Abstract

The purpose of this study is to analyze if economic and social conditions have any impact on the number of children born by women in Sweden. The results support (not surprisingly) a negative correlation between women’s working experience and number of children. The results do also support the assumption that women with higher education have fewer children than women with lower. However, this holds only when non-completed fertility is analyzed. It is not valid for the group of women with completed fertility.

Key Words: Completed fertility; Non-completed fertility; Economics; Count data; Sweden

JEL classification: D19; J13
1 Introduction

The total fertility rate (TFR)\(^1\) in Sweden has shown a varying pattern during the 20th century (see figure 1). From 1900 until the mid 1930s, the fertility dropped from approximately four children per woman to less than two. After that, and probably due to the introduction of several new reforms and legislations, economic as well as social ones, the fertility rate started to increase.\(^2\) The cohorts born in the 1940s are today well-known as the big baby-boom groups. The ”fertility peak” was however already reached by mid 1940s. From then on the rate fell but not as much as earlier. During the 1950s the fertility rate was rather stable, about two children per women on average, a figure equal to the replacement level\(^3\). Next phase with record-high fertility rates occurred in the mid 1960s. Within a couple of year the TFR did rise quite dramatically reaching a peak at 2.5 in 1965. After that the rate fell continuously during a long period of time. By the end of the 1970s and in the beginning of the 1980s the level was almost as low as it was in the 1930s. However, during the remaining part of the 1980s there was a sudden change and the fertility started to rise again. In the years 1989 to 1992 the fertility rate was above replacement level, i.e. two, but the peak was already reached in 1990-91.

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\(^1\)The TFR is the sum of the age specific fertility rate for women in the ages 16-49 years old. The age specific fertility rate is the number of children borned by women in a specific age related to the total number of women in that age.

\(^2\)Some of the reforms which were introduced during the late 1930s are maternity leave, maternity benefit for all mothers, laws against dismissal because of pregnancy etc.

\(^3\)The replacement level is 2.1 children per woman.
The peak-figure, 2.14, was among the highest in the industrialized world at that time although much lower than the peak in the 1960s. The drop in fertility after that became substantial and the rate was as low as 1.5 in 1999. After this historical minimum the fertility rate has been slowly, and still is, increasing (see e.g. Hoem and Hoem, 1996, 1997).

The figure above shows very clearly that fertility is sometimes increasing and sometimes decreasing and it seems reasonable to believe that variations are the normal thing. These variations in fertility may however reflect other changes as well and in that respect be difficult to predict in advance. In a long-run perspective it is obvious that all types of economic and social changes, including changes in fertility, are more or less connected to each other. Examples with relevance here is the legislation from 1939 that prohibited employers from dismissing women when they got married or became pregnant, and the increasing demand for female labour in the 1960s and onwards.

One direct consequence of both spouses performing paid work is of course rising family wage income but also rising "costs" of having children. The latter is due to loss of income when women have to leave the labour market, temporarily or permanently, when becoming mothers. This "cost" may however vary a lot depending on the financial support the society provide to families and whether the parental leave is paid or not and for how long.

The demand for children has been a topic of several empirical studies and women’s wages have often been the crucial variable in these studies see e.g. Butz and Ward (1979), Winegarden (1984), Lee and Chuen (1989), Wang and Famoye (1997), Caudill and Mixon (1995), McIntosh (1999). The findings are often unambiguous: Women’s wages do matter for the demand but also other economic variables such as female educational attainment.

The purpose of this study is to analyze the impact different variables may have on the number of children. Our focus is related to the labour market although we are fully aware of the complexity in the process of becoming a parent and all that precedes such a decision. The development shown in the figure above is in a sense also the history of women’s closer and closer association to the labour market. Rising female participation rate and falling fertility rate is a common phenomenon world wide. This was also the case in Sweden at least until the beginning of the 1980s. From then on rising participation rate and rising fertility do appear simultaneously as is falling participation and falling fertility (see figure 1 in Löfström and Westerberg, 2006). Our interest here is to find out whether this is visible or not in a statistical analysis based on individual data. The theoretical framework is based on the new home economic approach (NHE) and the data used in the study are from Swedish household market and non-market activities (HUS) data from 1993.

The paper proceeds as follows. The next section will present the theoretical framework. Section 3 contains a discussion about the data and the empirical model is presented in Section 4. Section 5 gives the results and the paper

\[\text{Only the TFR in Ireland and Iceland was higher.}\]
concludes with Section 6.

2 The theoretical framework

The pioneering work in the field of household fertility behavior was carried out by Leibenstein (1957), Becker (1960, 1965) and Mincer (1963). Becker (1960) suggested, that children might be viewed as a durable good. This implies that the family makes the decision to have children as if it was calculating the costs and benefits of a "commodity" whose end result is a flow of utilities over time, and a flow of costs, given income and prices. The household is assumed to be a rational economic unit with perfect foresight. It acts optimally in any given situation and the preferences of the two partners of the household are always the same. The child is assumed to provide utility to the household, which is compared with that of other goods via the family utility function. This function is determined by the relative preferences for children. Since children are assumed to be a commodity in the family’s ”shopping basket”, the relative prices between children and other goods are essential.

The NHE-approach used in this paper is simple and straightforward. It assumes that the family maximizes the utility function where the number of children and of all other commodities are arguments in the function, subject to a budget and a time constraint.

If children are seen as a normal good, it is reasonable to assume that higher income may result in more children. However, adding a quality argument to the discussion there is a possibility that the demand for children decreases when income increases. The reason to this may be that families not only take into account the number of children they want, but also the quality of life they want for their children. Wealthier families may therefore have as many (few) children they want while families with low incomes have no alternative than few children. This is however not as simple since ”children” represent a lot more to parents that may easily exceed the ”costs” for them. The reason why wealthier families do not have as many children as they can afford may nevertheless be that they prefer to spend relatively more on each child. The correlation between ”quality” and ”quantity” is according to Becker and Lewis (1973) negative in this respect.

2.1 Measures of cost for children

Parents’ expenditures on their children’s upbringing are normally split into two parts: direct costs e.g. food, clothes, toys and indirect costs related to the time-consuming effect children may have on their parents’ time. Indirect costs are correlated with the wage income due to the time parents have to give up

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5 The ideas underlying NHE are originally based on the theory of labor supply as an individual choice theory (see Hicks, 1963).

6 It is possible that the intentions of the spouses not initially are equal. The household’s decision may therefore be a result of a game theoretical process. However, such aspects of the decision procedure is outside the scope of this paper.

7 Household and family are used as synonymous in this paper.
on the market when spending time at home bringing up children. Since wages normally are dependent on investment in human capital, i.e. education, work experience etc., the hypothesis is that the longer the work experience and the higher (longer) the level of education the fewer the children are.

Higher level of education does not necessarily mean fewer children but we know that postponing the first child is common among women attending universities or colleges (see Gustafsson, Kenjoh and Wetzels, 2001). The reasons are primarily difficulties to combine care for small children and time-consuming studies and young women’s (and men’s) wishes to be established in the labour market before they start building a family. Irrespective of motive the consequence of postponement may be of no problem for some but become a major problem for others. Fewer children than planned and problems in getting pregnant, due to the so called biological clock, are not unusual. However, the expected negative effect of higher (longer) education on the fertility rate must be treated with caution. Cigno and Ermish (1989) show in a theoretical model that women with relatively greater human capital will have their first child later in life, but this does not necessarily mean that they will have fewer children. They can have as many children as those women who became mothers at a younger age, only the spacing between children is less.

Pregnancy, delivery and breast-feeding are biological factors that separate women and men. These factors have also been, and still is, important when the differences in time allocation between the spouses, before and after a childbirth, are discussed and explained. While the time allocation between paid and non-paid job is almost un-changed for the male partner the opposite is the case for the female. After the period of paid parental leave approximately ten percent of the men did some changes in favor for more time with the child/children while 90 per cent did not. The figure for women were not exactly the opposite but approximately 60 per cent did reduce the working time (see Löfström, 2003). As long as the market wage is lower for women than for men and/or the female and male roles in home production are not interchangeable, as for delivery and nursing, this unbalanced time-allocation may be expected. In a sense it may also be seen as efficient. It is obvious that childbirth does imply a certain time of absence from the labour market for the woman and as long as she continues to take the lion-part of the parental leave and after that decide to reduce the working time, a negative relationship may be expected. However this negative relationship, between number of children and female labour market experience, may have become weaker due to the positive relationship between fertility and female labour market participation since the 1980s.

As has already been told, female participation rate and fertility rate in Sweden did simultaneously increase in the 1980s, decrease in the 1990s and increase again from year 2000. One reason for this ”paradigm-shift” is that the labour market situation has become much more important in the decision of raising a family. Today it is as important for a woman to have a paid job as it is (and always has been) for a man. The family policy program introduced in the 1970s, on a larger scale, and successively expanded was also aimed to facilitate for both parents to combine paid work with a family. The variations in fertility
rates we have seen since the 1980s may therefore rather mirror changes in the
economic situation in general, and the labour market situation in particular,
than absence of relevant family policy or dramatic deteriorations in the same
(see also Bernhardt 1993; Hoem and Hoem, 1996, 1997; Hoem 1998, 2000 and
Andersson, 1999, Björklund, 2005)

2.2 Preferences for children

According to Becker (1976) the American transition from a rural to an urban
community during the early 20th century raised the average cost of children. It
was "cheaper" to raise children on the countryside. Becker (1976) also stressed
that unequal knowledge of contraception in the society implied fertility patterns
which may differ between ethnic groups. The knowledge of contraception, the
right to use them as well as their availability did increase during the 20th century.
However, there are still regions in the world where the resistance against using
contraceptives is common.

The direct cost for raising children in rural relative urban communities has
converged but the opportunity cost for raising children may still be higher in
urban communities. The supply of both jobs and better career prospects as well
as interesting and demanding leisure opportunities raise the alternative cost for
family building in urban societies (see e.g. Löfström, 2003).

Besides the direct and indirect cost a new "cost-category" may also be added.
Costs associated to the "social sacrifices" a parenthood may be the cause of.
Whether these costs exceed the benefits of becoming a parent or not is of course
a question of purely individual assessment. Having children make most parents
change focus in life and in most cases this means changes in order of priorities.
Depending on the extent of these changes, reached through more or less com-
prehensive negotiations with partners, employers and/or friends, these "costs"
may be big or just marginal. In former days these "costs" were probably neither
existent nor discussed while today the reverse are more accurate. Young men
and women of today have a much more open discussion on this matter. What
they, as a mother or a father, have to "sacrifice" in type of lost job-opportunities
and careers, of lost friends, of lost leisure prospects etc. but also about the risk
of separation/divorce. New alternatives and a huge range of different oppor-
tunities within as well as outside the labour market may therefore make many
young persons be at a loss what to do.

3 Data

The data used in this study are from the supplementary HUS-data survey, a
micro data-base covering the time, money and public services of Swedish house-
holds in 1993. The samples in our analysis consists of women sorted according
to the following criteria:

(i) women with completed fertility (50-80 years of age), (ii) women with
non-completed fertility (16-49 years of age), (iii) women with completed and
non-completed fertility (16-80 years of age) and lastly (iv) all women in the age of 16-64 years.

The dependent variable is the number of children a woman has given birth up to the date of the survey i.e. the year of 1993. The independent variables are the following: First labour market experience (Experience). This variable is expected to be negative due to the fact that the more time a woman have spent in the labour market the fewer the children and vice versa. (The problem with endogenity is discussed later.) The information on labour market experience (number of years) is from the respondents themselves. The second variable is level of education and the expected sign is also here negative. The higher the level of education the fewer the children and vice versa. The education data include both years in the formal school system and years in vocational training. We assume, however, that the respondents’ formal school attainment is the major part of her total education where low level of education (Low) ranges from 0 to 9 years, medium (Medium) from 10 to 12 years and high (High) from 13 years and above.

The third and fourth variable are dummies aimed at capturing information on different social preferences and their presumed effect the fertility decision. The first dummy variable indicates whether the respondents did grow up, and still are living, in a rural area (Rural). The expected sign of the estimate is positive since the opportunity cost for children is assumed to be lower for those living in a rural area compared with people living in an urban area. The second dummy variable indicates whether the respondent’s father and/or mother are born in Sweden or outside (Parents). The assumption is that a respondent with at least one parent from another country may have more children - due to e.g. other family priorities or/and religious, traditional, cultural or other reasons - compared to respondents with parents born in Sweden. The weakness with this variable is its broad definition. Parents refer to all irrespective of origin, i.e. if they are from Denmark, India, Turkey, Somalia or USA.

As a complement to the samples (i), (ii) and (iii) we also analyze a sample of women 16-64 years of age (iv). In this analysis we want to test whether women’s relative wage (Wage) may be a determinant for number of children or not. The variable is, according to theory, assumed to be negative since the more the female partner contribute to the relative family wage income the higher the opportunity cost for children and vice versa. The variable used here can however only be a crude proxy for income distribution within the family since the female relative wage rate refers to 1993 while the fertility decision (most likely) have been taken at another point of time.

4 Econometric Issues

Consider the variable $Y_i$ the number of children born by woman $i$. Since $Y_i$ is a non-negative integer we are dealing with count data. A model frequently used

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8 The number of children includes all children born by the woman.
for count data is the Poisson model. Conditional on explanatory variables $x_i$, $Y_i$ is Poisson-distributed with density:

$$f(y_i \mid x_i) = \frac{e^{-\mu} \mu^{y_i}}{y_i!}, \quad y_i = 0, 1, 2...$$ (1)

In the log-linear version of the model the mean parameter is parametrized as $\mu_i = \exp(\beta' x_i)$ to ensure $\mu > 0$. However, this distribution assumes that the mean and the variance are equal for the dependent variable i.e.:

$$E(Y_i \mid x_i) = \mu = V(Y_i \mid x_i)$$ (2)

If the variance is lower than the mean, underdispersion will occur and the standard Poisson model will yield an upward bias in the estimated covariance matrix, with the asymptotic standard errors being too large (see e.g. Winkelmann and Zimmermann, 1994). The inverse implication is true in the case of overdispersion i.e. when the variance exceeds the mean (see e.g. Caudill and Mixon, 1995).

To test for under-/overdispersion a Wald test has been carried out based on the estimates from the standard Poisson model. Dispersion can be defined as:

$$V(Y_i \mid x_i) = \mu + \alpha g(\mu)$$ (3)

where $\alpha$ is an unknown parameter, taking a positive value if there is over-dispersion and a negative value if there is under-dispersion. $\mu$ is the mean value and $g(\mu)$ is a known function, usually assumed to be equal to $\mu$ or $\mu^2$.

Following Cameron and Trivedi (1998) we estimate a Poisson model to predict the fitted values $\hat{\mu} = \exp(\beta' x_i)$. The test is then carried out by estimating:

$$\frac{(y_i - \hat{\mu})^2 - y_i}{\hat{\mu}} = \alpha \frac{g(\hat{\mu})}{\hat{\mu}} + \varepsilon_i$$ (4)

by OLS. For each sample we obtain the results presented in Table 1. $\alpha_1$ and $\alpha_2$ denote the estimated parameters for $g(\hat{\mu})$ and $g(\hat{\mu}^2)$ respectively.

<table>
<thead>
<tr>
<th>Table 4.1: Wald test</th>
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<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>$\alpha_1$</td>
</tr>
<tr>
<td>$\alpha_2$</td>
</tr>
</tbody>
</table>

Note: $\alpha_1$ occurs if $g(\alpha_1) = \mu$ and $\alpha_2$ occurs if $g(\alpha_2) = \mu^2$

The Wald test rejects the null hypotheses of both $\alpha_1$ and $\alpha_2$ on a 99-per cent significance level for the sample related to women in the ages 16-64. For all other samples, the Wald test reveals no significant difference between the variance and the conditional mean. It implies that for three of four samples the
standard Poisson model can be used while a more flexible model should be used for the fourth sample.

One popular alternative which allows the mean and variance to differ is the negative binomial regression model. In this model \( \lambda_i \) is specified so that:

\[
\lambda_i = \exp(\beta' x_i) + \varepsilon
\]

where \( \varepsilon \) is assumed to have a gamma distribution with mean 1 and variance \( \phi \). The distribution function that follows is:

\[
f(y_i \mid \varepsilon) = \exp\left(\frac{(-\lambda_i \exp(\varepsilon) \lambda_i^{y_i})}{y_i!}\right)
\]

To yield unique estimates from the negative binomial model and the Poisson model respectively we use maximum likelihood.

### 4.1 The Data Generating Process

The data generating process in the standard Poisson model and in the negative binomial model respectively does not separate between zero and positive counts. This is a short-coming since there are reasons to believe that the zero and positive counts are generated by different mechanisms. Silvia and Covas (2000) stress for example that some couples do not have children by choice but as a result of biological reason. Such reasoning will consequently result in a heterogeneous mean which in turn makes the standard Poisson and negative binomial models improper.

The process that generates any positive number of children may thus differ from the process that generates "decisions" to remain childless. To allow the data generating process to differ a zero-inflated count data model may be used. Following Greene (1994) and Lambert (1992) the probability for the Poisson model of the various outcomes can be written as:

\[
\begin{align*}
\text{prob}\{y = 0\} &= \text{prob}\{z = 0\} + \text{prob}\{z = 1\}\text{prob}\{y = 0 \mid \text{poisson}\} \\
\text{prob}\{y = j > 0\} &= \text{prob}\{z = 1\}\text{prob}\{y = j \mid \text{poisson}\}
\end{align*}
\]

The zero inflated model is based on construction of a model for \( z \), such as the probit model, which is then integrated into the Poisson or negative binomial data setting. \( z = 0 \) if the outcome would always be 0, 1 if a negative binomial/poisson model applies, \( y \) is the observed response.

The Vuong test statistic is used for testing the standard poisson/negative binomial model against the zero inflated versions of the model (see Vuong, 1989; Greene 1994).

### 4.2 Completed versus non-completed fertility

The data in our study include women aged 16-80 in 1993. The age span makes it possible to compare the impact from economic and social covariates \( x_i \) on the number of children \( y_i \) related to respondents in different ages.
The primary division is between those who have completed their fertility, i.e. women 50 years or older, and women who have not, i.e. women below 50 years. When women with completed fertility are analyzed all respondents experience an exposure time for fertility which is of equal length for all observations.\footnote{The fertility exposure time for women 50 years old and above is defined as 34 years.}

Further, since all respondents have completed their fertility the observed number of children per woman equals the actual number of children per woman during her fertility life cycle. This is contrary to women in the ages of 16-49. For this group a censoring problem occurs since some of the women may have experienced a long time of exposure for fertility while some of the women are just in the beginning of their life time fertility cycle. In such a case it is important to incorporate a measure of exposure time in the model. McIntosh (1999) approaches this problem with reduced form methods while Caudill and Mixon (1995) based their censoring on age as a proxy for completion. In our paper we control for different exposure times by incorporating the logarithm of the individual observed fertility exposure ($\text{Lnexposure}$) in the model and fix the coefficient to unity\footnote{Fertility exposure time is defined as age minus 16 for women up to the age of 49.} (see Winkelmann and Zimmermann, 1994).

### 4.3 Endogeneity

A number of count-data studies report estimates of the relationship between female labour market experience or female wage rate and fertility (see e.g. Caudill and Mixon, 1995; Gensler, 1997; Nguyen-Dinh, 1997 and Wang and Famoye; 1997) without any discussion of the endogenity problem with such approach.

Our paper does also use female labour market experience as an explanatory variable of number of children. We are well aware that this may cause endogeneity problem. Female labour market experience is assumed to have an effect on fertility decision but it might be an effect of the fertility decision as well. Despite this we find it reasonable to interpret a negative parameter estimate for female labour market experience as a sign of difficulties in combining market work with children, irrespective of the endogenity between the variables.

### 5 Empirical results

Table 5.1 presents the parameter estimates and standard deviations for the groups analyzed here. The samples (i), (ii) and (iii) are estimated with maximum likelihood in a zero inflated Poisson model while (iv) is estimated with maximum likelihood in a zero inflated negative binomial model. The Vuong statistic is reported for each sample and is testing the non-nested hypothesis of the zero inflated model versus the non inflated model. Large positive values of the statistics supports the zero inflated model while values less than two (2) does not favour any of the models (see e.g. Greene, 1997).
Table 5.1: Estimation results for the poisson and negative binomial models respectively

<table>
<thead>
<tr>
<th>Variable</th>
<th>(i)</th>
<th></th>
<th>(ii)</th>
<th></th>
<th>(iii)</th>
<th></th>
<th>(iv)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age in 1993</td>
<td>Age in 1993</td>
<td>Age in 1993</td>
<td>Age in 1993</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>50-80 (n=267)</td>
<td>16-49 (n=572)</td>
<td>16-80 (n=839)</td>
<td>16-64 (n=755)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>-0.018 **</td>
<td>0.004</td>
<td>-0.033 **</td>
<td>0.004</td>
<td>-0.028 **</td>
<td>0.058</td>
<td>-0.032 **</td>
<td>0.004</td>
</tr>
<tr>
<td>Low</td>
<td>Ref. case</td>
<td>Ref. case</td>
<td>Ref. case</td>
<td>Ref. case</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>-0.158</td>
<td>0.129</td>
<td>-0.060</td>
<td>0.083</td>
<td>0.014</td>
<td>0.056</td>
<td>-0.168</td>
<td>0.145</td>
</tr>
<tr>
<td>High</td>
<td>-0.116 &lt;0.157</td>
<td>0.122 &lt;0.155</td>
<td>0.022</td>
<td>0.097</td>
<td>0.045</td>
<td>0.074</td>
<td>0.055</td>
<td>0.106</td>
</tr>
<tr>
<td>Rural</td>
<td>0.107</td>
<td>0.132</td>
<td>0.051</td>
<td>0.078</td>
<td>0.032</td>
<td>0.067</td>
<td>-0.012</td>
<td>0.020</td>
</tr>
<tr>
<td>Parents</td>
<td>-0.598</td>
<td>0.153</td>
<td>0.051</td>
<td>0.078</td>
<td>0.032</td>
<td>0.067</td>
<td>-0.012</td>
<td>0.020</td>
</tr>
<tr>
<td>Wage</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.020</td>
<td>0.017</td>
</tr>
<tr>
<td>Lnexposure</td>
<td>1.293 **</td>
<td>0.124</td>
<td>1.721 **</td>
<td>0.088</td>
<td>1.888 **</td>
<td>0.058</td>
<td>1.514</td>
<td>0.232</td>
</tr>
<tr>
<td>Constant</td>
<td>Young: 0.012</td>
<td>Young: 5.444</td>
<td>Young: 4.196</td>
<td>Young: 2.338</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: **) Significant at a 0.05-per cent level
*) Significant at a 0.10-per cent level

In the first group (i), women with completed fertility, only one of the estimates was significant, female labour market experience. The other variables are insignificant although the signs are in most cases as expected. The simple interpretation of the first negative estimate for experience is that more of experience will give fewer children while less will give more. This negative relationship is hardly surprising since women in this group are old (born between 1913 and 1943). For many of them, the prime fertility age was e.g. far ahead the coming reforms within the family policy area. The expansion of this, from the 1970s and onwards, may in that respect have come "too late" for many women wishing to combine family and paid work.

Looking at the younger group, (ii), does however not indicate any changes in this respect. The estimate is still significant and negative. A straightforward interpretation is that longer experience is equal to few children and shorter to many. However, it is hard to tell whether a long experience has resulted in fewer children or if fewer children has caused long labour market experience. The difficulty interpreting the causality between these variables is stressed by the fact that the negative and significant relationship is also valid, if labour market experience is used as dependent variable and number of children is used as an independent variable.

It is possible that a future analysis of this group of women, i.e. when their fertility is completed, will give a non-significant or even positive estimate. The former indicates that labour market experience has lost its significance while the latter indicates that experience and number of children might not be a contradiction any longer. This statement depends, however, on the design of the parental leave in the future. Will it be split into two parts of equal size - one part for each parent - or will it be kept as it is today?

Contrary to the group of women with completed fertility (i), the estimates
for higher education is also significant for the younger group (ii) as for all women (iii). Women with a higher (longer) education tend to have fewer children than women with lower educational level. This result supports the theoretical approach by Cigno and Ermisch (1989) as well as the empirical result by McIntosh (1999), who found that women who invest in human capital (education) have their children later in life but compensate for the postponement by shorter space between the births. No differences can be found between high educated and low educated women when the life time fertility period is completed. The assumption that high educated women give birth to fewer children can consequently not be supported.

Living in a rural area seems to have a positive effect, but is not significant. Whether the woman has Swedish-born parents or not does not have any impact on the number of children. In the last group (iv) female relative wage was also included as an independent variable. The estimate was as expected negative, although not significant. The Vuong test statistic is less than 2 in the estimation of the first group (i). This is not surprising since the group only includes women who have completed their fertility. The other groups (ii)-(iv) include "younger" women who have not completed their life time fertility cycle. Since the probability to give birth to at least one child increases with the time of exposure, the share of childless respondents is smaller in the first group (i) compared with the samples (ii)-(iv). Irrespective of the reason for why the respondent is childless, the need for including an "extra" probability for a zero outcome seems to be larger in the samples including women with incompleted fertility.

11 The share of childless respondents in group (i) is 13 %. The share of childless respondents in the other groups (ii)-(iv) is 38 %, 33 % and 30 % respectively.
6 Conclusions

The purpose of this study was to analyze the effects of a few economic and social variables on the number of children. The results are mixed, but the only significant results occurring in all estimations is the negative and significant parameter estimate for female labour market experience. In Sweden we have noticed a positive relationship between female labour market participation and total fertility rate the last decades, but this is obviously not transferable to market experience and number of children. The reason why it fails to hold is the differences between the key variables: Female labour force participation and fertility rate versus female labour market experience and number of children. Despite of the high participation rate among women in Sweden, their absence from the labour market at child birth are still considerable. Absence of leave may be long or short, but in most cases the length of it depends on the number of children and the division of responsibility for the children within the family. The length as well as the design of the parental leave (paid and unpaid) is therefore of crucial interest. In some cases the length has been questioned, due to the fact that women are the ones that (still) use the lion-part of it. As an effect of that, the proposition of an equal split between the parents of the paid parental leave can be seen.

The results support the assumption that women with a (longer) higher level of education have less children. This result is however not significant in the oldest group (i) which may indicate that this might be a stronger effect among the younger and if this is true may become stronger in the future. The results may also indicate a catching-up effect, which means that higher educated women have their children later in life, but the intervals between the births are shorter.

The results presented here are solely based on female respondents. We have deliberately disregarded variables associated with their male partners, except for the one concerning the female relative wage. In a future research we have to involved the role of the male partner more thoroughly.
References


