



universität
wien

Diplomarbeit

Titel der Diplomarbeit

Fertility Timing and Income – Insights from the
EU-SILC for Austria

Verfasserin

Nora Preat

angestrebter akademischer Grad

Magistra der Sozial- und Wirtschaftswissenschaften
(Mag. rer. soc. oec.)

Wien, Juli 2008

Studienkennzahl lt. Studienblatt:
Studienrichtung lt. Studienblatt:
Betreuerin:

A 140
Volkswirtschaft
Dipl. Ing. Dr. Christine Zulehner

Acknowledgements

I owe special thanks to Dr. Helmut Mahringer and the Austrian Institute of Economic Research, Vienna (WIFO), which provided the data from the EU-SILC for this diploma thesis. The **S**tatistics on **I**ncome and **L**iving **C**onditions (SILC) is an annual, EU-wide, survey conducted in Austria by STATISTIK AUSTRIA and placed at the disposal of research institutions against payment. Any opinions, conclusions, and results expressed are those of the author. Data copyright remains that of STATISTIK AUSTRIA.

For my grandmothers

Thanks those who gave me support.

Table of contents

1	Introduction	7
2	Postponement of maternity in Europe	9
2.1	Second demographic transition	9
2.2	Timing and spacing of births	11
3	Modern labour economics and fertility	17
3.1	Modelling fertility: from static to dynamic decision-making	17
3.2	Modelling female career planning motives	23
3.3	Fertility responses to unexpected career interruptions	27
4	The Austrian setting	31
4.1	Overview of socio- economic and -demographic developments since the 1960s	31
4.2	Gender equality and attitudes towards family in Austria	37
4.2.1	Part-time employment	37
4.2.2	Cost of children and labour force participation of mothers	40
4.2.3	Gender wage gap	42
4.2.4	Value system and the reconciliation of work and family life	44
5	Timing of first births, female wages, and fertility – Insights from Austria	47
5.1	The EU-SILC dataset for Austria	47
5.2	Age at first birth	49
5.2.1	Age at first birth according to educational attainment	50
5.2.2	Impact of pre-maternal work experience on motherhood	53
5.3	Women's wages and fertility	56
5.3.1	Estimating potential wages	57
5.3.2	Impact of potential wages on fertility	62
5.3.3	Results	63
6	Conclusion	69
	References	71
	Appendix	75
	List of tables	77
	List of figures	77

1 Introduction

Decreasing fertility rates and the steady rise in the mean age upon entering motherhood have been observed throughout Europe and in the (post)industrialized world: women have fewer children and that later in their lives. Causes and effects are complex; what the relationship between fertility decisions and political, societal, and economic changes looks like is not clear. An indication is therefore, the various demographic developments in different countries in Europe.

In modern labour economics decreasing fertility rates are associated with longer periods of educational attainment on the one hand, increasing female labour force participation rates on the other. The approaches eventually resort to the “New Home Economics” (re)introduced¹ by Jacob Mincer and Gary S. Becker in the 1960s. Modelled is the optimal demand for children in the framework of household consumer decisions. The basic assumption is that the partner’s income increases the demand for children, whereas the mother’s income is assumed to have a negative impact on fertility as opportunity costs of children increase with greater earning potential. Further is assumed that only the mother’s time use is affected by childbearing and -rearing (e.g. Cigno and Ermisch 1989, Blackburn et al. 1993). More recent works focus on this (wrongly?) postulated negative relationship between female incomes and labour force participation on the one side, and fertility on the other (e.g. Gustafsson 2001, Ejrnaes and Kunze 2004, Del Bono et al. 2008, Zabel 2006). They suggest that it is less the impact of increasing female labour force participation that hampers the entry into motherhood, than the difficult reconcilability of family and professional careers for women.

The focus of this diploma thesis is on Austria. The country fits well into the overall picture of decreasing fertility rates. The total fertility rate fell below the replacement level², which is assumed to be 2.1 children per woman, in the early 1970s. Fertility reached its all time low in 2001 with 1.33 children being born per woman. In respect to the mean

¹ Mincer and Becker expanded on the field of family and consumptions economics that Hazel Kirk and Margaret Reid began in the early 1920s (Grossbard-Shechtman 2001)

² “The replacement level fertility is the level of fertility at which a population exactly replaces itself from one generation to the next. In developed countries, replacement level fertility can be taken as requiring an average of 2.1 children per women” (quoted from <http://www.ncbi.nlm.nih.gov/pubmed/7834459>, last page view 2008-01-26).

age at first birth, Austria takes an intermediate position among European countries. With an average of 27.5 years in 2007, mean age at first birth is lower than in countries such as the United Kingdom, Switzerland or the Netherlands, where the mean age lies clearly beyond 29 years. Though, the trend is obvious, also in Austria, it was only in the last few years (from 2000 to 2007), that mean age at first birth increased by 1.3 years. Consequently, two principal questions are addressed: Why do women in Austria postpone first births? And what role do female wage rates play in this?

So far, analysis on the impact of female earnings and career planning motives on the timing and spacing of births in Austria has suffered from a lack of appropriate data: apart from administrative records there is not much data relating fertility to incomes and the job histories of women. This might change with the EU-SILC for Austria³, conceived as cross-sectional and longitudinal multidimensional microdata containing information on income and household specifics. Even though I cannot use the panel information yet, the EU-SILC allows for insights into factors determining fertility decisions in Austria. The main interest lies with the impact of female earnings on fertility. Therefore I estimate a probit model on the probability of entering motherhood for the first time at time of the survey. As neoclassical models of fertility suggest, I find a negative impact of potential wages on fertility, albeit, not for all women in the sample.

To assess the different aspects determining the fertility behaviour of women, the work at hand tracks the demographic developments in the last decades in Europe (chapter 2), then places these within the framework of modern labour economics on the one hand (chapter 3) and within the context of the situation in Austria on the other (chapters 4 and 5). Chapter 6 concludes.

³ The Statistics on Income and Living Conditions (SILC) is an annual, EU-wide, survey conducted in Austria by STATISTIK AUSTRIA.

2 Postponement of maternity in Europe

2.1 Second demographic transition

Decreasing fertility rates have been observed throughout Europe and the industrialised world in the last decades, a phenomenon also called “Second Demographic Transition” (see below). The first dramatic declines in fertility – and mortality – that were witnessed are described in the classical Demographic Transition Model. This general demographic pattern refers to the long transition from high birth and death rates to low ones in the course of a country’s economic development from a pre-industrialised to an industrialised society. For most European countries this transition took place from the late 18th and 19th century and extended to World War II. By 1940 some countries in Europe already experienced fertility rates below the replacement level, i.e. Belgium, Switzerland, France, England and Wales and Sweden (Gustafsson 2001: 226). At times it was expected that fertility rates would stabilise around the replacement level which is an average of 2.1 children per woman. This assumption was shown to be incorrect by the post-war “baby boom” when fertility rates increased again. However, from the mid-1960s onwards fertility rates began to slow down again remarkably. Today, in virtually all highly developed countries fertility rates are (far) below the replacement level – with the small exception of Iceland which is slightly below it.

The observed reduction in fertility was labelled Second Demographic Transition (SDT) in the 1980s in the works of Lesthaeghe/Van de Kaa (1986) and Van de Kaa (1987). The identified factors explaining fertility rates below the replacement level in (post) industrialised countries are fundamentally different from those observed in the first demographic transition: “The SDT framework suggests that demographic changes, including postponement of childbearing, are to a large extent due to ideational shifts, in particular to the increased emphasis on individual autonomy, the rejection of institutional control, the rise of values associated with the satisfaction of individuals’ ‘higher-order needs’, and the growth of gender equality [...]. These ideational changes have led to the emergence of ‘postmodern fertility preferences’” (Billari et al. 2006: 3). Put shortly, individualisation and the emancipation of women were identified as driving forces behind

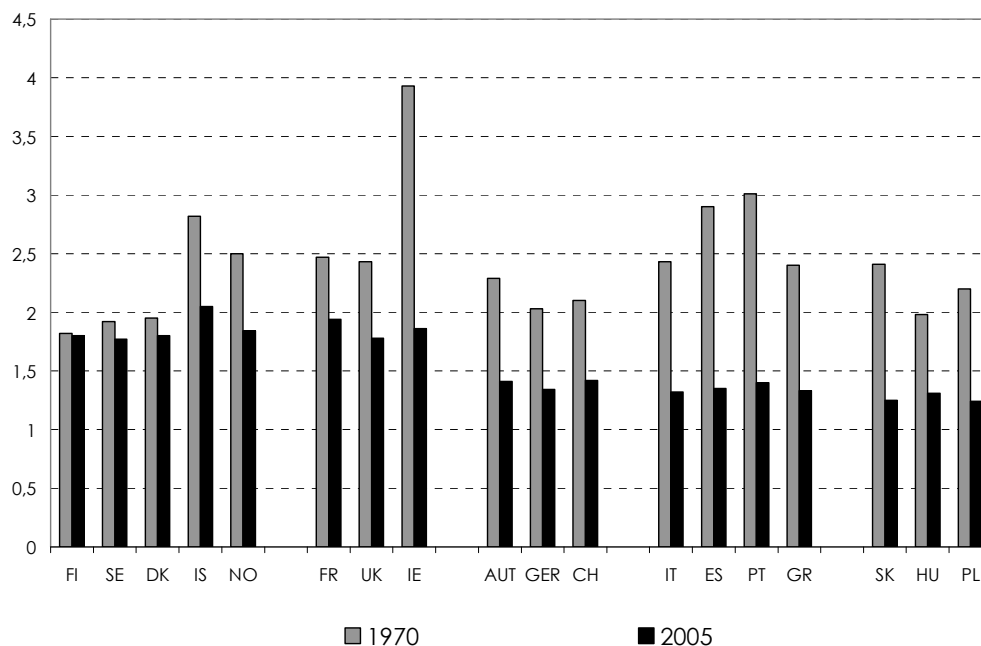
the decline in fertility in European countries. Also the widespread availability of the birth control pill, leading to a “baby bust” after the “baby boom” from the late 1960s onward, certainly influenced fertility behaviour of women, allowing to much larger extent for actually planning fertility throughout a woman’s life cycle.

Despite this overall downward trend of fertility rates, there are noticeable differences among different regions in Europe. Very sharp declines in fertility have been observed in the Southern European countries Italy, Spain, Portugal and Greece. Total fertility rates dropped from around 2.5 in the 1970s to a level close to 1.3 in these countries⁴, what made them examples for “lowest-low fertility”. The expression points out the ongoing decline in fertility in Southern European countries in the 1980’s – as well as Central and Eastern European countries in the 1990’s. Lowest-low fertility concepts not only take into account ideational factors, but also policies and economic trends as well as long-standing cultural factors such as patterns of family formation or the timing of the transition into adulthood. Economic insecurities and the increasing flexibility of the labour market – which can present a chance or at the same time bring about precarious working conditions with lower welfare benefits – have also lately been a subject on the fertility research agenda (e. g. Kreyenfeld 2005 for Germany). That there is some sort of (negative) relationship between economic insecurity and fertility rates seems to be especially true for countries of the former Eastern Bloc: the change of political and economic regimes in these countries went along with major, often complex, demographic developments (Economic Survey of Europe 1991: 181). Fertility went down significantly throughout the 1990’s in Central and Eastern European countries; until now fertility rates remain at a very low level. Also the German-speaking countries (Germany, Switzerland and Austria), where fertility patterns have shown similarities over the last decades, experienced a rather sharp decline in fertility during the 1970s – e.g. in Austria the TFR went down from 2.3 in 1970 to 1.65 in 1980. The figures continued their downward trend to the present in Germany; in Switzerland and Austria fertility rates slightly increased again in the last years (e.g. in Austria from the all time low of 1.33 in

⁴ Reference for the comparison is the commonly used Total Fertility Rate (TFR). It gives a picture of the total number of children a woman would have if the fertility rates for a given year applied to her throughout her reproductive life. In effect, it’s a way to summarize what fertility is *now*, without waiting for the end of the childbearing years of (potential) mothers (see PRB Population Handbook, 5th edition; downloadable from http://www.prb.org/pdf/PopHandbook_Eng.pdf, last page view 2008-01-26).

2001 to 1.41 in 2005 and 2006; for 2007 the trend seems to be reversed again). Other, mostly Scandinavian countries like Finland, Sweden and Denmark, show remarkably stable fertility rates in the overall trend since the 1970s. These countries were the first to experience the SDT, but fertility rates never fell beyond the mark of 1.5 in these countries. Today they are among the countries in Europe with the highest fertility rates. Three cases apart are presented by France, the United Kingdom and especially Ireland: these countries experienced relatively high levels of fertility in the 1970s, but the rates did not decline as dramatically as observed in Spain or Italy. In 2006, France ranked, along with Iceland and Norway, among the European countries with the highest fertility rates. Unchallenged explanations for these differences among European Countries are still missing.

Figure 2.1: Total Fertility Rates 1970 and 2005 in subsets of countries



Source: EUROSTAT, OECD. Countries from left to right: Finland, Sweden, Denmark, Island, Norway, France, United Kingdom, Ireland, Austria, Germany, Switzerland, Italy, Spain, Portugal, Greece, Slovak Republic, Hungary, Poland.

2.2 Timing and spacing of births

The Second Demographic Transition started, albeit at different points in time, earlier in North and West Europe than in South Europe (Gustafsson 2001: 225) which may ex-

plain some of the differences in fertility in the EU-15 countries today. The Nordic countries and the Netherlands are often identified as forerunners of the SDT in literature (e.g. Kohler/Ortega 2002: 146). The key indicator in SDT-theories is the postponement of maternity. What is meant by it?

Excursus: Measures of fertility

Total Fertility Rates can be affected by the level (also *quantum*) of births – how many children on average a woman gives birth to – and by the timing (also *tempo*) of births, i.e. the distribution of births over a woman's lifetime. The level-part is quite clear, more interesting is the timing effect. A decreased *tempo* of fertility means that women give birth to their children (if at all) at a later point in their lives. Here a note on different concepts of fertility is necessary: the already mentioned *Total Fertility Rate* (TFR)⁵ is the average number of children a woman will give birth to under the assumption that the currently observed age-specific fertility rates would apply to her throughout her reproductive life. The age-specific fertility rate is the number of live-births per 1,000 women of a specific age group⁶. Summing up these age-specific birth rates gives the TFR. Note that the TFR is a synthetic rate, not something that is actually counted. By contrast, *cohort fertility* refers to the fertility of the same women at successive ages. Women born in the same year comprise a birth cohort. If we observed, for example, women born in 1961 today – which means at the end of their reproductive life - if we assume the reproduction age for women to fall between the ages of 16 and 46 – we can derive the cohort completed fertility of these women. Also note that TFR and cohort fertility rates are robust vis-à-vis changes in the age structure of the population as they refer to births per 1,000 women of childbearing age. If we were interested in age structure-specific effects on demography the *Crude Birth Rate* would be the measure to use: it refers to the number of births per 1,000 of the entire population. And finally one should remember that the TFR is a measure for fertility *quantum*, whereas mean age at first birth (MAB) is a measure for fertility *tempo*.

⁵ The TFR is also called Period Total Fertility Rate or simply fertility rate.

⁶ See http://www.prb.org/Content/NavigationMenu/PRB/PRB_Library/Glossary2/Glossary.htm and http://en.wikipedia.org/wiki/Total_fertility_rate (last page views 2008-01-27).

Back to the interaction of the timing and spacing of births and (declining) fertility rates. One important reason of decreasing Total Fertility Rates is if one cohort of women postpones childbearing in comparison to the previous cohort (Gustafsson 2001: 227). “Postponement” refers to the observable fact that women tend to get their children at a later point in life than 30 or 40 years ago. Postponement of maternity does not necessarily result in lower TFRs: “Similarly, period total fertility rates [TFR] can increase again if the postponing cohort later catches up its fertility behaviour so that cohort fertility rates are equalized between the cohort with the early births and the cohort, that postponed fertility” (ibid.). Indeed, there are several reasons why this may not happen. It is likely that the postponing cohort does not catch up completely, partly because starting to get children later in life may lead to fewer children per women/family and partly because it may increase the number of women who do not get children at all.

The simultaneous effects of changes in timing and spacing of births are shown by Gustafsson (2001) and Bosveld (1996) respectively: table 2.1 indicates the contribution of women aged 30 and over to the TFR. Using Austria as an example we see that the contribution to the TFR of women aged 30 years or older was approximately the same in 1965 as in 1996 (in the meanwhile the proportion decreased and then increased again, described best with a U-shaped curve). This actually conceals changes in the level as well as in the timing of births: In the same period the TFR decreased steadily from 2.7 in 1965 to 1.4 in 1996⁷. In contrast, a mother’s mean age at first birth was increasing⁸.

⁷ Source: Eurostat

⁸ Figures on the mean age of mothers at first birth for Austria are only available from 1981 onwards; in 1981 the mean age at first birth was 24.1, in 1996 25.9 and in 2006 27.5 (source: STATISTIK AUSTRIA).

Table 2.1: Contribution of women aged 30 and over to the TFRs (1960-1996)

	1960	1965	1970	1975	1980	1985	1990	1992	1996
<i>Western Europe</i>									
Austria	32.0	35.2	28.3	24.4	23.0	24.9	28.1	28.5 ^o	35.4
Belgium	35.6	34.2	27.9	22.2	24.7	27.7	-	-	32.4 ^a
France	34.0	31.7	30.9	27.4	27.2	31.1	37.7	-	42.6 ^b
Germany*	35.7	33.3	31.9	28.2	30.1	34.8	38.5	37.6	46.8
The Netherlands	47.6	42.1	33.4	25.6	27.5	34.3	48.1	51.8	53.5
Switzerland	40.5	36.6	31.8	29.3	34.2	37.9	43.6	44.3 ^o	50.0
<i>Northern Europe</i>									
Denmark	27.3	26.3	24.6	21.7	23.5	29.5	35.4	42.2	42.3 ^c
England-Wales	30.2	28.9	25.8	23.1	26	29.6	33.5	-	41.2
Finland	35.5	33.6	28.8	26.8	31.2	35.6	39.2	39.3	47.2
Iceland	36.8	35.4	32.5	29.6	30.9	31.9	36.6	38.9 ^o	41.2
Ireland	57.1	53.5	49.5	44.3	45.7	47.4	47.7	53.9	52.8
Norway	32.4	29.7	27.9	23.6	25.8	29.1	37.8	40.5	40.6
Sweden	31.6	32.5	26.8	24.9	29.8	35.2	41.0	43.1	44.3
<i>Southern Europe</i>									
Greece	37.4	34.5	31.4	27.1	22.5	23.4	27.7	-	33.7 ^c
Italy	41.0	38.4	35.6	31.5	29.9	34	44.2	45.5 ^o	47.3 ^c
Portugal	43.3	43.8	39.8	36.5	29.2	29.2	33.5	34.6	35.3
Spain	45.8	45.7	41.5	38	34.6	36.3	43.9	45.5	49.0 ^c
<i>Eastern Europe</i>									
Bulgaria	17.2	16.3	14.6	13.1	10.7	11.5	11.6	11.0 ^o	12.2 ^c
Czech Republic*	21.4	21.1	18.0	17.3	14.8	13.9	16.1	-	17.9
Hungary	21.4	19.6	18.9	18.2	15	16.2	18.0	18.8 ^o	20.8
Poland	31.4	28.6	27.4	25.6	23.3	23.1	22.0	22.3 ^o	26.7
Rumania	26.3	23.1	27.5	22.7	18.4	18.2	19.6	16.8	12.8
Yugoslavia*	-	-	26.0	24.1	22.7	21.5	-	-	25.2

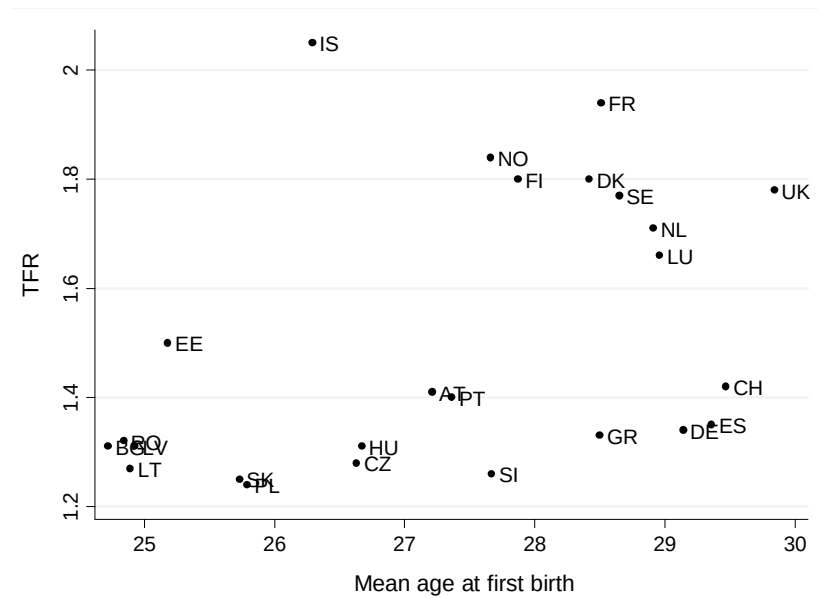
Source: Gustafsson: 227 (primary source: Bosveld 1996). *) Countries with border changes. Numbers for 1996 from the 1997 Demographic Yearbook, United Nations, New York 1999; the following are for a different year: ^a) 1992, ^b) 1994, and ^c) 1995.

On the other hand, a comparatively high mean age at first birth does not necessarily lead to low fertility rates on the macro-level (figure 2.2). Actual data for 26 European countries⁹ indicates a rather positive relationship between age at first birth and Total Fertility Rates, at least for some countries. Furthermore, there is empirical evidence that the fore-runners of the SDT, which were the first to experience fertility rates below the replacement level, today form a group of countries with relatively high fertility rates – all of them with a high mean age at a mother's first birth. Still, this does not explain why France today falls into the “high fertility” group whereas the neighbour, Germany,

⁹ Eurostat (figures from 2005).

ranges among the “lowest-low” fertility countries. Austria lies in the middle concerning mean age at first birth – compared with most of the EU-15 countries mean age at first birth is, nevertheless, actually low.

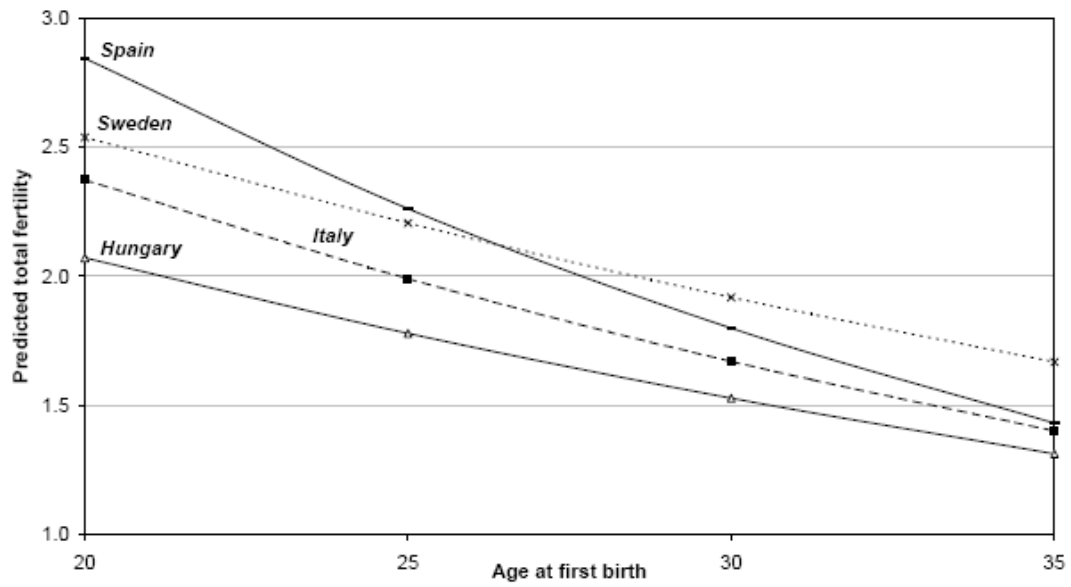
Figure 2.2: Total Fertility Rates and mother's mean age at first birth (2005)



Source: Eurostat

On the individual (or micro-) level, however, models predict a clearly negative relationship between the postponement of motherhood and the level of fertility. Billari and Borgoni (2005) showed that the postponement of first births influences total fertility in a negative way, particularly in those countries where institutional arrangements make it more complicated for women to combine family and professional careers (Billari et al. 2006: 7/8). Such institutional arrangements can be childcare facilities and labour market regulation, but also gender relationships and attitudes toward family. Figure 2.3 shows that the negative effect of postponement on the predicted total fertility is stronger in countries like Spain, Italy and Hungary than in Sweden; the latter being counted among the countries with a relatively high degree of gender equality, as well as child care facilities.

Figure 2.3: Micro-level effect of postponement in an empirical study: Predicted completed fertility for a woman by age at first birth



Source: Billari et al. 2006: 8 (primary source: Billari and Borgoni 2005).

3 Modern labour economics and fertility

3.1 Modelling fertility: from static to dynamic decision-making

Women's labour market choices and decisions have become central to the field of labour economics, to such an extent, that it would not be much of an exaggeration to claim that women gave "birth" to modern labour economics (Goldin 2006: 3). Married women's labour supply increased steadily in industrialised societies throughout the last century, in particular after the Second-World-War. And it was in the late 1950s and '60s that economists started to investigate a woman's labour supply decision within the framework of a family unit (Becker 1960 and 1965, Mincer and Polachek 1974, Becker and Barro 1988). Analysis concentrated on married women, who took their husband's labour supply decisions as given. The models were static, i.e. fertility decisions were assumed to be taken at one point in time, and set up within the framework of neoclassical theories of consumer demand and utility maximisation.

The emphasis lay on the effects of parents' income and the costs of childbearing and rearing. The impact on fertility from the husband's income is assumed to be positive since his time use is not affected by the birth of a child. The mother's income instead is expected to have a negative impact on fertility since higher earnings increase the opportunity costs of children.

The static framework might have been appropriate at the time. More realistic models, however, incorporate the dynamics in labour supply and fertility decisions, in dependence of human capital accumulation and/or imperfect capital markets (Happel et al. 1984, Cigno and Ermisch 1989, Blackburn et al. 1993). Such dynamic models on the other hand tend to make "drastic simplifications to the decision framework" (Cigno and Ermisch 1989: 738). Cigno (1983) assumed that timing decisions are taken entirely on the basis of financial considerations. Happel et al. (1984) restricted their attention to the timing of first births, taking the time-profile of subsequent births as given. Others like Moffit (1984) or Rosenzweig and Schultz (1985) assumed contrariwise that the timing of births, given a woman's age or marriage duration, is independent of economic variables (ibid.).

Two seminal papers on the dynamic modelling of fertility are those of Cigno (1988) and Cigno and Ermisch (1989), respectively. The latter compares the theoretical predictions from Cigno (1988) to family and work-patterns among married women in Great Britain, using data from the British Women and Employment Survey. The data provides complete marital, childbearing and work histories for women aged 16 to 59 in 1980. The model allows the utility that parents derive from a child to depend on both the age of the mother at birth of the child and the amount of resources expended on the same. It also takes into account the interrelations between the time-patterns of childbearing and maternal earnings and recognises the simultaneous nature of employment, fertility and life-time consumption decisions (Cigno and Ermisch 1989: 738).

The model describes the demand for children as the outcome of the optimising decisions of parents with

$$\text{Max} \quad U = U(C, B) \text{ with } C = \sum_{t=a}^T u_t(C_t) \text{ and } B = \sum_{t=a}^T v_t(I_t)B_t.$$

The parents' lifetime budget constraint is

$$\{B_t(q + I_t) + C_t\}(1+r)^{a-t} = A_a + \sum_{\tau=a}^T L_\tau W_\tau (1+r)^{a-t}$$

with $L_t = m - B_t$ being the woman's labour supply and $W_t = K_t w$ being her wage rate.

K_t is the stock of the woman's human capital at t and accumulated with work experience

$$K_t = K_a + \beta \sum_{\tau=a}^{t-1} L_\tau.$$

C_t and B_t denote, respectively, the parental consumption and the rate of birth at t with u_t being increasing and concave, and dated to allow for possible time preferences. I_t is the optimally timed stream of voluntary parental expenditures on a child born at t with $v_t(I_t)$ being the parent's assessment of the lifetime utility of the child. a is the exogenously given date of marriage, T the date of death (assumed to be exogenous and the same for both parents). q is the fixed cost of a child, defined as the sum of all unavoidable expenditures associated with childbirth, plus the minimum cost of supporting the

child. r is the real interest rate, A_a is the couple's stock of wealth at marriage (financial assets, plus the present value at marriage of the husband's lifetime earnings), L_t the labour supply and W_t the woman's wage rate in year t . Finally, m denotes the work capacity, K_t is the woman's stock of human capital at t , w the (real) market rate of return to human capital. K_a depends on the woman's natural talent, education and pre-marital work experience (Cigno and Ermisch 1989: 739-740).

The underlying assumptions in the Cigno and Ermisch model are that a father's labour supply is simply his work capacity m ; his wage rate is determined by a similar mechanism as the mother's wage rate described above, but not dependent on the number and time distribution of births (whereas the mother's work experience depends crucially on both). Further it is assumed that a certain amount of parental time – i.e. especially maternal time –, is required over the first period of a child's life. Maternal and paternal time is not explicitly modelled in the birth rate function, but it is assumed that income expenditure (I_t) is a perfect substitute for maternal and paternal time in all subsequent periods (Cigno and Ermisch 1989: 739). The length of this crucial first period around birth is taken as the unit of time of the analysis and conventionally referred to as the year (ibid.). Further is assumed that parents have free access to capital markets.

The endogenously determined “price” P_t that parents must pay in order to have a child at time t is then given by a sequence of birth and expenditure rates $\{B_t, C_t, I_t\}$ which maximize the utility function $U = U(C, B)$ and satisfy the dynamic conditions

- i)
$$\frac{u'_t - u'_{t+1}}{u'_{t+1}} = r$$
- ii)
$$\frac{v'_t - v'_{t+1}}{v'_{t+1}} = r \text{ and}$$
- iii)
$$\left\{ \left(\frac{P_{t+1}}{v_{t+1}} \right) - \left(\frac{P_t}{v_t} \right) \right\} / \left(\frac{P_t}{v_t} \right) = r, \text{ where}$$
- iv)
$$P_t = q + I_t + W_t + \beta w \sum_{\tau=t+1}^T L_\tau (1+r)^{t-\tau}.$$

$q + I_t$ represents an actual disbursement, W_t stands for the loss of earnings since the mother is temporarily unavailable for employment and $\beta_w \sum_{\tau=t+1}^T L_\tau (1+r)^{t-\tau}$ stands for the future earning potential (evaluated at date t), as the mother has to forego an increment in her stock of human capital (ibid: 741). P_t can also be interpreted as the full opportunity cost of a unit of time spent at home by the women in year t .

The properties of expenditure profiles and therewith an efficient time-distribution of births can be derived from the above equations (ibid: 743). Imposing further assumptions on the model, such as positive but small income effects, it is then possible to assign the effects of a , A_a , K_a , and q on the number and time-distribution of births.

What the Cigno and Ermisch (1989) model predicts is that women tend to have their children earlier in married life if they are endowed with greater financial assets at marriage or if they are married to men with higher incomes. The same is true for women who marry late or are endowed with more human capital, i.e. a greater earning ability at the time of marriage, except that these women will have fewer children (ibid: 745). On the other hand, women in occupations with steeper earning profiles will tend have their children later. This is somewhat contradictory to the finding above; the authors conclude that the tendency to earlier motherhood by the greater amount of human capital at time of marriage (or a late entry into marriage) may be offset by the fact that women with these characteristics tend to be in professions where the wage rate rises sharply with seniority or service. The impact of female wage rates (after tax) on the timing of fertility is predicted to be negative, whereas it is not possible from the theoretical model to assess the impact of female wage rates on completed fertility.

Cigno and Ermisch were among the first to take into account the simultaneity of decisions on human capital accumulation and fertility. A shortcoming in the model is the limitation of the analysis for married women and that the crucial variable is marriage entries and durations and not more generally the age of women at first and higher order births.

Blackburn et al. (1993) focus more generally on the interaction of human capital accumulation and the timing of fertility. They are interested in explaining why women who postponed maternity more than others earn higher wages. Therefore, a simple human capital model is extended to allow childbearing to affect the human capital investment decision. The crucial point is the effect that withdrawal from the labour market after childbearing has on the benefits of human capital investment (Blackburn et al. 1993: 7). The key implication of the model is that relatively late childbearing is associated with greater human capital investment (ibid.). Also Blackburn et al. (1993) make simplifying assumptions, most importantly that all women are equally productive at the beginning of their working careers and every woman bears but one child.

The maximisation problem is

$$\text{Max} \quad U = U(Y, T) \text{ with } U = Y - aT \text{ and } a > 0$$

In the case of an interior solution for optimal time of birth, i.e. $0 < T^* < R - \tau$, and if a woman chooses to invest in human capital, her lifetime income is given by

$$Y_I = \int_0^T w e^{(s+q-r)t} dt + \int_{T+\tau}^R w e^{(q-r)t} e^{s(t-\tau)} dt - C$$

The first-order condition for a utility maximum is

$$MB_I(T) \equiv w e^{(s+q-r)T} [1 - e^{(q-r)\tau}] = a. \quad (1)$$

If the women decides not to invest in human capital, lifetime income is

$$Y_N = \int_0^T w e^{(q-r)t} dt + \int_{T+\tau}^R w e^{(q-r)t} \text{ with}$$

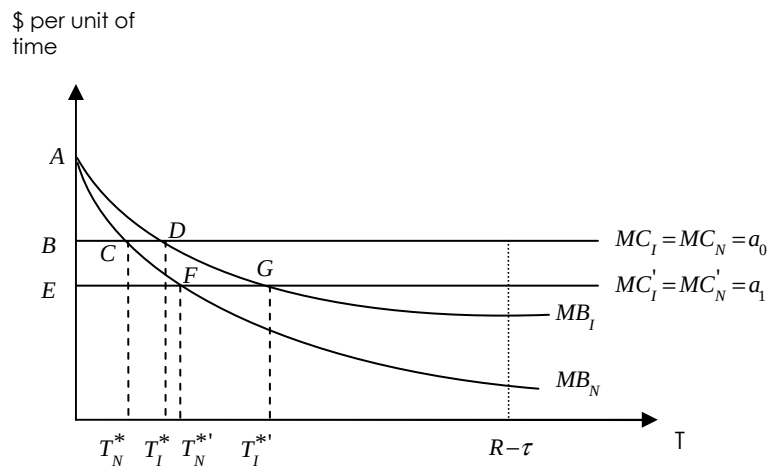
$$\text{FOC} \quad MB_N(T) \equiv w e^{(q-r)T} [1 - e^{(q-r)\tau}] = a \quad (2)$$

$R - \tau$ is the upper boundary for childbearing ages, Y the present value of lifetime income, T the time period of childbearing with T_I^* being the optimal age at birth if investing in human capital and T_N^* being the age at birth if not investing in human capital. w is the initial wage rate, q the economy-wide rate of growth of wages, r the discount rate and a the childbearing preference (or utility) parameter (Blackburn et al 1993: 8).

In the Blackburn et al. (1993) model, it is assumed that a woman's lifetime utility depends on the present value of her lifetime income and on the time period in which she has her child. Furthermore, it is assumed that women prefer both earlier births and higher incomes. Blackburn et al. (1993) model the twofold decision – whether to invest in human capital or not, and when to have a first child – by first deriving an expression for the optimal age at first birth conditional on either investment or non-investment; and second, given that the woman is optimising in her fertility timing decision, by asking whether a woman's lifetime utility was higher under investment or under non-investment in human capital (ibid: 7). The left-hand side of equation (1) represents the marginal benefit from delaying childbirth, the right-hand side refers to the marginal cost of delaying. Equation (2) represents lifetime income and the marginal benefits for women who choose not to invest in human capital.

It follows from (1) and (2) that women who have invested in human capital will delay childbearing more than women who did not invest in human capital (ibid: 8). A fall in a , i.e. the childbearing preference parameter or utility of the child, increases the difference between the birth timing of non-investors and investors in human capital (figure 3.1).

Figure 3.1: Marginal benefits of delaying childbirth for women investing and not-investing in human capital for two different levels of marginal costs



Source: Blackburn et al. (1993)

The second step in the Blackburn et al. (1993) approach is to model the human capital investment decision. A woman will choose to invest in human capital if $V_I > V_N$ with $V_j = V_j(w, q, r, a, s, C)$ and $j = I, N$; i.e. the indirect utilities of the two choices, the fertility timing and the human capital investment decision.

It can be shown that women with weaker preferences for early childbearing are more likely to find $V_I > V_N$ to be true than women with stronger preferences for an early birth (Blackburn et al. 1993: 9). With human capital investment increasing the wages of investors compared to non-investors at all times after $T = 0$, the authors expect to observe higher wages for those women who delayed births compared to otherwise similar women (ibid: 10).

Blackburn et al. (1993) model a woman's optimal human capital investment behaviour over the life cycle conditional on her preferences over the timing of first birth. The model also suggests that women with higher initial wages will choose to delay their childbearing more. This finding is also emphasised by other approaches to model optimal age at (first) birth. In the following I focus in more detail on the female career planning motive and the timing of births, drawing on Gustafsson (2001).

3.2 Modelling female career planning motives

Dynamic models of fertility generally suggest that having a child earlier in life increases the parent's utility as they enjoy a longer life together with their children. On the other side, having a child later in life may decrease the cost of children over the life cycle. In terms of economic theory this means that the utility of a birth at time $t+1$ rather than at t must equal the ratio of the shadow price of a birth at $t+1$ rather than at t (Gustafsson 2001: 232). Models on the timing of births therefore analyse the costs of children at any point in a woman's life. The optimal timing of births can be modelled by several approaches; for example models of optimal life cycle consumption; models of life cycle labour force participation; models of human capital investment and accumulation; and stochastic models of human reproduction (Gustafsson 2001: 233, referring to Hotz et al. 1997). The following section deals with the optimal timing of births from the viewpoint of its effects on a mother's lifetime earnings, according to Gustafsson's (2001) career planning model. He takes into account the findings from several theoretical and empiri-

cal approaches. The partner's earnings are left out of the analysis, assuming that a father's professional career is not affected by the timing of births. Further it is assumed that capital markets perfectly allow for borrowing and saving across periods. Modelled are only the costs of children in terms of the mother's potential earnings, given the time preference of births and the present value of the partner's earnings. Gustafsson (2001) identifies six factors determining optimal age at birth (*ibid*: 236/237). That is, the (i) the woman's accumulated human capital at beginning of the planning period; (ii) the depreciation rate of woman's job skills; (iii) the rate of return to human capital investments; (iv) the profile of human capital investments; (v) the length of time spent out of labour force; and (vi) the size of child quality expenditures.

A larger stock of pre-parental human capital accumulation (i) is represented by a larger intercept in figure 3.2. How it affects the timing of births depends on the model specifications. According to Cigno (1989, 1991) women who enter marriage better endowed with market specific human capital will get fewer children sooner in their lives (see above). Contrastingly, Happel et al. (1984) derive from their model that women with a larger stock of human capital tend to delay births. Gustafsson concludes from his own empirical findings for Germany, Great Britain, the Netherlands and Sweden (Gustafsson and Wetzels 2000) that women with higher levels of education have their children at a later point in life than less educated women. They were also the ones postponing births the most when comparing the 1980's to the 1990's (Gustafsson 2001: 237).

The size of the depreciation rate of human capital (ii) is the subject of the gender wage gap literature. Mincer and Polachek (1974) were among the first to identify a negative coefficient on years spent of home on wages. However, the size of the coefficient is contested. Corcoran and Duncan (1979) found a less negative coefficient than Mincer and Polachek. Gustafsson (1981) who analyses Swedish cross sectional data for 1974 matched with panel information on work histories, even found a positive wage coefficient on time spent at home rather than a net depreciation. But as the coefficient is considerably smaller than the wage coefficient on years spent actively in the labour market, time spent at home decreases future earnings in any case (*ibid*: 238).

The slope of the lifetime earnings curve in figure 3.2 is the product of the rate of return to human capital investments (iii) and the investment profile (iv) (*ibid*: 239). The impact of the rate of return on human capital on the timing of births is somewhat unclear in the

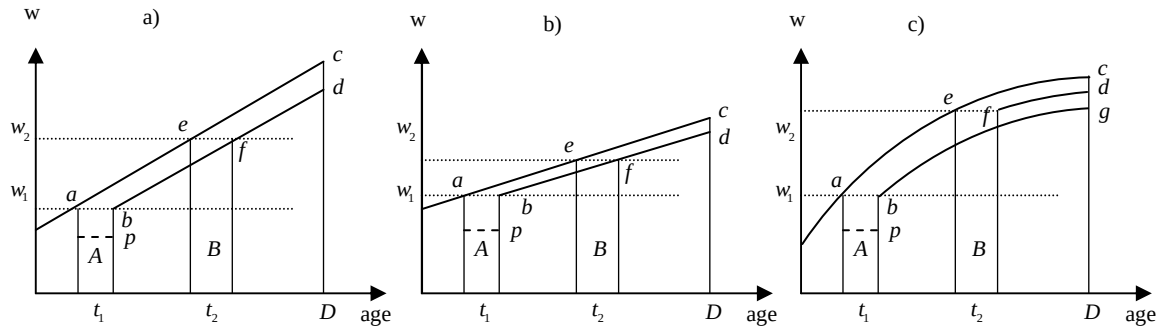
literature (as in Cigno 1991) or completely left out of some analysis (Happel et al. 1984). More intuitive is the impact of the profile of human capital investments on the timing of births. Comparing panel a) to b) in figure 3.2 reveals that the capital loss is larger when the earning profile is steeper. This clearly works in the direction of later births when assuming non-linear earning profiles but convex ones instead (panel c)).

The time spent out of the labour force for maternal leave (v) is crucial to explain the cost of children: The longer the time spent at home the higher is the loss in future potential earnings (e.g. Lutz 2003 for Austria). But does the time spent out of the labour force also affect the timing of births? Gustafsson answers in the positive, according to the Happel et al. (1984) model¹⁰. However, when analysing the time spent at home the focus lies in the cost of children, or the shadow price of giving birth, and not on its effects on the timing of births (e.g. Walker 1995, Gustafsson and Wetzels 2000).

Finally, the size of child quality expenditures (v_i) refers to the money parents spend on a child including educational expenses. The more money is spent and the longer the child benefits from parental support the higher is the shadow price of a child (Gustafsson 2001: 242, Happel 1984). Happel et al. (1984) show in their model with consumption smoothing that the larger the expenses on children the later in life a couple will choose to become parents. Given that highly educated parents normally also want their children to benefit from higher education – and therefore spend more on child quality expenditures –, this last motive strengthens the incentive for highly educated couples with steeper earning functions to postpone births.

¹⁰ In the Happel et al. (1984) model consumption smoothing is addressed as one of the determinants of the timing of births. Different to the assumptions in career planning models there is no possibility for saving in the future (assumption of “perfectly imperfect capital markets”; Gustafsson 2001: 235). In the model with consumption smoothing it is optimal to delay births to the biological limit if the partner’s earnings increase over time. The household smoothes its consumption profile and therefore raises its economic welfare (ibid: 236).

Figure 3.2: Timing of first birth and costs of a child assuming different life time earning profiles



Source: Gustafsson 2001: 238

Summing up, figure 3.2 illustrates different aspects in the Gustafsson career planning model. When assuming zero depreciation rates of human capital (as in the Cigno and Ermisch (1989), Happel et al. (1984) and Walker (1995) model) and that wage is linear in labour force experience, then the timing of births does not matter. Forgone earnings are simply represented by the time spent at home (panel a) and b)). When assuming that the shape of the earning profile is not linear but quadratic as in the original Mincer (1974) formulation, then the timing of births does matter (panel c)): The incentive to postpone first birth is stronger since the difference between the direct wage loss of a late birth and an early birth is smaller comparing panel a) to c) and the capital loss of a late birth area delineated by 'efcd' is smaller in c) than in a) (Gustafsson 2001: 241). The effect of a depreciation rate of human capital different from zero is represented by point p in panels a) to c): A mother, upon return to the labour market, will receive a lower wage than she received before leaving the labour market for maternal leave.

Figure 3.3: Overview of selected studies on the impact of female earning on timing and spacing of births

	Theoretical approach	Methodological approach	Survey	Analysed population	Impact of female wages on timing and spacing of births
Cigno & Ermisch (1989)	Inter-temporal model of family decisions	Ordered probit model	British Women and Employment Survey (1980)	Women, whose marriage lasted at least 10 years with no pre-marital pregnancy	Negative impact of female wage rate after tax on both <i>quantum</i> and <i>tempo</i> of births
Blackburn et al. (1993)	Joint human capital investment and fertility decisions	Wage estimations (OLS)	National Longitudinal Survey of Youth (1982)	Young US-women	Positive relationship between human capital (and therewith higher wages) and age at first birth
Heckman & Walker (1990)	Dynamic microeconomic model of fertility	Multi-state duration models with time varying covariates	Swedish Fertility Survey (1981)	Swedish women	Negative impact on quantum and tempo of births (positive income effect of male income)
Tasiran (1995)	Dynamic microeconomic model of fertility	Event-history analysis	US-Panel Study of Income Dynamics (PSID)	US women	Significant and positive impact of female wage rate
Aassve & Billari & Rondinelli (2006)	Dynamic microeconomic model of fertility	Discrete-time hazard models	Bank of Italy's Survey of Italian Households (SHIW) matched with Italian Labor Force Survey	Women co-residing with their children at time of interview	Negative effect of (predicted) female wages on probability of having children; negative effect on timing of first births, though, women with higher wages make up later in their lives (not completely)

Source: Own delineation

3.3 Fertility responses to unexpected career interruptions

A decisive contribution to the very recent fertility research agenda is that of Del Bono et al. (2008). The authors investigate fertility responses to an unexpected career interruption in the form of a job loss after firm closure (ibid: 30/31). The analysis design allows for the circumvention of one of the crucial problems in the fertility research agenda, the problem of endogeneity: econometric analyses on the impact of female labour force participation, and therefore income, on fertility suffer from a potential endogeneity bias, as a woman's decision pertaining to labour market participation and family formation is

likely to be determined by the same set of covariates.¹¹ By using – truly exogenous – firm closures as quasi-experiment in an event study approach, the Del Bono et al. (2008) study found a viable instrument to solve for the endogeneity problem. The analysis design further allows for investigating not only the interaction between human capital accumulation and fertility timing but the specific relationship between female career considerations and fertility. The authors identify the difficulty women face in pursuing their careers upon job loss as the main factor responsible for a reduction of fertility. The effect is not confined to, but is stronger for women in top positions (ibid.). Hence, it is not (stable) careers that determine the timing and spacing of fertility downwards, but discontinuities and the lack of career progression in young workers' lives.

Optimal fertility decisions are modelled within the framework of a dynamic job search model with endogenous savings (Del Bono et al. 2008: 5). A woman's per period utility is given by $u(c_t) + v(k_t) - \psi(p_t)$ with c_t and k_t being consumption and the number of children. p_t is the probability of birth in period t . u and v are increasing and concave, while ψ is decreasing and convex.

Income in each period depends on the employment and maternity status with $m < b < w$; where m is the maternity leave benefit, b the unemployment benefit and w wage rate. Wages on the job are paid according to a deterministic scheme and rise with tenure T ; i.e. wages grow with job tenure and human capital is entirely accumulated on the job. It is assumed that a woman enters period 1 after job displacement, when she is unemployed and tenure is reset to zero (ibid: 32). She will respond to a change in assets A_t with the optimal fertility choice

$$\frac{\partial p_t^*}{\partial A_t} = \{u'(c_t^1) - u'(c_t^0)\} / \psi''(p_t^*) \geq 0 \quad (1)$$

where c_t^1 is the maternity leave state, and c_t^0 the working or unemployment state. If the woman faces borrowing constraints and is not able to fully smooth consumption across maternity states, then $u'(c_t^1) - u'(c_t^0) > 0$, which implies that an additional unit of wealth

¹¹ Usually, the endogeneity problem is sought to be solved by estimating simultaneous equation models that take into account simultaneity of the female labour supply and fertility decision-making.

increases fertility (income effect) (ibid: 6) . Accordingly, the effect from an increase in the wage rate on the optimal fertility decision is given by

$$\frac{\partial p_t^*}{\partial w} = -u'(c_t^0) / \psi''(p_t^*) \leq 0, \quad (2)$$

which denotes the (negative) substitution effect (a higher wage rate decreases the marginal return of having a child to the extent that it raises the value of being unemployed) (ibid.).

When it is assumed that wages grow with job tenure then displacement destroys all job specific human capital (a woman re-entering a new job starts with wage $w(0)$). Further it is assumed that the birth of child affects the labour market situation of the mother in two dimensions: a child lowers a mother's job finding rate, and it reduces the rate at which human capital is accumulated in the future (ibid: 7; see also Miller 2007, Ellwood et al. 2004).

Del Bono et al. (2008) analyse the effect of job loss on fertility decisions using data from the Austrian Social Security Database¹², matched with child benefits records (ibid: 11). One of the main conclusions the authors draw from their analysis is that women for whom career concerns and the destruction of firm specific human capital matter most show the largest response to a job loss in terms of lower birth rates (ibid: 25). They also find that women with medium experience levels are affected much more than those with either very little or very much experience (ibid.). That is, job displacement does particularly influence the fertility decisions of women when displacement hits at a crucial stage in a woman's career.

¹² Hauptverband der österreichischen Sozialversicherungsträger

4 The Austrian setting

4.1 Overview of socio- economic and -demographic developments since the 1960s

The post Second-World-War baby boom¹³, which was at its peak level in Austria in 1963 with an average of 2.8 children per woman, was followed by dramatic declines in total fertility. The TFR fell below the replacement level of 2.1 in the early 1970s and reached its all time low in Austria in 2001 with 1.33 children per woman. Since the 1980s fertility rates dropped slightly but steadily from around 1.55 to 1.4. Since the lowest level ever registered in 2001, no clear trend has been visible – in particular, there is no evidence that fertility regains significantly higher levels. In 2002 the TFR increased again to a rate of 1.39 before reaching 1.38 in 2003 and rates slightly above 1.4 since then (1.42 in 2004, 1.41 in 2005 and 2006). Preliminary figures for 2007 indicate a downshift once again.

Decreasing fertility rates came together with increasing female labour force participation and educational expansion since the 1960s for both sexes, but more particularly for women. In the last 30 years the amount of women having completed their secondary education increased from 15% in 1971 to more than 45% in 2001 and those of males from 17% to 40% (figures based on the average of all 18 to 20 years-olds) (Landler 2008: 185). The number of female university first-year students quintupled from 1971 to 2002, whereas the number for males doubled in the same period. Consequently, the larger part of educational improvement at the tertiary level was also due to extended female enrolment: In 1971 the proportion of female holders of a university degree was 2.3% of the corresponding age group¹⁴. By 2001 the share had increased to almost 13%. For males in contrast, the proportion decreased from a level of 7.8% in 1981 (females 4.5%) at 7.2% in 2001. The male share is actually higher if holders of the “Fach-

¹³ Different countries experienced the so called “baby boom”, marked by increasing fertility rates after the Second-World-War, at slightly different points in time. In the United States birth rates were increasing and remaining high from the mid-1940s till the mid-1960s. Other countries like Germany or Austria experienced low birth rates in the immediate post-war era but increasing rates from the mid-1950s onwards. In Austria the highest fertility rates were to be found between 1957 and 1968. The “baby boom” was followed by the “baby bust” after introduction of the birth control pill (<http://www.statistik.at>).

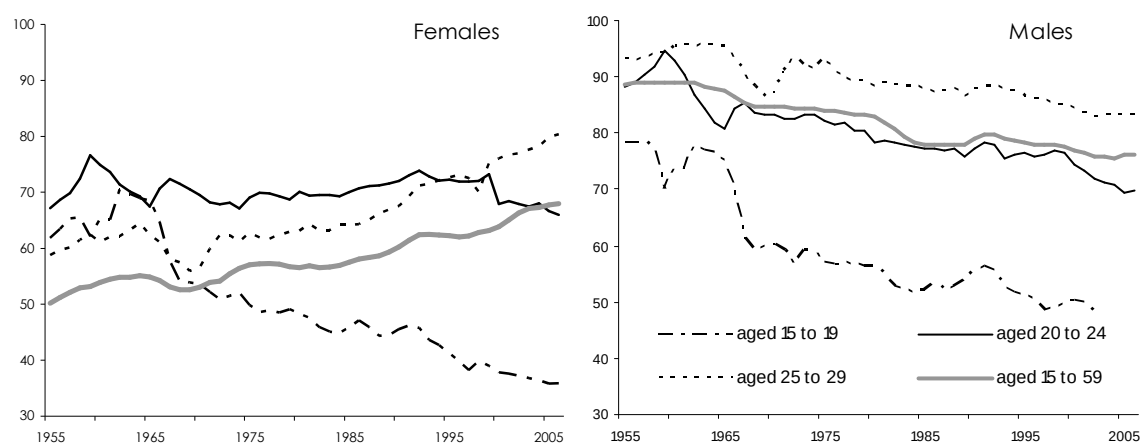
¹⁴ The corresponding age groups are the five cohorts of people aged 25 to 29 years.

hochschul"-degree, i.e. universities of applied sciences or polytechnics, are taken into account. "Fachhochschulen" were established in 1994 in Austria (ibid: 185/186).

Today 54% of students in undergraduate courses are women (Hochschulstatistik 2005/06: 15) even though the increase in women's educational enrolment has been concentrated on a few fields of study and schooling institutions (Landler 2008: 186). Summing up, the qualification structure of Austrian habitants did improve noticeably in the last 35 years and the improvement was largely due to females. This is at odds with the only moderate narrowing of the wage gap between males and females in the last decades (Böheim et al. 2007: 227; see below).

Nonetheless, in the international comparison the share in holders of a tertiary degree among the resident population aged 25 to 34 years is low in Austria. According to OECD figures the share was 15% in 2003 (for both sexes) whereas the OECD-mean was 29%. The share of PISA-model country Finland, which also experiences significantly higher fertility rates, was 40%, in the United States 39%. Even in Germany – often compared to Austria for also not having the system of comprehensive schools ("Gesamtschule") across the whole country for pupils aged 6 to 14 and 15, respectively – the share was 22% (Landler 2008: 181).

Figure 4.1: Age-specific labour force participation rates in Austria from 1955 to 2006



Source: AMS, HSV, STATISTIK AUSTRIA, WIFO

Female labour force participation rates were shaped by contradictory effects in the last decades: The overall trend for women aged between 15 and 59 years is clearly positive since the 1950s (figure 4.1). Nevertheless, as a result of the educational expansion, participation rates went down for women aged 15 to 19 years (from 70.5% in 1962 to 35.9% in 2006¹⁵) – as did the age-specific fertility rates for that same cohort (see figure 4.2). For the successive age group (women aged 20 to 24 years) labour force participation rates increased between the 1970s and the early 1990s before experiencing a reversal of the trend. This coincides with a strongly growing proportion of females in the mean age cohort holding a tertiary degree: it went up from 6% in 1991 to 12.6% in 2001 (Landler 2008: 185). In the same period the corresponding age-specific fertility rate experienced the most considerable downward trend among all age groups.

For women aged 25 to 29 years, labour force participation rates increased steadily with the exception of the mid-1960s. This is in large parts due to an increasing share of mothers who participate in the labour market: In 1971 44% of women with children were actively in the labour market; till 2003 the share increased up to 76% (Wernhart/Neuwirth 2007: 9). Despite this noticeable increase in female labour force participation, women of this age group experienced the highest age-specific fertility rate since the mid-1980s; nonetheless fertility is declining in this group since the early 1990s. Today women of this age group together with women aged 30 to 34 years are the most important contributors to the total fertility rate. In addition, this latter cohort is the only one with a clearly positive development of the fertility rate since the 1980s. This is also true for the age cohort of 35 to 39 years old women, but only in recent years. Correspondingly, the share in live births (per 1,000 women) for the age group of the 35 to 39 years-olds increased in only 6 years (from 2000 to 2006) by 3.4 percentage points (see table 4.1).

¹⁵ Source: AMS, HSV, STATISTIK AUSTRIA, WIFO

Table 4.1: Share in live births per 1,000 women and changes over time in percent-age points by age groups:

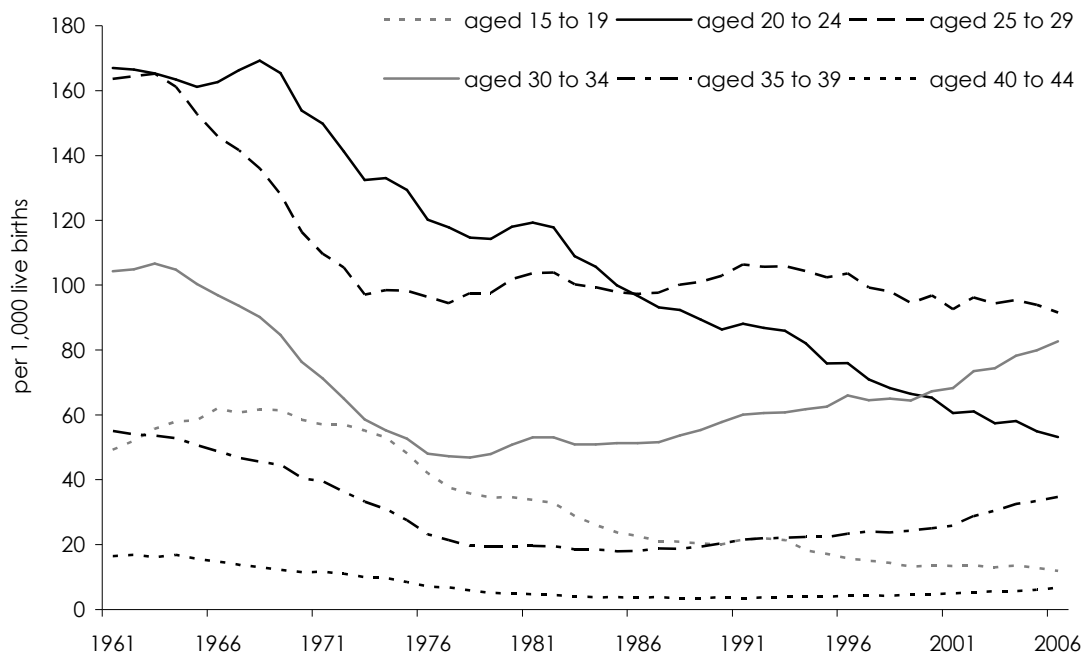
<i>Mothers aged</i>	<i>1973</i>	<i>2000</i>	<i>2006</i>	<i>1973-2006</i>	<i>2000-2006</i>
15 to 19	14.2	4.8	4.3	-10.0	-0.6
20 to 24	34.2	24.4	18.9	-15.3	-5.5
25 to 29	25.1	34.6	32.6	7.5	-2.1
30 to 34	15.1	23.6	29.4	14.3	5.8
35 to 39	8.6	8.9	12.4	3.8	3.4
40 to 44	2.6	1.7	2.4	-0.2	0.7
45 to 49	0.2	0.1	0.1	0.0	-0.1
	100	100	100		

Source: STATISTIK AUSTRIA [einjaehrige_fertilitaetsziffern_seit_1961_029824_STAT_AUST.xls]

For women aged between 40 and 44 years the share in live births in 2006 was almost as high as in 1973 even though the age-specific fertility rate in 1973 was significantly higher (see figure 4.2). This also reveals the shift in shares (i.e. in the contribution of the age-specific fertility rates to TFR) from younger to older women.

Summing up, we observe decreasing female labour force participation and fertility rates in the youngest age group as well as for women aged 20 to 24 since the early 1990s due to educational expansion (on the secondary and tertiary levels). For women aged between 25 and 29 years both labour force participation and fertility increased till the end of the 1980s; the slightly negative trend in fertility since the 1990s did not change the fact that this age cohort is the one contributing the most to the total fertility rate. Male labour force participation was decreasing in all age cohorts due to the educational expansion, especially among men in the youngest age cohort.

Figure 4.2: Age-specific fertility rates from 1961 to 2006 (per 1,000 live births)

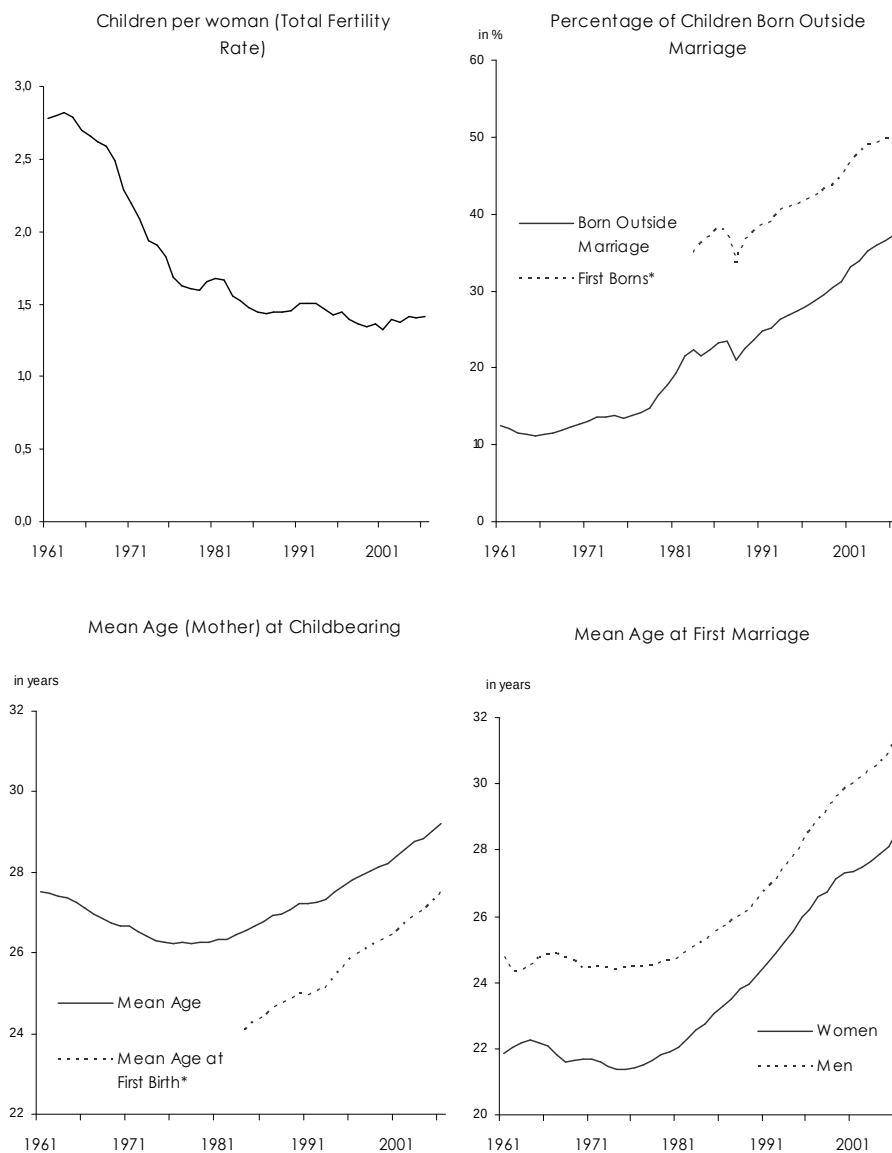


Source: STATISTIK AUSTRIA

As a result of decreasing age-specific fertility rates in the younger age cohorts, mean age at (first) birth was steadily increasing. By the end of the 1990s only 5% of all children were born from mothers younger than 20; only 31% from mothers aged between 20 and 24 (figures based on the fraction of the age-specific fertility rates in total fertility, i.e. they are adjusted for effects caused by changes in the age-composition of the population; Tazi-Preve et al. 1999: 21). Mean age at birth went down in the years around and after the baby boom but from 1978 onwards it experienced a considerable upward trend. The same is true for the mean age at first birth (see figure 4.3 c). Figures for mean age at first birth are only available since 1984 but since then these were steadily increasing. Up to the present, there are no signs of a slow-down of this trend even though postponement cannot continue forever given the fixed age-range of childbearing. Considering only the very last development: mean age at first birth increased by 1.3 years from 2000 to reach 27.5 years in 2007 (mean age at birth was 29.4 years).

Still, in international comparison¹⁶, Austria ranks among the countries with rather low mean ages at first birth, within the group of the EU15-countries (see figure 2.2 in chapter 2). It is considerable higher, for example, in the United Kingdom, Switzerland, the Netherlands or Germany.

Figure 4.3 (a-d): Socio-demographic key figures



Source: STATISTIK AUSTRIA. *) Data available since 1984.

¹⁶ See table A.1 and figure A.1 in the appendix for an overview on TFRs, mean age at first birth and female labour force participation for a selection of European countries.

As shown in chapter 2, increasing mean age at first birth on the individual level leads to lower total fertility rates. Another factor working in the direction of lower fertility rates is the *de facto* disappearance of families with five or more children. From 1963 to 1986 the number of fifth or higher order born children (born inside marriage) was cut down to one tenth of the initial value, those of fourth born children to one fourth, whereas the number of third and second born children dropped to only one third of the initial value. By the end of the 1990s 45% of all newborns were first born children (Tazi-Preve et al. 1999: 21).

4.2 Gender equality and attitudes towards family in Austria

The following section focuses in more detail on gender-related issues to grasp the conditions under which women in Austria decide whether to have children or not. Secondary literature as well as findings from the EU-SILC dataset¹⁷ for Austria, serve as the basis of information.

4.2.1 Part-time employment

Female labour force participation rates¹⁸ increased steadily in the last decades as did the share of part-time employment, especially among women. In total, female labour force participation increased from 52.2% in 1955 to 68% in 2007 for women aged between 15 and 59¹⁹. The figures for female part-time employment²⁰ went up from 17.5% in 1974 to 37.2% in 2003 and 41.9% in 2006. Part-time employment for males increased as well, but at a much lower level (the rate increased from 1.2% in 1974 to 3.9% in 2003 and 5.9% in 2007). Note that the increases after 1993 and 2003 are partly due to changes in the recording of the status “being in labour force”.

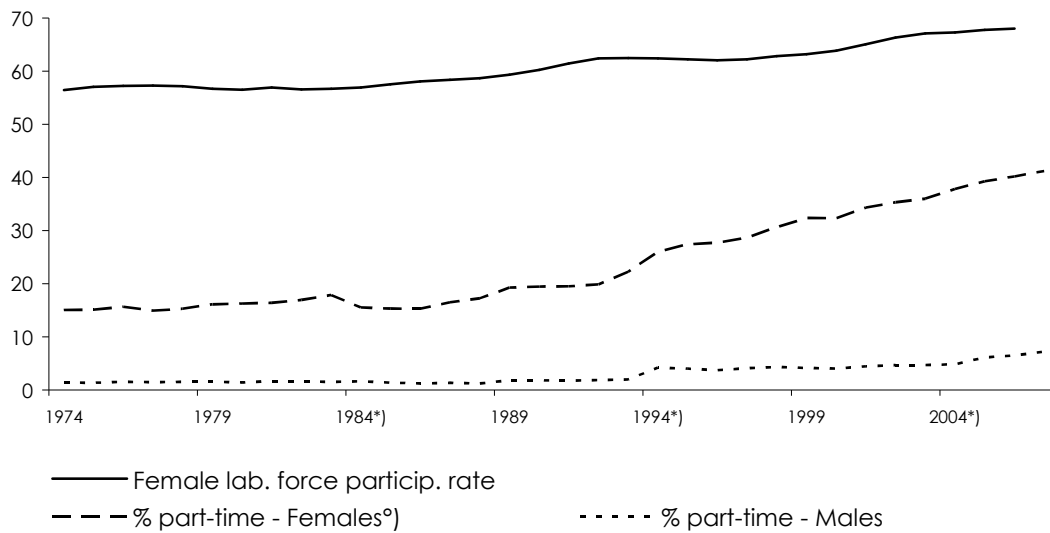
¹⁷ Used were three waves of the EU-SILC for Austria (2003 – 2005); see chapter 5 for more details on the dataset.

¹⁸ Based on “unselbständig Beschäftigte”, i. e. not self-employed.

¹⁹ Source: AMS, HSV, STATISTIK AUSTRIA, WIFO.

²⁰ Source: STATISTIK AUSTRIA

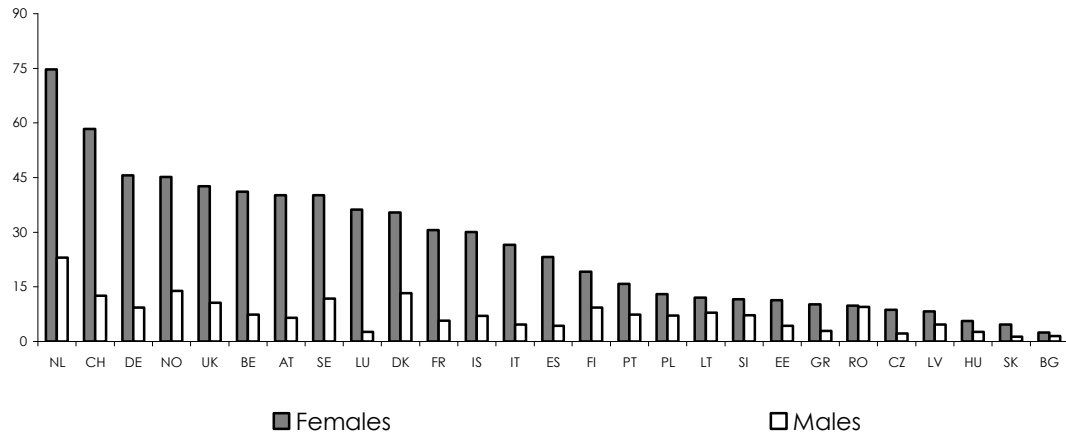
Figure 4.4: Female labour force participation and percentage of part-time employment



Source: Figures for the overall participation rate: AMS, HSV, STATISTIK AUSTRIA, WIFO. Source for part-time employment: STATISTIK AUSTRIA. *) Break in time series (% part-time) °) Till 1993 in labour force according to "Lebensunterhaltkonzept", since 1994 in labour force according to labour-force-concept (Eurostat). Reference are women aged between 15 and 59.

Compared to other European countries female labour force participation is relatively high in Austria. In 2004 only Denmark, Sweden, the Netherlands, the United Kingdom, Finland and Portugal showed bigger shares of women being in the labour force than Austria. High is also the share in female part-time employment (figure 4.5). The two countries with significantly higher shares in female part-time employment are the Netherlands and Switzerland; i.e. countries with noticeable differences in their total fertility rates (TFR in the Netherlands was at 1.7 in 2006, in Switzerland at 1.34). This indicates that high shares in part-time employment – which is often argued to facilitate the combination of work and family life for mothers – do not necessarily lead to high fertility rates.

Figure 4.5: Shares of part-time employment in European countries (2006)



Source: Eurostat. Countries from left to right: Netherlands, Switzerland, Germany, Norway, United Kingdom, Belgium, Austria, Sweden, Luxemburg, Denmark, France, Iceland, Italy, Spain, Finland, Portugal, Poland, Lithuania, Slovenia, Estonia, Greece, Romania, Czech Republic, Latvia, Hungary, Slovakia, Bulgaria.

An important part of the Austrian increase in employment in the last years was due to new jobs in the often lower qualified part-time segment (Arbeitskräfteerhebung 2006: 14). Even in 2006, when the unemployment rate went down for the first time since 2000 and an important number of new jobs was created also in the full-time segment, part-time jobs grew at a steeper rate than full-time employment. Women have been and still are recruited to a larger extent in the part-time segment than men are (ibid.). Also, in terms of qualification women continued to be more likely to be employed in lower qualified fields than men: Only 24% of employees in highly qualified positions in the private sector were women whereas the female-ratio in unskilled positions was 69% (Arbeitskräfteerhebung 2006: 13). This may be explained by the higher percentage of women working part-time; something which is usually incompatible with the large amount of work effort demanded in top positions.

In fact, being employed part-time is often (deliberately?) chosen by women, either because of individual preferences or domestic and child care duties. Out of 1,395 women in a sample out of the EU-SILC²¹ nearly 8% stated not to wish full-time employment against 6.5% who indicated that they preferred to work full-time but could not find a

²¹ Sample out of three waves of the EU-SILC data set for Austria 2003, 2004 and 2005 (own calculations). Data copyright by STATISTIK AUSTRIA, responsibility for the contents lies uniquely with the author.

corresponding job. Looking at women with no children, the percentage of those who stated not to want full-time employment was even higher (17.3% versus 14.5% for those who did not find a full-time job and 25.4% who worked part-time because of domestic duties). Out of 1,049 mothers 81.8% indicated that they were working part-time because of domestic work and/or child care. So the main reason why women do work part-time is household-duties. To answer the question whether part-time employment is really voluntary chosen by women or rather the result of societal pressures and/or habits, would require to assess the inter-familial surroundings and social and institutional frameworks such as the availability of child care facilities in much more detail (see Schulmeister 2003: 19). This is not within the framework of this diploma thesis, but certainly relevant for the fertility research agenda.

4.2.2 Cost of children and labour force participation of mothers

The larger part of the educational expansion in Austria was due to an increase in female participation. According to economic theory, higher qualified individuals gain higher (potential) wages and therefore have a bigger incentive to participate in the labour market. Indeed the developments in Austria and elsewhere in Europe were marked by noticeable educational improvements and increasing female labour force participation rates since the end of Second-World-War.

Education and former professional careers influence fertility behaviour as well as future potential incomes and labour force behaviour after an eventual birth, mainly via effects of human capital accumulation (Lutz 2003: 771). Women who get children and drop out of the labour market for maternity leave will re-enter the labour force according to their qualification status: The better educated and the higher the potential wages the sooner a mother will return to work. Institutional arrangements also influence the labour force behaviour of mothers. Lutz (2004) examined these two effects (among others) when studying the impact of the reorganisation of the family allowance regime in 2002. After the introduction of the “Kinderbetreuungsgeld” (organised as family allowance for all children²² for a maximum of 36 months²³) instead of the old “Karenzgeld” (organised as

²² Recipients of the “Kinderbetreuungsgeld” are also non-Austrian children if their mother (or father) has lived for at least 5 years in Austria without interruption or if the mother (or father) is within an intact employment relationship.

assurance benefit for a smaller group of recipients and for a maximum of 24 months), less mothers returned to work after giving birth: Only 28% of women being employed before the birth of their (youngest) child returned to work within 24 months. Under the old “Karenzgeld” it was almost 50% (Lutz 2004: 18). This cutback was not completely made up after the expiration of the “Kinderbetreuungsgeld”: 41% did not return to work within 33 months. Under the “Karenzgeld”-regime it was 35% not returning to work within 33 months (ibid.).

Differentiating by income groups Lutz (2004) showed that the new “Kinderbetreuungsgeld” also provided negative incentives to re-enter the labour market for mothers with high incomes²⁴ before birth: With the “Karenzgeld” 67% of mothers with a monthly income above € 2,000 returned to work within 24 months (69% within 33 months). With the “Kinderbetreuungsgeld” it was only 50% within 24 months, another 7% within 33 months. The share of mothers with an income above € 2,000 who did not return to work within 33 months increased from 17.3% to 23% (ibid: 22). For lower income groups the effects were even stronger. Under both regimes women with incomes below € 850 were least likely to re-enter the labour market within 33 months which is in line with the economic theory of opportunity costs.

The stronger incentive to stay longer in maternity leave or to not re-enter the labour market at all also means higher indirect costs of children (see also Lutz 2003). This is likely to have a negative impact on fertility and may explain why the introduction of the “Kinderbetreuungsgeld” had no significant effect on fertility behaviour (fertility rates were not increasing in substantial manner since 2002).

Furthermore, labour force participation of mothers depends strongly on the number of children and the age of the youngest child. Female labour force participation increases with the age of the youngest child and decreases with the total number of children (Lutz 2003: 773). In 2000 more than 70% of the women with only one child participated in the labour market when the child reached the age to enter kindergarten, but only 54% if the woman was a mother of 3 or more children (ibid). Last, but not least, a mother’s probability to participate in the labour market depends on her civil status. Women (with

²³ “Kinderbetreuungsgeld” is paid for 30 months for one parent or for 36 months if both parents make use of the benefit.

²⁴ Used was gross monthly income (without special or bonus payments) in 1999.

children under the age of 15) who raise their children as single-parents are more likely to be in the labour force (86% in 2003) than women living in a partnership (74.5%) (Wernhart/Neuwirth 2007: 10). Both aspects can also be shown with data from the EU-SILC for Austria: When estimating potential female wages controlling for sample selection (Heckman 1979) we observe a significantly and strongly negative effect on the probability of participating in the labour market if a woman has children under the age of three and a negative (even though much smaller) effect of the number of children. Also married women have a significantly lower probability to participate in the labour market (see chapter 5.3.1 for details).

4.2.3 Gender wage gap

Another factor influencing the indirect costs of children in family constellations with a father and a mother are differences in wages between men and women. Men still do earn higher wages than women (e.g. Schulmeister 2003). Böheim et al. (2007) found that the average “gender wage gap” in Austria in 1997 was almost as high as in 1983 (examining differences in wages from full-time employment): Not controlling for observable differences such as educational status or professional position women in 1983 earned on average a quarter (25.5%) less than what men did. Controlling for these differences, women still earned 17% less, due to other unobserved factors. These unobserved factors are referred to as the “gender wage gap”. In 1997 this gender wage gap was still 14%; not controlling for observable differences female wages were at 23.3% of men’s wages (using men’s wages as reference; Böheim et al. 2007: 226/227). In terms of opportunity costs it is therefore rational in a partnership that the woman retires from the labour market in order to take care of the children.

Differences in male and female wages can also be shown with the EU-SILC²⁵ dataset for Austria.²⁶ The sample contains individuals receiving income from a dependent employment relationship (“unselbständig Beschäftigte”) between the age of 16 and 64 if male and 16 and 59 if female (retirees are excluded from the sample). Examined are log hourly wages (see section 5.3.1 for details on the construction of the variable). Control-

²⁵ Data copyright by STATISTIK AUSTRIA, responsibility for the content lies uniquely with the author.

²⁶ Used were three waves (2003, '04, and '05), combined to a cross-sectional dataset (see chapter 5 for details).

ling for work experience, educational status, professional position, having a migratory background, and living in a rural area, women in the sample earn about 11% less than men do (own calculations, see table A.2 in the appendix). Note that log hourly wages are derived from net yearly incomes, therefore differences in wages between men and women are underestimated for reasons of tax progression: Women work part-time decisively more often, consequently, female yearly incomes on average fall into lower tax classes than men's incomes²⁷. Regressing individual characteristics on log hourly wages for males and females separately reveals further differences between the sexes (see table 4.2). In particular, males profit more from higher education and higher professional positions in terms of higher potential income than women. Having a migratory background in contrast has a less negative impact on females than males.

Table 4.2: OLS regression on log hourly wages (based on net yearly incomes from dependent employment) for males and females:

	Males		Females	
	Number of obs = 5,685 R-squared = 0.2482		Number of obs = 4,657 R-squared = 0.2324	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Experience (years)	0.0217 ***	0.0026	0.0239 ***	0.0029
Experience squared	-0.0003 ***	0.0001	-0.0004 ***	0.0001
Migratory background ^{o)}	-0.1026 ***	0.0195	-0.0745 ***	0.0221
Rural area	-0.0489 ***	0.0133	-0.0490 ***	0.0149
<i>Highest level of education (reference: Apprenticeship, BMS^{oo)})</i>				
No compulsory education	-0.021	0.0433	-0.1693 ***	0.0461
Compulsory education	-0.0622 ***	0.0207	-0.0719 ***	0.0195
College ("Matura")	0.0991 ***	0.0202	0.1125 ***	0.0193
University degree	0.2788 ***	0.0295	0.2440 ***	0.0301
<i>Professional position (reference: Medium skilled position)</i>				
In Apprenticeship	-0.6474 ***	0.0488	-0.6677 ***	0.0528
Unskilled position	-0.1608 ***	0.0310	-0.1490 ***	0.0260
Low-skilled position	-0.0693 ***	0.0178	-0.1043 ***	0.0182
High-skilled position	0.1332 ***	0.0184	0.1193 ***	0.0208
Leading position	0.2059 ***	0.0264	0.1401 ***	0.0329
Constant	1.8641 ***	0.0286	1.7595 ***	0.0295

Notes: ^{o)} "Migratory background" defined as not born in Austria or in EU15/EFTA or first citizenship is not Austrian or EU15 or abandonment of an other than Austrian citizenship

^{oo)} BMS: "Berufsbildende mittlere Schule"

*** 1 percent significant level, ** 5 percent significance level, * 10 percent significance level

Source: EU-SILC 2003-2005, own calculations.

²⁷ Mean yearly net incomes for males is around € 21,500 whereas women earned in average € 14,200.

4.2.4 Value system and the reconciliation of work and family life

Work-life reality in Austria is also reflected in values and attitudes *vis-à-vis* work and family life. In a study²⁸ by the Austrian Institute for Family Studies (ÖIF) from 2007 (using data from 2004) 15% of the interviewed women stated that the mother of a child aged between ½ and 3 years should not work at all. Among men, the percentage was even higher (22%). Asked if it is compatible with the image of a “good mother” that she participates in the labour market 65% among those having completed only primary education stated “no”. Among persons holding a tertiary degree the percentage was still 35% (Kapella/Rille-Pfeiffer 2007: 13).

The image of a “good father” by contrast is still dominated by the traditional view that a father should assure the economic survival of the family: 60% (both sexes) answered that it was “absolutely necessary” that a “good father” assures the economic income of the family, 38% thought it was “rather important” (together 98%). Somewhat contradictory, only 11% (both sexes) thought it was “absolutely necessary” that a father concentrates on his professional career (35% thought it is “rather important”). The authors interpret this discrepancy as a sign of conflicting expectations young men feel themselves confronted with nowadays: Assuring a family’s income and assuming domestic and family duties at the same time (ibid: 14). 96% (both sexes) stated that it was “absolutely necessary” or “rather important” that the father assumes a bigger share of domestic and family duties, 95% found it either “absolutely necessary” or “rather important” that the father participates equally in taking care of the child (ibid: 15). This does not necessarily mean that mothers in Austria want their partners to take advantage of the possibility to go on maternity leave: Only 51% of all women wanted their partners to do so (ibid: 16). A possible explanation for this is that the woman’s income may be too low to sustain the family. Among males, the willingness to go on parental leave was higher: 75% among men with no children indicated that they would interrupt their career for paternity leave. Among fathers the percentage was 58%. Reality is, albeit, different: In the sample interviewed for the study almost every father (95%) was employed full-time and did not interrupt employment after the baby was born (ibid: 21).

²⁸ Interviewed were 1,000 persons (506 women and 494 men) aged between 18 and 70 on their attitudes towards “classical father-mother-child(ren)- families”. In the foreground of the study were attitudes and values concerning work and family life (reference were families with children aged between ½ and 3 years).

The authors conclude that on the one hand a high engagement in domestic and family duties of the father is demanded (men do so even to a larger extent than women). The actual behaviour on the other hand corresponds much more to the traditional role allocations between father and mother, where the former stays in the labour market to assure the families income and the latter takes care of the children. An explanation for this discrepancy has yet to be advanced. It is likely that it is related to economic pressures resulting from the often higher opportunity costs for men dropping out of the labour market but the authors doubt that the discrepancy can be explained solely with existing barriers and restraining factors from the institutional and societal framework (Kapella/Rille-Pfeiffer 2007: 23).

5 Timing of first births, female wages, and fertility – Insights from Austria

In modern labour economics, changes in the fertility behaviour of women have been linked to women's labour market choices and decisions (Golding 2006: 3). Commonly, decreasing fertility rates are associated with longer periods of educational attainment, especially of females, on the one hand and increasing female labour force participation rates on the other. In particular, female wage rates are expected to affect the demand for children negatively, as higher earnings increase the opportunity costs of children. Yet, empirical results are ambiguous.

In the following I investigate the impact of potential female wages on fertility for Austria, using data from the EU-SILC. From a technical point of view, econometric analyses on the impact of female wages on fertility suffer from a problem of endogeneity, as a woman's decision on labour market participation and family formation is likely to be determined by the same set of covariates. A possibility to avoid the endogeneity problem is shown in Del Bono et al. (2008)²⁹. The authors investigate fertility responses to an unexpected career interruption, using a truly exogenous dummy variable on job loss after firm closure as a covariate. Given the lack of appropriate instruments in the EU-SILC, however, the work at hand accepts the consequences of this potential endogeneity bias as inevitable. To this extent, we observe a negative impact of potential wages on fertility, albeit not for all women in the sample.

5.1 The EU-SILC³⁰ dataset for Austria

Despite the potential endogeneity of female labour supply, and therefore income, in modelling fertility decisions, numerous works focus on the impact of female wages on fertility (e.g. Becker 1981, Becker and Barro 1988, Cigno and Ermisch 1989, Heckman and Walker 1990, Hotz et al. 1997, Aassve et al. 2006). For Austria, so far, there is little

²⁹ The paper is discussed in the literature review in chapter 2.

³⁰ Data copyright by STATISTIK AUSTRIA, responsibility for the content lies uniquely with the author.

evidence for the sign of this impact³¹. The following analysis, resorting to data from the EU-SILC, provides some first insights. Officially launched in 13 EU-member countries in 2004, EU-SILC³² is an instrument aimed at collecting timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion and living conditions. At present, the survey is conducted in the 27 member states of the European Union, as well as in Norway, Iceland, Turkey and Switzerland.

For the work at hand I construct a cross-sectional dataset out of the first three waves of the survey available for Austria³³, including data from the test survey of 2003 (which was not yet conducted as a panel but only as a cross section). The combination of three waves to one cross-sectional dataset allows for the enlargement of the number of relevant cases. However, there are some shortcomings in the data, which render it difficult to investigate the determining factors of entry into motherhood in detail: the published data does not contain information on the exact timing of births but only on the age (in years) of children present in a household³⁴. Hence it is not possible to reconstruct the pre-maternal and pre-conception histories of “young”³⁵ mothers in detail. Information on former work experience is available, but only to a certain extent. In particular, it is not possible to track spells of unemployment or how often a woman changed her employer. This information, had it been available, could have been used as an indicator for job stability which is supposed to play a major role in a woman’s decision to enter motherhood (e.g. Kreyenfeld 2005, Aassve et al. 2006).

Summing up, the EU-SILC allows insights into a woman’s individual situation before she gives birth to a child, but this only to a certain extent. There is information on a woman’s highest level of completed education, at which age this level was attained, if and when a woman entered the labour market as well as information on the number of years spent working. There is also information on the participation status³⁶ during the

³¹ Mahringer (2005) measured the impact of (potential) wages and child care costs on the employment decisions of mothers, but not on fertility *per se*.

³² SILC stands for Community Statistics on Income and Living Conditions; see <http://epp.eurostat.ec.europa.eu>; last page view 2008-03-01.

³³ In Austria, the survey is conducted by STATISTIK AUSTRIA.

³⁴ For or privacy reasons personal data such as birth dates are not published.

³⁵ “Young” refers to the fact of getting mother for the first time recently, independent from the actual age.

³⁶ Participants of the survey were asked about their main activity in each month. Answers were categorised as follows: full or part time employee, full or part time self-employed, unemployed, retired, enrolled in school or university, not in gainful employment for other reasons (domestic work, child caring...), military of alternative civilian service.

twelve months of the year preceding the survey (i.e. people interviewed in 2003 were asked about the status in the twelve months of 2002). The EU-SILC also contains detailed information on the social and living conditions and in particular on income, both on earnings as well as on household incomes.

The following analysis focuses on two aspects: the timing of first births in Austria, using a strictly empirical, nonparametric approach; i.e. Kaplan-Meier survival estimates (section 5.2) and the impact of current potential wages on the probability of entering motherhood (section 5.3), using the detailed information on income in the EU-SILC.

I use different samples out of EU-SILC to emphasise the different aspects. The Kaplan-Meier survival estimates focus on all, mothers and childless women between the ages of 16 and 40. The analysis on the impact of wages on fertility is restricted to a smaller subsample: as information is available only on current incomes, I analyse the birth transition of women who had their first child at the time of the survey, as compared to childless women. The underlying assumption is that the status of women before their first birth – which is given in the EU-SILC – is a good enough proxy for the status of the women 9 months before an eventual first birth. Note that women with older children are excluded from the sample.

5.2 Age at first birth

To a certain extent EU-SILC allows for the tracking of pre-maternal individual characteristics for all women in the sample, even for those who had their first child years earlier. That is, the level of educational attainment and the number of years spent working before entering motherhood. The information is used to explain age at first birth using Kaplan-Meier survival estimates.

The Kaplan-Meier estimator (1958), also called Product Limit estimator, is a strictly empirical, nonparametric approach to survival and hazard function estimation (Greene 2000: 948). The “hazard” in the present setting refers to the risk of becoming a mother for the first time. “Survival” refers to remaining childless till the end of the reproductive age. The survivor function $\hat{S}(T_k)$; i.e. the probability of survival past time T_k , can be

written as

$$\hat{S}(T_k) = \prod_{i=1}^k \left(\frac{n_i - h_i}{n_i} \right)$$

where the observations are sorted in ascending order so that $t_1 \leq t_2$. There are K distinct survival times in the data (i.e. “survival” till becoming a mother), n_k denotes the number of individuals whose observed survival time is at least T_k , forming as such a risk set of individuals (thus n_k is the size of the risk set at time T_k). h_k denotes the number of observed spells completed at time T_k (ibid.), i.e. the number of individuals who experienced the failure event before the time of observation; put shortly, the number of failures. “At risk” are women within their reproductive age; the “failure” is represented by the fact of becoming a mother for the first time at time T_k .

The estimator of the hazard function is then $\hat{\lambda}(T_k) = \frac{h_k}{n_k}$ (ibid: 799), which is simply the ratio of the number of failures to the number of the individuals at risk (women in their reproductive ages).

In the following I use the EU-SILC sample described in chapter 4.1, but include only women aged 16 to 40. Note that women are not observed till the age of their reproductive age, which is normally assumed to be 46. The reason is a technical one: in the EU-SILC, women are only identified as mothers if they are co-residing with their children in the same household. The information given on the age of the oldest child present in a household allows reconstructing the mother’s age at first birth, the attained level of completed education before entering motherhood and, if the woman participated in the labour market, the number of years spent working before the first birth. Women above the age of 40 are excluded from the sample, because it is likely, that the oldest child has already left the mother’s household. Consequently, age at first birth would be overestimated if younger children were present in the household; or the woman would not be identified as a mother if the only child has left home already.

5.2.1 Age at first birth according to educational attainment

Increasing age at first birth is due in large part to longer educational enrolments of women. This can be shown with the Kaplan-Meier estimator. The sample contains

4,574 women born between 1962 and 1988. Among these women 2,342 (51%) are living with their children in the same household.

Table 5.1: Summary statistics: Share of mothers and mean age at birth according to different levels of education and work experience

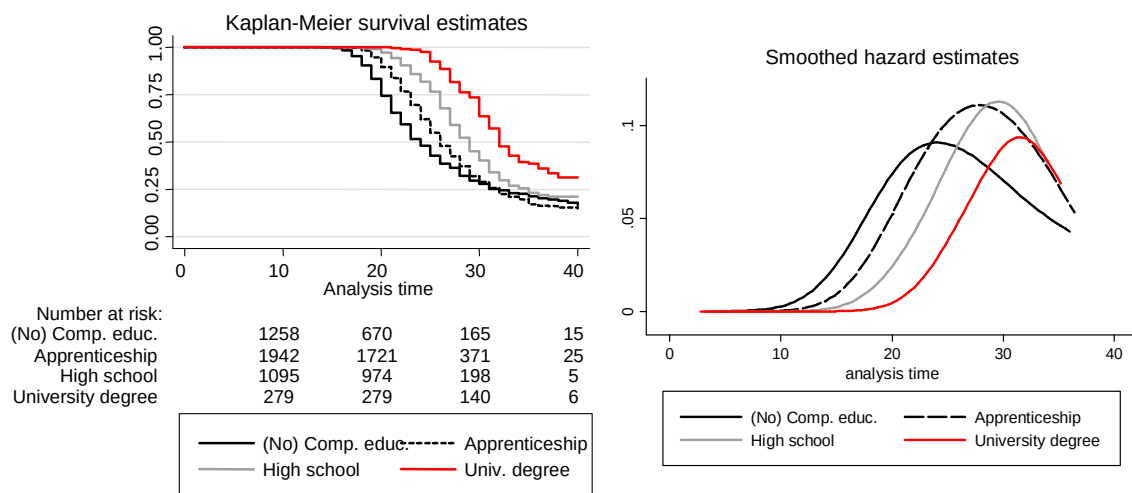
	Nr. of observations			Share of mothers	Mean age at first birth (only mothers)	Mean age at survey	
	Childless women	Mothers	Total			Mother	Not a mother
<i>All levels of education – total</i>	2,232	2,342	4,574	51.2	24.6	33.2	24.3
no exp.	702	279	981	28.4	21.4	31.9	19.8
1 to 2 years	321	183	504	36.3	21.4	30.9	20.2
3 to 5 years	347	574	921	62.3	22.2	32.4	22.3
6 to 9 years	326	716	1,042	68.7	24.7	33.4	25.3
> 9 years	536	590	1,126	52.4	29.3	35.0	33.3
<i>(No) compulsory educ. – total</i>	663	595	1,258	47.3	22.5	32.9	21.4
no exp.	326	133	459	29	20.4	31.3	18.5
1 to 2 years	138	60	198	30.3	18.7	30.2	18.2
3 to 5 years	61	140	201	69.7	20.1	32.8	21.2
6 to 9 years	39	152	191	79.6	23.4	33.7	25.1
> 9 years	99	110	209	52.6	28.9	35.3	34.0
<i>Apprenticeship – total</i>	755	1,187	1,942	61.1	24.6	33.1	25.7
no exp.	72	61	133	45.9	20.6	31.7	19.2
1 to 2 years	63	66	129	51.2	21.5	30.0	19.9
3 to 5 years	158	284	442	64.3	21.3	31.8	20.7
6 to 9 years	167	389	556	70	24.0	33.2	23.3
> 9 years	295	387	682	56.7	29.0	34.7	32.5
<i>High school ("Matura") – total</i>	660	435	1,095	39.7	26.1	33.6	24.3
no exp.	285	64	349	18.3	22.4	32.6	21.2
1 to 2 years	93	44	137	32.1	23.5	32.1	21.9
3 to 5 years	99	111	210	52.9	24.9	33.0	23.9
6 to 9 years	83	140	223	62.8	26.9	33.8	26.8
> 9 years	100	76	176	43.2	30.8	35.8	33.9
<i>University degree – total</i>	154	125	279	44.8	29.1	34.6	30.1
no exp.	19	21	40	52.5	26.8	34.7	24.9
1 to 2 years	27	13	40	32.5	26.6	35.1	25.6
3 to 5 years	29	39	68	57.4	28.3	34.0	28.4
6 to 9 years	37	35	72	48.6	30.3	33.7	31.1
> 9 years	42	17	59	28.8	33.0	36.9	35.8

Source: EU-SILC 2003-2005, own calculations. Sample contains women aged 16 to 40.

Figure 5.1 indicates a noticeably lower risk³⁷ of becoming a mother for women having obtained a university degree before having a first child at any point in the analysis time (red line). The Kaplan-Meier survival estimates indicate that more than 25% of the women with a tertiary degree remain childless at the age of 40³⁸. By then, they will not completely have caught up to the fertility behaviour of lower educated women; the proportion of women remaining childless is higher than for other educational groups. Highly educated women are also the ones postponing first births at most, shown by the peak level of the hazard rate in the right-hand side figure, which is clearly beyond the age of 30.

Women having finished high school (with “Matura”) also postpone first births but at the end of their reproductive lives the fraction of childless women is close to the ones of women with lower levels of educational attainment. The same is true for women having completed their apprenticeship (“Lehrabschluss”). Women having finished only compulsory education or less (black solid line) have children earlier than all other women and for this to occur in their twenties is more likely than for other women.

Figure 5.1: Kaplan-Meier survival estimates and hazard rates*) for different levels of educational attainment



Source: EU-SILC 2003-2005 (own calculations). Sample contains women aged 16 to 40. Analysis time is age at first birth. The number at risk denotes the number of childless women at the age of 10, 20, 30, and 40, respectively. - *) STATA calculates Nelson-Aalen hazard estimates.

³⁷ A lower risk is represented by a “higher” survival curve in the left-hand side figure of 5.1.

³⁸ The result does not change substantially if I consider women aged 16 to 46.

5.2.2 Impact of pre-maternal work experience on motherhood

Timing of first births not only depends on the level of educational attainment but also on the position in their professional lives. Lutz (2003), using data from the Austrian Social Security Database³⁹ from 1972 to 2000, shows that women, who are better integrated into working life, are more likely to get children compared to women of the same age group and educational level (Lutz 2003: 772). Accordingly, we should find a positive impact of integration into working life on fertility. Due to the lack of detailed information on pre-maternal job histories, the number of years spent working before having a first child is used as a proxy for integration in work life. The variable of interest here is the risk of becoming a mother in the overall course of a woman's reproductive life, rather than age at first birth (obviously, a woman with ten years of pre-maternal observed work experience postponed the transition into motherhood compared to a woman with only two years of pre-maternal work experience).

I can confirm Lutz' (2003) findings, when measuring integration into working life in terms of number of years spent working⁴⁰: we find the highest share of mothers within the group of women who spent working 6 to 9 years before the birth of their first child. This is also due to age effects, as age is non-linear, but positively correlated with the probability of being a mother. However, the result does not change when controlling for different levels of education – and therewith also for age –, with the exception of women having completed tertiary education. For this latter group we find the highest share of mothers within the group of women who spent 3 to 5 years in the labour force (see table 5.1 for summary statistics). Note, that the reason for having “no work experience” can either be that a woman stood at the very beginning of her adult or professional life when having her first child or that she does not participate in the labour market at all.

The impact of work experience on fertility can again be shown with the Kaplan-Meier estimator (figure 5.2). Women, who spent time in the labour force before entering motherhood, catch up, up to a certain extent, in their fertility behaviour compared to

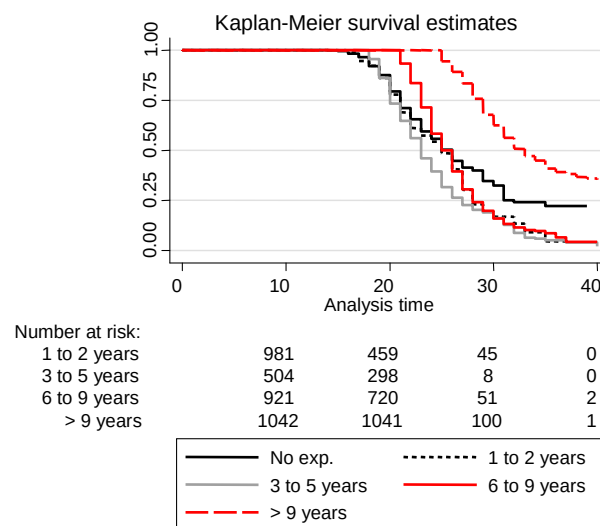
³⁹ Hauptverband der österreichischen Sozialversicherungsträger

⁴⁰ The variable on work experience is constructed out of several other variables, using the information given by respondents on the age at entry into the labour market (if there was an entry), the number of years spent working and age at first birth (constructed *via* the age of the eldest child living in the same household).

women with no or little work experience. This means that the pursuit of a professional career does not detain women from getting children at a later point in life. This is also true for highly educated women (see last figure in 5.3). On the other hand, women with more than 9 years of pre-maternal work experience show a significantly lower risk of becoming a mother, indicating that it may be too late at some point to realise the eventual wish for children. This effect is stronger for higher educated women with longer periods of educational enrolment.

Women with no work experience (black solid line) are the first to get children. Note that the proportion of women remaining childless in this group is relatively high. This is foremost due to the data structure, since many of these women have incomplete spells: remember that we observe women who are not necessarily at the end of their reproductive life, but at current age. This is low in the group of women with no work experience: mean age at survey is only 19.8 years for women with no children (not differentiating for different levels of education). That means that the Kaplan-Meier estimate resorts to very few observations of older women with no work experience and children.

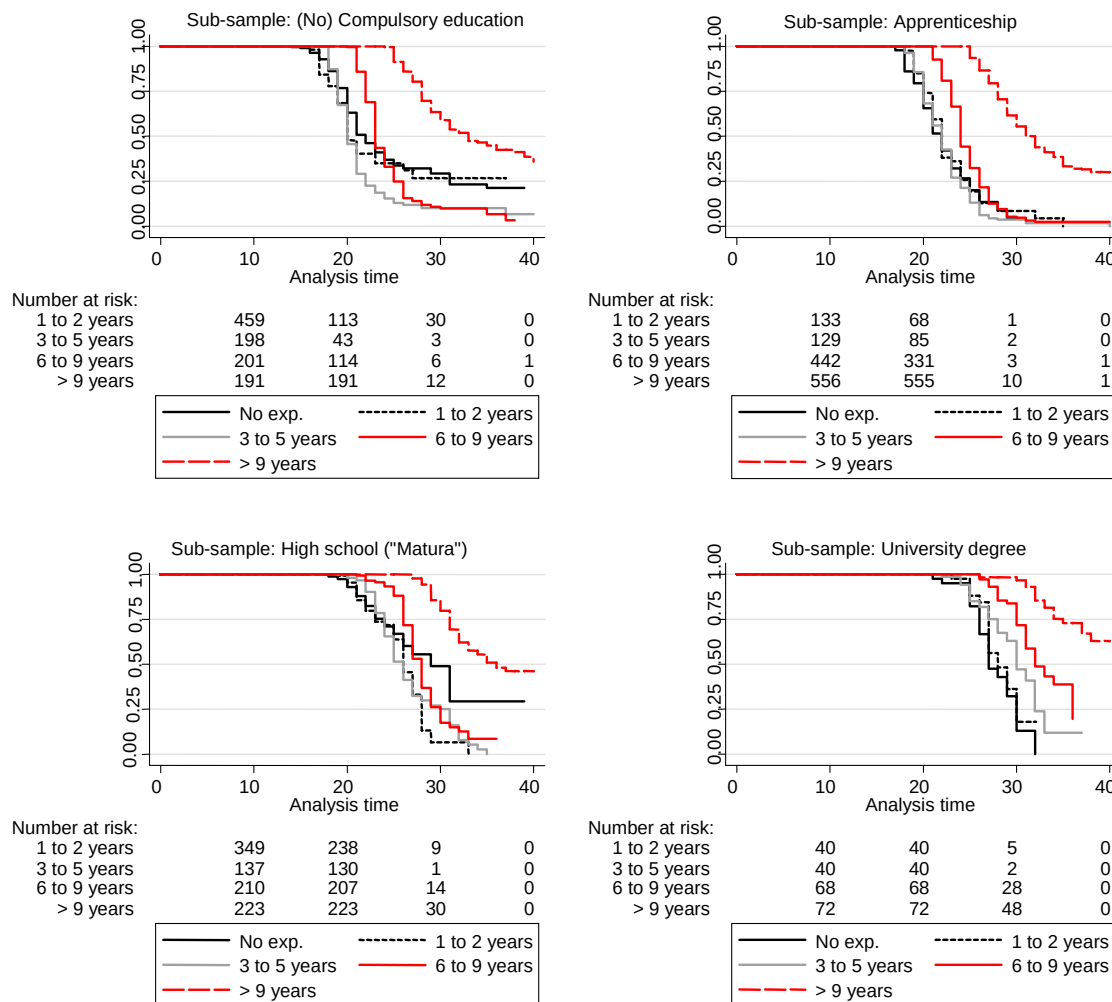
Figure 5.2: Kaplan-Meier survival estimates for different levels of work experience



Source: EU-SILC 2003-2005, own calculations. Sample contains women aged 16 to 40. Analysis time is age at first birth. The number at risk denotes the number of childless women at the age of 10, 20, 30, and 40, respectively.

Figure 5.3 shows the survival estimates for different sub-samples of educational attainment. In the trend, we observe the same characteristics as in the overall sample. The proportion of childless women is highest among highly educated women with more than 9 years of work experience (last figure in 5.3). But we still observe that women with 6 to 9 years of work experience catch up later in their fertility behaviour. However, one should interpret the survival estimates with caution since many women have incomplete spells and the number of observations is low.

Figure 5.3: Kaplan-Meier survival estimates for different levels of work experience and different levels of educational attainment



Source: EU-SILC 2003-2005, own calculations. Sample contains women aged 16 to 40. Analysis time is age at first birth. The number at risk denotes the number of childless women at the age of 10, 20, 30, and 40, respectively. Sub-samples: observations restricted to those fulfilling the sub-sample characteristics. Note that the survival estimates in the sub-samples are to be interpreted with caution since many of the women with no or little work experience have incomplete spells.

5.3 Women's wages and fertility

The impact of female wage rates on fertility is a contested one. Most studies in the econometric timing and spacing literature find a negative impact of female income on fertility. This is in line with neoclassical models on labour force participation and family decisions: children are time intensive; hence, an increase in the wage rate should induce a negative substitution effect on the demand for children as higher earnings increase the opportunity costs of childbearing and -rearing (e.g. Becker 1981, Becker and Barro 1988, Cigno and Ermisch 1989, Heckman and Walker 1990). However, more recent studies showed less clear results. Tasiran (1995) found with data from the American PSID 1985-1988 Birth History File, estimating hazard models using male and female wages as covariates as well as parental benefits and childcare possibilities, a positive impact of female wages (Gustafsson 2001: 232). Using the same data as Heckman and Walker (1990), i.e. the Swedish household panel data set (HUS), Tasiran estimated much weaker effects of current male and female wages on birth transition than Heckman and Walker did – which made him conclude “that the common belief in a negative (female) wage rate effect and a positive (male wage) income effect might not hold generally” (Gustafsson 2001: 232).

For Austria, given the poor data base, analysis on the impact of female income on fertility is poor. But the EU-SILC in its present make-up⁴¹ allows for at least some insights into the relationship. The econometric approach is a twofold one: in order to assess the impact of female earnings on fertility we need to know the wages offered to all women in the sample. As wages are only observed if a person is employed, a measure for wages for the whole sample of women needs to be estimated. If this is not done one cannot separate the effect of wages on fertility from the effect of female labour force participation on the same. In a second step, potential wages are included as one of the covariates in binary response models on the probability of entering motherhood. In order to obtain robust results I estimate a linear probability model as well as a probit model specification. As neoclassical models of fertility suggest, I find a negative impact of potential wages on fertility, due to the negative substitution effect from higher female wages on

⁴¹ The possibilities of analysis will be richer when more waves of the survey, including the link file, are available.

the demand for children. However, when controlling for the interaction between potential wages and age I find a positive and statistically significant impact of wages on the probability of entering motherhood for women above the age of 27. That is, for women who postponed their first births in order to establish stable professional careers – represented by higher (potential) wage rates –, the positive income effect from higher wages outweighs the negative substitution effect.

5.3.1 Estimating potential wages

Wages are predicted according to a Mincer-type wage offer equation with sample selection correction, using Heckman's (1979) two-step method.

Heckman's sample selection model is based on two latent dependent variable models

$$(1) \quad \ln W^* = \beta' X_w + u_w$$

$$(2) \quad P^* = \gamma' X_p + u_p$$

where (1) represents a Mincer-type wage equation with vector X_w of observed characteristics, and u_w being the unobserved variation. (2) indicates the probability that a woman is employed. The regressor vectors X_w and X_p may contain common components such as level of education, numbers of years spent working, and the like, including intercepts. The errors u_w and u_p are, conditional on X_w and X_p , jointly bivariate normally distributed with zero mean vector and variance matrix Σ .

$\ln W^*$ is only observable if $P^* > 0$; thus the observed dependent variable

$$\ln W = \begin{cases} \ln W^* & \text{if } P^* > 0 \\ \text{missing value} & \text{if } P^* \leq 0 \end{cases}$$

However, the X_p 's are observable if $\ln W$ is a missing value, and the X_w 's are observable if the $\ln W$'s are. Taking advantage of this information, Heckman's two-step method corrects for the sample selection bias of the OLS estimator of β if $\ln W$ is regressed on X_w , using the valid observations on $\ln W$ only (Bierens 2007: 7).

The response probability of the selection, or participation, equation (2) is

$$P[P^* > 0 | X_p] = F(X_p, \gamma) \text{ and}$$

$$P[P^* \leq 0 | X_p] = 1 - F(X_p, \gamma).$$

In order to assure that F takes values strictly between 0 and 1, it is assumed that F follows the standard normal distribution (e.g. Greene 2000: 814ff, Wooldridge 2006: 583ff), with Φ standing for the standard normal distribution. This leads to the so called *probit model* where

$$P[P^* > 0 | X_p] = \int_{-\infty}^{X_p' \gamma} \phi(t) dt = \Phi(X_p' \gamma).$$

For the wage offer equation $\ln W = \beta' X_w + u_w$, log hourly wages are regressed on the covariate vector X_w including an intercept and using the standard OLS procedure.

The sample for the wage estimation contains women in their working ages, whether they have children or not; i.e. women aged 16 to 59. Retirees and the self-employed are excluded from the sample. EU-SILC provides information on net⁴² yearly income and the numbers of hours worked per week⁴³. Hence it is possible to construct net (log) hourly wages⁴⁴. Note that respondents indicate the number of hours spent working at the time of the interview, whereas the information on income refers to the year preceding the survey. Hours worked at the time of the survey are in most cases a reasonable proxy for hours spent working the year before. However, there may be inconsistencies, for example in the case of mothers with small children who were working part-time in the year preceding the survey – indicating the yearly income – and returned to full-time employment at time of survey, indicating the number of hours worked. Hence, the derived hourly wage rate would be too low. I control for this potentially misleading information, using the information given on the employment status in the twelve months of the year preceding the survey. Also note that salaries for the 13th and 14th months are included in the yearly income. This causes an upward bias of hourly wages, as well as the use of net incomes does for reasons of tax progression, as the lower income out of part-time employment is subdued to lower marginal tax rates. Though, this is not problematic as the interest lies in the effect of disposable income on fertility rather than of gross earnings.

⁴² Information on gross income would have been only available for the EU-SILC 2003 and '04, but not for 2003.

⁴³ Hours worked per week were restricted to a maximum of 55.

⁴⁴ Yearly income was divided by the working hours per day times 52 weeks. For women who were not continuously employed in the year preceding the survey income was projected to a yearly equivalent.

The sample contains almost 7,500 women. For two thirds we observe wages; i.e. 4,818 women who participated in the labour market at the time of the survey (based on all jobs held in the year preceding the survey). 54% out of them are mothers.

Table 5.2: Sample characteristics

	Number of observations			Share of mothers	Share of mothers in labour force
	Mother*)	Not a mother	Total		
Total number of observations	4,097	3,384	7,481	54.8	63.6
In labour force	2,606	2,212	4,818	54.1	
Highest level of completed education					
No compulsory education	159	119	278	57.2	42.1
Compulsory education	929	936	1,865	49.8	49.9
Apprenticeship, BMS ^o	2,013	1,304	3,317	60.7	67.5
High school ("Matura")	676	793	1,469	46.0	70.0
University degree	317	229	546	58.1	76.0
Professional position					
In Apprenticeship	18	132	150	12.0	16.7
Unskilled position	618	345	963	64.2	63.8
Low-skilled position	1,279	795	2,074	61.7	65.2
Medium-skilled position	1,049	759	1,808	58.0	67.3
High-skilled position	747	548	1,295	57.7	79.8
Leading position					
Married	3,260	1,182	4,442	73.4	61.0
Foreign	592	390	982	60.3	54.1
Rural	1,891	1,343	3,234	58.5	58.8
Observed hourly wage quantiles					
25 th percentile (mean: € 3.65)	606	599	1,205	50.3	
25 th to 75 th percentile (mean: € 7.27)	1264	1145	2,409	52.5	
75 th percentile (mean: € 14.01)	736	468	1,204	61.1	

Source: EU-SILC 2003-2005, own calculations. - *) Mothers with children of all ages. ^o) BMS: "Berufsbildende mittlere Schule"

The covariates from the Heckman's two-step wage estimation show the expected signs, in the participation equation as well as in the wage equation (table 5.3). The participation equation uses the covariates of the wage equation as instruments plus some household specifics, which are assumed to influence the participation decision of women. Especially the presence of young children reduces the probability of participating in the labour market. The inverse of Mill's ratio which corrects for the sample selection bias is positive – i.e. unmeasured factors such as ambition or intelligence, that raise the wage a

women receives in employment also raise potential earnings (Ermisch/ Wright 1994: 188) –, and statistically significant at a 5% level.

Table 5.3: Wage estimation according to Heckman's two-step method

	Wage equation		Participation equation	
Number of obs = 7,481	Censored obs = 2,663 (i.e., no wages observed)			
	Uncensored obs = 4,818			
	Coefficient	Std. Errors ^{*)}	Coefficient	Std. Errors
Experience (in years)	0.0294 ***	0.0038	0.1729 ***	0.0063
Experience squared	0.0005 ***	0.0001	0.0033 ***	0.0002
Migratory background ^{°)}	0.0885 ***	0.0222	0.0908	0.0552
Rural area	0.061 ***	0.0140	0.027	0.0366
<i>Highest level of completed education (reference: Apprenticeship, BMS^{°°)}</i>				
No compulsory education	0.161 ***	0.0450	0.6771 ***	0.0969
Compulsory education	0.0899 ***	0.0214	0.5151 ***	0.0470
High school ("Matura")	0.1187 ***	0.0194	0.0532	0.0507
University degree	0.2727 ***	0.0271	0.2784 **	0.0820
<i>Professional position (reference: Medium-skilled position)</i>				
In Apprenticeship	0.6074 ***	0.0602	1.526 ***	0.1226
Unskilled position	0.1165 ***	0.0254	0.4496 ***	0.0605
Low-skilled position	0.0876 ***	0.0188	0.3827 ***	0.0442
High-skilled position	0.1541 ***	0.0231	0.6106 ***	0.0626
Leading position	0.1552 ***	0.0349	0.5601 ***	0.1181
In agriculture				
<i>Household specifics</i>				
Married			0.4185 ***	0.0430
Number of children			0.1349 ***	0.0205
Child(ren) aged ≤1			0.4515 ***	0.0606
Child(ren) aged >1 and ≤3			0.3969 ***	0.0746
Child(ren) aged >3 and ≤6			0.0382	0.0713
Disposable household-income (per day) ^{°°°)}			0.0010 ***	0.0003
Constant	1.6610 ***	0.0542	0.5565 ***	0.0606
<i>Selection-correction term</i>				
Inverse Mill's ratio	0.0838 **	0.0407		

°) "Migratory background" if not born in Austria or in EU15/EFTA or first citizenship is not Austrian or EU15 or abandonment of an other than the Austrian citizenship.
°°) BMS: "Berufsbildende mittlere Schule"
°°°) Family income without the working income of the mother.
*) Calculation in STATA; two-step consistent estimates (correction of the asymptotic covariance matrix in the second step; i.e. the wage equation)
*** 1 percent significant level, ** 5 percent significance level, * 10 percent significance level

Source: EU-SILC 2003-2005, own calculations.

Subsequently, potential wages are predicted for all women in the sample. Note that the work-related dummy variables on professional positions can be used in the wage equation as the EU-SICL provides information on former professional positions if a person

is currently not employed (otherwise, wages could not be predicted if there were missing values in any of the covariates). Table 5.4 shows the corresponding summary statistics on observed and potential female wages. In the overall mean (not differentiating for different age groups), mothers do earn higher wages than childless women; mainly because wage increases with age and older women are more likely to have children. Correcting for age, the differences in earnings between mothers and childless women become insignificant (based on two-sided t-tests). Observed wages are indeed higher⁴⁵ for women who had their first child at the age of 33 or older (referred to as “first mother” in table 5.4) than for childless women in the same age group (note, however, that the number of observations is small).

Table 5.4: Summary statistics: Observed and estimated net female hourly wages

	All women		Mother		"First" mother*)		Not a mother	
	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.
<i>All ages</i>								
Mean observed female wages (in €)	8.27	4,818	8.71	2,606	8.35	163	7.74	2,212
Mean predicted female wages	6.74	7,481	6.95	4,097	6.40	318	6.49	3,384
<i>Women aged 16 to 19</i>								
Mean observed female wages (in €)	4.20	210	2.55	3	2.08	2	4.23	207
Mean predicted female wages	4.56	668	4.32	10	4.51	8	4.56	658
<i>Women aged 20 to 23</i>								
Mean observed female wages (in €)	6.66	414	6.26	44	6.38	30	6.70	370
Mean predicted female wages	5.57	686	5.02	98	5.04	67	5.66	588
<i>Women aged 24 to 27</i>								
Mean observed female wages (in €)	7.20	363	6.89	110	7.21	37	7.33	253
Mean predicted female wages	6.16	566	5.73	218	5.94	70	6.42	348
<i>Women aged 28 to 32</i>								
Mean observed female wages (in €)	8.41	557	8.52	333	8.78	61	8.25	224
Mean predicted female wages	6.60	895	6.36	611	7.03	112	7.11	284
<i>Women aged 33 to 59</i>								
Mean observed female wages (in €)	8.83	3,274	8.90	2,116	11.02	33	8.69	1,158
Mean predicted female wages	7.33	4,666	7.21	3,160	7.55	61	7.56	1,506

Source: EU-SILC 2003-2005, own calculations. - *) "First" mother indicates that the women entered motherhood at time of the survey.

⁴⁵ On the basis of a two-sided t-test on differences of the mean; statistically significant at a 1% level.

5.3.2 Impact of potential wages on fertility

In order to assess the impact of female earnings on fertility, I include potential wages estimated in 5.3.1 as one of the covariates in a binary response model on the probability of entering motherhood for the first time.

Again, M is the probability of a certain event to happen, i.e. enter motherhood for the first time

$$M = \alpha'Z + u_M$$

where

$$M = \begin{cases} 1 & \text{if the woman gives birth} \\ 0 & \text{otherwise} \end{cases}$$

Response probability P is a function of the explaining variable vector z :

$$P[M = 1 | Z] = F(Z, \alpha)$$

$$P[M = 0 | Z] = 1 - F(Z, \alpha).$$

Z includes covariates related to individual characteristics – such as age, highest level of education, participation status before birth and potential wages –, as well as household characteristics such as the disposable household income or the presence of a partner. If F is restricted to take on values strictly between 0 and 1, the model specification leads to a probit model as in 4.3.1 with

$$P(M_p = 1 | Z_p) = \int_{-\infty}^{Z_p' \alpha} \phi(t) dt = \Phi(Z_p' \alpha)$$

If we do not restrict F to values between 0 and 1, we can also estimate a Linear Probability model with

$$P(M_{LPM} = 1 | Z_{LPM}) = Z_{LPM} \delta + \varepsilon.$$

In order to check the robustness of the results, I estimate both models.

As the EU-SILC only provides information on *current* incomes, the sample has to be modified in order to assess the impact of potential wages on fertility: it contains only women, of whom we observe the first transition into motherhood *at the time of the survey*, and childless women as the reference group. Women with older children are ex-

cluded from the sample⁴⁶. For the identification problems mentioned in 4.1 – i.e. women are identified as mothers if, and only if, they are co-residing with their children in the same household –, the sample is again restricted to women between the ages of 16 and 40.

Table 5.5: Sample characteristics

	Number of observations			
	"First" Mother*)	Not a mother	Total	Share of mothers
Total number of observations	313	2,232	2,545	12.3
Women aged				
Aged 16 to 19	8	658	666	1.2
Aged 20 to 23	67	588	655	10.2
Aged 24 to 27	70	348	418	16.7
Aged 28 to 32	112	284	396	28.3
Aged > 32	56	354	410	13.7
Highest level of completed education				
Primary education	222	1,418	1,640	13.5
Secondary education	59	660	719	8.2
Tertiary education	32	154	186	17.2
Participation status				
In labour force	238	1,341	1,579	15.1
Out of labour force ^{o)}	75	891	966	7.8
Household specifics				
Partner	281	679	960	29.3
Foreign	57	259	316	18.0
Rural	130	944	1,074	12.1
Mean				
Mean potential hourly wages (in €)	6.38	5.96	6.01	
Mean disposable household income (per	80.75	83.53	83.18	

Source: EU-SILC 2003-2005, own calculations. Women aged between 16 and 40. - *) "First" mother indicates that the woman entered motherhood at time of the survey. - ^{o)} Out of labour force either because of being in educational enrolment, being unemployed or being a housewife.

5.3.3 Results

In order to get reliable results I estimate a probit model as well as a linear probability model. In both models the probability of entering motherhood is regressed on the same set of covariates; i.e dummy variables for different age groups and levels of education, a dummy for labour force participation before an eventual first birth, potential hourly net wages and a set of household specifics. As potential wages have been estimated in a

⁴⁶ In order to enlarge the number of relevant cases, I include not only mothers of newborns (age 0) at time of survey but also mothers of 1 year old children. The underlying assumption is that current wages serve as a well enough proxy for potential wages *before* first birth, also for mothers whose children have at maximum age 1.

first step, the standard errors in the second step model – the probit and linear probability model, respectively – have to be corrected, using the method of bootstrapping⁴⁷.

Table 5.6: Impact of potential wages on fertility: probit regression and linear probability regression on the probability of entering motherhood

Number of obs = 2,545	Probit model		Linear Probability Model	
	Pseudo R2 = 0.2785		Adj. R.squared = 0.1937	
	Observed coeff.	Bootstrap Std. Err. ^{°)}	Observed coeff.	Bootstrap Std. Err. ^{°)}
<i>Age group (reference: women aged 24 to 27)</i>				
Aged 16 to 19	-1.8863 **	0.8412	-0.3125 ***	0.1145
Aged 20 to 23	1.0658	0.6742	0.0912	0.1297
Aged 28 to 32	-1.0635 *	0.6141	-0.1386	0.1439
Aged > 32	-1.8301 ***	0.6526	-0.3437 ***	0.1195
<i>Highest level of education (reference: primary education)</i>				
Secondary	-0.2712 **	0.1080	-0.0390 **	0.0158
Tertiary	-0.1615	0.1857	-0.0078	0.0380
<i>Participation status (reference: not participating in labour market before birth)</i>				
Labour force participation	0.1119	0.1003	0.0110	0.0150
<i>Impact of potential female wages</i>				
Pot. hourly wages (net)	-0.2018 **	0.090	-0.036 **	0.0173
<i>Cross-terms wage with age dummies (reference: cross term with aged 24 to 27)</i>				
Hourly wages x aged 16 to 19	0.2184	0.1637	0.0427 **	0.0189
Hourly wages x aged 20 to 23	-0.2505 **	0.1158	-0.0239	0.0203
Hourly wages x aged 28 to 32	0.2116 **	0.0926	0.0342 *	0.0205
Hourly wages x aged > 32	0.2212 **	0.0973	0.0402 **	0.0171
<i>Household specifics</i>				
Partner	1.4540 ***	0.1058	0.2565 ***	0.0162
Dispos. household income (per day) ^{°°)}	0.0019 ***	0.0007	0.0003 ***	0.0001
Migratory Background ^{°°°)}	-0.0411	0.1234	-0.0030	0.0231
Rural Area	0.1089	0.0866	0.0174	0.0129
Constant	-0.8382	0.5496	0.2468 **	0.1100

^{°)} 500 bootstrap replications

^{°°)} Family income without the working income of the mother

^{°°°)} "Migratory background" if not born in Austria or in EU15/EFTA or first citizenship is not Austrian or EU15 or abandonment of an other than the Austrian citizenship

*** 1 percent significant level, ** 5 percent significance level, * 10 percent significance level

Source: EU-SILC 2003-2005, own calculations.

The results of the two models, presented in table 5.6, are comforting: in both the probit and the linear probability model, the coefficients show the same signs. In both models

⁴⁷ Bootstrapping is used to obtain a description of the sampling properties of empirical estimators using the sample data themselves, rather than broad theoretical results (see Greene 2000: 173/174 and 843).

potential hourly wages do have a significant and negative baseline effect on the probability to enter motherhood.

However, as the linear probability model faces a number of shortcomings (Greene 2000: 813) I will focus on the probit model to interpret the results. Table 5.7 reports the corresponding marginal effects.

Table 5.7: Probit model reporting marginal effects

	Number of obs = 2,545 Pseudo R2 = 0.2785	Observed coeff.	Bootstrap Std. Err. ^{°)}
<i>Age group (reference: women aged 24 to 27)</i>			
Aged 16 to 19 ¹⁾		-0.1347 **	0.8412
Aged 20 to 23 ¹⁾		0.1797	0.6742
Aged 28 to 32 ¹⁾		-0.0699 *	0.6141
Aged > 32 ¹⁾		-0.0947 ***	0.6526
<i>Highest level of education (reference: primary education)</i>			
Secondary ¹⁾		-0.0277 **	0.1080
Tertiary ¹⁾		-0.0161	0.1857
<i>Participation status (reference: not participating in labour market before birth)</i>			
Labour force participation ¹⁾		0.0122	0.1003
<i>Impact of potential female wages</i>			
Pot. hourly wages (net)		-0.0225 **	0.090
<i>Cross-terms wage with age dummies (reference: cross term with aged 24 to 27)</i>			
Hourly wages x aged 16 to 19		0.0244	0.1637
Hourly wages x aged 20 to 23		-0.028 **	0.1158
Hourly wages x aged 28 to 32		0.0236 **	0.0926
Hourly wages x aged > 32		0.0247 **	0.0973
<i>Household specifics</i>			
Partner ¹⁾		0.2289 ***	0.1058
Dispos. household income (per day) ^{°°)}		0.0002 ***	0.0007
Migratory Background ^{°°°)} ¹⁾		-0.0045	0.1234
Rural Area ¹⁾		0.0123	0.0866
°) 500 bootstrap replications			
°°) Family income without the working income of the mother			
°°°) "Migratory background" if not born in Austria or in EU15/EFTA or first citizenship is not Austrian or EU15 or abandonment of an other than the Austrian citizenship			
¹⁾ dF/dx is for discrete change of dummy variable from 0 to 1			
*** 1 percent significant level, ** 5 percent significance level, * 10 percent significance level			

Source: EU-SILC 2003-2005, own calculations.

The reference group is women aged between 24 and 27. We observe a lower and statistically significant risk to enter motherhood for very young women (aged between 16 and 19) and women above the age of 28, compared to the reference group. Further, we controlled for the level of educational attainment before first birth; the reference group

are women with primary education (either no or compulsory education, apprenticeship or BMS⁴⁸). Higher educated women experience lower risks to enter motherhood as the reference group. This is in line with theories of opportunity costs of motherhood. Being in the labour force before an eventual first birth has a positive impact on the probability to enter motherhood, though this is not statistically significant. Still, it tends to confirm the results obtained from the survival estimates in section 5.2.2. The reference group is women not participating in labour force, either because of being in educational enrolment, being unemployed or not having participated in labour force at all before an eventual first birth.

Turning to the main variable of interest; i.e. the impact of female incomes on the probability to enter motherhood: we observe a negative and statistically significant baseline effect of potential wages on fertility as economic models of fertility predict. An increase in the wage rate by one unit reduces the probability to enter motherhood by 2.3%. However, when controlling for the interaction between potential female wages and age at first birth, by including cross terms of potential wages with age, we see a positive impact of potential wages on fertility for the older women in the sample; that is, for women above the age of 27 the income effect outweighs the negative substitution effect of increasing wage rates. Note, that the coefficient of the cross-term between wages and the dummy variable for the youngest age group in the sample is also positive, but not statistically significant; there are actually only 14 women in this age group who just entered motherhood.

Women who get children at a comparatively young age tend to have lower levels of educational attainment as was shown in section 5.2.1. Among these women higher wage rates affect the probability to enter motherhood negatively: women with lower prospects on the labour market – represented by lower potential wages – are more likely to enter motherhood. On the other hand, women who postpone first births are likely to have higher educational levels. The positive impact of potential wages on the probability to enter motherhood for these groups of women supports the hypothesis that women – and especially higher educated women – seek to establish themselves in the labour market

⁴⁸ “Berufsbildende mittlere Schule”

(reflected in higher potential wages) before taking the risk to drop out of the labour market for parental leave.

That is, on the one hand, women with lower prospects on the labour market decide for children and family, typically at a younger age, as well as on the other hand, women who have established already stable careers and are economically independent (this, however at a higher age). For the latter the income effect from higher wages outweighs the negative substitution effect.

Positive and statistically significant is also the impact on fertility of the disposable household income⁴⁹, representing the per day disposable net household income without the working income of (potential) mothers. This is again in line with economic models of fertility where the partner's income is supposed to have a positive impact on the demand for children. Evidently, the presence of a partner in the household increases the risk to enter motherhood.

⁴⁹ The variable does not include the working income of the mother.

6 Conclusion

Decreasing fertility rates have been observed all over industrialised countries after the Second-World-War baby boom and this phenomenon has appeared together with the postponement of maternity. Austria fits well into this picture: the total fertility rate fell below the replacement level of 2.1 in the early 1970s and reached its all time low in 2001 with 1.33 children per woman. From the 1980s onwards fertility rates dropped slightly but steadily from around 1.55 to 1.4. So far, there is no evidence that fertility regaining significantly higher levels. At the same time, mean age at (first) birth steadily increased. In 2007, mean age at first birth was 27.5 years. Less than 8% of all newborns were born to mothers younger than 25⁵⁰.

In modern labour economics, demographic changes have been linked to women's labour market choices and decisions. Commonly, decreasing fertility rates are associated with increasing female labour force participation rates on the one hand and educational expansion, especially of females, on the other. Longer periods of educational attainment do indeed lead to an increase in mean age at (first) birth. EU-SILC data for Austria confirms the importance of the educational level on the timing and spacing of fertility: women having obtained a university degree experience a noticeably lower risk of entering motherhood throughout their reproductive lives. They are also the ones postponing first births at most, with a mean age at first birth of 29.4 years, compared to 24.6 years in the overall EU-SILC sample mean.

Less clear, in the international econometric literature is the impact of female earnings on fertility. Female wage rates are expected to affect the demand for children negatively, as higher earnings increase the opportunity costs of children (substitution effect). Yet, empirical results are ambiguous. From a technical point of view, econometric analyses on the impact of female wages on fertility suffer from a problem of endogeneity, as a woman's decision on labour market participation and family formation is likely to be determined by the same set of covariates. Given the lack of appropriate instruments in

⁵⁰ Source: Statistik Austria

the EU-SILC, however, the work at hand accepts the consequences of this potential endogeneity bias as inevitable. To this extent, we observe a negative impact of wages, albeit, not for all women in the sample. The econometric approach is a twofold one: in order to disentangle the effect of female earnings on fertility from the effect of female labour force participation on the same, we need to know the wages offered to all women in the sample. Hence, potential wages are estimated for all women, including for those not participating in the labour force. In a second step, potential wages are included as one of the covariates in a probit model on the probability to enter motherhood. As neo-classical models of fertility suggest, I find a negative impact of potential wages on fertility, due to the negative substitution effect from higher female wages on the demand for children. However, when controlling for the interaction between potential wages and age I find a positive and statistically significant impact of wages on the probability to enter motherhood for women above the age of 27. That is, for women who postponed their first births in order to establish stable professional careers – represented by higher (potential) wage rates –, the positive income effect from higher wages outweighs the negative substitution effect. That is, on the one hand, women with lower prospects on the labour market decide for children and family, typically at a younger age, as well as on the other hand, women who have established already stable careers and are economically independent (this, however at a higher age). For the latter the income effect from higher wages outweighs the negative substitution effect.

Due to the data structure, the results have to be taken as first insights from the EU-SILC for Austria. When EU-SILC data will be available in form of a reasonable panel dataset, i.e. when we are able to observe one and the same woman in multiple consecutive years, a richer set of research questions will become addressable. In particular, it should become possible to explore in much greater detail how a woman's fertility decision is affected by career considerations.

References

- Aassve, Arnstein/Billari, Francesco/Rondinelli, Concetta (2006), Income and Childbearing Decisions: Evidence from Italy, ISER Working Paper 2006-06 (downloadable from <http://www.iser.essex.ac.uk/pubs/workpaps/pdf/2006-06.pdf>, last page view 2008-05-22)
- Ariza, Alfredo/Ugidos, Arantza (2007), Entry into Motherhood: The Effect of Wages, DFAE Series WP 2007-03, University of the Basque Country (downloadable from <http://www.ehu.es/FAEII/workingpapers/wp2007-03.pdf>, last page view 2008-02-07)
- Becker, Gary S. ([1981] 1991), A Treatise on the Family, Harvard University Press
- Becker, Gary S./Barro Robert J. ([1988] 1991), A Reformulation of the Economic Theory of Fertility, *Quarterly Journal of Economics* 103: 1-25
- Bierens, Herman (2007), Maximum likelihood estimation of Heckman's sample selection model, October 2007 (downloadable from <http://econ.la.psu.edu/~hbierens/EasyRegTours/HECKMAN.PDF>, last page view 2008-07-20)
- Billari, Francesco C./Liefbroer, Aart C./Philipov, Dimiter (2006), The Postponement of Childbearing in Europe: Driving Forces and Implications, in: Billari, F./Liefbroer, A./Philipov, D. (guest eds.) *Vienna Yearbook of Population Research 2006*, pp. 1-17, Vienna
- Blackburn, McKinley L./Bloom, David E./Neumark, David (1993), Fertility timing, wages, and human capital, *Journal of Population Economics* 6: 1-30
- Böheim, René/Hofer, Helmut/Zulehner, Christine (2007), Wage differences between Austrian men and women: *semper idem?*, *Empirica* 34: 213-229
- Bongaarts, John/Griffith, Feeney (2006), The Quantum and Tempo of Life-Cycle Events, in: Billari, F./Liefbroer, A./Philipov, D. (guest eds.) *Vienna Yearbook of Population Research 2006*, pp. 115-151, Vienna
- Cigno, Alessandro/Ermisch, John (1989), A Microeconomic Analyses of the Timing of Births, *European Economic Review* 33: 737-760
- Cleves, Mario A./Gould, William W./Gutierrez, Roberto G. (2003), An Introduction to Survival Analysis using STATA, revised edition
- Del Bono, Emilia/Weber, Andrea/Winter-Ebmer, Rudolf (2008), Clash of Career and Family: Fertility Decisions after Job Displacement, IZA Discussion Paper No. 3272 (downloadable from <ftp://repec.iza.org/RePEc/Discussionpaper/dp3272.pdf>, last page view 2008-01-28)
- Economic Survey of Europe 1999, No.1, Chapter 4: Fertility Decline in the Transition Economies, 1982-1997: Political, Economic and Social Factors, UNECE - United Nations Economic Commission for Europe, pp. 181-194 (downloadable from http://www.unece.org/ead/ead_ese_new.htm, last page view 2008-01-27)

- Ejrnaes, Mette/Kunze, Astrid (2004), Wage Dips and Drops around First Birth, IZA Discussion Paper No. 1011 (downloadable from <ftp://repec.iza.org/RePEc/Discussionpaper/dp1011.pdf>, last page view 2008-07-20)
- Ermisch, John F./Wright, Robert E. (1994), Interpretation of negative sample selection effects in wage offer equations, *Applied Economic Letters* 1: 187-189
- Goldin, Claudia (2006), The quiet revolution that transformed women's employment, education and family, AEA Papers and Proceedings, Vol. 96, No. 2 (downloadable from <http://www.economics.harvard.edu/faculty/goldin/files/GoldinEly.pdf>, last page view 2008-07-20)
- Greene, William.H. (2000), *Econometric Analysis*, Prentice Hall
- Gustafsson, Siv (2001), Optimal Age at motherhood. Theoretical and empirical considerations on postponement of maternity in Europe, *Journal of Population Economics* 14: 225-247
- Heckman, James, J./Walker, James, R. (1990), The third birth in Sweden, *Journal of Population Economics* 3: 235-275
- Hochschulstatistik 2005/06, STATISTIK AUSTRIA (downloadable from http://www.statistik.at/web_de/dynamic/statistiken/bildung_und_kultur/publdetail?id=5&listid=5&detail=300, last page view 2008-03-28)
- Kapella, Olaf/Rille-Pfeiffer, Christiane (2007), Einstellungen und Werthaltungen zu Themen der Vereinbarkeit von Familie und Erwerb, Austrian Institute for Family Studies, Working Paper Nr. 66 | 2007 (downloadable from http://www.oif.ac.at/projekte/projekte_item.asp?Rubrik=4&Projekte_Item=234&ID_Art=4)
- Kohler, Hans-Peter/Ortega, José A. (2002), Tempo-Adjusted Period Parity Progression Measures: Assessing the Implications of Delayed Childbearing for Cohort Fertility in Sweden, the Netherlands and Spain, *Demographic Research* 6(7), pp. 145-190 (downloadable from <http://www.demographic-research.org/volumes/vol6/7/6-7.pdf>, last page view 2008-01-28)
- Kohler, Ulrich/Kreuter, Frauke. (2006), *Datenanalyse mit Stata*, München, 2. Auflage
- Landler, Frank (2008), *Die Qualifikationsstruktur der österreichischen Bevölkerung im Wandel*, Verlag der Österreichischen Akademie der Wissenschaften
- Lutz, Hedwig (2003), Verdienstentgang von Frauen mit Kindern, WIFO-Monatsberichte 10/2003 (downloadable from http://www.wifo.ac.at/wwa/jsp/index.jsp?typeid=8&display_mode=2&fid=23923&id=24623, last page view 2008-04-05)
- Lutz, Hedwig (2004), Wiedereinstieg und Beschäftigung von Frauen mit Kleinkindern, WIFO-Publikation (downloadable from http://www.wifo.ac.at/wwa/jsp/index.jsp?fid=23923&id=24945&typeid=8&display_mode=2, last page view 2008-04-05)
- Mahringer, Helmut (2005), Child Care Costs and Mothers' Employment Rates in Austria, in: "Essays on Child Care Costs and Mothers' Employment Rates and on Trends in Job Stability", Linz

- Schulmeister, Agnes (2003), Entwicklungen am Arbeitsmarkt und Gleichstellung von Frauen und Männern, WISO 2/2003 (downloadable from http://www.isw-linz.at/media/files/2_2003/LF_schulmeister_2_03.pdf, last page view 2008-04-05)
- Tazi-Preve, Irene/Kytir, Josef/Lebhart, Gustav/Münz, Rainer (1999), Bevölkerung in Österreich. Demographische Trends, politische Rahmenbedingungen, entwicklungspolitische Aspekte, Österreichische Akademie der Wissenschaften – Institut für Demographie, Wien (downloadable from http://www.öaw.at/vid/download/sr_vol12_bevoest.pdf, last page view 2008-03-28)
- Wernhart, Georg/Neuwirth, Norbert (2007), Haushaltseinkommen und Einkommenselastizität der Erwerbsbeteiligung von Müttern. Ergebnisse aus dem EU-SILC 2004, Austrian Institute for Family Studies, Working Paper Nr. 63 | 2007 (downloadable from http://131.130.67.132/ftp/projekte/wp_63_hh-einkommen_erwerbsbeteiligung_muetter/wp_63_hh-einkommen_erwerbsbeteiligung_muetter.pdf, last page view 2008-04-05)
- Zabel, Cordula (2006), Employment Experience and First Birth in Great Britain, MPIDR Working Paper WP 2006-029 (downloadable from <http://www.demogr.mpg.de/cgi-bin/publications/paper.plx?pubid=2383>, last page view 2008-01-28)

Further cited literature

- Becker, Gary S. (1960), An economic analysis of fertility, in: Demographic and Economic change in developed countries, Universities-National Bureau of Economic Research Conference Series 11, NBER: 209-231
- Becker, Gary S. (1965), A theory of the allocation of time, *Economic Journal* 75: 493-517
- Cigno, Alessandro (1983), Human capital and the time-profile of human fertility, *Economic Letters* 13: 385-392
- Cigno, Alessandro (1988), The timing of births: A theory of fertility, family expenditures and labour market participation over time, in: Wenig, A./Zimmermann, K.F. (eds.), Demographic change and economic development, Berlin
- Cigno, Alessandro (1991), Economics of the Family, Oxford
- Corcoran, Mary/Duncan, Greg (1979), Work History, Labour Force Attachment, and Earnings Differentials between Races and the Sexes, *The Journal of Human Resources* 14: 3-20
- Ellwood, David/Wilde, Ty/Batchelder, Lily (2004), The mommy track divides: The impact of childbearing on wages of women of differing skill levels, Russell Sage Foundation Working Paper
- Grossbard-Shechtman, Shoshana (2001), The New Home Economics at Colombia and Chicago, *Feminist Economics* 7: 103-130
- Gustafsson Siv (1981), Male Female Lifetime Earnings Differentials and Labor Force History, in: Eliasson G./Holmlund, B./Stafford F.P. (eds.), Studies in Labor Market Behavior, Sweden and the United States, Stockholm, pp. 235-300

- Gustafsson Siv/Wetzels Cecile (2000), Optimal Age at Giving Birth: Germany, Great Britain, the Netherlands and Sweden, in: Gustafsson, S./Meulders D.E. (eds.) *Gender and the Labour Market. Econometric Evidence on Obstacles in Achieving Gender Equality*, London
- Happel, S.K/Hill, J.K/Low, S.A. (1984), An Economic Analyses of the Timing of Childbirth, *Population Studies* 38: 299-311
- Heckman, James (1979), Sample selection bias as a specification error, *Econometrica* 47: 153-161
- Hotz, Joseph/Jacob Alex, Klerman /Robert J., Willis (1997), The Economics of Fertility in Developed Countries, in: Rosenzweig, Mark/Stark, Oded (eds.), *Handbook of Population and Family Economics*, Amsterdam, p. 275-347
- Kreyenfeld, Michaela (2005), Economic Uncertainty and Fertility Postponement. Evidence from German Panel Data, MPIDR Working Paper WP 2005-034 (downloadable form <http://www.demogr.mpg.de/papers/working/wp-2005-034.pdf>, last page view 2008-04-04)
- Lesthaege, Ron/Van de Kaa, Dirk (1986), Twee demografische transitie's?, in: Lesthaege, R./Van de Kaa (eds.) *Bevolking: Groei en Krimp*, Deventer, pp. 9-24
- Miller, Amalia (2007), The effects of motherhood timing on career path. Manuscript University of Virginia
- Mincer, Jacob/Polachek Solomon (1974), Family Investments in Human Capital. Earnings of Women. *Journal of Political Economy*, Part II
- Moffit, Robert (1984), Profiles of fertility, labour supply and wages of married women: A complete life-cycle model, *Review of Economic Studies* LI: 263-278
- Rosenzweig, M.R./Schultz, T.P. (1985), The demand for and supply of births: Fertility and its life-cycle consequences, *American Economic Review* 75: 992-1015
- Tasiran, Ali (1995), *Fertility Dynamics: Spacing and Timing of Births in Sweden and the United States*, Amsterdam
- Van de Kaa, Dirk (1987), Europe's Second Demographic Transition, *Population Bulletin* 42(1)
- Walker, James R. (1995), The Effect of Public Policies on Recent Swedish Fertility Behaviour, *Journal of Population Economics* 8: 223-251

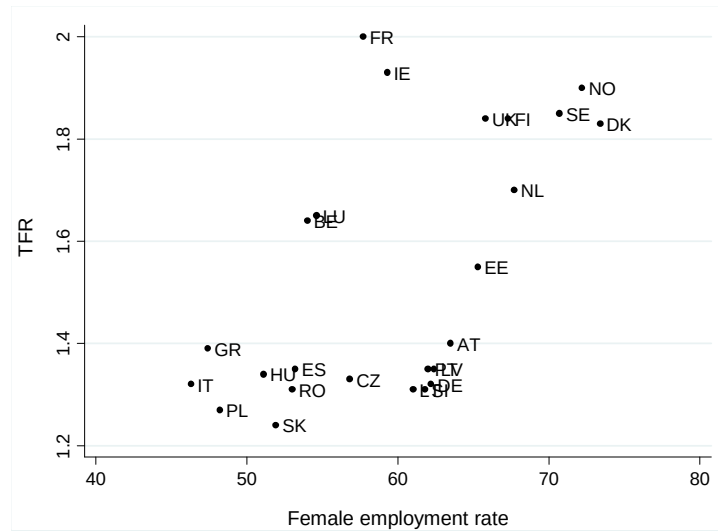
Appendix

Table A.1: TFRs, mean age at first birth and female labour force participation for a selection of countries

	1960	1970	1980	1990	2000	2005
<i>Total Fertility Rate</i>						
Sweden	2.20	1.92	1.68	2.13	1.54	1.77
Netherlands	3.12	2.57	1.60	1.62	1.72	1.71
France	-	2.47	1.95	1.85	1.89	1.94
Germany	2.37	2.03	1.56	1.45	1.38	1.34
Austria	2.69	2.29	1.65	1.46	1.36	1.41
Italy	2.41	2.43	1.64	1.33	1.26	1.32
Spain	-	2.90	2.20	1.36	1.23	1.35
Poland	-	2.20	2.28	2.04	1.35	1.24
<i>Mother's Mean Age at First Birth</i>						
Sweden	-	25.7	25.3	26.3	27.9	28.7
Netherlands	25.7	24.8	25.7	27.6	28.6	28.9
France	24.3°	24.0°	24.6°	-	27.8	28.5
(West)Germany	24.9°	23.8°	25.0°	26.3°	28.2	29.1
Austria	-	-	-	25.0	26.4	27.2
Italy	25.3°	24.6°	24.6°	26.4°	27.5°°	-
Spain	-	-	25.0°	26.8	29.1	29.4
Poland	-	-	-	-	24.5	25.8
<i>Female Labour Force Participation</i>						
Sweden	-	-	-	73.1*	70.9	70.4
Netherlands	-	-	-	51.8*	63.5	66.4
France	-	-	-	51.4*	55.2	57.6
Germany	-	-	-	55.9*	58.1	60.6
Austria	50.7	49.0	53.6	58.0*	59.6	62.0
Italy	-	-	-	-	39.6	45.3
Spain	-	-	-	31.5*	41.3	51.2
Poland	-	-	-	-	48.9	46.8

Source: Eurostat. *) figures from 1992. °) figures from Gustafsson 2001: 230 (primary source: Bosveld 1996). °°) figures from 1997 (source: Gustafsson).

Figure A.1: Total Fertility Rates and female labour force participation (women aged 16 to 45) in European countries (2006)



Source: Eurostat

Table A.2: Log hourly wages (based on yearly net incomes): Males and Females, income from dependent employment relationships

	Number of obs. = 1,0342		
	R-squared = 0.2562	Coefficient	Robust Std. Error
Experience (years)		0.0224 ***	0.0018
Experience squared		-0.0003 ***	0.0000
Migratory background ^{o)}		-0.0903 ***	0.0146
Rural area		-0.0493 ***	0.0098
Female		-0.1059 ***	0.0098
<i>Highest level of education (reference: Apprenticeship, BMS^{oo)})</i>			
No compulsory education		-0.1003 ***	0.0323
Compulsory education		-0.0664 ***	0.0142
College ("Matura")		0.1076 ***	0.0140
University degree		0.2646 ***	0.0211
<i>Professional position (reference: Medium skilled position)</i>			
In Apprenticeship		-0.6538 ***	0.0356
Unskilled position		-0.1492 ***	0.0197
Low skilled position		-0.0849 ***	0.0126
High skilled position		0.1269 ***	0.0138
Leading position		0.1844 ***	0.0202
Constant		1.8641 ***	0.0208

^{o)} "Migratory background" if not born in Austria or in EU15/EFTA or first citizenship is not Austrian or EU15 or abandonment of an other than the Austrian citizenship
^{oo)} BMS: "Berufsbildende mittlere Schule"
^{ooo)} Household income minus "own" income
*** 1 percent significant level, ** 5 percent significance level, * 10 percent significance level
*) Sample weights were included in the regressions.

Source: EU-SILC 2003-2005, own calculations.

List of tables

Table 2.1: Contribution of women aged 30 and over to the TFRs (1960-1996)	14
Table 4.1: Share in live births per 1,000 women and changes over time in percentage points by age groups:	34
Table 4.2: OLS regression on log hourly wages (based on net yearly incomes from dependent employment) for males and females:	43
Table 5.1: Summary statistics: Share of mothers and mean age at birth according to different levels of education and work experience	51
Table 5.2: Sample characteristics	59
Table 5.3: Wage estimation according to Heckman's two-step method	60
Table 5.4: Summary statistics: Observed and estimated net female hourly wages	61
Table 5.5: Sample characteristics	63
Table 5.6: Impact of potential wages on fertility: probit regression and linear probability regression on the probability of entering motherhood	64
Table 5.7: Probit model reporting marginal effects.....	65
Table A.1: TFRs, mean age at first birth and female labour force participation for a selection of countries.....	75
Table A.2: Log hourly wages (based on yearly net incomes): Males and Females, income from dependent employment relationships	76

List of figures

Figure 2.1: Total Fertility Rates 1970 and 2005 in subsets of countries.....	11
Figure 2.2: Total Fertility Rates and mother's mean age at first birth (2005)	15
Figure 2.3: Micro-level effect of postponement in an empirical study: Predicted completed fertility for a woman by age at first birth	16
Figure 3.1: Marginal benefits of delaying childbirth for women investing and not-investing in human capital for two different levels of marginal costs.....	22
Figure 3.2: Timing of first birth and costs of a child assuming different life time earning profiles	26
Figure 3.3: Overview of selected studies on the impact of female earning on timing and spacing of births	27
Figure 4.1: Age-specific labour force participation rates in Austria from 1955 to 2006	32
Figure 4.2: Age-specific fertility rates from 1961 to 2006 (per 1,000 live births)	35
Figure 4.3 (a-d): Socio-demographic key figures	36
Figure 4.4: Female labour force participation and percentage of part-time employment	38
Figure 4.5: Shares of part-time employment in European countries (2006)	39
Figure 5.1: Kaplan-Meier survival estimates and hazard rates ^{*)} for different levels of educational attainment	52
Figure 5.2: Kaplan-Meier survival estimates for different levels of work experience	54
Figure 5.3: Kaplan-Meier survival estimates for different levels of work experience and different levels of educational attainment	55
Figure A.1: Total Fertility Rates and female labour force participation (women aged 16 to 45) in European countries (2006)	76

Abstract (in English)

Decreasing fertility rates and the steady rise in the mean age upon entering motherhood have been observed throughout Europe and in the (post)industrialized world: women have fewer children and that later in their lives. In modern labour economics, demographic changes have been linked to women's labour market choices and decisions. In particular, female wage rates are expected to affect the demand for children negatively, as higher earnings increase the opportunity costs of children. Yet, empirical results are ambiguous.

The focus of this diploma thesis is on Austria. The total fertility rate reached its all time low in 2001 with 1.33 children being born per woman. In 2007 the average Austrian women having her first baby was almost 28 years old. So far, analyses on the impact of female earnings, career planning motives and work experience on the timing and spacing of births in Austria suffer from a lack of appropriate data. This might change with the EU-SILC, an annual, EU-wide, survey conducted in Austria by STATISTIK AUSTRIA. Most importantly, the survey relates household characteristics to incomes. The EU-SILC does not yet include enough waves to perform a panel analysis, albeit, the dataset allows for some insights into factors determining fertility decisions in Austria.

The econometric approach is a twofold one: in order to disentangle the effect of female earnings on fertility from the effect of female labour force participation on the same, potential wages are estimated for all women, including for those not participating in the labour force. In a second step, potential wages are included as one of the covariates in a probit model on the probability to enter motherhood. As neoclassical models of fertility suggest, I find a negative impact of potential wages on fertility. However, when controlling for the interaction between potential wages and age I find a positive and statistically significant impact of wages on the probability to enter motherhood for women above the age of 27. That is, for women who postponed their first births in order to establish stable professional careers, the positive income effect from higher wages outweighs the negative substitution effect.

Abstract (in German)

Sinkende bzw. (zu) niedrige Geburtenraten sowie das stetige Ansteigen des Alters bei Erstgeburt kennzeichnen die demographische Entwicklung in (post)industriellen Gesellschaften. Moderne Arbeitsmarkttheorien setzen sinkende Geburtenzahlen in Verbindung mit der vor allem in den vergangenen Jahrzehnten beobachteten zunehmenden Erwerbsbeteiligung von Frauen. Insbesondere wird davon ausgegangen, dass ein höheres Erwerbseinkommen von Frauen über den negativen Substitutionseffekt zu einer Verringerung der Nachfrage nach Kindern führt. In empirischen Analysen kann dieser Effekt aber weder eindeutig bestätigt, noch widerlegt werden.

Die vorliegende Diplomarbeit legt den Fokus auf Österreich. Mit durchschnittlich 1,33 Kindern pro Frau wurde im Jahr 2001 die bislang niedrigste Geburtenrate verzeichnet; das durchschnittliche Alter bei Erstgeburt lag im Jahr 2007 bei 27,5 Jahren. Untersuchungen zur Fertilitätsentscheidung von Frauen in Abhängigkeit ihrer Einkommens- und Erwerbssituation für Österreich sind bislang rar. Neue Erkenntnisse sollte der als integrierte Quer- und Längsschnittserhebung konzipierte EU- SILC ermöglichen, erhoben in Österreich von STATISTIK AUSTRIA. Er verlinkt Haushalts- mit detaillierten Einkommensinformationen. Obwohl für eine Panel-Untersuchung derzeit noch zu wenige Erhebungsjahrgänge vorliegen, erlaubt der Datenkörper Einblicke in die Fertilitätsentscheidungen von Frauen. Die ökonometrische Analyse erfolgt in zwei Schritten: um den Effekt des Einkommens auf die Fertilitätsentscheidung von jenem der Erwerbsbeteiligung zu trennen, werden Potentiallöhne für alle Frauen im Sample geschätzt. Diese fließen in einem zweiten Schritt in ein Probit-Modell ein, das die Wahrscheinlichkeit abbildet, im Erhebungszeitraum zum ersten Mal Mutter zu werden. In Übereinstimmung mit modernen Arbeitsmarkttheorien zeigt die Analyse einen negativen Effekt des Potentialeinkommens auf die Fertilität. Wird allerdings für die Interaktion zwischen Erwerbseinkommen und dem Alter der Frauen bei Erstgeburt kontrolliert, zeigt sich für Frauen, die mit 27 oder älter ihr erstes Kind bekommen, ein positiver Effekt des Potentialeinkommens. Das lässt den Schluss zu, dass für Frauen, die vor ihrer ersten Geburt den Grundstock für eine stabile Karriere gelegt haben, der positive Einkommenseffekt den Substitutionseffekt ausgleicht.

Curriculum vitae

Nora PREAN

Born 1979-09-16 in Innsbruck
 Contact Wasnergasse 11/6, 1200 Vienna, Austria
 nora_prean@yahoo.de
 +43-650-79 09 161

Education

2004-2008 Study of Economics at the University of Vienna –
 Departement of Economics (focus on applied economics, labour market economics, and demographics)

1999-2008 Study of Political Science at the University of Innsbruck
 Focus on Conflict and Security Studies

09/2003- Institut d’Etudes Politiques Paris (Sciences-Po)
 07/2004 Diplôme International du Premier Cycle

2000-2004 Study of Economics at the University of Innsbruck

1990-1998 Grammar School (AHS BG Adolf-Pichler Platz), Innsbruck

Professional Experience – Field of Economics

02/2008- WIFO – Austrian Institute of Economic Research, Vienna
 07/2008 Contractor for the research group “Labour Market, Income and Social and Policy” (working on forecasts on dependent employment in Austria 05/2007- in the forecasting horizon 2006 to 2012)

08/2007

11/2007- WIFO – Austrian Institute of Economic Research, Vienna
 01/2008 Junior research fellowship in the research group “Labour Market, Income and Social Policy”. Supervisor: Mag. Dr. Helmut Mahringer

Publications

Fritz, O., Huemer, U., Kratena, K., Mahringer, H., Prean, N., Streicher, G., Mittelfristige Beschäftigungsanalyse und sektorale Veränderungen 2006 bis 2012, WIFO, September 2007 (sowie Teilstudien für die Bundesländer)

Huemer, U., Mahringer, H., Prean, N., Mittelfristige Beschäftigungsanalyse für die Ostregion. Berufliche und sektorale Veränderungen 2006-2012, WIFO, Mai 2008