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EDUCATION AND SECOND BIRTHS: ANALYSIS OF THE ESTONIAN GGS

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Abstract

The article examines the influence of educational attainment and enrollment on second births in Estonia, comparing the patterns before and after the onset of societal transformation of the 1990s. While many Northern and Western European countries have shown a positive relationship between female education and second births, this pattern has not been found in Central and East European countries. Against that background, Estonia offers an interesting case with a noticeably high second birth intensities for highly educated women. In the state socialist period, after controlling for the influence of other characteristics, including the partner's education, women with tertiary education featured higher second birth intensity than any lower educational strata. In the post-socialist period, the difference has grown smaller but women with tertiary education still display a significantly higher transition rate to second birth than their counterparts with secondary education. Following the presentation of empirical findings, the article discusses the mechanisms that could underlie the observed relationship between education and fertility decisions in the changing societal context. The analysis employs microdata from the Estonian Generations and Gender Survey, conducted in 2004–05.

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1 Introduction

Contemporary fertility in Europe is characterised by sizeable contrasts that have emerged over the past two decades. Larger regions of the continent seem to form relatively coherent units within which countries experience similar levels and trends of childbearing (Frejka and Sardon 2004; Frejka and Sobotka 2008). To an important extent, the crystallization of these new divides relate to variations in parity distribution, and the progression to second (and third) births. In this context, for a number of reasons the relationship between female education and higher order births has attracted considerable scholarly interest. In the diffusionist framework, women with advanced education are regarded as trendsetters who introduce novel behaviours that are subsequently adopted by other groups. From another angle, the comparison of fertility patterns among women with different level of schooling contributes to the understanding of opportunities and constraints under which childbearing decisions are made. And last but not least, as the proportion of young people who attain higher education has been rising with each successive cohort, educational differentials are influencing fertility trends on the aggregate level.

The prevailing explanatory framework in research focusing on the relationship between education and fertility originates in micro-economic theories that predicted largely negative consequences of women's increased educational attainment and economic autonomy (Becker 1993; Cigno 1994). From the late 1980s, however, the evidence has been accumulating about highly educated women exhibiting elevated second birth intensity compared to their less educated counterparts. Geographically, these results pertain to countries of Northern Europe (Gerster et al 2007; Hoem and Hoem 1989; Kravdal 2007; Vikat 2004) and Western Europe (Hoem et al 2001; Kreyenfeld 2002; Köppen 2006). At the same time, virtually all findings obtained from Central and Eastern Europe (e.g. Koytcheva 2006; Muresan 2007; Oláh 2003; Perelli-Harris 2008; Rieck 2006) have failed to demonstrate a similar pattern and conform with the argument of economic theory.

This article aims to complement the aforementioned body of research by analysing the transition to second birth in Estonia. In comparative perspective, Estonia is worth attention particularly for its location at the boundary of varying institutional and cultural influences. In terms of long-term demographic development it resembles Northern and Western Europe (Coale and Watkins 1986; Coale 1994). On the other hand, political and socio-economic arrangements following the Second World War fostered the demographic patterns characteristic to state socialist regimes. With respect to childbearing pattern, in the 1970s and 1980s fertility was close to a replacement level and children were born to women of relatively young ages. This was followed by an abrupt decline after the fall of Communism, with the scale of decline exceeding most other countries on the eastern side of the Iron Curtain. In recent years, Estonia has witnessed a noticeable recovery that brought fertility rates to a level highest among the post-socialist countries (Eurostat 2009).

Given the significance of second births in setting the contemporary fertility levels, the article focuses on the transition from the first to second parity, with particular interest in the ways how educational attainment and enrollment status have influenced

it as the country has moved from one social system to another. Although there are numerous analyses published on various aspects of fertility development in Estonia (e.g. Katus 1991; 1994; 1997; 2000; 2003; Katus et al 2009), the educational differences in childbearing have not been systematically explored. The results are expected to enhance knowledge of fertility behaviour in Estonia, under profoundly transforming societal environment.

The study employs microdata collected by the Estonian Generations and Gender Survey (GGS) in 2004-2005, which includes full educational and activity histories. Structurally, the article consists of six main sections. Following the introduction, the article starts with a brief discussion of the theoretical framework. The third section describes the general fertility trend of the country and contextual features that are relevant for the analysis. Thereafter, the fourth section presents the data, hypotheses and analytic approach. The fifth section focuses on empirical findings, obtained by means of both descriptive techniques and multivariate event-history models. A summary and discussion of the findings round up the study.

2 Theoretical perspectives

Education is an indicator of several differences between individuals. It can be seen as a measure of personal achievement, income potential and social status since more highly educated people usually earn more than those with less education. It is also a signal of individual autonomy, for one would expect highly educated individuals to be more independent from others, and perhaps also from general norms in society. In the life course perspective, the discussion of the relationship between education and childbearing is facilitated by the distinction between the effects of the educational level or attainment and school participation or enrollment.[1]

Most studies of the relationship between *educational attainment* and fertility consider in some form the micro-economic theory of the New Home Economics as a starting point (Becker 1993; Cigno 1994). The theory posits that as women receive education on an equal footing with men and have an access to improved opportunities in the labour market, the costs of childbearing increase. Primarily this relates to opportunity costs, in the form of foregone earnings, slower career advancement, depreciation of professionals skills etc. The time spent with caring for and raising children could be used for gainful employment, and staying at home means a loss of potential income and human capital accumulation. Assuming that the education level of a woman reflects her career prospects and income potential, a negative relationship between female education and fertility is expected. In addition, it has been suggested that higher educational attainment entails stronger preference for the "quality" of children, which under limited resources available, leads to lower number of offspring (Becker 1993; Gustafsson and Kalwij 2006).

The inverse relationship between educational attainment and fertility is also envisioned by the theory of the Second Demographic Transition (SDT), though the latter

[1] Hoem, Neyer and Andersson (2006a; 2006b) have recently demonstrated sizeable variation in childbearing patterns among women who opted for different fields of education.

points to a different mechanism, – the shift in cultural values –, as the driving force behind the changes in demographic behaviour (van de Kaa and Lesthaeghe 1986; van de Kaa 1987). Doubting that purely economic explanation would prove adequate, the framework of the SDT emphasises a move away from traditional family-oriented values toward individualisation and self-realisation, coupled with the shift from religious attachments toward secularism. In this context, Lesthaeghe (1995) regards 'female emancipation' a central element in his theory of secular fertility decline. As highly educated strata of the population form an avant-garde in all these developments, it leads to the notion that more highly educated women strive for greater independence from family life and want to have fewer children than others. In the settings where voluntary childlessness is not very common, the question of whether or not to have a child would be particularly pertinent to considering a second and a third birth.

Despite the wide appeal of these theoretical frameworks, over the past years the assumption of negative association between women's educational attainment (economic independence) and fertility has proven increasingly controversial from both theoretical and empirical point of view. The view that gender-specific division of work and family life are favourable to the family has been criticized on the grounds that it entails considerable risks to the well-being of the family. Oppenheimer (1994, 1997) has pointed out that a dual income family has become less vulnerable to economic risks if one of the partners is unable to provide his/her contribution. In a modern dual-income context highly educated women should be particularly attractive partners and women's employment can be viewed as a highly adaptive strategy rather than a threat to the family as a social institution. With regard to the SDT, for instance Hoem and collegues (2001) contest the notion that a higher degree of individualism must lead a to lower level of natality at the life stage addressed in the present study. Furthermore, the authors express doubt that highly educated women have necessarily less family-oriented values.

As noted in the introductory section, the evidence from a growing number of empirical studies reveals the pattern opposite to the prediction of the aforementioned theories. Indeed, the elevated second and third birth intensities among highly educated women has become a standard finding in the Nordic countries (e.g. Gerster et al 2007; Hoem and Hoem 1989; Kravdal 1992; 2007; Vikat 2004). Similar results are also found in several countries of Western Europe, including Austria (Hoem et al 2001), France (Köppen 2006), Germany (Kreyenfeld 2002; Köppen 2006) and Great Britain (Ermisch 1989; Kreyenfeld and Zabel 2005). The positive gradient of education in these settings may be attributed to family- and gender-related welfare state policies. Today, it is widely acknowledged that the stance of public policies supporting the compatibility of work with family life and gender equity in the domestic sphere can play an important role in modulating the relationship between women's education, labour market participation and fertility (e.g. Gornick et al 1998; Esping-Andersen 1999; McDonald 2000; Morgan 2003). As it has been shown, that countries which disburden women from some costs that go along with parenthood and allow them to realise their educational qualification and income potential are nowadays experiencing higher fertility rates.

By contrast, Central and Eastern Europe has demonstrated prevailingly negative,

or in part non-positive, association between women's educational attainment and second birth intensities. This finding appears common in recent country studies pertaining to Bulgaria (Koycheva 2006), Hungary (Oláh 2003), Romania (Muresan 2007), Russia (Rieck 2006) and Ukraine (Perelli-Harris 2008). Kreyenfeld (2004) for East-Germany has reported reduced second birth rates among women with low education, but also in that study second birth intensities for highly educated women do not exceed those among women with medium level of education. Thus, quite interestingly, the most unequivocal support to the assertion of micro-economic rational choice theory comes from the group of countries which only recently opted for the market economy. Authors of the aforementioned studies have attributed the negative educational gradient to the outcomes of rapid societal change that involved the deterioration of living standards, downscaling the policies meant to facilitate the combination of employment and parenthood, reduction of child-care benefits etc on one hand, and increased returns from education and exposure to new ideas on the other As the argument goes, in combination these developments have produced a shift in opportunity structure and aspirations that could account for the observed negative educational gradient of second birth risks in the CEE region. While the proposed mechanism is plausible for the years after 1990, the argument stemming from micro-economic theory appears less convincing for the period of state socialism.[2]

The effect of *educational enrolment* on childbearing appears consistently negative in the empirical literature. This effect has been reported for many countries and many different levels of the educational system, including a number of studies on second births referred to in this section. The mechanisms by which participation in education is thought to suppress childbearing, temporarily or permanently, may be diverse. First of all, as a child needs to be cared for and the care is time-consuming in the early stage of parenthood, family formation could threaten the successful completion of a study program and put the whole career strategy of young adults at stake (e.g. Hoem 1986; Liefbroer and Corijn 1999). Also, childbearing entails short-term costs that may be difficult to meet for students and therefore, it may be regarded as economically advantageous to postpone childbearing until a decent family income can be secured. The latter motive can be strengthened by the institution of earnings-related parental leave (e.g. Andersson et al 2009; Rönsen 2004; Vikat 2004). Finally, there can be norms against childbearing while being a student, as suggested by, for instance, Blossfeld and Huinink (1991).

Based on these theoretical and empirical considerations, we will investigate the influence of both main aspects of education, educational attainment and participation on the progression from first to second birth in Estonia. Aside from the general pattern, we are interested in the transformation of the relationship during transition from state socialism to a market economy setting. Our hypotheses and analytic approach are presented in the fourth section of the article, but before that, the next section briefly outlines some general features of demographic, economic and cultural features of the

[2] Of the studies focusing on the CEE countries that have separately analysed the period before and after the onset of societal transition, for highly educated women only Rieck (2006) in her study of Russian Federation has reported an elevated second birth intensities in a short *interregnum* 1989-1992.

setting that are relevant to the analysis.

3 The Estonian setting

In the long run, the demographic development in Estonia shared several commonalities with the countries of Northern and Western Europe. In terms of nuptiality, the country historically formed the limit of so-called European marriage pattern in the East (Hajnal 1965). This pattern of relatively late marriage, with a remarkably high proportion of never marrying became established in the country by the 18th century and persisted until the Second World War (Palli 1988; 2004). Fertility indices derived from the Princeton project show that the onset of fertility transition dates back to the mid-19th century. Judging from the spread of parity-specific family limitation, the emergence of modern population reproduction in Estonia and Latvia was the earliest among the nations included in the Russian Empire and synchronous with the forerunners of fertility transition in Europe (Coale, Anderson and Härm 1979; Coale and Watkins 1986). Consequently, fertility fell under replacement level for the first time in the late 1920s, and owing to the pattern of demographic transition with rather limited growth in the size of population, the country experienced the first peacetime spell of negative natural increase already in the 1930s.

3.1 After the Second World War

The similarity of fertility trends in Estonia, and in Northern and Western Europe was lost in the aftermath of the Second World War, when Estonia was incorporated into the Soviet Union. In the 1950s and 1960s, unlike other nations that had witnessed low fertility in the prewar years, Estonia failed to experience a baby-boom (Frejka and Sardon 2004). In that period, Estonia featured one of the lowest fertility levels in the world. In the late 1960s, contrary to the trends emerging in the pioneering countries of the second demographic transition, Estonian fertility rates increased and stayed close to replacement level until the turn of the 1990s. The increase in fertility levels is corroborated by the trend in completed cohort fertility that increased from 1,8 among native women born in the late 1920s to 2.1 in the birth cohorts of the late 1950s and early 1960s (Katus, Puur and Sakkeus 2000).

These two features — the absence of baby-boom as well as baby-bust — translated into a noticeable stability of the postwar Estonian fertility level up to the 1990s. Paradoxically, over three decades since 1960 precisely this stability brought about the turnaround in the position of the country — from the bottom to the top — relative to major regions of Europe (see Figure I in the Appendix). Against that background, leaving aside some fluctuations, the second-order total fertility rate shows an upward trend rise from the 1960s until the late 1980s. Apart from the increase in the progression ratios from first to second birth, at least two additional factors contributed to this trend. On the one hand, the observed rise reflected the changes in lower parities in the parity distribution, in particular the decline in the proportion of childlessness that

followed the fall of the European marriage pattern.[3] On the other hand, the upward trend was strengethened by the prolonged shift towards earlier childbearing and shorter birth intervals. As a consequence, in the 1980s Estonia featured very high second-order fertility rates in the European context (Figure II).

Turning to institutional framework, the Soviet authorities followed a strategy of far-reaching centralisation and introduced uniform models in virtually all sectors of administration. The application of these models applied to the institutions that framed daily living and life courses of the population (Kahk and Tarvel 1997; Mertelsmann 2003). The high degree of uniformity also extended to the functioning of the labour market, the organisation of the educational system and the societal gender system, in which respect Estonia shared characteristics that are commonly associated with state socialist regimes throughout Central and Eastern Europe.

With regards to education, the decades until the late 1960s witnessed a rapid expansion of enrollment on upper secondary and tertiary levels.[4] The previously existing gender gap was closed relatively early in Estonia — in tertiary education, this ocurred in the cohorts born in the beginning of the 1940s, who completed their studies mainly in the 1960s; in upper secondary education, a reversed gender gap can be traced back to the birth cohorts of the 1930s. In subsequent generations the proportion of university graduates appeared systematically higher among women, with female advantage expanding towards younger generations (Table I in the Appendix). In the 1970s and 1980s, replacement-level fertility coexisted with very high levels of female labour force participation. In international comparison, Estonia ranked top with respect to female employment, and women were overwhelmingly to be found in full-time jobs (Puur 1995). Employment was a prescribed norm for all able-bodied citizens, be they men or women.[5] Consequently, the number of women who chose to become full-time housewives after marriage or childbirth was very small and the dual-income family model clearly prevailed. In the 1970s and 1980s, the gender gap in economic activity was almost entirely attributable to women who were currently on maternity and childcare leave. From the economic point of view, the dual-income model was imposed by a low level of administratively set wages, which made it difficult for most families to live on a single income.

The societal context included various provisions to facilitate the reconciliation between women's employment and family. A central element in this field was public childcare that expanded vigorously starting from the early postwar decades. According to the evidence from the Estonian GGS, enrollment in public childcare rose from 26% among children born in the late 1940s to 70% in birth cohorts of the late 1960s and 86% among those born in the early 1980s. The mean age of entry into public childcare was around 2 years, with some increase in the 1980s. Other work-related provisions

[3] Among the native population, the proportion of childless women decreased from 25% in the cohorts born in the early 20th century to 7-8% in the birth cohorts of the 1950s (Katus, Puur and P oldma 2002).

[4] In the 1970s and 1980s, the increase of tertiary education enrollment ceased reflecting the stagnation of centrally planned economic system.

[5] According to official statistics, 54% of labour force in Estonia and Latvia consisted of women in 1981, which was brought as an example of one of the highest ratios in the USSR (Smith 1983).

were relatively limited during the early postwar decades but then gradually extended (Katus, Puur and Põldma 2004). Since 1968, women were entitled to take unpaid leave until the child's first birthday, without losing their job and maintaining uninterrupted employment record.[6] Further extension of provisions, which started in some parts of the USSR in 1981 (Weber and Goodman 1981; Smith 1983), came to Estonia in 1984 when the duration of partly paid parental leave (at flat rate of benefits, less than 20% of average wage) was extended to one year, and unpaid leave 18 months (Katus, Puur, Põldma 2002). On the eve of societal transition, additional extension that allowed mothers to stay on leave until the child's third birthday was introduced. The duration of employment interruptions followed the extension of provision quite closely, implying longer home attachment after childbirth (Puur 2000a). However, this was not paralleled with other provisions (e.g. the extension of part-time work) to combine childrearing and employment.

The economic support for families was implemented mainly by means of subsidies on food, basic manufactured goods and public services, universal cash benefits for families with children were not introduced. With respect to the housing policy, several authors (e.g. Vikat 1994, Katus 2003; Zakharov 2008) have pointed out that the criteria of housing allocation were instrumental in sustaining the pattern of remarkably early family formation in the 1970s and 1980s, though an explicit empirical test of this assertion is yet to be undertaken.

3.2 The 1990s and beyond

With respect to demographic trends, the 1990s witnessed a downsurge period of fertility to a lowest-low level. In Estonia, the period TFR bottomed at 1.28 in 1998. Roughly half of the observed decline in total fertility rate is attributable to the rapid postponement of childbearing (Katus et al 2009). After reaching the lowest point in 1991 (22.6 years), the mean age at first birth began increasing, and over the past decade and a half, this measure has increased by more than 3 years, reaching 25.8 years in 2008. In the period 1996-2000, the tempo-effect has been estimated to be among the highest in Europe: -0.49 of the TFR, this being second after the Czech Republic's -0.55 (Sobotka 2004). Regarding second order births, the slump of the 1990s appears more extensive compared to the CEE average (Figure II). The scale of decline stems from the combination of very high level of second order fertility in the 1980s on one hand, and the steepness of decrease in the 1990s, on the other hand. The evidence based on the Estonian GGS indicates a shift towards longer birth intervals that made an additional contribution to the decline in second birth rates.[7]

After reaching the lowest point, however, fertility rates began to increase at the beginning of the 21st century. Interestingly, despite the postponement of childbearing

[6] Before that the provisions related to childbirth were rather limited. In 1956, the fully paid maternity leave was extended from six to eight weeks after delivery after which women became eligible for three months of unpaid leave (Põldma 1995).

[7] Constraining the observation to ten years since the onset of childbearing, the average length of the interval between first and second birth increased from 3.3-3.4 years in the 1980s to 3.8-3.9 years in the 1990s.

well in progress, in 2008 the total fertility rate had reached 1.66. With these levels, since 2005 Estonia has featured the highest period TFR among the countries of Central and Eastern Europe. Yet another conspicuous feature of the contemporary Estonian fertility pattern relates to non-marital childbearing. The period since the beginning of the 1990s marked a spectacular growth in the proportion of children born to unwed mothers, usually cohabiting with their partner. In a matter of less than a decade, it closed the gap with the Nordic countries, the well-established European vanguard in this regard. According to most recent statistics, 59.1% per cent of children are born out of registered marriages, with only Iceland demonstrating a higher degree of disconnection of childbearing from marriage. However, leaving aside immigrant population the proportion of non-marital births amounted to 66.2% in 2008.[8]

As elsewhere in the countries of the Eastern bloc, the shifts in demographic behaviour progressed in the context of an extensive societal transformation, which involved conversion of the economic system towards market economy, (re)institution of pluralistic political system and (re-)establishing civil society, with an array of repercussions in the lives of individuals. In Estonia, these changes were perhaps even more dramatic, than was the case in the countries of Central Europe (Aslund 2007). Unlike in the latter, the inclusion of the Baltic states into the Soviet sphere implied the loss of statehood and dismantling of all national institutions. As a consequence, in 1991 rebuilding commenced more or less from scratch. Strengthened by the path of a radical transition rather than gradual and cautious approach chosen by Estonian authorities, the pace of reforms was rapid. For instance, when measured by the net sectoral shift in the structure of economy, only Hungary seems to have featured greater reallocations during the 1990s (Puur 1997; 2000a). The downside of these changes included the temporary shrinking of gross national product by more than 30% in the first half of the 1990s, upsurge of unemployment to two-digit numbers peaking at 12.8% in 2000, and the concurrent deterioration of living standards.

In the field of education, along with profound modernisation of the content of education and curricula, the 1990s witnessed a sharp rise in educational participation at post-secondary and tertiary levels. Overall, the number of students enrolled in higher education increased from 26,000, in 1990 to 56,000 in 2000 (ESA 2009). In the recent years the enrollment has stabilised at the level of 68,000, even leaving aside the students in higher vocational education, this translates into 1.8-fold increase compared to the late 1980s. In comparative perspective, the educational enrollment of 15-24 years (62,1% in 2007) somewhat exceeds the average of the EU27 (59.5%) and EU15 (60.4%).[9] Significant changes also ocurred in the structure of student population (Loogma et al

[8] To this end it should be noted that despite acceleration since 1990, the disconnection of childbearing from marriage and the rise of non-marital cohabitation can be traced back to the 1960s in Estonia. In fact, premarital cohabitation had become the mainstream route to family building already in the generations born in the late 1960s and early 1950s (e.g. Katus, Puur and Sakkeus 2008). However, owing to several structural constraints, new patterns of family formation could manifest themselves after the cessation of the state socialist regime.

[9] Estonia ranks relatively high also with respect to the share of population having completed at least upper secondary education (88,5% in the 25-64 age group). With this figure, the country holds the 4th position among the EU member states (Eurostat 2009).

2008). On one hand, student body has "aged" considerably since many students are trying to combine schooling with employment, least not in order to finance their studies; but there are more flexible forms to pursue higher education (e.g. Open University programmes). From another angle, the transition period has also witnessed a further feminisation of higher education. With more than 61% (since 2001) female students Estonia ranks close to the top among the EU member states.

The abolition of mechanism that sustained full employment during state socialism and subsequent large-scale re-allocation of labour implied a reduction in employment opportunities. In Estonia, the scale of the ensuing decline was fairly equal for men and women: between 1989 and 2000 employment rate among men in working age (15-64) decreased from 83.4% to 64,8%, among females it dropped from 73.9% to 57%; in relative terms, this implies a 77-78% reduction in employment rates for both sexes. After reaching bottom in the year 2000, employment rates have significantly recovered, reaching 73% among working age males and 66.3% among females at the eve of the current recession. As part-time employment is not widely practised, in terms of the full-time equvalent employment rate (64.1% in 2007), Estonian women feature the strongest attachment to the labour market among the EU member states (EC 2008).

In the early 1990s, it was widely feared that the facilities supporting the reconciliation of employment and parenthood would be cut in the course of institutional transformation. Part of these concerns materialised in the early 1990s when the enrollment in public childcare shrunk.[10] However, after reaching the lowest point in 1993, the enrollment rates have been continuosly increasing and before the turn of the 21st century, they had breached the ceiling attained in the 1980s. In 2008, 61.2% 2-year olds, 87.6% 3-year olds and more than 90% 3-6-year olds attended public childcare (ESA 2009). Parental leave with guaranteed return to previous employment was extended to three years in 1989 but the degree of income compensation remained rather low. A major change in the program was introduced in 2004. The renewed scheme foresaw the payment of earnings-related parental benefit amounting to 100% of the income earned during the year preceding childbirth. In 2006 the duration of payment was extended to from 11 to 14 month following childbirth, and in 2008 the duration of eligibity was increased to 18 months (Karru and Pall 2009). Following the model of Nordic countries, the parents of more than one child have been entitled to benefits at least as high as for the previous, without returning to the labour market in-between births, if the interval births were 30 months at least. After the first 70 days reserved for mother, the parents can share parental leave, but the general uptake of paternal-leave is still small.[11]

At the turn of the 1990s, Estonia also instituted universal child allowances but as the amounts have been modest and not adjusted on regular basis, their impact on the well-being of the families has been fairly limited. In this respect, far greater is

[10] In 1990-1993, the net enrollment rate decreased from 24.1% to 11.6% among 0-2 year-olds, and from 68.5% to 56.1% among 3-6 year-olds. The reduction reflects not only the reduction in the supply of public childcare but also similar change on the demand side, as considerable part of women were out of employment in that period.

[11] In 2008, fathers constituted 4% of the total recipients of parental leave benefit in Estonia. The figure was 1% in 2004 (Võrk, Karro and Tiit 2009).

considered the contribution of general economic growth which recovered in the mid-1990s. It has been estimated that in 2001, the GDP per capita returned to the level of 1990, and by 2007 it exceeded the referred benchmark by 63% (UNECE 2009). In comparative perspective, the country's per capita gross national product amounted to 68% of the EU average, ranking fourth among the countries of Eastern EU accession (Eurostat 2009).

4 Data and analytic approach

Our empirical analysis is based on the data extracted from a national survey carried out in Estonia in 2004-2005, in the context of Generations and Gender Programme (UNECE 2005; Vikat et al 2007). The programme of the Estonian survey is somewhat different than the general approach of the GGS. In the latter, part of the life history modules were deliberately left to subsequent panel waves. In Estonia, all life history modules (partnership formation and dissolution, childbearing, education, employment, residential mobility, and health) were packed in a single questionnaire.[12] The comparability with the FFS program was a significant consideration in the design of these modules, and in most cases, the concepts and definitions are comparable between the two surveys. Compared to the GGS core questionnaire, the Estonian survey included fewer questions on subjective items and the characteristics of the respondent and his/her partner at the time of the survey (EKDK 2004).

For the survey, a probability sample was drawn from the 2000 population census. The target population comprised of men and women born in 1924–1983, i.e. 20–79 years old at the beginning of 2004. The Estonian GGS opted for a proportionally larger sample for women. The selection of cases was performed using a one-stage random procedure, without preceding geographic clustering. Of the 11,197 eligible respondents sampled, 5,034 women and 2,821 men were interviewed. The overall response rate was 70.2 per cent, with the response rate for females (73.4%) being somewhat higher than it was for males (65.9 per cent). Further information on the survey methodology, data quality, and the results are available in the two volumes of standard tabulations (Katus, Puur and Põldma 2008; Puur, Põldma and Sakkeus 2009).

As the present study focuses on second births in the female population, we consider respondents who appear "at risk" of a second birth, i.e. women who have had at least one biological child recorded. Further selection is made on the basis of nativity. We exclude postwar immigrants and their descendants, because demographic, structural and cultural contexts in which respondents belonging to foreign-origin population experience family formation and childbearing may have been substantially different from the native population and we do not intend to address the differences between native and foreign-origin in this article.[13]

[12] This approach stem from uncertainty about the feasibility of follow-up waves within the recommended 3-year interval.

[13] Previous analyses have revealed systematic differences in the demographic patterns between native and foreign-origin population in Estonia. The patterns among the foreign-origin population are discussed, for example, by Katus, Puur and Sakkeus (2000, 2002); Sakkeus (2000); Puur (2000b).

Finally, we also drop the cases with multiple first births (23 cases). After these manipulations our working sample includes 2923 women with one child, being at risk of having another child. Of these respondents, 2060 gave birth to second child before the time of interview. In addition, we also included the second births expected by women who were pregnant during the survey and reported the date of childbirth (28 cases). As a result, our final dataset contains 2923 individuals and 2088 events. The proportion of respondents who had a second child during the period of observation is 71.4%.

4.1 Variables, hypotheses and operationalisation

The event under study in this article is a second birth, and the intensity of its occurence during the life course is analysed as the dependent variable. To analyse the transition from first to second birth a series of multiplicative intensity regression models were estimated. In the models, the duration from first birth to second birth constitutes the time axis, along which the transition from the origin to destination state occurs. We start measuring the time of being at risk from the moment of the first (live) birth; the exposure is measured in monthly precision, as is the timing of the following events and changes in the value of time-varying covariates. In most cases, the process time variable is identical with the age of the first child, but not necessarily, as the analysis does not account for the death of a child.[14] The respondents are followed until the birth of the second child, or until the censoring at the interview, whichever comes first. For a more realistic representation of time at risk we also censor women at parity 1 at 15 years after the first birth (and lose 2 second births out of 2088 by doing this).

We use piecewise constant exponential models, i.e. the basic time factor is defined as a categorical variable, with process time being divided into smaller units. In this article, we apply yearly intervals until the 10th ordinal year since the first birth, which we believe is sufficient to distinguish the change of risk over process time. We assume that the second birth intensity is constant within each of our pre-selected intervals, but let it vary between intervals. Information for those who did not have a second birth is considered on an equal footing.

In accordance with the theoretical considerations outlined in the previous sections, the independent variables of main interest in this study relate to educational attainment and enrollment, in the transforming societal context. When analysing the effect of women's education on the intensity of second birth, we control for a set of demographic factors, partner's charateristics and social background of the respondent. In the following, we briefly discuss the specification of our covariates and hypotheses attached to them.

4.1.1 Educational attainment

In the present article, the main independent variable is educational attainment. Previous research has revealed that the association between education and childbearing

[14] In our working sample, 35 women (1.6%) lost the first child before having the next one.

depends very much on how and when educational characteristics are measured (e.g. Hoem 1996; Kreyenfeld 2002; Kravdal 2001; 2007). Taking advantage of the complete educational histories collected in the Estonian GGS, with the exact time for starting and ending studies at successive levels of education, and interruptions in the educational career, educational attainment is operationalised as a time-varying covariate. It refers to the highest level of education the respondent attained in any month in the period of observation. Although only a relatively small minority of women complete their schooling after entering parenthood[15], several authors have emphasised the importance of using the current rather that final educational level. Analyses employing the latter approach tend to be anticipatory, involving a risk of yielding biased estimates on the effects of educational attainment (Hoem and Kreyenfeld 2006a).

For the classification of different educational qualifications that have existed in Estonia during lifetime of the birth cohorts covered by our data, we have grouped them into five categories[16], as follows:

- "Basic" means compulsory general education at the levels which are inferior to upper secondary education. Since the late 1980s, the duration of basic education has been 9 years, earlier in the postwar period it was 7 or 8 years.
- "Secondary" means general education at the upper secondary level (high-school, gymnasium). The duration of such education is currently 12 years, earlier in the postwar period it was 11 years.[17] This category is used as a reference in our multivariate models.
- "Vocational" means vocational education that followed the graduation from lower levels of general education (primary or basic) or from upper secondary general education (high-school, gymnasium). With reference to the period before 1990s, the so-called specialised secondary education (technical schools, medical schools, music and arts schools etc) are also included in this category. The duration of such education currently ranges between 10-15 years.
- "Tertiary" means academic education that followed upper secondary education. All are holders of an academic degree in this category, as are graduates from non-academic higher education programs which have emerged in the 1990s. The minimum duration of such education is currently about 15 years.

In formulating our hypotheses with respect to educational attainment, we considered the transformation of the societal context in which childbearing occurs. As discussed earlier in the article, before 1990s the labour market returns to education were low (Noorkõiv et al 1998). The earnings were set according to centrally administered wage grids which tended to favour blue-collar workers and left little room for

[15] In the Estonian GGS, in younger cohorts 12-13% of women completed their educational career after first birth.

[16] To give an idea about the life course profile of our categories of educational attainment, for each of them Figure III in the Appendix presents the median age at completion and the mean number of years spent in education after age 15.

[17] In the schools with Russian as the main language of instruction, the duration of secondary education was limited to 10 years before the 1990s. In these schools, the curricula followed the model of the Russian Federation.

individual variation. Somewhat simplifying the matter, higher wages could be attained through employment in the privileged sectors of economy (e.g. heavy industry, enterprises producing military equipment etc) rather than from individual effort (McAuley 1981). Under state-guaranteed full employment and highly structured employment tracks, work interruptions related to childbirth were hardly punished in terms of career options or depreciation of human capital. By the same token, the combination of female employment and parenthood was facilitated by affordable and accessible public childcare, at least since the late 1960s.

Against that background we assume that before the 1990s the cost of having children were not markedly differentiated which translates into weak association between educational attainment and the likelihood of second birth. A similar assertion, in an explicit or implicit form, can be found in most previous studies addressing the relationship between female educational attainment and fertility in the state socialist settings. However, should a significant difference between educational groups occur, the findings from previous studies (Koytcheva 2006; Muresan 2007; Oláh 2003; Perelli-Harris 2008) would lead one to assume an inverse relationship with higher second birth intensities among less educated strata of the population.

Extending the hypothesis to the 1990s, it is logical to expect an increasing differentiation across educational level. In the post-socialist period, the importance of education increased dramatically and new opportunities opened up above all for highly educated people. This change is perhaps best exemplified by labour market returns to education: in comparison to basic education, higher education translated into 69% wage premium in 1994, whereas in 1989 the difference had been only 11% (Noorkõiv et al 1998). Stronger attachment to the workforce of the more educated is also reflected in higher employment rates, longer usual working hours, more frequent multiple jobholding etc. Together with their greater input to household income and higher risk of skill depreciation, these shifts imply increasing opportunity costs of childbearing among the highly educated, and hence a negative association between educational attainment and childbearing.[18] The inverse relationship could also be strengthened by the deterioration of the relative labour market position among the less educated women. With poor prospects on the labour market, they may seek uncertainty reduction from motherhood, which brings order and stability to the life course. Also, the assertion of a strengthening negative education gradient of second birth intensities seems to be a common finding in the studies on Eastern Europe, which have explicitly compared the situation before and after societal transition (Koytcheva 2006; Muresan 2007; Perelli-Harris 2008; Rieck 2006).

4.1.2 Educational enrollment

Our second explanatory variable measures educational enrollment. This time-varying variable draws on activity histories of the respondents which provide information on

[18] In the micro-economic framework, a competing hypothesis could be derived from the strengthening income effect. The income effect implies that higher earnings help highly educated people to cope better with the direct costs of childbearing and rearing. However, empirical studies have found little support to this hypothesis in transition countries.

the spells of employment, unemployment and economic inactivity. In the survey, the activity history started from the month the respondent turned 14 and considered all changes in the status of the respondent on a monthly basis.[19]

In the present specification, different activities are grouped into four categories/statuses. The status of the primary interest in this study, the enrollment in education refers to studying as the main activity of the respondent. Compared to the education history, the status measure derived from the activity history does not necessarily capture all episodes of school enrollment since respondents who combined education with employment (or possibly some other status) had to choose which activity was more important for them and to define their main activity status at a particular life stage. We believe that with this approach the category is somewhat biased towards participation in full-time education which is less likely paralleled with jobholding.

The reference category in our multivariate models is employment, with no distinction between full- and part-time employment work as the latter has not been widely spread in Estonia.[20] Regarding non-employment, the distinction was made between two statuses which are associated with strongly differentiated intensities of second birth. Home attachment combines maternity and parental leave as well as other spells of economic inactivity during which women stayed out of employment taking care of children and the family. The residual category combines all other statuses on non-employment, including unemployment, economic activity for health reasons (disability), retirement etc.

In accordance with a common finding from previous hypotheses we expect a negative effect of educational enrollment on second birth intensities. Compared to educational attainment, relatively fewer studies have analysed the change in the effect of educational enrollment during societal transition at that stage of the life course. For Bulgaria, Koytcheva (2006) observed that the negative impact of being enrolled in studies became stronger in the 1990s, which she interprets as support to the notion that childbearing was more compatible with studying during the state socialist regime. Indirectly, these results have been corroborated by the analyses by Kreyenfeld (2004) who compared the transition to first birth in East and West Germany before the fall of the Berlin wall and found that educational participation and parenthood were more compatible in the GDR than in FRG. In another article (Kreyenfeld 2006), she observes the strengthening negative effect of educational enrollment on first birth intensities in East Germany after 1990. Also for the Czech Republic, a similar finding pertaining to first births is reported by Kantorova (2006).[21]

Against that background it seems plausible that the compatibility between educational enrollment has (further) decreased compared to the period of state socialism also in Estonia. In the market economy setting, there is a strong motivation for young

[19] According to the interviewers instructions, activity spells with duration of three months or longer had to be recorded. Shorter than that spells were merged with longer episodes (EKDK 2004).

[20] In our dataset, with the cut-off level of 35 usual working hours per week a mere 6.6% of employment episodes could be regarded as part-time work.

[21] In the referred studies focusing on first births, the authors have combined educational attainment and enrollment into a single covariate which hampers the comparability between their and our results. The same is true about the study by Rieck (2006) on Russia and Muresan (2007) on Romania.

people to complete their education and attain a secure footing in the labour market before having children, particularly before getting beyond the first parity. In Estonia's case, this argument may be strengtened by the strongly market-centred stance of housing policies, relatively high share of paid tuition in tertiary education[22] etc.

4.1.3 Other covariates

Other covariates included in our models include a calendar period, age at first birth, partnership status, partner's educational attainment and selected characteristics pertaining to the background of respondents.

Calendar period is used to contrast childbearing behaviour before and after the onset of societal transition. Determining a precise dividing line between the two regimes is of course not possible since in order to manifest in demographic behaviours, changes need to accumulate over several years. In Estonia, the political shift started to gain momentum in 1987-88 and culminated with dissolution of the Soviet Union in August 1991; in turn, the fall of old political regime removed the roadblocks for major systemic reforms to follow. From the range of options, we chose 1990 as a main borderline; among others, our delineation is grounded in the fact that in Estonia 1990 marks the beginning of the decline in period fertility measures.[23] In addition to contrasting the two societal regimes, we were keen to see whether the period of state socialism represents an homogeneous entity, or are we able to detect significant shifts in the association between education and childbearing. For that purpose, we split it into two sub-periods: until 1968 and 1968-1989. In terms of fertility, 1968 witnessed the sharpest annual increase of the period TFR (on average +6%, more among the native population) since the end of the Second World War. As noted earlier in the article, in that year women in the Soviet Union became entitled to (unpaid) childcare leave until the child's first birthday, which followed maternity leave (8 weeks in case of delivery without medical complications). But it is obvious that the variable picks up not only the changes in the specific policy sector but more general shifts in society.

The calendar period is operationalised as a time-varying covariate: if exposure time extends to more than one calendar period, it is split at January 1 of the calendar year, dividing the periods. Analytically, we employ this variable to build interactions and test the hypotheses related to our education variables.

With the *age at first birth* we intend to control for indirect influence of educational attainment. This indirect influence stems from the fact that, partly or fully due to longer participation in education, women with different educational levels tend to start childbearing at different ages. In our dataset, the median age of first birth is 22.3 years among native women with basic education, 22.6 years among those with upper secondary education and 24.9 years among university graduates. It has been hypothesised that given the time left until the biological limit of reproductive period,

[22] The share of students fully paying the tuition themselves exceeded 50% in 2003 in Estonia (ESA 2004). Estonian system of higher education has been critically evaluated for shifting large part of the costs to students and not sufficiently taking into account their economic situation (OECD 2006).

[23] In 1990 the number of live births was 8.3% less than in the preceding year. It was the largest decline of fertility in single year since the Second World war.

women with higher education tend to have their children in a shorter time-span than their less educated counterparts. Kreyenfeld (2002) has termed the corresponding phenomenon a "time-squeeze" that could provide an explanation to elevated second birth intensities among highly educated women. An alternative explanation for the same pattern relates to work accelerated childbearing. As suggested by Ní Brolcháin (1986a; 1986b) in order to minimise both foregone earnings and risks of a depreciation of human capital, it might be rational for career-oriented women to space their births close together. Whatever the mechanism, in the event history models the described effect could be detected as a reduction in the strength of the effect of educational attainment on birth intensities that follows the inclusion of the age at first birth among the covariates. From a technical point of view, Britta Hoem (1996) elaborated this approach by proposing the use of relative instead of absolute age at first birth in this context.[24]

Although a significant time-squeeze effect seems not very likely in the Estonian context with comparatively early onset of childbearing, we include the age at first birth in our models, with absolute as well as relative specification. In the case of the former, the age of mother is grouped into six categories (-18, 19-22, 23-26, 27-30, 31-35 and 36+); in the latter case, the distinction is made between younger and older age of childbearing, relative to the mean of each educational group.

The chance that a woman has a child depends in part on her *partnership status*, which in turn is influenced by education. For instance, an earlier study based on the Estonian FFS revealed that women with university education featured somewhat lower propensity to start a conjugal union than their less educated counterparts (Katus et al 2007). Further, the type of partnership may also be important. In Estonia, since 2005 more than 50% of second births occur outside registered marriage, mostly to cohabiting couples. Leaving aside the foreign-origin population, among ethnic Estonians the corresponding proportion amounts to 60.2%. There are no recent analysis focusing on the effects of partnership status on the likelihood of second birth in Estonia, but to account for plausible differences, we include partnership status as a control in our models.

The need to consider a *partner's education* stems from the educational homogamy in couple formation. There is a tendency for better educated women to form partnerships with better-educated men, and vice versa (Blossfeld and Timm 2003; Schwartz and Mare 2005). This phenomenon is relatively common also in Estonia, for instance in our survey, 64.4% of couples appeared homogamous in terms of partner's education.[25] Educational homogamy can be very important when analysing the role of women's education in fertility decisions. A positive relationship between women's education

[24] According to B. Hoem's argument, educational groups may hold different standards with respect to the appropriate age of childbearing — for one group childbearing in a certain chronological age may be completely normal, while for the another group the same behaviour could be very unusual. In her study of second and third births in Sweden, positive educational gradients for highly educated women disappeared when the age at first birth was respecified. Similar result was achieved by Hoem, Prskawetz and Neyer for third births in Austria (2001).

[25] This percentage is based on the distinction between low, medium and high educational attainment. Among highly educated women, the degree of educational homogamy is somewhat lower, amounting to 50.5% of all partnerships.

and fertility can appear even when there is no net effect of women's education, provided that a large proportion of highly educated women have partners whose similarly high education and earnings potential could have a stimulating effect on couple's childbearing decisions. Analyses pertaining to countries with persistent male breadwinner tradition have revealed that without considering a partner's characteristics one might easily overestimate the role of the woman's educational attainment for the transition to second birth (Hoem et al 2001; Kreyenfeld 2002; Köppen 2006). Although a male breadwinner model has been rare in Estonia both before and after the societal transition, we choose to include the partner's education as a control variable in our models. The variable has been specified as a time-varying covariate with three levels (low, medium and high) that changes from one partnership to another.[26]

Additionally we introduce some *background characteristics* that refer to the respondents' childhood experiences and are known to have an influence on fertility decisions. Our background characteristics include number of siblings (0, 1, 2, 3+) at the parental home and the type of settlement in which they grow up (urban vs rural).[27] As regards to the number of siblings, the common finding across different settings is that respondents who stem from larger families tend to develop a similar preference and have a somewhat greater number of offspring themselves. By the same token, respondents who grew up in a rural environment feature higher birth intensities. From the analytical point of view, some background factors may simultaneously affect the educational attainment and fertility and thus contribute to spurious relationship between education and fertility. In principle, such factors may capture unobserved heterogeneity and push education-fertility relationship in either direction (Kravdal 2007). Any major change in the model estimates for education that follows the inclusion of background characteristics signals about the possibility of such confounding influence.

Appendix Table II provides information on the number of events and exposure time at different levels of covariates included in the models.

4.2 Model fitting

We apply a piecewise constant hazard regression model to analyse the relationship between the above described education variables and the transition from first to second parity. The process time starts at first birth and defines the baseline hazard (risk) of conceiving a second child. The process time ends eight months before the second birth (roughly a month after conception that leads to second birth); it may also end 15 years after first birth. The specification of our main effects model can be written as follows:

$$r_{(t)} = h_{(t)} exp[\alpha x_1 + \beta x_{2(t)}] \quad (1)$$

[26] For partners, the information is limited to highest education attained. We proceed as if the partner's education had been completed before conceiving a child. Although this is not necessarily true for all male partners, we assume that the bias introduced by this misspecification is harmless for a second child.

[27] At the stage of exploratory analyses, we experimented with a broader range of background characteristics. However, the inclusion of additional characteristics did not affect the gradients of our main independent variables for educational attainment and enrollment.

where r is the hazard rate, h is the baseline hazard, αx_1 is the vector of coefficients for time-constant covariates (age at first birth, number of siblings, settlement type of parental home) and βx_2 for time-varying covariates (educational level, activity status, calendar period, partner's education).

Our modeling strategy is straightfoward. We start with examining the main effects, for that purpose we estimate a series of hierarchical models. The initial model includes only educational attainment to which we then stepwise add other covariates, monitoring the changes in the effects of education variables. The main effects models are estimated for the entire dataset and do not distinguish between the patterns before and after the societal transition. To account for the latter, we proceed with interactions between calendar period and the main independent variables.

Statistical software used to fit the event history models is Stata version 10. The results, produced as maximum likelihood estimates of the effect parameters of the model, are presented in the form of relative risk.

5 Results

5.1 Descriptive analysis

Before presenting the results from multivariate models, this section briefly outlines educational differences in childbearing patterns by means of the ultimate number of ever-born children and parity progression ratios for women with different educational levels. To complement the general account drawn from period fertility measures, the present section applies the cohort perspective. From the analytical point of view, this approach has an important advantage of reflecting the ultimate fertility level, free from distortions into a period measured by the rejuvenation or postponement of childbearing. But at the same, definite conclusions about lifetime fertility can be drawn only for generations who have reached or are close to the end of their reproductive life span. In Estonia, like in other contemporary low-fertility countries, childbearing is almost completed by about age 40.

In most international sources (e.g. Council of Europe 2006; Eurostat 2009; Freijka and Sardon 2004), cohort fertility measures are based on the counts of live births and the stock of the female population in successive calendar years, and the rearrangement of this information into cohort data. In our study we opted for a different approach and drew our evidence from the population and housing census 2000. The census is particularly useful and indispensable for the examination of fertility differentials across subgroups of the population which is rarely feasible with vital registration data. Over sample surveys, the census has indeed the advantage of completeness, which allows to achieve high accuracy of the measurement.

To be comparable with the results of multivariate analysis that follows, we applied a classification of educational levels similar to that described in the previous section.[28]

[28] The only exception is that for the census we have merged lower and upper vocational education. People with missing information on educational attainment have been excluded from our analysis but they form a very small group (2% of the population aged 10+).

To this end it should be noted that unlike with the event history data available in the survey, in the census education information pertains to final educational attainment at the time of data collection. Using this type of information for the portrayal of fertility differentials represents a kind of anticipatory analysis (e.g. Hoem and Kreyenfeld 2006a; 2006b) but we believe the benefits of providing a general account of the educational differentials outweigh the analytical imperfection. Also, the referred problems are less pronounced for second and higher parities since a relatively small proportion of women attains a higher education after the onset of childbearing.

5.1.1 Ultimate number of children

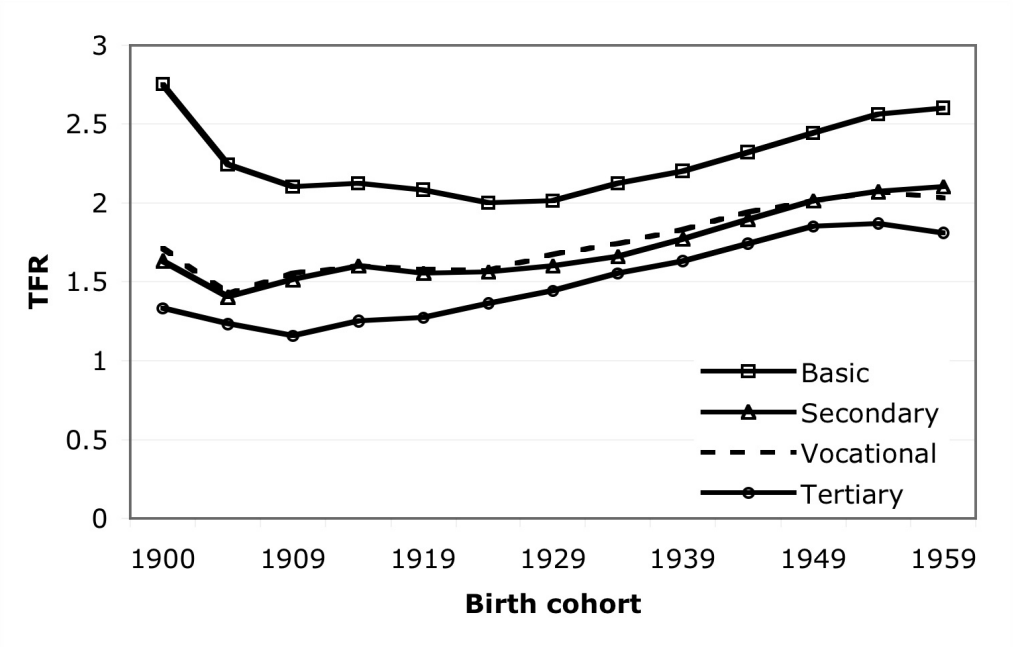
To give a longer view, Figure 1 plots the mean number of children for the cohorts of native women born since 1900. Women in the youngest generation for which the data are presented had completed 36-37 years at the time of the census, i.e. for them the figure slightly understates the ultimate number of children.[29] In terms of calendar periods, these cohorts shaped fertility trend in Estonia from the 1930s till the beginning of the 1990s. In general, the data reveal very low fertility already in the earliest generations, born after the turn of the 20th century. At the same time, fertility differentials related to education were relatively large in these generations. Women with tertiary education, on average had only 1,15-1,3 children in these generations. Among women who had attained (upper) secondary or vocational education, the cohort TFR was somewhat higher but still well below replacement (1.4-1,7). Among women with less schooling, completed fertility fell from 2.75 to 2.1 in the cohorts born before the First World War. Thus, the graph evidently captures the tail end of the fertility transition which was pioneered by the more educated strata of the population.

After reaching the lowest point, however, fertility then turned to prolonged increase. The data presented in Figure 1 reveals that groups with higher educational attainment reached the turning point earlier — among women with upper secondary, vocational and tertiary education the decline related to fertility transition came to an end in the generations born around 1905-1910. For women with primary and basic education, fertility bottomed two decades later, in the birth cohorts of the 1920s. The increase in fertility levels that followed was quite extensive, although it did not return fertility to the levels quite as high as in the countries which experienced a pronounced baby-boom during the postwar decades. For all educational groups, the upward trend in cohort fertility continued until the generations born in the 1950s who sustained the near replacement fertility levels during the 1970s and 1980s.

In relative terms, the rise in fertility was most extensive for women with tertiary education. In the birth cohorts of the 1950s, their ultimate number of children rose to 1.87, exceeding the corresponding figure in the 1910 generation by 60%. Among women with secondary and vocational education, the cohort TFR reached 2.1 and 2,03 respectively (relative increase 50% and 45%). Also, women with tertiary, upper secondary and vocational education born in the late 1930s and in the following decades

[29] The rough estimation based on age-specific fertility rates implies that for the birth cohorts of early 1960s, the census data may understimate completed fertility by 0.05-0.1 children per woman.

Figure 1: Ultimate number of children by educational attainment



Source: Estonian Population Census 2000, authors' estimates.

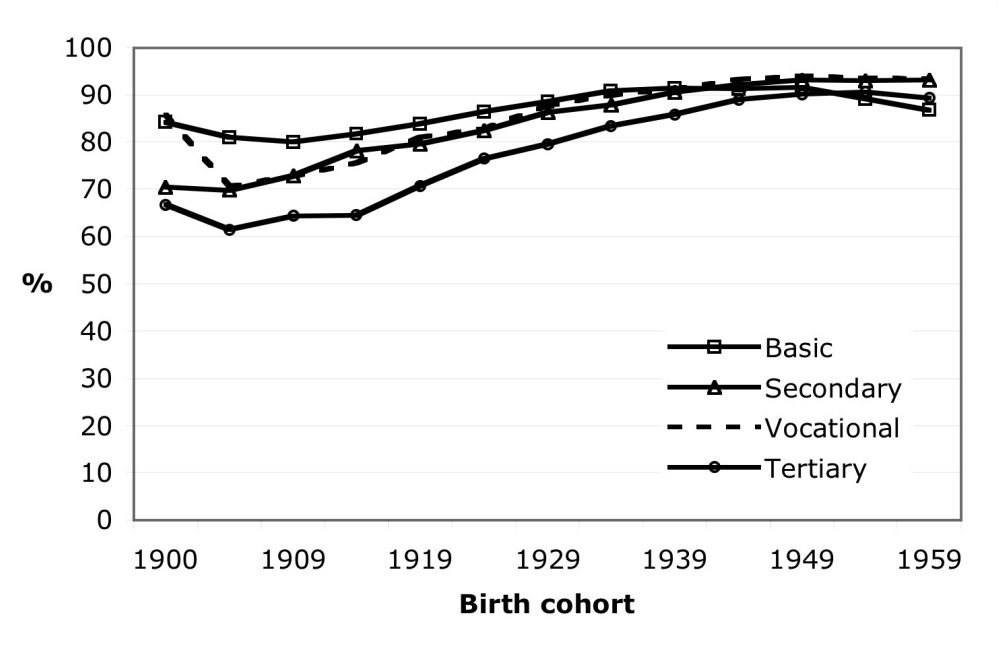
completed their reproductive careers with a greater number of children than their counterparts born at the turn of the 20th century. The latter outcome differs from the experience of women with the lowest educational attainment who featured the smallest relative increase (30%) in completed cohort fertility, though their mean number of children amounted to a remarkably high level of 2.6 in the 1959-63 birth cohort. To this end it is interesting to note that across the same generations, the overall increase in the cohort TFR has been only 13%. Understandably, this seeming contradiction stems from the rapid educational expansion and rise in the proportions of women with secondary and tertiary education.

Although the ordering educational groups remained unaltered throughout the cohort range, more pronounced increase in the highly educated strata implies a marked shift towards the convergence of fertility levels. Taking upper secondary education as a reference, the deficit in the number of children among women with tertiary education decreased from 22-23% to 8-13%. On the other hand, the excess for women with primary and basic education fell from 69% to 24%. This result suggests that childbearing patterns among women with different levels of schooling have become more similar in Estonia over most of the 20th century.

5.1.2. Parity progression ratios

In the life course perspective, childbearing constitutes a sequential process whereby people move from one parity to the next. At the beginning of their reproductive career, childless women enter motherhood. In the following stage, some first-time mothers go

Figure 2: Parity progression ratio 0>1 by educational attainment



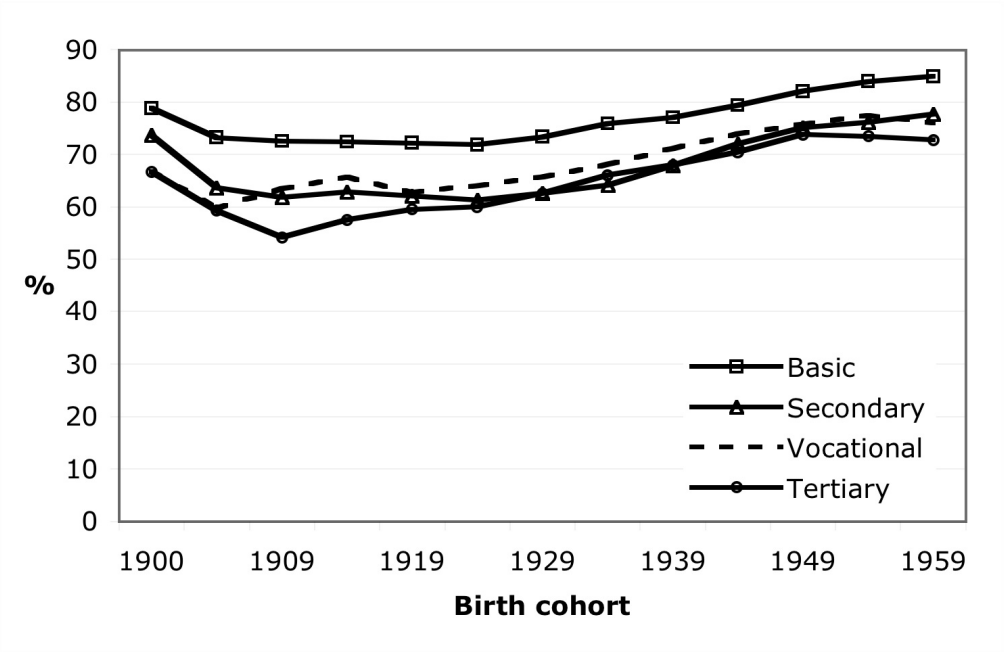
Source: Estonian Population Census 2000, authors' estimates.

on to have a second child, then some women with two children opt for a third child etc. The examination of probabilities of these moves, termed as parity progression ratios (PPR) can yield additional insight into levels of completed fertility.

In accord with the focus of the present article, Figure 2 presents educational differences in transitions from childlessness to having a first child, and from the first to a second child. The data in the first panel of the figure reveal a very high propensity to remain childless around the turn of 20th century, particularly in the highly educated groups. In the cohorts born before the First World War 19-21% of women with primary or basic education remained childless. Among women with upper secondary and vocational education the corresponding percentage amounted to around 30%, while 35-40% of female university graduates remained childless. The decline of the proportion of childlessness to the levels slightly below 10% in the subsequent generations relates to the disappearance of the European marriage pattern that took place in Estonia after of the Second World War (Katus, Puur and Põldma 2002; Vikat 1994).

The rise in the progression ratios to first parity has been more pronounced among highly educated women, and as a result, the gap in the proportion of childlessness almost disappeared: in the birth cohorts of the late 1940s and early 1950s the difference between the groups that are farthest apart does not exceed 3 percentage points. For women with low education, we observe an interesting cross-over in the proportion of childlessness: while in the older cohorts women with primary and basic education featured the lowest chances of remaining childless, in the youngest cohorts women with low education have the highest likelihood to end up childless, exceeding even the

Figure 3: Parity progression ratio 1>2 by educational attainment



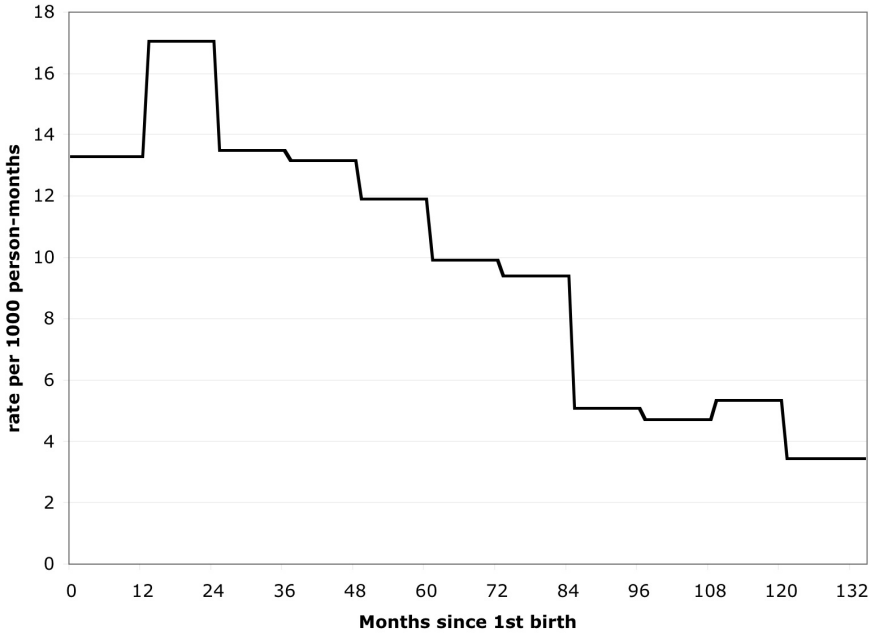
Source: Estonian Population Census 2000, authors' estimates.

university graduates. From a substantive point of view we regard this mainly as a result of selection process ensuing from a rapid educational expansion. While in the oldest cohorts 75-80% of native women belonged to the group with low educational attainment, the corresponding proportion dwindles to 6-7% in the generations born in the late 1950s. Evidently, a noticeable proportion of these low educated women may have some health or other problems which decreases their chances of starting a family and pushes up the level of childlessness.

The PPR to second parity — which is the main interest in this article — also follows an upward trend. Among women who attained tertiary education, the increase can be traced back to generations born at the eve of the Second World War, in other groups the progressive rise began somewhat later, in the birth cohorts of the 1920s. From the viewpoint of educational differences, perhaps the most noteworthy is the high similarity in the proportion of one-child mothers who proceed to second birth. Starting from the birth cohorts of the early 1920s, the difference in PPRs between these groups has not exceeded 3-4 percentage points. Moreover, unlike for the progression to first birth in a number five-year birth cohorts women with tertiary education do not feature a lower PPR than their counterparts with secondary education. This finding is particularly interesting in the light of systematically later onset of childbearing among highly educated women. In the 1959-1963 birth cohort the difference gets bigger but this may be partly due to the fact that women in that cohort had not yet completed childbearing at the time of the census.

To conclude, in Estonia the evidence from the descriptive analysis indicates a

Figure 4: Intensity of second conception per 1000 person-months



Source: Estonian GGS, authors' estimates.

marked decrease of educational fertility differentials in the second half of the 20th century. Particularly small differences pertain to the progression to the second child and women with secondary and tertiary education. In the generations that shaped fertility trends during the 1970s and 1980s, the latter differences were close to disappearing. In the following sections, we will elaborate educational differentials in the multivariate framework.

5.2 Multivariate analysis

5.2.1 Main effects

To begin with, Figure 4 displays the overall baseline hazard — the absolute intensity of second conception per 1000 person months; the scale of the figure measures process time elapsed since the birth of the first child. The presented data reveal that in Estonia, women have conceived a second child overwhelmingly at short durations. The baseline hazard peaks between 24 and 36 months after the first birth. After 48 months, the likelihood of having a second child decreases with a particularly steep decline occuring 7-8 years after a first birth. The introduction of independent and control variables in the model somewhat reduces the rate of decline at longer durations, however, the general shape of the baseline hazard remains unaltered.

Table 1 summarises the results from a series of multiplicative main effects models. The initial model (M1) includes, besides the duration variable, educational attainment

to which we then stepwise add other covariates. Unlike other countries in Eastern Europe for which similar analyses have been conducted, and upon which we formulated our hypothesis, the model fails to reveal a prevailingly negative association between educational attainment and the intensity of second birth. Although women with basic education demonstrate a slightly (9%) elevated risk of having a second birth compared to their counterparts with upper secondary education (the reference group), the difference between the groups is statistically insignificant. Having vocational and tertiary education, however, tends to increase the likelihood of second birth, and in both cases the effect is statistically significant. In the initial model, vocational education is associated with 18% higher and tertiary education with 20% higher rate of progression to second birth. This also implies that women with tertiary or vocational degree have a higher propensity to have a second child than women with the least schooling.

What comes as another bit of a surprise is a relatively weak association between educational enrollment and our depedent variable. In the next model (M2), being enrolled in education implies only an 11% lower risk of having a second child than for the reference group (employed). Given the size of our working sample, the effect does not reach the level of statistical significance. Being on maternity leave with the first child or a homemaker has a slight positive influence on the likelihood of second birth but we do not discuss the findings pertaining to this category in detail since the issue falls beyond the central interest of the article.

In the next step (M3), we added women's age at first birth. As expected, the propensity of having a second birth is inversely associated with the age at which women start childbearing. In the first two groups (under age 18 and 19-22 years), the risk is by nearly one fifth higher than in the reference category (23-26 years), while a later onset, particularly after age 30, is associated with a markedly reduced chance of progressing beyond the first parity. The introduction of the covariate in the model results strengthening of effects for both the educational attainment and participation in education.

As regards to the level of education, a particularly large increase in the relative risk is characteristic for women with tertiary education. After controlling for the age at the onset of childbearing, women with a university degree have a risk that is 55% higher than those with (upper) secondary education. The strengthening of the effect is also observed for women having vocational education but it remains on a smaller scale (22%). For women with low educational attainment, the change in the relative risk appears marginal. The strengthening of the effect suggests that in the case of Estonia the positive gradient of educational attainment, observed in the initial model, does not result from the "time-squeeze effect" or accelerated childbearing among the highly educated women, hypothesised in some studies (Kreyenfeld 2002; Gerster et al 2007). On the contrary, the strengtening of the effect suggests that the later onset of childbearing, because of fecundity decreasing at later age and/or other reasons, partially offsets the higher rate of progression to second births characteristic among highly educated women. Also, the effect of educational participation strenghtens and reaches the level of statistical significance in the second model.[30]

[30] Alternatively, following the suggestion by B.Hoem (1996) we used a relative specification of age

Table 1: Main effects models of transition to second birth in Estonia

	M1		*M2*		*M3*		*M4*		*M5*		*M6*		*M7*	
Years since 1st birth														
1	0.78	*0.000*	0.75	*0.000*	0.76	*0.000*	0.75	*0.000*	0.75	*0.000*	0.72	*0.000*	0.72	*0.000*
2	1		1		1		1		1		1		1	
3	0.79	*0.002*	0.81	*0.005*	0.8	*0.004*	0.82	*0.009*	0.82	*0.009*	0.84	*0.019*	0.84	*0.019*
4	0.77	*0.001*	0.8	*0.008*	0.8	*0.006*	0.83	*0.019*	0.83	*0.021*	0.85	*0.050*	0.85	*0.051*
5	0.7	*0.000*	0.73	*0.000*	0.73	*0.000*	0.76	*0.002*	0.76	*0.003*	0.79	*0.007*	0.79	*0.008*
6	0.58	*0.000*	0.61	*0.000*	0.61	*0.000*	0.65	*0.000*	0.65	*0.000*	0.67	*0.000*	0.67	*0.000*
7	0.54	*0.000*	0.57	*0.000*	0.58	*0.000*	0.62	*0.000*	0.62	*0.000*	0.64	*0.000*	0.64	*0.000*
8	0.29	*0.000*	0.31	*0.000*	0.32	*0.000*	0.34	*0.000*	0.34	*0.000*	0.35	*0.000*	0.35	*0.000*
9	0.27	*0.000*	0.28	*0.000*	0.29	*0.000*	0.31	*0.000*	0.31	*0.000*	0.32	*0.000*	0.32	*0.000*
10	0.3	*0.000*	0.32	*0.000*	0.33	*0.000*	0.34	*0.000*	0.34	*0.000*	0.36	*0.000*	0.36	*0.000*
11	0.18	*0.000*	0.19	*0.000*	0.2	*0.000*	0.22	*0.000*	0.22	*0.000*	0.23	*0.000*	0.23	*0.000*
Educational level														
Basic	1.09	*0.177*	1.09	*0.220*	1.11	*0.141*	1.13	*0.073*	1.14	*0.059*	1.13	*0.086*	1.08	*0.326*
Secondary	1		1		1		1		1		1		1	
Vocational	1.18	*0.003*	1.17	*0.005*	1.22	*0.000*	1.23	*0.000*	1.24	*0.000*	1.25	*0.000*	1.22	*0.001*
Tertiary	1.2	*0.014*	1.19	*0.016*	1.55	*0.000*	1.53	*0.000*	1.42	*0.000*	1.47	*0.000*	1.52	*0.000*
Activity status														
Studying			0.89	*0.460*	0.77	*0.092*	0.73	*0.047*	0.69	*0.019*	0.74	*0.050*	0.75	*0.062*
Working			1		1		1		1		1		1	
Home			1.16	*0.008*	1.12	*0.052*	1.06	*0.290*	1.06	*0.280*	1.14	*0.026*	1.14	*0.027*
Age at first birth														
14-18					1.18	*0.057*	1.36	*0.001*	1.37	*0.000*	1.41	*0.000*	1.43	*0.000*
19-22					1.19	*0.001*	1.25	*0.000*	1.26	*0.000*	1.28	*0.000*	1.29	*0.000*
23-26					1		1		1		1		1	
27-30					0.7	*0.000*	0.72	*0.000*	0.72	*0.000*	0.72	*0.000*	0.71	*0.000*
31-35					0.41	*0.000*	0.42	*0.000*	0.42	*0.000*	0.41	*0.000*	0.41	*0.000*
36+					0.29	*0.000*	0.33	*0.000*	0.32	*0.000*	0.31	*0.000*	0.3	*0.000*
Marital status														
Married							1		1		1		1	
Cohabiting							1.06	*0.276*	1.07	*0.211*	1.19	*0.003*	1.18	*0.005*
W/o partner							0.21	*0.000*	0.24	*0.050*	0.27	*0.066*	0.22	*0.037*
Partner's education														
Basic									1.01	*0.824*	0.98	*0.676*	0.95	*0.380*
Secondary									1		1		1	
Tertiary									1.23	*0.002*	1.21	*0.005*	1.23	*0.002*
Calendar period														
Before 1968											0.9	*0.100*	0.88	*0.03*
1968-1989											1		1	
1990-2004											0.71	*0.000*	0.74	*0.000*
Parental home														
Urban													1	
Rural													1.13	*0.010*
Siblings														
0													0.97	*0.640*
1													1	
2													1.18	*0.010*
3													1.2	*0.000*
LL0		-4681		-4681		-4681		-4681		-4681		-4681		-4681
LL		-4419		-4414		-4320		-4149		-4144		-4126		-4112

Source: Estonian GGS, authors'estimates.
Notes: p-values in italics. Missing values not shown but controlled for.

Model M4 extends the previous model with partnership status. Expectedly, the propensity of having a second child appears much lower among women currently without a partner than for the reference category (married). At the same time, living in a consensual union is associated with slightly higher likelihood of a second birth than marriage, signalling advanced disconnection of procreation from registered marriage. When partnership status is included, it marginally (by 2 percentage points) reduces the positive effect of tertiary education, and increases, to the same extent, the positive effect of basic education. This may have to do with the better ability of highly educated women to maintain a stable partnership that encourages childbearing.[31] Likewise, the control for partnership status slightly adds to the effect of educational enrolment.

Further, we include a control for partner's education (in model M5). Like women, highly educated men at parity 1 have a higher chance of having a second child: it is 23% higher than for the reference group (upper secondary education), the difference being statistically significant. Regarding women, the consideration of this covariate removes some of the effect of a woman's own educational attainment among the highly educated. For women with tertiary education, the positive effect is reduced to 42%, and again, slightly strengthened for the least educated (to 14%). In other words, part of the strongly positive effect of women's high level of education may stem from the fact that they have a better educated partner which stimulates fertility (Kreyenfeld 2002; Köppen 2006). Despite its importance, the partner's education accounts for less than one quarter of the overall effect of women's own educational attainment. The effect of participation in education is further strengthened and amounts to 31% in model M5.

Model M6 adds the calendar period to the analysis. The effect of the calendar period is fully in accord with our expectation and the general account of Estonian fertility trend presented earlier in the article. For the period 1990-2004, the model shows a noticeable reduction in the second birth risks, but at the same time, also in the early postwar decades fertility was lower than that in the reference period 1968-1989.[32] The inclusion of a calendar period in the model strengthens the positive effect for tertiary education and slightly reduces it for basic education. At the same time, the effect of school enrolment is also somewhat reduced. With respect to control variables, the difference between cohabiting and married women becomes more pronounced and reaches the level of statistical significance in model M6. Evidently, in the previous models the elevated second birth risk among coinhabitants was partly attenuated by

at first birth. We partitioned women's ages into two groups for each level of education, those having first birth at a younger age than average and those having it in an older age than average. With this specification, the effect of educational attainment did not strengthen but remained unaltered. The effect of educational enrolment grew stronger as it was the case for the model with absolute age at first birth.

[31] Except for the youngest cohort 1979-1983, women with tertiary education feature a higher proportion currently living in partnership than their counterparts with less schooling (Katus, Puur and Põldma 2008).

[32] We have also fitted a model with a more detailed division of calendar periods. In that model, not presented here, we were able to pick up a recovery in the second birth rates that followed the turn of the 21st century. In 2000-2004, which yet constitutes the beginning of fertility increase, second birth risks were still much lower than in the 1980s, however, the difference in relative risks with the 1950s was reduced to 6 percentage points.

the downsurge in fertility trend that occurred after the turn of the 1990s.

In the final model, we include two covariates pertaining to the parental home and childhood environment. Both covariates — the number of siblings and the type of settlement where the respondent grew up — influence the second birth risk as expected. Women who have 3 or more siblings have a 20% higher chance of having a second child than those who come from a two-child family. For those who have been socialised in the rural milieu, the transition rate to second birth is 13% higher. The inclusion of background characteristics slightly reduces the effect of educational enrolment and attainment, except for tertiary education which reaches again over 50%.

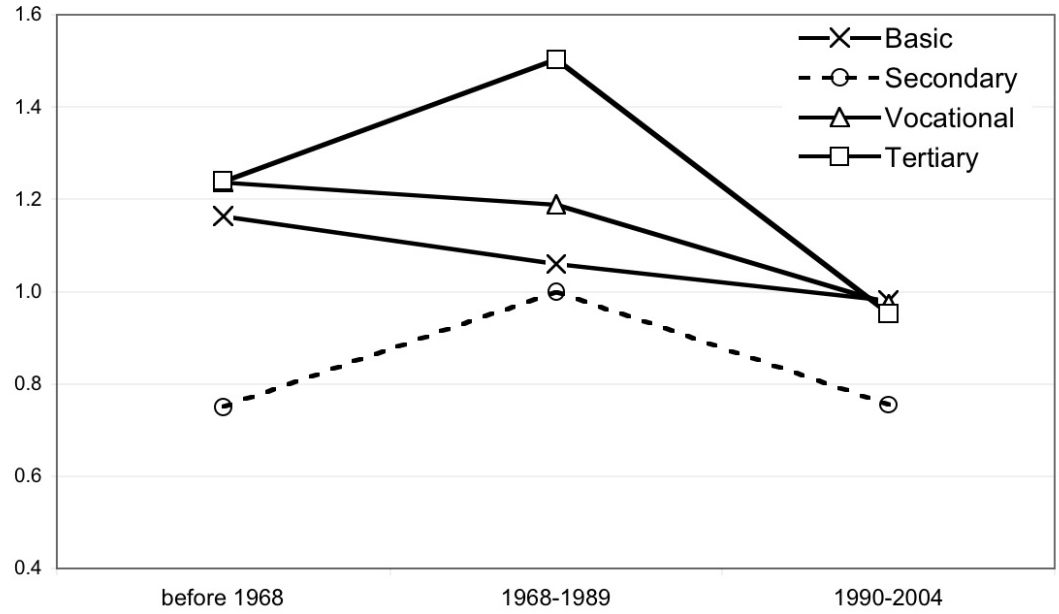
To sum up, on the contrary to our hypothesis on educational attainment, the findings from the main effects models reveal a consistently positive and statistically significant effect of vocational and tertiary educational level. For the latter, the association is also relatively strong: in the final model, highly educated women have a risk that is 52% higher than for the reference group with (upper) secondary education. No less importantly, with some alteration across successive models, the effect persists after the inclusion of controls for the age at the onset of childbearing, partnership status, partner's education, calendar period and socio-demographic background. On the other hand, the effect of low educational attainment appears less consistent: although the gradient remains marginally positive in the final model, it fails to reach the level of statistical significance and is no match to the effect observed for higher levels of education. The results for educational participation are generally in line with our expectation, indicating an inverse association between the second birth risk and school enrolment: studying indeed appears less compatible with having an additional child than other common activity statuses.

5.2.1. Interaction effects

To gain an insight into the changes in the effect of education, we employ an interaction between a calendar period and education variables, instead of considering them separately as in the previous section. The results of the interaction for educational attainment are plotted in Figure 5 and the values of relative risks can be seen in Table 2; women with (upper) secondary education in 1968-1989 constitute the reference category.

There are two ways of reading the table, and interpreting the figure. As our main interest lies with patterns before and after the societal transition, we first look at them columnwise in order to see how second birth risk is affected by educational attainment in each period. In the previous sections, we assumed fairly small differences during the state socialism. Low returns to education in the labour market, state-guaranteed full employment, highly structured career paths and the broad coverage of public childcare were thought to translate into relatively low and similar opportunity costs across women with low and high educational attainment. Quite contrary to our expectation, however, the data reveal the largest differences associated with educational attainment during the state socialism. In addition, the pattern is not uniform but alters from one subperiod to another.

Figure 5: Interaction of educational attainment and calendar period



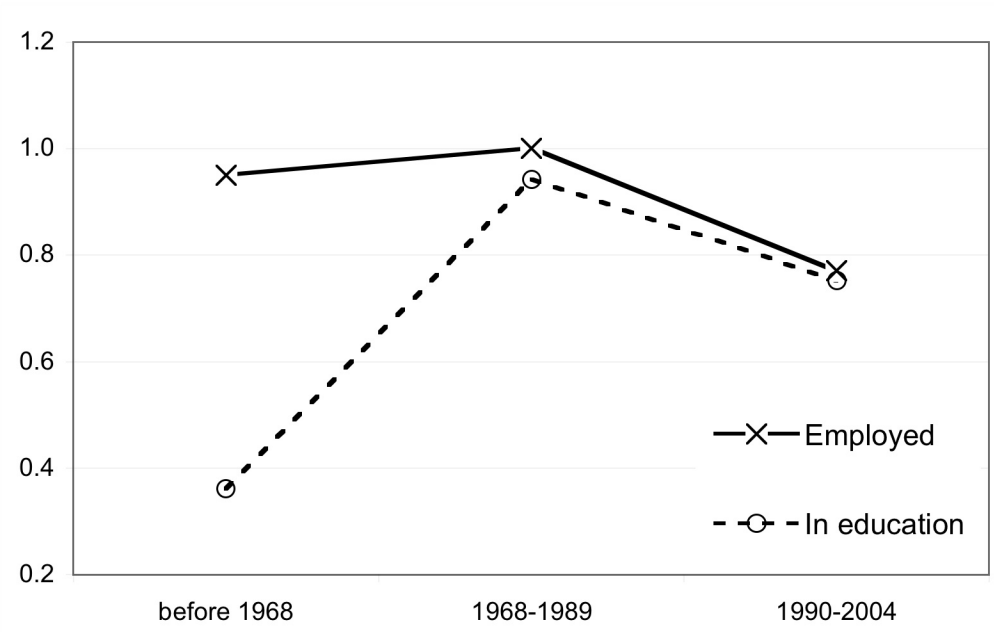
Source: Estonian GGS, authors' estimates.
Note: Missing values not shown but controlled for. Control variables as in M7 in Table 1.

Table 2: Interaction of educational attainment and calendar period

	before 1968	1968-1989	1990-2004
Basic	1.16	1.06	0.98
Secondary	0.75	1	0.75
Vocational	1.24	1.19	0.97
Tertiary	1.24	1.5	0.95

Source: Estonian GGS, authors' estimates.
Note: Missing values not shown but controlled for. Control variables as in M7 in Table 1.

Figure 6: Interaction of educational enrollment and calendar period



Source: Estonian GGS, authors' estimates.
Note: Missing values not shown but controlled for. Control variables as in M7 in Table 1.

In the first period, before 1968, the relationship between women's level of education and progression to second birth appeared U-shaped. The propensity to have a second child was lowest among women with general secondary education, while both lower and higher educational attainment were associated with elevated second birth risks. The differences with reference category are, in fact, quite extensive: women with basic education had 55%, women with tertiary education 65%, and those with vocational education a 68% higher risk of having a second child as compared to women with secondary education. In the 1970s and 1980s the pattern transforms from the U-shape to inverse L-shape. The effect of tertiary education maintained its strong positive gradient on second births, although the difference from the reference category is somewhat smaller (50%) than in the earlier decades. A more pronounced reduction is characteristic of women with vocational education, they feature a 19% higher risk of having a second child. Finally, the low education basically ceases to have a positive effect on the second birth rates. A rowwise examination of Figure 5 indicates that the reason behind the observed transformation of the pattern related to divergent trends in the second birth risks: among women with secondary and tertiary education the propensity to have a second child increased as compared to previous decades, while the opposite was true for those with basic and vocational education.

Regarding to the period since 1990, our assumption was that after the transition, educational differences will increase, and possibly, a negative gradient for the educational level emerges as more educated women will encounter increasing opportunity

costs of childbearing. This assertion is partly confirmed as women with tertiary education experienced the sharpest decrease in second birth risks. At the same time, however, the relative risk for higher education did not change a sign and a moderate positive effect (25%) persists. If we examine the change of the pattern rowwise, then we can observe strengthening of a positive gradient in relative risks for women with basic (to 29%) and vocational education (28%). As a result, we can observe re-emerging of the U-shaped pattern, but contrary to our expectation with less overall variation in relative risks than during the state socialist regime.

Table 3 and Figure 6 present the interaction between a calendar period and activity status; employed women in 1968-1989 serve as the reference category. Our assumption, inspired by some earlier studies on East European countries, was in favour of the increasing incompatilibity between educational enrolment and childbearing. This assertion, however, does not gain further support from our analysis. The data reveal that the negative association between educational enrollment and the propensity to have a second child was strongest in the first period. Before 1968, women currently enrolled in education had 62% lower likelihood to have a second birth than employed women. In the 1970s and 1980s, most of this incompatibility ceased to exist as the difference dwindled to 6%. After 1990, the risk of having a second child fell for both employed and studying women. For the latter, the decline was slightly less steep, reducing the difference in relative risks to a mere 3%. However, regarding educational enrollment the interaction results should be taken with caution, as the exposure time and number of occurrences in this category are very limited (see Table II in the Appendix).

Table 3: Interaction of educational enrollment and calendar period

	before 1968	1968-1989	1990-2004
Employed	0.95	1	0.77
In education	0.36	0.94	0.75

Source: Estonian GGS, authors' estimates.
Note: Missing values and category "Home attached" not shown.
Control variables as in M7 in Table 1.

6 Summary and discussion of the findings

In this article, we addressed the transition to second birth in Estonia using the data from the 2004-2005 national GGS. The central focus of the article was on the relationship between women's current educational attainment and enrollment, and the propensity of having a second child. Aside from the general pattern, we were interested in the shifts in childbearing patterns before and after the societal transition of the 1990s. To analyse the effect of education on second birth risks, we examined the differences in the ultimate number of children and the cohort parity progression ratios, and estimated a series of piecewise constant intensity regression models. The major findings from the empirical investigation can be summarised as follows:

• Descriptive analysis revealed a gradual convergence in the completed fertility to women with different educational attainment born since the turn of the 20th century. As regards to the transition to second birth, women with tertiary education almost catched up to their counterparts with vocational or general secondary education in the birth cohorts of the 1940s-1960s.

• Unlike the previous studies on the countries of Eastern Europe, we found a positive and relatively strong effect of high educational attainment on second birth risks in Estonia. The elevated intensity of second births for women with vocational and tertiary education appears to be a genuine result and is not due to mis-specification of the model. The effect persists after controlling for the age at the onset of childbearing, both in absolute and relative terms, partnership status and partner's education, and socio-demographic background characteristics.

• In the main effects models, women with low educational attainment exhibited a slightly positive gradient of second birth risks. However, it did not reach the level of statistical significance.

• Participation in education has a prevailingly negative effect on the propensity to have a second child, indicating that school enrolment is less compatible with childbearing than other major activity statuses (employment, home attachment) of women.

• Comparing the patterns before and after societal transition, the positive gradient of second birth risks became weaker for women with high educational attainment. On the other hand, however, although the decrease in second birth risk was largest among the highly educated, it neither disappeared nor turned to negative, as we had initially assumed. As the relative risk of lowly educated women grew stronger, the relationship between educational attainment and the transition to second birth returned to the U-shape, observed in the earlier stage of state socialism. Surprisingly, in Estonia the range of educational differences in the second birth risks appears largest not in the aftermath of the recent societal transition but in the 1950s and 1960s.

• Contrary to our expectation, we did not observe any increase in the incompatibility between educational enrollment and the likelihood of having a second child in the 1990s, as compared to other activity statuses. In fact, also for this aspect of education, the largest differences were characteristic for the period before 1968.

How then have these patterns arisen and how could we interpret them in the light of our theoretical considerations?

The increasing compatibility between educational enrolment in the 1970s and 1980s, compared to the earlier decades, may in part reflect the opposite trends in the timing of childbearing and duration of education. Within the Estonian GGS cohort range, there was a prolonged shift towards earlier childbearing that bottomed in the generations born in the late 1950s and early 1960s. In these cohorts the median age of mother at second birth was slightly below 26 years of age. It seems plausible that the concurrent increase in the duration of education facilitated an increasing overlap between the educational and family transitions. Consequently, the proportion of women who completed their education after having a first child rose from 3% in the earliest GGS cohorts to 13% among those born around the turn of the 1960s. Among those who

attained tertiary education, such sequence of the life course events was characteristic for nearly one in three women in these generations. Aside from the factors that drove the shift towards earlier childbearing, the increase in the compatibility between school enrolment and family formation was evidently facilitated by the low cost of being in education in that period.

In interpreting the developments after 1990, it is important to note that the overall risk of second birth significantly declined for all activity statuses, though the reduction was not disproportionately greater among those currently participating in education. This result may seem somewhat unexpected and difficult to interpret given the noticeable increase in the costs of education. In our opinion, other factors, including the marked rise in educational enrolment among young people in their 20s and early 30s that has occurred after 1990 and a vigorous shift away from the highly standardised career tracks characteristic for the state socialism have offset the effect of the former.

The explanation for the reduction in the positive effect of tertiary (and to a lesser extent vocational) education after 1990 appears quite straightforward. The societal transition dramatically increased the economic returns to education, and in the context of micro-economic theory, the rise in opportunity costs seems to have exerted a stronger influence on the decision to have a second child than increasing incomes and improving living standards among the highly educated. In the light of the theory of the Second Demographic Transition, a more rapid reduction of second birth risks among women with tertiary education could be seen as a reflection of their position as forerunners in the move towards stronger individualisation, and a wider range of pathways for self-realisation beyond the family, particularly after the societal transition. Evidently, the jobs of higly educated women are demanding and require stronger commitment. An indirect support for this argument comes from the somewhat longer working hours of the highly educated, more frequent incidence of multiple jobholding among them and a more pronounced shift towards shorter durations of home attachment that emerged over the past decade (see Figure III in the Appendix).

The strengthening *resp* re-emergence of the positive gradient of the low educational attainment lends some support to the uncertainty reduction hypothesis. According to the latter, women with poor prospects in the labour market seek uncertainty reduction by motherhood, which offers a possibility for self-realisation in the family sphere. This notion gains some further support from the higher value attached to children among women with low level of schooling (Katus, Puur and Põldma 2008). On the other hand, however, it is important to note that the re-emergence of the positive gradient does not stem from an increase in the second birth risks among the less educated but just from a somewhat slower decline of second birth rates compared to women who attained more schooling.

Perhaps the most intriquing finding in this article is the persistence of the positive gradient of second birth risks among highly educated women — it was remarkably strong in the decades of state socialism and did not fade away after 1990. An essential contributing factor may be sought from the institutional framework, which has evidently reduced the opportunity costs of chidbearing for highly educated women. First of all, this relates to public childcare, which reached remarkably high coverage already in the 1960s, and which availability and affordability deteriorated only temporarily,

for a short period after 1990. As noted earlier in the paper, an advanced degree of reconciliation of motherhood and women's employment can be judged from the currently highest rates of female employment among the EU member states. One could claim that in this respect Estonia shares several commonalities with the Scandinavian countries, which are commonly regarded as trendsetters in facilitating the combination of gainful employment and parenthood for both mothers and fathers, although the welfare state system in Estonia is indeed less generous than in the latter countries.

Though the policy impact argument seems valid, it is alone evidently not sufficient to account for the observed pattern. The incompleteness of the policy argument can be highlighted by the comparison of Estonia to other countries of Eastern Europe that shared the basically similar features of institutional framework in the 1970s and 1980s, however, none of the studies on these countries referred to in this article, have reported a positive gradient of second birth risks for highly educated women. Moreover, as noted by Zakharov (2008), among the former state socialist countries, the Soviet Union was among the last to institute pronatalist family policies in the beginning of the 1980s, and the schemes introduced were not the most generous in the former Eastern bloc.

In search of an additional explanation, we need to consider further commonalities between Estonia and the countries in which the positive effect of the higher education on second- and higher-order births has been found. In our opinion, the general timeframe of demographic development — both distant and more recent transformations — deserves attention in this context. As noted earlier in the article, according to the accounts of the Princeton project, the transition to a modern generation replacement and parity-specific family fertility began relatively early in Estonia (Coale and Watkins 1986; Coale 1994). Also, the transformation of nuptiality patterns since the 1960s fits quite well the idea of the synchronism with Northern and Western Europe, although the emergence of the new phenomena was partly suppressed by the prevailing societal regime. The international compendia of demographic statistics (Council of Europe 2006; Eurostat 2009) and comparative studies drawing on the FFS programme (e.g. Macura and Klijzing 1997; Prioux 2006; Sobotka 2004; Sobotka and Toulemon 2008) point to the advanced position of Estonia in terms of the spread of the new family forms and the disconnection of childbearing from marriage, which is considered a hallmark of the second demographic transition.

A similar position of Estonia in both transitions may not be accidental but reflect the path dependence or continuity of demographic development, notwithstanding the intervening shifts in societal regime. The country's current international ranking with respect to female labour force attachment, retreat of marriage and diversity of living arrangements, which goes hand-in-hand with the highest fertility levels in the former state socialist countries seems to corroborate the same notion. A few years ago, the same connection was noted by Lesthaeghe and Surkyn (2002). They wrote that "those countries with the faster rate of transition in household structures will be the first to move to fertility recuperation ..., and hence to be the first to recover to more acceptable levels of subreplacement fertility". The evidence presented in this article for Estonia indicates that the latter assertation has become a fact of life. It appears quite concievable that the observed positive effect of high educational attainment on second birth risks also represents a characteristic of fertility regimes that have come

to the fore in the countries of Northern and Western Europe in recent decades. For instance, in their recent analysis of fertility patterns in the Nordic countries Andersson et al (2009) pay considerable attention to education, concluding that "small or declining educational differences in completed fertility, in all (Nordic) countries is one indication in this direction."

This study is among the first that uses data from the 2004-2005 Estonian Gender and Generations Survey, with the aim to highlight the relationship between women's education and transition to second births. To obtain a more comprehensive account of childbearing patterns, one would need to examine the transitions preceding and following the second birth. Future research on fertility in Estonia should preferably address these transitions with joint modeling of births of different order and by including parameters for unobserved heterogeneity (e.g. Kravdal 2007; Kreyenfeld 2002). Another aspect that needs to be addressed in the future relates to childbearing patterns among the immigrant population who has settled in Estonia in postwar decades, including the second and the emerging third generation. This would allow to cast additional light on the role of structural and cultural factors that facilitate or inhibit the progression towards higher parities in transforming societal context. The present article offers a good starting point for such studies.

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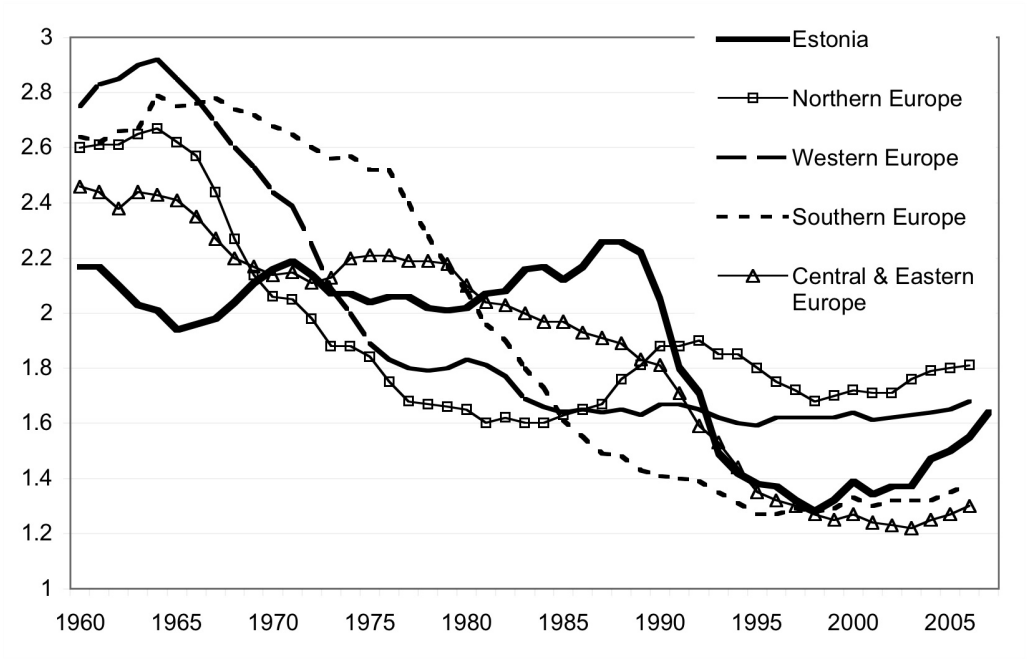
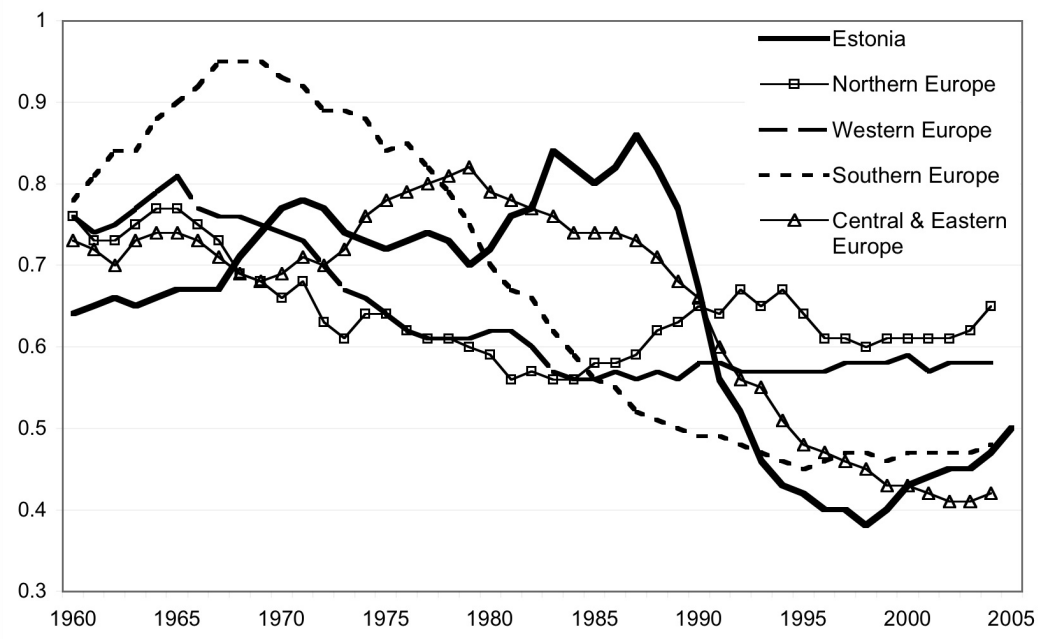
9 Appendix

Figure 7: Total fertility rate. Estonia and major European regions 1960-2005



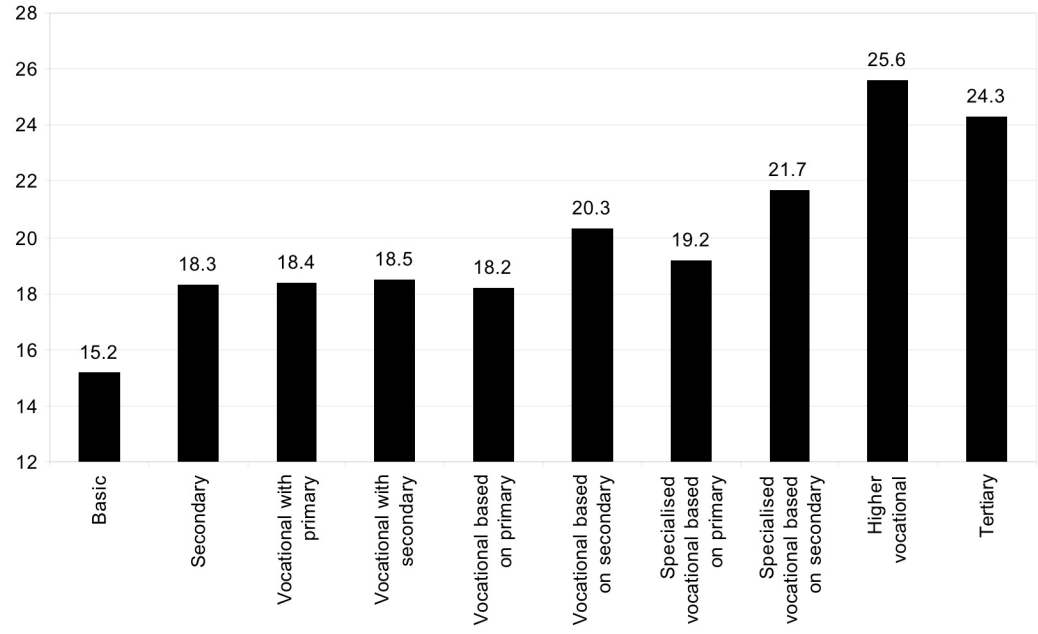
Source: Council of Europe 2006; Eurostat 2009.
Note: Northern Europe represents Denmark, Finland, Norway and Sweden. Western Europe is used to denote Ireland, Austria, Belgium, France, Germany (West Germany prior to reunification), Ireland, Luxembourg, the Netherlands, Switzerland and the United Kingdom. Southern Europe encompasses Greece, Italy, Portugal and Spain. Central Europe refers to Bulgaria, the Czech Republic, East Germany (until reunification), Hungary, Poland, the Slovak Republic and Slovenia. The CIS and Balkan countries were left out of the comparison primarily for the reason of limited data availability. The data are summarised as unweighted arithmetic means.

Figure 8: Total fertility rate. Estonia and major European regions 1960-2005



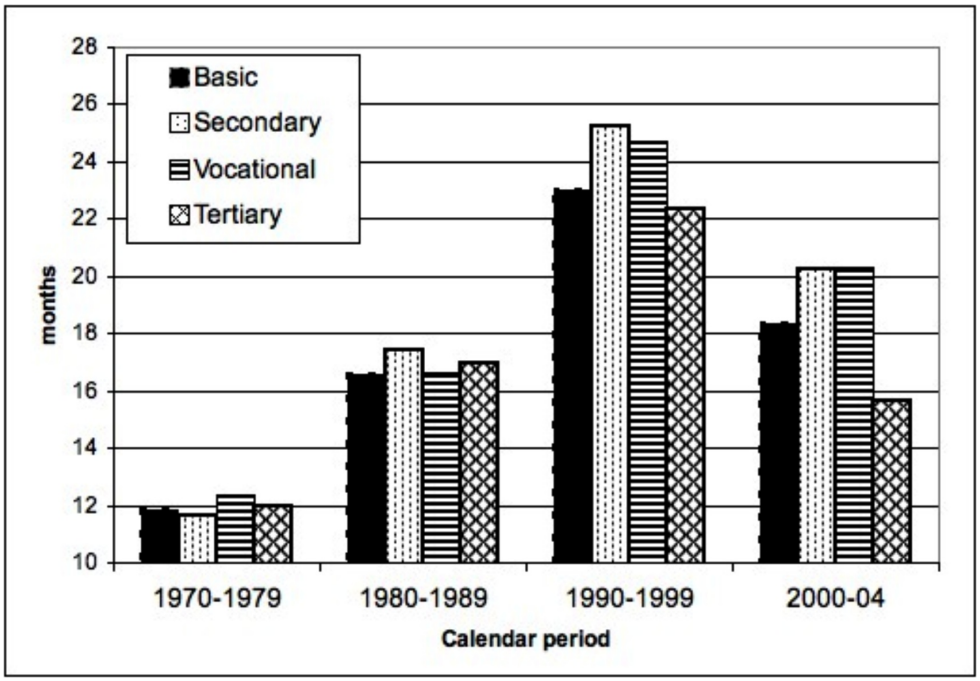
Note: see the note for the previous figure.

Figure 9: Median age at completion of educational level



Source: Estonian GGS, authors' estimates.

Figure 10: Mean length of maternity leave after first birth



Source: Estonian GGS, authors' estimates.

Table 4: Educational attainment of adult population, birth cohorts 1910-1969, percent.

	Male			Female		
Birth cohort	Basic	Secondary	Higher	Basic	Secondary	Higher
1910-1914	17.2	12.9	8.4	16.1	12.7	2.3
1915-1919	22.1	14.9	10.1	22.5	15	3.8
1920-1924	23.3	16.1	11.4	24.3	18.1	5.9
1925-1929	25.4	13.1	13.5	26.5	17	9
1930-1934	30.2	13	15.5	28.9	16.8	12.9
1935-1939	31.1	17.2	17	27	22.7	15.4
1940-1944	32.4	22.7	17.2	22.9	31	17.7
1945-1949	27	30	18.7	16.2	36.1	20
1950-1954	21.1	36.2	18.7	11.7	36.7	22.1
1955-1959	14.3	42.1	18.5	6.7	38.5	23.9
1960-1964	9.7	45.4	17.8	4.7	39.9	23.7
1965-1969	10.1	49.2	14.4	5	41.9	21.7

Source: Estonian Population Census 2000.

Table 5: Time at risk distribution

Variable	Exposure person-months	%	Occurrences count	%
Years since 1st birth				
1	33122	16.29	440	21.09
2	26435	13	451	21.62
3	21587	10.61	291	13.95
4	18023	8.86	237	11.36
5	15231	7.49	181	8.68
6	13062	6.42	129	6.18
7	11367	5.59	106	5.08
8	10374	5.1	52	2.49
9	9562	4.7	44	2.11
10	8764	4.31	45	2.16
11	35857	17.63	110	5.27
total	203384	100	2086	100
Educational level				
Basic	39477	19.41	398	19.08
Secondary	53686	26.4	507	24.3
Vocational	75710	37.23	822	39.41
Tertiary	30033	14.77	308	14.77
Missing information	4478	2.2	51	2.44
total	203384	100	2086	100
Activity status				
Studying	4202	2.07	45	2.16
Working	152735	75.1	1386	66.44
Home attached	43152	21.22	634	30.39
Other	3295	1.62	21	1.01
total	203384	100	2086	100
Age at 1st birth				
14-18	13582	6.68	170	8.15
19-22	54797	26.94	729	34.95
23-26	70999	34.91	801	38.4
27-30	35778	17.59	278	13.33
31-35	20184	9.92	84	4.03
36+	8044	3.96	24	1.15
total	203384	100	2086	100
Marital status				
Married	132143	64.97	1558	74.69
Cohabiting	33039	16.24	441	21.14
Without partner	38202	18.78	87	4.17
total	203384	100	2086	100
Husband's education				
Basic	53596	26.35	601	28.81
Secondary	86956	42.75	1053	50.48
Tertiary	24524	12.06	343	16.44
W/o partner or missing information	38308	18.84	89	4.27
total	203384	100	2086	100
Calendar period				
Before 1968	42783	21.04	501	24.02
1968-1989	93200	45.82	1016	48.71
1990-2004	67401	33.14	569	27.28
total	203384	100	2086	100
Number of siblings				
No siblings	30012	14.76	258	12.37
One	67837	33.35	650	31.16
Two	44014	21.64	490	23.49
3+	59917	29.46	668	32.02
Missing information	1604	0.79	20	0.96
total	203384	100	2086	100
Location of parental home				
Rural	107844	53.02	1158	55.51
Urban	95540	46.98	928	44.49
total	203384	100	2086	100