

**The effect of the completion of education
on entry into motherhood in Austria.
Or:
The "real" educational catch-up effect**

FORSCHUNGSBERICHT 22

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Vienna, September 11, 2001
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¹ I wish to thank Prof. Jan M. Hoem for his helpful comments and instructions. Furthermore I would like to thank G. Andersson, R. Borgoni, A. Fürnkranz-Prskawetz, M. Kreyenfeld, T. Lappegard, A. Tölke for their valuable critical comments on earlier versions of this paper. I am also grateful to the Max Planck Institute for Demographic Research where part of the work was carried out and whose excellent computer facilities were used.

Schriften des Instituts für Demographie
Österreichische Akademie der Wissenschaften

Forschungsbericht 22

Imprint

Editor:
Institute for Demography
Austrian Academy of Sciences
Hintere Zollamsstr. 2b
A-1033 Vienna
Tel: ++43 - 712 12 84
Internet: www.idemog.oeaw.ac.at

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Abstract

Apart from the social background, the entry into motherhood has been found to be greatly influenced by a woman's educational attainment and her educational activity (e.g. Newman and McCulloch 1984, de Wit 1994, Liefbroer and Corijn 1999). Numerous papers have shown that being enrolled in education strongly inhibits fertility (e.g. Hoem 1986, Bernhardt 1990, Blossfeld and Huinink 1991, Vikat 1994, Liefbroer and Corijn 1999, B. Hoem 2000) but the findings of the impact of the educational attainment on the timing of fertility diverge (Blossfeld 1995). The relationship between working experience or employment status and fertility (e.g. Cigno and Ermisch 1989, Kravdal 1994, Kreyenfeld 2000a) as well as the influence of wages on the timing of the entry into motherhood (e.g. Groot and Pott-Buter 1992, B. Hoem 2000) have been the subject of further empirical investigations. But up now the effect of completing one's education or being between two educational episodes has been ignored in the analysis of fertility behavior, as far as we know.

The purpose of this paper is to analyze whether and how the time elapsed since the completion of one's last education influences the entry into motherhood. With the Austrian Fertility and Family Survey 1995/96 we have biographies of partnerships, childbearing, education and employment at our disposal. This allows us to assess this issue. We model the intensity of the conception of the first child for Austrian women by using a piecewise constant exponential model and show that in Austria entry into motherhood is strongly influenced by the completion of education and by educational attainment, standardized for several control factors.

1 Introduction

The access of women to higher education and the increasing participation of women in the labor force is one of the most important features of the (late) twentieth century. Marrying, getting children, running the household and rearing children is no longer the only objective in a woman's life and the access to education has enabled more and more women to get a good education and to find an adequate job. In the public mind women's education, their participation in the labor market, and their contribution to the family income are often connected with (decreasing) fertility rates. Women's growing economic independence is hypothesized by economists to lead to a delay and perhaps a reduction in childbearing in industrialized countries (Becker 1981).

Numerous studies in the United States (e.g. Rindfuss et al. 1980, Rindfuss and John 1983, Rindfuss et al. 1996), Canada (e.g. Grindstaff et al. 1991, de Wit 1994) and Europe (e.g. Bernhardt 1990, Blossfeld and Huinink 1991, Martín 1992, Kravdal 1994, Vikat 1994, Blossfeld and Rohwer 1995b, Gierveld and Liefbroer 1995, Liefbroer and Corijn 1999, Kalwij 1999, Lappegård 2000, Kreyenfeld 2000b) have investigated the impact of a woman's educational attainment on her timing of entry into motherhood or have been concerned with changes in educational differences over time.² The results diverge, some studies reveal strong reducing effects (e.g. de Wit 1994, Gierveld and Liefbroer 1995, Liefbroer and Corijn 1999), others do not find any significant effect at all after controlling for several other factors (Blossfeld and Rohwer 1995b).

In this paper we first want to analyze the effect of educational attainment on entry into motherhood in Austria. In a second step we want to find out whether and how the time elapsed since the completion of education influences the conception of a first birth and whether the effect varies for different levels of educational attainment.

One can argue that the completion of education is one of the most important steps towards adult status and should lead to a steep rise in the rate of entry into parenthood. Such

² Fertility differentials by education were found as early as in the US census of 1910 (Rindfuss and Parnell 1989).

conclusions were drawn by the authors mentioned above by comparing the first-birth intensities for women in education and for women who have finished their education. This paper is based on the Austrian Fertility and Family Survey (FFS) 1995/96 which includes very precise data on the level of educational attainment, the beginning and the end of any educational period, information if an education has been attained full-time or part-time and whether any educational attainment has been completed or not. We are therefore able to follow women in childbearing during, as well as after their periods of educational attainment. Based on this extremely good dataset, the paper intends to find out if and how childbearing develops over the time elapsed since the completion of education and its differentials by educational attainment. As far as we know, the influence of the time elapsed since the completion of education on entry into motherhood has not been looked at before.

The current paper reveals an interesting pattern in the first-birth conception risk. We find that women with higher secondary education have very low first-conception intensities during education and during the first two years after completion of their education, but after four years they reach the same level as women with basic education or women who have learned for a trade. Women with higher education try to inhibit childbearing immediately after the completion of their education. Their opportunity costs of childbearing may be higher early in their career than somewhat later, but they then catch up at a fast pace. Women with tertiary education "speed up" with childbearing even more rapidly. The analyze of the time elapsed since the completion of the last education therefore reveals a precise structure of a "catch-up effect": Better educated women do not intend to get a child immediately after completion of their formal education, but then get pregnant rather quickly.

The paper is organized as followed: First we start with an overview of fertility trends in Austria (chapter 2), the educational system in our country (chapter 3) and the development of women's educational attainment (chapter 4). We then describe our data and method of analysis (chapter 5), and present the prevailing economic theory of the "new home economics" (chapter 6). Studying the influence of education on fertility behavior is subject of chapter 7, followed by an overview of demographic and socio-economic factors that are hypothesized to influence entry into motherhood (chapter 8) and that will be included in the analysis. Our results are presented in chapters 9, followed by a discussion of our findings for Austrian women (chapter 10).

2 Fertility trends in Austria

Up to the 1930s the demographic trends in Austria are comparable with those in other industrialized countries, i.e. we have a transition from high to low fertility and mortality rates. The year 1937 marks a minimum of only 86,000 births, and during the time of the annexation by Germany the birth rates have increased substantially due to the population policies at that time. After some minor fluctuations in the number of births after the Second World War Austria has experienced a baby boom starting in 1955 and reaching its maximum in 1963 with 134,809 births.³ Since then the number of births has steadily decreased in Austria, with two exceptions: The total number of births in Austria peaks in 1982 and in 1992, due to a structural effect⁴ and to the refugees of the war in former Yugoslavia.⁵ In 1998 81,233 children have been born in Austria, of which 36,233 (i.e. 69 per cent) have been first births (figure A1).

Austria has experienced a strong drop in fertility from the mid-1960s to the late 1970s. Since then Austria is at a sub-replacement level (figure A2). In 1999 the total fertility rate (TFR) has been 1.43. Cohort parity progression ratios shows that the much of the fertility decline has been concentrated at parities two and above (figure A3) which means that Austrian women have declining rates for third and higher-order births (Hanika 1996). As in most industrialized countries, motherhood has gradually been postponed and there has been a dramatic shift towards later childbearing, especially for first births (figure A4). The mean age at first birth has reached its historically lowest level in 1973 (22,8 years) and is increasing since then every year (figure A5). In 1998 the mean age at first birth has been 26.9 years; for births of all parities the mean age at childbirth has been 28.7 years. The increasing participation of women in the labor market, induced by increase in education and changing attitudes towards gender roles has made later childbearing more accepted.

A high and still increasing proportion of children, especially of parity one, are born out of wedlock. In 1998 four out of ten first births have been nonmarital births (figure A6) but it has

³ Haslinger (1981) gives a short summary of the demographic trends in Austria up to the 1980s.

⁴ Half of the increase in births 1979 – 1982 can be explained by the fact that the children of the baby-boom in the early 1960s have entered adulthood at that time and which has led to an increase in young women and men (Findl 1985).

to be mentioned that more than half of these births get "legalized" by the marriage of the parents, mostly within the first three years after childbirth (Kytir and Münz 1999b). Austria is traditionally a country with a rather high proportion of nonmarital births. Haslinger (1982) and Mitterauer (1985) give a very detailed description of the historical roots of the high illegitimacy in Austria and its regional differences. Religious conditions, economic factors like the methods of production and the way work was organized within the family (especially in agriculture), legislation as well as restrictions on who could marry are the main factors that have produced high rates of nonmarital births in certain parts of Austria. No monocausal relation but the combination of several factors leads to a plausible explanation of the extensive nonmarital births in certain regions (Mitterauer 1985).

3 The Austrian educational system⁶

In Austria school attendance is compulsory and lasts a minimum of nine years for all children who reside permanently in Austria. Primary school starts at the age of six and lasts for four years. It is designed to provide all pupils with the same elementary education. Years 5 to 8 of the educational history may be attended in a lower-secondary school or at the lower level of a higher secondary school (*Gymnasium*). The 9th year may be completed in a pre-vocational school or in any type of secondary school. (Figure A7 gives a scheme of different types of schools in Austria.)

Lower-secondary school, so-called *Hauptschule* is designed to provide all pupils with a basic general education within a four-years period. Its purpose is to prepare pupils for working life and to equip them with the necessary skills to transfer to upper-secondary school if decided.

Education in *Gymnasium* or *Allgemeinbildende Höhere Schule* lasts for an overall period of eight years, is generally started right after completion of primary school and is divided into a lower (years 5 to 8) and an upper (years 9 to 12) level. *Oberstufengymnasium* comprises years 9 to 12 and may be attended after successful completion of four years of a lower-secondary school. The purpose of *Gymnasium* is to impart broad and extended general education,

⁵ Between 1990 and 1995, the share of live births of non-Austrian nationals has increased from 7.3% to 13.8%, while the number of live births to Austrian nationals has decreased, except in the years 1991 and 1996 (Buber and Prskawetz 2000).

⁶ See also: <http://www.bmbwk.gv.at/en/index.htm>

thereby providing pupils with standard entry qualifications for university and a solid basis for more specialized education or training (in post-secondary courses, at post-secondary colleges, *Fachhochschul*-courses) or on the job. *Gymnasium* ends with *Matura*⁷ which provides access to university studies and other forms of tertiary education.

Beside *Gymnasium* there are mainly three types of occupation-oriented education ending with *Matura*, namely secondary school for business administration (*Handelsakademie* (HAK)), secondary school for engineering (*Höhere Technische Lehranstalt* (HTL)) and secondary school for commercial professions (*Höhere Lehranstalt für wirtschaftliche Berufe*). They last five years and are started after eight years of schooling. *Handelsakademie* provides pupils with general and business education to qualify them for white-collar jobs on the executive level in commercial and administrative lines of work and gives access to tertiary education, whereas the various types of *Höhere Technische Lehranstalten* are mainly technically oriented. *Höhere Lehranstalten für wirtschaftliche Berufe* put the main emphasis on foreign languages, nutrition and business management, social services, health care and cultural tourism.⁸

Among the lower-secondary educations we want to mention the frequently attained lower-secondary schools for administration (*Handelsschulen* (HAS)), which are attained after eight years of schooling. They take three years and end with a school-leaving certificate, not with the *Matura*. Just as *Handelsakademien* they provide pupils with a general and business education, but at a lower level.

Some part of the Austrian teenagers choose to complete compulsory education by attending the pre-vocational year (*Polytechnischer Lehrgang*) without continuing any higher educational level. This possibility is mainly used by those 14 to 15 year-olds who intend to enter an apprenticeship.

In Austria an apprenticeship in general lasts for three years, is oriented towards a vocation, and is accompanied by schooling periods. Apprentices are trained to be skilled workers and

⁷ In Germany the final certificate is called *Abitur*; in Austria it is called *Matura*.

⁸ We observe a strong gender-specific segregation in occupationally oriented education (Fraiji and Lassnigg 1995). In technically oriented secondary schools the proportion of girls is still rather low.

get their instruction in part-time vocational schools where they attain the theoretical background necessary for their occupation as well as a general education.

Further professional training is attained through specialized courses, vocational schools and colleges in various fields and for various occupations, e.g. courses for master craftsmen.

Universities, colleges of art, and post-secondary colleges are the main institutions for tertiary education.⁹ There has been no tuitions so far, but the Austria government has decided to introduce tuition fees in October 2001. We find twelve universities and six colleges for art and music in Austria; all of them are state-run. Post-secondary colleges, so-called *Akademien*, offer studies mainly for the following fields: social work, para-medical professions (e.g. physio-therapists, medio-technical assistants¹⁰) or teaching at a primary or lower-secondary school.¹¹

4 The educational attainment of women in Austria

Since 1951 the highest formal education is asked in the Austrian Population Census and between 1951 and 1991¹² the educational level has increased remarkably. Especially the increase in the proportion of persons with higher secondary education and tertiary education during these four decades illustrates the improvement of the educational level of the Austrian population. The percentage of persons with a university degree has increased from 1.7 in 1951 to 5.2 in 1991, and the proportion of those with higher secondary education has increased from 4.8 per cent in 1951 to 9.8 per cent in 1991. But Austria also has experienced an improvement at the secondary level. In 1971, exactly 30 per cent have acquired an apprenticeship or a lower secondary school, compared to 43.6 per cent in 1991. The improvement in formal education of the Austrian population lead to a decrease in the share of

⁹ In 1994, ten *Fachhochschul-Studiengänge* or briefly *Fachhochschulen* have been introduced as part of tertiary education in Austria. In the academic year 2000/2001 already 67 different *Fachhochschulen* have existed in Austria (Federal Ministry for Education, Science and Culture 2000). This type of tertiary education provides professional and academic training for specific occupations, includes periods of practical training, and usually last for four years. Since the first *Fachhochschulen* focus on technical studies and have been attained mainly by men and since our dataset is censored in May 1996, only a few women in our dataset are supposed to have attained a *Fachhochschule* at the time of the interview. This group can only be a negligible minority.

¹⁰ In order to become a medical doctor or a pharmacist one has to study at university.

¹¹ Non-university tertiary education is dominated by female students. Three out of four students are women (Fraiji and Lassnigg 1995). This situation might change in future with the expansion of *Fachhochschulen*.

¹² The last Population Census dates from 1991 and in May 2001 the next will be hold in Austria.

those with only basic education and no further formal education (1971: 62.0 per cent; 1991: 41.5 per cent) (Austrian Central Statistical Office 1997).

As in many countries the educational structure differs remarkably between women and men and between different age groups (tables A1 and A2).¹³ The educational structure - especially of women - reflects to a great extent the access to higher education, educational facilities and chances during the last generations. Since our study investigates the connection between educational attainment and childbearing, we will concentrate on the educational level of women aged 15 to 45 years and briefly describe the educational structure of these age groups (table A1). In 1991, four out of ten women aged 15 to 45 years had only basic education, or had learned for a trade (i.e. they have completed an apprenticeship or a lower secondary school), one out of eight women had a higher secondary education and 6.2 per cent had completed a tertiary education.

If we want to look at the highest educational level attained, we should concentrate on women aged 30 years and older, because there is little further formal educational attainment after the age of 30. We find that 8.6 per cent had a university degree, 8.4 per cent had a higher secondary education, one out of ten had a higher secondary education, 47.2 per cent had completed a professional training and 35.8 per cent had basic education without further formal education.

Comparing the educational level of women aged 30 to 35 years to that of women aged 36 to 45 years we clearly see an educational catch-up effect during the last decades¹⁴: Among the older age-groups we find a lower percentage of women with tertiary education and with higher secondary education and a higher percentage of women with basic education. Only 4 per cent of all women aged 45 at the Population Census 1991 had a university degree, compared to 11 per cent of all women aged 33 to 35 years. The proportion of women who have completed a professional training is rather the same in both groups, and the percentage

¹³ Looking at the sex-ratio we find that more and more women attend higher education in Austria. Since 1982, there are more girls than boys among the pupils who get *Matura* (i.e. who finish a higher secondary education), and since 1990 there are more women than men among those who start university (Landler 1997). The fact that it took eight years until the sex-ratio among those who started university has changed in favor of women shows that this development at the highest educational level has been rather slow.

¹⁴ The proliferation of the educational attainment among women is considered as the main driving force behind the long term rise of female labor force participation (Biffl 1991).

of basic educated women decreases with age (age 35 years: 35 per cent; age 45 years: 42 per cent).

Furthermore an improvement of the educational level of young Austrian women is evident, since for only 25 to 28 per cent of women aged 20 to 29 basic education is the highest educational attainment. In former decades compulsory school, but no further education was the "usual form" of educational attainment, but nowadays it is a "minimal standard" (Wiederschwinger 1995). Nevertheless the proportion of women with compulsory education, but no further formal education is still higher compared to men (tables A1 and A2) and astonishingly about one quarter of young Austrian women have only a basic education and no further formal education in 1991. In an international comparison of school attendance quotas among young people aged 18 years we find Austria in the upper half of the OECD-countries (Biffl 1996).

After compulsory school girls and boys can choose between different types of schools. In *Handelsakademien* and *Höheren Lehranstalten für wirtschaftliche Berufe* three out of four pupils are girls. *Höhere Technische Lehranstalten* and vocational schools are dominated by boys (1991: 79%). This strong gender segregation determines to a great extent future occupational histories of young people and might be a barrier for the integration of women in future-oriented and well-paid jobs (Biffl 1996).

5 Data and method

Our analysis uses data from the Austrian Fertility and Family Survey 1995/96 (FFS), which has been conducted between December 1995 and May 1996 (Doblhammer et al. 1997). The survey gives a rich set of data and includes retrospective histories on education, employment, housing, partnership and childbearing. It also records attitudes towards topics like abortion and family policies. The selection of respondents is described in our Appendix and summarized in table 1. We include 4,260 eligible records of Austrian women¹⁵ born 1941 to

¹⁵ To reduce the heterogeneity of the comparison group, foreign nationals have been excluded.

1976 in the analysis. Of these 77.4 per cent have had at least one child by the time of the interview.¹⁶

The main interest of the paper is to find out whether there is a relation between the completion of an education and entry into motherhood. We model the intensity of the conception of the first child by using a piecewise constant exponential model (Blossfeld and Rohwer 1995a):

$$h(t) = \exp\{\alpha_{l(t)} + A(t)\beta\}^{17}$$

This proportional hazard model postulates that everyone in the sample is subject to a baseline risk $\exp\{\alpha_{l(t)}\}$ of an event. The baseline risk is multiplied by a factor that depends on a woman's characteristics as reflected in the additional term $A(t)\beta$, or more precisely in the factor $\exp\{A(t)\beta\}$.

Here, $l(t)$ is the number of the interval of constancy that contains time t and α_k is a constant associated with the k -th interval. $A(t)$ denotes a row vector of categorical covariates and includes fixed as well as time-varying covariates. The latter may change their value over time. The parameter β represents an associated vector of coefficients assumed not to vary across time intervals. The exponential form of the coefficients expresses the effect of the covariates as proportionate increases or reductions in childbearing risks, lower or higher intensities indicate a slower or faster pace of transition to motherhood. The intensities are calculated using the program ROCANOVA (Martinelle 1993), which implements the maximum likelihood estimation of the coefficients of the transition rate model.

Our main explanatory covariate is the time elapsed since the completion of education. We control for several other factors that have been found or hypothesized to influence fertility

¹⁶ We found 39 women who were pregnant with their first child at the time of the interview. Since the expected birthdate of the child is coded, it is possible to calculate (approximately) the time of conception. We included these records as occurrences in the analysis.

¹⁷ The dependent variable is specified as the rate of entry into motherhood, defined as

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{P(t < T < t + \Delta t / T - t)}{\Delta t}, \quad t \geq 0, \quad \Delta t > 0,$$

where $P(\cdot)$ is the simultaneous probability of entering into motherhood, i.e. of getting pregnant, in the interval $(t, t + \Delta t)$, respectively, provided that the entry has not occurred before the beginning of this interval (see Blossfeld, Hamerle and Mayer 1989, p. 31).

behavior. We have calculated the fixed and time varying covariates as described in our Appendix.¹⁸

We follow women from age 15 until the time of an event (the conception of the first child) or up to the time of interview for childless women who have not been pregnant at the time of the interview. There are no competing events. We right-censor at the date of the interview (922 records) or at the end of the second union (42 records) since we suppose that women who did not have a child by the end of their second union are a quite special group, i.e. either they do not want or cannot have a child.

6 The theory of the "new home economics" and its empirical applications

Gary Becker and Richard Easterlin are the most well known economists who have tried to explain the interdependencies between economic factors and fertility. Whereas Becker has explained fertility behavior in a purely economic theory, Easterlin has introduced the concept of socialization into economic model-building (Sanderson 1976).¹⁹

In his relative income approach Easterlin (1975) argues that the material situation during adolescence affects an adult's preferences for children. The income of the parents is compared with the person's own family income, and an increase in the relative income enhances lifetime fertility.²⁰ Since the Austrian FFS does not include income data neither for the respondent's whole working period nor for the parents, Easterlin's theory cannot be applied in this study.

Becker's intention is to analyze marriage, birth and other nonmarital behavior with the tools and framework developed for material behavior by postulating that the household has a utility function that has to be maximized.²¹ He uses the price of children and real income and stresses a woman's wage and its role as opportunity costs for the birth of a child to explain

¹⁸ These covariates have been included in the model in a stepwise procedure. If it has turned out that a covariate persistently is not significant it has been dropped in later steps.

¹⁹ Sanderson (1976) gives a very good summary on the intellectual controversy between the two "rival camps" headed by Becker and Easterlin.

²⁰ Macunovich (1998) gives a comprehensive review and critique of the literature regarding fertility aspects of the Easterlin hypothesis.

²¹ In a first step the utility function depends on the quantity of children, the expenditures on a child (called the quality of children), and the quantities of other commodities (Becker 1981, p. 95).

why a rise in wage rates of employed women reduces their fertility.²² Becker, and the "new home economics" in general, deduce that an increase in a woman's income increases her opportunity costs of having a(nother) child and therefore decreases the demand for children (Becker 1981, p. 93ff).²³

Becker's theory has initiated a tremendous variety of studies to verify or disprove the impact of women's (1) wages (e.g. Newman and McCulloch 1984, Cigno and Ermisch 1989, Groot and Pott-Buter 1992, Kalwij 2000), (2) labor market experience (e.g. Blossfeld and Huinink 1991, Kravdal 1994, Kreyenfeld 2000a), or (3) educational attainment (e.g. Rindfuss and John 1983, Bernhardt 1990, Blossfeld and Huinink 1991, Grindstaff et al. 1991, Martín 1992, de Wit 1994, Kravdal 1994, Vikat 1994, Blossfeld and Rohwer 1995b, Gierveld and Liefbroer 1995, Rindfuss et al. 1996, Liefbroer and Corijn 1999, Kreyenfeld 2000b) on the timing of the first birth. Further studies concentrated on the timing of second and/or third births (e.g. Ní Bhrolcháin 1988, Hoem and Hoem 1987, Hoem and Hoem 1989, Huinink 1989, Kravdal 1992, de Wit 1994, Hoem et al. 1999, Berinde 1999).²⁴

It is often not possible to measure wages and therefore years of schooling or educational attainment are used as a substitute for wages (e.g. Melkerssen and Rooth 2000). Educational attainment has long been used by social scientists as an indicator of labor-market position and as a measure for women's economic independence. Since education and wage rates are mostly highly correlated, better educated women have higher opportunity costs for childbearing and childrearing. Following Becker's arguments leads to the hypothesis of a reducing influence of education on fertility. Better educated women are hypothesized to have fewer children compared to less educated women.

A woman's educational attainment has generally been found to be a very important determinant of the timing of her first birth as well as her lifetime fertility (e.g. Rindfuss et al.

²² The number of children is strongly negatively related to the wage rate or other measure of the value of time of women, and is more often positively rather than negatively related to the wage rate or earnings of husbands (Becker 1981, p. 98).

²³ As it is especially the woman who rears children and since childrearing is time intensive it is typically the woman who has to reduce her employment in case of the birth of a(nother) child according to this theory.

²⁴ Becker's predictions concern primarily the number of children, not the timing of maternity, and it is questionable whether studies on the relationship between fertility and wages, income, and education as a proxy for income can be taken as arguments for or against complete confirmation of Becker's theory (Groot and Pott-

1980, Rindfuss and John 1983). It is supposed to influence her adult life by imparting "values, aspirations and skills which encourage and facilitate non-familial roles" (Rindfuss et al. 1980, p. 431).²⁵ The findings in the literature, especially in recent years, have shown diverging results and we briefly review the literature on the impact of education on the timing of the first birth.

The majority of studies find that a higher educational attainment delays entry into motherhood. In some cases the impact is significant (e.g. de Wit 1994, Gierveld and Liefbroer 1995, Liefbroer and Corijn 1999), in others there is only a weak or no fertility-inhibiting impact of a higher education (Blossfeld and Jaenichen 1992), an increasing effect (Blossfeld and Huinink 1991), or a U-shaped effect (Bernhardt 1990). Investigations on the impact of a woman's educational attainment on second or third births reveal further interesting results: Studies on Sweden (Hoem and Hoem 1989) and Norway (Kravdal 1992) show that a higher educational attainment tends to increase third-birth rates. In an analysis on third births in Austria Hoem et al. (1999) use different categories for a woman's age. They find that a high educational level tends to increase third birth rates when the woman's absolute age is controlled for. But the results no longer hold and lose significance when the absolute age at second birth is replaced by the corresponding age computed relative to the woman's educational attainment. For second births Hoem and Hoem (1989) find a increasing impact whereas de Wit (1994) reveals only a weak and nonsignificant reducing effect for Canada.

7 Studying the influence of education

Previous studies on the effect of education on childbearing have revealed miscellaneous results. What are the reasons for these differences? Synthesizing results from a large number of studies on nine countries, Blossfeld (1995) observe a large variation in the effect of female's educational attainment across societies. His publication presents the results of comparative studies of family formation for nine different countries, offering "a range of variations in important variables such as industrial development and culture, political systems and history, and family traditions" (Blossfeld 1995, p. 5).

Buter 1992). But since the timing of children (or more exactly the postponement of children) can be hypothesized to affect completed fertility, we think that these doubts no longer hold.

²⁵ In addition, one can argue that education facilitates better control of unwanted pregnancy through more effective use of contraception (Grindstaff et al. 1991).

Blossfeld suggests that the effect of educational attainment varies with the kind of "family system" predominant in a given society. "Family system" is a loosely defined concept, including a country's dominant cultural values, family and religious traditions, and family policies. It implies that the reducing effect of educational attainment on family formation can be expected to be stronger in societies in which the incompatibility of labor force participation and family formation is larger compared to societies in which this incompatibility is small as has been found by Liefbroer and Corijn (1999) and Kreyenfeld (2000b). Therefore, factors like employment rights of mothers, costs and availability of child care, and the relative economic position of highly educated may be the reason for differences among countries (Kravdal 1992).

7.1 Different measures for educational attainment

Besides the differences between societies, we suppose that the varying measures of the educational attainment used by the authors are another important reason for diverging results. It is a common view that similar methods and similar measurements are required in order to get interpretable differences between countries. In the majority of existing studies the educational attainment included in the models is a linear term depending on the number of years of education. This implies that there can only be a significant increasing or a reducing impact of education. But a non-significant results may also be caused by a non-linear relation between the number of years spent in education and the rate of entry into motherhood.

Most studies have included a linear term for the years of enrollment in education (e.g. Blossfeld and Huinink 1991, Liefbroer and Corijn 1999, Newman and McCulloch 1984, Blossfeld and Rohwer 1995b) or a categorical covariate for the years of schooling (e.g. Kravdal 1994, de Wit 1994, Bernhardt 1990, Martín 1992, Kreyenfeld 2000b). But we argue that the introduction of different levels of educational attainment opens up the possibility for a more complex relationship between education and the timing of the first child.

7.2 The accuracy of the educational level in the Austrian FFS

The Austrian FFS includes very detailed data on the educational histories. For any educational episode we have the exact date (month and year) of the beginning and the end; the level of an

educational period is divided into nine subgroups. Furthermore we also know whether an education has been completed or interrupted and not finished, or whether a woman is still in education. This allows us to include all educational periods with their exact timing and their final status (completed, interrupted, or still in education) while several studies have to rely on comparatively low information on educational episodes.²⁶ Finally, we also know whether an education was taken full-time or part-time. These rich educational histories enable us to make a very deep analysis of various aspects of the relationship between education and entry into motherhood.

We describe shortly the handling of the very accurate coding of educational attainment in the Austrian data set and continue with our results. The following nine levels of educational attainment are coded in the Austrian FFS:

- (1) Basic education
- (2) Apprenticeship
- (3) Lower-secondary education: ending without *Matura*,
e.g. *Handelsschule* (lower-secondary school for administration)
- (4) *Gymnasium* (secondary academic school): ending with *Matura*
- (5) Occupation-oriented education: ending with *Matura*,
e.g. *Handelsakademie* (secondary school for business administration),
Höhere Technische Lehranstalt (secondary school for engineering)
- (6) Professional training ending without *Matura*
- (7) Professional training ending with *Matura*
- (8) *Akademie* (Post-secondary college)
- (9) University.

In the course of the analysis we have tried to find a more compact grouping of the very accurate levels of educational attainment coded in the Austrian FFS. We have ended up by collapsing levels (2), (3), (6) and (7) to the group *trade*. These types of education emphasize

²⁶ Part of this information is not available in the set-up of most other studies that concentrate on the impact of education on fertility. Due to less precise data, Rindfuss et al. (1996) include the education at the time of interview. Blossfeld and Rohwer (1995b) use the average number of years required to obtain a certain education or vocational training. Kravdal (1994) refers the educational attainment to the respondent's currently highest completed education. The accuracy of the Austrian data enables to specify exactly the periods of education. This allows to take into account periods of non-schooling, and the fact that not all women start e.g. university at the age of 19 and finish it, say five years later.

on the improvement of professional knowledge, independently if the education ends with or without *Matura*. Women who have chosen such an education are more occupationally and less academically²⁷ oriented compared to women with higher secondary education.²⁸ In a second step we grouped those who attended *Gymnasium* (4) or an occupation-oriented education (5) and called the new level *higher secondary education*. Even if education in an occupation-oriented school includes lessons in practical work, all types of *higher secondary education* prepare for university or other tertiary education and therefore for an academic path which justifies the collapsing of these groups. Women who have achieved either a university degree (9) or attended a more practically oriented *Akademie* (8) have the highest degree of educational training and constitute the group *tertiary education*.

We end up with four categories for the current educational attainment by taking into account the orientation (academic – non academic) and if an education ends with *Matura* which entitles for tertiary education, or not²⁹:

- (A) Basic education
- (B) Trade
- (C) Higher secondary education
- (D) Tertiary education.

As we know if an education has been completed or interrupted or if a woman is still attaining a certain education we include a dummy indicating if the last education has been completed or interrupted. We hypothesize that women who have interrupted an education have higher first-conception intensities since the foregone hopes connected to their interrupted education may make childbearing an option to their unfulfilled educational opportunities.

7.3 Hypotheses on the relationship between childbearing and education

The theoretical importance of education can be viewed either from the perspective of the "new home economies" or from a sociological perspective. For the first case, the

²⁷ Except of the group "professional training with *Matura*" all types of education in this group end without *Matura*.

²⁸ Later on we will look at the interaction between the current educational attainment and the time elapsed since the end of the last education. When interacting the two covariates we have found a similar pattern for the collapsed subgroups which confirms our grouping.

²⁹ In the analysis we have included the described different grouping for the current educational level and table 2 shows the corresponding results.

accumulation of human capital, expressed as an increasing level of education, raises women's labor-market attachment and thereby leads to greater delay of marriage (Becker, 1981). For the second case, normative societal expectations include the attitude that young people attending school are "not ready" to enter into marriage and parenthood (Blossfeld and Huinink 1991). The roles of students and mothers are sufficiently demanding so that most women delay fertility until they have completed the desired amount of education (Rindfuss et al. 1996).

Attending school, university, or vocational training is associated with a high degree of economic dependence on parents, and finishing education is expected to count as one of the most important prerequisites for fully entering into an adult status, which opens for entry into marriage and parenthood (Oppenheimer 1988, Blossfeld and Nuthman 1989). Furthermore, having a child early could interfere with the completion of education (Bernhardt 1990).

It is well-known in literature that family formation is postponed until the completion of education (e.g. Hoem 1986, Bernhardt 1990, Blossfeld and Huinink 1991, Vikat 1994, Blossfeld and Rohwer 1995, Liefbroer and Corijn 1999, B. Hoem 2000). In order to control for the influence of currently attaining education, we construct dynamic, time-dependent measures for actual enrollment in education.

Furthermore, we hypothesize that enrollment in full-time and part-time education has different effects on first-conception intensities. More exactly we assume that part-time education inhibits entry into motherhood to a lower extent than full-time education. We find that in our data 43 per cent of the exposure time of part-time education, but only 11 per cent of the exposure time for full-time education is overlapping with employment. This non-surprising result indicates that women in part-time education are more often financially independent compared to women in full-time education.

7.4 Hypotheses on the influence of the time since the completion of an education

The completion of education is one of the most important steps towards adult status and should lead to a steep rise in the rate of entry into parenthood. Opportunity costs can vary across the life course (Liefbroer and Corijn 1999) and it has been shown that women postpone childbearing until after schooling.

We hypothesize that the time elapsed since the completion of a woman's last education influences her entry into motherhood. In addition, we suppose that the relation between the completion of education and fertility varies among different levels of educational attainment. Especially more highly-educated women may intend to work for a certain time after the completion of their education in order to apply what they have learned, to get working experience, and to be entitled for maternity leave in case of a pregnancy.³⁰ This is of course a very general statement and does not apply for all women.

For our analysis the explanatory covariate is the time elapsed since the completion of education. We compute this duration in the following way: If a woman is currently not in an educational period, the time since the completion of the last educational period is calculated as a time-varying covariate. In a first step we distinguish eight time periods: up to 6 months, 7 to 12 months, 13 to 18 months, 19 to 24 months, 25 to 36 months (third year), 37 to 48 months (4th year), 49 to 60 months (5th year) and 61st month and more (6th year onwards).

If a woman is currently in education we distinguish if education is full-time or part-time.³¹ While most studies include a dummy variable indicating if a woman is attending an education or not (e.g. Blossfeld and Huinink 1991, Groot and Pott-Buter 1992, Kravdal 1994, Blossfeld 1995, Liefbroer and Corijn 1999), we are able to differentiate furthermore between full-time and part-time education.

This covariate enables to pick up two aspects, (1) if a person is currently in education or not, and (2) if a person is currently not in education we focus at the time since the last education has been completed. We have tried several ways for the division of the elapsed time and have ended up with two levels for women who currently attend some kind of education, and four time periods for those who are currently not in education. The remaining levels are: Full-time or part-time education; first year after the completion of the last education, second year, third year and fourth year onward.

³⁰ In Austria women get maternity leave if they have been employed a certain amount of time (for first births: 20 weeks within the last two years for women under 25 and 52 weeks for women aged 25 or more) before the birth of a child. Women with a shorter employment period at the time of conception can establish full rights during pregnancy.

³¹ If a person has two educational periods simultaneously and if one of them is full-time, then this educational period is defined as full-time.

8 Overview of demographic and socio-economic factors that are hypothesized to influence entry into motherhood

Numerous studies during the last decades have revealed significant demographic and socio-economic determinants of fertility, like age, marital status, regional aspects or religiosity. We shortly review the hypotheses and the corresponding findings in literature. In the current study these factors are controlled for in order to (1) find out their impact on Austrian first-conception intensities and (2) see if the effect of education and the time elapsed since the last education still remains as soon as they are included in the analysis.

One of the most important factors that determine fertility is a woman's age, since the time of childbearing is limited to a woman's reproductive period, mostly between age 15 to 40³². The relation between a woman's current age and her fertility behavior is characterized by an inverted U-shape (see e.g. Gierveld and Liefbroer 1995). As age increases, the rate of entry into motherhood initially increases, reaches a peak and then decreases.

Another main factor of fertility is a woman's marital status. Married women are hypothesized to have higher conception intensities than cohabiting women and it is "a trivial fact" that women who are not living in a stable sexual relationship have lower conception intensities than cohabiting or married women (Kravdal 1994). In a comparison of effects on the rate of entry into motherhood among seven European countries, Blossfeld (1995) states that the most important influence is a woman's marriage. We therefore calculate a time-varying covariate that indicates the current union status distinguishing whether a woman is currently living (1) outside a union, (2) cohabiting or (3) married. By taking the conception of the child as the event under consideration we try to disentangle to a certain extent the causality between marriage and birth of the first child.³³

We furthermore control for a woman's religious feelings. Religiosity, often measured by going to church regularly, is considered to be a proxy for a traditional view of life (Groot and Pott-Buter 1992) and to be linked to family oriented attitudes and traditional gender role

³² Only a few women get their first child after age 40 or older. In 1998 1.58 per cent of all women who gave birth to a child were aged 40 or more (Demographisches Jahrbuch 1998).

ideals (Martín 1992). Several studies (Poston 1990, Martín 1992, Silva and Covas 2000) have revealed that religion and the degree of religiousness influences significantly fertility. For Austria, Hoem et al. (1999) have found a rather strong influence of the degree of self-reported religiousness on third birth intensities. In our paper we use a similar indicator for religiousness, i.e. the strength of a woman's religiousness at the time of the interview.³⁴

Women who have grown up in large cities and surrounding urban areas are expected to be more cosmopolitan, to have a more modern attitude towards family and work, i.e. to value occupation and career higher compared to women living in rural areas (Groot and Pott-Buter 1992). Urban areas are more likely to offer support for (female) education, greater encouragement and broader opportunities for paid employment and for non-familial role behavior leading to later childbearing (Bernhardt 1990, Martín 1992).

Educational opportunities in rural areas are limited and even if public transportation and boarding schools nowadays enable many children to attend school in a place that is at a quite far distance from home it may be assumed that in general the access to education is easier in urban than in rural areas.³⁵ Furthermore women (and men) in bigger towns are assumed to have better information and more experience with alternatives to the traditional life cycle (Huinink 1987).³⁶ Finally, taking into consideration the situation with a child, women in the rural area are supposed to rely to a greater extent on relatives or neighbors to take temporary care of their child which makes the decision to have a child easier (Kytir et al. 2000).

For women who have grown up in urban areas we expect a reducing effect on the entry into motherhood. Various studies (e.g. Huinink 1987, Huinink and Wagner 1989, Martín 1992)

³³ Rindfuss and Parnell underline the complex set of possible relationships between marriage and fertility. They state that "temporal ordering of marriage and childbearing presents issues of causality that remain unsolved" (Rindfuss and Parnell 1989, p. 448).

³⁴ As Hoem et al. (1999) remark, the degree of religiousness is only given at the time of the interview but religiousness is assumed to be more or less stable at adult age (Hoem and Hoem 1989).

³⁵ For Germany Huinink and Wagner (1989) explain the difference in the level of education in rural and urban areas by regional differences in the supply of educational establishment.

³⁶ Becker (1976) states another possible relationship between regional structure and fertility: He argues that the distribution of contraceptive knowledge is unequal in society. It might differ between rural communities and urban centers as well as between racial and ethnic groups. More recently, Martín (1992) assumed that living in an urban setting enables a better access to birth control.

have shown that women from rural areas have their first child earlier than women from urban areas and we assume that this is also true for Austria.³⁷

Another factor that captures the social background and which is hypothesized to determine fertility is a woman's number of siblings.³⁸ The size of a woman's family of origin might influence her fertility and, consequently, the timing of her first birth, via intergenerational transmission of childbearing norms. "Women who grew up in larger families are not only systematically disadvantaged in their educational career but are also more socialized toward a career as a housewife and mother. They are therefore more inclined to have children earlier and to have more children" (Blossfeld and Huinink 1991, p. 159). Finally, if the family is large, direct parental guidance may be limited, and this might increase the probability of accidental motherhood (Rindfuss and John 1983).³⁹ The argument that daughters raised in larger families have a more rapid pace of transition to first birth was empirically found in various studies (e.g. Michael and Tuma 1985, Blossfeld and Huinink 1991, Martín 1992).

A country's economic situation as well as its family policy are often assumed to have an impact on fertility behavior. During periods of economic crises or – less dramatic – economic downswings, women are hypothesized to postpone childbearing which induces a decline in fertility. In Austria, the comparable low fertility during the economic crises of the thirties and the high fertility during the sixties are examples for influences of economic circumstances on fertility behavior. A further macroeconomic factor of fertility is a country's family policy⁴⁰ with Sweden as the most prominent example for influences of family policy on fertility

³⁷ Huinink and Wagner (1989) have shown that the regional differences in fertility behavior are influenced by selective migration processes and they stress the importance of a dynamic approach of social selective regional mobility. Since we do not have sufficient information in the habitation histories, we have to restrict our analysis to the size of the place the respondent lived at age 15.

³⁸ In the Austrian dataset each respondent is asked for the number of siblings and half-siblings the respondent has lived with during his/her childhood. We sum up these two numbers to aggregate the covariate *siblings* which gives the number of siblings and half-siblings a woman has grown up with. This again is an example for what an extensive dataset the Austrian FFS is.

³⁹ Murphy (1999) gives a very detailed historical summary of the correlation of fertility between parents and children. He argues that the relationship has become stronger through time and that "it is now of similar order of magnitude in developed countries as widely used explanatory variable such as female educational attainment" (p. 28). He precises that this conclusion is mainly based on comparing completed fertility of the younger generation with that of their parents, rather than analysis of contemporary childbearing and he states that younger generations are now more likely to adopt an individualistic approach to demographic decisions.

⁴⁰ Already since the ancient Rome governments have tried to influence fertility and therefore have introduced different laws to "enforce" or support childbearing. Nuber (1984) gives some interesting historical aspects of family policies. Kytir and Münz (1999a) underline the negative connotation of population and family policy in Austria and give some historical examples.

(Hoem and Hoem 1996). Austria's family and population-related policies include measures to alleviate the financial burden of parents. A comprehensive summary of the instruments and measures aimed to promoting families can be found in the National Report on the Austrian Population (Federal Government of Austria 1994)⁴¹.

The relationship between female labor force participation and fertility has been investigated comprehensively. A woman's occupational activity is a very important economic variable and previous research has revealed diverging results: Impens (1988) has identified a significant birth-probability reducing impact of unemployment among Belgian women. Kreyenfeld (2000a) has found that female unemployment encourages the transition into parenthood in East Germany. Focusing on Norwegian women less than 30 years old, Kravdal (1994) has revealed that first-birth rates are highest among women who neither attend school nor have a job. Further econometric studies have investigated the bearing of work experience (Cigno and Ermisch 1989, Kravdal 1994) or wages and income (Groot and Pott-Buter 1992, B. Hoem 2000) on the timing of motherhood.

9 Results

First, we will describe the influence of the social background on first-conception intensities. We continue with the effect of educational attainment and then present our results about the influence of the time elapsed since the last education and its interaction with various covariates. We will mainly refer to model 3 (Table 2). Our arguments will not concern the quantity of fertility, but rather the timing of fertility and how timing varies by level of education and by the time elapsed since the completion of the last education. Throughout the analysis, a five per cent significance level has been chosen for each individual test. Table 4 gives the distribution of occurrences and exposures.

⁴¹ Austria's maternity leave regulations are one of the most generous, with actually paid maternity leave up to 18 months after childbirth for women who have worked a certain time span before childbirth. If the father of the child also takes parental leave, a couple gets maternity leave up to the second birthday of the child. Furthermore, a parent can take part-time maternity leave, if the employee agrees, allowing to get transfer payments at most up to the third birthday of the child. For a more detailed survey of Austria's maternity leave legislation see Tazi-Preve et al. (1999) and Hoem et al. (1999). New changes in the legislation of parental leave are planed during the year 2001 by the Austrian government.

9.1 The effect of age, social background, calendar period and employment status

Controlling for the current age of a woman and her social background (union status, size of the residence up to the age of 15, number of siblings) reveals the expected significant effects, while religiosity turns out to have no significant effect. First-conception intensities are highest for the age group 20-23 years. Young girls (15-17 years) and women in their thirties have approximately one third first-conception intensities compared to women in their twenties. Married women have the highest intensity which is twice as high compared to cohabiting women and women currently living in no union have the lowest risk of getting pregnant. For the rural-urban environment among adolescence our results show that women who grew up in Vienna have 26 per cent lower first-conception intensities compared to women who grew up in small towns (up to 10,000 inhabitants)⁴². Bernhardt (1990) characterizes Stockholm Metropolitan women to be the vanguard in the transition to a new fertility pattern, characterized not so much by completed fertility as by its age pattern. This seems to be valid also for Austria. We furthermore find a strong impact of a woman's family size on her entry into motherhood.

The current calendar period strongly decreases and then slightly increases the entry into motherhood over time. Analogous to Hoem et al. (1999) we distinguish six periods which are mainly determined by economic up- and downswings in Austria: 1960-1973 (high economic growth), 1974-1979 (fluctuating economic growth), 1980-1987 (low economic growth), 1988-1990 (high economic growth), 1991-1992 (declining economic growth) and 1993-1996 (low economic growth). Up to 1974 first-birth conception intensities are high, decrease and remain rather stable between 1974 and 1987 and then slightly increase again. While we can explain the elevated intensities before 1974 by high economic growth, the increase after 1987 cannot be explained by economic developments or changes in family policies. It might be that part of the births have been postponed during the years of fluctuating and low economic growth (1974 – 1987) which has lead to an increase in the conception intensities later on.

⁴² Austria has only one city with more than 1 million inhabitants, and this is the capital Vienna. Household and family structures differ substantially between rural and urban areas (Gisser et al. 1995).

The traditionally high and still increasing percentage of nonmarital first births⁴³ in Austria indicates that childbearing is and was not restricted to marriage. We have tried to find out whether entry into motherhood has changed among married and cohabiting women over time and therefore have tested for an interaction between the calendar period and the marital status which turned out to be significant. We find that the difference between married and cohabiting couples has increased since 1987 (figure 1) due to an increase in the first-conception intensity of married women. This effect may be due to a selection process and we might assume that during the last decade the marriage of a childless woman has become a stronger indicator for her family orientation and desire for children.

It turns out that women who are currently employed have significantly lower first-conception intensities compared to women who are not employed, i.e. housewives and/or unemployed women.⁴⁴ This goes in line with several findings which show that unemployed women have higher first-birth intensities (Kreyenfeld 2000a). The fact that a childless woman is a housewife and not employed indicates a higher family-orientation and a higher propensity towards childbearing. Furthermore childless unemployed women have a higher tendency towards childbearing than employed women. For them a child might be an alternative to discouraging labor market chances.⁴⁵ From the economic theory it is argued that the time costs of having a child are lower for unemployed women, which makes it reasonable to give birth during a period of unemployment (Zimmermann and de New 1990). An interaction between the current employment status and the time elapsed since the completion of education reveals a similar pattern over time for employed and non employed women (figure 2). We conclude that in Austria the opportunity costs for having a child are lower for non-working women than for employed women.⁴⁶

⁴³ Not only the rate of nonmarital first births, but also of second births is steadily increasing (figure A6 in our Appendix). Between 1984 and 1998 the proportion of children born out of wedlock has increased from 36.0 per cent to 43.0 per cent for first births, from 9.8 per cent to 20.4 per cent for second births and from 7.0 per cent to 14.6 per cent for third births (Kytir and Münz 1999b).

⁴⁴ Being more precisely, we did not control for unemployment, but only for being currently employed and not employed. The second group includes women who are "deliberately" non-working women (housewives) and "undeliberately" non-working women (unemployed women).

⁴⁵ Among currently not employed women we do not further concentrate on unemployment. A deeper analysis of the effect of unemployment would have to take into account various parameters for unemployment like the duration of unemployment, shifting the main focus of this paper in another direction.

⁴⁶ Comparable to other countries within the European community, we can observe a segregation by gender among the economically active population (Appendix, table A5). According to the 1991 Population Census, the

When omitting the current employment status, the effect of the other covariates we control for change only slightly (Models 4 and 5, table 3). This indicates that the current educational level and the time elapsed since completion of education explain a major part of the transition into motherhood which cannot be captured by the current employment status.

9.2 The influence the current educational level

A woman's educational attainment is one of the most differentiating key variables for the timing of childbearing. Inspired by numerous studies with diverging results and as indicated previously, one of our aims is to analyze the influence of the educational level on first-conception intensities in Austria. The effect of the covariate *current educational attainment* has the form of a U-shape: Women with basic education and especially women with a tertiary education have the highest first-conception intensities. Women who have learned for a trade – more exactly women whose highest educational attainment currently is an apprenticeship, a lower-secondary education or a professional training – do not differ from women with basic education. But those with a higher secondary education have significantly lower first-conception intensities: For women with higher secondary education the rate is 32 per cent lower and for those with a tertiary education it is 24 per cent higher compared to women with basic education (Model 3, table 3).

These results are highly significant even after controlling for age, union status, employment status and further covariates that have been hypothesized or shown to influence first-birth intensities. Bernhardt (1990) also found a U-shaped pattern for the effect of completed educational attainment on first-birth propensities with a 25 per cent lower risk of having a first birth for women with gymnasium compared to women with compulsory school only⁴⁷. She concludes that women who go on to some institution of higher learning exhibit higher first-birth propensities once they have finished their university education. We further do not interpret the effect of the current educational level, but look at the interaction with the time elapsed since the completion of education which reveals interesting new insights in the fertility behavior among Austrian women.

service sector is dominated by women (51 per cent females), production by men (75 per cent males) (Ladstätter 1994).

⁴⁷ But she has investigated only women under 30. Especially when it comes to a university degree, this time may be too short for observation.

9.3 The impact of educational attainment and the time elapsed since completion of education

Going in line with previous findings our results provide evidence that educational enrollment has a strong reducing effect on the entry into motherhood and that childbearing is postponed for those who have not yet completed their education.⁴⁸

In our paper we furthermore distinguish between full-time and part-time education and find that full-time education reduces to a greater extent the entry into motherhood than part-time education (figure 3). We assume that this is an evidence that women in full-time education are more involved in the educational process and do concentrate on education more than women in part-time education. Women in part-time education have some fifty per cent higher first-conception intensities compared to those in full-time education.⁴⁹

One novelty of this paper is the finding that the time elapsed since the completion of the last education significantly influences the first-conception intensity. Even after controlling for educational attainment and employment status, this covariate turns out to significantly influence the entry into motherhood. Figure 3 shows the effect. We find that first-conception intensities are relatively low immediately after the completion of an education, show a "jump" after the first year and remain rather stable from then onwards.

During the first year after completion of the last education the intensities are significantly lower than in the second year which is taken as the baseline level (Model 3). Austrian women tend to avoid to get pregnant immediately after finishing education. Surely they want to apply their attained knowledge and get a (stable) job. Kreyenfeld argues that "one would more likely expect a woman to first search for a stable employment situation before she opts for parenthood, assuring the right to return smoothly to her job after childbirth, thus guaranteeing a continuous employment career" (Kreyenfeld 2000a, p.175f). First-conception intensities are rather stable from the second year onwards. We further do not interpret the profile for the effect of the time elapsed since the completion of education and refer to the next chapter which deals with the variation between different levels of educational attainment.

⁴⁸ Although education can occur after the start of childbearing, the reverse sequence is preferred and more common (Rindfuss et al. 1996). In how far a woman's first child "prevents" her from further education she perhaps has intended previously, cannot be analyzed in this model.

⁴⁹ We obtain this percentage by dividing 0.59 by 0.38 in Model 3.

9.4 The "real" catch-up effect

As mentioned before, Bernhardt has found a U-shaped pattern for the effect of the completed educational attainment on first-birth propensities for Stockholm women under 30 years and she has interpreted this finding as a "hurry-up"-effect: "These are women who have had up to the completion of their education very low fertility. Once they finished their education and established themselves in a probably well paid job, they are ready to start their family-building" (Bernhardt 1990, p. 1025). Kravdal (1994) has revealed a significant increasing effect of educational attainment at higher ages and has interpreted this result as a selection or catching-up phenomenon: Well educated women in their late 20s tend to "make up for" their low fertility during previous enrolment, whereas women with low education who are still childless at these ages form a more select group (Kradval 1994, p. 262). Blossfeld and Huinink have found that the level of education has a significant and increasing effect. "More highly qualified women, because they leave the educational system later, come increasingly under pressure from the greater medical problems of late first births as well as from societal age norms (Menken 1985). Women who stay longer in the educational system and attain higher educational resources catch up with their contemporaries with lower levels of education" (Blossfeld and Huinink 1991, p. 164f).

They argue that "not human capital investment, as claimed by the new home economics, but this increasing pressure (medical problems with lateness of first birth, societal age norms) might be the force, if the level of education has an effect on the timing of the first birth."⁵⁰

We argue that a so-called "catch-up" or "hurry-up"-effect can only be found when looking at the interaction of the current educational attainment and the time elapsed since the completion of the last education, as we have done as a next step in our analysis. One intriguing issue of our paper is whether the information on the time elapsed since the completion of the last education would reveal any differences in the propensity of becoming a mother among the various levels of educational attainment. We get a highly significant effect of the interaction

⁵⁰ Beets et al. deal with the medical point of postponing childbirth and the increasing complications with the increase in age at motherhood. They show that the so-called "waiting-time-to-conception" rises with age meaning that with increasing age it takes longer before a fecund woman who tries to conceive gets pregnant. Therefore they conclude that "we can no longer neglect the price (especially emotionally, but also financial) of postponing first birth" (Beets et al. 1993, p. 20). Their conclusion should not be interpreted as "a plea for returning to the days before women's liberation", but they suggest to adequately inform the (young) population

between *current educational attainment* and *time elapsed since the completion of the last education* and find evidence for the "real" catch-up effect for higher educated women. Figure 4 illustrates the effect.

For women who have reached some education beyond compulsory school we find that the higher the educational level the steeper the slope (figure 4). If we interpret the slope as an indicator for a "catch-up" effect, we see that the higher the educational attainment and therefore the longer women have postponed their first child, the higher the "catch-up"-effect after the completion of education.

Our estimations show that women with higher education try to inhibit childbearing immediately after the completion of their education. The opportunity costs of childbearing for highly educated women may be higher early in their post-educational career than somewhat later in their careers (Liefbroer and Corijn 1999). But they then catch up at a fast pace. Women with higher secondary education have very low first-conception intensities during education and during the first two years after the completion of their education, but after four years they reach the same level as women with basic education or women who have learned for a trade.

When analyzing the main effect of the current educational attainment we have found that women with tertiary education have significantly higher first-conception intensities than women with basic education. Now we see that they start at the same level as those with basic education but the intensity strongly increases during the second and the third year. Assuming that most of these women have entered the labor market we might interpret this as "speeding up" with childbearing once they have a footing on the labor market.

Women with higher secondary education have lower first-conception intensities compared to women with tertiary education for the whole observation period (figure 4). We explain this by a "louder biological" clock. Women who have finished their higher secondary education are at the beginning of their twenties and therefore can more easily postpone childbearing. Women with tertiary education are in general 25 years and older. Even if there is still enough time for

and to offer an adequate supply of facilities which enables the compatibility of a combined professional and family career.

postponing childbearing, part of them decide to have their child rather quickly after their studies and to speed up the process of family formation in order to "catch up" with their peers in terms of life cycle stage.

Women who learned for a trade have rather stable first-conception intensities over time since the completion of the last education. This pattern implies that the opportunity costs of family formation remain more or less constant for them. Comparing the transition rates of women with higher secondary education, we see that those who have learned for a trade have higher rates for all periods.

What about women with basic education? As we can see in figure 4 they have rather low intensities in the first year, but a peak in the second year.⁵¹ We interpret this peak as an indicator for a higher degree of family orientation for women with basic education only. Women with no further formal education beyond compulsory school are supposed to be the least of all groups oriented towards a working career and they might compensate their unfavorable employment prospects (Kreyenfeld 2000a) and missing professional challenge by getting a child and concentrating more on family life than on working career or labor market. Their comparatively poor general and vocational education and their overrepresentation in lower ranks of the occupational period might be closely connected with an orientation toward the traditional sex-specific roles that emphasize women's responsibilities as housewives and mothers (Blossfeld and Huinink 1991).

9.5 What do we gain by introducing the time elapsed since the completion of the last education?

In order to find out what we gain by introducing the time elapsed since the completion of the last education we omit this variable and distinguish only between currently (1) in full-time, (2) in part-time education or (3) not in education (Model 4). Table 3 shows that the effect of tertiary education is no longer significant. Our results indicate that the inclusion of the time elapsed since the completion of the last education reveals a strong significant impact as well as an intriguing time pattern for women with tertiary education. The total effect of the

⁵¹ Supposing that a woman has started to work immediately after the end of the nine years of compulsory school or after breaking off an education, then this is the stage when she gets eligible for maternity leave. This might be

educational attainment operates through the current educational attainment and the time elapsed since the last education. By ignoring the time pattern after the completion of the last education we therefore would get a non-significant higher effect for women with tertiary education. The direction and the significance for higher secondary education and trade remain stable (figure 5).

In addition, it turns out that omitting the time elapsed since the completion of the last education leads to minor changes in the effect of the current age. Comparing the intensity rates of the current age (figure 6) reveals that without the time elapsed since the completion of the last education the influence of the current age is lower for young women and slightly higher for women aged 24 and more. Leaving out the time elapsed since the last education slightly confounds the effect of the current age. Most women under 20 who are not in education just have finished their education and we have find especially during the first year after the completion of an education conception intensities are rather low. The effect of age on fertility is partly due to low conception intensities immediately after the completion of education.

10 Discussion

Formal education is one of the most important determinants in our society. "Education increases access to knowledge, information and new ideas. It enhances overall efficiency, opportunities in the labor market and social status. And, it changes attitudes and behaviors and makes people more autonomous" (Beets 1998, p. 104). Our paper contributes to the studies on the relationship between educational attainment and entry into motherhood by including an aspect that has be neglected up to now, as far as we know, namely the time since the completion of education.

In this study we have considered the effect of educational attainment and the time elapsed since the completion of an education on the entry into motherhood among Austrian women. We have applied a piecewise constant exponential model and have estimated the hazard rates for the main explanatory covariates mentioned above, controlling for several demographic

another explanation for the peek during the second year after the completion of education. Nevertheless, we do not find a corresponding effect for women with other levels of educational attainment.

and socio-economic factors that have been found or hypothesized to influence fertility behavior.

The timing of a woman's first birth has important implications for her subsequent life options. Therefore the incorporation of the time since the completion of the last education and the distinction between different educational levels is of considerable interest, since it allows a dynamic analysis of the relationship between family-formation and educational attainment. Our analysis reveals that the pace of entry into motherhood varies substantially among women with different levels of educational attainment.

We find evidence that women with basic education and no further formal education are to a greater extent family oriented compared to women who have learned for a trade or who have a higher secondary education. Due to their poor general and vocational education they are supposed to find a job mostly in low paid occupations and to have only limited career prospects on the labor market. From an economic point of view their opportunity costs of childbearing and childrearing are rather low. This explains the intensity of the conception of the first child as very high soon after the completion of (compulsory) education.

In Austria we observe a strong gender-specific segregation in apprenticeship. Eight out of ten female apprentices are employed in three main types of training: (1) trade and commerce, (2) beauty care and (3) food sector and guest trades (Fraiji and Lassnigg 1995). With other words, girls who learn or have learned for an apprenticeship are for the majority sales personnel, hairdressers, waitresses or cooks. They are often seen as cheap workers and their formation is not very future-oriented. Further specification and educational training is often not provided or available and women find themselves in an occupational "blind-alley" (Rowhani-Ennemoser 1995). Women who have learned for an apprenticeship often have no adequate employment. About one half of female blue collar workers who have learned for an apprenticeship is employed under their qualification, they work as unskilled workers or as semiskilled workers⁵². Among blue collar workers with the same qualification women are often employed in lower positions than men (Wiederschwinger 1995). Due to this rather frustrating occupational situation young women might shift their priorities, concentrate less on work, more on family (Wiederschwinger 1995) and get a child sooner compared to women

with higher education. Austrian women who have learned for an apprenticeship have higher rates of entry into motherhood than women with higher secondary education.

For women with higher educational attainment we find clear evidence that the costs involved when having a child immediately after the completion of an education are very high. This again goes in line with the economic perspective of high opportunity costs for highly educated women. Women who have invested several years in a higher education want to use their human capital, apply what they have learned, earn money and maybe compensate the long period of financial dependency during the educational period.

But the pattern of the first-conception intensity for women with tertiary education reveals new insights as we follow a woman further after the completion of her education. The level of educational attainment is supposed to be a substitute for career prospects and wages. Empirical and theoretical investigations seem to indicate that woman's higher earning capacity could be expected to reduce first-birth rates (Kravdal 1994), but we find that women with the highest formal education "speed-up" with childbearing. During the second and the third year after the completion of education their first-conception intensities are steeply increasing. We interpret this phenomenon as a "speed-up effect".

Furthermore we may assume that there is a positive assortative mating, i.e. that women of the highest educational group also have partners with an equivalent educational attainment and that they can more easily afford childcare facilities like day nursery, child-minder or private kindergarden than women with lower formal education. In Austria, public child-care facilities are very limited for children under three years.

In 1999, four out of ten economically active women with tertiary education have been working as a teacher, two out of ten have been employed in the branches health service, veterinarian or social services (Statistics Austria, 2001). Therefore some 60 per cent of all employed women with tertiary education have belonged to these branches and although exact data are not available, we speculate that the employer in these branches is often the state or

⁵² The corresponding proportion among men is only one quarter.

the public sector.⁵³ We furthermore suppose that in these domains working places have used to be quite safe and returning to work after maternity leave in general has been less problematic compared to the private sector. This might be a further reason why women with university degree or other post-secondary education more often and sooner get their first child after their education compared to women with higher secondary education.

A higher level of education attainment implies a longer period of educational enrollment, which has in itself a direct and strong decreasing effect on the likelihood of union formation and of marriage (Blossfeld and Jaenichen 1992) and a consistent finding is that women with higher levels of education have a later age pattern of childbearing.⁵⁴ The generally accepted explanation stresses the difficulty of combining student and mother roles. Having postponed childbearing until the completion of education, the "ticking biological clock" for childless women of the highest educational groups seems to be a reason for the decision to have a child rather soon after the completion of education and - for most of them - the entrance into the labor market.

These results on women with tertiary education contradict micro-economic theories which hold that high direct costs and opportunity costs of childbearing reduce the probability of having a(nother) child. Kravdal (1994) states that for a childless couple the fundamental issue is not only: "Do we have a child now or do we not?" The decision problem may equally well be formulated as: "Do we have a child now or later?" The opportunity costs of childbearing are supposed to be very high for women with tertiary education who have worked for one or two years. After their long period of education they "finally" entered the labor market and have achieved working experience which often opens interesting occupational opportunities. Women who decide to start childbearing at this stage are supposed to have difficulties in progressing further up the career ladder, as they have to dedicate part of their time to childrearing - even if they use purchased child care like nannies or child-minders.

⁵³ Among economically active women with higher secondary education 36.1 per cent have belonged to these mentioned branches (Statistics Austria 2001).

⁵⁴ B. Hoem brings a more broader explanation for the postponement of childbearing. She argues that "instead of a simplistic theory to the effect that the postponement of family formation has mostly been driven by the improvement in educational achievement and consequent developments in the labor market, an alternative explanation is that recent family trends in Sweden can also be seen as the outcome of a series of successive adjustments induced by general social and attitudinal changes. The transformation of gender roles is thus only one (albeit important) factor along with many others that affect young people's plans and hopes for the future" (B. Hoem 1995, p. 36).

Nevertheless, our results clearly indicate that women with tertiary education enter motherhood during this time, i.e. rather soon after the completion of their education and they have high first-conception intensities also from the fourth year onwards, when the degree of financial deprivation in case of pregnancy and a "baby-pause" is high.

Childbearing is seen as an "important part of full a life" (B. Hoem 1995, p.52), but more and more young people postpone childbearing and want to enjoy life, to get a good education and settled to a certain degree in the labor market before family formation. A piece of evidence that goes in this line comes from a survey conducted recently among men and women aged 20 to 40 years in Upper Austria. Asked about their goals for the next years, single and childless women as well as men have been found to be more interested in enjoying life, getting ahead in their jobs, realizing their potential and improving their standard of living than in starting a family and having children (Kytir et al. 2000).

In the general discussion on the (in)compatibility between labor force participation of (young) women and their family formation behavior these results underline the importance of public childcare facilities and a legal basis for part-time maternity leave for mothers. Especially for higher educated women a long absence from the labor market for childrearing has a strong negative effect on her human capital and her chances to return into the labor market. It should therefore be an important task of social policies to relieve the compatibility of child rearing and employment.⁵⁵

⁵⁵ Hoem et al. (1999) characterize Austria as a country that "has retained much of old spirit of family-role specification" and stress the greater difficulties of combining motherhood and labor-force participation in Austria (compared to Sweden).

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12 Tables and figures

Table 1: Number of respondents excluded from the analysis and censoring by cause

Total number of records		6,120
Of these for women		4,581
Of the records for female respondents:		
A. Excluded cases		
Cause of exclusion		
Foreign nationality		188
Missing information on children		2
Missing information on start or completion of a union		31
Missing information on change of location		6
Missing information on educational period		80
Woman was less than 15 years at the conception of the first child		14
Sum of exclusions		321
B. Occurrences		
	End date	
Conception of the first child	Date of the conception	3,296
C. Censored Cases		
Cause of censoring		
	Censor date	
No child conceived	Date of interview	922
End of second union	Date of the end of the second union	42
Total number of cases		4,260

Source: Austrian FFS, own calculations.

Table 2: Relative risks of the conception of the first child in Austria, selected models I

Covariate	Model 1	Model 2	Model 3
Educational attainment			
Basic education	1	1	1
Apprenticeship	1.06	1.06	1.03
Lower-secondary education	0.98	0.98	
Professional training without matura	1.07	1.10	0.68
Professional training with matura	1.33		
Gymnasium	0.64	0.68	0.68
Occupation-oriented education	0.72		
Post-secondary college	1.14	1.13	1.24
University	1.46	1.45	
Time elapsed since the completion of last			
Currently in full-time education	0.39	0.39	0.38
Currently in part-time education	0.61	0.61	0.59
0-4 months	0.81	0.81	0.72
5-12 months	0.69	0.69	
13-18 months	1.04	1.04	1
19-24 months	1	1	
25-36 months	0.92	0.92	0.90
37-48 months	1.08	1.08	1.04
49-60 months	1.06	1.06	
61 months and more	1.10	1.09	
Employment status			
Not employed	1	1	1
Employed	0.77	0.78	0.77
Union status			
No union	0.39	0.39	0.39
Cohabiting	1	1	1
Married	1.93	1.93	1.93
Current age			
15-17 years	0.30	0.30	0.30
18-19 years	0.94	0.94	0.94
20-23 years	1	1	1
24-27 years	0.92	0.92	0.94
28-29 years	0.79	0.79	0.81
30 years and more	0.33	0.33	0.34
Siblings			
None	0.80	0.80	0.80
One	1.00	1.00	1
Two	1	1	
Three	1.01	1.01	
Four	1.13	1.13	1.18
Five and more	1.21	1.21	
Size of town			
Under 10,000 inhabitants	1	1	1
10,000-1 Mio. inhabitants	0.88	0.88	0.88
Vienna	0.74	0.74	0.74

Table 2 (cont'd): Relative risks of the conception of the first child in Austria, selected models I

Covariate	Model 1	Model 2	Model 3
Calendar period			
Before 1974	1.41	1.41	1.42
1974-1979	1.06	1.06	1.06
1980-1987	1	1	1
1988 and later	1.10	1.10	1.11

Remark: Numbers in boldface type indicate that the specific level is significantly different (at the 5 per cent level) from the baseline level.
Source: Austrian FFS, own calculations.

Table 3: Relative risks of the conception of the first child in Austria, selected models II

Covariate	Model 3	Model 4	Model 5
Educational attainment			
Basic education	1	1	1
Trade	1.03	0.97	0.99
Higher secondary education	0.68	0.62	0.68
Tertiary education	1.24	1.09	1.19
Time elapsed since the completion of last education			
Currently in full-time education	0.38	0.41	0.43
Currently in part-time education	0.59	0.62	0.62
1 st year	0.72	1	0.74
2 nd year	1		1
3 rd year	0.90		0.90
4 th year and later	1.04		1.04
Employment status			
Not employed	1	1	
Employed	0.77	0.79	
Union status			
No union	0.39	0.38	0.39
Cohabiting	1	1	1
Married	1.93	1.96	1.94
Current age			
15-17 years	0.30	0.26	0.32
18-19 years	0.94	0.85	0.96
20-23 years	1	1	1
24-27 years	0.94	0.99	0.93
28-29 years	0.81	0.86	0.81
30 years and more	0.34	0.36	0.34
Siblings			
None	0.80	0.80	0.81
1-3	1	1	1
Four or more	1.18	1.18	1.18
Size of town			
Under 10,000 inhabitants	1	1	1
10,000-1 Mio. inhabitants	0.88	0.88	0.89
Vienna	0.74	0.74	0.75
Calendar period			
Before 1974	1.42	1.43	1.42
1974-1979	1.06	1.06	1.05
1980-1987	1	1	1
1988 and later	1.11	1.11	1.11

Remark: Numbers in boldface type indicate that the specific level is significantly different (at the 5 per cent level) from the baseline level.
Source: Austrian FFS, own calculations.

Table 4: Distribution of occurrences and exposures

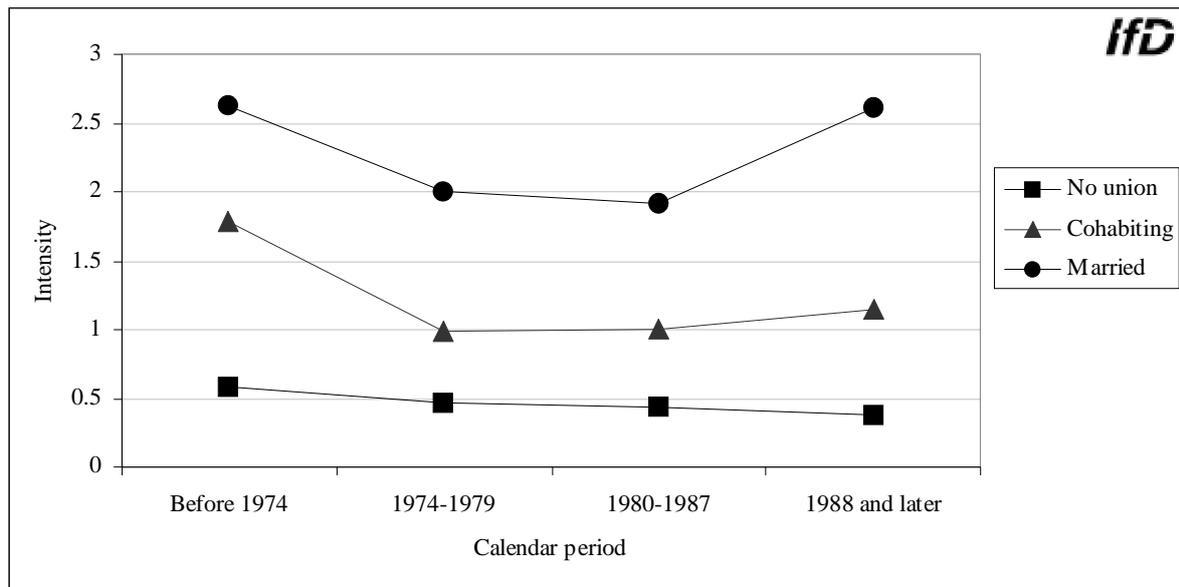
Covariate	Occurrences		Exposures		Characteristics of respondents	
	Numbers	%	Half-months	%	number	%
Educational attainment						
Basic education	1,258	38.2	466,619	52.0		
Apprenticeship	919	27.9	165,637	18.5		
Lower secondary education	520	15.8	111,381	12.4		
Professional training without matura	238	7.2	44,862	5.0		
Professional training with matura	42	1.3	8,592	1.0		
Gymnasium	76	2.3	45,744	5.1		
Occupation-oriented education	96	2.9	28,383	3.2		
Post-secondary education	77	2.3	15,126	1.7		
University	70	2.1	10,176	1.1		
Time elapsed since the completion of the						
Currently in full-time education	270	8.2	259,561	29.0		
Currently in part-time education	17	0.5	8,110	0.9		
0-4 months	101	3.1	49,291	5.5		
5-12 months	146	4.4	71,154	7.9		
13-18 months	165	5.0	46,822	5.2		
19-24 months	157	4.8	42,461	4.7		
25-36 months	339	10.3	75,131	8.4		
37-48 months	368	11.2	62,968	7.0		
49-60 months	326	9.9	51,984	5.8		
61 months and more	1,407	42.7	229,038	25.5		
Employment status						
Not employed	845	25.6	384,989	42.9		
Employed	2,451	74.4	511,531	57.1		
Union status						
No union	1,367	41.5	688,536	76.8		
Cohabiting	609	18.5	99,300	11.1		
Married	1,320	40.0	108,684	12.1		
Current age						
15-17 years	147	4.5	201,993	22.5		
18-19 years	497	15.1	186,872	20.8		
20-21 years	659	20.0	156,266	17.4		
22-23 years	651	19.8	114,188	12.7		
24-25 years	525	15.9	77,519	8.6		
26-27 years	356	10.8	49,610	5.5		
28-29 years	219	6.6	30,899	3.4		
30 years and more	242	7.3	79,173	8.8		
Calendar period						
Before 1974	957	29.0	247,015	27.6		
1974-1979	557	16.9	149,597	16.7		
1980-1987	875	26.5	253,473	28.3		
1988 and later	907	27.5	246,435	27.5		

Table 4 (cont'd): Distribution of occurrences and exposures

Covariate	Occurrences		Exposures		Characteristics of respondents	
	Numbers	%	Half-months	%	Numbers	%
Siblings						
None	326	9.9	111,702	12.5	468	11.0
One	760	23.1	229,018	25.5	1,072	25.2
Two	766	23.2	214,399	23.9	1,019	23.9
Three	558	16.9	143,814	16.0	698	16.4
Four	348	10.6	80,832	9.0	398	9.3
Five and more	520	15.8	112,294	12.5	584	13.7
No answer	18	0.5	4,461	0.5	21	0.5
Size of town						
Under 10,000 inhabitants	2,232	67.7	566,647	63.2	2,789	65.5
10,000-1 Mio. inhabitants	699	21.2	216,967	24.2	975	22.9
Vienna	317	9.6	100,874	11.3	436	10.2
No answer	48	1.5	12,032	1.3	60	1.4
Sum	3,296	100	896,520	100	4,260	100

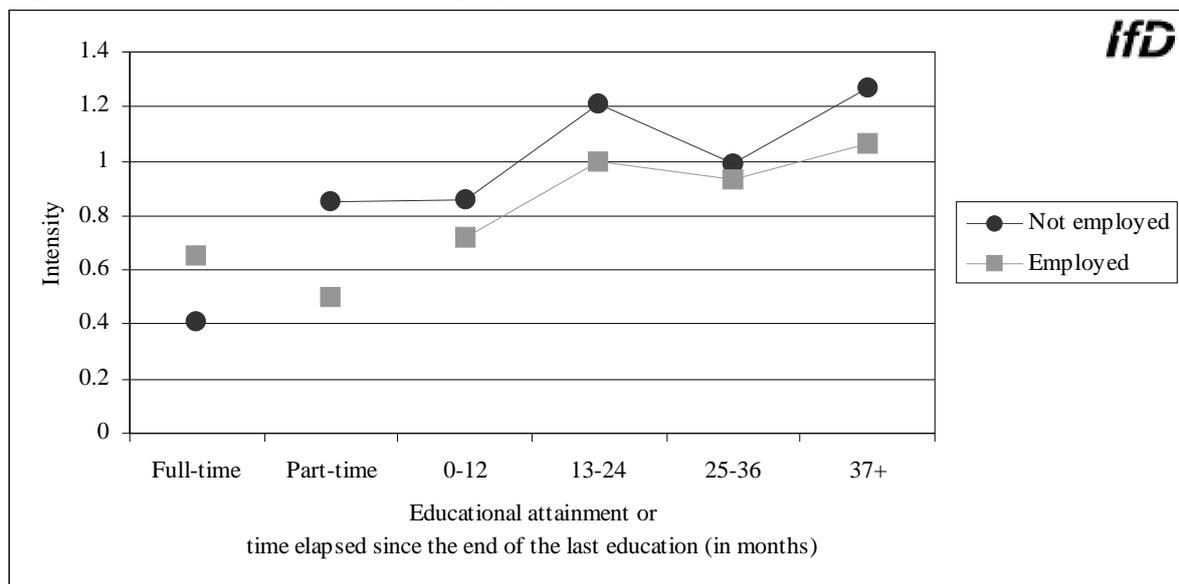
Source: Austrian FFS, own calculations.

Figure 1: First-conception intensities among Austrian women, interaction between calendar period and union status



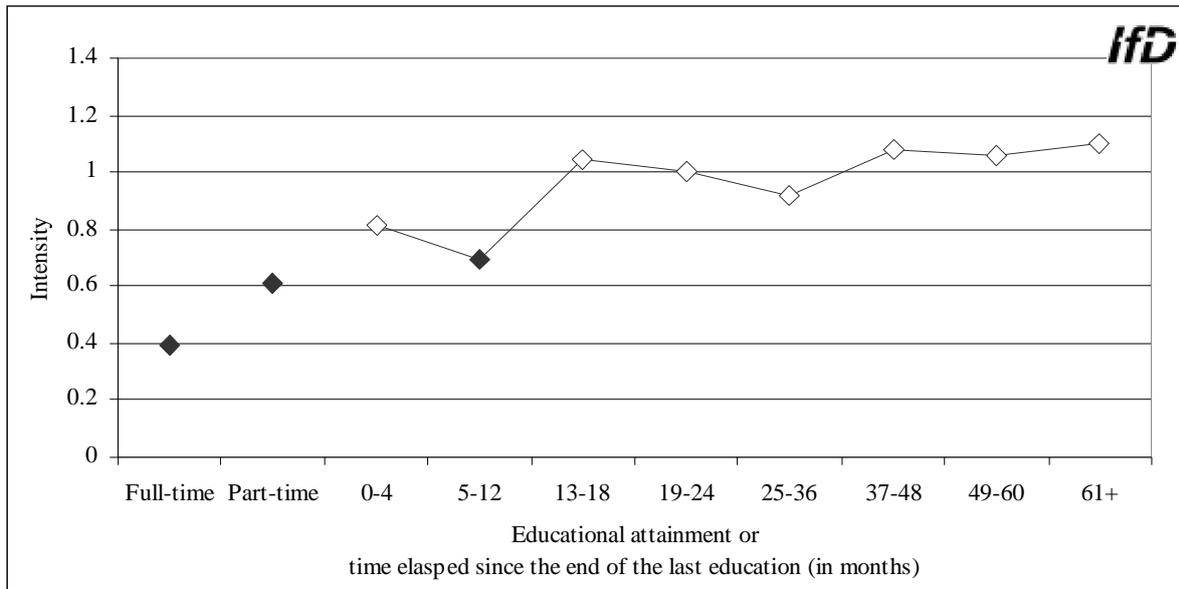
Source: Austrian FFS, own calculations.

Figure 2: First-conception intensities among Austrian women, interaction between time elapsed since last education and employment status



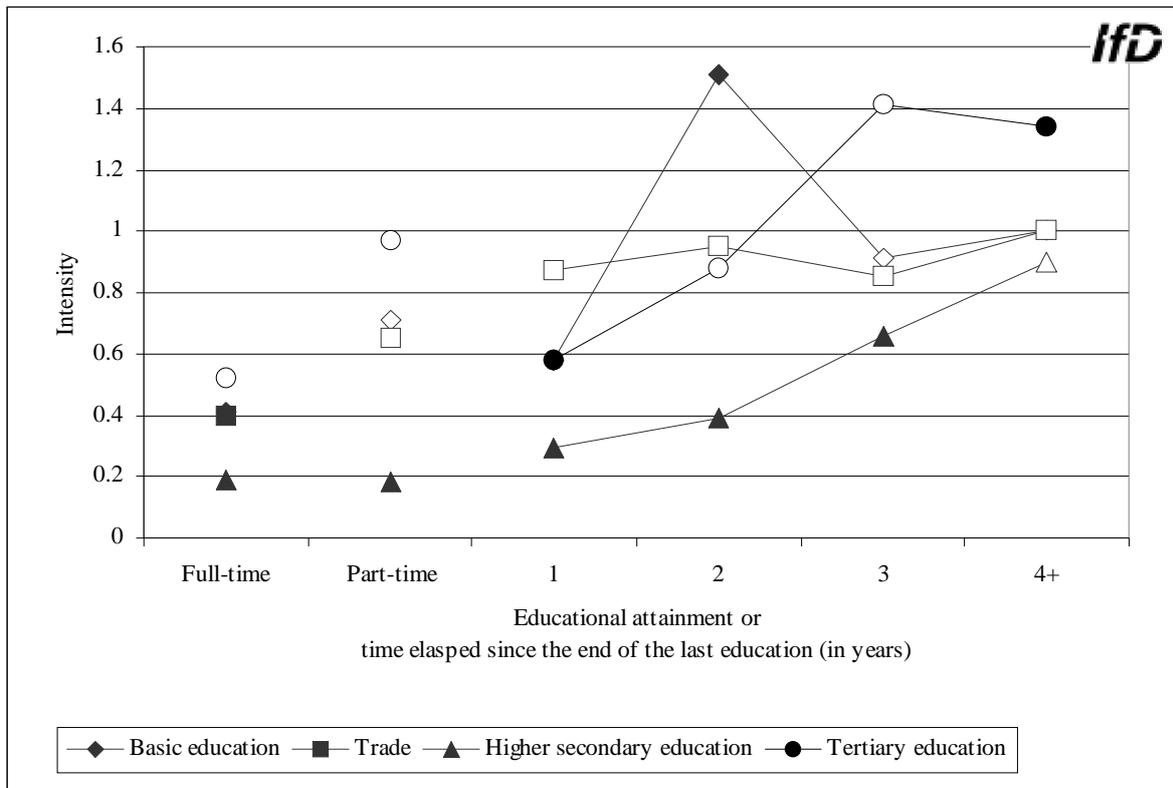
Source: Austrian FFS, own calculations.

Figure 3: The effect of the time elapsed since the completion of the last education on first-conception intensities, Austrian childless women, controlling for various factors (model 1)



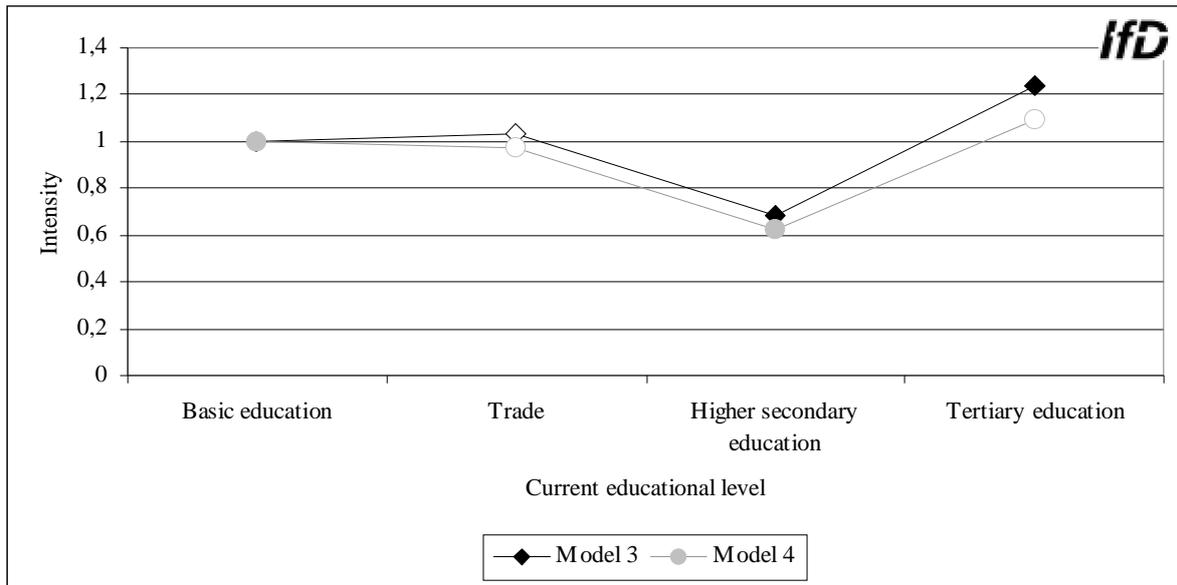
Remark: Full boxes indicate that the corresponding level is significantly different from the baseline level (19-24 months).
Source: Austrian FFS, own calculations.

Figure 4: First-conception intensities among Austrian women, interaction between time elapsed since the completion of the last education and current educational attainment



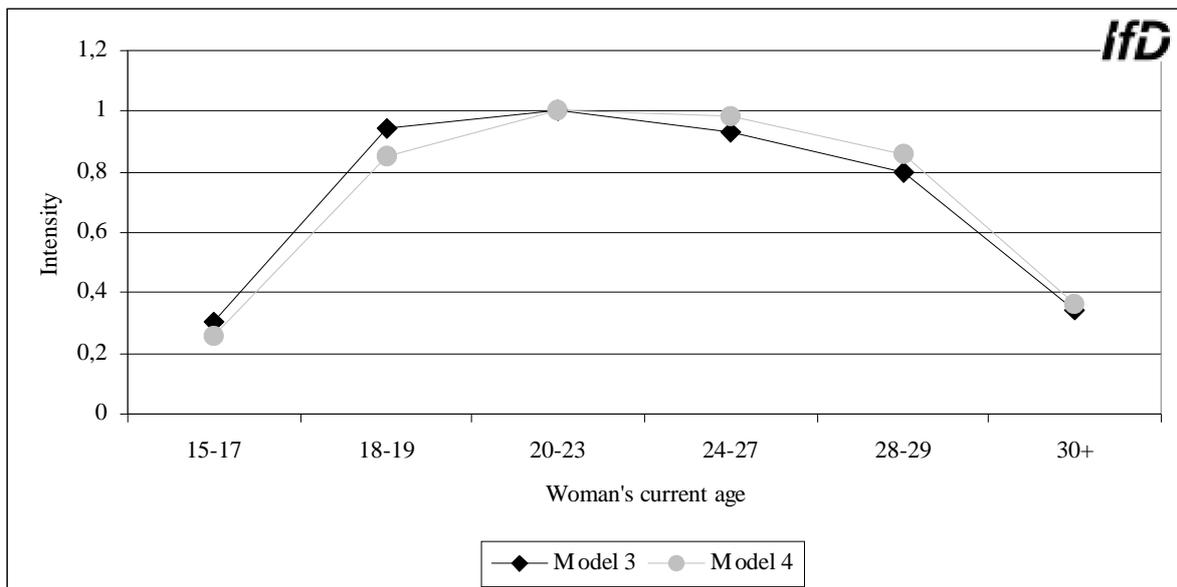
Remark: Full boxes indicate that the corresponding level is significantly different from the baseline level (basic education and 4th year or later after the completion of the last education).
Source: Austrian FFS, own calculations.

Figure 5: Effect of current educational attainment on first-conception intensities in a model with and without controlling for the time elapsed since the last education



Remark: Full boxes indicate that the corresponding level is significantly different from the baseline level (basic education). Model 3 controls for the time elapsed since the completion of the last education, model 4 does not include this covariate. Source: Austrian FFS, own calculations.

Figure 6: Effect of current educational attainment on first-conception intensities in a model with and without controlling for the time elapsed since the last education

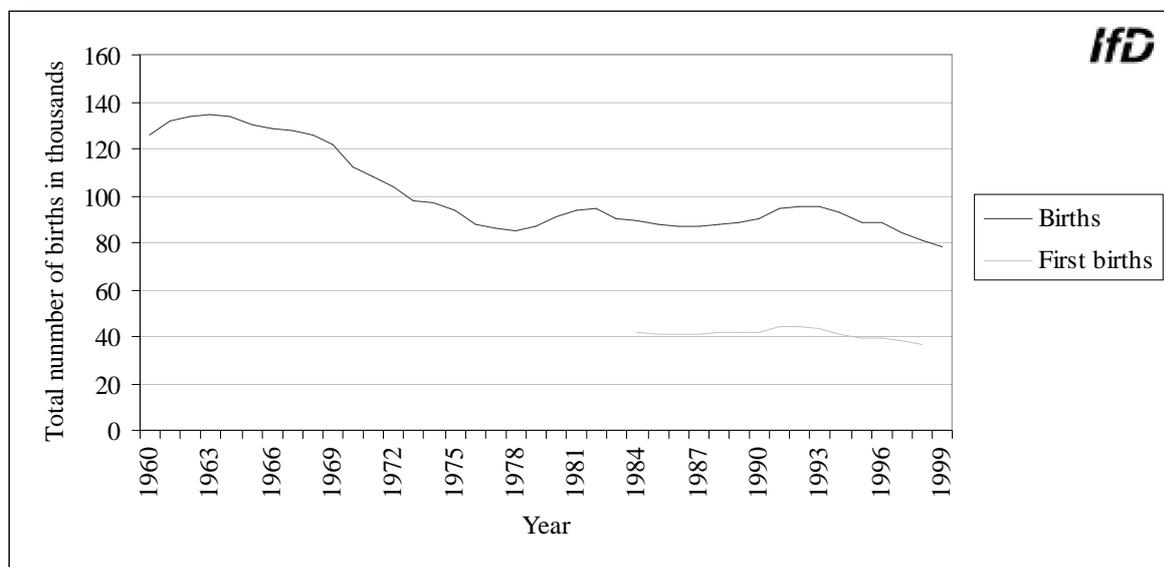


Remark: Full boxes indicate that the corresponding level is significantly different from the baseline level (basic education). Model 3 controls for the time elapsed since the completion of the last education, model 4 does not include this covariate. Source: Austrian FFS, own calculations.

13 Appendix

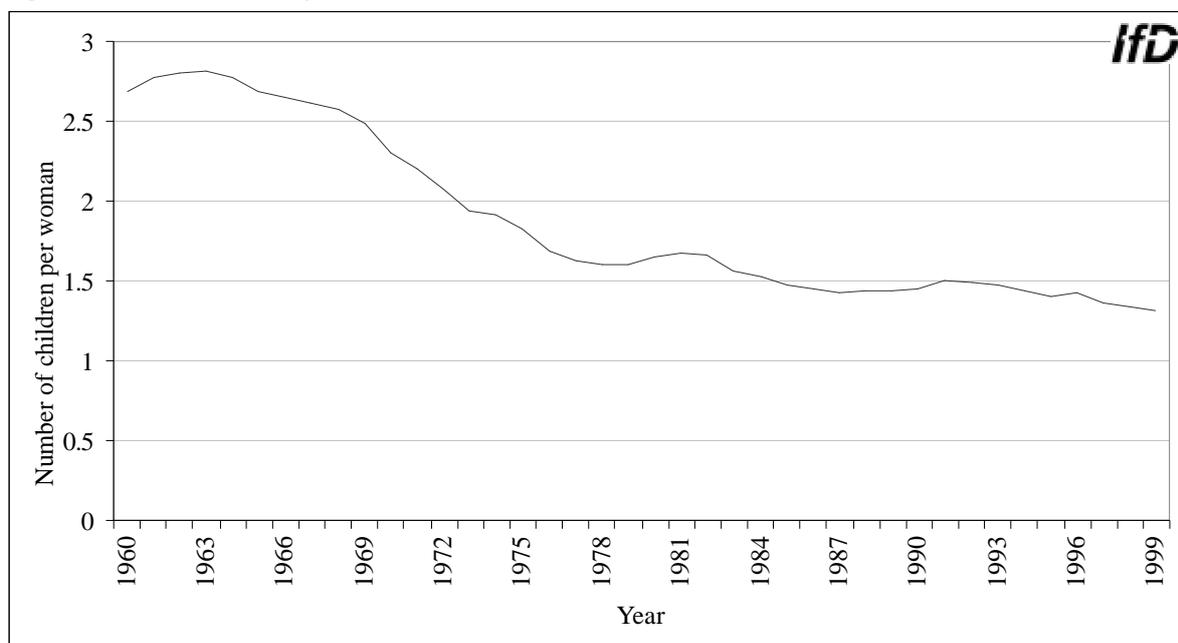
13.1 Tables and figures

Figure A1: Number of live births in Austria, 1960 – 1999



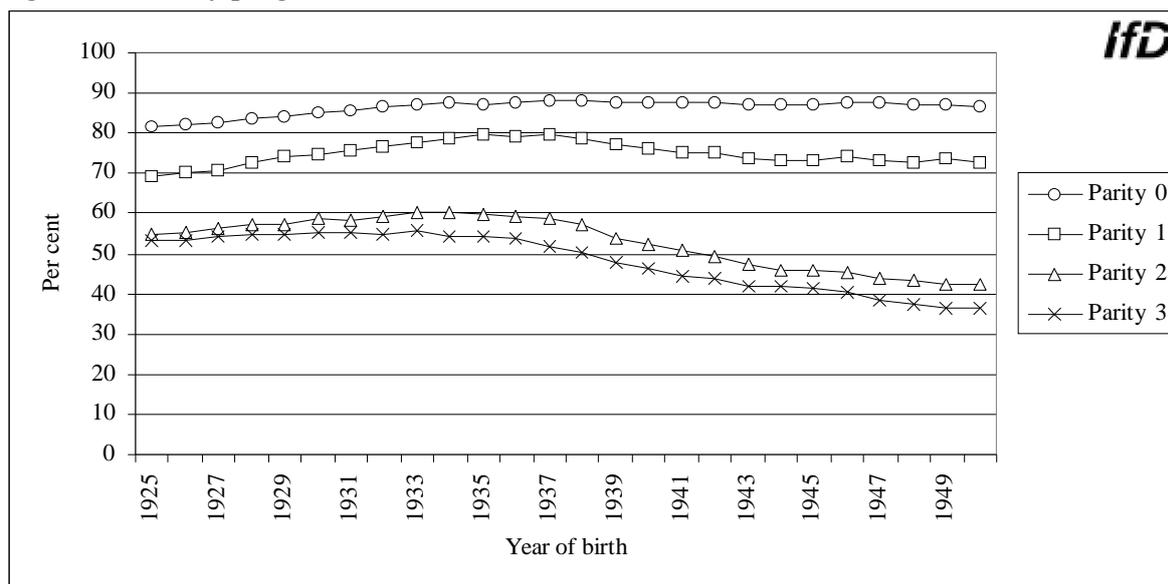
Remark: Data on first births are available only since 1984. Before that time "only" marital first births were coded.
Sources: Demographisches Jahrbuch Österreichs 1998, Working tables of the Austrian Central Statistic Office, Statistische Übersichten 1. Quartal 2001.

Figure A2: Total fertility rate, Austria, 1960 – 1999



Sources: Demographisches Jahrbuch 1982, Demographisches Jahrbuch 1998, Statistische Übersichten 1. Quartal 2001.

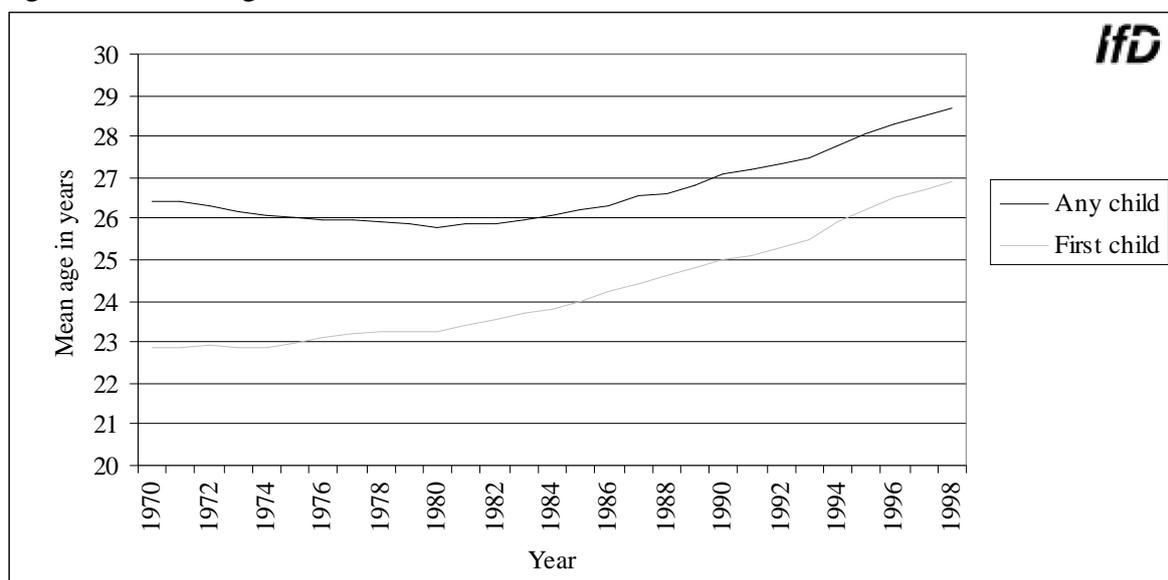
Figure A3: Parity progression ratio in Austria, women born in 1925 - 1950



Remark: The graph shows the probability of having a(nother) child by current parity. Parity progression ratios at parities 4 and 5 are very close to those for parity 3 and are not shown in the figure.

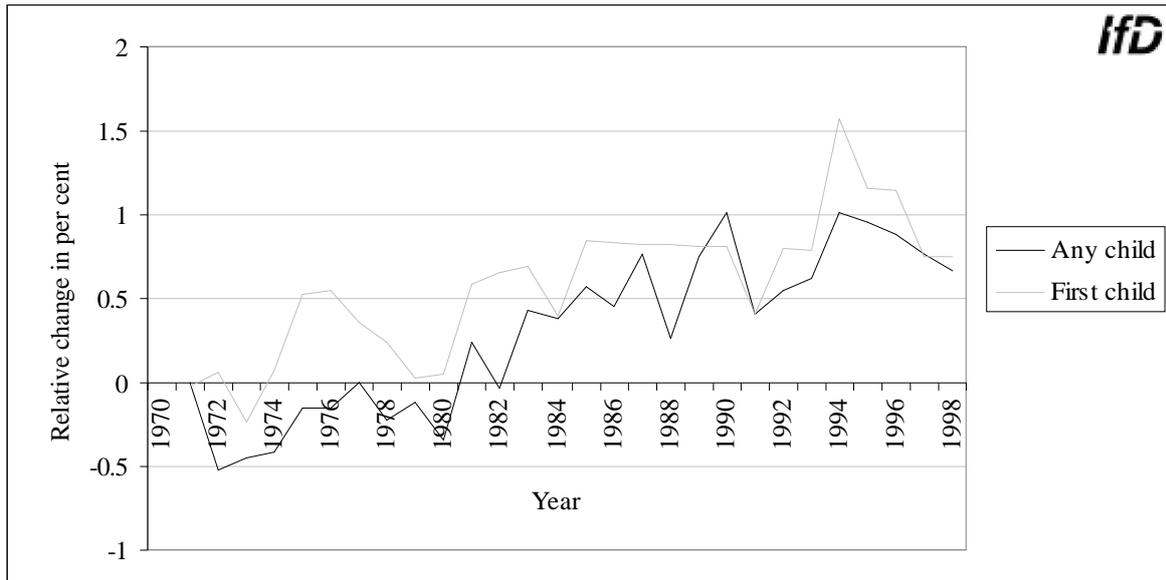
Sources: Hanika (1996), Working tables of the Austrian Central Statistic Office.

Figure A4: Mean age at childbirth, Austria, 1960 – 1999



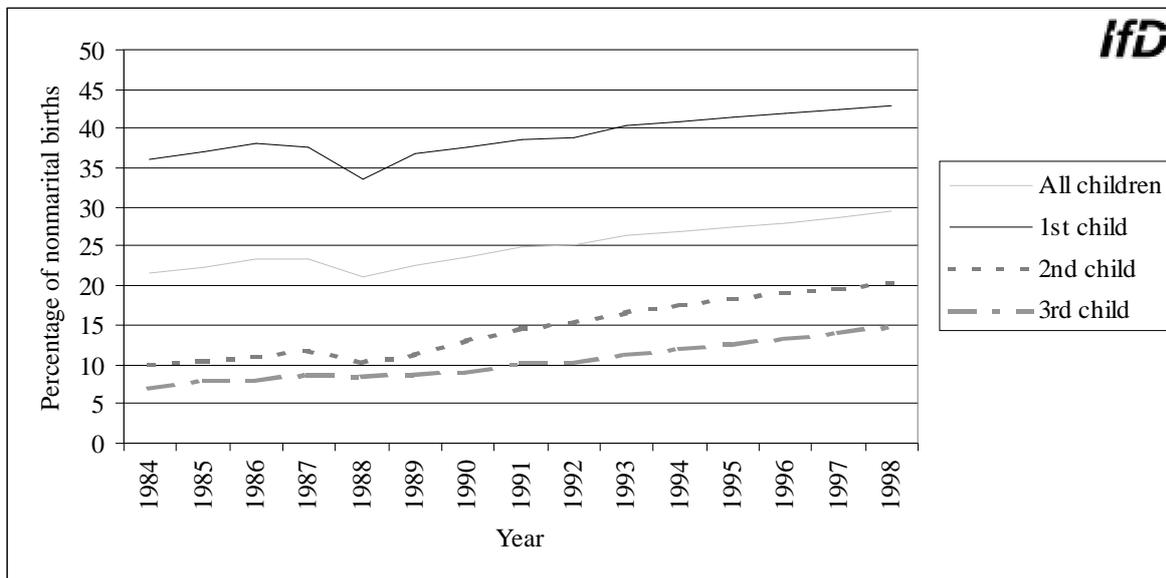
Sources: Working tables of the Austrian Central Statistic Office, Demographisches Jahrbuch Österreichs 1997, calculations by Josef Kytir based on the Population Census 1981 (the values between 1981 and 1983 are interpolated), Demographisches Jahrbuch Österreichs 1998.

Figure A5: Relative change in the mean age at childbirth, Austria, 1970 – 1998



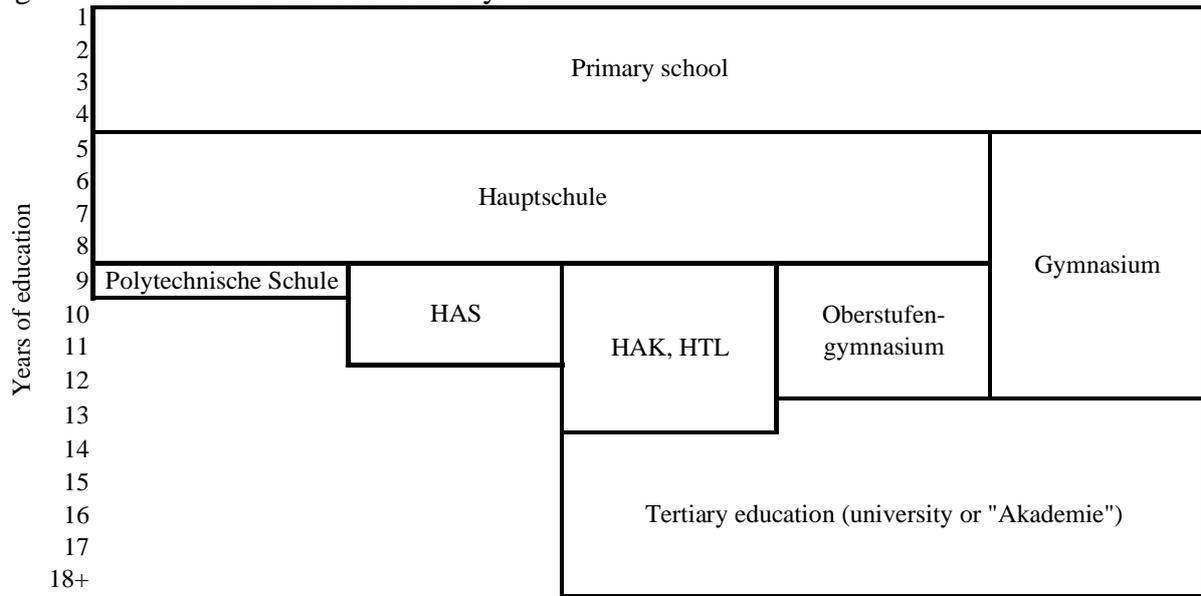
Sources: Working tables of the Austrian Central Statistic Office, Demographisches Jahrbuch Österreichs 1997, calculations by Josef Kytir based on the Population Census 1981 (the values between 1981 and 1983 are interpolated), Demographisches Jahrbuch Österreichs 1999, own calculations.

Figure A6: Nonmarital births in Austria, 1984 – 1998



Source: Kytir and Münz (1999b).

Figure A7: The Austrian educational system



Remark: The first nine years are compulsory for all children.

Table A1: Educational attainment of women, 15 – 45 years, Austria, 1991, in per cent

	Basic education	Trade	Higher secondary education	Tertiary education
15	99.8	0.2	0.0	0.0
16	98.6	1.4	0.0	0.0
17	93.2	6.8	0.0	0.0
18	71.3	21.5	7.2	0.0
19	40.0	39.9	20.1	0.0
20	27.6	45.3	27.1	0.1
21	25.6	47.2	26.6	0.7
22	24.7	48.1	25.1	2.1
23	24.7	48.3	23.3	3.6
24	25.0	48.9	21.4	4.7
25	25.5	49.1	19.0	6.4
26	26.0	49.5	16.9	7.6
27	27.1	49.5	14.9	8.5
28	27.6	49.6	13.6	9.2
29	28.1	49.3	12.8	9.8
30	29.0	49.0	12.1	9.9
31	29.3	49.2	11.2	10.3
32	30.2	48.7	10.6	10.5
33	31.4	47.5	10.1	10.9
34	33.4	46.4	9.1	11.1
35	35.1	45.7	8.2	11.0
36	36.1	45.6	7.8	10.5
37	37.6	45.3	7.4	9.7
38	37.9	46.3	6.8	9.0
39	38.2	46.7	6.6	8.4
40	39.7	46.7	5.9	7.7
41	40.3	46.8	6.0	6.9
42	40.4	47.1	6.7	5.7
43	39.6	48.1	7.5	4.8
44	39.8	48.0	7.8	4.4
45	41.6	46.7	7.5	4.2
15-45	38.2	43.2	12.3	6.2
30-45	35.8	47.2	8.4	8.6

Remark: The category *Trade* includes persons with apprenticeship or lower-secondary education (*Fachschule*).
Sources: Population Census 1991 (Austrian Central Statistical Office 1997).

Table A2: Educational attainment of men, 15 – 45 years, Austria, 1991, in per cent

	Basic Education	Trade	Higher secondary education	Tertiary education
15	99.9	0.1	0.0	0.0
16	99.5	0.5	0.0	0.0
17	97.1	2.9	0.0	0.0
18	75.7	19.5	4.8	0.0
19	37.5	47.3	15.2	0.0
20	23.6	54.4	22.0	0.0
21	19.4	56.8	23.7	0.1
22	18.4	57.4	23.6	0.6
23	18.1	57.8	22.6	1.5
24	17.9	58.1	21.4	2.6
25	18.8	58.0	19.5	3.7
26	18.9	58.5	17.5	5.1
27	18.4	59.0	16.1	6.5
28	18.2	59.4	14.9	7.6
29	18.0	59.3	14.3	8.4
30	18.0	59.5	13.5	9.0
31	18.7	59.1	12.8	9.4
32	18.8	59.0	12.5	9.7
33	19.5	58.3	12.1	10.0
34	20.3	57.8	11.6	10.3
35	21.9	56.4	11.1	10.6
36	22.2	56.6	10.7	10.6
37	22.2	57.4	9.9	10.4
38	23.1	57.0	9.6	10.3
39	23.7	57.4	9.1	9.9
40	24.2	58.0	8.3	9.5
41	25.0	57.5	8.3	9.3
42	23.5	58.8	8.3	9.4
43	23.6	59.0	8.8	8.7
44	23.1	59.8	8.7	8.5
45	24.5	58.1	8.9	8.5
15-45	28.9	52.1	13.0	6.1
30-45	21.8	58.2	10.4	9.6

Remark: The categorie *Trade* includes persons with apprenticeship or a lower-secondary education (*Fachschule*).
Sources: Population Census 1991 (Austrian Central Statistical Office 1997).

Table A3: Cross-classification of union status at conception and at the birth of the first child, distribution of occurrences

		Union status at childbirth			
		No union	Cohabiting	Married	Sum
Union status at conception	No union	668 (48.9%)	147 (10.8%)	552 (40.4%)	1,367 (100%)
	Cohabiting	0	350 (57.5%)	259 (42.5%)	609 (100%)
	Married	8 (0.6%)	0	1312 (99.4%)	1,320 (100%)
	Sum	676 (20.5%)	497 (15.1%)	2,123 (64.4%)	3,296 (100%)

Source: Austrian FFS, own calculations.

Table A4: Occurrences and exposures by the time elapsed since the completion of the last education

Time elapsed since last formal education	Total number of occurrences	Percentage of occurrences	Total number of exposures	Percentage of exposures
First year	247	7.5	120,445	13.4
Second year	322	9.8	89,283	10.0
Third year	339	10.3	75,131	8.4
Fourth year onwards	2,101	63.7	343,990	38.4
In full-time education	270	8.2	259,561	29.0
In part-time education	17	0.5	8,110	0.9
Total	3,296	100	896,520	100

Source: Austrian FFS, own calculations.

Table A5: Economically active population aged 15 and more by branches, Austria, 1991
Population Census

Economically active population	Men	Women	Men	Women	Share of women
	Absolut		In per cent		
Agriculture and forestry	118,191	96,283	5.5	6.3	44.9
Industry and production	990,048	322,408	45.9	21.1	24.6
Service	1,050,676	1,106,676	48.7	72.6	51.3
Total	2,158,915	1,525,367	100	100	41.4

Source: Austrian Central Statistical Office, Ladstätter 1994.

Table A6: Classification of all educational periods before the conception of the first child

	Age at start		Age at end		Duration		Number of	
	Min	Max	Min	Max	Min	Max	excluded records	final spells
Basic education	20.4	35.6	20.6	40.2	0.1	0.8	0	9
Apprenticeship	13.9 (12)	39.3	16	40.2	0.1	5.8 (11.1)	3	162
Lower-secondary education	13.8	39.3	15.4	39.3	0.1	3.9 (8.4)	1	35
Gymnasium	9.8	34.2	16.6	38.3	0	10.8	0	17
Occupation-oriented education	13.9	22.8	18.3	26.8	2.7	4.8 (9.3)	0	17
Professional training without Matura	14.3	47.9	17.6	47.9	0.1	4.8 (7.1)	1	98
Professional training with Matura	17.7	46.4	20.7	49.4	0.7	3.5 (19)	1	15
University	18.1	49.5	20.2	55	0.4	9.4 (19.4)	7	53
Post-secondary education	17.8	48.6	20.2	49.5	0.1	5.8 (7.8)	2	22
Postgraduate education	21.2	40.5	21.2	41.3	0.1	3.9	0	5
Final records for the analysis							15	433

Remark: Numbers in brackets indicate that these cases have been excluded in a later version.

Source: Austrian FFS, own calculations.

13.2 Descriptive results

Our dataset includes 4,260 Austrian women and three out of four has at least one child at the time of interview. Two thirds of our respondents have lived up to their 15th birthday in small towns with less than 10,000 inhabitants, 23 per cent have grown up in town with 10,000 up to 1 Million inhabitants, 10 per in Vienna. One out of ten women has no sibling, one quarter reports one sibling, one quarter has two siblings and four out of ten have grown up in families with four and more children.

Among the 3,296 first births in our data, 1,367 (41 per cent) have been conceived outside a union, 609 (18 per cent) during woman's cohabitation and 1,320 (40 per cent) within marriage. Therefore six out of ten first births in our dataset have been conceived outside marriage, and mainly outside a union (usually before the first union). Even if our event is the conception of the first birth and not the birth of the child, we shortly look at the union status at childbirth: Among the 609 first children out of a consensual union 43 per are born within marriage married, so the parents have converted their consensual union in a marriage during pregnancy.⁵⁶ Among the 1,367 women who have not been living in a union when they got pregnant, 40 per cent have married during pregnancy (see table A3) showing that in our data many women have legalized their union in case of pregnancy.

Four out of ten children have been conceived when the mother had a basic education, four out of ten to mothers who have learned for a trade, 5 per cent to women with higher secondary education and 13 per cent to women with tertiary education. We shortly give the distribution of the exposure time for the different educational levels and the time elapsed since completion of the last education: Basic education constitutes is the biggest educational group (52 per cent) and represents the baseline level in our analysis. It includes women with nine years of compulsory school but with (currently) no further completed formal education. Women who have learned for a trade represent the second largest group with 37 per cent of all exposure time spent in this state. Their professional education has been achieved during an apprenticeship, in a secondary education or by attending courses or classes of professional training. Women with higher secondary education have completed their schooling with

Matura, which entitles them to go to university or to another type of tertiary education. Those who have attended an occupation-oriented education also have achieved a professional training and in general can enter the labour market relatively easy after school. 8 per cent of the exposure time refers to this educational attainment. Not surprisingly, women with tertiary education are the smallest group in our data set (3 per cent of the total exposure time).

When is a first child conceived? As we can see in Table A4 most occurrences (53 per cent) appear during the fourth year or later, roughly ten per cent during the first, second, third or fourth year after the last formal education, or during an education.

Three quarters of all women with at least one child have been employed at the conception of their first child, one quarter have not been employed. The distribution of the occurrences according to the calendar periods shows that 29 per cent of all first births have been conceived before 1974, 17 per cent between 1974 and 1979, 27 per cent between 1980 and 1987 and 28 per cent 1988 or later. Looking at the two-years age groups shows that two out of ten children have been conceived when the woman was under 20 years, 20 to 21 years or 22 to 23 years. Further 16 per cent were 24 to 25 years, 11 per cent 26 to 27 per cent, 7 per cent 28 to 29 years and further 6 per cent 30 years or older. Looking at the cumulative percentages shows that our women have got their first child rather early: Six out of ten have been 23 years or younger at conception of their first child.

10 per cent of our mothers have grown up without sibling, 23 per cent with one or two siblings, 17 per cent with three siblings and 26 per cent in an even bigger family. Two thirds of our mothers have spent most of their childhood in small villages or towns, one quarter in towns with 10,000 up to 1 Million inhabitants and 11 per cent in Vienna.

13.3 Dataset and description of the covariates included in the analysis

The analysis is based on the Austrian Fertility and Family Survey conducted between December 1995 and May 1996 (Doblhammer et al. 1997). In total, 4,581 women and 1,539 men aged between 20 and 54 years have been interviewed retrospectively. For our study we concentrate on women with Austrian citizenship to reduce the heterogeneity of the group. We

⁵⁶ Further 14 per cent have married before the first birthday of the child. Nonmarital cohabitation therefore can

start the observation at the age of 15. We right-censor at interview, or at the end of the second union, since we suppose that women who did not have a child by the end of their second union are a quite special group, i.e. either they do not want or cannot have a child.

We exclude the following records due to missing data:

- (1) No answer whether child was natural or adopted, birthdate of child is not coded.
- (2) Start or end of any union prior to the birth of the first child is missing.
- (3) Marriage date is not coded.
- (4) Date of any change of location is missing.
- (5) Order of the dates of changes of the location is wrong.
- (6) Start or end of an educational period is missing.
- (7) Woman was under 15 years at conception of first child.

The covariates described below have been included in the analysis. Time-varying covariates (all except educational level) have been coded to change their value at beginning of a month. If the event (conception of the first child) occurs in a month when the time-varying covariate also changes its value, we make sure that the conception always occurs later.

- Current educational status (time varying covariate): The current educational attainment is computed with the information on the educational histories. For every formal formation the beginning and the end is coded and it is also coded, whether the respondent has finished an education successfully or whether the respondent broke up the corresponding education. Similar to the paper on third births in Austria (Hoem et al. 1999) we never reduce a respondent's educational attainment, even if the respondent goes back to education at a level that is lower than the one once attained. We are able to distinguish the following levels:
 - (1) Basic education
 - (2) Apprenticeship
 - (3) Lower-secondary education: ending without *Matura*
 - (4) *Gymnasium* (secondary academic school): ending with *Matura*
 - (5) Occupation-oriented education: ending with *Matura*
 - (6) Professional training ending without *Matura*

- (7) Professional training ending with *Matura*
- (8) *Akademie* (post-secondary college)
- (9) University.

The final analysis distinguishes the following four educational levels⁵⁷:

- (A) Basic education (1)
- (B) Trade (2, 3, 6, 7)
- (C) Higher secondary education (4, 5)
- (D) Tertiary education (8, 9).

- Time elapsed since completion of last education (time varying covariate): We have tried to find an appropriate division of the covariate *time elapsed since the end of the last education* in order to get an interpretable clear pattern. We have started with eight time intervals: 0 to 6 months, 7 to 12 months, 13 to 18 months, 19 to 24 months, 25 to 36 months, 37 to 48 months, 49 to 60 months, 61 months and more. The first year after the end of the last education initially has been divided into 0 to 6 months and 7 to 12 months. But then we have thought of the fact that women often have short "waiting times" between two educational periods and have found in the data that 63.2 per cent of all intervals between two educational periods last less than five months. This can easily be explained by the fact that schools usually start in September and end in July, the last year of an higher secondary education mostly ends in June and university starts in October. In order to take into account these short "waiting times" we have rearranged the first year after the end of the last education into the two periods 0 to 4 months and 5 to 12 months to get the following periods:

- (1) 0 – 4 months
- (2) 5-12 months
- (3) 13 – 18 months
- (4) 19 - 24 months
- (5) 25 - 36 months
- (6) 37 – 48 months
- (7) 49 – 60 months
- (8) 61 months and more

- (9) Currently in full-time education
- (10) Currently in half-time education.

- Current employment status (time varying covariate)
 - (1) Not employed
 - (2) Employed.

- Current union status (time varying covariate)
 - (1) No union
 - (2) Cohabiting
 - (3) Married.

- Current age (time varying covariate): For the current age we mainly use two-years intervals (15-17 years, 18-19 years, 20-21 years, 22-23 years, 24-25 years, 26-27 years, 28-29 years, 30 years and more) which have been more broadly grouped later on. We have ended up with the following distinction:
 - (1) 15 - 17 years
 - (2) 18 - 19 years
 - (3) 20 - 23 years
 - (4) 24 - 27 years
 - (5) 28 - 29 years
 - (6) 30 years and more.

- Total number of siblings (fixed covariate)
 - (1) 0 siblings
 - (2) 1 sibling
 - (3) 2 siblings
 - (4) 3+ siblings
 - (5) Unknown.

- Size of the place the respondent has lived most of the time up to the 15th birthday (fixed covariate)

⁵⁷ The numbers in brackets corresponds to the numbering of the original nine levels.

- (1) Under 2,000
- (2) 2,000-5,000
- (3) 5,000-10,000
- (4) 10,000-50,000
- (5) 50,000-100,000
- (6) 100,000-1,000,000
- (7) More than 1,000,000, i.e. Vienna
- (8) Unknown.

- Current calendar period (time varying covariate)

- (1) Before 1974
- (2) 1974-79
- (3) 1980-87
- (4) 1988-89
- (5) 1990-92
- (6) 1993 and later.

- Religiousness: The respondent has been asked about her degree of religiousness (fixed covariate). This covariate is not included in the final model since its effect turned out to be not significant.

- (1) Very religious
- (2) Rather religious
- (3) Rather not religious
- (4) Not religious at all
- (5) No answer.

- Indicator whether last education has been completed (time varying covariate). This covariate is not included in the final model since its effect has turned out to be not significant.

- (1) Last education completed or last education is elementary school
- (2) Not completed
- (3) No answer.

13.4 Data corrections

For the cleaning of the dataset we proceed the following way: If the number of children does not correspond to the number of children in the child-histories, we correct the number of children according to the birth-histories. If the month of any date is unknown we set it June of the corresponding year (see also Hoem and Thomson 2000).

The inspection of the educational histories reveals certain inconsistencies which have to be cleaned before starting the analysis (table A6). We find 34 cases where the type of education of at least one educational period is unknown. We have checked all these cases, changed one case "manually", excluded eleven cases and kept the remaining records.

We control for the age a woman had started university or another tertiary education. Since it takes at least twelve years to get *Matura* and therefore to be able to start a tertiary education and since children enter school at the age of six, some already before the 6th birthday, we consider entrance to university before the age of 17 as not plausible. We have found ten cases with an age less than 17 at the beginning of university, have checked all cases individually and have found out that four cases could be corrected "manually" (looking at age at start and at end and at the following educational periods we find that these periods must have been at *Gymnasium* and not at university), the other six cases are excluded. For the remaining records the age at the start of a tertiary education is at least 17.2 years.

When entering a university the educational attainment should be a higher secondary school. We find 33 cases where the educational attainment before university is "basic". These records should have a schooling like *Gymnasium* before. We proceed the following way: If a woman is less than 21 years at the beginning of the university-period, then we include an education at *Gymnasium* starting at age 14 and ending two months before the beginning of the university-period. But if the woman is older than 21 at the beginning of university then we exclude the record because it has to be assumed that she has periods without education in between. Therefore we exclude five records.

Nine women have attained an apprenticeship before studying at university. Looking at the age at the start of university we find that these women were 23 up to 35 years, so it can be assumed that they have made an examination in order to have access to university, which is

possible if a person has concluded an apprenticeship. Further seven women have a lower-secondary education before entering university. Again we check the age when they have entered university and keep these records with the same arguments like in the previous case with apprenticeship.

In another step we look at the duration of all educational periods before the conception of a child, in order to keep as many cases as possible. One can argue that what happens after the conception of the first child is not interesting in this analysis. By distinguishing between the level of education we exclude 15 cases where the duration of the educational period is too long, according to the educational attainment.

When looking at the duration of the educational periods we find records with rather short periods of education. Since we want to concentrate on types of education which last longer, and not on the influences of some courses which last for a few months, we exclude those 35 records where an education lasted less than half a year and which were completed successfully. We keep those short educational periods where an education was broken up. These are the main rules for the setup of the data.