

CZECH REPUBLIC POPULATION DEVELOPMENT FORECAST UNTIL 2050

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All Czech Republic population development partial analyses common goal is to identify its general regularities and specific features, and first of all those which could help forecast population size and demographic structures future changes direction and intensity. Thus demographic research logical conclusion is demographic or population forecasts.

During the past few years, a few Czech Republic population forecasts originated at Prague Charles University Faculty of Science. 1991 population census results and subsequent population balance served as grounds for a series of five variant forecasts, compiled in 1993, 1995, 1998, 2000 and 2002. Their common denominator was, apart from identical information roots, shared methodological starting points and its stable authors' team as well. These common signs support comparative studies and represent a definite warranty as to forecasts quality, due to experience and knowledge combination.

Originally four forecasts were to represent the above-mentioned series while the present one was to stem from 2001 population census definitive findings. Changes in population categories delimitation within census, retroactively covering demographic events ordinary update throughout 2001, and first and foremost the expected delayed publication of census findings due to August floods led to, within the context of an ongoing wide interest in forecasting information, not giving up on compiling another forecast. Thus the presented forecast represents a certain compromise between the intention of compiling a totally new one, a so-called basic one, and a review of the former one, covering as well the period until 2050. Part of this forecast computation is still made up of subsequent orientation computations. However due to analytical reasons, their projected horizon has been moved to 2100. This computation results commentary, mostly analytically oriented, is not part of the hereby presented forecast.

From a methodological point of view, the new forecast was traditionally compiled according to demographic development classical cohort component pattern, registering demographic reproduction all three elements parallel effect – fertility, mortality and migration on structure created by dividing population into sex and age groups. Thus reproductive process individual elements became partial and to a certain degree main subjects of forecast interest and the basis of resulting recapitulative forecast.

Forecast conclusions introduced below are indebted to demographic development knowledge at the time of forecast compilation, 2000 population movement final data, sex and age structure as of 31.12.2000, 2001 movement preliminary basic data and in some cases 1.3.2001 census preliminary results as well, published by the Czech Statistical Office, were available. Indefiniteness, specific to all forecast conclusions, is expressed through three variants of expected development – medium, high and low. The medium variant conveys the most probable development direction and extreme variants represent the frame within which real development according to normal conditions as compared to starting ones should remain. Each variant of recapitulative forecast corresponds to reproduction elements development specific complex of ideas, therefore a given variant emerged as a combination of corresponding, analogously named forecast variants of development individual elements. At the same time partial forecasts variants designation corresponds to given processes intensity concrete indicators level – such as total fertility, life expectancy at birth and migration balance, and definitely not own processes level.

The presented forecast starting age structure contains all its irregularities originating during the past decades. Their gradual shift onto an older age usually triggers certain development fluctuations. Afterwards fluctuations became the strongest during these irregularities coming across an exposed age, e.g. female highest fertility one or high mortality probability one. The late 2000 age structure was chosen as the starting one, being the last balance structure related to 1991 census. Its most significant irregularities are represented by population waves caused by a high natality level in the forties, early fifties and mainly in the seventies. However future development will fundamentally indicate children born since the mid 90's very low numbers.

Parameters of future fertility level according to age indicated on table of total fertility expected level were drawn from generation characteristics. Probable development projections were first and foremost formulated on the basis of reflections on ongoing level changes corresponding to partial and combined indicators of fertility intensity between individual female years. Such limited cohorts are actually created by women sharing a similar life experience and that is why their reproductive behaviour is usually homogeneous to a certain extent. So-called transitional generations of women born between 1969 and 1980 created an exception, since an important part of one generation embraced a new behaviour pattern

**Thanks to New Data
Submitted Forecasts
Confirm Already
Known Trends of
Czech Republic
Population Rapid
Ageing**

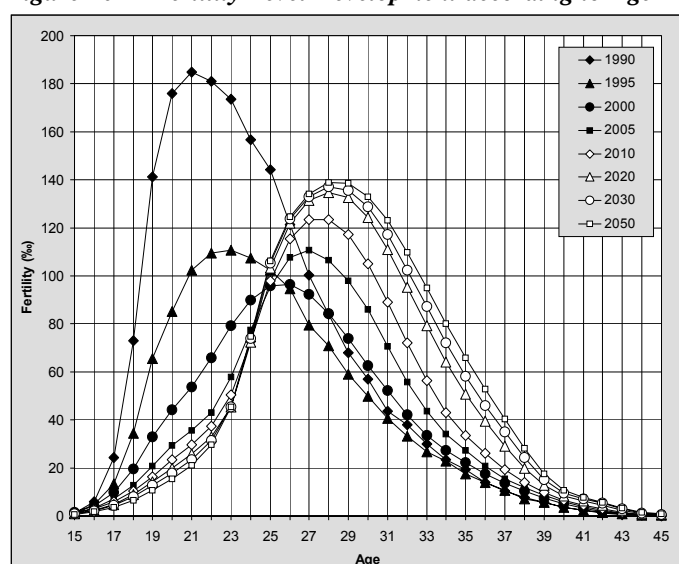
whereas an equally important part of another one still behaves according to traditional patterns. An increased attention was devoted to these generations fertility intensity analysis and forecast.

Table 10.1: Considered Variants of Fertility, Mortality and Migration Future Development

Year	Fertility (Total Fertility Rate)			Mortality (Life Expectancy at Birth)						Migration (Net Migration in thousands)		
				Men			Women					
	Variant			Variant			Variant			Variant		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
2000	1.14	1.14	1.14	71.65	71.65	71.65	78.35	78.35	78.35	6.5	6.5	6.5
2010	1.18	1.31	1.36	73.57	74.26	75.06	80.03	80.63	81.35	2.0	10.3	14.5
2020	1.32	1.50	1.58	75.53	76.73	77.83	81.66	82.72	83.71	4.0	13.1	20.3
2030	1.39	1.57	1.67	77.20	78.90	80.19	82.96	84.43	85.55	4.6	13.3	21.1
2040	1.43	1.61	1.74	78.62	80.62	81.96	83.98	85.79	87.01	4.7	12.6	20.5
2050	1.45	1.63	1.80	79.91	82.18	83.56	84.92	87.04	88.36	5.2	12.6	20.8

Even though the much awaited compensatory fertility increase did not even occur in 2000–2001, we did not abandon our fundamental hypothesis that young women's until 25 years of age ongoing rapid fertility level decrease would lead to a further fertility transposition onto an older age and its transformation into a totally new form. However in contrast to former notions, realisation of total fertility intensity will no longer be concentrated into a narrow age group, but it could be distributed among numerous age groups, due to proportionally higher reproductive behaviour differentiation. Former reproduction pattern, characterized by early marriage, followed by subsequent birth of two children, often within the frame of a single “extended” maternal leave and mother's subsequent return to permanent employment, has been nowadays given up by most women and replaced by a new pattern. Current and particularly future pattern is and will likely be completely different: children will be born only after certain different social and first of all economic female goals are reached, such as acquiring a higher professional qualification, an adequate professional position and income, i.e. during the period following expected, subjective future family securing. Thus less time will remain available for reproduction and children education which will be reflected in resulting subsequent lower children births per woman in future generations. This is further corroborated by the hypothesis that a lower female percentage will contract marriage as compared to the past and that unmarried women fertility level (including common-law marriages) will remain lower than married women one.

Figure 10.1: Fertility Level Development according to Age



frame for number of children variant forecasted estimate.

Mortality rate relatively regular decrease combined with the latter distinct and stable enough structure during the last decade create favourable starting points for future mortality ratios forecast. Taking into consideration the Czech Republic mortality intensity current development, its sex and age differentiations, mortality structure shifts according to death causes and advanced countries mortality shifts evolution as well, we assume that mortality total level will continue to decrease. In the third

The concerned transposition will be a long term process and a smooth continuation of current changes. Its main part should, according to hypotheses, come to an end between 2015 and 2020. Then fertility level and structure, according to age could stabilise or undergo minimal changes. Forecast low variant relies on total fertility rate relatively limited increase and its stabilization between values of 1.4 to 1.5 live birth per one woman, thus below current European average. From the top, the curve rising up to forecast horizon of 1.8 child limits fertility level probable development, reflecting notions of reproduction within the frame of favourable conditions for families with children set up and existence. However the most probable seems to be reaching a limit corresponding to Western Europe fertility current relatively stabilised level (1.6 child). Concerning the few coming years, only the low variant allows for total fertility ongoing stagnating level, marking past periods postponed reproduction compensation low level. The two variants left stem from accumulated reproduction potential, rather than from notions of reproduction improved conditions, and rely on fertility intensity increase. All three scenarios create within the context of female age structure development a wide enough

variant we expect average life expectancy increase at half rate, as compared to the 90's, when between 1990 and 2000, life expectancy concerning men approximately grew by 4 years and by 3 years concerning women. The low variant of mortality level forecast can be, despite studied combined indicator expected growth, described as relatively pessimistic, since reaching some Western countries, such as Sweden and Switzerland (76 to 77 for men and 83 to 84 for women) current mortality level is only expected between 2020 and 2030. In contrast, development according to high variant would mean reaching the rather ambitious goal of equating advanced countries life expectancy at birth prior to 2050. Due to mortality level decrease current reserves, all variants imply a relatively faster male mortality ratios improvement, consequently leading to an additional decrease of life expectancy difference according to sex and all its subsequent outcome.

Migration traditionally problematic forecast was separately compiled due to both immigration and emigration components. Hypotheses concerning both components development were confronted to hypotheses concerning probable migration balance extent during separate years. All variants rely on a positive migration balance throughout forecast period, except the first two years in the low variant case. Each scenario differs from the others mainly due to total migration balance different extent. Following population initial decreases due to foreign migration, the forecast low variant implies a migration gain increase of up to 3 000 to 4 000 inhabitants yearly. The medium variant considers in distant horizons a yearly gain of 12 000 to 13 000, even up to 20 000 inhabitants as far as the high variant is concerned. However foreign migration parameters actual values will be mainly decided upon by the political establishment, thus within a domain considerably impairing most forecast estimates reliability. Thus the greatest unknown is migration ratios shift as a result of the Czech Republic expected membership in the European Union. Nevertheless, in spite of a significant indefiniteness, migration does retain an inalienable place within population development forecast. From an objective point of view, on one hand it represents an important development component which reproduction significance should durably increase and on the other hand its inscription within forecast computation denotes migration real possibilities to make up for population expected losses resulting from natural movement deficit and eliminate age structure adverse development. In addition, the mere fact of not including migration in population forecast would significantly affect its authenticity.

According to present forecast results, Czech Republic population number future development is not completely definite. Its temporary stability seems to be the most probable one followed by a relatively intensive decrease after 2020. According to the low variant, population total number should decline throughout forecast period, while during the next decade yearly deficit should fluctuate approximately at the level of 20 000 inhabitants, subsequently rising up to 70 000. Yet, according to the high variant, a time limited current trend reversal could occur, leading to population decrease. Population number moderate growth, though possible merely until 2020, would rapidly give way to a relatively intensive decreasing situation, as a consequence of reductions on average of approximately 20 000 inhabitants yearly mainly after 2030. Within the frame of future development realistic limits, these findings lead to the fact that a short term increase or rather a total number stabilization could only be achieved due to a joint relatively high fertility level, a low mortality level and a significantly high net migration.

Neither mortality positive development nor rather high fertility level and migration gains common effect will be enough to maintain Czech Republic population long term total number above the 10 million limit. Throughout the period roughly until 2020, a yearly migration balance of up to 10 000 inhabitants could suffice, however later on it should fluctuate between 30 000 to 50 000, according to real development closeness to forecast variant. Expected adverse development due to natural movement may probably be only partially compensated by migration, following a very restricted period. Migration balance increase onto a level which would merely ensure population total

Figure 10.2: Life Expectancy at Birth Forecast Development

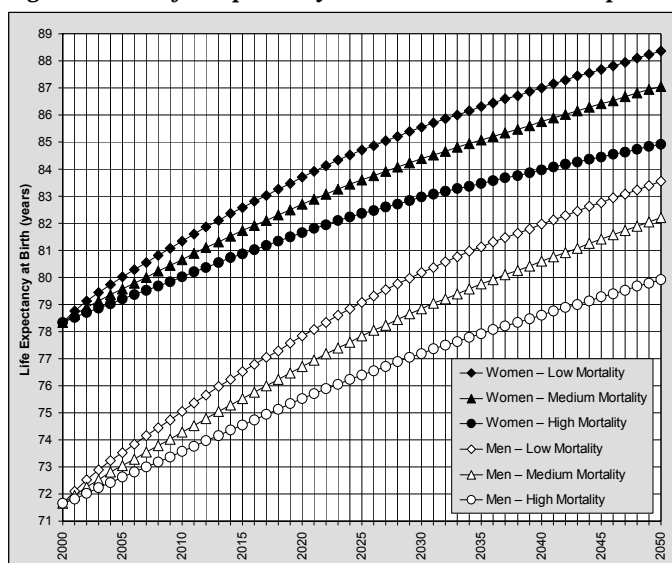


Figure 10.3: Population Size Forecast Development

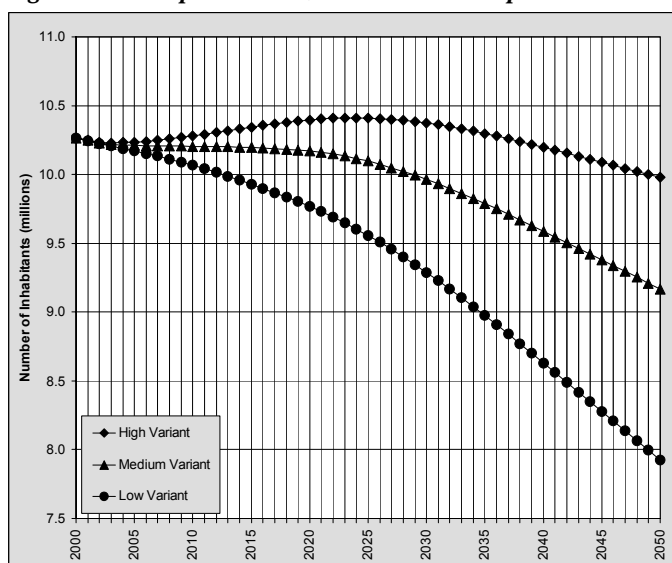
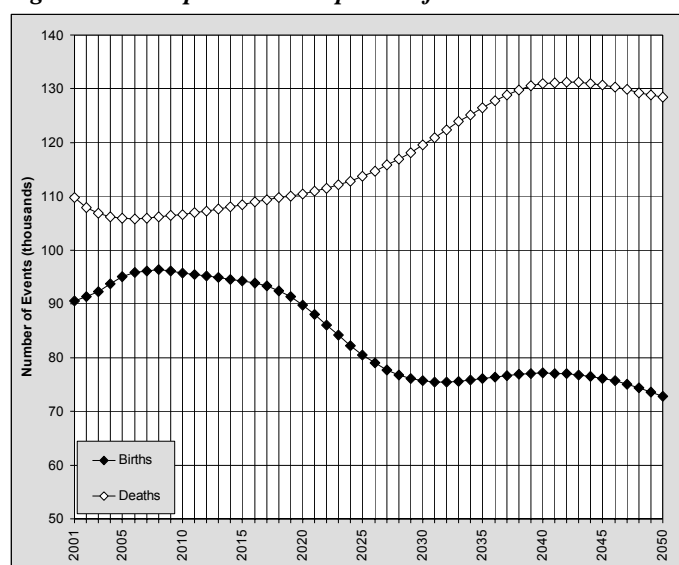


Figure 10.4: Expected Development of Births and Deaths



to forecast extreme variants is a proof that considering supporting natality makes sense. Due to higher fertility conditions, combined with a higher migration increase, according to high variant more than 33 000 children would be born as compared to low scenario.

Age structure deteriorating will affect basic tendency of the deceased total number development as well. Not even mortality level additional significant decrease would actually lead to the deceased total number decrease. Approximately after 2015, yearly numbers of the deceased will gradually rise and after 2030, they will probably fluctuate somewhere between 120 000 and 130 000 inhabitants. This irreversible change stems from the shift of numerous generations born in mid 20th century onto an age of a fundamentally higher death risk. Thus age structure deteriorating will bear a stronger effect on the deceased numbers than on expected human life expectancy extension.

Table 10.2: Expected Development of Population Number and Its Age Structure

Variant	2000	2010	2020	2030	2040	2050
Population Size (thousands)						
Low	10 267	10 066	9 767	9 287	8 630	7 924
Medium	10 267	10 205	10 170	9 964	9 589	9 167
High	10 267	10 280	10 397	10 373	10 197	9 978
Share of Children up to 15 Years of Age (%)						
Low	16.2	13.3	12.7	11.5	10.8	10.9
Medium	16.2	13.7	13.9	12.8	12.0	12.5
High	16.2	13.7	14.2	13.1	12.6	13.3
Share of the Elderly over 60 Years of Age (%)						
Low	18.5	23.5	28.1	31.9	38.7	42.2
Medium	18.5	23.6	28.0	31.6	37.9	40.7
High	18.5	23.7	28.3	31.9	37.8	40.1
Share of Persons Aged 15–59 (%)						
Low	65.3	63.2	59.2	56.6	50.5	46.9
Medium	65.3	62.7	58.1	55.6	50.1	46.8
High	65.3	65.6	57.5	55.0	49.6	46.6

Population total number is definitely a significant demographic parameter of each country, nevertheless due to world globalization and capital as well as labour free movement, the Czech Republic position within the European unification process and its further economic and social development will not be determined according to population number extent. Certainly population age structure future development will be the most important. During the forecast first period, age structure will be strongly dependent on starting point, on structure which is part of the forecast. As a consequence of births number decrease in individual years, children component number extent and representation will shrink. Moreover relatively numerous older generations will shift onto higher age groups. Though at the beginning, their size will not be too much affected by mortality intensity expected decrease, one may openly state that in coming

years, the Czech Republic population age structure changes general and basic feature will be its further intensive ageing.

According to forecast medium variant during the next decade, anticipated children numbers of up to 15 years of age will probably decrease from the current 1.6 million to approximately 1.4 million. Consequently, during the next decade a moderate increase should occur though after 2020, children numbers decrease will continue, however this time it will be permanent and relatively steep. Children component percentage would dwindle below 14% during the first phase (2005–2020) and until 2050 it could further decrease to the 12% limit. Results of forecast corresponding low variant even disclose the possibility of children numbers ceaseless decrease down from present 1.6 million to approximately 1 million in 2030 with a marked tendency towards a further reduction. Thus fifty years from now, children aged up to 15 years of age would merely represent approximately one ninth of population expected total number. In case of a development according to the optimistic scenario, children numbers would decrease over a long period of time though significantly at a slower pace, and their relative percentage out of total population would remain at approximately 14%.

The elderly total number will evolve in a completely opposite way as to children component total number extent, i.e. the number of senior citizens aged 60 and more could almost double until 2050. Within current population, approximately 1.9 million inhabitants belong to this age group out of a population total number of 10.2 million, whereas in 2050, according to the medium variant, senior citizens could probably represent 3.7 million out of 9.2 million inhabitants. The elderly relative percentage within total population would thus increase from 19% to more than 40%. Forecasted development main factor will be numerous strong generations transition across the 60 age limit combined with average life expectancy growth. Life extension will also foster significant changes within analysed age group. In fact one can say that the more advanced the age, the more significant population change may be expected. If the number of senior citizens aged 60 and over approximately doubled during analysed period, then there would be three times more senior citizens older than 75 and even five times more older than 85 than nowadays.

The principal tendency of population number at productive age development, represented by the 15–59 age group, will be a permanent shrinking, represented during the 2000–2050 period by a decrease between 2 to 3 million persons. Thus population number at productive age would then shift from its 6.7 million starting value, representing within present development context a historical maximum, to a level between 3.7 up to 4.7 million persons in 2050, according to forecast scenarios fulfilling rate extent. At the same time, not only above-mentioned numbers will be modified but inner structure of this wide range age group as well. Similarly to total population ageing, age group at productive age will age too. If, currently this latter group is characterised by an average age of 35, in 2040 its value will be approximately 10 years higher, since the 70's population wave will have crossed the analysed high age limit.

Obviously differentiated development in basic age groups will lead to significant shifts in their mutual relations. The relation among children and productive components will change relatively slightly since in both cases inhabitants total number will decrease. However,

Figure 10.5a: 2010 Expected Population Age Structure Compared with 2000 Initial Age Structure

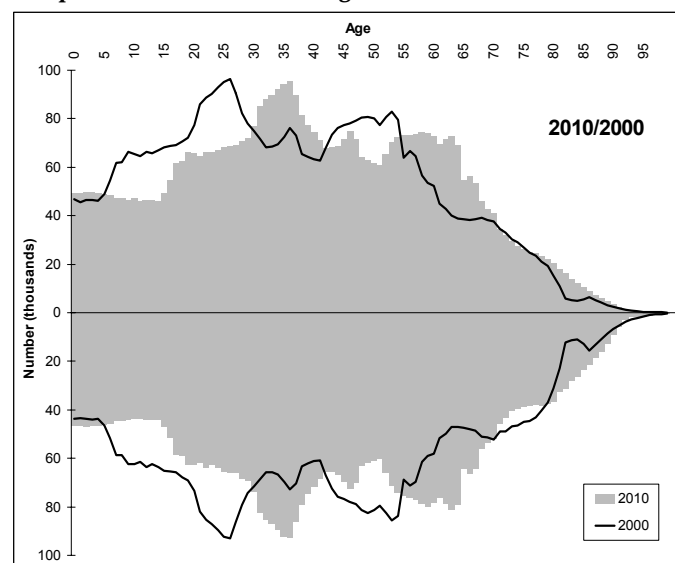


Figure 10.5b: 2030 Expected Population Age Structure Compared with 2000 Initial Age Structure

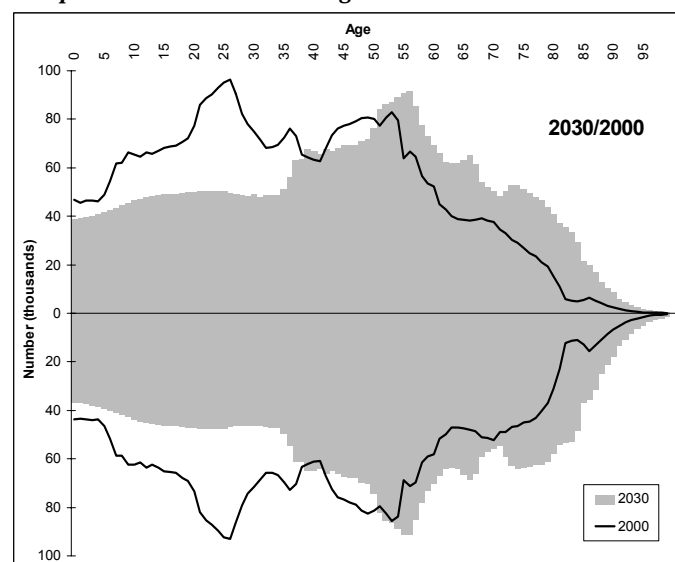
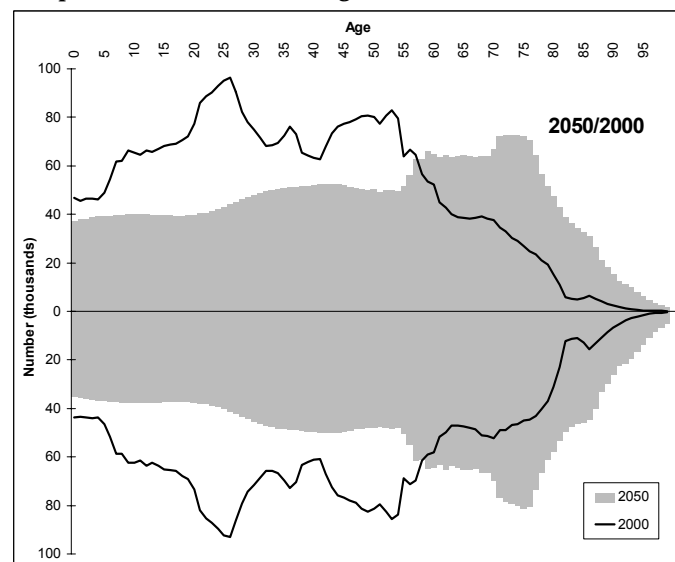
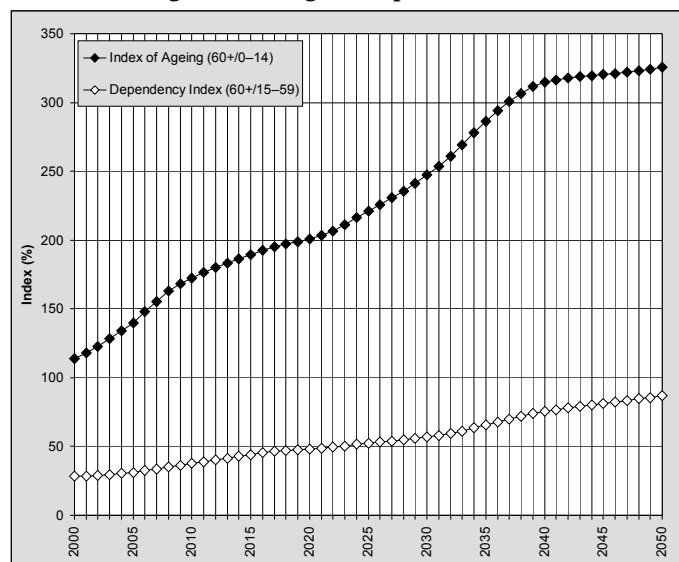


Figure 10.5c: 2050 Expected Population Age Structure Compared with 2000 Initial Age Structure



in the coming decades, ageing index, expressing the relation between the elderly total number and children total number, will undergo a significant change. Already during the period until 2030, this index values would more than double, even according to the most favourable scenario. If, currently, to 100 children aged up to 15 correspond 115 senior citizens aged 60 and over, then in 15 to 20 years horizon to 1 child aged 15 or less will correspond 2 persons older than 60. Metaphorically speaking: one set of grandparents would only have one grandchild younger than 15 and a little later not even one. During the next period 2030 to 2040, the ratio would probably reach the value of one to three and around 2050, according to the low variant, it could even be one to four; i.e. only every second set of grandparents would live to see their grandchild, furthermore on the condition that none of them would have more than one.

Figure 10.6: Expected Development of Total Number Relation among Selected Age Groups



The above mentioned change in ageing index values and its outcome belongs, due to its range (and its impact), to the category of hard to picture changes. At the same time it is not the sole cardinal change within the context of the Czech Republic future population size and structure development. Economically and socially, the permanently deteriorating relation between senior citizens and productive age citizens numbers will definitely be more significant. The dependence index, expressing this relation, will probably rise until 2030 from current 28% to more than double (56% to 58%) and in 2050 it could realistically fluctuate between 86% and 91% (medium variant – 87%).

Findings regarding dependence index swift increase represent forecast most important outcome, since the Czech Republic forecasted population changes main results will be particularly tied to this development aspect. Thus one needs to underline a fundamental fact concerning forecast results reliability. In contrast to forecast of childbirths numbers, estimated on the basis of developmentally less stable fertility parameters and above the limit roughly indicating one generation range and even of potential mothers numbers, most of whom were not born yet at the time of computation, forecast

of senior citizens numbers is globally significantly more reliable. Older than 60 senior citizens numbers are determined decades in advance according to extent of generations already alive when forecast was compiled. Future extent of current generations will obviously be modified due to expected mortality level and migration. However mortality development is relatively stable and migration should not excessively influence older than 60 senior citizens numbers, minimally in the horizon of 2030. That is precisely why elderly population numbers forecast can be considered relatively reliable even in the horizon of a few decades.

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According to presented fundamental findings of the Czech Republic population development forecast, anticipated changes could most probably lead to long term and currently still hard to detect in many regards consequences for our society further development. At the same time, as to decisive orientations, there is no hope that development would take another permanently auspicious direction concerning society and conditions of its development, due to demographic structure changes mechanism. UN compiled demographic forecasts project as well that the Czech Republic population will perspectively belong to world oldest populations.

The Czech Republic realistically forecasted population development consequences – its decreases and permanently deteriorating age structure – will not only impact on the country's economy (reductions of potential workforce) but mainly on wide social sphere (huge increase of retirees and of the elderly medical care claims) even after a much needed economic activity increased age limit. However the Czech Republic population ageing outcome will also affect a sphere not included within forecast findings, that of society mentality and psyche, definitely affected by a very high percentage of elderly people.