2057 (at 8.7 million). This draws attention to the fact that 'multidimensional' population reproduction – decreasing mortality, a moderate rate of emigration and encouraging return migration – is just as important as fertility-based natural reproduction.

Mortality

The assumptions on mortality are based on life expectancy at birth.

For the basic variant, we consider values that are lower – 83.5 years in the case of men and 88.3 years in the case of women – than those predicted by Eurostat for Hungary (men: 83.9 years, women: 88.6 years) in 2070, and take the period between 2011 and 2016 as the basis for our calculations. Eurostat used life expectancy at birth in 2014, and took account of the slowly increasing tendency of recent years.[2] It should be noted that 2015 marked the end of a 15-year trend. Since 1998, Hungary had never witnessed a decrease in life expectancy at birth, but in 2015 the figure fell by 0.3 years compared to the previous year. Not only was this decline apparent in Hungary: it was felt in 19 other European countries. We cannot tell whether it was an isolated blip – perhaps a consequence of the influenza epidemic (see chapter on 'Mortality') – or whether we might experience something similar in years to come. Between 1990 and 2010, life expectancy at birth among women increased by 2.4 years every 10 years; however, this tendency seems to have moderated somewhat, and from 2010 to 2015 the figure rose by only 0.6 years. In the case of men, life expectancy at birth increased by 2.3 years between 1990 and 2000, and by 3.2 years between 2000 and 2010, with a similar increase from 2010 to 2015. This shows that the difference between life expectancy at birth for men and for women is gradually shrinking. This ever-decreasing gender difference is a well-known and thoroughly examined phenomenon, and several researchers have tried to establish the reasons behind it. Usually health reasons and the different morbidity patterns of men and women are cited. Also, the significantly smaller differences between the lifestyle and the labour market status of men and women might explain why the mortality figures are converging; this is also apparent in the ever more similar figures for life expectancy at birth (Meslé 2004; Sundberg et al. 2018).

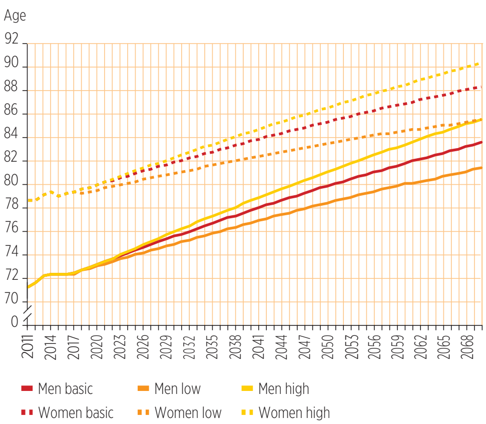
[2] For more details on the projection hypotheses and calculation methodology of Eurostat, see: Eurostat (2007): Summary methodology of the 2015-based population projections. Eurostat, Luxembourg. http://ec.europa.eu/eurostat/cache/metadata/Annexes/proj_esms_an1.pdf

While the difference in 2011 was 7.5 years, it is likely to have narrowed to 4.8 years by 2070. In 2015, the average difference in the EU-28 countries was 5.4 years, with the largest gap in Lithuania (10.5 years) and the smallest in the Netherlands (3.3 years).

Bearing this in mind, and in light of the 2015–2016 figures for life expectancy at birth, we modified the data for the starting year of the time series for life expectancy at birth of the basic Eurostat variant. Since the quadratic polynomial fitted on the original Eurostat data set with a precision of 99.99%, we used this approach to determine life expectancy at birth for men and women for the basic variant up until 2070 (Eurostat 2017).[3]

The *low variant* is based on high mortality: that is, it is the variant with the lowest life expectancy at birth. We determine the average life expectancy values for men and women for the period between 2016 and 2070 by fitting a quadratic polynomial on the five-year averages for the period between 1990 and 2015. In this case, life expectancy would be 81.4 years for men and 85.5 years for women by the end of the period.

Figure 5: Hypotheses on average life expectancy at birth, 2011–2070



Source: HCSO HDRI 2018; author's calculations.

The hypothesis for the *high variant* – based on low mortality and high life expectancy at birth (following the similar scenarios of Eurostat) – is that by 2070 both men and women will live 2.0 years longer than in the case of the basic variant (85.5 years for men instead of 83.5 years and 90.3 years for women instead of 88.3 years). This means that the previously sharp increase in life expectancy will become more moderate. There are physiological limits to the increase in life expectancy, coupled with health care and lifestyle-related effects; consequently, it is obvious that the previous rising trend cannot continue.

Migration

The most unpredictable factor in the population projection is international migration (for the uncertain nature of data on international migration and the methodology, see the chapter on 'International migration'). Migratory processes have been rather different in recent decades. In Hungary, the early 1990s were typified by the arrival of foreign immigrants (although there was also some emigration). The emigration of Hungarian citizens became a significant trend in the second half of the 2000s; however, even today we do not have precise relevant data, although we do have data sources based on estimations (e.g. mirror statistics; see chapter on 'International migration').

According to the Eurostat database, the net migration rate for host countries varied between 1‰ and 1% in 2017; the exception was Sweden, where it exceeded 1%. EU members reported an average 0.4% annual net migration rate. According to official data from the HCSO, in the case of Hungary the figure was 0.12% in 2011 and 0.14% in 2017. Officially, then, this translates into a positive balance of an average of 10,000 annually.

[3] Eurostat established two hypotheses regarding life expectancy at birth: a basic (medium) and a high variant.

However, the Hungarian Demographic Research Institute (HDRI) calculates a negative migration balance of Hungarian citizens as a result of the impact that the opening up of the British, German and Austrian labour markets had; we assume that this will continue to be felt for a few more years (Gödri et al. 2014; Bleha et al. 2014; Földházi 2014; Gödri 2015). Thereafter, we project a negative migration balance of over 20,000 for a few years, according to the basic variant and a highly negative migration balance of 30,000 for 15 years, according to the low variant – partly due to the effect of migration networks, the increased mobility of young people and the appealing nature of countries with more favourable labour market opportunities. However, we can assume that following this period, those who previously emigrated will return in their old age; consequently, population loss due to emigration will decrease (Földházi 2014). The migration balance of Hungarian citizens will still be negative in 2040. From 2040 to the end of the projection period, the deficit will be 10,000 according to the basic variant and 20,000 according to the low variant.

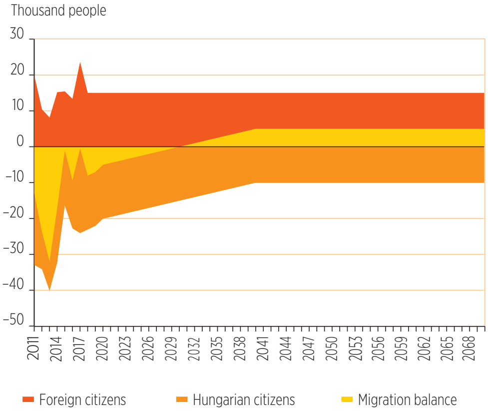
The former – basic – migration hypothesis can be described as *partial model change*, since for a limited time the migration balance will be negative; however, after 2030 it will turn positive due to the immigration of foreign citizens (Földházi 2014).

In the case of the latter (low) there is *complete model change* compared to the period from 2004 to 2009, when Hungary was still a country of destination. According to demographic data regarding vital events and estimations based on mirror statistics, Hungary's migration balance has been negative since 2010. According to Földházi:

> the balance of foreigners does not increase, the dip in the number of Hungarian emigrants lasts longer than in the case of the previous variant, and although changes for the better will eventually happen, this is far from enough to turn the entire migration balance into a positive one. This model means that Hungary will continue as a sending country; thus, a complete model change will have taken place [since the period 2004–2009]. (Földházi 2014: 255)

We established four possible variants regarding migration. In the case of the *basic variant* (*Figure 6*), the emigration of Hungarian citizens will moderate, while the migration balance of foreign citizens will stabilize at plus 15,000 individuals; consequently, the country's migration balance will turn from negative to positive by 2030.

Figure 6: Basic variant for migration hypothesis

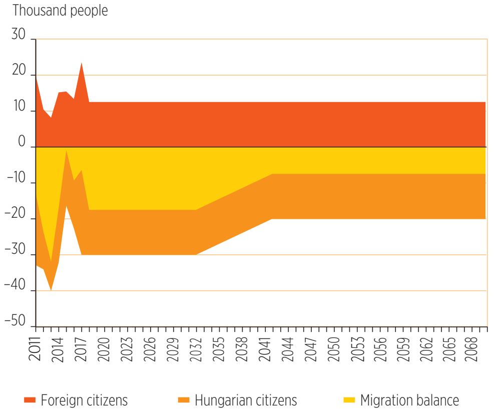


Source: HCSO HDRI 2018.

In the case of the *low variant* (*Figure 7*), the emigration of Hungarian citizens continues to significantly exceed the number of return migrants, while the positive balance of foreign citizens becomes less dominant; thus, the migration balance will remain negative throughout the period.

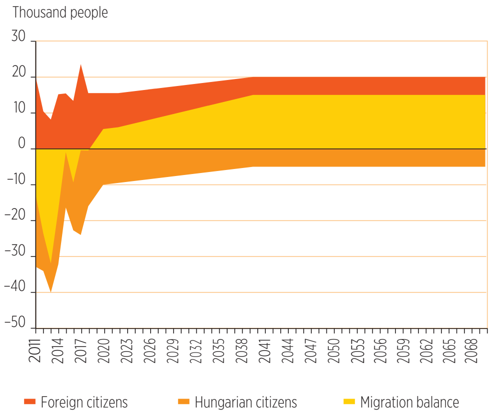
In the case of the *high variant* (*Figure 8*), the collective migration balance of Hungarian and foreign citizens will stabilize at +15,000: this is due to, on the one hand, the decreasing emigration of Hungarian citizens, and on the other hand, a positive and growing balance of foreign citizens – though still of a volume acceptable to current migration policy.

Figure 7: Low variant for migration hypothesis



Source: HCSO HDRI 2018.

Figure 8: High variant for migration hypothesis



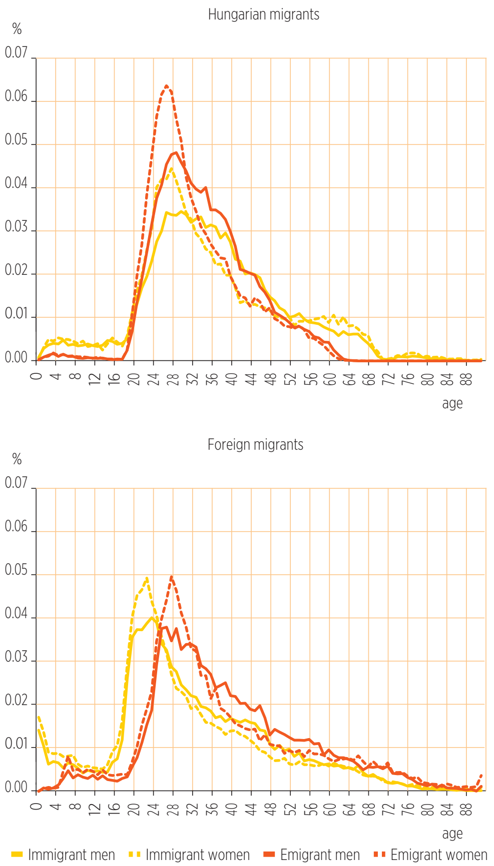
Source: HCSO HDRI 2018.

Foreign and Hungarian migrants are taken separately into consideration. This is because their age structures are different, and migratory changes by age over time are also likely to differ (*Figure 9*).

The data on foreign immigrants show that between 2012 and 2016, the male-to-female ratio was 57:43; in the case of emigration it was 60:40. The gender distribution of Hungarian immigrants and return migrants was 56:44; among emigrants it was 53:47.

In the case of a positive migration balance, we consider the age structure of immigrant men and women, while in the case of negative migration balance, we consider the age structure of emigrant men and women – in both cases separately for foreign and Hungarian citizens.

Figure 9: Average age structure of migrants, 2012–2016



Source: HCSO, Vital statistics; author's calculations.

UN AND EUROSTAT PROJECTIONS ABOUT POSSIBLE CHANGES IN HUNGARY'S POPULATION

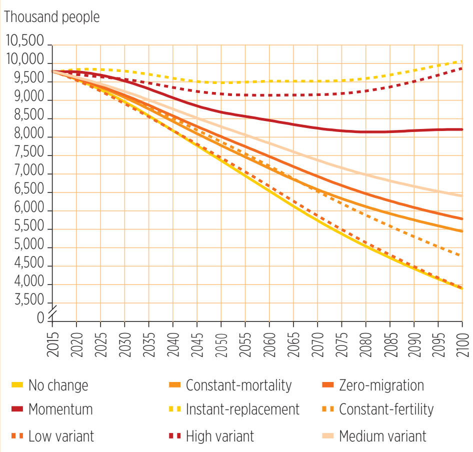
The Population Division of the United Nations published the most recent results of its population projection for 233 countries of the world in 2017. Altogether nine variants of the population projection were produced using the cohort component method. The projection is based on data for the period 1950–2015, and calculates five-year averages for the period 2015–2100. The different variants mainly relate to fertility, and are as follows: 'medium fertility', 'high fertility', 'low fertility', 'constant fertility', 'instant replacement'.[4] In addition, the so-called 'momentum' scenario was created by altering the mortality and migration parameters of the instant-replacement variant in such a way that mortality was kept at the average value for the period between 2010 and 2015, while the migration balance was zero (for details, see United Nations 2017).

Six out of the nine variants reveal a constant population loss for Hungary, although to varying degrees. However, three variants were produced that would (eventually) halt population decline.

According to the 'momentum' variant, the population will cease to decline by 2080; according to the instant-replacement variant, population loss will last until 2052, and will be followed by a moderate increase; according to the high variant, the change will take place in 2060.

Probability calculations were also used by the UN to predict population sizes. Based on this calculation, the population of Hungary will shrink to 6.4 million by the end of the century – a figure that is identical to the medium scenario based on traditional calculations. A 95% confidence interval allows a deviation of 1.95 million individuals from the mean value (6.4 million); thus, with 95% probability, the population of Hungary will be somewhere between 4.4 million and 8.3 million by 2100. For the sake of comparison, using the probability method, the UN predicted a population of 7.37 million by 2070, whereas according to the basic variant of our projection (based on the cohort component method), the prediction is 7.75 million.

Figure B1: Projections of UN scenarios, 2015–2100



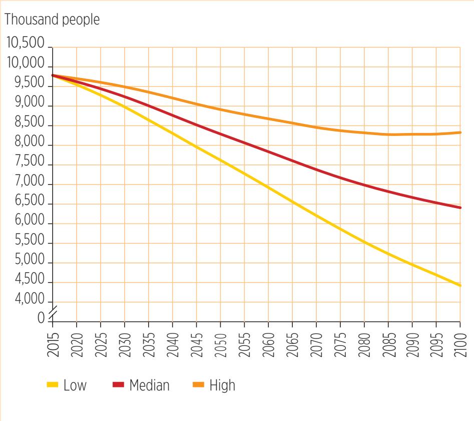
Source: UN (2017); author's design.

Eurostat also uses the cohort component method in its projections. Its basic premise is that the birth and death indices of EU Member States are becoming ever more similar to one another, while an equilibrium will be reached regarding

[4] In this case, the value for fertility is determined in such a way that guarantees long-term population reproduction. Mortality and migration hypotheses are identical to the medium variant.

international migration. In the most recent projection, 2150 is taken as the year of convergence. Calculations are updated every other year, and are published as part of the Europop series.

Figure B2: Median variant for probability-based population projection with a 95% confidence level, 2010–2100

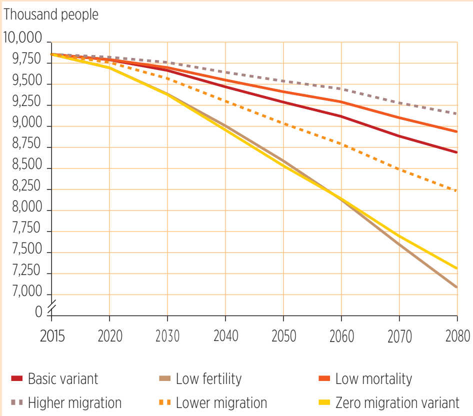


Source: UN (2017); author's design.

Eurostat has created five scenarios for the population projections of different countries:

- Low fertility: fertility is 20% lower than in the case of the basic variant.
- Low mortality: the age- and sex-based mortality rate decreases continuously, so that by 2070 life expectancy at birth will be two years higher than in the basic variant.
- Higher migration: the migration balance will increase by a third during the projection period.
- Lower migration: the migration balance will decrease by a third during the projection period.
- Zero migration variant: in reality, the migration balance does not reach zero during the projection period; this is only a hypothetical value, and indicates that the migration balance converges to zero in the long run.

Figure B3: Eurostat population projection for Hungary according to various scenarios, 2015–2080



Source: ENSZ (2017); author's design.

According to the basic variant, Hungary's population will be 8.88 million in 2070, as opposed to the 7.5 million projection calculated by the Hungarian Demographic Research Institute. The main reason for this difference is the inaccurate migration data, since Eurostat calculations involve a positive migration balance for Hungary (based on official data from the HCSO), while our estimated migration balance has been negative in recent years, and is unlikely to turn positive in the near future.

RESULTS OF THE PROJECTION UNTIL 2070

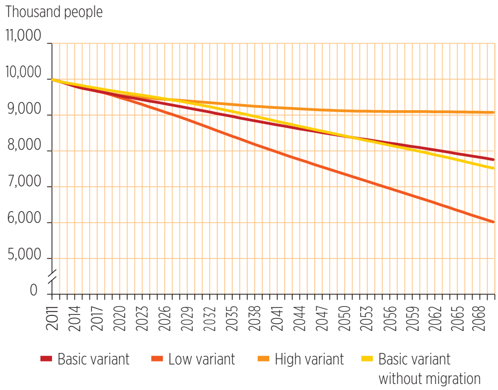
This section presents a future projection based on the period since the last population census in 2011. The population of Hungary was 9.985 million on 1 October 2011, the theoretical time of the population census. That is 728,000 people fewer than the highest figure of 1981; in other words, the country's population shrank by 6.8% in 30 years – a decrease of 25,000 annually. If this trend continued in a linear fashion, Hungary would have 8.5 million inhabitants by 2070.

Population estimations are based on vital and migration statistics, the latter containing the number of registered emigrants and immigrants. Thus, we calculated for the most recent period from 2011 to 2017 based on the size of the population in 2011 and taking into consideration estimated international migration processes. The difference is 134,200: 75,600 men and 58,600 women are missing from the population compared to the population estimation; this is primarily the result of Hungarian citizens not registering when they emigrate.

In what follows, we present the population projection based on the 2011 population census according to four scenarios (*Figure 10*). Since the projection period is over 50 years, we can set a fairly wide range for the potential population size. The lowest value is 6 million and the highest is 9.07 million; meanwhile, according to the basic variant, Hungary's population in 2070 will be 7.75 million.

The *low variant* yields the lowest population size (6 million). This reflects the least likely, highly pessimistic approach, and predicts a practically linear and quite dramatic annual fall of 69,000 on average. This scenario calculates using the low fertility of 2015 for the entire period, and a moderate increase in life expectancy at birth. Currently life expectancy at birth in Hungary is approximately 5–6 years lower than in those EU countries with low mortality (e.g. France); the low-variant scenario assumes that this difference will remain.

Figure 10: Expected population size of Hungary, 2011–2070



Source: HCSO HDRI 2018; author's calculations.

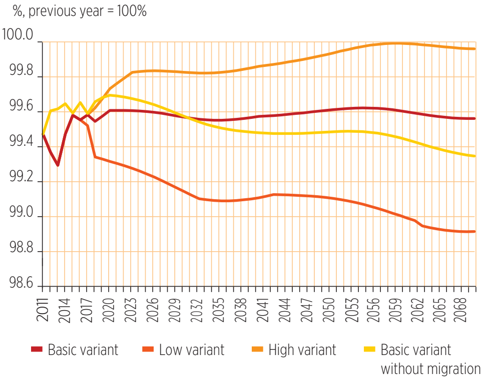
The population decrease continues until 2070 even according to the *basic variant,* although population loss does moderate. During the course of more than 50 years we will lose over a fifth of our population, or 2.24 million individuals.

The *high variant* presents us with the most favourable result. According to this, the difference between EU countries with low mortality and the average life expectancy at birth in Hungary will decrease; however, the average number of children will still not reach the desired level of 2.1. Even though a positive migration balance and more favourable mortality figures mean that population loss will moderate over the 50 years, that loss cannot be halted.

In the early years, the *no-migration* scenario is the most favourable, since in all other cases the negative migration balance reduces the population size. In the basic and high variants, the negative migration balance moderates, then plateaus in the 2030s, and finally turns positive. In later years, the high variant offers the most favourable and biggest population size of all the scenarios. The basic variant can only compensate for its initial loss by the beginning of the 2050s. By that time, the no-migration variant will have resulted in a bigger population size than either the basic or the low variant.

Based on these scenarios, population loss by 2070 will range from 917,000 to 3.98 million – a population decrease of between 9.1% and 39.9%, depending on which hypothesis proves correct (*Figure 11*).

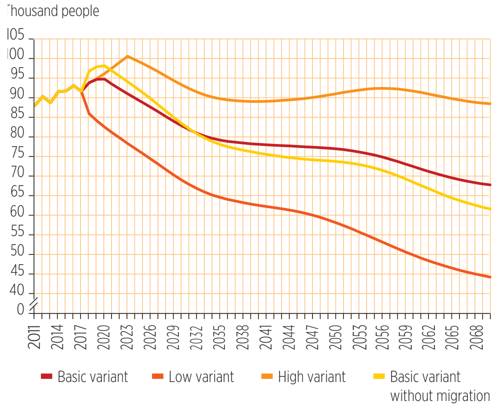
*Figure 11: Population decrease according to various scenarios, 2011–2070**



Source: HCSO HDRI 2018; author's calculations.
* Previous year = 100%.

Population size is determined by the number of births, the number of deaths and migration. The number of births is influenced by the number of women of childbearing age and willingness to have children. Whereas from 2001 to 2008 there were between 90,000 and 95,000 live births annually, in the years that followed that number fluctuated at around 90,000. According to the *high scenario*, the dynamically rising fertility rate increases the number of births. In the case of the *no-migration* variant, the number of births remains higher than in the basic variant for as long as the migration balance is negative. In the case of the *low variant*, both the negative migration balance and the low fertility rate lead to a declining number of births (*Figure 12*).

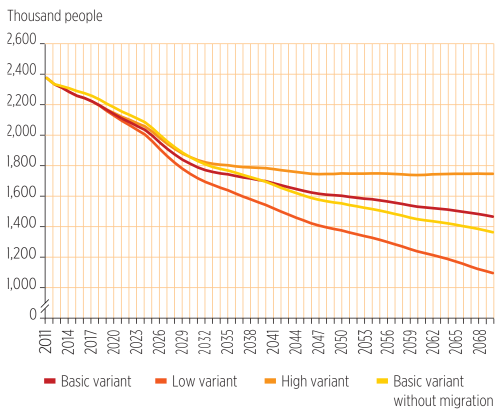
Figure 12: Possible changes in the number of births, 2011–2070



Source: HCSO HDRI 2018; author's calculations.

The number of births is further reduced by the decreasing number of women of childbearing age (*Figure 13*). Whereas in 2011, they numbered over 2.3 million, by 2026 that figure will have fallen below 2 million; and according to the basic variant, by 2066 this age group will contain fewer than 1.5 million women. If willingness to have children remains at its current level, the number of births will fall sharply; but even if fertility improves, a declining number of births is to be expected.

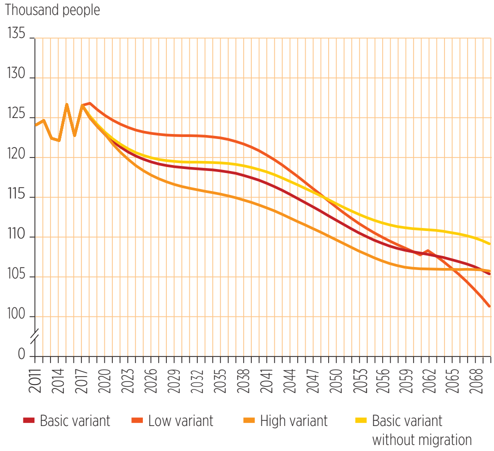
Figure 13: Number of women of childbearing age, according to various scenarios, 2011–2070



Source: HCSO HDRI 2018; author's calculations.

Mortality is the other element in the equation governing *natural increase/ decrease*[G]. The population of Hungary, as in most developed countries, is ageing. With an increase in life expectancy at birth, the proportion of the elderly increases. With age, the probability of death increases; and therefore, the number of deaths is primarily determined by the size of the old-age population. With population decline, the number of elderly individuals also decreased; however, the number of deaths has not changed over the past seven years, and continues to fluctuate at around 125,000 to 135,000 annually. Presumably, the number of deaths will decrease slowly over the next 20 years due to the ageing population, but this will be followed by another 20-year period of more intensive decrease. After that, the decrease will again become more moderate; despite improving mortality, the number of deaths will not drop below 100,000 by 2070 (*Figure 14*).

Figure 14: Number of deaths according to various scenarios, 2011–2070



Source: HCSO HDRI 2018; author's calculations.

INTERNATIONAL COMPARISON

There are significant demographic differences between the countries of Europe, which can be divided into two main groups: countries with population loss and countries with population gain. According to data from UN sources, the majority of the former socialist states belong to the former group – with the exceptions of Slovakia and the Czech Republic, whose populations have barely changed since 2000 (or have even increased slightly). Latvia and Lithuania have suffered the greatest population decline, losing almost 17% of their populations over 15 years. The population loss of Romania and Ukraine is approximately 10%; and the figure is 6% in the case of Estonia. By contrast, the populations of developed Western European and Scandinavian countries have increased. Over the past 15 years, the population of Ireland rose particularly dynamically (22%), due to significant immigration into the country; it is followed by Switzerland and Norway (over 15%). The population increase in Austria, Finland, Sweden and France has been approximately 5–10%. These population increases are a consequence of a decade-long highly positive migration balance, the higher fertility observed in the immigrant population (compared to the local population) (Sobotka 2008), increasing fertility in the local population and decreasing mortality.

Looking ahead, by 2070 Latvia will have lost over 33% of its population; Poland, Ukraine and Romania – 28%; Lithuania – 26.5%; Hungary – 24.7%; Estonia – 22.4%; and Slovakia – 18.5%. Meanwhile, the Czech Republic will have lost only 11%; Germany – 8%; and Austria – a mere 1.6%, all according to the medium variant of the projection (UN).

Among countries with population gain, the populations of Finland and France are likely to increase by 10–12%; Switzerland – 22%; Sweden and Ireland – 27–29%; and Norway – the country with the most intensive rate of increase, compared to its current population size – will see a rise of over 40%.

We have selected three countries in order to compare their age structures with that of Hungary: France, a country with one of Europe's highest fertility rates (1.96); Poland, a fellow Visegrád country with a fertility rate (1.32) that is lower than Hungary's; and Austria, a German-speaking neighbouring country with a fertility rate (1.49) similar to that of Hungary (1.45 in 2016).

Although the proportion of elderly men and women (aged over 65) was the lowest in Poland in 2015, according to the projection by 2070 this indicator will be the highest: that is, as a consequence of low fertility and significant emigration, Poland will experience the highest rate of ageing. The proportion of the elderly was similar for France and Austria in 2015; however, by 2070 – due to the different fertility rates – there will be a difference between them of 3.5%, and Austria will have the second-highest share of the elderly among the four countries considered.

Table B2: The proportion of individuals aged 65 and over in four European countries, 2015, 2070

(%)

Country	Gender	2015	2070
France	men	16.1	23.3
	women	20.5	27.9
Austria	men	16.1	28.6
	women	20.7	32.1
Poland	men	12.3	30.7
	women	18.3	36.0
Hungary	men	14.0	26.6
	women	21.4	31.6

Source: UN (2017); author's calculation

Table B1: Changes in the population of selected European countries, 2000–2015

Country	Population, thousand people				Change by 2015
	2000	2005	2010	2015	%[a]
Czech Republic	10,290	10,258	10,536	10,604	103.1
Hungary	10,221	10,086	9,928	9,784	95.7
Poland	38,550	38,363	38,323	38,265	99.3
Slovakia	5,399	5,399	5,404	5,439	100.7
Romania	22,128	21,431	20,440	19,877	89.8
Ukraine	48,840	46,892	45,793	44,658	91.4
Austria	8,069	8,254	8,410	8,679	107.6
Estonia	1,399	1,356	1,332	1,315	94.0
Latvia	2,384	2,252	2,119	1,993	83.6
Lithuania	3,502	3,344	3,124	2,932	83.7
Finland	5,188	5,259	5,366	5,482	105.7
Norway	4,499	4,632	4,886	5,200	115.6
Sweden	8,882	9,039	9,390	9,764	109.9
France	59,608	61,234	63,027	64,457	108.1
Ireland	3,849	4,213	4,627	4,700	122.1
Germany	81,488	81,671	80,895	81,708	100.3
Switzerland	7,167	7,410	7,832	8,320	116.1

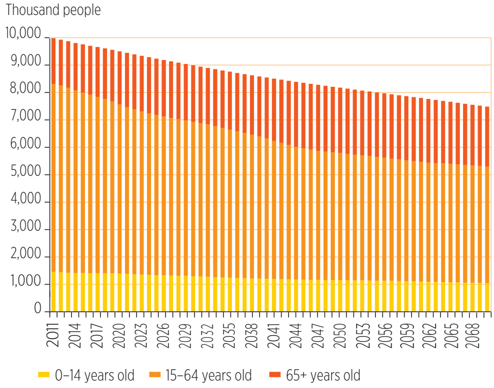
[a] 2000=100%.
Source: UN (2017); author's calculations.

THE FUTURE STRUCTURE OF THE POPULATION BY SEX AND AGE

The three main age groups of the population are children, working-age individuals and the elderly (*Figure 15*). Children are those individuals aged under 15, while the elderly are individuals aged 65 and over (which coincides with the current retirement age). In 2011, there were 1.46 million children in Hungary. Over time, according to the *basic variant*, this age group will gradually shrink, as the population steadily ages: by 2020, the number of children will fall below 1.4 million, and by 2070 will probably not even reach 1.1 million. This decrease of almost 400,000 is a consequence of lower fertility and postponed childbearing. Due to the gradually decreasing number of women of childbearing age, even a significant increase in fertility could not prevent population loss. At the same time, the size of the population aged 65 and over will increase significantly: in 2011, there were 1.67 million elderly people in Hungary, and that figure will grow to over 2 million in the early 2020s (as those born in the 1950s join that age group); thereafter, the rate of increase will moderate. This age group will peak at 2.41 million in 2047; thereafter it will start to decrease, and is expected to be approximately 2.27 million by 2070.

Since on average women tend to live longer than men, their share within the population increases with age: in 2011, while the numbers of men and women in the 50–64 age group were almost identical, over 63% of those aged 65 and over were women. However, this figure will decline to 55% by 2070.

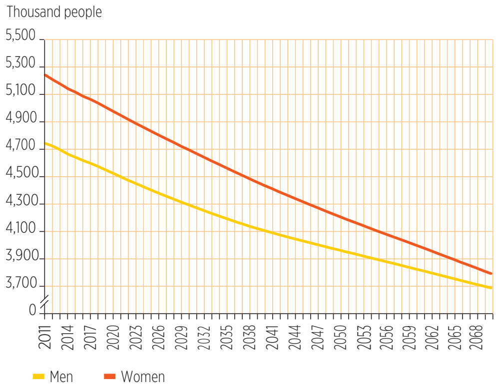
Figure 15: Composition of the population by main age groups: basic variant



Source: HCSO HDRI 2018; author's calculations.

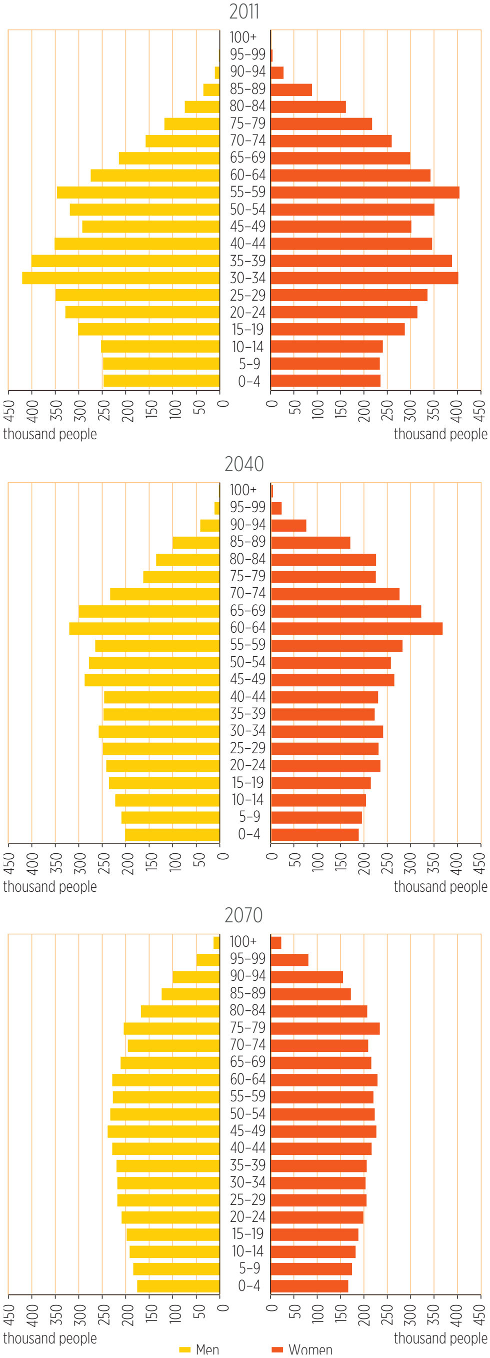
The share of male infants is about 51–52%. In 2011, this slight gender imbalance levelled out in the cohort aged 45. According to the basic variant of the projection, in 2040 the two sexes will be in balance at the age of 53, and at 61 by the end of the period (2070). In 2011, the number of women exceeded the number of men by half a million. This surplus will shrink significantly to just over 100,000 by 2070 (*Figure 16*).

Figure 16: Expected size of male and female population according to the basic variant, 2011–2070



Source: HCSO HDRI 2018; author's calculations.

Figure 17: Population pyramids 2011, 2040, 2070



Source: HCSO HDRI 2018; author's calculations.

The size of a given age group is determined by several factors, but the most important is the number of births in consecutive years. Huge peaks and troughs in the past have resulted in an increase or decrease in the size of various age groups. The 2011 age pyramid reveals two disproportionately populous age groups (*Figure 17*): those born in the 1950s, during the so-called Ratkó period; and those born in the 1970s – the children of people born in the Ratkó period.[5] The first group started to reach retirement age in 2017, and as a consequence the ageing of the population intensified. Furthermore, their children are coming to the end of their fertile period, which is having a negative impact on the number of births (Hablicsek 2009; Földházi 2015).

The different scenarios lead to significant differences regarding possible change in the number of children and elderly people (*Table 3*). The *high variant* predicts an increasing number of children in the period 2018–2031. This is the combined effect of a sharply increasing fertility rate and decreasing mortality. Following a minor dip during the mid-2040s, the number of children will probably increase, stabilizing eventually at 1.4 million. Although there might be periods of increase, there will be some 67,000 fewer children in 2070 than in 2011.

In the case of the *low variant,* the number of children will decrease to almost half of the initial 1.46 million. The *basic* and *no-migration variants* do not differ significantly from one another, with 1.09 million children in the case of the basic variant, and 1 million in the no-migration variant by 2070.

In the case of the *no-migration variant*, the number of children is higher until 2035, since the effect of emigration cannot be felt.

[5] Named after Anna Ratkó, minister of health (1949–1953), whose sometimes controversial social and health policies led to a baby boom in Hungary.

The various scenarios are all similar, in the sense that the emigration of Hungarian citizens remains a typical feature. The average age of emigrants is lower than the average age of the population, and consequently the unfavourable changes in migration affect the number of children.

The *ageing index* was already in excess of 100% in 2011, which meant that the elderly population was already larger than the population of children. The low and no-migration variants offer a rather unfavourable prediction that by 2070 there will be 2.4–2.5 times more elderly people than children.

Another indicator of an ageing society is the *old-age dependency ratio or the support ratio*[G]. Whereas in 2011, there were four individuals of working age to support one elderly person, by 2070 (even according to the most optimistic variant) that ratio will have fallen to two working-age individuals supporting one elderly person – and we have not even considered young-age (or child) dependency.

The *young-age dependency ratio*[G] does not change significantly, with the number of children being lower (by approximately a quarter) than the number of the working-age population, according to the basic variant.

In the long term, according to every variant, the share of the working-age population will decrease (from 68.7% to 56%) by 2070. The disproportionately populous group of the Ratkó generation has started to leave the working-age population for retirement; and 30 years from now their children will also be retiring. This double bump will result in a significant imbalance in the working-age population. Thus, in the next 50–60 years Hungary will be hit by another wave of demographic ageing, by the end of which the country may have a so-called 'one-third' population: every third person will be elderly (Hablicsek 2003).

Table 3: *Population by age, according to the various scenarios, 2011, 2070*

Population	High		Low		Basic		Without migration	
	2011	2070	2011	2070	2011	2070	2011	2070
0–14 years old	1,457,210	1,389,892	1,457,210	745,209	1,457,210	1,090,404	1,457,210	1,000,509
15–64 years old	6,857,377	5,105,424	6,857,377	3,404,046	6,857,377	4,390,642	6,857,377	4,126,962
65+ years old	1,671,135	2,573,470	1,671,135	1,854,423	1,671,135	2,269,340	1,671,135	2,379,652
80+ years old	405,699	1,172,693	405,699	799,706	405,699	1,006,627	405,699	1,077,102
Population total	*9,985,722*	*9,068,786*	*9,985,722*	*6,003,678*	*9,985,722*	*7,750,386*	*9,985,722*	*7,507,123*
Index, %	High		Low		Basic		Without migration	
	2011	2070	2011	2070	2011	2070	2011	2070
0–14 years old ratio	14.6	15.3	14.6	12.4	14.6	14.1	14.6	13.3
15–64 years old ratio	68.7	56.3	68.7	56.7	68.7	56.7	68.7	55.0
65+ years old ratio	16.7	28.4	16.7	30.9	16.7	29.3	16.7	31.7
80+ years old ratio	4.1	12.9	4.1	13.3	4.1	13.0	4.1	14.3
Young-age dependency ratio	21.3	27.2	21.3	21.9	21.3	24.8	21.3	24.2
Ageing index	114.7	185.2	114.7	248.8	114.7	208.1	114.7	237.8
Old-age dependency ratio	24.4	50.4	24.4	54.5	24.4	5170.7	24.4	57.7

Source: HCSO, Demographic Yearbooks; author's calculations.

SUMMARY

The scenarios we have created predict a more or less decreasing and significantly ageing population for the next projection period. As László Hablicsek[6] noted back in 2003, demographic ageing has long been typical of the age structure of Hungary's population. This is a basic process of population development, and we must learn to live with it. It is a long-term process, the effect of which unfolds slowly but relentlessly, while adequate responses are rather complex. It is not enough to react after the event; we must prepare now to tackle the possible effects. Hungary faces a fundamental question of how it can consolidate the population situation.

[6] This chapter draws heavily on the studies of László Hablicsek (Hablicsek 2003, 2009).

GLOSSARY

Actual increase: The balance between natural increase/decrease and migration.

Ageing index: The old-age population (65 and over) as a percentage of the child population (0–14 years).

Average age of the population: The arithmetic mean of the age of every member of a population at a given time.

Young-age dependency ratio: An indicator of population rejuvenation, which is the share of children (aged 0–14) in relation to the working-age population (15–64).

Crude rate of natural increase: The absolute number of the natural increase, divided by the population number and multiplied by 1,000.

Mid-year population: The average of the population size at the beginning and end of a given year (in practice 1 January of the following year).

Natural increase/decrease: The difference between live births and deaths.

Old-age dependency ratio: An indicator of population ageing, which is the share of the elderly (65 and over) in relation to the working-age population (15–64).

Population change: The composition of the population is constantly changing due to demographic tendencies of births, deaths and migration.

Population estimation: Determining the annual population during a period between two population censuses. Its baseline is the population number at the time of the last census. Estimation is based on vital statistics. Since 1 January 2001, international migration has also been taken into consideration when determining the population between two censuses.

Population projection: Based on conclusions regarding the state of the population and demographic tendencies, it tries to predict possible changes to the future population and its demography. Projections in Hungary are currently made using the cohort component method, as recommended by the UN. Calculations for the method are based on groups according to sex and age. Projections are based on various hypotheses related to future fertility, mortality and migration.

Support ratio (total dependency ratio): The child and old-age population (0–14 and 65 and over) as a percentage of the working-age population (15–64) – i.e. the total of the young-age and the old-age dependency ratios.

Vital statistics: The systematic collection of data (register statistics, address register) regarding natural demographic phenomena (births, deaths, marriages, divorces, migration), their analysis and regular publication of information.

Women of childbearing age: Women aged 15–49.

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