DEMOGRAPHIC WINDOW IN THE CZECH REPUBLIC (WITH INCREASING RETIREMENT AGE)

Jitka Langhamrová – Tomáš Fiala

Abstract

The demographic window (or demographic dividend, gift, opportunity etc.) is a period when proportion of the non-productive parts of the population is low owing to an already low fertility and a still high mortality so the productive part of the population outweights the non-productive part. This period is temporary and terminates when people of productive age get older, and due to mortality decline the proportion of the post-productive economic generation relatively rapidly increases. The paper presents the development of proportion of the population in pre-productive, productive and post-productive age since 1950 by present time and the projection until 2100 according to the medium variant of the population projection of the Czech Republic published by the Czech Statistical Office in 2013 and the occurrence of the demographic window. Lengthening the time of the study and the permanent increase of retirement age are taken into account. The permanent increase of retirement age considerably prolongs the period of duration of the demographic window.

Key words: demographic window, retirement age, young age dependency ratio, and old-age dependency ratio, population projection

JEL Code: J11, J21, J26

Introduction

The demographic window is a period when proportion of the non-productive parts of the population is low owing to an already low fertility and a still high mortality. It offers to the society an opportunity for increasing personal and public savings and significant economic growth. Utilizing this potential depends on the ability of the society to employ a sufficient supply of labor, utilize growing participation rate of women, increase human capital (education, qualifications, health), increase the volume of savings and potential investments, flexibility of the labor market, support for education etc. (Bloom et al, 2009). *Declining fertility rates can open a "demographic window" when a "downturn in fertility at the 'micro'*

level translates within a generation into potential economic growth at the 'macro' level, in the form of a large group of working-age people supporting relatively fewer and younger dependents (Ashraf, 2002).

According to the original definition – see, e.g. UN (2004), p. 2., the period of demographic window is a period when the proportion of persons aged 0–14 is lower than 30% and, at the same time, the proportion of persons of post-productive age 65 and more is even lower than 15%. But in monitoring the development during a longer time period it is problematic to consider a constant threshold of productive age during the period under review. This also applies to the Czech Republic. This paper brings computations of the period of demographic window for various ways of determination of the limits of productive age.

1   Economic generations in the Czech Republic with increasing age thresholds

In analysis of demographic evolution and occurrence of a demographic window one of the key questions is setting of thresholds regarded as the beginning and end of productive age.

The lower threshold should be the usual age of starting economic activity. A threshold of 15 years is often chosen. However seeing the technological and economic development and ever-increasing demands for professional qualifications, an increasing number of young people continue with further study or another way of gaining qualifications and begin their economic activity a few years later. So it has been seen as appropriate in the last years to consider the age threshold of starting economic activity 20 years.

The upper threshold of productive age is mostly the qualification for old-age pension. Since in a number of European countries the retirement age is 65 years, this value is used. It is more realistic for some countries, however, to use a threshold 5 years lower, that is 60 years. The retirement age was constant in the Czech Republic until 1995, but over the last 20 years it has been steadily rising and it is expected to rise throughout the 21st century. Calculations taking this fact into account were performed for example in Fiala & Langhamrová (2014).

Likewise, the assumption of a constant lower threshold of productive age is unrealistic for the Czech Republic in many professions and increasing number of colleges and universities, most young people in the Czech Republic study after leaving elementary school at colleges and many of them at universities. Therefore, it is increasingly unrealistic to consider the lower threshold of productive age as 15 years. This threshold has raised steadily, not abruptly. The development of this threshold can be estimated by the following way.

It follows from census data that the proportion of economically active persons in the age group 15–19 was already in 1970 much lower than 50%, and the minimum threshold of productive age should be higher than 15. On the other hand, as the number of economically active persons aged up to 25 years is higher than the number of persons aged 20–24 in the population, the threshold should be therefore lower than 20 years.

The degree of economic activity rises with age and in the age group 25–29 it is relatively high. It can be assumed that people aged 25 and more have completed their education or are taking mostly evening courses. One of the options for determining a more accurate threshold of productive age for the Czech Republic in a given year is the choice of a value of exact age x_p, where the ratio between economically active people under 25 and persons of productive age under x_p–24 years is the same as the economic activity rate of people aged 25–29. The value x_p is determined by solving the equation

$$\frac{S_{15-24}^{(a)}}{S_{x_p-24}} = \frac{S_{25-29}^{(a)}}{S_{25-29}}, \qquad (1)$$

Where $S_x^{(a)}$ is the number economically active persons in a given age interval, S_x is the number living in that age. The equation is solved using an appropriate numeric method. The value x_p, need not be an integer, we determine the numbers of persons by linear interpolation. The results are shown in Table 1.

**Tab. 1: Economically active population and productive generation**

Age group	1970	1980	1990	2000	2010
Economically active population					
15–19	327 734	197 442	301 449	98 707	66 831
20–24	752 133	597 597	602 861	641 312	386 160
25–29	642 153	785 383	662 711	737 253	571 657
Total population					
15–19	829 222	691 236	862 172	685 483	578 984
20–24	880 190	693 733	683 087	851 779	676 888
25–29	716 859	826 488	687 295	857 875	728 047
Economic activity rates (%)					
15–19	39,5	28,6	35,0	14,4	11,5
20–24	85,5	86,1	88,3	75,3	57,0
25–29	89,6	95,0	96,4	85,9	78,5
x_p-	18,1	18,9	18,3	19,9	20,8

Source: author's calculations based on Census data of Czech Statistical Office

Until the end of 1995 the retirement age for Czech males was 60 years. Women's retirement age depended on the number of children raised; for women with two children it was the age of 55. Since 1996 retirement age has been increasing steadily: for men by 2 months, for

women by 4 months, and later by 6 months for each subsequent year of births until it reaches the level of men's pensionable age. By 2030 the retirement age is to reach 65 years and retirement age of males and females with up to 2 children is to be equalized. By the end of the century pensionable age is to reach 75 years (see Fig. 2).

Fig. 1: Assumed lower threshold of productive age
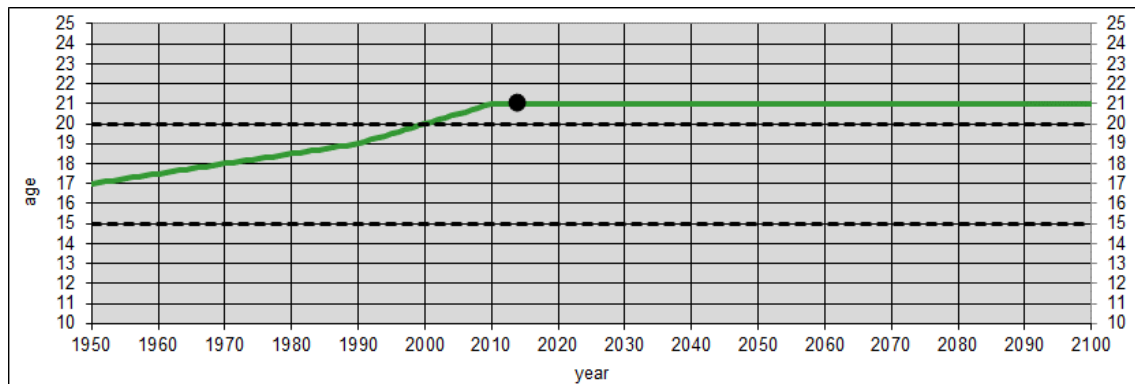
Source: author's assumptions

Fig. 2: Assumed upper treshold of productive age
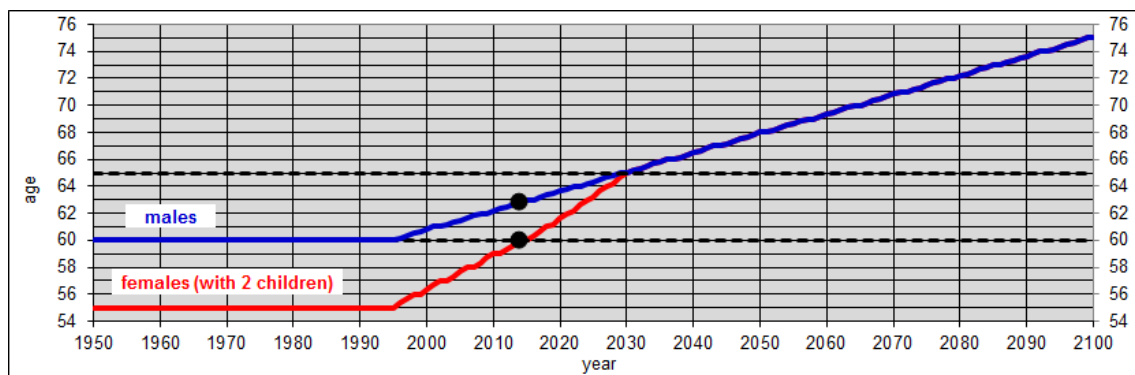
Source: author's calculations based on Law No. 155/1995 Coll. (Zákon 155/1995 Sb.)

The empiric values x_p of the projected age when economic activity starts have been rounded so that the development has partly linear and constant value. In 1950 the minimum threshold of productive age was selected 17 years, by 1990 increased to 19 years, by 2010 more rapid increase to 21 years, in the following years the constant threshold is 21 years (see Fig. 1).

2   Demographic window with various definitions of the productive age

In the period 1950–2100 we analyze the development of the proportion of pre-productive, productive and post-productive age generations in the Czech Republic with different age

definition of these generations. Until 2012 the proportions were calculated on the basis of real numbers of inhabitants by sex and age published by the Czech Statistical Office (CZSO). The values from 2013 are based on the medium variant of the CZSO projection (ČSÚ, 2013).

Let us consider three possible ways of definition of the lower threshold of productive age

    a) constant value 15 years,

    b) constant value 20 years,

    c) rising value from 17 to 21 years (marked CZ) – see Fig. 1.

Let us also consider three possible ways of definition of the upper threshold of productive age

    a) constant value 65 years,

    b) constant value 60 years,

    c) rising value from 60/55 to 75 years (marked CZ) – see Fig. 2.

With these thresholds we can consider a total of 5 ways of definition of the age threshold of productive generation

    a) 15–64,

    b) 20–64,

    c) 15–59,

    d) 20–59,

   e) both thresholds rising – see Fig. 1 and Fig. 2 – marked CZ.

With all the three ways of definition of pre-productive age the proportion of the pre-productive generation indicates a downward trend (see Fig. 1). We note the most marked decline at the turn of the 21st century, when fertility rate of Czech women was very low as young women often deferred maternity to a higher age after 1989. According to the CZSO projection, the fall in the proportion of the pre-productive generation should stop in approximately 30 years and by the end of the century it should be relatively stable.

As expected, the development of the proportion of persons of post-productive age is the polar opposite. With the standard definitions of this generation (with a constant lower age threshold) the proportion of persons of post-productive age in the population will more than double in the first half of this century. Strong post-war age groups will reach post-productive age followed by numerous generations born in the 1970s. Only in the second half of this century the proportion of senior citizens should stabilize because numerous strong generations born in the 1970s will gradually die out and be replaced by less numerous age groups.

If we consider a realistic lower threshold of post-productive age equaling retirement age in the Czech Republic, the development trend is far from being so dramatic. The
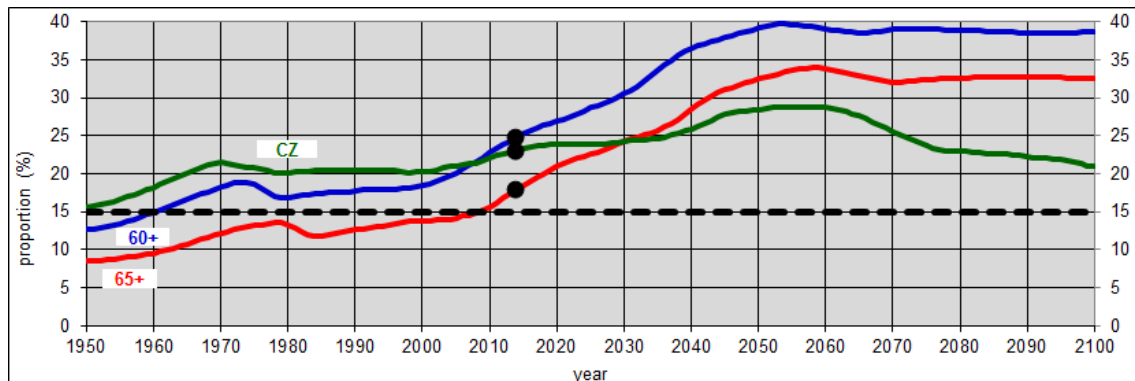
percentage of persons of post-productive age should reach a maximum by the beginning of the second half of this century and later drop to the current level or even to lower values.

Fig. 3: Proportion of the population in pre-productive age
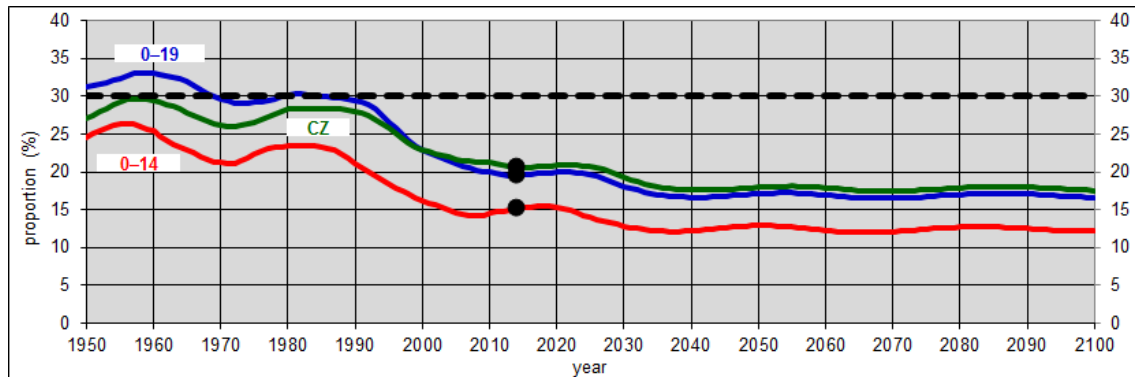
Source: author's calculations based on data of CZSO

**Fig. 4: Proportion of the population in post-productive age**

Source: author's calculations based on data of CZSO

With the definition using constant age thresholds the growth in the proportion of persons of post-productive age will be higher than the drop in proportion of pre-productive. After a short-term increase at the turn of the 21ˢᵗ century the proportion of persons of productive age will drop by almost 20 percentage points with the four methods of its definition. Taking into consideration the expected growth of the retirement age it is evident that the proportion of persons of the productive generation, which has ranged in the last years around 56%, should oscillate around this value for about another 50 years, and in the last decades it should even exceed this threshold (see Fig. 5).

The duration of the demographic window in the Czech Republic with the different determination of productive age is given in Table 2. With the standard determination of

productive age (15–64 years) it can be said that the demographic window lasted almost 100 years, approximately from 1915 to 2009. If we consider the age of starting economic activity 20 years, a demographic window only opened since 1970. By contrast, with a threshold of productive age 15–59 years demographic window already closes in 1961, with the narrowest determination of productive age 20–59 years – which can be regarded for the Czech Republic as very close to reality – no period of demographic window occurred. The proportion of pre-productive age only fell below 30% in 1970, while the proportion post-productive exceeded the threshold of 15% as early as 1961. The same situation arises with a realistic determination of productive age with both thresholds rising, when throughout the period analyzed the post-productive proportion was higher than 15%. See Fig. 3 and Fig. 4. However on the other hand in this case the proportion of population in productive age will never fall below the value of 50 % and in the future it should be permanently higher than 55 % which is the situation in demographic window.

Fig. 5: Proportion of the population in productive age
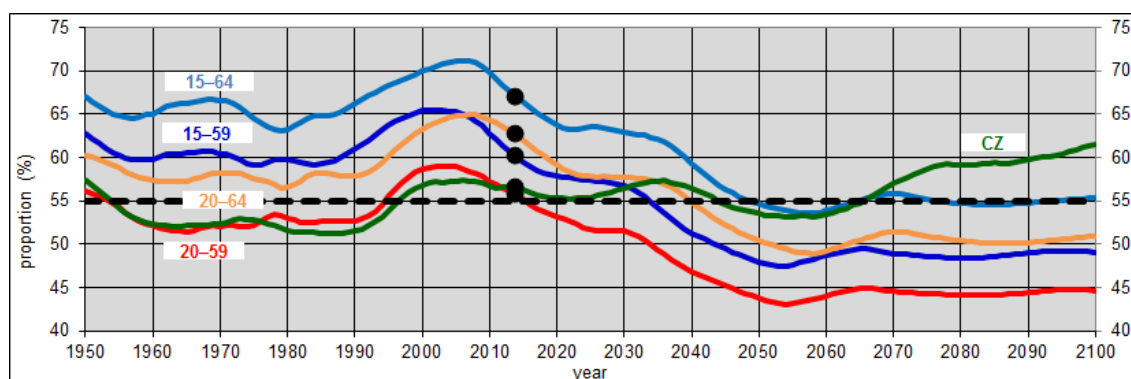
Source: author's calculations based on data of CZSO

**Tab. 2: Duration of demographic window in the Czech Republic**

Productive age	Opened	Closed
15–64	about 1915	2009
20–64	1970	2009
15–59	about 1915	1961
20–59	no window	no window
CZ real	no window	no window

Source: author's calculations

From the economic viewpoint, of more importance are the young-age and old-age dependency ratios. Their development trends are essentially identical with trends of the proportions of persons in these economic generations. Evolution of the dependency ratio,

which is defined as a ratio of the sum of the generation of pre-productive and post-productive age and the productive age generation, merits more attention (Fig. 6). This is manifested by mutual compensation of both dependent generations: An increase in the proportion of persons of post-productive age is partly compensated by a decrease in the proportion of persons of pre-productive age. With constant age thresholds of productive age this compensation is insufficient in the 21ˢᵗ century.

Fig. 6: Dependency ratio (in %)
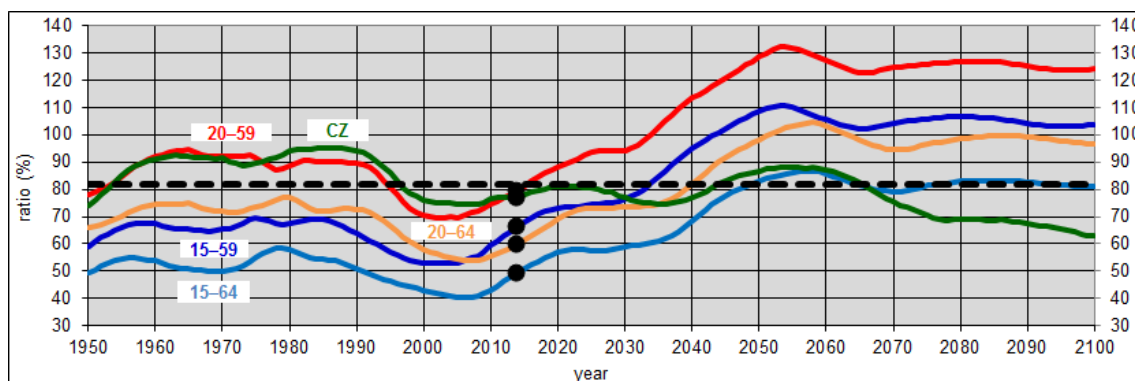
Source: author's calculations based on data of CZSO

If we consider the real productive age in the Czech Republic, the ratio in the 2ⁿᵈ half of the 20ᵗʰ century has been for a number of years higher than 90%, which is one of the highest values. The reasons for this is very low retirement age at that time. The growth in retirement age in the 21ˢᵗ century results in the ratio ranging in the first four decades only around 80%, with subsequent growth not exceeding 90% however by the end of the century it should be under 70%, which is lower than in 1950.

Conclusion

Duration of the phenomenon called demographic window depends on the way we define the period of productive age. With the frequently used standard (15–64) the demographic window in the Czech Republic lasted almost 100 years, with a narrower definition (20–64), which best corresponds to the situation no demographic window existed.

If we consider a determination of the productive generation with a rising minimum and maximum age threshold, a demographic window does not appear because of the relatively low retirement age in the 20ᵗʰ century. On the other hand, there is an assumption of a relative stabilisation of the proportion of persons in productive age (and hence dependency ratio) in

the following decades. The retirement age, and hence the upper threshold of productive age, is to increase steadily throughout this century and will therefore eliminate the effect of continuous ageing of the population in the Czech Republic.

Persons in productive age are only potential employees. Much will depend on the degree to which this potential is unlocked in the future. Unemployment of young people is on the rise in many countries. There is a more important aspect, namely whether the planned raising of the retirement age will result in a real extension of the period of economic activity. Several years ago the income of Czech households was relatively stable (Bartošová & Longford, 2014). But later on in a number of regions of the Czech Republic persons aged 50 and over are regarded in some cases as less employable (Löster & Langhamrová, 2011). By the year 2030 the number of persons aged 50 and more who will not qualify for old-age pension is to increase from the present number by tens of percentage points. If no suitable work is available to them, it can worse the standard of living of older people which can affect their mortality (see, e.g. Šimpach and Pechrová, 2014). And, of course, in such case, although the increase in retirement age may lead to a financial stabilization of the pension system, it would result in increased expenditure on social-security benefits.

Acknowledgment

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