AN INTRODUCTION TO THE POPULATION PROJECTION OF THE CZECH REPUBLIC OF THE CZECH STATISTICAL OFFICE 2018–2100

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In November 2018, the Czech Statistical Office (CZSO) issued a new population projection for the Czech Republic. The CZSO currently processes and publishes demographic projections at approximately 5 year-intervals, and the previous one was released in July 2013. Since the latest projection the CZSO population forecast has been assigned an official role in the pension system.

THE LEGISLATIVE BACKGROUND

Working out projections of demographic development is assigned to the Czech Statistical Office by the Act on the State Statistical Service. However, further details about periodicity, regional level, time horizon, or the demographic characteristics according to which the projection should be made are not set out in this legislation. No obligation to use the data from the CZSO population projections for some policies has been established in legislation (contrary to the number of inhabitants, which has been used in several cases in public administration). Since January 2018, an amendment of the Act on the Organisation and Execution of the Social Security System has come into force, where an obligation for the CZSO concerning the processing of population projections has been stated. In connection with the change in the retirement age threshold (in the Act on the Pension System), the CZSO must work out a Report on the future development of mortality, fertility, and migration ('Report') in the calendar years ending in the figure 3 or 8 (up to 31 December). The Report must also contain the age at which persons of given birth cohorts still have a quarter of their life to live, and the proportion of the estimated life expectancy left to live upon reaching the retirement age threshold according to the Act on the Pension System. These indicators must be given for the birth cohorts reaching the age of 25 to 54 in the calendar year following the year of the Report's release. The average life expectancy for men and women calculated as a simple arithmetic mean has to be considered. The Report must also include information about the expected development of fertility, mortality, and migration rates for the period of at least the next 50 years. This demographic Report is meant to be used by the Ministry of Labour and Social Affairs to prepare the Report on the state of the Czech pension system and its expected development with regard to the demographic situation of the Czech Republic and the country's expected population and economic development on a regular basis at 5-year intervals in the years ending in 4 and 9 (up to 30 June).

One of the impulses to change previously valid legislation related to retirement age threshold was

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the Council's recommendation on the Czech Republic's national reform programme in 2014. There was a recommendation to ensure the long-term sustainability of the public pension scheme, in particular by accelerating the increase in the statutory retirement age threshold and by linking it more clearly to the changes in life expectancy. The second important incentive was the system of automatically increasing the retirement age threshold without a limit that existed at that time. Dealing with and solving these two main issues was the task for the Expert Committee on Pension Reform established by the then government in 2014. It had to propose a mechanism for the regular assessment of the retirement age threshold. The approved amendment of the relevant Act was based on its recommendation; however, it was not fully implemented for several reasons.

GENERAL APPROACH

The new legal obligation has had an impact on the process of preparing population projections since the CZSO has (logically) decided to join the 'standard' projections of population size and demographic structures with the information requested by the relevant Act. Thus, now a minimal periodicity, the exact years of the projection's release, or the time horizon of the projections are predetermined. In addition, fulfilling all the data requirements must be taken into account. This mainly concerns the production of mortality data in a cohort perspective for the purpose of the Report on the future development of mortality, fertility, and migration. Along with the responsibility that the Czech Statistical Office has been assigned with, the CZSO has considered and partly revised the general approach to calculating population projections, particularly with respect to the methodology for parameters estimation. It should be noted, however, that the procedures and techniques used so far worked quite well. The team of authors working on the new population projections was extended to include external experts – namely, Tomáš Fiala and Markéta Pechholdová from the University of Economics in Prague, the former head of the Demographic Statistics unit at the CZSO Miroslav Šimek, and Kryštof Zeman from the Vienna Institute of Demography.

The assumptions (and the projection results) have been kept as deterministic, with three basic scenarios – medium, low, and high. The deterministic approach seems to be demanded more by users in the Czech Republic than the stochastic approach. The medium scenario represented, from the point of the view of the authors, the most plausible expected future development of all the components of population change, and in scientific terminology it constituted a population forecast. The low and high scenarios signified the boundaries of possible development. In the low scenario, the target levels of all the main indicators – total fertility rate, life expectancy at birth, and net migration – were the lowest of all three scenarios, and for the high scenario, it was the other way around. Thus, the extreme scenarios could also be regarded as expressing the uncertainty of the medium scenario. In addition to the three basic scenarios, the medium scenario without considering migration was calculated to show the sensitivity of international migration to the population size and the sex and age structure of the Czech Republic.

Like other forecasts/projections, the new population projection of the Czech Statistical Office also estimated the future demographic development as fluent, since the effect of sudden changes in the external circumstances of any actor, either small or large, on the development of mortality, fertility, and migration in a short- or long-term perspective could not be predicted. Although there are differences in the reproductive behaviour of the populations of certain social/economic/migratory characteristics, all subpopulations were expected to have uniform reproductive behaviour.

DEFAULT METHODOLOGICAL INFORMATION

The 2018 CZSO population projection was processed using the cohort-component method by units of age and for every year of the projection period, which was set as ending by the year 2100 (the same year as in the previous CZSO projection). The projection threshold was the population structure by sex and age as at 01/01/2018, which was obtained from the results of the last population census (2011) and the annual population balances, and the last projected

demographic structure was that on 01/01/2101. The first projected annual indicators on demographic development were the ones for 2018. The population of the Czech Republic consists of all persons with permanent residence in the country irrespective of their citizenship, third-country foreign nationals staying in the country on a visa for a period of 90 days or more and those with a long-term residence permit, EU citizens with a temporary stay permit, and persons who have been granted asylum status. No change in the definition of the population base was assumed in the projection.

OUTPUTS

Publication of the results of the latest CZSO population projection was divided into two outputs. The first output, released in November 2018, consisted of the results of a pure demographic projection (all three scenarios including the medium scenario based only on natural population change) supplemented with written commentary on the methodology used and on the basic results. The whole output is available on the CZSO website under the section dedicated to population statistics.

A month later, in December 2018, the Report on the future development of mortality, fertility, and migration according to § 10b of the Act on the Organisation and Execution of the Social Security System was released in a special section of the CZSO website (Information according to special acts). The assumptions and results corresponded to the medium scenario of the projection, and the content of the Report focused especially on the information required under the terms of the Act and only the most basic results were included.

CONCLUDING REMARKS

It is obvious that a population projection for 80-year period is burdened with a considerable degree of uncertainty, which rises with time. Only real development will show which scenario is ultimately the one closest to reality. However, it can be assumed with great certainty that future development will be within the range given by the low and high scenarios. This range is relatively narrow in the coming years, as the women from the generations that will give birth to children are already living now, and unless

some unpredictable situation with greater impact occurs, it is not expected that the mortality rate will change significantly. However, the estimation of international migration is the least reliable estimation, even in a short-term perspective, because it depends so strongly on external conditions and the inertia of this process is relatively short. In the distant future, when new generations that are not yet living now will be the ones determining population development, the estimates are more complicated and more uncertain. This is particularly true for fertility and migration levels. In the case of mortality, it is generally expected that it will decrease further, but of course, it is not possible to predict whether the development of mortality will accelerate or reverse its course in response to major progress in medicine or, conversely, an epidemic of some known or even unknown diseases. Due to the uncertainty of the population projection's assumptions, it is always necessary to interpret the results conditionally in relation to the input assumptions.

The initial age structure of the population of the Czech Republic, which formed in the past, is very irregular, and it is clear that these irregularities are going to shift to a later age. Thus, it is very likely that the basic future tendency of the future development of the age structure that is outlined by the projection – population ageing – will indeed occur. Since the projected development will not be in line with the observed development even in a short-term horizon, the Czech Statistical Office expects the next revision of population projections in five years, again in connection with the duty to prepare a new Report on the future development of mortality, fertility, and migration.

The following articles deal with the methodology used to forecast the individual components of demographic development. The methods and principles used to formulate the fertility assumptions in the new CZSO Population Projection and the related fertility indicators are described by the Kryštof Zeman (a researcher at the Vienna Institute for Demography), while the mortality assumptions are presented by Markéta Pechholdová (University of Economics in Prague) and the procedure for making total and sex–age specific assumptions in the field of international migration is explained in the article

prepared by Michaela Němečková (CZSO). In addition to this methodological section, the main results of the new demographic projection are presented by Roman Kurkin (CZSO).

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