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**Education and Entry into Motherhood:
The Czech Republic during State
Socialism and the Transition Period
(1970-1997)**

Vladimíra Kantorová

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Education and Entry into Motherhood: The Czech Republic during State Socialism and the Transition Period (1970-1997)

Vladimíra Kantorová¹

Abstract

The Czech Republic presently shows one of the lowest total fertility rates (TFR) in Europe. A decline in period fertility followed the transition from a centrally planned economy to a market economy that started in 1990. In this study, we investigate women's transition to first births, focusing on the impact of female education. We make a distinction between the effects of education attainment and time elapsed since completion of education. There are two aspects to the role of education that influenced the delay of entry into motherhood in the 1990s. First, during early adulthood women spent more time in education than their contemporaries did in the era of state socialism. Second, women entered motherhood much later after completion of education than before, which contrasts with the previous pattern of a strong immediate effect the completion of studies had on first-birth risks. The decline in first-birth risks in the 1990s applies more so to women with a higher level of education than to those with a lower level. We argue that greater education differentiation of labor market opportunities and constraints brought about greater education differentiation in the timing of entry into motherhood.

¹ Max Planck Institute for Demographic Research, Germany. E-mail: kantorova@demogr.mpg.de

1. Introduction

During the 1990s, the economic and social environment in which Czechs lived was subject to dramatic transformations including the transition from a centrally planned to a market economy, the democratization of politics and changes to the welfare state. The total fertility rate in the 1980s was slightly over 1.9 children per woman, yet it dropped throughout the 1990s to fairly low levels, in particular between 1996 to 2001 (1.13 to 1.19 children per woman). The mean age of mothers at first birth rose from 22.5 in 1989 to 24.6 in 1999. This development is not unique in that most countries of Central and Eastern Europe have experienced a substantial decline in fertility since the onset of politic and economic transition in 1989 (Kučera et al. 2000).

The Czech experience of the 1990s provoked a discussion on the nature and underlying factors of recent demographic changes (e.g. Rychtaříková 1995, 2000, Rabušic 1996, Fialová and Kučera 1997). These investigations were based on macro-level associations between reproductive behavior and the economic and social development of the Czech Republic. In this discussion frequent reference was made to the “economic crisis thesis” and the “second demographic transition thesis”, which mostly were being considered as mutually incompatible hypotheses. The aim of this contribution is to look at the changes in the timing of entry into motherhood on the individual level and to look at the role of women’s education in two specific contextual situations – during state socialism in the 1970s and 80s, with a centrally planned economy, and during the profound societal and economic transition of the 1990s.

The education of women has generally been regarded as a very important determinant of first birth timing. Life course studies on first birth transition offer two explanations for differences in first birth timing among women with different education levels (Hoem 1986, Blossfeld and Huinink 1991). First, being enrolled in education; second, education attainment. The major theoretical assumption in these studies is that the effect of education on first-birth risks needs to be viewed in a dynamic way; from a methodological view this means the inclusion of women’s education as a time-varying variable that distinguishes between the periods in and out of education. In this way, the impact of being enrolled in education can be distinguished from the *net* impact of the education level on first-birth risks.

Empirical studies report opposing results as concerns the effect of women’s education attainment on the timing of first birth. Some studies report that higher education attainment is associated with deferred childbearing (e.g. Liefbroer and Corijn 1999). The authors argue that women with higher education are more inclined to pursue an employment career and postpone childbearing to a later stage, that is until they have settled into a stable career (if they do not refrain from having children at all). Others do not find any significant effect of education attainment on birth timing. Blossfeld and

Huinink (1991) for example claim that delayed first births among better educated women are largely linked to continuing education activity, whereas a higher education level has no net inhibiting effect on first-birth risks.

The chapter is organized as follows: Next, we describe changes in the institutional context such as in the education system, the presence of women in the labor market, economic returns to education and family policies. The theoretical framework is based on the economic approach to the timing of births (e.g. Gustafsson 2001). Within this framework, we discuss childbearing decisions under state socialism and during the transition period, and highlight major differences between these periods that may be a reason for the postponement of first birth in the 1990s. In particular, we look at education differences in the timing of first birth. Our empirical analysis is based on data from the Czech Fertility and Family Survey of 1997. We apply an event-history analysis to the transition to first child. The analysis proceeds in two steps and in both we compare behavior under state socialism with behavior during the transition period. In the first step, we investigate the effect of education attainment on first-birth risks. In the second step, we study first-birth risks since completion of studies in order to provide a deeper insight into the relationship between education duration and the timing of entry into motherhood in the life course of women.

2. Changes in the institutional context

2.1 Education – structures and changes

Many aspects of the state-socialist education system (the number and type of schools, the length of education, the number of students admitted every year to different kinds of schools, the admission requisites) were planned according to the needs of the economy. The purpose was to provide white-collar workers with technical education and especially manual workers with technical apprenticeship for industry. The education system did not experience any major changes or reforms in the 1970s and 1980s. The state-socialist regime strongly promoted an education path leading to apprenticeship and the length of this education was generally two to three years (women were 16 to 17 years old at completing education). Upper-secondary education with school-leaving certificate (*maturita*) lasted four years (women were around age 18 at completing education). Places in university education were limited and admission was based not only on the academic qualification of students, but also on other requirements (such as Communist party membership of students or their parents).

In the 1990s, the inherited education system had a low level of flexibility and a weak capacity to fully absorb the education aspirations, especially for university

education, of young adults. Furthermore, the baby boom cohort born in the mid-1970s entered into upper-secondary and tertiary education. In the 1990s, interest in the lowest structural level (apprentice schools) decreased to the benefit of upper-secondary education with a certificate (*maturita*). While in the school year 1989/90, 61 % of post-elementary school students enrolled in apprentice schools, it was down to 46 % in 1997/98 (Čerych et al. 1999). During the 1990s, more possibilities for further study opened up for young adults after completion of upper-secondary education. Students could now study in a non-university sector of tertiary education (of 1 to 3 years duration), which offered more specialized (social work, lower medical professions, languages) or market-oriented (management, marketing) studies. However, young people strongly perceived a limitation still to be the low capacity of universities.

To conclude, differences in the structure of paths and wider opportunities for attending tertiary education extended the period spent in education. The proportion of young women at age nineteen enrolled in education increased from 15 % in 1992 to 40 % (20 % in upper-secondary and 20 % in tertiary education) in 1999 of the total female population of this age. Among women aged 20 to 22 in 1999, 20 % of them enrolled in education activities; this compares to 12 % in 1992 (OECD 2001). Despite this development, however, the Czech education system was behind not only the countries of the European Union, but also Poland and Hungary as far as the expected average years of schooling in 1999 (15 years for men and 15.2 years for women) is concerned (OECD 2001).

2.2 The presence of women in the labor market

Strict labor market regulations developed in the centrally planned economy. Employment was defined as a state-guaranteed social right and not as an outcome of market forces. On the whole, work contracts were permanent and the degree of mobility between jobs was low. Due to low wage levels and an official ideology that emphasized the role of women's work in gender equality and emancipation, financial and ideological pressure on women to enter paid employment was strong. Thus, nearly all women participated in the labor market after completion of studies. The proportion of women to the total number employed has been very stable and fluctuated around 46-47 % since the 1960s. At the end of the 1980s, participation in the labor force reached over 80 % of women at the economically active age (70 % if women on paid maternity leave were excluded from the active labor force). Differences in the female labor force participation by level of education were small (Pailhé 1998). The model of 'continuous employment' was typical for Czech women, who combined work and family life during their reproductive years with only short interruptions of work during maternity and

parental leave (Čermáková 1997). Moreover, the majority of women worked full-time. Contrary to some expectations, a massive withdrawal of women from paid employment did not occur during the transition period (Pailhé 1998). This was the result of both the continued economic need for two incomes in a family and women's unwillingness to give up paid employment.

The usual participation of both partners in the labor market led to the formation of the dual earner family model. The families in which the man only was employed and the woman stayed at home were very rare – in 1998, housewives formed a mere 4 % and women on parental leave represented just 4.2 % of the female population aged 15+ (Kuchařová 1999). With increases in female education attainment and labor force participation, one can presume that husbands and wives are less likely than before to define the role of women traditionally; yet much of the research suggests that traditional gender roles in work and family persist. Empirical evidence points out that childrearing responsibilities were shared along traditional gender roles (Čermáková et al 2000). The division of labor in Czech households was characterized by housework mostly being done by women. In 1996, the quantitative difference in the division of work between men and women living in a two-income family was that men devoted an average of 48.5 hours per week to their jobs and women 42.5 hours, while on average men spent 10 and women 25 hours on housework (Křížková 1999).

2.3 Economic returns to education in the centrally planned and transition economy

During state socialism, earnings were set by certain categories for all employees according to centrally determined wage grids (Munich et al 1999). The aim was that differences in individual incomes should be as small as possible. The decreasing significance of education in individual income differentials was a long-term trend during the 1970s and 80s and the rewarding system was characterized by the predominance of factors such as age and seniority (Večerník 1996). Education played a role more so in other channels than in wage differentials. These channels offered various perks such as a second job, extra money, access to scarce goods or services, useful contacts or improved working conditions, thus resulting in a higher quality of both the work and private life (Večerník 1996).

The transition from a centrally planned economy to a market economy led to a fundamental transformation of the occupational structure, an expansion of the private sector and a growing demand for qualified workers with specialized education. Firms began to act according to market forces and output, employment and wages were set by firms rather than a planning center (Svejnar 1999). Education, on-job experience and

work performance were valued higher in areas where modernization was introduced, and over-employment decreased. However, other areas were influenced by the ‘soft conditions’ for transformation leading to the sustenance of inefficient firms. All these factors brought wider differences in employment contracts, wages, accessibility of non-wage advantages and employment security.

In the 1990s, the transition to a market economy introduced more economic incentives to obtain higher education; these were lacking in the preceding era. Greater importance was placed on higher education and this opened up new opportunities in the labor market, ensuring access to more stable jobs with relatively higher earnings. Following the collapse of communism, wage regulations were quickly abolished, and a number of studies summarized in Svejnar (1999) provide evidence of a rapid increase in income dispersion during the transition, underlined in part by an increase in returns to education (Note 1). Therefore, the income level of female university educated employees rose from 133 % of the average female income in 1988 to 145 % in 1992 and to 160 % in 1996 according to Microcensus data (Večerník 1999, Table 1). Despite equal pay legislation and nearly overall employment of women in all sectors of the economy, both the state-socialist and transition economies were characterized by a gender wage gap, which is not different from that in market economies (Jurajda 2001, Pailhé 2000).

Table 1: Average wage by education attainment and gender, the Czech Republic (Percent).

Education	Total			Men			Women		
	1988	1992	1996	1988	1992	1996	1988	1992	1996
Elementary	90.5	75.7	69.9	90.5	81.0	73.0	93.1	80.3	74.6
Upper-secondary:									
- without maturita	95.4	92.9	87.6	95.4	90.3	85.9	93.9	85.2	81.8
- with maturita	101.4	103.7	106.9	102.2	104.5	110.3	104.3	112.6	112.7
Tertiary	134.0	144.0	164.7	124.6	140.0	161.3	133.1	145.4	160.7
Average	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
In % of total	100.0	100.0	100.0	115.3	119.3	116.4	79.6	77.8	81.7

Source: Microcensus 1989, 1992 and 1996 (Večerník 1999).

Moreover, having higher education was kind of an ‘insurance’ against economic uncertainty. Between 1993-1997, the unemployment rate of university educated women was around 2 % and for women with elementary education it was between 8 to 15 %, for the others it fluctuated between 4 and 8 %. While the general unemployment rate of women was between 4.5-7 % between 1993 and 1997, among 15 to 19 years old women this percentage was more than 3 times higher (CSU 2003).

2.4 Population and family policies

In the discussions on fertility in the Czech context, the question on population policies and the role of the state in general is of importance (e.g. Heitlinger 1976, Frejka 1980, Wolchik 2000). The relevant measures of pronatalist policies were introduced in the first half of the 1970s. In 1968, paid maternity leave was extended to 26 weeks. Prolonged maternity leave with a job guarantee was granted until a child reached 2 years of age (in the mid-1970s, it was extended to 3 years). Maternity allowance (at the time representing around 40% of the average female salary) was introduced in 1971 starting with the birth of second child and paid until the child reached 2 years of age (Kocourková 2002). However, for many families forgone earnings of women were an important part of the budget and women usually returned to work earlier than the period guaranteed by law (Fialová and Kučera 1997).

A massive development of childcare facilities during state socialism was the result of economic and ideological arguments for a high labor force participation of women. Public day care for children over age 3 was easy accessible and not costly (subsidized by municipalities). In the 1980s, kindergartens offered places to over 85 % of children aged 3 to 5 and places in nurseries corresponded to 15 % of children aged 0 to 2 years (Kučera 2001).

State support for families included not only direct cash transfers such as child allowances (Note 2), but also subsidies in kind for day-care centers, nursery schools, after-school care, school canteens, transport, summer camp, or indirect subsidies on food and manufactured goods intended primarily for children (Fialová and Kučera 1997). All this had a strong compensatory effect on the overall budget of families with children (Note 3).

State housing policy preferred married couples with children over others in all types of newly constructed housing (Kučera 2001). Loans for young married couples up to age 30 were introduced in 1973 and repayments were partly cancelled at the birth of a child (Note 4). Therefore, population policy promoted an early start of family formation, gave a great advantage for families with children and preferred married to cohabiting couples.

After 1990, the system of indirect social assistance, which in the past consisted of various price cuts and subsidies from the public budget, was reduced. The state abolished some measures (such as annulling of state guarantee for newly-weds loans in 1991). Since inflation was high in the early transition period, child allowances and other family benefits in cash reduced in value. Eligibility criteria for some family benefits (e.g. child allowances) were changed to means-tested benefits in 1996.

The system of maternity and parental leave (up to four years) became more generous (Note 5) but granted little flexibility to combine childrearing and employment.

In addition, parental-leave benefits were far below income replacement levels, being based on a flat rate principle. Throughout the 1990s, the provision of places in kindergartens for the total aggregate of children aged 3 to 5 remained stable at between 85 to 90 % (CSU 2001). By contrast, the greatest reduction occurred in the number of public nurseries for children aged 0 to 2 (to 1 % of the population of same-aged children in 1997, see UZIS 1998) causing difficulties for women willing to return to work before the child reached age 3. The growth of fees led to the diminished affordability of kindergartens and nurseries for low-income families because the average monthly charge for pre-school facilities was approximately 10 % of the average wage in that period (Čermáková et al. 2000). As a result of these trends, the reconciliation between childrearing and paid employment for mothers with small children became increasingly difficult.

3. Theoretical considerations on the role of education in the timing of first birth

According to the economic approach, the role of female human capital plays a central part in the timing of birth (e.g. Gustafsson 2001). The relative costs of children are affected significantly by changes in the value of the time that women have at their disposal. This is because the cost of mother's time is a major part of the total cost of producing and rearing children (Becker 1993). The economics of family provides a comprehensive framework for the role of women's education in the context of 'market' economies. Among the components that must be included in the costs of children the 'career planning hypothesis' discusses: (i) the opportunity costs of time spent with children instead of being in the labor market, (ii) the depreciation of the value of education and experience while caring for a child, and (iii) net direct child costs (Cigno and Ermisch 1989, Cigno 1991, Walker 1995; these models are discussed in Gustafsson 2001). The authors considered the economic costs of having a child at different stages of a woman's life. These considerations are not the same for women with different socio-economic characteristics – such as education. Even if the effect of women's education is theoretically disputed (Gustafsson 2001), it is generally considered to be harmful having children during the 'career building' phase, in particular so for women with higher education (e.g. Liefbroer and Corijn 1999, Gustafsson et al 2002).

However, the contextual framework for which these explanations have been developed is different to the conditions under state socialism and perhaps the transition to a market economy in the Czech Republic. First, the theoretical concept assumes that career interruption is penalized and, moreover, that it is dependent on the stage of career at which the work interruption due to childbirth is taken. Second, the economic returns

to education are held to be the result of market mechanisms. However, these assumptions need to be questioned when looking at overall employment, definite work contracts and wage grids in a centrally planned economy. Third, the theory assumes an incompatibility between childrearing and women's employment. Nevertheless, the population policy of the state under socialism aimed at alleviating women's childcare responsibilities by supporting public childcare. In what follows, we discuss the context of childbearing decisions under state socialism and the transition period and highlight the major differences. In particular, we look at education differences in the timing of first birth.

Under Czech state socialism, most women participated in labor market activities and future earnings were highly predictable according to wage grids. When earning levels were largely dependent on age and the timing of work interruption due to childbirth had no major influence on women's future employment and earnings, it was generally considered better for women to have children early in life, that is when earnings were the lowest (as noted also by Fialová and Kučera 1997). Furthermore, the withdrawal from the labor market after childbirth was on the whole temporal and the compatibility of work and childrearing was supported by public childcare provisions. Besides, strong incentives provided by public policies favored low age at first childbirth. Easier access to housing for couples with children and reduced repayment of newly-wed loans at the birth of each child are examples of such policies. There were few education differences in income or the standard of living, because of wage regulations, an important redistribution of incomes and various kinds of subsidies from public sources. Therefore, (i) the opportunity costs of forgone earnings, (ii) the depreciation of the value of education or job experience while caring for a child, and (iii) net direct child costs applied to a similar extent to all women. We consequently assume that there was little differentiation by education attainment in first birth risks (when controlled for different education duration).

In the 1990s one observed the decline in period fertility, along with a rise in the mean age of mothers at first birth. The fact that in the 1990s women spent more time in education than before can explain at least in part the observed postponement of entry into motherhood. Young women involved in longer education paths formed a family later in life. Besides, there was a prolongation of the period between the end of studies and the formation of family during which young women established their position in the labor market and society in general. An intriguing question is whether this development was proportional in all education groups or whether the education differentiation in the timing of first birth was rising. Finding out whether and how women's education had an effect on the transition to first birth might contribute to the understanding of the fertility decline of the 1990s.

In economic terms, it can be argued that the (i) indirect costs of children (opportunity costs of mothers' time spent with children) continued to rise as the market economy widened options for young people, the labor market became more competitive and education and job job-related experience gained in importance. Apparently, (ii) the depreciation of female human capital while caring for a child also became a more important factor in considering fertility decisions. However, there existed differences by education attainment. While these considerations were of comparatively low importance to women with lower earnings and/or higher uncertainty on the labor market (with a higher risk of unemployment and difficulties to find job), they rose for women with relatively high earnings and good career prospects. Thus, it became for women increasingly important to time motherhood with respect to their employment career, in particular so for those with higher education. The hypothesis following from this argument is that the education differentiation of fertility augmented in the 1990s and women with higher education had comparatively lower risks of first birth.

The second hypothesis is based on different arguments than the previous one and discusses the role of 'economic hardship' accompanying the transition to a market economy. Expenditures on children were rising during transition (through inflation or the canceling of subsidized prices) and the subsidies for families from public resources declined substantially. Therefore, in terms of economic theory (iii) net direct costs of children increased. The growing uncertainty resulting from the overall economic insecurity disproportionately affected young people and young families (Večerník 2001, Forster and Toth 2001). The former might have delayed childbirth because financial resources to fulfill the basic needs of the family were lacking. This argument supports the hypothesis emphasizing economic and social difficulties experienced in the 1990s, which created a specific and almost a 'crisis' behavior that was manifested in a decline of fertility (Rychtaříková 2000). On the individual level, the possible behavioral response to the economic hardship could affect the groups of women who were the 'losers' in the economic transition to a considerably higher degree than those who were not. Women with low education had relatively less paid and less stable jobs, and they faced greater difficulties in establishing themselves on the labor market than their counterparts with higher education. They therefore faced stronger financial constraints when it came to family formation. Moreover, the subsidies for families from public resources formed an important part of the family budget. Thus, diminishing state financial support for families had a greater impact on these women. The hypothesis following from this argument is that there was higher education differentiation in fertility in the 1990s and women with a lower education level refrained comparatively more often from first childbirth than those with a higher education level.

To sum up, we formulated two competing hypotheses with different expectations concerning the role of education in the decline of first births in the 1990s. The following empirical analysis will help to assess their validity.

4. Data and method

4.1 Sample selection

The data used in the empirical analysis are from the Fertility and Family Survey of the Czech Republic, conducted in November-December 1997 (Rychtařková and Kraus 2001). It contains information on 1,735 women and 721 men, the latter who are current partners of women in the sample. In our analysis, we use the female part of the sample only (Note 6). The women surveyed were born 1952-1982, and were 15-45 years old at the time of the interview in November 1997. The data provide us with full retrospective histories of childbearing and education paths.

In our analysis, we partition the data sample, primarily because two different structures of the socioeconomic incentives influenced entry into motherhood. We construct two separate parts of the data set (Note 7) – one for the 1970s and 80s and the second one from January 1990 until the time of the interview. In this way, we obtain distinct effects of the explanatory variables for each period.

4.2 Analytical procedure

We apply hazard regression to model the transition to first birth as a function of an underlying risk modified by a vector of covariates. The hazard function for $\ln \mu_i$ as a log-hazard of occurrence of the event at time t for i th woman is defined as:

$$\ln \mu_i(t) = y(t) + \sum_j \beta_j x_{ij}(t)$$

where x_{ij} are covariates with β_j as the respective regression parameters, $y(t)$ is the log-hazard function by age of mother with t as the time passed since the 15th birthday. The baseline hazard by age of woman is a piece-wise linear spline in the log-hazards (generalized Gompertz). For the estimation of the hazard models we use the aML software – Version 1.04 (Lillard and Panis 2000). Further useful characteristics (such as several duration splines) are described in the empirical analysis where we apply them.

4.3 Description of variables

We are interested in the event of first birth (expressed in month and year of birth). The date of first childbirth is backdated by nine months to obtain an approximate date of conception. This is because events that occurred after conception might be influenced by conception itself (e.g. the end of participation in education, caused by pregnancy). The event of first child conception is studied from women's age 15. Because of the very young age pattern of first order fertility we limit our analysis to age 35. After excluding 26 cases (Note 8), we work with 1709 female life histories. The total number of first births is 887 in the 1970s and 80s and 333 in the period 1990-1997. All events are reported in month and year. We attribute the occurrence of the event to the middle of the respective month.

Our time-varying variable on education attainment is constructed as a categorical variable. 'No upper-secondary certificate' applies to education without secondary school leaving certificate (*maturita*). 'Upper-secondary certificate' corresponds to an upper-secondary education with secondary school leaving certificate (*maturita*). 'University degree' applies to a part of life after university graduation. Periods 'in education' are assigned only to full-time participation in education (Note 9).

Table 2: *Sample composition of childless women by education.*

Total number of individuals, period 1970-1997	100%	1709
Education ever obtained:		
upper-secondary certificate (<i>maturita</i>)	41%	697
university degree	5%	78
Ever been in education (at ages 15 and above):		
any education	94%	1604
after upper-secondary certificate (<i>maturita</i>)	12%	209

Source: Czech Fertility and Family Survey of 1997 (author's own calculations).

5. Findings and discussion of results

5.1 How did education attainment affect the timing of first birth?

There are two aspects to the possible influence of education on entry into motherhood. First, being enrolled in education; second, education attainment.

Young women in the state-socialist period did not appear to perceive the incompatibility between childbearing and education to be *very* strong. Becoming pregnant and giving birth to a first child while being a student was not an extremely rare event. According to FFS data, in the 1970s and 80s every sixth first child (17.7 %) was conceived when the women surveyed were still in education. Less than half of them (7.8 % of all first children) were born when their mothers were still students. This points to the sequence of events in a short period: *conception – end of education – birth of first child* (10 % of all first births) or *conception – birth of first child – end of education* (7.8 % of all first births) as contrasted to *end of education – conception – birth of first child* (82.2 %). Most women completed their education even if they were pregnant or already a mother; moreover many pregnancies took place in the last year of school or university (Note 10). During 1990-1997, the proportion of first children that were conceived and/or born while the mothers-to-be were still in education dropped to 10 % and 5 % respectively.

Starting with survival curves of the transition to first birth disaggregated by final level of education, one observes a postponement of first birth from the cohort born in 1965-69 to that born in 1970-74 (Figure 1) especially for women with higher final levels of education.

In next analysis, we take the education variable as time-varying with differentiation of the periods in education and out of education. We estimate a multivariate model in which we include woman's age and the education characteristics only (Table 3). As expected, in both periods being in education lowered the risk of entry into motherhood compared to women who had already finished education. Therefore, since the years spent in education prolonged during the 1990s (Section 2.1), the period in women's life when it is not considered as appropriate to give birth to a child – due to incompatibility between education and childrearing – also extended, leading to a postponement of first births.

As concerns the *net* effect of education attainment, having a university degree as opposed to an upper-secondary certificate increased the transition to the first child in the 1970s and 80s (but not significantly). Whether this may merely be the consequence of a timing effect – resulting from a comparatively high intensity of first birth in a brief period shortly after the end of studies – we will discuss later in the analysis of first birth risks after the completion of education. Women with no upper-secondary certificate had

a relative first birth risk that is higher by 18 % compared to those with an upper-secondary certificate (maturita).

In the period 1990-97, women with no upper-secondary certificate had a 37 % higher risk of first birth compared to women with at least an upper-secondary certificate. Therefore, women with lower education entered transition to first birth more rapidly than their counterparts with higher education. It follows that higher educated females were contributing to the observed decline in first birth risks more so than other women did.

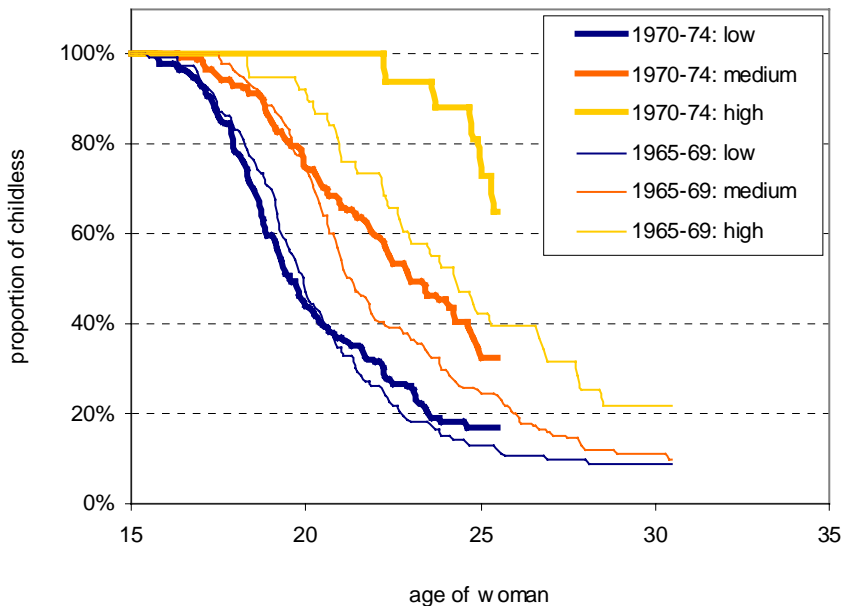


Figure 1: Transition to first birth: Proportion of childless women by age and final education level, cohorts 1965-69 and 1970-74.

- Notes: (1) Method: Kaplan-Meier survival plots; dependent variable: transition to first child measured since age 15.
 (2) Final education attainment is measured at the date of interview. Women in education at date of interview are excluded. Levels of education attained: low (no upper-secondary certificate), medium (upper-secondary certificate), high (university degree).
 (3) Number of cases in the analysis for the 1965-69: 321 women, and for the 1970-74 cohort: 322 women.
 (4) Data: Czech Fertility and Family Survey of 1997.

Table 3: *Transition to first birth: Effects of women’s education.*

	Period 1970-1989			Period 1990-1997		
			(SE)			(SE)
Baseline by age of woman:						
Intercept	-4.91		(0.33) ***	Intercept	-5.03	(0.80) ***
Slopes:				Slopes:		
Age 15-18	0.97		(0.13) ***	Age 15-18	0.94	(0.28) ***
Age 18-19	0.46		(0.16) ***	Age 18-20	0.14	(0.13)
Age 19-22	0.07		(0.05)	Age 20-25	0.03	(0.04)
Age 22-25	-0.11		(0.06) **	Age 25-28	-0.08	(0.10)
Age 25-35	-0.09		(0.04) **	Age 28-35	-0.16	(0.09) *
	b	exp(b)	(SE)	b	exp(b)	(SE)
Education obtained:						
Out of education:						
no upper-secondary certificate	0.17	1.18	(0.08) **	0.31	1.37	(0.12) **
upper-secondary certificate		1.00			1.00	
university degree	0.19	1.21	(0.22)	0.05	1.05	(0.27)
In education:						
no upper-secondary certificate	-0.64	0.53	(0.14) ***	-0.69	0.50	(0.30) **
upper-secondary certificate	-0.97	0.38	(0.18) ***	-1.30	0.27	(0.33) ***
Log Likelihood	-5,586					
Observations	1361			806		
First births	887			333		

Notes: (1) Event-history model (generalized Gompertz) with age of mother as piecewise linear spline;

(2) Reference category = upper-secondary certificate;

(3) Significance: * at 10%; ** at 5%; *** at 1%;

(4) Data: Czech Fertility and Family Survey of 1997.

5.2 The timing of entry into motherhood after the end of education

To investigate further the effect of education attainment on entry into motherhood, we distinguish between the effect of the time passed since the end of education and the effect of the women’s age. Thus, we examine the period after participation in education and its relationship with family formation. We introduce along with the age of women another ‘time clock’ (i.e. the time passed since the end of education). If there are multiple clocks in the model (by age of women and time passed since education completion), they combine additively to form the overall risk of first birth in the log-

hazard. Women complete their studies at a certain age and this is when we consider the ‘time clock’ for the time passed since the end of education to start ticking (Note 11).

The mathematical representation is as follows:

$$\ln \mu_i(t) = y(t) + c(t - e_i) + \sum_j \beta_j x_{ij}(t)$$

where $c(t - e_i)$ is a time dependent linear spline term which enters the model only if the woman in question completed her education and e_i is indicating the time of education completion relative to age of woman. In our results, the spline for the effect of studies completion is characterized by an immediate effect (constant) and a later development (with a change in slope of effect at 2 or 4 years from the end of studies). In the present analysis, the effect of education completion interacts with the covariate education level. It has three categories: no upper-secondary certificate, or an upper-secondary certificate or a university degree.

In order to interpret the coefficients, it is easier to visualize them in a graph. The multiplicative effects of the time passed since the end of studies are added to the hazard of first birth by women’s age at the ages typical for completing education at the respective level (Figures 2 and 3).

In the 1970s and 80s, the risk of conception doubled (after completion of studies at an upper-secondary or lower level) or tripled (after completion of a university degree) immediately after a woman subject to our analysis left school. For a few years, the risk was rising or stable and then declining (Figure 2). Education completion was strongly perceived as the beginning of the family formation period. In particular, women with university education had a high risk of entry into motherhood shortly after completion of university studies and the risk declined thereafter. This may be the result of societal norms on early entry into motherhood, the ‘ideal’ age these women already passed by having undergone university studies (for that period, the mean age of mothers at first childbirth was 22,0 to 22,5 years while the usual age of university completion was between 22 and 24 years). Therefore, they tended to have their first child comparatively swiftly after the end of education, and age differences in entry into motherhood relative to women with other education levels were less than different lengths of participation in education.

Differences between education groups in the role that the time passed since education completion played in first birth risks were more important in the 1990s than the previous two decades. Particularly women with a university degree had low risks of first childbirth after completion of studies, with a subsequent rise in risks thereafter (Figure 3). This reveals that the period between education and family formation constituted a distinct part of life in which young educated women established their

position on the labor market and pursued their education attainment. At the opposite end, women with no upper-secondary certificate still had increased risks of first childbirth shortly after the completion of studies. These women had comparatively limited prospects on the labor market and were less motivated to translate their education qualifications into labor market activities.

To conclude, the change in the timing of entry into motherhood after studies completion is a significant feature of the relation between education and first birth in the 1990s.

Table 4: *Transition to first birth: Effects of time elapsed since end of education.*

	Period 1970-1989		Period 1990-1997	
	(SE)		(SE)	
Baseline by age of woman:				
Intercept	-5.58	(0.32) ***	Intercept	-5.78 (0.70) ***
Slopes:		Slopes:		
15-18 years	0.95	(0.13) ***	15-18 years	0.68 (0.29) **
18-19 years	0.38	(0.15) **	18-20 years	0.01 (0.14)
19-22 years	0.04	(0.05)	20-25 years	-0.12 (0.08)
22-25 years	-0.06	(0.07)	25-28 years	-0.17 (0.12)
25-35 years	-0.03	(0.06)	28-35 years	-0.24 (0.11) **
Time elapsed since end of education:				
No upper-secondary certificate:				
Constant	0.93	(0.17) ***	1.97	(0.43) ***
Slope: 0-2 years	0.14	(0.10)	0.02	(0.21)
Slope: 2+ years	-0.08	(0.04) **	0.08	(0.06)
Upper-secondary certificate:				
Constant	0.50	(0.21) **	1.16	(0.56) **
Slope: 0-2 years	0.22	(0.13) *	0.02	(0.30)
Slope: 2+ years	0.00	(0.05)	0.21	(0.10) **
University degree:				
Constant	1.22	(0.42) ***	-0.84	(0.92)
Slope: 0-4 years	-0.17	(0.20)	0.66	(0.52)
Slope: 4+ years	0.04	(0.23)	0.19	(0.09) **
Log likelihood	-5,548			

Notes: (1) Event-history model (generalized Gompertz) with age of mother as piecewise linear spline;

(2) Significance: * at 10%; ** at 5%; *** at 1%;

(3) Data: Czech Fertility and Family Survey of 1997.

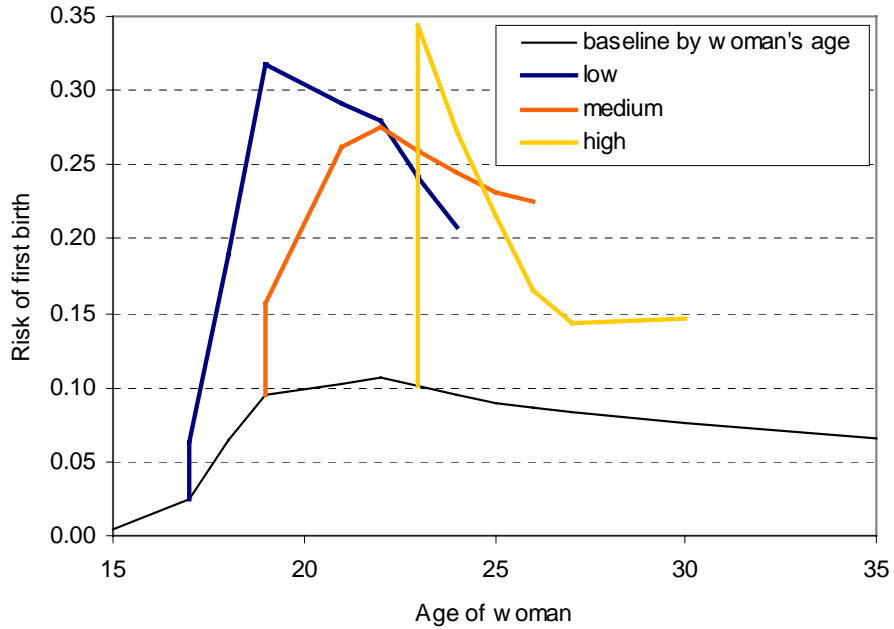


Figure 2: *Transition to first birth: Effects of time elapsed since end of education for different education levels, period 1970-1989.*

Notes: (1) Levels of education attained: low (no upper-secondary certificate), medium (upper-secondary certificate), high (university degree).

(2) The age at the end of education is the following: no upper-secondary certificate: 17 years; upper-secondary certificate: 19 years; university degree: 23 years.

(3) Data: Czech Fertility and Family Survey of 1997.

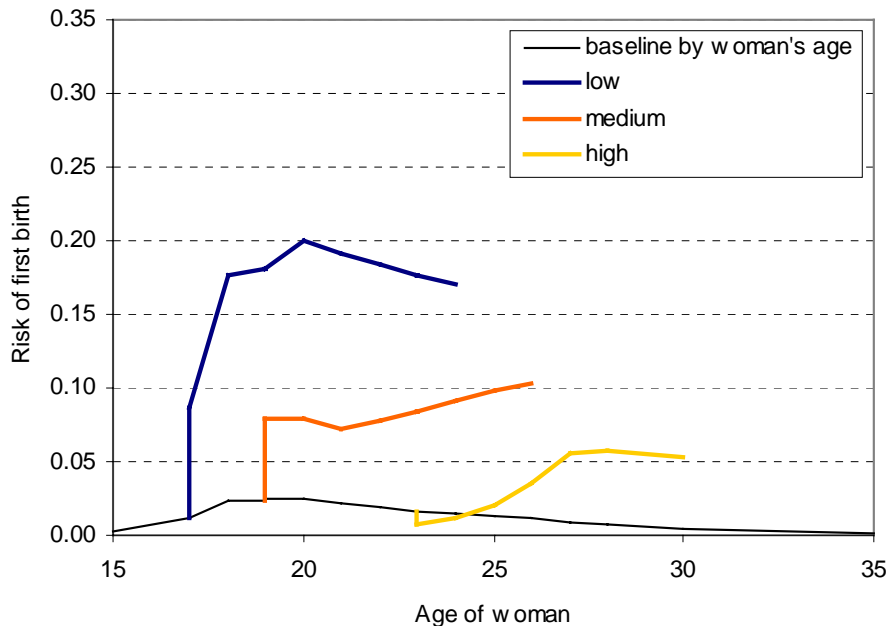


Figure 3: *Transition to first birth: Effects of time elapsed since end of education for different levels of education, period 1990-1997.*

Notes: (1) Levels of education attained: low (no upper-secondary certificate), medium (upper-secondary certificate), high (university degree).

(2) The age at the end of education is the following: no upper-secondary certificate: 17 years; upper-secondary certificate: 19 years; university degree: 23 years.

(3) Data: Czech Fertility and Family Survey of 1997.

6. Conclusions

We investigated the role women's education played in the entry into motherhood, looking at two specific contextual situations – the state socialism of the 1970s and 80s, with a centrally planned economy, and in the societal and economic transition of the 1990s. The event-history analysis of the Czech Fertility and Family Survey of 1997 showed several findings:

- Education differentiation had a small impact on first-birth risks in the 1970s and 80s.
- Women faced high risks of transition to first birth immediately after the completion of education, and in particular so university graduates.
- There was an increase in the impact of woman's education on timing of entry into motherhood after 1990. Women with an upper-secondary certificate or university degree had comparatively lower first-birth risks than their counterparts with a lower education level.
- In the 1990s, the period between studies completion and entry into motherhood prolonged, and this was especially evident for university graduates.

In the interpretation of our results, we stress the importance of the institutional environment (political setting, institutions of the labor market, the education system and public policies) in fertility behavior. In the Czech society of the 1970s and 80s, the labor market provided little room for up- and downward mobility (obligatory overall employment, no unemployment, rigid rules for career advancement and wage grids based mainly on age). In view of this situation, the timing of work interruptions related to maternity leave did not have any major influence on future women's employment and earnings, since both of them were institutionally regulated. At the same time, population policy facilitated the reconciliation of childrearing with women's employment. Furthermore, these policies motivated young couples to marry and enter parenthood early. This combination of, on the one hand, the lack of incentives and weak constraints on the labor market and, on the other hand, incentives provided by population policies led to universal and early entry into motherhood with little impact of education differentiation.

For the period 1990-1997 we formulated two contrasting hypotheses explaining the decline in first-birth risks in the 1990s and a greater education differentiation in the timing of entry into motherhood compared to the previous period. In the first hypothesis, we made the supposition that the increased evaluation of education and greater education differentiation of labor market opportunities and constraints brought about increasing opportunities for highly educated women. Following from this, highly

educated women should have lower first-birth risks. The second hypothesis perceived economic hardship associated with economic transition as the most important factor having an influence on reducing first-birth risks. Accordingly, women with a low education status should have lower risks of entry into motherhood.

The empirical analysis lent no support to the second hypothesis. On the contrary, the study supported theoretical assumptions that changes in opportunity structures and institutional settings induced changes in fertility behavior among young women. The transition to a market economy was characterized by profound and swift changes in the framework conditions of the labor market – such as entry and exit patterns, earnings, and evaluation of education or job experience. Women with higher education made use of the new employment opportunities and career prospects, and their education received greater importance in terms of prestige or income than in the state socialist era. Women seemed to postpone family formation to a time after the consolidation of employment – this means acquiring some job experience, making the most of the education attained and creating improved conditions for prospective maternity leave with the right to a period of job protection (Note 12).

We compared two institutional settings with different economic evaluations of women's education (see Section 2.3) and different career options for highly educated women. We conclude that the way in which women's education is rated on the labor market and the possibilities to reconcile women's employment with childrearing seem to influence the effect women's education has on the timing of first births.

Against the background of our results, the intriguing question arises whether low first-birth risks in the 1990s are related to (i) a postponement of entry into motherhood, or to (ii) an increase of childlessness among Czech women. However, this question stays at present unanswered. One may assess the importance of both effects in the decline of fertility in the 1990s when the cohorts of women born in the 1970s reach the age limit of childbearing. Meanwhile, an interesting finding of our analysis is that women with a higher education seemed to postpone entry into motherhood or to a refrain altogether from childbearing more so than women with a lower education.

As concerns the policy implications of our results, one might question the development of family policies in the 1990s. It then became difficult to reconcile employment and childrearing especially for mothers with children below age 3. Public childcare for children below this age was very limited and the system of parental leave was inflexible (as concerns combining parental leave with part-time work or employment at home). The prevalent type of family with children below age 3 was mainly that the man was the breadwinner (being in full-time employment) and the woman was temporarily a housewife staying at home and being financially dependent on the male partner. Such prospects play an important role in childbearing decisions of young women, especially those with a higher education. Therefore, family policies in

the Czech Republic need to take a new direction: they should address the issues of public childcare for children below age 3, the parental leave system and work time flexibility.

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Notes

1. On the basis of micro data from the Social and Stratification Surveys of 1984 and 1993, for one additional year of education, earnings increased in the pre-transition period by 2.4 % for males and 4.2 % for females and in the early transition period by 5.2 % for males and 5.8 % for females. Those with university education experienced a particularly large earnings increase. Unlike the earnings return on formal education, the earning return on experience declined (Chase 1998).
2. Child allowances were given to all dependent children, but not to an equal amount per child. It was mostly to the benefit of families with 3 children. In the 1970s and 1980s, child allowances for two children represented 15 to 20 % and for three children 35 to 40 % of the average monthly wage (Kučera 2001).
3. In the 1980s, average transfers (cash benefits, benefits in kind including the provision of day-care centers, nursery schools, after-school care, transport and school canteens and income tax relief or rent subsidies) per child per month equaled approximately 15 % of an average monthly salary and in total represented around 10 % of total government expenditures (Kroupová and Huslar 1991).
4. From the loan to newly wed of 30 000 CZK (i.e. around 14 times the average monthly wage in 1973) to be repaid in 10 years, 2000 CZK were cancelled at the birth of the first child and 4000 CZK at the birth of the second and each following child.
5. Maternity leave was guaranteed for 28 weeks (36 weeks for lone mothers) and maternity allowance was equal to the amount of sickness leave allowance (since 1993, it has been 69 % of the daily basis of income with a certain maximum amount). After this period, one of the parents had the right to stay on parental leave. In 1990 parental leave was prolonged up to the child's third birthday including job protection and in 1995 it was extended by another year but without further job protection. However, in reality in some cases the 3 years job protection rule failed due to an unstable business environment in which many new companies shut down and many companies rationalize or cancel individual branches or work positions (Čermáková et al 2000). Mothers (or in rare cases father) on parental leave received a fixed flat rate contribution (in 2001, 25 % of the average monthly female wage). In general, mothers stayed at home with their children for a longer period compared to the 1970s and 80s.
6. To use in our analyses information on the women's partners would be in many aspects very helpful with respect to the theoretical assumptions and explanations, since most of them deal with couples as a unit of observation. However, there are

methodological obstacles using this information in the case of the Czech Fertility and Family Survey. First, we have only 721 partners to 1735 women. Second, we consider first births and the male partner who answered questions on his life history at the time of the interview in 1997 was not necessarily the partner with whom the woman had her first child or was under the risk of first childbirth.

7. In the first part covering the period of the 1970s and 80s, censoring is attributed at 1 January 1990 or when the women reached age 35. The second part contains parts of women's life histories experienced from 1st January 1990 to April 1997. All women who became 15 years old after 1990 are included. Women who celebrated their 15th birthday before 1990 are considered only if they were childless and not pregnant in January 1990. In practice, the observations on these women start at their respective age on 1 January 1990 and pre-1990 parts of female life histories are not included. Censoring was made at April 1997 (eight months before the date of the survey) and when the women reached age 35. For the months February and March 1997, we use the start of pregnancies leading to first childbirth, with the child expected to be born in November or December 1997.
8. We excluded 26 female records from the analysis. In 2 cases the women conceived their first child before age 15 and in 23 cases women did not reach age 15 before April 1997, i.e. the date of censoring of observations.
9. 'Out of education' periods are distinguished only if longer than 12 months; if they are shorter, this part of the female life history is treated as 'in education'. Part-time education is not included in periods of enrollment in education, but any completion certificate gained is considered in the variable of education attainment.
10. One of the questions in the Fertility and Family Survey questionnaire in the section on education histories is whether the education spell was finished successfully or not. In the 1970s and 80s, among women who were pregnant while being in education, only less than 15 % did not complete successfully their education (own calculations from FFS).
11. In the present analysis, the end of full-time education is considered as the date at which the woman finished her education. If there is another education spell that started less than 16 months after the end of the previous education period, then the schooling is considered as not yet finished.
12. Since the motivation for changes in the timing of births have to be supported by the possibility of introducing these changes; the quick spread of contraceptive use in the 1990s was of major importance. Not surprisingly, the use of modern contraceptive methods did not expand in the same pace across different education

groups; contraceptive use among Czech women appeared to increase with the education level (Wynnyczuk and Uzel 1999).

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