

Katedra Sociologie
Fakulta filozofická Západočeské univerzity

Martina Štípková

**CLOSING AT THE BOTTOM, OPENING AT THE TOP:
TRENDS IN THE EDUCATIONAL HOMOGENY
OF CZECH MARRIED PARENTS OVER
THE PAST TWO DECADES**

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**Closing at the bottom, opening at the top: Trends in the educational homogamy of
Czech married parents over the past two decades**

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Abstract:

Assortative mating creates families, and these families have and raise children. Hence the pattern of status homogamy in a society has implications for the social standing of families and, as a consequence, for the intergenerational transmission of social status. To address this implication of status matching, I study the homogamy of parents. I focus on trends in parental homogamy in the Czech Republic, a country where socioeconomic inequalities have increased and socioeconomic status has become more closely tied to education in the last two decades. I expect this profound social change to translate into rising homogamy among parents. I analyse data from the Czech birth register. The dataset includes all live marital births in selected years between 1990 and 2009 with information about the educational attainment of the mother and the father (N=498,565). The results show that homogamy has risen only slightly in absolute numbers. However, the log-linear modelling showed that the relative tendency to have children with an equally educated partner increased strongly among parents with the lowest educational level and decreased somewhat among parents with tertiary education.

Keywords: intergenerational status transmission, marriage, parenthood, post-socialist.

Introduction

People tend to enter marriage and have children with a partner who has a similar social status. This feature of assortative mating shapes people's lives in both childhood and adulthood. When entering a partnership or marriage, people are also choosing with whom to pool their resources, economic and social, and this affects their own and their future children's life chances (Kalmijn, 1998). In a macro-perspective, individual partner choices pattern the distribution of scarce resources and the overall social openness of a society. A high level of homogamy (i.e. preference for a same-status partner) is considered to contribute to the growth of inequalities between families, especially when most households are dual-earner families (Blossfeld and Buchholz, 2009). Greater status homogamy in a society then leads to the closing of the social structure and results in family background having a stronger influence on the social status of the next generation. The question of who has children with whom is therefore one of the key interests of stratification research.

So far, most homogamy research has focused on the matching of spouses, either in new marriages or in prevailing marriages. While new marriages are more sensitive to historical changes, the study of prevailing marriages is more appropriate when the implications of assortative mating are studied (Schwartz and Mare, 2005). However, even the analysis of prevailing marriages does not enable an accurate interpretation of the socioeconomic context in which children are raised. The educational similarities or differences between spouses are dynamic – people may upgrade their education during marriage, or they may divorce and remarry (Schwarz, 2010). These processes do not occur randomly. Divorce, for instance, is more common among heterogamous couples, while remarriages tend to be less homogamous than first marriages (Blossfeld and Buchholz, 2009: 607; Schwarz, 2010). Moreover, not all

married couples have children and not all families have the same number of children. Thus, there may be a difference between the homogamy of new marriages and the homogamy of married couples that have children. Unfortunately, studies of parental homogamy are very rare (for an exception, see Garfinkel et al., 2002)

Both the homogamy of new and prevailing marriages has been shown to vary across countries and over time in relation to structural conditions. Smits et al. (1998) compared 65 countries and observed an inverted-U relationship between industrialisation and marital homogamy: as industrialisation proceeds, the level of homogamy increases, but it eventually stabilises and decreases after reaching a certain level. Smits and Park (2009) found a negative association between the level of modernisation and women's employment on the one hand and the level of newlyweds' educational homogamy on the other in ten East Asian countries.

Homogamy is sensitive even to abrupt policy changes that alter importance of education. Song (2009) showed that the reduced value of education during the Cultural Revolution in China resulted in a temporary decline in the educational homogamy of new marriages. The period after the fall of state socialism in the former socialist countries is another example of a specific context created in the aftermath of a profound political change. A comparison of four Central European countries found no uniform trend in the educational homogamy of newlyweds during the post-socialist period, although the nature of social changes was similar in all of the countries (Katrňák et al., 2006).

This paper aims to contribute to the understanding of how the post-socialist social changes influenced educational matching in family formation in the Czech Republic. To assess the intergenerational-status-transmission aspect of assortative mating, I focus directly on children and analyse the educational similarities or differences of their parents. The goal is to find out

whether and how the social homogeneity of families that have children has changed since 1990. Owing to data limitations that will be specified below, I limit the focus just to married parents. Below I will briefly summarise some of the changes in the Czech social structure since 1989 in order to situate the issue of parental homogamy in the appropriate context. Before proceeding to the analysis, I will discuss how the family-formation process was transformed during the post-socialist transition of Czech society and hypothesise that the homogamy of married parents increased during the period under study.

Overview of the changes in the Czech social structure since 1990

In the early 1990s there was intense intra-generational occupational mobility. Tuček and Harmádyová (1998), for instance, showed that almost 40% of the labour force experienced a change of occupation between 1988 and 1995. Večerník (1998: 23) found that 70% of employees reported that they had changed their occupational position and/or employer in the first half of the 1990s (between 1989 and 1995). He also claims that upward and not forced (i.e. not after being fired) mobility prevailed, though this is truer for people with higher levels of educational attainment (*ibid.*). A system of filling jobs on the basis of political criteria was replaced with a more meritocratic principle based on educational attainment, and income also became more strongly tied to education (Matějů and Kreidl, 2001). Income inequality rose (Večerník, 2009) and socioeconomic risks (poverty, unemployment, job uncertainty) became more stratified, as well. For instance, Katrňák and Mareš (2007) have shown that people with the lowest level of education have the highest risk of unemployment and especially long-term unemployment.

Not surprisingly, stratification is also reflected in life-style and health. Lux (2000) observed increasing differences in expenditure patterns by education of the head of the household

between 1990 and 1997. The gap increased mainly in the area of expenditures on leisure activities such as sports, education or culture. Changes in socioeconomic inequality also translated into rising health disparities. Shkolnikov et al. (2006), for instance, found that the general trend of improving life expectancy was more beneficial for population groups with higher levels of education.¹ In sum, educational attainment became more strongly connected to occupational and life prospects.

During the transition period education also became more accessible. Both secondary and tertiary educational expanded. The number of university students increased almost threefold between 1990 and 2006 (Czech Statistical Office, 2007). On the other hand, the influence of social background on educational attainment is relatively strong. Simonová and Soukup (2009), who analysed European Social Survey data, found that inequality in access to tertiary education by social background is currently relatively high in the Czech Republic compared to both Western and Eastern European countries. These authors also identified a cultural factor (measured as father's education) to be, among social background characteristics, the strongest predictor of entering tertiary education². Kraaykamp and Nieuwbeerta (2000), analysing data from the early 1990s on five post-socialist countries, reached similar findings about the strong significance of cultural resources for intergenerational status transmission.

There is also a gender asymmetry in educational attainment. Although a higher percentage of men than women traditionally get a university degree, the opposite is true at the secondary level. Since the birth cohorts born in the late 1930s, more women than men have tended to

¹ The widening of educational disparities in life expectancy was, however, relatively slight in the Czech Republic when compared to the development in Russia or Estonia.

² This mechanism differs from other post-socialist countries analysed (Poland and Germany) where socioeconomic position is more influential (Simonová and Soukup, 2009).

obtain an upper secondary education (i.e. graduating with a diploma), while men's secondary education has usually taken the form of vocational training (i.e. lower secondary level).

According to the 2001 census, 38% of women and only 28% of men aged 30-34 had complete secondary education. Almost half of men (48%) and 37% of women had vocational training in the same age group (Czech Statistical Office 2003). Moreover, in the younger cohort women started to overtake men even in tertiary education (ibid.). We will see below that the educational structure of Czech men and women results in relatively common matches between men with vocational training and women with complete (upper) secondary education.

Social stratification of childbearing in the Czech Republic

Marital and reproductive behaviour has undergone profound changes in the Czech Republic during the past twenty years. Marriage and childbearing were once an almost universal phenomenon. People typically used to marry at a young age and had children soon after. Yet, new risks, opportunities and values have challenged and changed those demographic patterns.³ These changes include the rapid decline in marriage rates and the postponement of marriage and childbearing, accompanied by an increase in the intensity of divorce, cohabitation, and non-marital childbearing (for an overview, see Sobotka, 2008). The trends in reproductive behaviour especially have been very dramatic. The total fertility rate decreased from 1.9 in 1989 to 1.1 in 1999 and then rose to the current level of 1.5 (Czech Statistical Office 2011). The mean age at childbearing increased from 25 to 29 between 1989

³ Authors identify different factors behind the demographic changes. Some emphasise the role of expanding life-style options and new values that may have challenged the commitment to family values (e.g. Hašková, 2008; Rabušic, 2001). Others point to the economic insecurity that has influenced decisions about starting a family (Rychtaříková, 2000).

and 2009. The share of non-marital births grew from 8% to almost 40% during the same period (ibid.).

We can distinguish different reproductive strategies according to the social status of the mother (and parents, respectively). Although the decrease in fertility in the 1990s affected all socioeconomic groups of women (Rychtaříková, 2003), more educated women tend to have fewer children. Kantorová (2004) analysed data from the Family and Fertility Survey 1997 and found a growing positive association between maternal education and the timing of first-order birth. This is caused not only by the longer amount of time more educated women spend as students, but also by the increasingly longer elapsed time between leaving school and childbearing. Analysing the same data, Pikálková (2003) showed that the likelihood of giving birth to a third-order child dramatically decreases with rising education. Social groups differ also with regard to the family situations in which they bear children. Rychtaříková (2008), for instance, showed that the typical never-married mother is a woman with elementary educational attainment in her late teens or early twenties. This was true in the late 1980s as well as in 2005. Moreover, the disparities in the share of never-married mothers by educational category increased over this period. Rychtaříková (ibid.) analysed population register data, in which only formal marital status is reported and thus unpartnered and cohabiting mothers cannot be distinguished. Analysis of survey data, however, shows that single motherhood is more likely to occur among never-married mothers with lower education than among more educated women (Hamplová, 2007). Chaloupková (2010) analysed early family trajectories as captured by the ISSP 2002 data and identified five distinct patterns of family formation that were strongly associated with a respondent's education.

It seems that there are different driving forces behind the decision of whether and when to have children in individual social groups. Hašková (2009: 97-102) showed that people with higher education and income tend to consider health, employment, and partnership conditions when deciding about having a child. Lower educational and income groups, on the other hand, are more strongly influenced just by their desire for a child.

On the other hand, there seem to be common family values shared by the whole population. Despite the decrease in fertility (even if partly balanced in recent years), a family with two children is still a highly and universally valued ideal and voluntary childlessness is preferred only by a marginal share of people (Pakosta, 2009). Similarly, marriage is a valued and the preferred family arrangement for childbearing among all educational groups of mothers, even though not all of them have marital children (Chaloupková, 2007).

Hypotheses

The goal of the paper is to assess how educationally homogamous Czech parents of newborns between 1990 and 2009 were. Based on an interpretation of the social changes described above, I have formulated four hypotheses.

Hypothesis 1: In general, I expect to find a rise in homogamy as education becomes a stronger predictor of the resources available to potential families and of life-styles.

Section 2 showed that the importance of education as a predictor of economic standing and life-style increased. The authors of several studies that have examined the homogamy of newlywed couples in the Czech Republic saw these changes as grounds for hypothesising that educational homogamy is increasing (Katrňák et al., 2004, 2006; Katrňák, 2008). However,

the evidence confirming this expectation is not convincing. The most recent study (Katrňák, 2008) has shown that, in absolute figures, the number of new homogamous marriages has been relatively constant since the mid-1970s. Conclusions based on log-multiplicative modelling point to an increasing relative homogamy. This result, however, contradicts previous findings. By contrast, uniform effect and distance models interpreted in previous papers (Katrňák et al., 2004, 2006) suggest that the level of newlywed educational homogamy has remained constant. Katrňák (2008) does not offer any explanation for this inconsistency.⁴

Even if the rising preference for homogamous marriages was not unambiguously confirmed among newlyweds, the selection of married couples into parenthood may work in this sense. People in heterogamous unions may choose to divorce when they feel they have a chance to make a better match with somebody else or they may upgrade their education to prevent their more educated spouse from leaving the relationship. This adjustment is likely to occur before the couple has children.

Hypothesis 2: The rise in parental homogamy will be most pronounced at the extreme ends of the educational scale.

Although the rise in homogamy should occur right across the educational scale, I assume that there will be some specific patterns at different educational levels. The increase in homogamy is likely to be most pronounced in the lowest educational group. People with just compulsory basic education seem to be increasingly marginalised in Czech society (cf. Katrňák and

⁴ The discrepancy may result from the different kinds of loglinear models used in the analyses or from an inappropriate interpretation of the results. I am inclined to trust the earlier result more, as the conclusion of the newer study is based only on the interpretation of interaction parameters without presenting the lower-level coefficients.

Mareš, 2007; Sirovátka and Mareš, 2006). Consequently, we can assume that they will be increasingly less attractive as partners for parenthood and thus will be forced to form couples with each other.

I also expect that there will be a bigger increase in homogamy among people with university education than among those with secondary education. As noted above, they tend to deliberate more carefully over their childbearing decisions, so they should be more sensitive to the increased value of education and not to match with somebody who has a lower status.

The final two hypotheses relate to the timing of the shift in homogamy. I have two competing explanations

Hypothesis 3: Parental homogamy increased most during the 1990s and then continued only at a slower pace or stabilised.

The sharp decline of the total fertility rate in the 1990s (see Section 3) suggests that potential parents responded to the new challenges of societal transformation during that period and were more reluctant in their childbearing intentions. It is likely that they at the same time adjusted their preferences about their choice of reproductive partner.

Hypothesis 4: The rise in parental homogamy was sharper during the 2000s than in the 1990s.

There are, however, also reasons to believe that the adjustment of parental educational matching took a longer time to occur. The state's family support policy may have prevented

the rise in parental homogamy in the 1990s, especially in the early part. The policies to support families were relatively generous during the state socialist period and persisted for some time before cuts were introduced. Hiršl (2004) calculated how child benefits and tax deductions contributed to the standardised needs of children in a hypothetical family with two average incomes and two children. While in 1989 the state covered half of these needs, this figure gradually dropped until it was slightly above one-fifth in the latter part of the 1990s and 15% in 2002. Declining state support probably made prospective parents increasingly aware of the importance of their own contributions to the family's budget.

Data and descriptive results

To assess the educational homogamy of parents, I analysed Czech birth register data. The dataset includes information about all live births in 1990, 1994, 1998, 2002, 2007, and 2009.⁵ The total number of newborns in these years is 655,499, of which 500,611 occurred in a marital union. For extra-marital births, before 2007 information about the father's education was not recorded in the birth register. The analysis is therefore restricted to married parents. Of these observations 2,046 were deleted because information on the mother's and/or father's education was missing. This left 498,565 cases in the analysis. Births to the same parents were not linked across the years, since the mother's identifiers were not available in the data.

The birth certificate includes a number of characteristics of the child and his/her parents. Among these available variables, I used the information about the educational attainment of the mother and the father (categories elementary, lower secondary, complete secondary, tertiary).

⁵ In the cases of multiple births, parental couples were included twice for twins, three times for triplets, etc.

Table 1 describes the trends in absolute homogamy. It shows that the proportion of homogamous parents slightly grew during the period studied, while the share of couples with a more educated father decreased, and the share of couples with a more educated mother slightly increased. We see in the first panel of Table 1 that the proportion of children with homogamous parents grew by two percentage points from the initial 54% between 1990 and 2009. The next two panels of Table 1 show the percentages of heterogamous parental couples. The most apparent change, although not very remarkable, is the decrease in the share of couples with a more educated father. Their proportion declined from 21% to 16%. Mothers were more educated than their husbands in 25% of cases in 1990 and by 2009 that share had increased by almost three percentage points.

<Table 1 about here>

A general trend of educational upgrading of parents can be observed throughout the table. Both homogamous and heterogamous parental unions formed by persons with low levels of educational attainment are less common now than they were twenty years ago. For instance, once the most common educational combination was that in which both parents had lower secondary (vocational) school. These couples accounted for about 30% of all married parents until 1998. However, by 2009 this figure had been cut in half. Instead, parents who both have complete secondary education became more common and the share of such couples rose to almost one-quarter (from 16% in 1990). Moreover, the share of children whose married parents both have a university education more than doubled in the period under study.

Similarly, the number of children whose parents have a combination of elementary and vocational schooling got smaller and children whose parents have a combination of complete secondary and university education became more common. Among parental couples in which the father has higher education than his wife, the combination of university and complete secondary became more common than the vocational and elementary combination and became the modal category for this type of heterogamous union. On the other hand, the proportion of couples formed by a mother with a complete secondary diploma and a father with vocational training, although declining, is by far the most common among couples in which the mother is more educated than the father. This is obviously a consequence of the educational structure of Czech men and women (see section 2). However, the share of parental couples formed by a university-educated mother and a father with complete secondary education more than doubled between 1990 and 2009.

Relative homogamy: model building

The shares of homogamous and heterogamous unions in the population are, to a certain extent, influenced by the marginal distribution of education among men and women.

Loglinear models make it possible to analyse relative homogamy net of this structural influence. The net effects are thus more informative for the assessment of the strength of social barriers between status groups that influence family formation.

For loglinear modelling, the data are ordered in a three-way contingency table that summarises the frequencies of all the combinations of categories of parental education and year. This table can be perfectly described with a saturated model that contains all the possible interactions between maternal education (M), paternal education (F) and year (Y). It can be formally written as

$$G_{ijk} = \theta + \lambda_i^M + \lambda_j^F + \lambda_k^Y + \lambda_{ij}^{MF} + \lambda_{ik}^{MY} + \lambda_{jk}^{FY} + \lambda_{ijk}^{MFY} \quad (\text{Eq. 1}),$$

where G_{ijk} is the natural logarithm of the expected (estimated) frequency in the i -th category of maternal education, the j -th category of paternal education, and the k -th category of year.

Parameter θ represents the average frequency in each cell, to which marginal effects ($\lambda_i^M, \lambda_j^F, \lambda_k^Y$), two-way ($\lambda_{ij}^{MF}, \lambda_{ik}^{MY}, \lambda_{jk}^{FY}$) and three-way (λ_{ijk}^{MFY}) interactions between variables are added. The model can be schematically expressed as [YMF].⁶

The saturated model predicts the data perfectly, but does not simplify the complexity of the data. The goal is to find the most parsimonious model, i.e. the model that describes the data satisfactorily and is as simple as possible for interpretation. I used two criteria for model selection: BIC (see Raftery, 1995), and the dissimilarity index (Δ), which counts the proportion of misclassified cases.⁷ I also present the chi-squared likelihood ratio (L^2).

However, because I am using population data, the standard test statistics should be taken only as a descriptive measure of the difference between the particular model compared to the saturated model.

⁶ The notation is used according to Hagenars (1990).

⁷ They are computed in the following way (see Vermunt, 1997: 74):

$$\Delta = \sum_i \frac{\text{abs}(n_i - \hat{m}_i)}{2N}, \text{ where } n_i \text{ is the observed cell frequency and } \hat{m}_i \text{ is the estimated cell frequency;}$$

To prevent the characteristics of the models from being biased by the different numbers of observations in individual years, I standardised the data to 70,000 newborns in each year. However, the model picked for subsequent interpretation is then re-estimated with the original number of cases in each year (the same procedure was used, for example, by Smits et al. 1998). All the analyses were conducted using Lem software (Vermunt, 1997).

Table 2 presents an overview of the estimated models along with their goodness-of-fit statistics. I started the model selection procedure with a simple model [Y MF] (Model 1). This model is constrained to allow only for a two-way interaction between maternal and paternal education and marginal effects:

$$G_{ijk} = \theta + \lambda_i^M + \lambda_j^F + \lambda_k^Y + \lambda_{ij}^{MF} \quad (\text{Eq. 2}),$$

Model 1 serves as a baseline to show the improving fit of the subsequent models and is not expected to fit the data well (and indeed it does not). It misclassifies more than nine percent of cases and has a very large BIC. Clearly, the two-way interactions of both maternal and paternal education with time have to be added (Model 2):

$$G_{ijk} = \theta + \lambda_i^M + \lambda_j^F + \lambda_k^Y + \lambda_{ij}^{MF} + \lambda_{ik}^{MY} + \lambda_{jk}^{FY} \quad (\text{Eq. 3}).$$

Model 2 [YM YF MF]⁸ supposes that there is a time trend in the educational structure of both mothers and fathers (YM and YF interactions), but, unlike the saturated model, it does not include the three-way interaction. This means that the model does not expect the association

⁸ This model is known as a CSF (common social fluidity) model in intergenerational mobility research (see Erikson, Goldthorpe 1987).

of maternal and paternal education (MF) to vary in time. The positive BIC, while much lower than in Model 1, still rejects Model 2 as an adequate representation of the data. This suggests that there is some change over time. On the other hand, only a very small share (1.3 %) of cases is misclassified in Model 2. So this model describes the data relatively well, while using 45 degrees of freedom less than the saturated model.

<Table 2 about here>

Rather than turning to the saturated model, I sought a model that treats the three-way interaction more effectively. More than half of all observations in the contingency table lie in the main diagonal cells (these account for the homogamous parental couples). Models 3 and 4 assume that the change over time occurs exclusively on the main diagonal. They allow coefficients for these diagonal cells to vary while the rest of the table remains unaltered. The main diagonal cells are modelled with additional diagonal coefficients δ_{ij} that change by β_k coefficient each year. Model 3 is formally expressed as:

$$G_{ijk} = \theta + \lambda_i^M + \lambda_j^F + \lambda_k^Y + \lambda_{ij}^{MF} + \lambda_{ik}^{MY} + \lambda_{jk}^{FY} + \delta_{ij}\beta_k \quad (\text{Eq. 4}),$$

where $\delta_{ij} = 0$ if $i \neq j$; $\beta_k = 0$ if $k = 1990$; $\beta_k = 1$ if $k = 1994$.

It uses eight more parameters than Model 2: the four δ_{ij} coefficients for the main diagonal cells in the years following 1990 and the four β_k multiplicative coefficients that move the value of the diagonal coefficients across the years from 1998 to 2009. In 1990, the reference category of the year β_k is zero and the change between 1990 and 1994 is captured using just the δ_{ij} coefficients (β_k is then equal to one).

Model 4 is less constraining and allows each diagonal coefficient to change at its own pace (i.e. each diagonal coefficient has its own β_k):

$$G_{ijk} = \theta + \lambda_i^M + \lambda_j^F + \lambda_k^Y + \lambda_{ij}^{MF} + \lambda_{ik}^{MY} + \lambda_{jk}^{FY} + \delta_{ij}\beta_{ijk} \quad (\text{Eq. 5}),$$

where $\delta_{ij} = 0$ if $i \neq j$; $\beta_{ijk} = 0$ if $i \neq j$; $\beta_{ijk} = 0$ if $k = 1990$; $\beta_{ijk} = 1$ if $k = 1994$.

Both of these two models fit the data very well. Their dissimilarity indexes are under one percent and both have a negative BIC. The lowest value of BIC in Model 3 (almost -360 compared to -245 in Model 4) suggests that the common multiplicative coefficient β_k captures the time trend reasonably well. Thus I consider Model 3 suitable for interpreting the trend in parental homogamy.

Relative homogamy: the contradictory trend in low and high educational groups

Table 3 shows the parameters for the association of maternal and paternal education (the λ_{ij}^{MF} terms) as estimated in Model 3. I present the parameters in the exponentiated form and interpret them in terms of odds ratios (rather than log odds ratios). I used effect coding for the educational variables and dummy coding for the year (with 1990 as the reference category). So the parameters in Table 3 correspond to the situation in 1990, the starting point of the period under study.

In 1990, the strongest association is, as expected, in the ‘homogamous’ diagonal cells. The case where both parents have only an elementary level of education was 7.7 times more likely to occur than the average likelihood in 1990. The homogamy of parents with a university degree is even higher (the likelihood of this union is 10.4 times higher than the average

likelihood). More intuitively understandable results, for instance, are that the odds of having a husband with elementary rather than lower secondary of education is 8.4 times⁹ higher for mothers with elementary education than for mothers with vocational (lower secondary) school. On the other hand, the social barriers between higher educational levels seem to be somewhat weaker. The odds ratio that compares the chances of a mother with university versus complete secondary education having a husband with a university degree rather than complete secondary schooling is 6.8. Homogamy is weakest in the middle educational categories. The odds ratio for fathers with lower versus complete secondary education of having wives with lower versus complete secondary schooling of mothers is 3.3.

<Table 3 about here>

When we focus on more remote educational groups and compare, for example, the chances of the same mothers (with elementary and vocational education, respectively) having a husband with university rather than complete secondary education, their chances for such a union are much lower and there is not much difference between them. The odds ratio is .98 $((0.51/0.18)/(0.97/0.34))$. This means that the odds of having a husband with tertiary education is only negligibly (1.02 times, i.e. $1/.98$) higher for a mother with vocational education than for a mother with elementary education.

According to the preferred model, the diagonal coefficients for later years differ from those presented in Table 3. Figure 1 shows the changing values of these parameters during the studied period (the $\delta_{ij}\beta_k$ terms). Surprisingly, the trend in relative homogamy varies by level of education. For married parents with the lowest educational attainment, the chances that

⁹ Calculated from Table 3 as $(7.65/1.40)/(1.40/2.17)=8.43$ (the original not-rounded results are used).

their spouse will have the same level of education strongly increased between 1990 and 2009. The value of the educational interaction coefficient rose from 7.7 in to 17.9. This means that the odds of having a husband with elementary rather than lower secondary education was almost 19 times¹⁰ higher for mothers with elementary education than for mothers with lower secondary schooling. Moreover, the rise in homogamy in the lowest educational group seems to have occurred at an increased pace in the second half of the studied period (see Figure 1).

By contrast, there is a declining trend in the homogamy of married parental couples in which both partners have university degrees. The coefficient for this combination of parental education declined from 10.4 to 6.8. However, this decline is not as remarkable as the increasing homogamy of the couples with elementary education attainment. For example, the odds of a husband having university versus complete secondary education were 6.1 times higher for mothers with university vs. complete secondary education in 2009, compared to the odds ratio of 6.8 in 1990.

<Figure 1 about here>

The trend in the relative homogamy of married parents with lower and complete secondary schooling is less remarkable. The homogamy of parents with lower secondary education slightly decreased (the coefficient declined from 2.2 to 2.1), and for parents with complete secondary school it increased somewhat (the coefficient rose from 1.4 to 2). The opposite direction of these (however modest) trends suggests that the social distance between the two levels of secondary education seems to have increased. The odds ratio of husbands having

¹⁰ (17.94/1.4)*(1.40/2.06).

lower versus complete secondary education for mothers with lower versus complete secondary education rose from 3.3 to 4.3.

Conclusion

This article analysed the educational matching of couples who became parents in the Czech Republic in selected years between 1990 and 2009. The analysis of birth register data was restricted only to marital births. The socioeconomic transition of the Czech Republic and shifts in family behaviour suggested that the homogamy of married parents would strengthen over the studied period. I expected this trend to be especially pronounced at the lowest and the highest educational levels.

These hypotheses were, however, not wholly confirmed. As regards absolute homogamy, the proportion of newborns with homogamously married parents increased by only two percentage points during the last two decades. I also used loglinear analysis to model the odds of particular types of educational matching net of the effect of educational structure of parents. The results showed increasing relative homogamy in the lowest educational groups and decreasing homogamy for parents with university education. No marked trend was observed in the homogamy of parents with secondary education.

I also had two competing expectations about the timing of the changes in homogamy. The first expectation was that it would occur mainly during the first half of the studied period, when most of the structural changes took place. The second hypothesis was that the pace of the changes would be modest in the 1990s and would then accelerate in the 2000s. The second expectation proved to be more valid suggesting that people adjusted gradually to the new social context.

The rising relative homogamy in the lowest educational category warrants special attention as it indicates the emergence of a possible social issue. Although the number of newborn

children whose parents both have only the lowest level of educational attainment is declining, people with only elementary school increasingly tend to have children in this kind of union, either as a preferred one or as a consequence of the inability to find a partner with higher education. This implies that this group is the most excluded and that the isolation of this social category seems to be growing at an increasing pace, which suggests a rising social disadvantage for children of these parents.

On the other hand, the trend in the upper educational group is the reverse. The absolute number of university-educated parents increased. However, their relative homogamy decreased. This suggests that the status connected with university education became less exclusive (see also Smits and Park, 2009). However, this trend may also be interpreted in terms of marital couples' willingness to have children. As the couples formed by spouses with a university degree are more likely to be dual-career, they may be less likely to have children than heterogamous couples in which only one partner has university degree.

The main limitation of the present analysis is the absence of information about children born outside of marriage. Their incidence has increased dramatically in the Czech Republic over the last two decades. While the 1990 data contain information about the parents of more than 90% of all newborns, in 2009 the data cover only 60% of newborns. Thus a further investigation of the trends in the social status of parents of extra-marital children is needed to obtain a deeper understanding of the processes.

This is especially true for children born to mothers without a stable partner. Although this condition is known to be stratified (cf. Hamplová, 2007), there is no research that would focus on whether motherhood without a partner became more or less associated with maternal

socioeconomic status in the Czech Republic. On the other hand, the lack of knowledge about the educational matching of parents who live in a consensual union seems to be less problematic. A comparative study of seven European countries based on the two waves of the European Social Survey suggest that, depending on the social context, unmarried cohabitations tend to be similarly or more homogamous than marriages (Hamplová, 2009). The rates of homogamy are similar for both kinds of unions in countries where cohabitation is widespread, in contrast to countries where marriage is more dominant. Hamplová explains the higher homogamy of cohabitation in the latter kind of countries as a consequence of the more egalitarian nature of these unions in terms of gender roles and resource sharing. Although Hamplová's study analysed partners and not parents, she focused on prevailing unions, which are a better proxy for the context of childrearing than newly formed unions. If Hamplová is right that the more widespread the unmarried cohabitation is, the more similar it is to marriage, the difference between parents who live in marriage and cohabitation should have been declining over the studied period, because childbearing in an unmarried cohabitation was far less common in the early 1990s than now.

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Tables a figures

TABLE 1. Absolute educational homogamy of married parents of children born in 1990-2009. Only live births, N=498 565.

	Year					
	1990	1994	1998	2002	2007	2009
Education of Paretns						
Same education	54.3%	55.5%	55.5%	55.2%	55.8%	56.4%
In which:						
Both elementary	3.9	3.3	2.7	2.4	2.1	2.0
Both vocational	28.6	31.7	28.9	24.3	18.4	15.3
Both complete secondary	15.9	14.8	16.8	19.9	23.1	23.8
Both university	5.9	5.7	7.1	8.6	12.1	15.3
Same education of parents total	64822	50541	40673	38280	41739	39804
Father more educated	21.0%	20.9%	20.5%	19.3%	17.4%	16.3%
In which:						
Father vocational and mother elementary	5.8	4.8	3.9	3.1	2.3	1.9
Father com. secondary and mother vocational	7.3	8.5	8.5	7.7	6.2	5.3
Father university and mother com. secondary	5.7	5.5	6.2	6.8	7.3	7.6
Father com. secondary and mother elementary	1.2	1.0	0.8	0.8	0.7	0.6
Father university and mother vocational	0.9	1.0	0.9	0.9	0.8	0.9
Father university and mother elementary	0.1	0.1	0.1	0.1	0.1	0.1
Father more educated total	25031	19017	15055	13349	13050	11518
Mother more educated	24.7%	23.6%	24.0%	25.5%	26.8%	27.3%
In which:						
Mother vocational and father elementary	2.4	2.3	1.9	1.6	1.1	0.8
Mother com. secondary and father vocational	17.7	17.0	17.1	17.8	16.8	15.4
Mother university and father com. secondary	2.4	2.3	3.1	4.0	6.0	7.7
Mother com. secondary and father elementary	1.2	0.9	0.8	0.7	0.7	0.7
Mother university and father vocational	1.0	1.0	1.1	1.3	2.0	2.5
Mother university and father elementary	0.1	0.1	0.1	0.1	0.1	0.1
Mother more educated total	29544	21514	17598	17698	20043	19289
Total	119397	91072	73326	69327	74832	70611

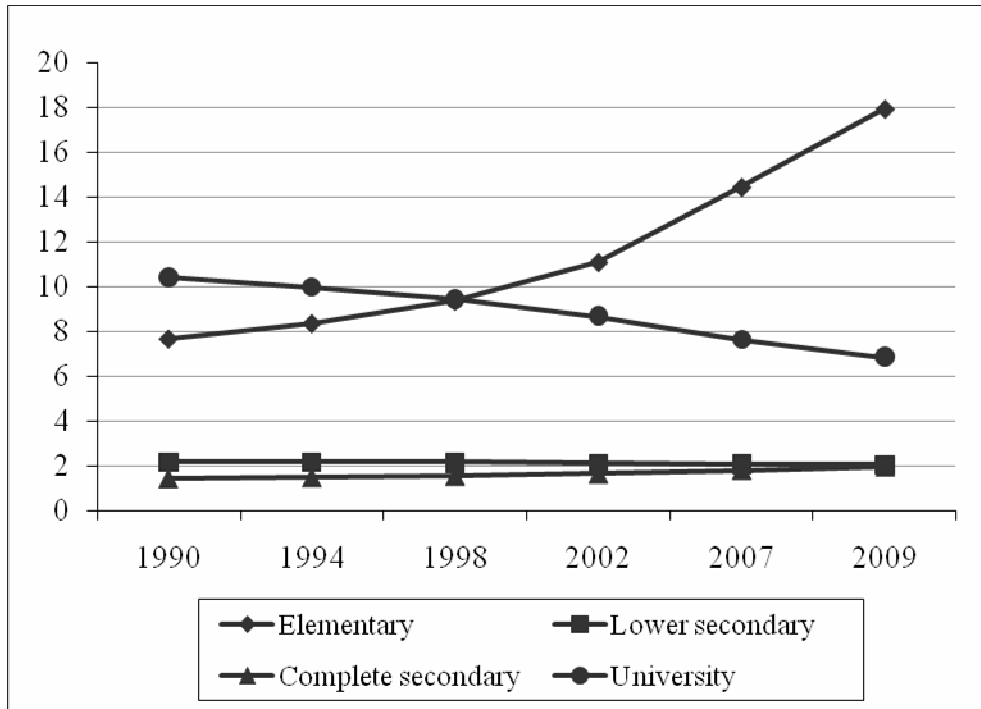
TABLE 2. Goodnes of fit statistics of the estimated models.

	L-squared	DF	Dissimilarity index	BIC
M1: [Y MF]	24437.76	75	9.37%	23466.66
M2: [YM YF MF]	705.56	45	1.29%	122.90
M3: M2 + Dx	119.65	37	0.47%	-359.42
M4: M2+Dxij	78.79	25	0.20%	-244.92

TABLE 3. Parameters for the association of maternal and paternal education as estimated by Model 3.

Father's education	Mother's education			
	Elementary	Lower secondary	Complete secondary	University
Elementary	7.65	1.40	0.47	0.20
Lower sec. (vocational)	1.40	2.17	0.97	0.34
Complete secondary	0.51	0.97	1.43	1.41
University	0.18	0.34	1.55	10.42

FIGURE 1. Change in diagonal parameters between 1990 and 2009 as estimated by Model 3.



Appendix A: Distributions of maternal and paternal education

TABLE A1. Percentage distribution of married mothers by education and year. Only live births, N=498 565.

	1990	1994	1998	2002	2007	2009
Elementary	11.1	9.3	7.5	6.3	5.2	4.6
Lower secondary (vocational)	39.1	43.5	40.3	34.5	26.5	22.3
Complete secondary	40.4	38.1	40.9	45.2	48.0	47.5
University	9.4	9.1	11.3	14.0	20.3	25.6
	100%	100%	100%	100%	100%	100%
Total	119397	91072	73326	69327	74832	70611

TABLE A2. Percentage distribution of married fathers by education and year. Only live births, N=498 565.

	1990	1994	1998	2002	2007	2009
Elementary	7.6	6.7	5.4	4.8	4.0	3.7
Lower secondary (vocational)	53.1	54.4	51.0	46.5	39.6	35.1
Complete secondary	26.7	26.6	29.2	32.3	36.1	37.4
University	12.6	12.3	14.4	16.4	20.3	23.9
	100%	100%	100%	100%	100%	100%
Total	119397	91072	73326	69327	74832	70611

Appendix B: Detailed results of Model 3

TABLE B. Complete list of coefficient estimated by Model 3.

		additive (logged)	multiplicative
Constant		7.56	0.00
Marginal coefficients			
Y			
1990		0.47	1.59
1994		0.14	1.15
1998		-0.10	0.91
2002		-0.17	0.84
2007		-0.12	0.88
2009		-0.21	0.81
M			
Elementary		-1.01	0.36
Lower sec.		0.52	1.68
Complete sec.		0.97	2.64
University		-0.48	0.62
F			
Elementary		-1.26	0.28
Lower sec.		1.04	2.82
Complete sec.		0.62	1.86
University		-0.40	0.67
Two-way interactions			
YM			
1990	Elementary	0.42	1.53
1990	Lower sec.	0.06	1.06
1990	Complete sec.	-0.04	0.97
1990	University	-0.45	0.64
1994	Elementary	0.29	1.34
1994	Lower sec.	0.21	1.24
1994	Complete sec.	-0.07	0.93
1994	University	-0.43	0.65
1998	Elementary	0.11	1.11
1998	Lower sec.	0.16	1.17
1998	Complete sec.	-0.03	0.97
1998	University	-0.24	0.79
2002	Elementary	-0.08	0.92
2002	Lower sec.	0.03	1.03

2002	Complete sec.	0.04	1.04
2002	University	0.01	1.01
2007	Elementary	-0.30	0.74
2007	Lower sec.	-0.18	0.84
2007	Complete sec.	0.06	1.06
2007	University	0.42	1.52
2009	Elementary	-0.44	0.64
2009	Lower sec.	-0.29	0.75
2009	Complete sec.	0.04	1.04
2009	University	0.69	2.00

YF

1990	Elementary	0.26	1.30
1990	Lower sec.	0.01	1.01
1990	Complete sec.	-0.10	0.91
1990	University	-0.18	0.84
1994	Elementary	0.17	1.19
1994	Lower sec.	0.04	1.04
1994	Complete sec.	-0.08	0.92
1994	University	-0.12	0.88
1998	Elementary	0.02	1.02
1998	Lower sec.	0.02	1.02
1998	Complete sec.	-0.02	0.98
1998	University	-0.03	0.97
2002	Elementary	-0.05	0.95
2002	Lower sec.	0.00	1.00
2002	Complete sec.	0.03	1.03
2002	University	0.01	1.01
2007	Elementary	-0.17	0.84
2007	Lower sec.	-0.02	0.98
2007	Complete sec.	0.09	1.09
2007	University	0.11	1.11
2009	Elementary	-0.24	0.79
2009	Lower sec.	-0.06	0.95
2009	Complete sec.	0.08	1.09
2009	University	0.21	1.24

MF

Elementary	Elementary	2.03	7.65
Elementary	Lower sec.	0.34	1.40
Elementary	Complete sec.	-0.67	0.51
Elementary	University	-1.70	0.18
Lower sec.	Elementary	0.34	1.40
Lower sec.	Lower sec.	0.77	2.17

Lower sec.	Complete sec.	-0.03	0.97
Lower sec.	University	-1.08	0.34
Complete sec.	Elementary	-0.76	0.47
Complete sec.	Lower sec.	-0.03	0.97
Complete sec.	Complete sec.	0.36	1.43
Complete sec.	University	0.44	1.55
University	Elementary	-1.61	0.20
University	Lower sec.	-1.08	0.34
University	Complete sec.	0.35	1.41
University	University	2.34	10.42

Three-way interactions

Diagonal Coefficients

Elementary	0.1	1.09
Lower secondary	0.0	0.99
Complete secondary	0.0	1.03
University	0.0	0.96

Beta coefficients

1990	0
1994	1
1998	2.32
2002	4.29
2007	7.37
2009	9.88
