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THE CONTINUING TRANSFORMATION OF NUPTIALITY AND DIVORCE IN CZECHIA AND SLOVAKIA AFTER 1989 IN A COHORT PERSPECTIVE

Branislav Šprocha[1)]

Abstract

Nuptiality and divorce are processes that have undergone several important changes in Czechia and Slovakia in the last three decades. The main aim of this paper is a cohort analysis of the quantum and tempo of nuptiality among single persons and of divorce rates among the selected marriage cohorts that have been most affected by the transformation of marriage behaviour in Czechia and Slovakia since 1989.

The results show a significant and, among selected cohorts, gradually steeper decline in the rate of first marriages. At the same time, there has been a continuous and inter-cohort intensification of the process of postponing entry into the first marriage in both countries and in both sexes. These changes are occurring more dynamically in Czechia. This means that in the birth cohorts from the late 1970s, more than a third of men and almost 30% of women never marry. In Slovakia, the figure is about 30% of men and a quarter of women. The main reason for this is the significant drop in the probability of marriage at a younger age and insufficient recuperation in older ages.

The steadily increasing cross-sectional level of divorce rates in both countries was also reflected in the development of the cohort probability of divorce. The highest risk of divorce (47%–48%) was identified in Czechia among the marriage cohorts from the second half of the 1980s and the early 1990s. In Slovakia, the highest risk was slightly lower (33–34%) and was observed among the marriage cohorts from the first half of the 1990s. Younger cohorts were affected by the faster increase in cross-sectional divorce rates. The result of the differences in the dynamics of the divorce rate trends between Czechia and Slovakia was thus a certain equalisation of the intensity of divorce among younger cohorts in both countries.

Keywords: nuptiality, divorce, cohort approach, Czechia, Slovakia

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INTRODUCTION

Differences in family behaviour between Czechia and Slovakia have long reflected the countries' particular historical, social, economic, and cultural situations. From a historical point of view, in Slovakia it was primarily the persistence and, after the Second World War, the fixation of the model of early and almost universal entry into marriage (*Fialová,* 1992; *Šprocha*

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and Tišliar, 2018). By contrast, family behaviour among the Czech population resembled more the European type (*Hajnal*, 1965) of marriage behavior (*Pavlík et al.,* 1990; *Fialová,* 1992 and 2006). However, the specific conditions of the previous political regime (see, for example, *Fialová*, 1992, *Sobotka*, 2002) contributed to a significant transformation of this model. In Czechia in the post-war period, marriage at a young age and high marriage rates became the main feature of family behaviour (*Fialová*, 1992). This sharply contrasted with the populations in the former Western bloc (*Monnier and Rychtaříková*, 1992, *Kalmijn*, 2007).

Some cultural and social factors also played an important role in the differences in nuptiality and divorce rates between Czechia and Slovakia. Czechia has been more culturally and socially advanced, with a higher proportion of educated people, more young people living in urban areas and especially in larger cities, and more people employed in the secondary and tertiary sectors (trade and services). It is also a much more secularised society, while in Slovakia the church, faith, traditions, social control, and norms played an important role in family behaviour even under the previous political regime. This could also help to explain why divorce rates in Slovakia long remained at a low level and only gradually increased in the period after the war.

In the last three decades the process of the formation and dissolution of marriages in Czechia and Slovakia has undergone several significant transformations. The model of early, almost universal entry into marriagedisintegrated relatively quickly. The year 1991 represents a dividing line between the old and the new model of marital behaviour (*Rychtaříková,* 1995 and 2018). As several researches have shown (e.g. *Fialová,* 2006, *Křesťanová*, 2020, *Šprocha*, 2012a), the old model ceased to fit in the new political, cultural, social, and economic conditions. The main feature (of the new model) is the postponement of marriage to a later age and in some cases the rejection of marriage, a tendency that was subsequently linked to a relatively significant drop in marriage rates. Only in recent years we have been able to observe the demise of this trend, and we have even witnessed a slight revival of nuptiality (*Křesťanová*, 2020, *Šprocha*, 2020). The process of marital dissolution (that can be empirically observed in both populations essentially only through the legal termination of marriage by divorce) was characterised by intensification as the past long-term increase in divorce rates continued to rise (*Křesťanová*, 2020, *Šprocha*, 2012b, *Šprocha and Tišliar,* 2018). This clear trend has stopped in the last decade and divorce rates have declined somewhat in Czechia and Slovakia. In both countries, an important part of the divorce transformation was the increase in the risk of divorce among marriages of longer duration (*Fialová and Kalibová*, 2010, *Křesťanová*, 2020, *Šprocha*, 2012b).

Several authors (e.g. *Fiala et al.,* 2018, *Fialová and Kalibová*, 2010, *Rychtaříková*,1995, *Křesťanová*, 2020, *Křesťanová and Kurkin*, 2020, *Šprocha*, 2016 and 2020, *Vaňo et al.,* 2001) have, using various approaches, often and in detail analysed these and other transformational changes in nuptiality and divorce that have been taking place in Czechia and Slovakia since the early 1990s. However, a cross-sectional view and an effort to capture annual changes are the approaches that clearly prevail, while a cohort approach is rather an exception. This is mainly because of the high demand for input data and the need for the long-term monitoring of the development of the relevant demographic events for individual cohorts. We are able to identify the completed intensity of the process only when all the persons in the cohort have reached a certain age (e.g. 50 years), or after a set time has elapsed since the formation of the cohort. On the other hand, the advantage of the cohort approach is that it is not subject to random fluctuations in external conditions and it measures the real intensity of the demographic process observed in a real cohort.

The main aim of this article is to present some important findings using the cohort approach in an analysis of first marriage and the divorce of selected marriage cohorts in Czechia and Slovakia.

DATA AND METHODS

The process of first marriage in Czechia and Slovakia was analysed through cohort gross nuptiality tables. These can be compiled by appropriately adjusting first marriage probabilities from a long series of annually published nuptiality tables constructed in the second main parallelogram. For the period 1961–1988, the source of data for both populations was the publication 'Nuptiality tables of single persons in the ČSSR,

ČSR, SSR for the years 1961–1988', compiled by the Federal Statistical Office (FSO 1989). For the period 1989–1993, the nuptiality tables for Czechia were published in Appendix I of the publication 'Population Development of the Czech Republic 1994' (*Pavlík et al.,* 1994: 73–77). The nextperiod (1994–2019) was covered using the official tables computed by the Czech Statistical Office (CZSO). For Slovakia, the period 1989–2019 was covered using the author's own computations of first-marriage probabilities, which were directly constructed using anonymised data from the Statistical Office of the Slovak Republic (SOSR). The basic calculation formula was based on a well-known relationship (e.g. *Rychtaříková* 1984, *Pavlík et al.,* 1986):

$$ {}_t^z q_{x,x+1}^s = \frac{{}_t^z S_{x,x+1}^s}{{}_{1.1.t}^z P_x^s - \frac{{}_t^z D_{x,x+1}^s}{2} + \frac{{}_t^z I_{x,x+1}^s}{2} - \frac{{}_t^z E_{x,x+1}^s}{2}} $$

where:

${}_t^z q_{x,x+1}^s$ is first marriage probability between exact age x and x+1 in the year (t) and for cohort (z),

${}_{1.1.t}^z P_x^s$ is the number of single persons aged (x), in the year (t) as of 1 January, and from cohort (z),

${}_t^z S_{x,x+1}^s$ is the number of first marriages aged (x and x+1), in the year (t), and from cohort (z),

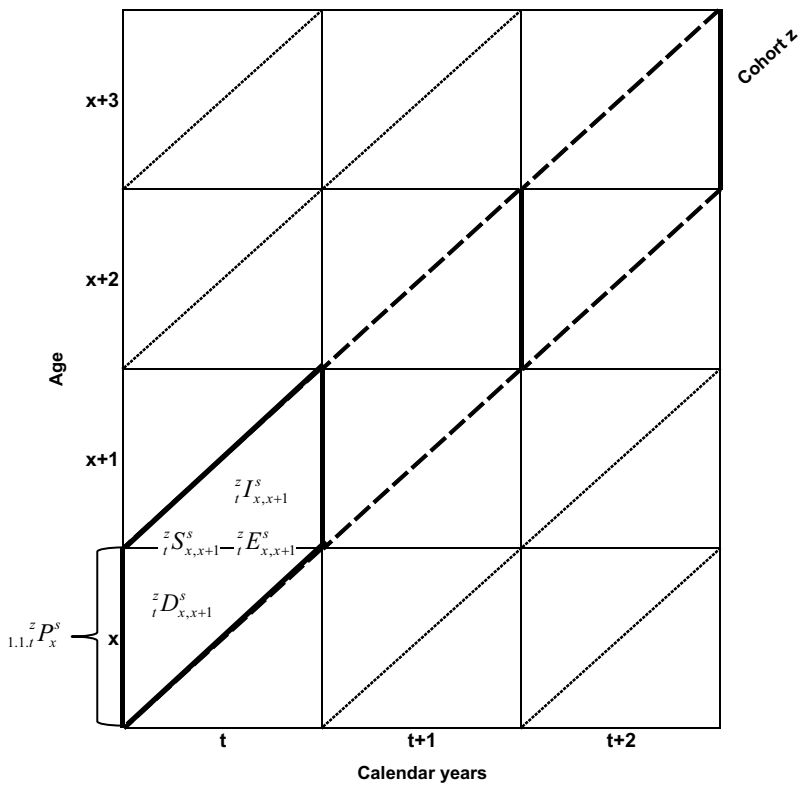
${}_t^z D_{x,x+1}^s$ is the number of deaths of single persons aged (x and x+1), in the year (t), and from cohort (z),

${}_t^z I_{x,x+1}^s$ is the number of single immigrants aged (x and x+1), in the year (t), and from cohort (z),

${}_t^z E_{x,x+1}^s$ is the number of single emigrants aged (x and x+1), in the year (t), and from cohort (z).

Other functions were then calculated from this long-term series of cohort first marriage probabilities: the cohort numbers of never-married and the cohort

Figure 1 **A simplified diagram of the computation of first marriage probability in a cohort perspective**



numbers of first marriages. These functions were designed for the 1945–1969 cohorts up to the exact age of 50. In our analysis, we also use the results for younger cohorts.

The radix of cohort nuptiality tables ${}^{z}_{t}l^{s}_{15}$ was set at 100 000 persons. The cohort numbers of first marriages were derived using this formula:

$${}^{z}_{t}d^{s}_{x,x+1} = {}^{z}_{t}q^{s}_{x,x+1} \cdot {}^{z}_{t}l^{s}_{x}$$

and the cohort numbers of never married (x+1):

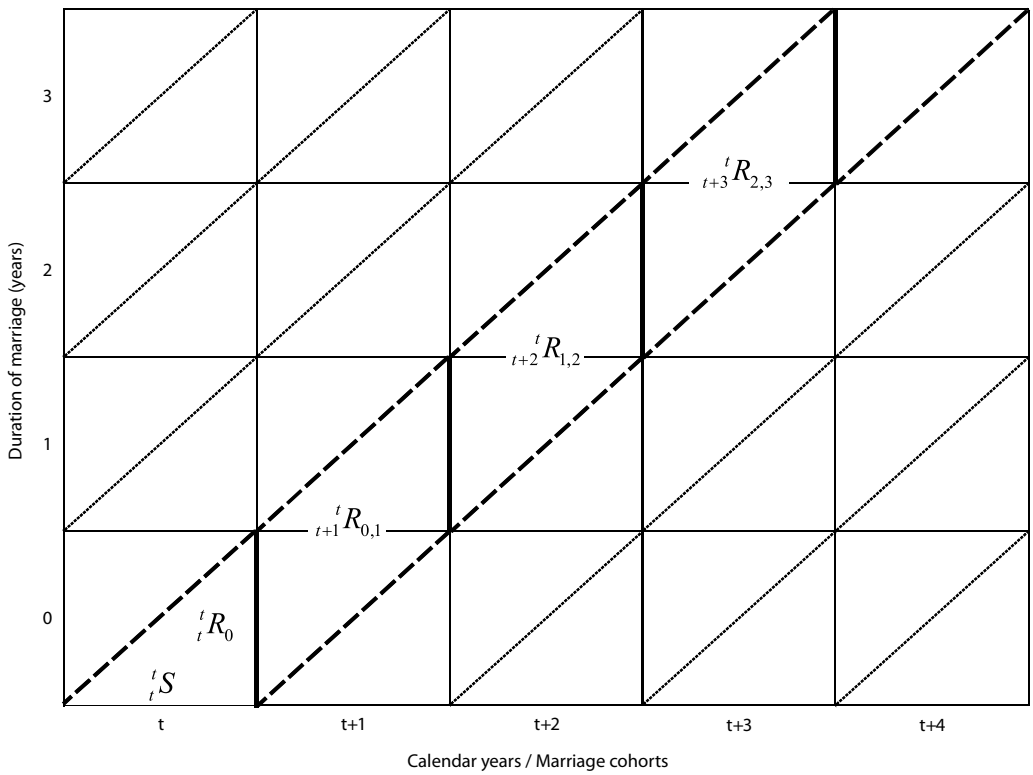
$${}^{z}_{t+1}l^{s}_{x+1} = {}^{z}_{t}l^{s}_{x} - {}^{z}_{t}d^{s}_{x,x+1}$$

The cohort analysis of divorce was based on cohort duration-specific divorce rates. The basis of this approach is to relate divorces classified by the time elapsed since the marriage to the relevant marriage cohorts. By specifically classifying divorces according to the year of marriage and the year of divorce, we are able to calculate directly the cohort duration-specific divorce rates for a given marriage cohort (see Fig. 2). Inputs for these purposes were prepared using primary data from the CZSO and SOSR. Based on this approach, it was possible to analyse the effects of divorce on marriage cohorts from 1980–2019. Given that demographic statistics in Czechia and Slovakia do not track deaths and migration by year of marriage, it was not possible to take into account the impact of these disruptive factors. Therefore, the results of the analysis present only the 'net' effect of divorce on marriage cohorts. The concept of construction of cohort duration-specific divorce rates for a selected marriage cohort (t) is presented in Figure 2 and can be described with the following formulas:

$${}^{t}_{t}r_{0} = \frac{{}^{t}_{t}R_{0}}{{}^{t}_{t}S} \; {}^{t}_{t+1}r_{0,1} = \frac{{}^{t}_{t+1}R_{0,1}}{{}^{t}_{t}S} \; {}^{t}_{t+2}r_{1,2} = \frac{{}^{t}_{t+2}R_{1,2}}{{}^{t}_{t}S} \; {}^{t}_{t+3}r_{2,3} =$$

$$= \frac{{}^{t}_{t+3}R_{2,3}}{{}^{t}_{t}S}$$

Figure 2 **A simplified diagram of the computation of duration-specific divorce ratesin a cohort perspective**



and generally:

$$ {}^{t}_{t+x}r_x = \frac{{}^{t}_{t+x}R_{x,x+1}}{{}^{t}_{t}S} $$

where:

${}^{t}_{t+x}r_x$ is the cohort duration-specific divorce rate of marriage cohort (t) in the year (t+x),

${}^{t}_{t+x}R_{x,x+1}$ is the number of divorces in marriage cohort (t) and the number of divorced in the year (t+x),

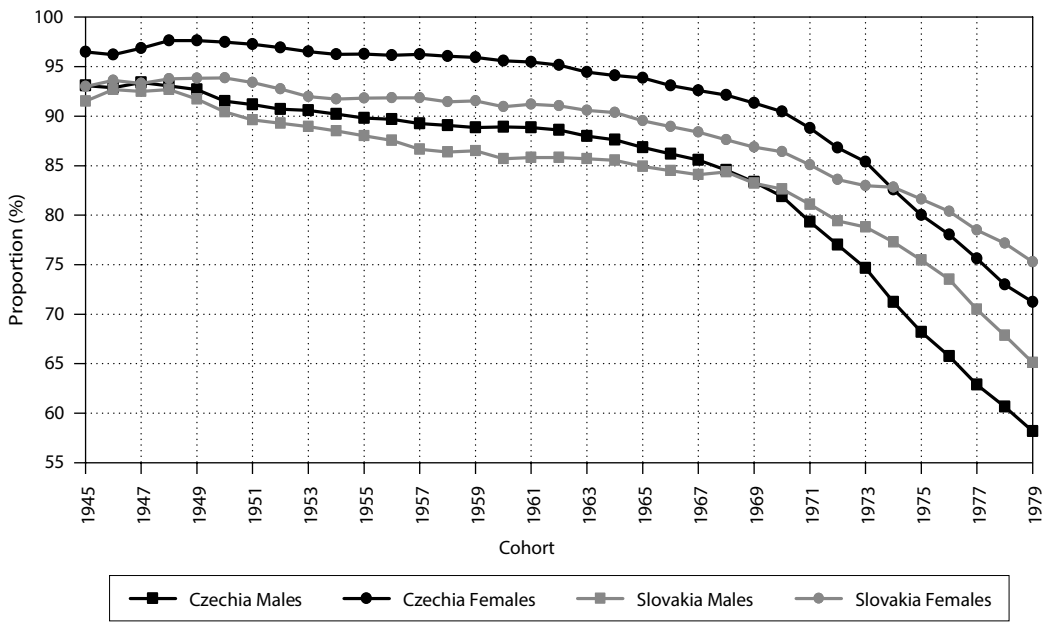
${}^{t}_{t}S$ is the number of marriages in the year (t).

A COHORT ANALYSIS OF FIRST MARRIAGE

A comparison of the trend in first marriage rates in Czechia and Slovakia after the Second World War reveals relatively significant changes (see, e.g. *Fialová*, 1992, *Rychtaříková*,1995, *Šprocha*, 2016). The earlier and more intensive first marriage rate that was identified in Czechia in the 1960s was a historical novelty. This phenomenon was also gradually reflected in cohort indicators. As can be seen in Figures 3 and 4, the exceptions were the youngest cohorts. In both countries and both sexes, data obtained from cohort nuptiality tables show that after a brief increase in first marriage rates among cohorts from the second half of the 1940s (influenced by the favourable population climate of the 1970s) there was a slight and gradual decline. This trend was more dynamic among the male population and in Slovakia. In Czechia, between the cohorts born in the mid-1940s and those in the 1960s, the first marriage rate of men fell from just over 93% to 87%. In Slovakia it went from less than 93% to below 85%. For women, the trend was more moderate, as the first marriage rates decreased from approximately 96–97% to 94% in Czechia and from 93–94% to approximately 90% in Slovakia (Fig. 3).

The development of the (table) cohort mean age at first marriage was more stable. In Czechia women born between the mid-1940s and the mid-1960s entered into their first marriage on average at the age of 21.3–21.6 years. For men, there was first a slight decrease among those born in the second half of the 1940s. In the following cohorts we can identify a gradual rise in the age of marriage from about 24.1 years to 24.7 years (Fig. 4). As mentioned above, in Slovakia first marriage occurred a little later. For women, it was more or less stable at the age of 22.

Figure 3 **Cohort total first marriage rate in Czechia and Slovakia, cohorts 1945–1979**



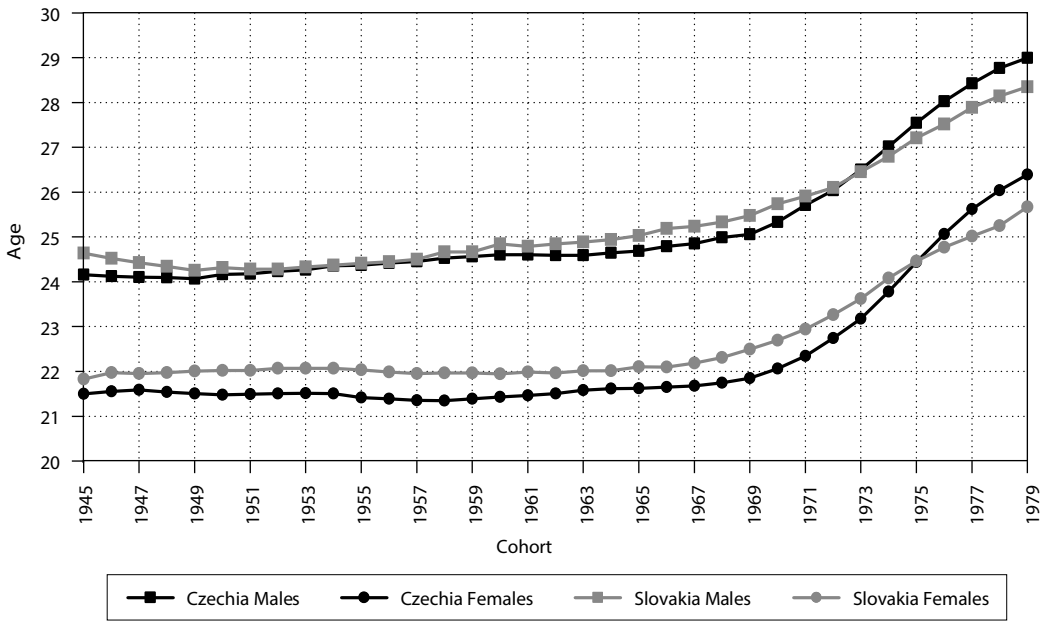
Source: *Tabulky sňatečnosti svobodných*... (1989); *Pavlík* (ed.) (1994); CZSO, SO SR; author's calculations.

For men, after an initial decline, there was a gradual increase from 24.3 years (cohort 1949) to more than 25 years (cohort 1965).

The trend in the first marriage rate of persons born in the second half of the 1960s was influenced by the transformational changes that took place in both countries after 1989. As Figures 3 and 4 show, with each younger cohort the first marriage rate decreased and there was a continuous increase in the cohort mean age at first marriage.

In the following text, we present the trend in the first marriage quantum and tempo for all the cohorts for which information was available on the nuptiality of persons aged 40 and over. We chose this age limit even though we are aware that the data obtained may not be final, especially for younger people. However, given the persistence of relatively low first marriage rates over the age of 40, no significant changes can be expected.[2] According to Figure3, it is clear that in Czechia the cohort first marriage rate has fallen quite sharply, to below 60% (cohorts from the late 1970s). If the current known marriage intensity of cohorts from the late 1970s increased by known cross-sectional intensity over the age of 40, that would mean that more than one-third of men would never marry. In Slovakia, the cohort first marriage rate started out from an even lower level. Between the 1965 and 1979 cohorts the decrease was from less than 85% to about 65%. This means that despite the slight increase in the first marriage rate among people over the age of 40, more than 28% of men would still be single at the end of the their reproductive life. However, the less dynamic inter-cohort drop in intensity contributed to the fact that the last known cohort first marriage rates are significantly higher than in Czechia. The less dynamic inter-cohort decrease in intensity in Slovakia is the reason why the last cohort first marriage rates for which we have information are higher than in Czechia.

Figure 4 **Cohort mean age at first marriage in Czechia and Slovakia, cohorts 1945–1979**



Source: *Tabulky sňatečnosti svobodných...* (1989); *Pavlík* (ed.) (1994); CZSO, SO SR; author's calculations.

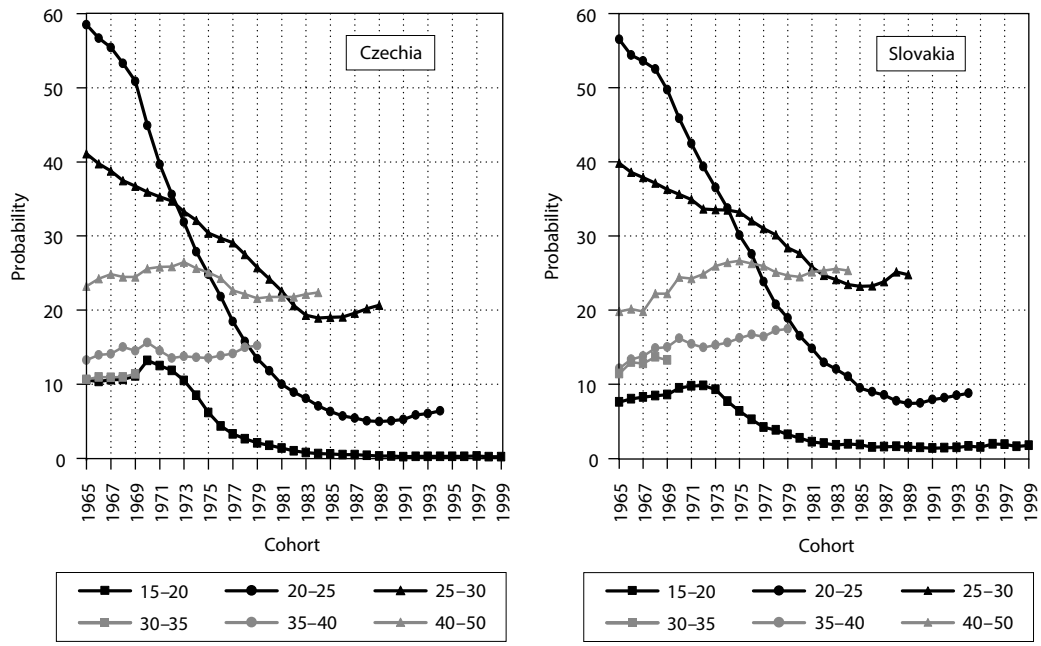
2) According to the data from the cross-sectional nuptiality tables in 2019, the first marriage rate of men in Czechia at the age of 40-49 would increase by almost 7 pp and for women by approximately 4 pp. In Slovakia, the situation is similar - for men, the potential increase is about 6.5 pp. and for women less than 4 pp.

The decline in the first marriage rates of women among cohorts from the late 1970s intensified in both countries. This process was more dynamic in Czechia, where the cohort first marriage rate fell from 94% to just over 71%. In Slovakia it went from less than 90% to just over 75%. This means that after taking into account the potential increase that may occur at the age of 40 and over in the cohorts from the end of the 1970s, almost a quarter of women in Czechia and a fifth in Slovakia would still be single at the age of 50.

Men and women in Czechia born between the second half of the 1940s and the beginning of the 1970s married for the first time at a slightly younger age than in Slovakia. The positions of the two countries changed very quickly (in this respect) as the cohorts transformed. The cohort mean age at first marriage among men in Czechia increased from 24.7 years (cohort 1965) to 29 years (1979). In Slovakia it rose from 25 years to more than 28 years. Given that the youngest cohorts are not yet at the end of their reproductive age, these figures may yet rise. A similar situation was observed in the tempo of first marriages among women. The last available (although not yet final) data on the cohort mean age at first marriage (cohort 1979) indicated an age of 26.4 years in Czechia and 25.7 years in Slovakia.

Changes in marital behaviour can be identified from the cohort conditional first marriage probabilities in selected age intervals (Fig. 5–8). In Czechia and Slovakia, the probability for single men under the age of 20 increased slightly. It is only among the cohorts born in the early 1970s that we can see a relatively significant decline. In the cohorts born in the second half of the 1980s and in the 1990s probabilities stabilised at an extremely low level. In Czechia, the probability is below 0.5% and in Slovakia is just below 2%. The conditional first marriage probability between the ages 20 and 25 in Czechia and Slovakia decreased very sharply. A certain turning point after which this trend intensified even more can be identified among persons born in 1970. The sharp decline at this age interval did not stop until the cohort of men born in the late

Figure 5 and 6 **The cohort conditional first marriage probability of men in Czechia and Slovakia, selected age intervals**



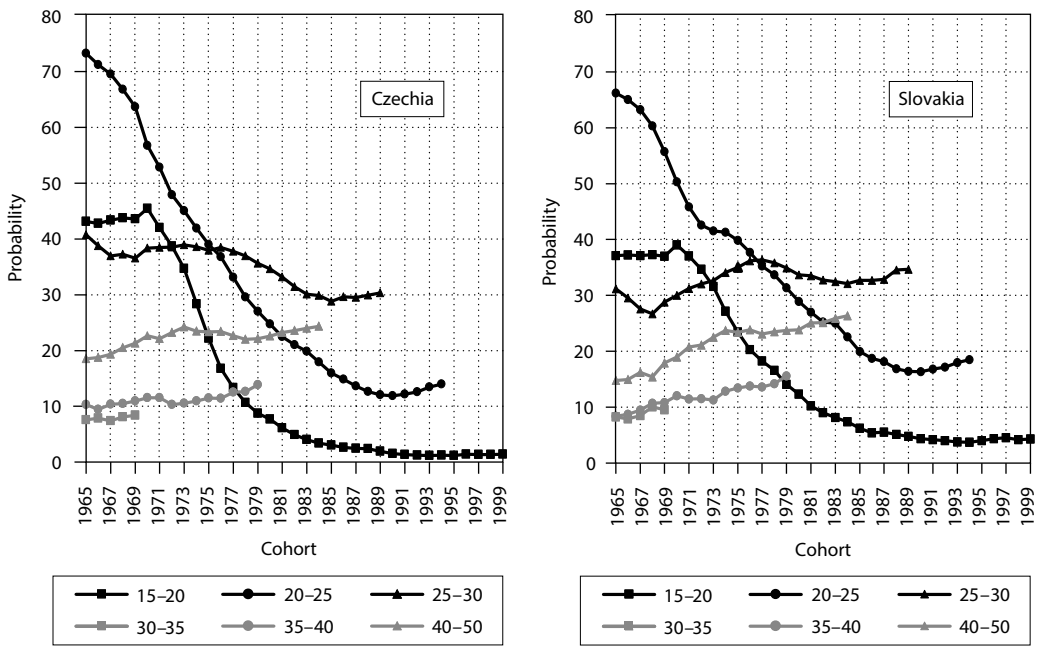
Source: *Tabulky sňatečnosti svobodných*... (1989); *Pavlík* (ed.) (1994); CZSO, SO SR; author's calculations.

1980s, when in Czechia it reached the 5% threshold of the original almost 60% and in Slovakia it fell below 8% from just over 55%. In the youngest cohorts we can identify a very modest rise in the probability rate in both populations – in Czechia to over 6% and in Slovakia to 9%. A significant decrease is also observed in the first marriage probability of men between the ages of 25 and 30. In Czechia, this probability dropped from about 40% to half that figure and in Slovakia it fell to below 25%. However, there has already been some stabilisation in the cohorts of the 1980s, and we can also see a slight recovery in the youngest cohorts. After the age of 30, the first marriage probability did not change significantly. In the oldest cohorts, there was only a slight increase between the ages of 30 and 35, which in Czech was then followed by a decline and in Slovakia by stabilisation around the level of 25%. Due to the development in younger ages, since the cohorts from the beginning of the 1980s, the first marriage probability is the highest in this age interval. Likewise, the chances of a 35-year-old single man marrying before the age of 40 in Czech remained almost the same across cohorts, while in Slovakia there was only a slight increase. The trend in conditional probabilities in the oldest segment of the population can only be observed in a limited number of cohorts. In Czechia, the information obtained indicates stability, while in Slovakia there has so far been a slight increase.

Almost the same picture is observed in the trend in women's conditional first marriage probabilities. The sharp decline in first marriage among young women was reflected in a decrease in probabilities to the age of 20 and also between the ages of 20 and 25. After this sharp decline occurred we then see in subsequent cohorts not only the stabilisation of probabilities in the youngest cohorts but also a slight recovery between the ages of 20 and 25. It turns out that women in Slovakia now have a slightly higher first marriage probability in this age interval.

In Czechia, despite the slight decrease from less than 40% to 30%, the highest first marriage probability is now found among women between the ages

Figure 7 and 8 **The cohort conditional first marriage probability of women in Czechia and Slovakia, selected age intervals**



Source: *Tabulky sňatečnosti svobodných...* (1989); *Pavlík* (ed.) (1994); CZSO, SO SR; author's calculations.

of 25 and 30. This can also apply in the case of Slovakia. The difference is that there is the slight increase in probability to 35% among the youngest cohorts in Slovakia. An increase in conditional probabilities can also be identified in the second half of the reproductive period. According to the results presented in Figures 7 and 8, it is obvious that this trend is more dynamic in Slovakia. Consequently, the first marriage probabilities of women in Slovakia are slightly higher after the age of 30 and 35, respectively.

A COHORT ANALYSIS OF DIVORCE

According to the results of several papers (e.g. *Fialová and Kalibová*, 2010, *Křesťanová*, 2020, *Šprocha*, 2012b), the long-term rising trend in divorce rates in Czechia and Slovakia after the WW II. accelerated after 1990. From a cross-sectional point of view, the total divorce rate in Czechia increased from 38% (1990) to 50% (2010). In Slovakia, this growth was somewhat more dynamic, as between 1990 and 2009 the total divorce rate rose from 23% to more than 41%. After reaching these highs, we have seen a slight decrease in these divorce rates. The change in the trend is faster in Slovakia, where by 2019 the total divorce rate had then decreased again by more than 8 pp, while in Czechia the decrease was approximately 5 pp. According to the latest cross-sectional data (2019), if the same intensity were maintained approximately 45% of marriages would end in divorce in Czechia, while in Slovakia it would be approximately one-third. The key factor behind the changes in divorce intensity in Czechia and Slovakia was identified as the increase in the risk of divorce among longer-lasting marriages (*Křesťanová*, 2020, *Šprocha and Tišliar*, 2018).

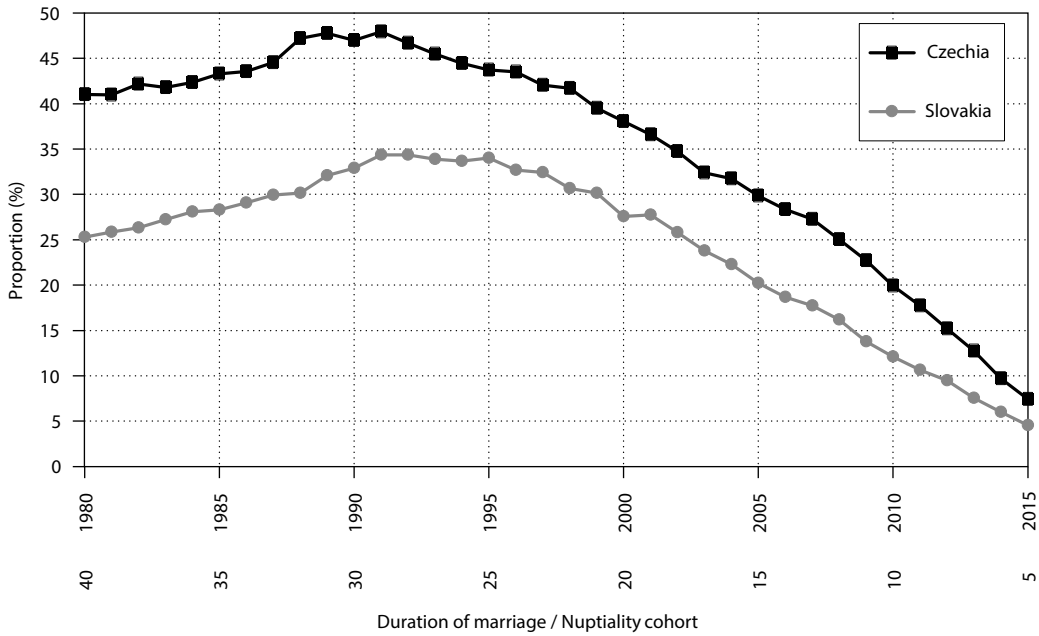
Given that these findings relate to cross-sectional indicators, which present a synthetic cohort of marriages that often have a different history and are subject to different conditions, they only represent an estimate of the true intensity and nature of the divorce rate.

Thus, only a cohort approach can give us a realistic picture of divorce. The key factor behind the (rising) risk of divorce is the amount of time that has elapsed since the marriage took place (*Křesťanová*, 2020, *Šprocha*, 2012b). Therefore, we tried to identify divorces in relation to individual marriage cohorts (see the section on data and methods). In our case, these marriage cohorts are defined as the number of marriages in one calendar year. As mentioned above, it was possible for the purposes of this analysis to construct the divorce rates for marriage cohorts going back to the year 1980. Because divorce can occur at any time within a cohort up until the last married couple in that cohort exists, the cohort divorce rates stated here represent the situation that was valid at the last recorded duration of the marriage and thus cannot represent the final cohort divorce rate.

The data on the cohort divorce rates in Czechia and Slovakia presented in Figure 9 point to a gradual increase in the proportion of divorced marriages in cohorts since the early 1980s. In Czechia we find in the 1980 marriage cohort that after 40 years of marriage slightly more than 40% of couples were divorced. When we look at the cohorts from the late 1980s and early 1990s (after about three decades of marriage) we see that it has already risen to more than 45%. The more dynamic rise in divorce rates in Slovakia noted above was also reflected in cohort data. While in the 1980 marriage cohort we find about a quarter of marriages were divorced forty years later, among cohorts from the first half of the 1990s the divorce rate rose to almost 35%. The subsequent decline observed in the cohort divorce rate in both populations among marriage cohorts since the second half of the 1990s is mainly due to the shorter period of time those cohorts have been married. At the same time, however, we believe that the decrease observed in the cross-sectional intensity of divorce is also likely to play a role in this development. If the last known cohort divorce rate in individual periods since marriage were to remain unchanged, the cohort divorce rate in Czechia would increase to over 50% (among marriage cohorts from the early 1990s), but it would decrease among more recent marriage cohorts to 47% (the 2005 cohort). In Slovakia, the cohort divorce rates among the marriage cohorts from the mid-1990s would also increase, rising to the level of 38–39%. Subsequent developments would bring the decline to 35%.

The higher cross-sectional intensity of divorce in Czechia also conditioned its higher cohort divorce rate in comparison with Slovakia (Fig. 9). At the same time, it is clear that the more dynamic rise in divorce

Figure 9 **The cohort divorce rate in Czechia and Slovakia, marriage cohorts 1980–2015**

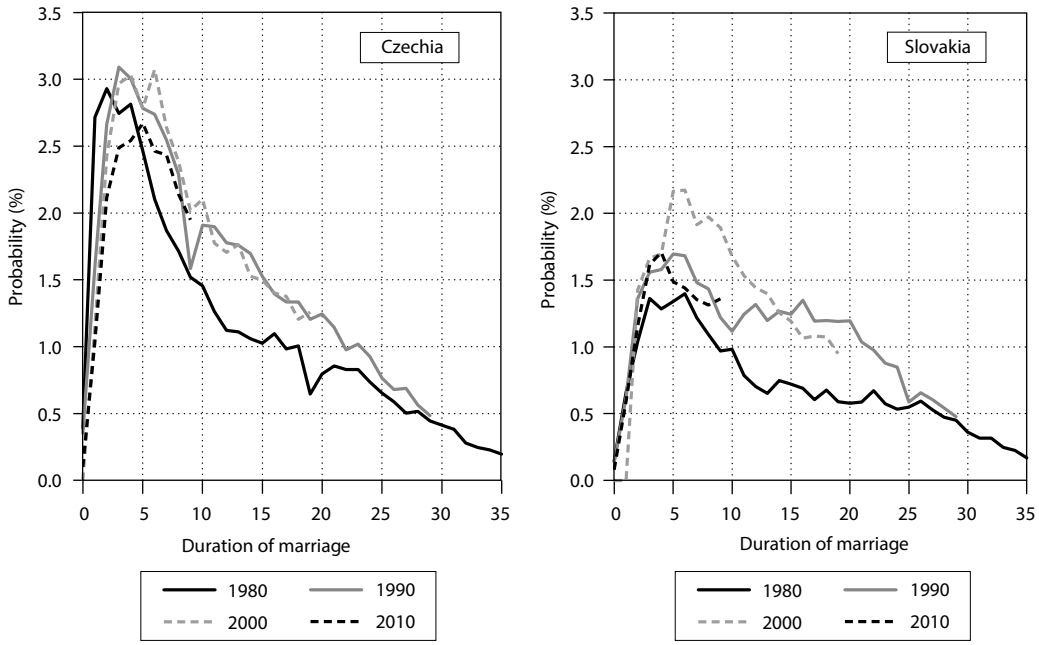


Note: Cohort divorce rates in younger marriage cohorts are affected by the shorter duration of their marriages
Source: CZSO, SO SR; author's calculations.

rates in Slovakia has contributed to reducing these differences. While among the cohorts who married in the 1980s the difference between the two countries was 15–17 pp, in the younger marriage cohorts the difference decreased to 10 pp. or even less. Caution should be exercised with regard to the lower divorce rates connected to the shorter duration of the younger cohorts' marriages may be a factor in this.

Among the observed marriage cohorts, the distribution of the intensity of divorce according to the duration of the marriage also changed to some extent (Fig. 10 and 11). Above all, we can see a shift in when the maximum divorce rate by marriage duration occurs. While in Czechia in the 1980 marriage cohort the highest risk of divorce was in the 3rd year of marriage, in the 2010 cohort it was in the 6th year. In Slovakia, such a similar maximum risk shortly after marrying was not observed in the oldest cohort, and a high risk of divorce existed not only after the 3rd but also the 4th or 5th years of marriage. We have even seen an increase in the cohort intensity of divorce among 3-5-year marriages. It was only in the youngest marriage cohorts (after 2005) that this trend was reversed. Conversely, in Czechia, a legislative change in the 1990s (the *Family Act*, No. 91/1998) that made getting a divorce more difficult shortly after marriage contributed to the aforementioned shift in when the maximum divorce risk occurs and, in general, to a decrease in the cohort intensity of divorce in the first years of marriage. An important part of the changes in the distribution of the risk of divorce in both countries has been an increase in the likelihood of a marriage ending in legal termination after a longer period. Even in this case, however, we can see some differences between the course of these changes in Czechia and Slovakia. While in Czechia the main shifts occurred between individual marriage cohorts from the 1980s, in Slovakia changes in the distribution of divorce risk by marriage duration affected more marriage cohorts. In addition, they confirm the above-mentioned faster rise in divorce rates (especially when we compare the 1980 and 1990 cohorts). However, we can already partially identify (in the 2000 and 2010 cohorts) the effect of the decline in divorce rates that Slovakia has been experiencing in recent decades.

Figure 10 and 11 **The cohort probability of divorce by duration of marriage in Czechia and Slovakia, selected marriage cohorts**

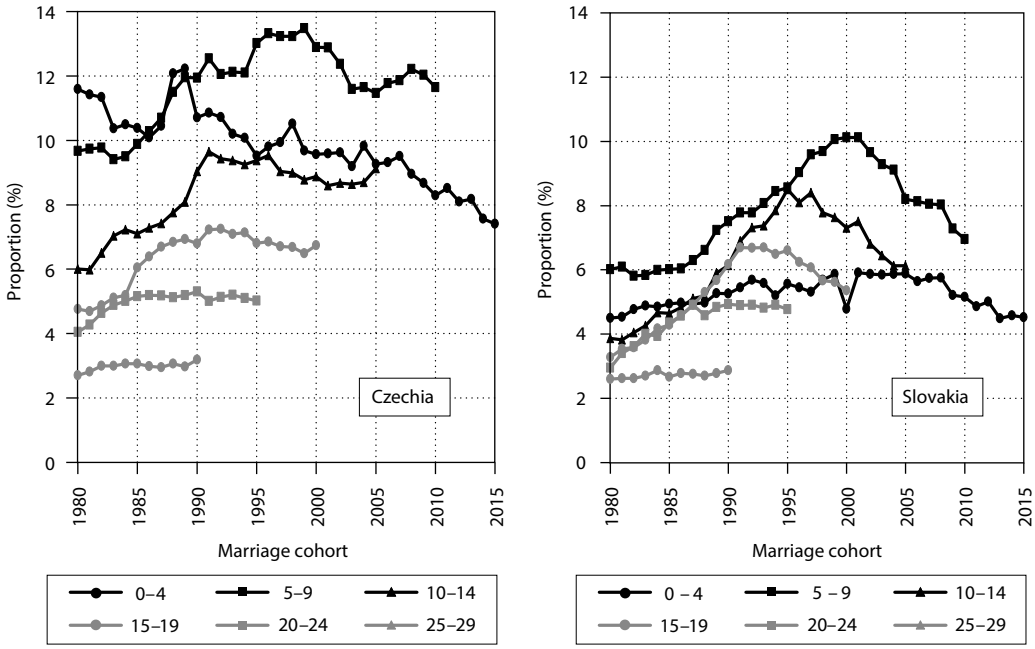


Source: CZSO, SO SR; author's calculations.

A more detailed analysis of the changes in the intensity of divorce in relation to the duration of marriage between the selected marriage cohorts observed here is provided in Figures 12 and 13. In Czechia, the analysis confirms the aforementioned more or less continuous process of declining divorce rates in the first years of marriage, while among the marriage cohorts from the 1980s and the first half of the 1990s the risk of divorce increased between 5–9 years and 10–14 years of marriage. We can also identify a certain increase between the 15th and 20th year of marriage. However, this only concerned the marriage cohorts from the 1980s, as we tend to see stagnation and even a slight decline in younger cohorts. This trend is also present in marriages of shorter duration (Fig. 12).

In Slovakia, the divorce risk within 0–4 years after marriage rose with each successive marriage cohort. Starting approximately with the marriage cohorts from the beginning of the new millennium, there has been some stabilisation, so we are able subsequently then to identify the onset of a decline in the youngest cohorts (Fig. 13). There was also a significant increase in divorce intensity between 5–9-year marriages and 10–14-year marriages. However, it has been possible to observe a decline in divorce intensity among marriage cohorts from the 21st century and the mid-1990s in the 10–14-year group as well. Similarly, among 15–19-year marriages the increase in the divorce risk among the 1980s marriage cohorts was replaced in later marriage cohorts by a decline in the divorce risk. These findings confirm that the transformational changes in the divorce rate in Slovakia were more dynamic and had a more significant impact on the level and distribution of the divorce risk. The decline in divorce rates was also faster among the youngest marriage cohorts and has affected a wider range of marriage duration intervals.

Figure 12 and 13 **Cumulative cohort divorce rates by duration of marriage in Czechia and Slovakia**



Source: CZSO, SO SR; author's calculations.

CONCLUSION

The causes of dramatic changes in family behaviour in Czechia and Slovakia after 1989 can be explained by means of two main theoretical approaches. The first highlights structural changes associated with the collapse of the socialist bloc and the transition to a market economy. These changes (e.g. inflation, unemployment, falling living standards, a decline in real income, increasing disparities in the income distribution, changes in family policy, etc.), especially in the early part of the 1990s, may have had a negative effect on the intensity of nuptiality and the stability of marriages. Some features of a modern market economy also began to emerge around this time. These include, for example, the restructuring of the labour market, rising job insecurity, the need to achieve a higher education and lifelong learning, individual flexibility, new career opportunities, and the increasing availability of consumer goods and services (more *Frejka*, 2008).

The second approach points to social, cultural, and psychological factors. This especially relates to changes in values, norms, and attitudes towards marriage, cohabitation (and other forms of couple coexistence outside the marriage), and divorce. It also involves, for example, the expansion of consumer behaviour and increased opportunities in education, travel, and leisure activities (*Frejka*, 2008). Intimate partnership and sexuality are no longer so closely socially regulated and normatively controlled (*Sobotka and Toulemon*, 2008). There is a stronger assertion of the ideal of a pure relationship, which is based on the mutual consensus of partners and emphasis on individual autonomy (*Giddens*, 1992). As Sobotka and Toulemon (2008: 86) noted, the ongoing transformation of family behaviour is reflected in the spread of new family forms and living arrangements other than nuclear families comprised of a married couple with children. The boundaries between family and non-family life have become much more difficult to identify (*Sobotka and Toulemon*, 2008).

A cohort analysis of first marriages in both countries highlighted the effects of long-term major transformational changes. In particular, a significant decline in cohort marriage rates is evident in both sexes. A dynamic decline in the cohort table marriage

rate can be identified especially among people born in the early 1970s. With each younger cohort, the intensity with which single men and women entered into marriage has so far been decreasing. According to the latest known data (2019), one third of the men born in the cohorts from the late 1970s in Czechia will never marry. In Slovakia, due to the slower dynamics of the decrease in the intensity of cohort first-marriage rate, just over a quarter of men will remain single to the end of their reproductive period age. In the same cohorts of women, the proportion of never married will be about one-quarter in Czechia will never marry and one-fifth in Slovakia. Changes in the distribution of cohort age-specific marriage rates have confirmed that the postponement of marriage to a later age has become increasingly more common. This is associated with a continuous inter-cohort increase in the values of the cohort table mean age of men and women at the first marriage. The cohort analysis thus confirmed the known fact that the process of marriage of single persons in Czechia and Slovakia is by no means exclusive to people of a young and very young age and it is no longer an almost universal process, as a significant number of men and women will never marry.

The cohort analysis also confirmed the growing intensity of divorce rates among the marriage cohorts from the 1980s and early 1990s. In Czechia, the known cohort divorce rates in these cohorts were greater than 45%, and in Slovakia they reached 35%. Among younger marriage cohorts we can expect to see in both countries a decrease in the risk of divorce and thus also a smaller propotion of divorced couples from marriage cohorts. The above analysis confirms that the transformational changes in divorce were more dynamic in Slovakia and had a more significant impact on the level and distribution of the divorce risk. The decrease in the divorce rate among the youngest marriage cohorts is also occurring more quickly there and is affecting a wider range of marriage duration intervals.

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REGIONAL DIFFERENCES OF FERTILITY IN SPAIN IN 1981–2011 BASED ON BASIC SUMMARY INDICATORS FROM PERIOD FERTILITY TABLES

Elizaveta Ukolova[1] – Luděk Šídlo[2]

Abstract

In this paper, regional differences in fertility behavior across the Spanish NUTS2 regions are analyzed for the years 1981, 1991, 1999, and 2011 using basic summary indicators from period fertility tables. The indicators used are parity- and age-adjusted total fertility rate, table mean age of mother at birth, and parity progression ratios. The results show that the differences in the quantum of fertility across Spanish regions have been disappearing over the years, but still persist in some form, most noticeably in relation to first-order births. Two groups of regions were identified using the parity progression ratios. The first group is characterized by the existence of two subpopulations, while the second one has no such subpopulations. The two subpopulations present in some regions consist of women who have had two children, and women who are more likely to go on to have a fourth child or more. Specific local attributes of fertility behavior in, for example, Madrid, Asturias, Andalusia and Murcia, Galicia are discussed.

Keywords: period tables, fertility, parity, Spain, regional differences

Demografie, 2021, **63: 105–118**

INTRODUCTION

Spain and Italy were among the first countries in which fertility rates fell to below 1.3 children per woman in the 1990s (*Kohler – Bilari – Ortega*, 2002). This phenomenon, which soon occurred in many other countries as well, became the subject of many demographic studies. Fertility levels below 1.3 children per woman were designated by Ortega and Kohler (2002) as the "lowest-low fertility". They concluded that such low rates occur when fertility is postponed and the proportion of children born in higher birth orders decreases. In Spain, the sharper decrease in fertility began as early as the mid-1970s. At that time, up to 35% of children were born in the third and higher birth orders, but by 1995 that figure was only 12%. This trend was accompanied by a significant increase in the mean age of the mother at childbirth, rising from 28.5 years in around 1975 to almost 31.0 years by the end of the millennium (*Human Fertility Database,* 2019ab).

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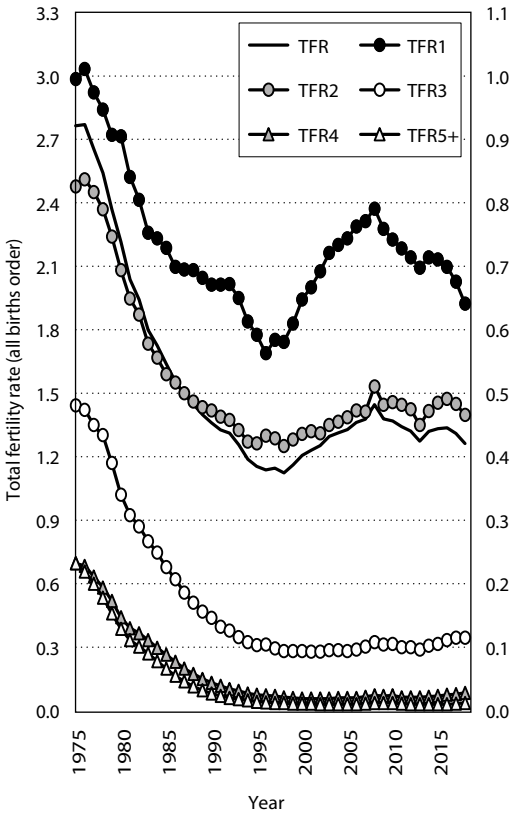
These changes in reproductive behavior were followed by different patterns after 2000, with the fertility rate in Spain stabilizing at lower levels, and even rising slightly between 2005 and 2010 (Figure 1). The increase in the mean age of mothers at childbirth has remained. However, a closer look at mean age by birth order reveals that mother's age at first birth rose most significantly between 1975 and 2015 (by about 5.5 years), while for third-born children the increase was two years, and for higher birth orders there were no noticeable shifts in the timing of fertility (Figure 2) (*Human Fertility Database,* 2019ab). As already mentioned, this was associated with a decrease in the proportion of third-order and higher births, which can be explained by many different hypotheses: for example, that women "have left it too late to give birth to more than two children" having delayed the onset of parenthood. Questions were raised about the extent to which postponed fertility is physically compensable at an older age (*Leridon,* 2010) and so attempts were made to reflect the potential compensation in period fertility indicators.

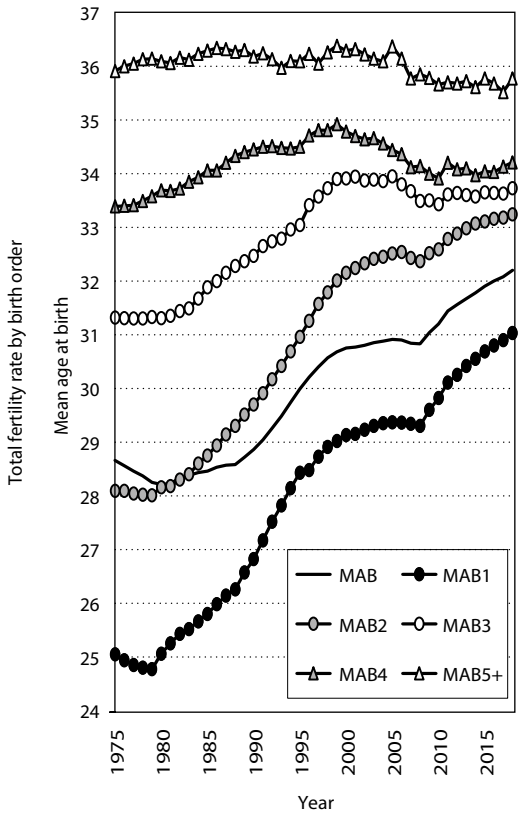
The indicator that is conventionally used to express fertility is the total fertility rate, which can be defined as "the total number of children born or likely to be born to a woman in her life time if she were subject to the prevailing rate of age-specific fertility in the population" (*World Health Organization*, 2020). But in the 1990s, the distribution of age-specific fertility rates changed significantly, and, in some cases, the total fertility rate lost its explanatory power. Therefore "it is appropriate to use alternative fertility indicators

Figure 1 **Total fertility rate, total (TFR) and by birth order (TFR1–TFR5+), Spain, 1975–2018**



Sources of data: Human fertility database (2019a).

Figure 2 **Mean age at birth, total (MAB) and by birth order (MAB1– MAB5+), Spain, 1975–2018**



Sources of data: Human fertility database (2019a).

in addition to the commonly used total fertility rate" (*Zeman*, 2011). One option is to use the period fertility tables constructed by the Human Fertility Database (HFD). According to the HFD (2019), changes in the timing of births tend to have less impact on the indicators obtained by this method.

The aim of this paper is to analyze fertility in Spain applying the period fertility table indicators. Spain is a fairly heterogeneous country, and this is reflected in the social, economic, and cultural spheres (*Gutiérrez Sanchís,* 2019). For example, according to Eurostat, regions such as Andalusia, Murcia, Castille-La Mancha, and Extremadura differ from other NUTS2 regions in Spain in terms of unemployment rate, GDP per capita, and take-up of early childhood education. Baizán (2009) explores the relationship between these variables and the higher fertility rates in these regions. However, the purpose of this paper is not to examine the factors affecting the regional differentiation of fertility, but to identify and describe these differences using alternative fertility indicators. This is done at the NUTS2 regional level, which corresponds to the Spanish Autonomous Communities (AC), for selected years between 1981 and 2011.

METHODOLOGY AND DATA

Period fertility tables (PFT), constructed using the HFD methodology, are multistate models. Each state is defined by women's parity, which refers to the number of children born to a woman over her lifetime. The principle underpinning the construction of the tables is that women move between these parity states and that the likelihood of these transitions can be determined based on the probability of having an *ith* birth at age interval [x, x+1) (denoted as $q_i(x)$, see Table 1). The probabilities are calculated using an indirect method based on empirical conditional age- and parity-specific fertility rates (denoted as $m_i(x)$, see Table 1). The construction of $m_i(x)$ requires the disaggregation of women by age and parity as well. Such data are available in census years, or in some cases can be replaced by fertility survey data. That is why 1981, 1991, 1999, and 2011 have been selected as the years of analysis in this paper. The resulting period fertility tables consist of table functions that are always attached to a certain parity (denoted *i*). The notation and the definitions of the functions are given in Table 1.

The basic summary indicators of the PFTs are the parity- and age-adjusted total fertility rate (PATFR) and table mean age of mother at birth (TMAB), both of which can be calculated either for all birth orders combined or for each birth order separately ($PATFR_i$ and $TMAB_i$) (*Jasilioniene et al.,* 2009). The formulae used for this purpose are defined according to the HFD Methods Protocol:

$$PATFR_i = \frac{\sum_{x_{min}}^{x_{max}} b_i(x)}{10000}$$

$$TMAB_i = \frac{\sum_{x_{min}}^{x_{max}} \overline{x} \times b_i(x)}{\sum_{x_{min}}^{x_{max}} b_i(x)}$$

Note: $\overline{x}$ is simplified by x+0.5

Table 1 **Period fertility table functions**

$w_i(x)$	Relative distribution of female population exposure by parity (population weights): $\sum_i w_i(x) = 1$
$E_i(x)$	Female population exposure by parity: $E_i(x) = w_i(x) \times E(x)$
$m_i(x)$	Conditional age-specific fertility rates in age interval [x, x+1)
$q_i(x)$	Probability of having an *ith* birth in age interval [x, x+1)
$l_i(x)$	Table population of parity *i* at age *x*
$b_i(x)$	Table number of births of order *i* in age interval [x, x+1)
$L_i(x)$	Table population exposure of women of parity *i* in age interval [x, x+1)
$Sb_i(x)$	Cumulative (in respect to age) births of order *i* by exact age *x*

Source: Jasilioniene et al., 2009.

The PTF can also be used to calculate parity progression ratios (a_i), which express the probability of a woman with *i–1* children giving birth to an *ith* child. Jasilioniene et al. (2009) define this indicator using cohort fertility tables, but Rallu and Toulemon (1994) state that a_i is an example of a period fertility indicator. In the present paper, probabilities of having second, third and fourth child are studied. Probability of having first child equals to $PATFR_1$ and is analyzed in the part of fertility level and timing analysis. The parity progression ratio is calculated using the formula:

$$a_i = \frac{PATFR_{i+1}}{PATFR_i}$$

Data from the Statistical Office of Spain and IPUMS are entered into the PFT. IPUMS is "a project of the Minnesota Population Centre and national statistical agencies, dedicated to collecting and distributing census data from around the world" (*Ruggles et al.*, 2015). The entry data for the years 1981, 1991, and 2011 are a combination of data from the Spanish population registers and yearbooks, which are provided by Statistical Office of Spain. To get parity distributions of women, data from censuses held in those years were downloaded from IPUMS. The exception is the parity data for women in 1999, which was obtained from the fertility survey. These data were taken from aforementioned Statistical Office of Spain too. There are limitations to working with such data (the statistical set is smaller than that from the census), but these data most closely resemble the data in the 2001 census. In the 2001 census, women in Spain were not asked how many biological children they had.

RESULTS

Regional differences in terms of fertility level and timing

Figures 3–5 show the Spanish Autonomous Communities divided into four categories that represent all the various combinations of the low and high values of table mean age of mother at birth (TMAB) and the parity- and age-adjusted total fertility rate (PATFR); both indicators are specified by birth order. The cut-off point separating ACs with higher TMABs or PATFRs from ACs with lower ones is the average of all regional values. The simple arithmetic mean was computed from TMAB and PATFR specified by birth order of a child.

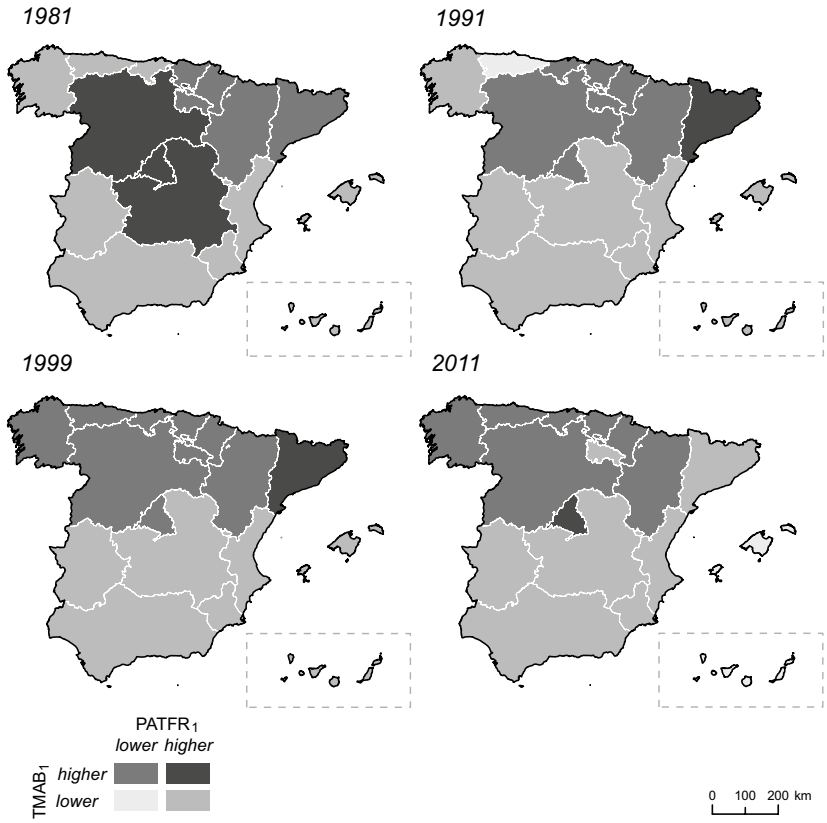
For all birth orders and years, the ACs in the south (excluding the Canary Islands) were characterized by higher fertility. This finding corresponds to results published in other studies (*Bussler*, 2016; *Baizán,* 2009; *Gutiérrez Sanchíz*, 2019); however, these other studies used the conventional total fertility rate, not PATFR. The authors also concluded that the northern ACs could be described as exhibiting lower fertility levels. In our study, this spatial pattern did not apply to third-order births (as can be seen in Figure 5), especially in 2011. The regions with above-average parity- and age-adjusted total fertility rate for third-order births ($PATFR_3$) were located in central and northern Spain, and two ACs in the south (Andalusia and Murcia). Thus, the statement that "the North-South divide [higher fertility in the south and lower in the north] still persists in some aspects of demographic behavior" (*Arpino – Tavares*, 2013) no longer applies to all birth orders. For example, ACs in the north – Catalonia, Navarra, La Rioja, and the Basque Country[3] – did not fit this pattern in 2011, as the parity- and age-adjusted total fertility rate was higher for second- and third-order births ($PATFR_2$ and $PATFR_3$).

At first glance, the regional differences concerning second- and third-order births seem to have the same spatial distribution as in 1991, when, in addition to Madrid, there were three macro-regions (Figures 4 and 5). The significant differences in reproductive behavior between the Autonomous Communities within these macro-regions in 1991 may have been caused by differences in first-order birth fertility.

Andalusia and Murcia are the only ACs in Spain with above-average PATFR for each birth order, in each year and a lower mean mother's age at birth, except for third-order births in 1999. Andalusia was one of the few ACs with a high proportion of third-order and higher births. After calculating the relative share of $PATFR_1$, $PATFR_2$ and $PATFR_3$ in relation to total PATFR, in 1999 parity- and age-adjusted total fertility rate for third-order births ($PATFR_3$) accounted

3) The locations of the regions and their names (and the abbreviations used later in the paper) are given in Appendix 1.

Figure 3 **Autonomous Communities grouped by PATFR and TMAB, first-order births**



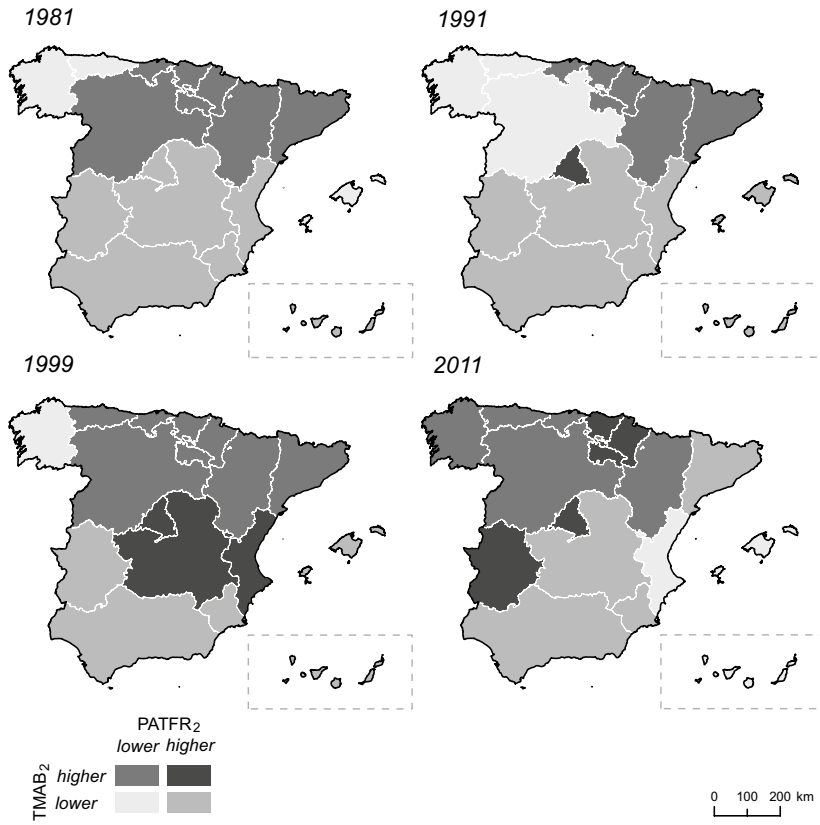
Sources of data: INE (2019), IPUMS (2019); **Sources of shapefiles:** Eurostat (2020).

for more than 7% of total PATFR, and almost 10% after fourth- and higher order births are added. In the other ACs, in 1999 fertility for third- and higher order births constitutes less than 5% of total fertility. As in Andalusia, third- and higher order births could be found more frequently in Extremadura, Castille-La Mancha, Murcia, and the Balearic Islands (Figure 5). This could lead to the conclusion that, in these regions, the overall shift in table mean age of mother at birth (TMAB) for all orders in 1999 had not yet resulted in a more pronounced decrease in fertility intensity in higher birth orders. Thus, the populations living in Castille-La Mancha, Extremadura, Murcia, the Balearic Islands, and Andalusia were not so keen on having fewer children and continued to have larger families despite the mothers being older. This can be seen in the fact that it was only in these ACs that the proportion of $PATFR_{3+}$ was more significant.

Aragon, on the other hand, is the only AC with a lower fertility rate and higher mother's mean age at childbirth for each year observed. This may be linked to the observations Baizán (2009) made: namely, that Aragon has a lower unemployment rate (*Gutiérrez Sanchís*, 2019) and lower take-up of early childhood education, which may be reflected in a higher TMAB over the long term.

Like Aragon, Galicia has lower fertility, and mean mother's age at birth is also lower (except in 2011) (Figures 3–5). However, first-order fertility is different: in 1991 and 1981, Galicia had a higher $PATFR_1$ than other regions did. This can be explained, for example, by the fact that in the first two years observed, people in Galicia were more focused on having their first child than women in other ACs: both the TMAB and PATFR for later birth orders were lower in 1991 and 1981 than in many other Spanish regions.

Figure 4 **Autonomous Communities grouped by PATFR and TMAB, second-order births**

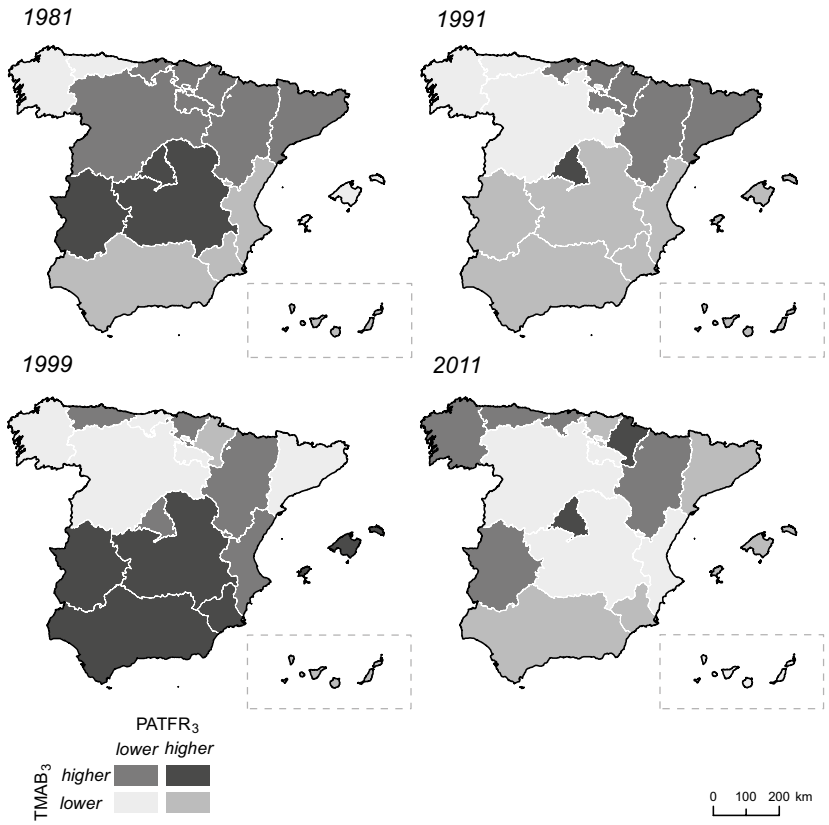


Sources of data: INE (2019), IPUMS (2019); **Sources of shapefiles:** Eurostat (2020).

Madrid had both a higher mean mother's age at birth and PATFR in 2011. Whereas at the end of the last millennium, it was mainly in the cities that fertility postponement led to a reduction in the fertility rate, recently, in more advanced regions, or states, fertility rates have tended to be higher than is the case in the superior territorial units. Baizán (2009) gives the example of Nordic countries, where there are higher female labor-force participation rates (conventionally taken as a sign the country is more advanced) and higher fertility. On this basis, Baizán (2009) concludes that the relationship between the women's labor-force participation rate and the total fertility rate is U-shaped. Madrid is Spain's most developed region, as measured by various economic indicators (*Eurostat*, 2019). So, when considering the relationship between level of development and fertility described by Baizán (2009), it may be that this also explains why Madrid had a consistently higher PATFR in 2011. In 1991 and 1999, Madrid's $PATFR_1$ was lower than the Spanish mean, while $PATFR_2$ was higher than the mean. Madrid may therefore have had a relatively higher proportion of women who remained childless in 1991 and 1999, but when they did go on to have children, they were more likely to have more than one, despite being older than average at birth, compared to women in other ACs.

A final point worth mentioning is that this method of analysis has several weaknesses relating to the use of average values. These are sensitive to outlier observations and do not account for marginal differences between regions. For example, looking at first-order births in 1981, in every region $PATFR_1$ ranged between 0.97 and 1.00 children per woman, but Figure 3 shows that at least five regions are classified as having lower fertility.

Figure 5 **Autonomous Communities grouped by PATFR and TMAB, third-order births**



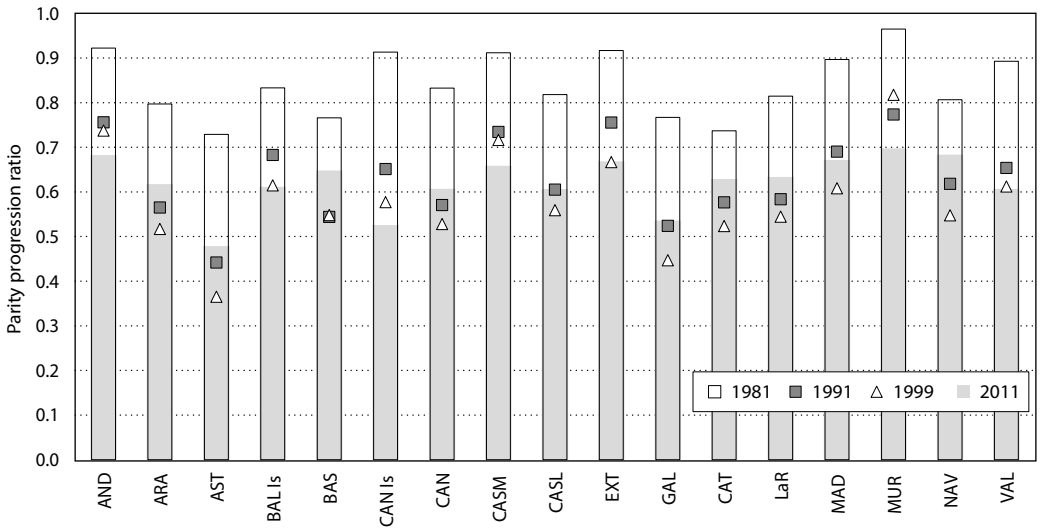
Sources of data: INE (2019), IPUMS (2019); **Sources of shapefiles:** Eurostat (2020).

Regional differences in terms of parity progression ratios

In all ACs the probability of a woman giving birth to a second child (parity progression ratio from first to second child, denoted a_1) was higher in 1981 than it was in 2011 (Figure 6). In regions that typically had higher fertility rates, such as Murcia, Andalusia, or Extremadura, a_1 exceeded 0.9 in 1981, indicating that in those regions less than 10% of female exposure remained one-child, according to the fertility schedule used in the PFT. In all regions except Murcia, a_1 was slightly higher in 1991 than in 1999. In Murcia, the probabilities were higher in all years. In 1981, in the Basque Country, Catalonia, and Navarra, parity progression ratios for women with a second child were relatively lower than in the other ACs, but did not fall so steeply between 1981 and 2011. Thus, the difference between 1981 and 2011 in those ACs is lower, than in the rest of the regions, which indicates, that in 2011 they were not the ones with relatively lower a_1 anymore. Asturias is also worth mentioning: just under half the women there went on to give birth to a second child in 1991, 1999, and 2011.

Next, the parity progression ratio from second to third child (a_2) was analyzed (Figure 7). In 1981, in regions such as Andalusia, the Canary Islands, Castille-La Mancha, Extremadura, and Murcia, almost half the women transitioned from second to third child, whereas in 2011 the a_2 in those regions fell to close to 0.2. The exception was again Murcia, where a_2 was close to 0.3. In contrast, in Catalonia, there is no difference between 1981 and 2011: a_2 was 0.25 in both years. Other Spanish regions where the parity progression ratios from second to third child were not so high in 1991 did not experience a steep decline in a_2 either.

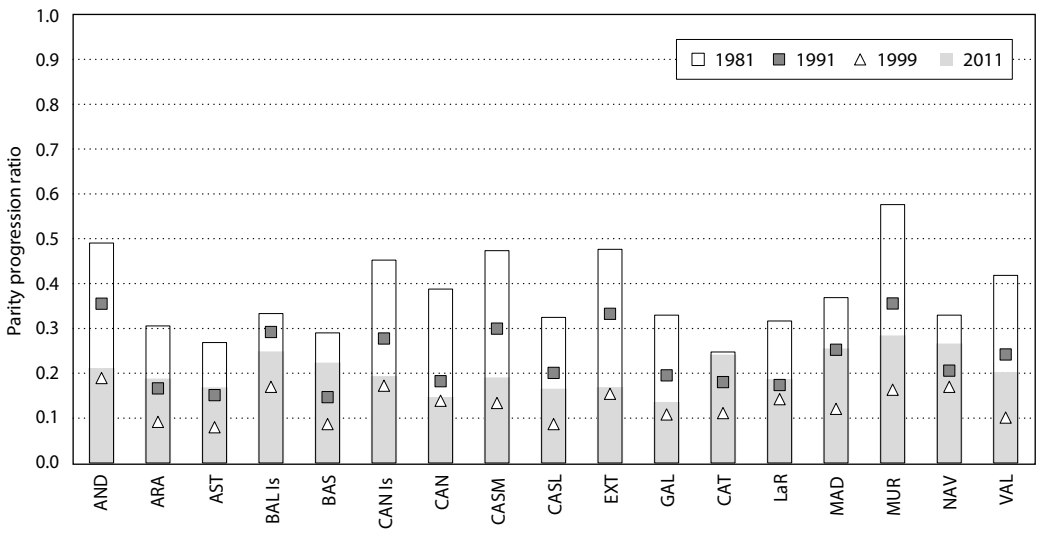
Figure 6 **Parity progression ratio of women with one child**



Sources of data: INE (2019), IPUMS (2019).
Note: For an explanation of the abbreviations see Appendix 1.

In certain regions, the parity progression ratios to third child for 1991 and 1999 share similarities. The Basque Country, Cantabria, La Rioja, and Navarra are both geographically closer, being located in the north of the country (Appendix 1), and had a similar a_2 in both 1991 and 1999. In this respect, these regions are noticeably different from, for example, Andalusia, Castille-La Mancha, Extremadura, or Murcia, where between 1991 and 1999 the parity progression ratio for a woman with two children fell dramatically.

Figure 7 **Parity progression ratio of women with two children**



Sources of data: INE (2019), IPUMS (2019).
Note: For an explanation of the abbreviations see Appendix 1.

The more pronounced decline in a_2 in these more southern ACs seems to have occurred after 1991. Not earlier, as was the case in most of the northern regions, where a_2 either fell much less steeply between 1991 and 1999, or remained the same.

Figure 8 shows the parity progression ratio from three to four children (a_3). The evolution of a_3 can be contrasted with that for lower-order births: in some regions, the parity progression ratio to fourth child was lower in 1981 than it was in 2011. This may be because the indicator selects highly family-oriented women, who having had three children are highly likely to have a fourth as well.

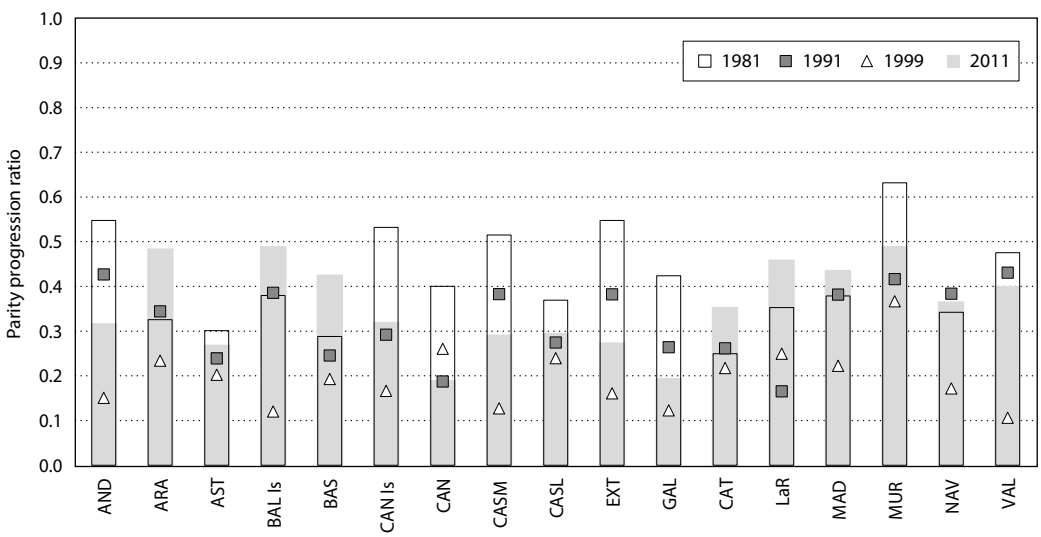
It is also worth comparing Figures 7 and 8. In 1981, a_2 and a_3 were similar, but in 2011 the values of a_3 exceeded those of a_2 in many regions. This indicates that while women were equally likely to have three or four children in 1981, two subpopulations had emerged by 2011 in some regions (Aragon, the Balearic Islands, the Basque Country etc.). The first subpopulation comprises women who were likely to stop at two children, while the second subpopulation was more likely to go on to have at least four children, but less likely to stop at three.

CONCLUSION

In recent decades, significant changes have been observed in the reproductive behavior of populations in virtually all European countries. Spain is one of the most prominent cases, having had one of the highest fertility rates in Europe until the 1970s (between 1960 and 1975 the total fertility rate was 2.8–3.0 children per woman), but by 1995 it ranked bottom of the list (at 1.16 children per woman) (*Cabré Pla*, 2003). Significant changes in reproductive behavior at the national level tend to indicate even greater differences at the regional level.

Spain, like many other developed countries in Europe, is characterized by significant differences in the intensity and structure of basic demographic indicators across its regions[4]. In this paper, the parity- and age-adjusted total fertility rate, table mean age at birth, and parity progression ratios were used to examine fertility differences among the Spanish NUTS2 regions. These alternative fertility indicators point to a slight increase in the heterogeneity of fertility behavior in 1981–2011 and an associated weakening of the typical North–South regionalization in Spain, but still persisting in some form in 2011.

Figure 8 **Parity progression ratio of women with three children**



Sources of data: INE (2019), IPUMS (2019).
Note: For an explanation of the abbreviations see Appendix 1.

4) See for example: https://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?

The North–South divide is mainly down to differences in the fertility of first-time mothers (Figure 3). In higher birth orders, especially in 2011, the "softening" of this divide may be down to higher parity- and age-adjusted total fertility rates in, for example, the Basque Country, Navarra, La Rioja, and Catalonia. In these regions, along with Madrid, Aragon, and the Balearic Islands, the parity progression ratios from third to fourth child were higher in 2011 than in 1981. Perhaps this is what distinguishes these regions from the remaining ACs. If so, one could conclude that Spain is no longer a state with "higher fertility and younger mothers in the south" and "lower fertility and older mothers in the north". But the regionalization can be viewed from another angle; the parity progression ratios in the Basque Country, Navarra, La Rioja, Catalonia, Madrid, Aragon, and the Balearic Islands may indicate the existence of two subpopulations of women, where the first comprises mothers with a maximum of two children and the second mothers with more than three children. During the studied period, both probability of having second child and probability of having third child decreased in these regions. In 1981 the probability of having third child was approximately the same as the probability of having fourth. But, in these ACs, the probability of a woman with three children going on to have a fourth increased between 1981 and 2011, even though a_2 didn't. It is this fact, that makes these regions significantly different from the remaining ACs, because it indicates, that during the studied period two subpopulations emerged in them; one preferring two children or less, second more than three.

When the regional differentiation is viewed from this perspective, geographical location ceases to be the visual link between the regions. However, the ACs can still be divided into two groups depending on whether the patterns of a maximum two-child families or more than three-child families are implemented in the region, or not. Therefore, although the authors of some of the more recent studies note a slight reduction in differences in fertility between ACs in Spain (*Bussler*, 2016), the two ACs groups can still be identified, but northern or southern affiliation plays less of a role.

Reproductive behavior will continue to change in Spain, although perhaps not so markedly as over the last few decades. In the long term, the differences in, for instance, fertility and timing indicators will probably continue to decline in all the various regional classification units. Nevertheless, it can be assumed (as confirmed by the results of this study) that despite the significant changes in the past, certain regional patterns of reproductive behavior will maintain and will always reflect the specific local subpopulations.

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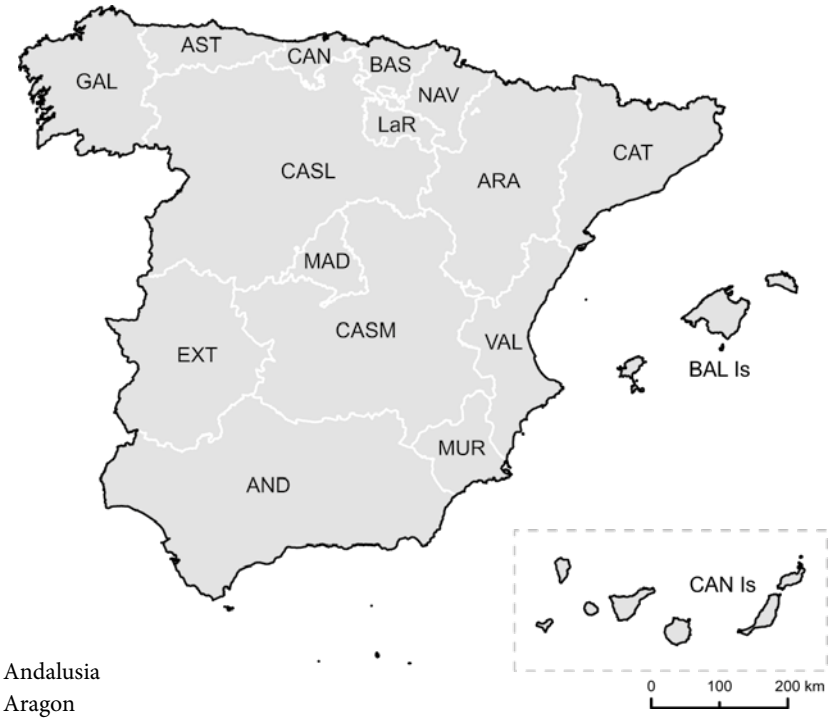
Appendix 1 **Spanish NUTS2 Regions (Autonomous Communities) and abbreviations**



AND	Andalusia
ARA	Aragon
AST	Asturias
BAL Is	Balearic Islands
BAS	Basque Country
CAN	Cantabria
CAN Is	Canary Islands
CASL	Castilla y Leon
CASM	Castilla-La Mancha
CAT	Catalonia
EXT	Extremadura
GAL	Galicia
LaR	La Rioja
MAD	Madrid
MUR	Murcia
NAV	Navarra
VAL	Valencian Community

Sources of data: Eurostat (2020).

Appendix 2 **Parity- and age-adjusted total fertility rate (PATFR) and table mean age of mother at birth (TMAB), Spain, Autonomous Communities, 1981 and 1991**

Year	Indicator	AND	ARA	AST	BAL Is	BAS	CAN	CAN Is	CASL	CASM	CAT	EXT	GAL	LaR	MAD	MUR	NAV	VAL
1981	**PATRF1**	1.00	0.98	1.00	0.99	0.97	0.99	1.00	0.99	1.00	0.99	1.00	1.00	0.98	0.99	1.00	0.97	0.99
1981	**PATFR2**	0.92	0.78	0.73	0.83	0.74	0.83	0.91	0.81	0.91	0.73	0.92	0.76	0.80	0.89	0.96	0.78	0.88
1981	**PATFR3**	0.45	0.24	0.19	0.28	0.22	0.32	0.41	0.26	0.43	0.18	0.44	0.25	0.25	0.33	0.55	0.26	0.37
1981	**PATFR4+**	0.25	0.08	0.06	0.10	0.06	0.13	0.22	0.10	0.22	0.05	0.24	0.11	0.09	0.12	0.35	0.09	0.18
1981	**TMAB1**	22.30	23.83	22.51	22.85	24.76	23.07	22.33	23.67	23.38	23.98	22.43	22.01	24.83	23.39	22.32	25.48	23.27
1981	**TMAB2**	28.23	29.55	28.60	28.33	30.12	28.97	28.37	29.78	28.89	29.44	28.50	28.09	29.71	28.93	27.53	30.77	28.52
1981	**TMAB3**	32.25	32.98	32.32	32.30	32.93	32.61	32.17	33.04	32.80	32.75	32.65	32.01	32.97	32.68	31.77	33.41	32.23
1991	**PATRF1**	0.79	0.70	0.70	0.82	0.62	0.67	0.80	0.64	0.76	0.77	0.76	0.74	0.67	0.67	0.82	0.68	0.75
1991	**PATFR2**	0.59	0.40	0.31	0.56	0.34	0.38	0.52	0.39	0.56	0.44	0.57	0.39	0.39	0.46	0.63	0.42	0.49
1991	**PATFR3**	0.21	0.07	0.05	0.16	0.05	0.07	0.14	0.08	0.17	0.08	0.19	0.08	0.07	0.12	0.23	0.09	0.12
1991	**PATFR4+**	0.09	0.02	0.01	0.06	0.01	0.01	0.04	0.02	0.06	0.02	0.07	0.02	0.01	0.04	0.09	0.03	0.05
1991	**TMAB1**	27.30	29.06	28.22	27.73	29.91	28.30	27.30	28.75	27.80	28.82	27.02	27.55	28.66	28.78	27.35	29.43	28.16
1991	**TMAB2**	29.64	31.06	30.12	29.74	31.31	30.80	29.98	30.29	30.06	30.77	29.51	29.86	30.93	30.74	29.67	31.26	30.22
1991	**TMAB3**	31.64	31.97	31.37	31.49	32.18	32.38	31.71	31.49	31.76	32.32	31.49	31.28	32.57	32.37	31.67	32.18	31.83

Sources of data: INE (2019), IPUMS (2019).
Note: For an explanation of the abbreviations see Appendix 1.

Appendix 3 **Parity- and age-adjusted total fertility rate (PATFR) and table mean age of mother at birth (TMAB), Spain, Autonomous Communities, 1999 and 2011**

Year	Indicator	AND	ARA	AST	BAL Is	BAS	CAN	CAN Is	CASL	CASM	CAT	EXT	GAL	LaR	MAD	MUR	NAV	VAL
1999	**PATRF1**	0.79	0.74	0.74	0.84	0.71	0.68	0.85	0.73	0.83	0.87	0.86	0.74	0.69	0.78	0.80	0.77	0.88
1999	**PATFR2**	0.58	0.38	0.27	0.52	0.39	0.36	0.49	0.41	0.59	0.46	0.58	0.33	0.38	0.47	0.66	0.42	0.54
1999	**PATFR3**	0.11	0.04	0.02	0.09	0.03	0.05	0.08	0.04	0.08	0.05	0.09	0.04	0.05	0.06	0.11	0.07	0.05
1999	**PATFR4+**	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.04	0.01	0.01
1999	**TMAB1**	29.17	30.61	30.29	29.28	31.89	31.03	28.84	30.97	29.59	30.59	29.26	30.37	30.78	30.86	29.19	31.74	30.15
1999	**TMAB2**	32.08	33.27	33.47	32.61	33.92	32.96	31.71	33.66	33.44	32.98	32.16	32.36	33.00	33.84	32.05	33.64	33.19
1999	**TMAB3**	34.29	35.85	34.40	34.06	35.19	32.20	33.58	33.18	34.98	33.68	34.68	33.37	31.70	34.71	34.21	33.42	35.43
2011	**PATRF1**	0.75	0.70	0.66	0.67	0.70	0.70	0.65	0.66	0.72	0.76	0.73	0.67	0.72	0.72	0.72	0.70	0.72
2011	**PATFR2**	0.51	0.43	0.31	0.41	0.45	0.42	0.34	0.40	0.48	0.48	0.49	0.36	0.46	0.48	0.50	0.48	0.44
2011	**PATFR3**	0.11	0.08	0.05	0.10	0.10	0.06	0.07	0.07	0.09	0.11	0.08	0.05	0.09	0.12	0.14	0.13	0.09
2011	**PATFR4+**	0.03	0.04	0.01	0.05	0.04	0.01	0.02	0.02	0.03	0.04	0.02	0.01	0.04	0.05	0.07	0.05	0.04
2011	**TMAB1**	29.83	30.72	31.10	29.79	31.48	30.89	29.75	31.15	30.24	30.08	30.42	31.42	30.40	30.66	29.38	30.99	30.33
2011	**TMAB2**	32.24	32.68	33.09	31.94	33.41	33.30	32.06	33.29	32.64	32.04	32.85	33.51	32.81	32.81	31.72	32.70	32.53
2011	**TMAB3**	32.40	33.20	33.25	32.05	32.56	34.28	31.93	32.70	32.67	32.16	32.80	34.22	31.71	33.16	31.97	33.38	32.16

Sources of data: INE (2019), IPUMS (2019).
Note: For an explanation of the abbreviations see Appendix 1.

ODRAZ DEMOGRAFICKÉHO STÁRNUTÍ V EKONOMICE REGIONŮ ČESKÉ REPUBLIKY

Martina Šimková[1)]

THE IMPACT OF DEMOGRAPHIC AGEING ON THE ECONOMY OF THE CZECH REGIONS

Abstract

Demographic ageing is an ongoing issue in the Czech Republic, but this phenomenon has a different regional impact. The main issue is the impact of ageing on cities, towns, and rural areas, which will be reflected in the corresponding expenditures on health and social care. In the future there may be big differences between the structure of the population in different regions. This projection serves as the basis here for a simulation of impacts using an input-output analysis. The combination of regional input-output tables and regional demographic projection should produce useful results. The increased demand for health care and social services is estimated up to the year 2050. The impact on the regional economy is expressed by the change in regional output and employment. The analysis shows the estimated increase in the amount of health and social services that will be required in the future compared to 2020 in relation to expected trends based on demographic projections.

Keywords: Ageing of population, regional input-output tables, regional employment, social and health care.

Demografie, 2021, **63: 119–132**

ÚVOD

Česká populace, stejně jako populace dalších zemí, stárne, jak ukazuje současný demografický vývoj i předpokládaný budoucí vývoj prostřednictvím demografických projekcí i dalších dílčích modelů (např. *Fiala – Langhamrová*, 2019). Mění se struktura obyvatelstva, ubývá mladých a přibývá starých, a to sebou ponese řadu změn a nároků nejen na sociální a zdravotní systém. Dopady budou různé, projeví se v mnoha oblastech, budou mít významný vliv na ekonomiku České republiky, a proto je nezbytné se kontinuálně na demografické stárnutí připravovat, což by mělo zahrnovat nejen diskuse o důchodovém pojištění, ale i odhady dopadů na zdravotnictví, sociální služby, školství, obranu apod. Kromě samotné diskuse a kvantifikace efektů je na místě se ptát, jakou výši výdajů lze pro Českou republiku očekávat a jaký bude dopad na strukturu naší ekonomiky. Odhlédneme-li od v současnosti největšího problému dotýkající se nejen naší populace, čímž je pandemie COVID-19, odborné diskuse se dlouhodobě věnují především dopadům na systém důchodového pojištění a souvisejícím efektům, ale i souvislosti stárnutí a důchodového systému jsou mnohem hlubší (např. *Rutarová – Slavík*, 2005 či *Šimková a kol.,* 2016). Na druhé straně problematika zdravotního systému a systému sociálních služeb, především péče o seniory se do popředí zájmu dostává velmi pomalu.

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Diskuse o dostupnosti a kvalitě v oblasti sociálních služeb se začíná v posledních letech pomalu rozvíjet a ukazují se nedostatky v současném systému. Nejde jen o dostupnost a kvalitu, ale i o udržitelnost a rozvoj. Například podle Průša (2015) se ukazuje, že systém sociálních služeb není na důsledky stárnutí populace dostatečně připraven. Vybavenost jednotlivých regionů těmito službami je výrazně diferencována a chybějící kapacity pobytových služeb nejsou nahrazovány péčí v přirozeném domácím prostředí terénními službami. Ve srovnání s ostatními zeměmi je rozsah těchto služeb nízký.

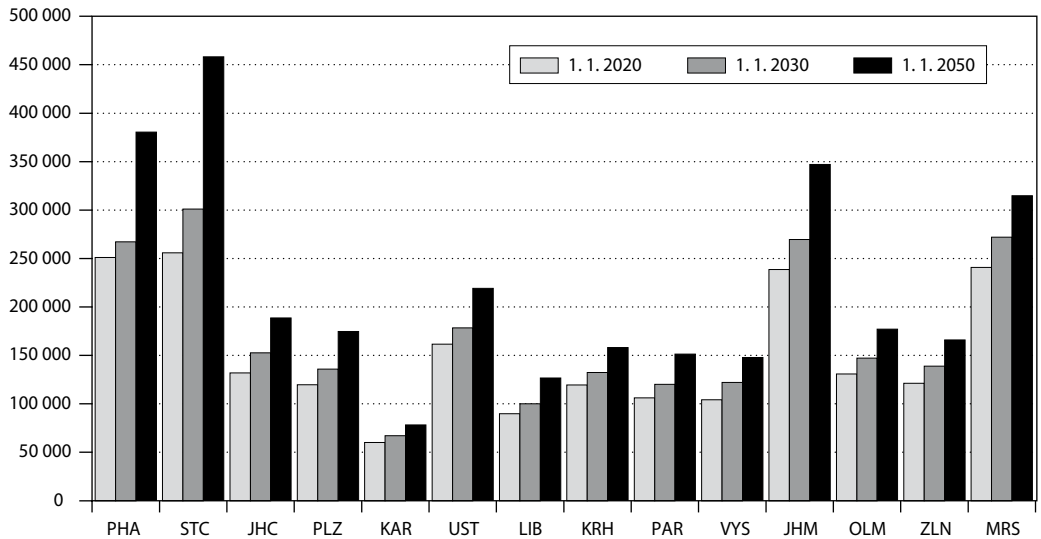
Tato oblast zahrnuje i oblast personálního zabezpečení. Studie o dostupnosti personálních kapacit se také začíná na odborném poli objevovat (*Průša*, 2019 či *Burcin – Šídlo,* 2017). Na tuto problematiku je nutné pohlížet též regionálně, neboť kvalitní péče o seniory musí být zajištěna i v menších oblastech České republiky, nejen ve velkých městech. V oblasti zdravotní péče se nedostatek lékařů různých kvalifikací v regionech projevuje silně již dnes. Např. studie (*Maláková a kol.*, 2020) ukazuje, že zejména ve venkovských oblastech je budoucí dostupnost péče ohrožena vyšším věkem lékařů a zdravotnického personálu.

Cílem tohoto článku je tak přispět do diskuse o zabezpečení stárnoucí populace s regionálním rozměrem, který podle dostupných dat je zaměřen na kraje České republiky. Optimální by samozřejmě bylo problematiku analyzovat ještě hlouběji, na úrovni okresů, ale k tomu nejsou zatím dostupná data. Tento příspěvek do diskuse o důsledcích demografického stárnutí naší populace na problematiku nazírá pohledem input-output modelu, který umožňuje simulovat změny ve struktuře ekonomiky odvíjející se od změny struktury populace. Input-output modely a modely všeobecné rovnováhy (CGE) představují standardní nástroje, kterých se v poslední době i v zahraničí používá pro hodnocení dopadů stárnutí (např. *Schon – Stahler*, 2020).

STÁRNUTÍ POPULACE V REGIONECH ČR

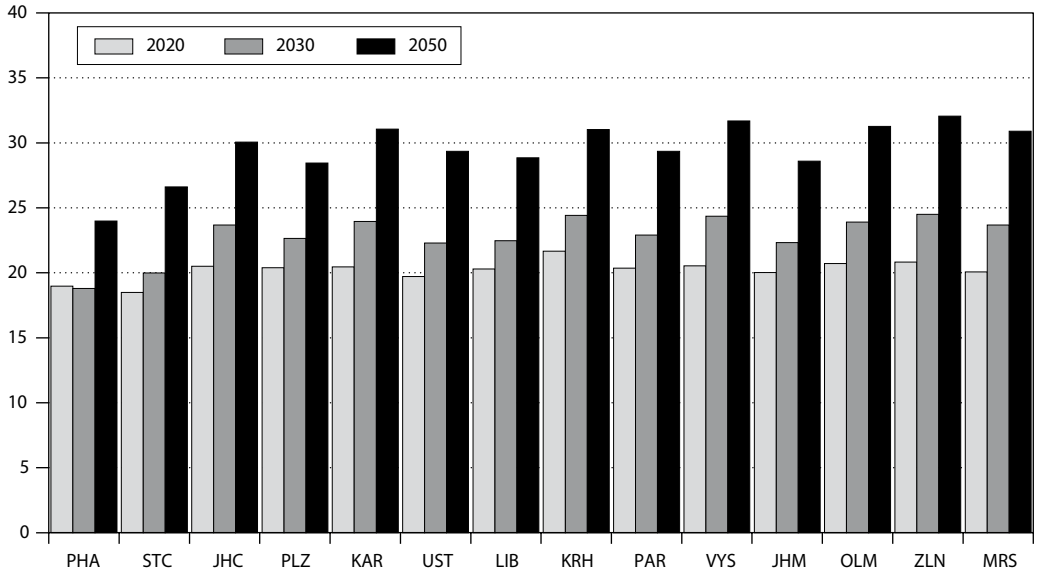
Počet obyvatel 65letých a starších je nyní v krajích různý a dle regionální projekce (*ČSÚ*, 2019) se bude zvyšovat. V roce 2030 bude ve všech krajích ČR zhruba o 15 % osob ve věku 65 let a starších více než bylo v roce 2020. Nejmenší nárůst počtu osob ve věku 65 let a starších se očekává v Praze (o 6,4 % v roce 2030), nejvyšší pak ve Středočeském kraji

Graf 1: Projekce počtu osob ve věku 65 a více let v krajích ČR v letech 2020, 2030 a 2050
Projected number of people aged 65 and over in the regions of the Czech Republic in 2020, 2030 and 2050



Zdroj: ČSÚ, 2019; vlastní výpočty.
Source: *CZSO, 2019; author's calculations.*

Graf 2: Projekce podílu osob ve věku 65 a více let na celkové populaci v krajích ČR (%)
Projected proportion of the population aged 65 and over in the total population in the regions of the Czech Republic (%)



Zdroj: ČSÚ, 2019; vlastní výpočty.
Source: *CZSO, 2019; author's calculations.*

(o 17,7 % v 2030). V roce 2050 regionální projekce očekává nárůst osob ve věku 65 let a starších zhruba o 40 % ve všech krajích ČR ve srovnání s rokem 2020. Výjimku tvoří Středočeský kraj, kde má dle projekce být o 79,1 % více osob ve věku 65 let a starších v roce 2050 než bylo v roce 2020, což je v absolutních číslech 200 tisíc osob (viz graf 1). V Praze by počet osob ve věku 65 let a starších měl narůst o polovinu. Po přepočtení do relativních čísel (viz graf 2), největší podíl osob ve věku 65 let a starších byl v roce 2020 v Královéhradeckém kraji (21,7 %). V roce 2030 se nejvyšší nárůst podílu osob ve věku 65 let a starších očekává v Kraji Vysočina (o 3,8 p.b. na 24,3 %) a ve Zlínském kraji (o 3,7 p.b. na 24,5 %). V roce 2050 se ve srovnání s rokem 2020 očekává nárůst tohoto podílu o více než 10 p.b. v téměř všech krajích ČR, ve Zlínském kraji a Kraji Vysočina o 11,2 p.b., resp. o 11,1 p.b. Výjimkou je opět Praha, kde by měl dle projekce být podíl osob ve věku 65 a více let v roce 2050 vzrůst pouze o 5,0 p.b. oproti počátečnímu stavu roku 2020.

Otázkou zůstává, jaké dopady bude mít stárnutí populace v jednotlivých krajích. Je zřejmé, že se změnou populace se bude měnit také struktura jejích potřeb. Existuje řada modelů, které se snaží odhadnout dopady stárnutí populace. Tento příspěvek je zaměřen na odhad změny regionální produkce a zaměstnanosti v souvislosti s nárůstem výdajů na zdravotní a sociální služby.

DATA A METODOLOGIE

Klíčovou otázkou tohoto příspěvku je nárůst výdajů na zdravotní a sociální služby vlivem stárnutí populace. Jaký to bude mít dopad na ekonomiku jednotlivých krajů ČR? Odhad dodatečných výdajů způsobených stárnutím populace lze provést více způsoby (*Průša*, 2018), zde je simulace vývoje nákladnosti na sociální a zdravotní péči provedena prostřednictvím statistického aparátu input-output analýzy. K této analýze jsou využity regionální input-output tabulky[2)]. Výsledky prezentované v tomto příspěvku jsou

2) Více viz např. v *Sixta – Vltavská*, 2016.

výsledkem vlastního výzkumu, kde ekonomické struktury regionálních input-output tabulek slouží pouze pro výpočty příslušných technických koeficientů (matice A, viz vzorec 1).

Input-output tabulka je zjednodušeně řečeno nástroj, který se používá k popisu struktury ekonomiky, kde je vidět, kdo komu co dodává a z čeho se skládá výroba[3]. Input-output tabulky jsou obecně rozděleny na tuzemské a dovoz. V této analýze je využita pouze tuzemská input-output tabulka, neboť předmětem zkoumání je pouze produkce v ČR. Sociální a zdravotní služby se téměř nedovážejí (pouze některé léky ano). Input-output analýza je založena na Leontiefově produkční funkci s fixními technologickými vazbami produkce[4]. Model standardní input-output analýzy a symetrických input-output tabulek pro tuzemskou produkci je možno zapsat jako:

$$\Delta \mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{y} \qquad (1)$$

kde
x je vektor produkce,
I je jednotková matice,
A je Leontiefova matice technických koeficientů a
y je konečné užití.

Principem input-output analýzy je vložení určitého impulsu (změna konečného užití) a výsledkem je změna struktury ekonomiky vlivem tohoto impulsu. Je použit jednoduchý statický model, který umožňuje odpovědět na otázku, jak by se změnila struktura ekonomiky v jednotlivých krajích a v ČR jako celku (za dnešních podmínek), kdyby se počet osob ve věku 65 a více let zvýšil. Je předpokládáno, že současné výdaje na zdravotnictví a sociální služby jsou úměrně vázány na strukturu populace. Zmíněným impulsem je tedy změna výdajů na zdravotní a sociální služby plynoucí z nárůstu počtu osob ve věku 65 a více let.

Odhad změny výdajů na zdravotní a sociální služby je proveden pomocí přímých výdajů vládních institucí dle metodiky národních účtů ESA 2010 (Eurostat, 2013), které souvisejí se zdravotními a sociálními službami. Pro účely tohoto příspěvku jsou tyto výdaje dále rozděleny do čtyř kategorií (na základě klasifikace produktů CPA): léky, ostatní zdravotní péče, sociální služby pobytové a sociální služby nepobytové. V úvahu jsou brány pouze přímé výdaje, které bezprostředně souvisí s provozem, nejsou uvažovány investiční výdaje. Analýza spočívá v porovnání budoucího stavu a stavu současného, neboť pouze tak je možné efekty změn přiblížit. Principem je tedy srovnání se současnými podmínkami ekonomiky, což jsou zejména dnešní cenová hladina (rok 2019) a dnešní struktura ekonomiky. Cenová hladina je záměrně volena jako fixní (zde dána bází input-output tabulek), neboť pouze reálné (cenově očištěné efekty) jsou ekonomicky zajímavé. Projekce budoucích cen, míry inflace a cenové hladiny nemá významný dopad na závěry input-output analýzy, která je naopak primárně založena na stálých cenách.

Odhad nárůstu výdajů na zdravotní a sociální služby[5] vychází jednak ze současného složení populace v jednotlivých krajích ČR, z regionální demografické projekce s dvěma vybranými referenčními horizonty 2030 a 2050 a dále z dostupných zdrojů o současných výdajích na zdravotní a sociální služby. Vzhledem k tomu, že poslední dostupná data jsou za rok 2019, odhad finančních ukazatelů do budoucna je proveden v současných cenách (tj. v cenách roku 2019). Pro odhad dopadu na ekonomiku krajů a ČR je využita kombinace posledních známých národních input-output tabulek za rok 2015 (ČSÚ, 2020a) a regionálních input-output tabulek za rok 2013 (*Sixta – Vltavská*, 2016).

Výsledkem regionální input-output analýzy jsou pak odhady produkce a zaměstnanosti, ze kterých je možné provádět odhady dalších makroekonomických ukazatelů. Právě produkce je klíčovou složkou Leontiefova modelu, kde je dobře zřetelná multiplikace efektů, jak je uvedeno v páté kapitole. Multiplikace efektů dle vzorce 1, vyvolaná změnou konečného užití (poptávkou stárnoucí populace) znamená postupnou změnu v objemu i struktuře regionální ekonomiky. Proto tedy platí, že výstavba zdravotnického či

3) Více viz např. v *Sixta – Fischer*, 2014.

4) V praxi se často používají složitější modely, např. dynamická input-output analýza, která reflektuje jednoduše řečeno čas, použité koeficienty se mění na rozdíl od statické input-output analýzy (více viz např. *Šafr*, 2016).

5) Pozornost je vzhledem k dostupnosti dat zaměřena pouze na vládní výdaje. Soukromé výdaje nejsou ve výpočtech zahrnuty.

sociálního zařízení a jeho následný provoz ovlivní řadu dalších navazujících odvětví. Tyto efekty nelze zanedbávat, neboť vyjadřují finanční a pracovní náročnost změn v ekonomice.

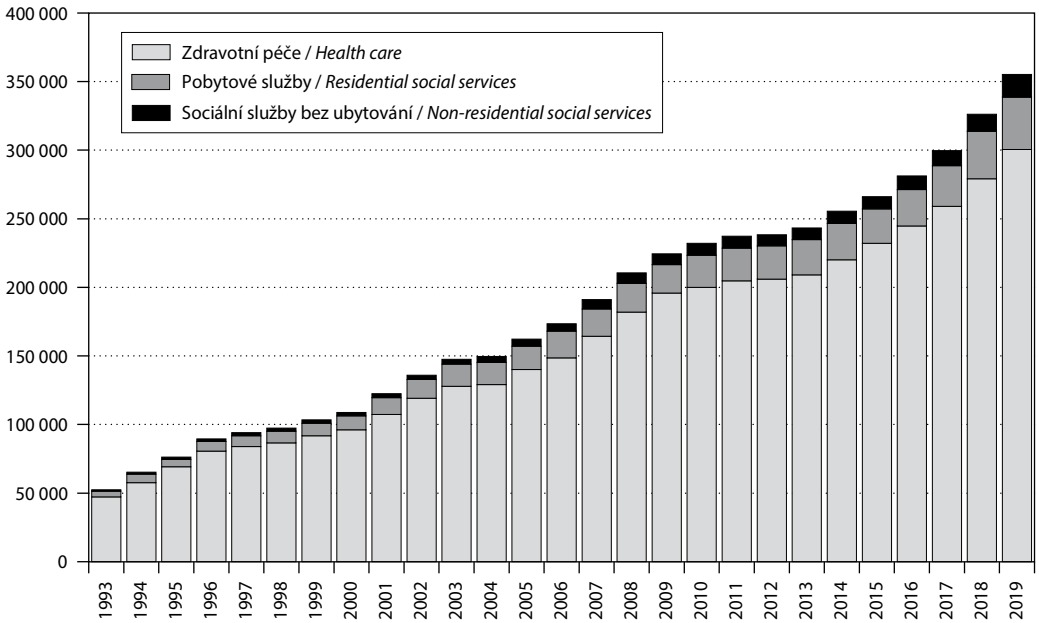
VÝDAJE NA ZDRAVOTNÍ A SOCIÁLNÍ SLUŽBY

Výdaje na zdravotní a sociální služby se v čase neustále zvyšují, jak ukazuje graf 3, který vývoj těchto výdajů zobrazuje v základních cenách od roku 1993. Tyto výdaje zahrnují výdaje domácností, vládních i neziskových institucí. V roce 1993 činil tento typ výdajů 52,3 mld. Kč, což představovalo 6,7 % celkových výdajů na konečnou spotřebu a 4,3 % HDP v roce 1993. V roce 2019 tyto výdaje vzrostly na 355,2 mld. Kč (viz graf 3), což je 10,1 % celkových výdajů na konečnou spotřebu a podíl na HDP roku 2019 je 6,2 %.

Výdaje na zdravotní služby v souvislosti se stárnutím populace lze vyjádřit prostřednictvím dat zdravotních pojišťoven o výdajích na zdravotní péči podle věku. Graf 4 ukazuje, že tyto výdaje rostou s věkem, výdaje na osobu ve věku 85 let a starší činily v roce 2018 více než 76 tisíc Kč. Nejvyšší absolutní výdaje mají zdravotní pojišťovny za osoby ve věku 60–75 let. Tato data jsou veřejně dostupná pouze za celou ČR. Pro další analýzu je předpokládáno, že výdaje zdravotních pojišťoven na osobu jsou víceméně regionálně stejné.

Po přepočtení celkových absolutních výdajů na osobu 65letou a starší vychází, že průměrná roční částka se pohybovala v roce 2018[6] kolem 59 tisíc Kč. Na základě této průměrné částky je možné odhadnout celkové zdravotní výdaje na osoby 65leté a starší v jednotlivých regionech. Dle výše uvedené klasifikace jsou tyto celkové výdaje rozděleny do dvou kategorií, na léky a ostatní zdravotní péči.

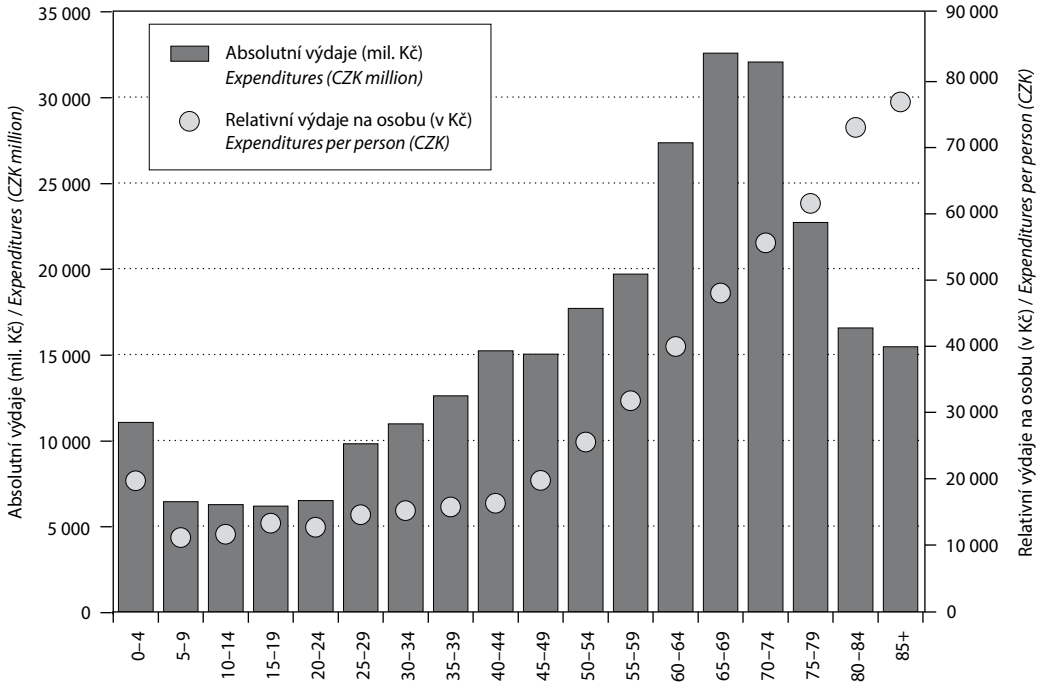
Graf 3: Výdaje na zdravotní a sociální služby od roku 1993 (mil. Kč)
Expenditures on health and social services from 1993 (CZK million)



Zdroj: ČSÚ, 2020a; vlastní výpočty.
Source: *CZSO, 2020a; author's calculations.*

6) Poslední dostupná data.

Graf 4: Výdaje zdravotních pojišťoven na zdravotní péči v České republice podle věkových skupin v roce 2018 (mil. Kč) a výdaje na osobu (v Kč)) / The expenditures of health insurance companies on health care in the Czech Republic by age group in 2018 (CZK million) and expenditures per person (in CZK)



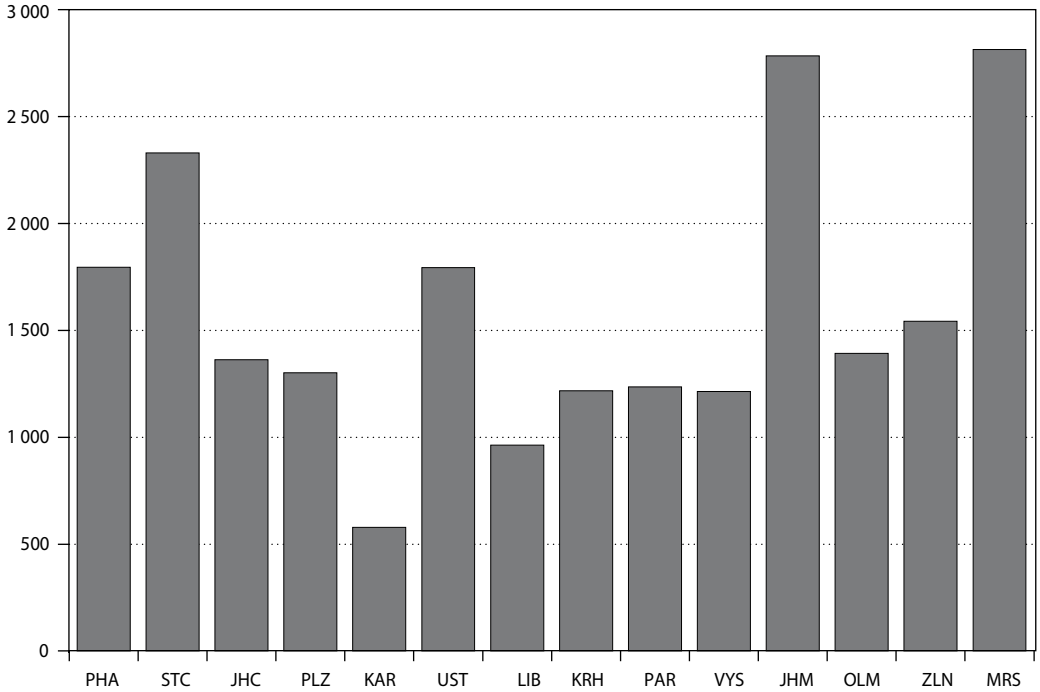
Zdroj: ČSÚ, 2020b; vlastní výpočty.
Source: *CZSO, 2020b; author's calculations.*

K tomuto rozdělení jsou využity informace ze symetrických input-output tabulek za ČR, které ukazují, že výdaje vládních institucí na léky v roce 2015 tvořily 11 % celkových zdravotních výdajů. Takto upravená data jsou využita k následujícímu odhadu budoucího nárůstu výdajů na zdravotní služby z důvodu nárůstu počtu osob ve věku 65 let a starších.

Druhou položkou výdajů, které se budou s největší pravděpodobností zvyšovat vlivem stárnutí populace, jsou výdaje na sociální služby. K vyjádření dodatečné poptávky po těchto službách vlivem stárnutí populace jsou i přes určité limity[7] využita data o poskytnutém příspěvku na péči. Příspěvek na péči je určen osobám, které z důvodu dlouhodobě nepříznivého zdravotního stavu potřebují pomoc jiné fyzické osoby při zvládání základních životních potřeb. Z tohoto příspěvku si pak osoby hradí pomoc, kterou jim může poskytovat osoba blízká, asistent sociální péče, speciální lůžkové zdravotnické zařízení hospicového typu apod. Tyto informace poskytuje MPSV regionálně (*MPSV*, 2020). Průměrná výše poskytnutého příspěvku na péči na osobu byla v roce 2019 kolem 82 tisíc Kč. Z dat MPSV dále vyplývá, že průměrný počet příspěvků na péči je poskytnut zhruba ve třech čtvrtinách případů osobám ve věku 65 let a starších. Pro účely tohoto článku jsou proto tato celková data přepočítána na osoby 65leté a starší (viz graf 5). Celkem za ČR tato částka v roce 2019 činila 22 mld. Kč. Opět je rozdělen poměr těchto celkových výdajů na sociální

7) Tyto informace mohou být ve skutečnosti podhodnocené, protože ne všechny osoby si o tento příspěvek zažádají, nebo si např. doplácejí pobytové sociální zařízení ze starobního důchodu apod.

Graf 5: Odhad poskytnutého příspěvku na péči osobám 65letým a starším v krajích ČR v roce 2019 (mil. Kč)
Estimated expenditures on the carer's allowance in the regions of the Czech Republic paid to people aged 65 and over in 2019 (CZK mil.)



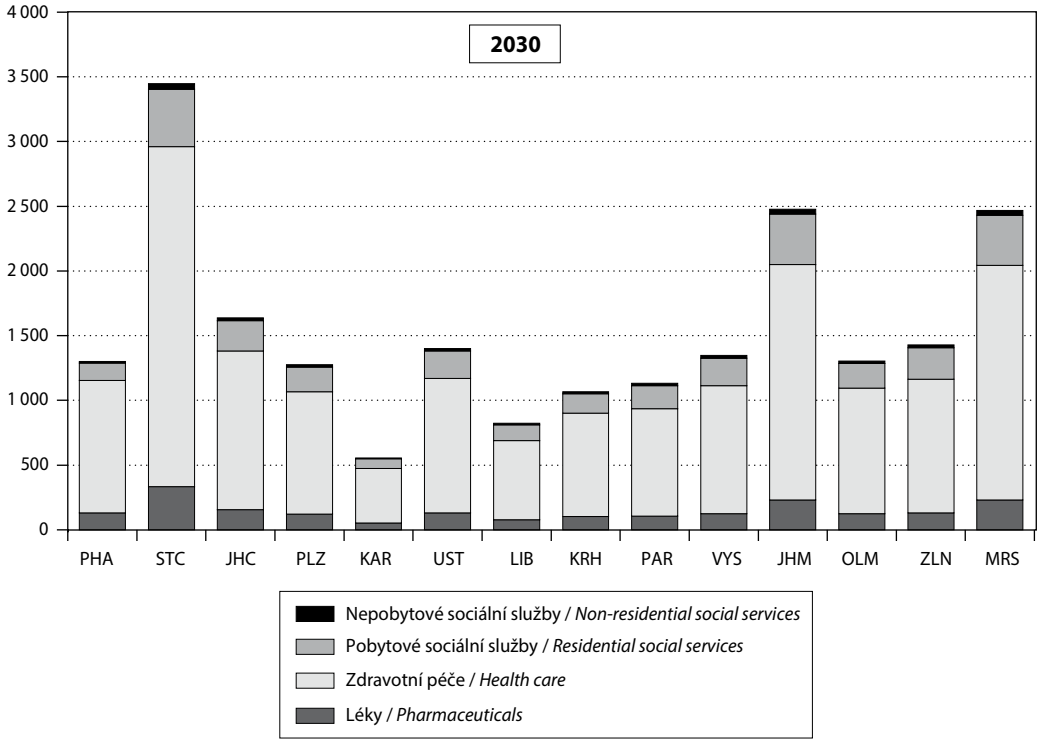
Zdroj: ČSÚ, 2019; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; LFSA, 2020; author's calculations.*

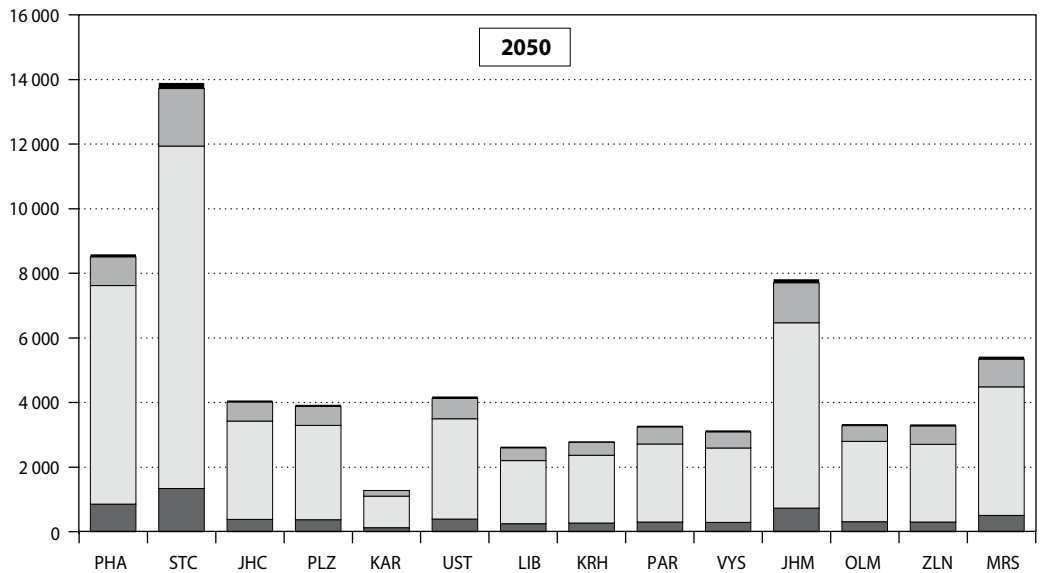
služby poměrem získaným z input-output tabulek na pobytové a nepobytové sociální služby. Vládní výdaje na pobytové sociální služby v roce 2015 činily 91 %.

Na základě odhadnutých výdajů na zdravotní a sociální služby vycházejících ze současných hodnot výdajů a predikovaných počtů osob 65letých a starších v budoucích letech lze vyčíslit potřebnou změnu konečného užití, ve smyslu výše zmíněného impulsu v rámci aparátu input-output analýzy (viz graf 6). Za dnešních podmínek (roku 2019) se podle těchto výpočtů v ČR do roku 2030 navýší výdaje na zdravotní a sociální služby vlivem změny struktury populace souvislé se stárnutím populace celkem o 21,6 mld. Kč. Jedná se o změnu v absolutním vyjádření, tudíž záleží na velikosti kraje, proto nejvyšší navýšení lze očekávat ve Středočeském (o 3,5 mld. Kč), Jihomoravském (o 2,5 mld. Kč) a Moravskoslezském kraji (o 2,4 mld. Kč). Ze tří čtvrtin se na tomto celkovém nárůstu výdajů podílí výdaje na ostatní zdravotní služby mimo léky. Do roku 2050 je celkové navýšení výdajů na zdravotní a sociální služby vlivem stárnutí vyčísleno na 67,7 mld. Kč. Nejvyšší nárůst je opět ve Středočeském kraji (13,9 mld. Kč), na druhé místo se ovšem posune Hlavní město Praha (8,6 mld. Kč) před Jihomoravský kraj (7,8 mld. Kč).

Růst výdajů na zdravotní a sociální služby plynoucí z nárůstu počtu osob 65letých a starších bude ovlivňovat jednak výši a strukturu produkce v ekonomice a jednak také výši a strukturu zaměstnanosti. Lze tak v této situaci spatřovat podnikatelskou příležitost v objemu desítek miliard.

Graf 6: Odhad nárůstu výdajů na zdravotní a sociální služby v krajích v letech 2030 a 2050 (mil. Kč)
Estimated increase in expenditures on health and social services in the regions of the Czech Republic in 2030 and 2050 (CZK million)





Zdroj: ČSÚ, 2019; ČSÚ, 2020a, b; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; CZSO, 2020a, b; LFSA, 2020; author's calculations.*

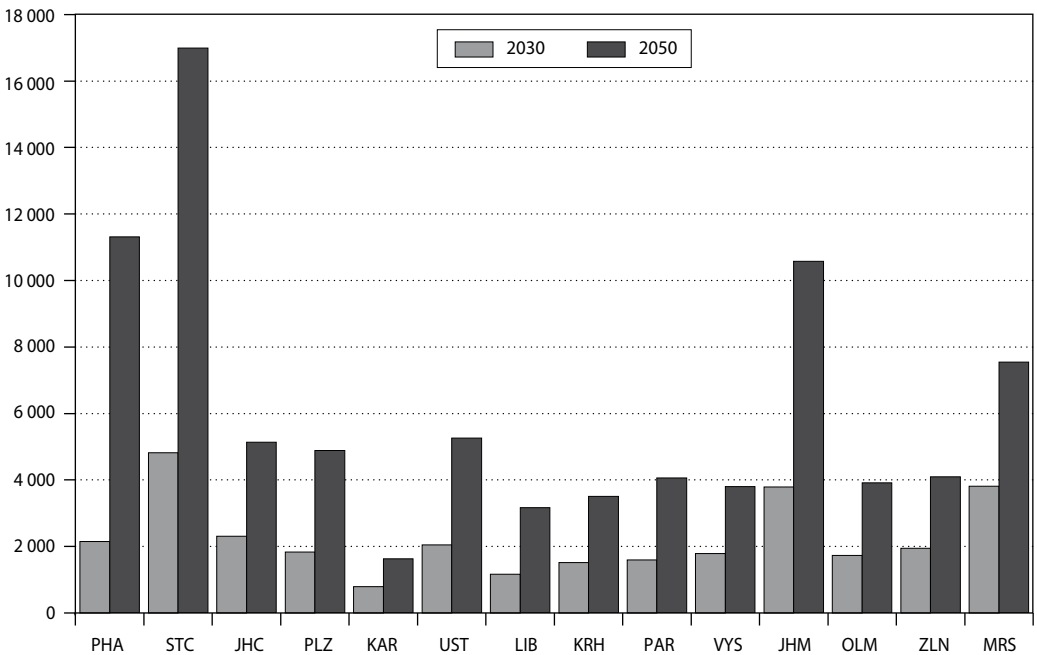
DOPADY NA EKONOMIKU KRAJŮ

Input-output analýza umožňuje pohlédnout na výši i strukturu změn v celé ekonomice, nejen v oblasti zdravotních a sociálních služeb. Nárůst počtu osob 65letých a starších v populaci se sebou nepřinese jen potřebu vyšších výdajů na starobní důchody a platy zdravotních a sociálních pracovníků. Vliv lze spatřovat mnohem šířeji, i v jiných odvětvích ekonomiky. Za současných podmínek (z roku 2019) je dle výše popsaného modelu potřeba celkem vytvořit do roku 2030 zboží a služby v hodnotě 31,2 mld (v současných cenách, tj. v cenách roku 2019). Kč. Do roku 2050 je to 85,9 mld. Kč. Nejvyšší nárůst produkce lze očekávat ve Středočeském, Jihomoravském a Moravskoslezském kraji. V roce 2050 je ve Středočeském kraji potřeba vyrobit zboží a služby za 16,9 mld. Kč, v Praze za 11,3 mld. Kč (viz graf 7).

Dopad stárnutí lze pozorovat ve všech odvětvích ekonomiky a díky input-output analýze je možné tyto dopady odhadnout. Vliv stárnutí populace se projeví např. ve stavebnictví (zejména výstavba nových pobytových sociálních zařízení) a v oborech s tím souvisejících. Dále to bude odvětví potravinářství, dopravy, stravovacích služeb. Porostou také výdaje na elektřinu, plyn, dopad jistě pocítí i trh s nemovitostmi. Je potřeba se proto zaměřit na celou ekonomiku, ne pouze na výdaje v sociální a zdravotní oblasti. Nejvyšší produkci lze napříč celou ČR očekávat v oblasti zdravotní péče, v sociálních pobytových službách a lécích. Významné dopady lze však také pozorovat v odvětví elektřiny a plynu, specializovaných stavebnických prací. V roce 2050 se jedná o nárůst produkce v řádu miliard (tabulka 1), ve srovnání s rokem 2019.

Zaměstnanost je jedním z ukazatelů, kterých se stárnutí populace bezpochyby dotkne, přičemž lze prokázat různý vliv v jednotlivých krajích. Při současné úrovni technologie bude v roce 2030 v odvětvích nezbytných k zabezpečení stárnoucí populace potřeba navíc 30,7 tisíc pracovníků (oproti roku 2019). V roce 2050 dokonce 81,9 tisíc pracovníků. Nejedná se pouze o lékaře a pečující zdravotnický

Graf 7: Odhad nárůstu produkce v krajích ČR (mil. Kč) v letech 2030 a 2050 ve srovnání s rokem 2019
Estimated increase in regional production (CZK million) in 2030 and 2050 in comparison with 2019



Zdroj: ČSÚ, 2019; ČSÚ, 2020a, b; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; CZSO, 2020a, b; LFSA, 2020; author's calculations.*

Tab. 1: Struktura odhadnutého nárůstu produkce v krajích ČR v roce 2050 (mil. Kč) ve srovnání s rokem 2019
Structure of the estimated increase in production in the regions of the Czech Republic in 2050 (CZK million) compared with 2019

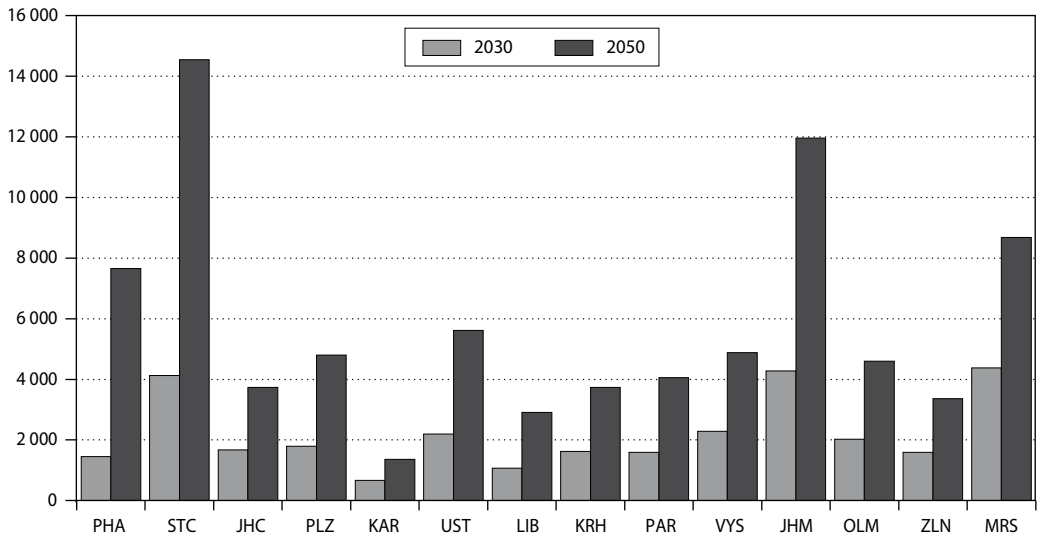
	Zdravotní péče *Health care*	Pobytové služby *Residential social services*	Sociální služby bez ubytování *Non-residential social services*	Ostatní *Others*	Celkem *Total*
PHA	6 659,2	830,2	85,3	3 732,6	11 307,4
STC	10 533,5	1 697,4	165,3	4 591,3	16 987,4
JHC	3 120,8	592,0	58,7	1 366,4	5 137,9
PLZ	2 973,6	571,1	56,4	1 289,8	4 890,9
KAR	1 026,5	176,3	17,5	408,5	1 628,9
UST	3 202,5	638,3	62,9	1 356,8	5 260,6
LIB	2 009,2	374,5	36,9	743,6	3 164,3
KRH	2 167,4	392,0	38,6	905,3	3 503,3
PAR	2 469,8	523,5	51,4	1 018,3	4 063,1
VYS	2 308,3	481,7	47,4	968,8	3 806,2
JHM	5 736,0	1 178,3	116,0	3 545,7	10 576,0
OLM	2 537,9	490,3	48,5	840,2	3 916,8
ZLN	2 467,1	546,4	53,9	1 027,2	4 094,7
MRS	4 133,1	843,2	83,4	2 489,7	7 549,4
ČR	51 344,9	9 335,3	922,2	24 284,4	85 886,9

Zdroj: ČSÚ, 2019; ČSÚ, 2020a, b; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; CZSO, 2020a, b; LFSA, 2020; author's calculations.*

a sociální personál, ale i o zaměstnance v dalších odvětvích, což souvisí s předchozím navýšením produkce v jednotlivých odvětvích. Nejvíce bude potřeba posílit zaměstnanost ve Středočeském (do roku 2050 o 14,5 tisíce pracovníků) a v Jihomoravském kraji (o 11,9 tisíc), viz graf 8.

Stejně jako u produkce lze pozorovat strukturální změny zaměstnanosti (tabulka 2). Největší navýšení

Graf 8: Odhad nárůstu zaměstnanosti v krajích ČR v letech 2030 a 2050 ve srovnání s rokem 2019
Estimated increase in employment in the regions of the Czech Republic in 2030 and 2050 in comparison with 2019



Zdroj: ČSÚ, 2019; ČSÚ, 2020a, b; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; CZSO, 2020a, b; LFSA, 2020; author's calculations.*

Tab. 2: Struktura odhadnutého nárůstu zaměstnanosti v krajích ČR v roce 2050 ve srovnání s rokem 2019
Structure of the estimated increase in employment in the regions of the Czech Republic in 2050 in comparison with 2019

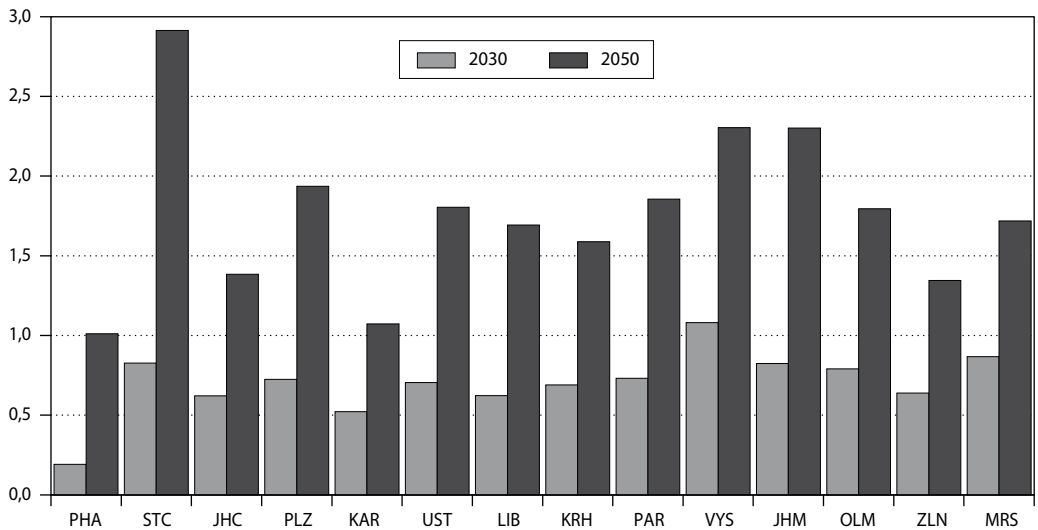
	Zdravotní péče *Health care*	Pobytové služby *Residential social services*	Sociální služby bez ubytování *Non-residential social services*	Ostatní *Others*	Celkem *Total*
PHA	6 044	244	76	1 288	7 652
STC	8 712	2 913	282	2 640	14 547
JHC	2 037	775	88	833	3 733
PLZ	3 301	656	55	792	4 804
KAR	721	177	24	443	1 365
UST	3 067	1 411	131	1 010	5 620
LIB	1 586	675	51	601	2 913
KRH	2 526	491	61	656	3 734
PAR	2 151	1 049	82	769	4 051
VYS	3 615	500	71	695	4 881
JHM	8 244	1 530	157	2 032	11 963
OLM	2 942	876	77	705	4 601
ZLN	1 667	1 015	86	592	3 360
MRS	5 125	1 536	145	1 876	8 682
ČR	51 737	13 849	1 386	14 934	81 906

Zdroj: ČSÚ, 2019; ČSÚ, 2020a, b; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; CZSO, 2020a, b; LFSA, 2020; author's calculations.*

personálních kapacit je potřeba samozřejmě v oblasti zdravotní péče, nicméně i ostatní odvětví nejsou zanedbatelná. V některých krajích se jedná o navýšení o desítky, někde o stovky či tisíce pracovníků v různých odvětvích.

Vzhledem k současnosti lze celkový nárůst zaměstnanosti v souvislosti s nárůstem počtu osob ve věku 65 a více let odhadnout na 0,7 % v roce 2030 a na 1,8 % v roce 2050. Procentní nárůst se liší v jednotlivých krajích (graf 9). Ve Středočeském kraji se jedná dokonce

Graf 9: Nárůst zaměstnanosti v krajích ČR (%) / Increase in regional employment (%)



Zdroj: ČSÚ, 2019; ČSÚ, 2020a, b; MPSV, 2020; vlastní výpočty.
Source: *CZSO, 2019; CZSO, 2020a, b; LFSA, 2020; author's calculations.*

o změnu ve výši 2,9 % v roce 2050, v Jihomoravském kraji o 2,3 %.

Z výsledků jasně vyplývá, že demografické stárnutí populace se bude nestejným způsobem odrážet v ekonomice jednotlivých krajů. Je proto potřeba dívat se na problematiku stárnutí populace nejen pohledem vyšších celkových výdajů vládních institucí do sociální a zdravotní oblasti, ale pohledem regionálním a do různých odvětví ekonomiky.

ZÁVĚR

Statistiky obyvatelstva ukazují na nárůst počtu starých osob v české populaci. Stejnou tendenci má i budoucí vývoj dle populačních projekcí. Otázkou je, jaké dopady bude mít tento populační vývoj, neboť se změnou struktury populace se mění také struktura jejích potřeb. Možnosti a metody, jak odhadovat dopady stárnutí populace jsou různé. Tento příspěvek se zaměřil na odhady dopadů do ekonomiky jednotlivých krajů České republiky za pomocí statického input-output modelu. Podrobnější analýzu by bylo možné provést pomocí sofistikovanějších modelů dynamické input-output analýzy a DSGE modelů, nicméně metodika a interpretace je výrazně složitější, proto byl zvolen statický model, který umožňuje snadněji ilustrovat výsledné dopady a pro účely takovéto analýzy je s ohledem na omezenou dostupnost regionálních dat vhodnější.

Výsledky ukazují ve všech krajích České republiky nezbytnost vyšších investic a zaměstnanosti nejen v oblasti sociální a zdravotní péče, ale i v dalších odvětvích ekonomiky. Pokud předpokládáme dnešní úroveň technologie, bude potřeba ve všech krajích několika tisíc zaměstnanců v různých oborech k zabezpečení odpovídajících podmínek pro život starých osob. V první řadě bude potřeba samozřejmě především investic do sociálních a zdravotnických zařízení. Nicméně jak ukázaly i výsledky statického input-output modelu, investice budou potřeba i v dalších oborech. Nutnou potřebou bude také propagace vhodných studijních a výučních oborů, které vychovají potřebné odborníky v různých oblastech, kterých se stárnutí populace dotkne.

Poděkování

Příspěvek vznikl za podpory GA ČR No 19-03984S Ekonomika úspěšného stárnutí.

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MARTINA ŠIMKOVÁ

Je absolventkou doktorského studijního programu Statistika na Fakultě informatiky a statistiky na Vysoké škole ekonomické v Praze. Od roku 2012 pracuje na Českém statistickém úřadě v Odboru národních účtů a nyní působí také na Katedře demografie Vysoké školy ekonomické v Praze jako vědecká a ostatní akademická pracovnice. Zabývá se sociálně-ekonomickými souvislostmi stárnutí populace.

SUMMARY

The aim of this text is to contribute to the discussion on the consequences of demographic ageing in terms of its impact on regional economies. The paper focuses on the estimated effects of demographic ageing on the economy of individual regions of the Czech Republic using a static input-output model, with which it is possible to simulate changes in the structure of the economy in relation to changes in the structure of the population.

The input-output model allows us to analyse the amount and structure of the changes that will/occur in the health and social services sectors and in the economy as a whole. According to the chosen model, it will be necessary to produce goods and services amounting to 31 billion CZK by 2030 and 86 billion CZK by 2050. The biggest increase in production can be expected in the Středočeský (Central Bohemia) region, Jihomoravský (Southern Moravia) region, and Moravskoslezský (Moravia-Silesia) region. Employment is one of the indicators that will undoubtedly be affected by population ageing. The various effects can be demonstrated in individual regions of the Czech Republic. Estimated in relation to the current level of technology available in society, 31,000 workers will be needed in 2030 to provide the necessary care for an ageing population, and by 2050 the required number will be as high as 82,000 workers. These figures refer to and include not just doctors and other medical and social staff, but also workers in other industries of economy.

The results show that in all regions of the Czech Republic there is a need for more investment and more employment and not just in the social and health care sector but also in other industries of the economy. These results were obtained using a static input-output model for simplicity. A more detailed analysis can be performed using DSGE models; however, the methodology and interpretation is significantly more complex. Given the available data, a statistical input-output model applied to the regional level provides a sufficient basis for this analysis. The size of the impact reveals that amount of investment necessary in different areas affected by ageing. Unresolved issue is also future labour capacities and promotion of such education.

Příloha

Zkratka / *Abbr.*	Název	Name
PHA	Hlavní město Praha	Prague
STC	Středočeský kraj	Středočeský region
JHC	Jihočeský kraj	Jihočeský region
PLZ	Plzeňský kraj	Plzeňský region
KAR	Karlovarský kraj	Karlovarský region
UST	Ústecký kraj	Ústecký region
LIB	Liberecký kraj	Liberecký region
KRH	Královéhradecký kraj	Královéhradecký region
PAR	Pardubický kraj	Pardubický region
VYS	Kraj Vysočina	Region Vysočina
JHM	Jihomoravský kraj	Jihomoravský region
OLM	Olomoucký kraj	Olomoucký region
ZLN	Zlínský kraj	Zlínský region
MRS	Moravskoslezský kraj	Moravskoslezský region

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Popisky tabulek a grafů (dodat v češtině a angličtině)

Tab. 1: Pohyb obyvatelstva, 1990–2010; Population and vital statistics, 1990–2010

Graf 1: Relativní věková struktura cizinců a obyvatelstva ČR celkem, 31. 12. 2009; Relative age distribution of foreigners and total population of CR, 31 Dec 2009

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