Family policy and the (causal) effect of mother's employment on childbearing outcomes in Norway

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1 Introduction

The aim of this paper is to investigate the causal interrelationship between mother's employment and fertility behaviour in Norway using individual-level register data covering the entire Norwegian population from 1993 onwards.

1.1 Family policy in Norway

The Nordic countries are often described as leaders regarding the process towards gender equal welfare states. The goal of gender equality is manifested in present family policies in Norway. For instance, an earning-related parental leave with income-replacement of around 80% makes it affordable for mothers to make use of the parental leave, which can last up to approximately one year. The parental leave programme has been more or less consistent since 1993. Parental leave makes the combination of female employment and family life more feasible for two reasons. First, its income-replacement character provides incentives for women to become established in the labour market before considering childbearing. Second, it also allows women to keep foothold in the labour market while taking care of newborn children, which means that they can continue with labour market work after the leave.

In addition, four weeks of the total parental leave of around 12 months are earmarked for the father in order to motivate fathers to be more involved in childcare by encouraging them to take parental leave. Four out of five fathers make use of this "fathers-leave". Father's use of parental leave can be associated with gender equality in the couple as it among others signals shared responsibility for children.

1.2 Background

In economic theory of fertility considerable attention has been paid to the role of women's employment in fertility (e.g. Becker (1991)). For working women the opportunity costs of having a child basically consists of two types - the mother's direct wage loss during labour force withdrawals and her loss of human capital investment and returns to these investments. Hence, low fertility in industrialised countries has often been linked to increasing female labour force participation.

There is a long tradition of empirical analyses of fertility and employment in social sciences, and a negative association between women's employment and fertility has been shown in many studies (Brewster and Rindfuss (2000)). Women who work for pay have fewer children, on average, than women who

do not, and mothers spend less time in paid employment, on average, than childless women.

At the macro level, cross-country studies find causality between female labour force participation and fertility in both directions, but the negative correlation becomes weaker over time (Engelhardt et al. 2004; Kögel, 2004). Other recent macro-level studies show that the correlation between female labour force participation has turned positive during the 1990s, especially in the Nordic countries (e.g. Ahn and Mira (2002), Billari and Kohler (2004) and Rindfuss et al. (2003)). These changes have been linked to changes in the institutional context, such as family policies and availability of childcare (Brewster and Rindfuss (2000)).

However, macro-level data reflect the sum of individual behaviour which does not necessarily reflect individual "average behaviour" (Rønsen and Skrede (2007)) and for our purpose, individual behaviour is the most relevant. The empirical literature that specifically focuses on the causal inter-relationship between mother's employment and childbearing from a micro-perspective is modest. Examples of country-specific studies on the relationship between female employment and fertility include for the UK Aassve et al. (2006) and Papapetrou (2004), for the US Francesconi (2002) and Budig (2003) and for the Netherlands Bloemen and Kalwij (2001). The general finding of these studies is that being in employment has a negative effect on childbearing for women.

The ability to combine female employment and motherhood varies across countries, and it has been argued that "the negative association between fertility and labour force participation can be expected to diminish as the conflict between work and family responsibilities is reduced" (Rindfuss and Brewster (1996)). The two has been seen as more feasible in the Nordic countries where the majority of women, including those with small children, are employed outside the home. This has brought wide interest towards the social policies that the Nordic countries offer parents of young children. In Norway three out of four mothers with children under age 3 are found in the labour force[1], and the total fertility rate is around 1.9 in which is relatively high compared to other industrialised countries.

We think that there are good reasons to believe that there are policy implications for the effect of the mother's employment on her fertility decisions. Given the generous parental leave policy in Norway we can assume that the opportunity costs of having a child for working mothers are reduced. This

[1] This number includes women who are on paid maternity leave.

especially concerns the mother's direct wage loss during labour force withdrawals. From this assumption, we can expect there to be small differences between working mothers in general and homemakers in their childbearing outcomes. However, the magnitude of the opportunity costs of having a child varies, i.e. women with higher educational attainment and earned income can be assumed to be more inclined to pursue an employment career, and therefore encounter higher penalty for career interruptions. We therefore expect differences due to human capital investments. The parental leave scheme gives parents the opportunity to stay at home with their baby for approximately one year in total, but the mother takes the lion share of the leave period.

2 Research question

The primary focus of this paper is to assess the effect of the woman's labour force attachment on the intensity with which she has her second and third child. However, when employing standard regression techniques in such a question the possible *feedback* or *endogeneity* between the fertility process and the employment process is not taken into account. This feedback mechanism refers to the fact that not only does the woman's labour force participation affect her fertility but her fertility might also influence her subsequent labour force participation.

For example, in a standard intensity regression model where the outcome in question is eg. the third birth intensity and employment status enters the model as a (possibly) time-dependent variable, a higher intensity for women who are not employed need not be a *causal effect* but could instead be due to two-child mothers staying home in anticipation of having the third child soon after.

Another yet similar interpretation comes from the possible *heterogeneity* of the population: Some women might have high preferences towards family and children and at the same time have low preferences towards a working career. If this is the case, a standard intensity regression model might show up as a higher second- or third birth intensity for home-makers; however this effect is not *causal* but rather a result of the heterogeneity of the population.

However, if we can rule out that a larger second- or third birth intensity is due to such modeling issues it is likely that the effect is in fact causal, which means that a possibly higher intensity of having the second or third child for home-makers might be due to factors such as more time to spend on the

family and lower opportunity costs of childbearing than what is the case for working mothers.

We would expect that such differences between women who are in employment and women who are not would be larger for the third-birth intensity than for the second-child intensity since there is a relatively strong two-child norm in Norway.

We employ joint modeling of several processes (the fertility, employment and non-employment processes) in order to assess the possible causal effect. This will be described in more details in Subsection 3.4 below.

3 Data and Methods

3.1 Norwegian Register Data

The data for this paper have been constructed by extracting data from Norwegian administrative registers, such as the Norwegian Central Population Register, the Register of Employers and Employees, and the Educational Database. Every person who has lived in Norway at some time point since 1960 has a unique person number which identifies this person across the registers. The data has been linked to form complete fertility and work histories for the study population.

3.2 The study population

The study population for this particular study comprises all women of "Norwegian origin" who had their first child after January 1st 1993 and before January 1st 2004. This time period is chosen because we only have complete work histories after 1993.

At the time of the birth of a child it is registered whether the parents are living together in a cohabitational union, are married or whether the mother is living alone. In the study population, we only include women who are either married or living in a cohabitational union when the first child is born. Also, we only include women who are at least 19 years old at the time of first birth.

There are 231994 women who have their first child during the period from January 1993 through December 2003. However, not all of these women have complete employment records throughout the study period[2] and are thus

[2]We expect that this is due to errors in the registers and not related to the outcome in any way.

removed from the study population. Furthermore, as we will also mention later, the women are followed up from the time their first child reaches the age of one. Therefore, women who give birth to their first child in 2003 will not enter into the study population. The final study population comprises 142994 women.

3.3 The available information

From the registers we have access to information about when the women give birth to first, second and third child on a monthly basis. Also, we are able to construct complete employment histories on a monthly basis for the women[3] apart from the first year after giving birth.

Furthermore, we have access to yearly information as to whether the women are registered as being in education and also to their highest educational attainment.

Apart from the variables mentioned above, we also know the mother's current age and the calendar time.

3.4 Methods

We follow the schedule for simultaneous hazards as suggested by Lillard (1993). This implies setting up a hazard model for the births including, a hazard model for entering into employment and a hazard model for entering into non-employment. In the specification of the hazard for births an unobserved heterogeneity term is included (which is shared across the births for each woman); in the specification of the hazard for employment an unobserved heterogeneity term is included (shared across employment spells) and finally, an unobserved heterogeneity term is included in the hazard for entering non-employment. These unobserved heterogeneity terms are supposed to represent unobserved characteristics affecting the 3 hazards. They might be interpreted as representing the woman's preferences towards children, employment and "home-making", respectively.

The hazard model for second and third birth The hazard model for the jth birth ($j = 2, 3$) is assumed to be

$$\begin{aligned}\log \lambda_B^j(t) =& \beta_1' \cdot \text{empl}(t) + \beta_2' \cdot \text{educ}(t) \\ &+ \beta_3 \cdot A_B^j(t) + \beta_4 \cdot D_B^j(t) + \beta_5 \cdot C_B^j(t) + \epsilon_B. \end{aligned} \tag{1}$$

[3]Those women for which this was not the case have been removed from the study population as mentioned previously.

In this specification the variables *empl* and *educ* are categorical variables with the levels *employed*, *not employed* and *student* and *primary education*, *secondary education*, *lower tertiary education* and *higher tertiary education*, respectively. The employment variable is assumed to be endogenous whereas the education variable is assumed exogenous[4]. The woman's current age, the calendar year and the age of the youngest are all included through the specification of spline functions (A_B^j, D_B^j and C_B^j, respectively).

For the second-birth intensity the follow-up period for each woman is from the time her first child reaches the age of one[5] until she gives birth to her second child[6]. The third-birth intensity is modelled by following those women who give birth to their 2nd child during the study period. Similar to the one-child mothers, they are followed from the time the second child reaches the age of one year until the birth of a third child (or end-of-study).

Among the 142994 women in the study population, 73556 enters the population used for modeling the third-birth intensity. Hence, we have up to two births per woman.

The employment variable is updated on a monthly basis and it describes whether the woman is employed during this month or not. We employ an intensity regression model where entering into employment is considered an event. We consider a woman "at risk" of entering the state of employment when she is either registered as non-employed or as being a student. If the women gives birth to a child she is assumed to enter into maternity leave and is therefore censored. The endogeneity of the employment variable is taken into account due to the specification of a separate model for the intensity of entering into employment:

$$\begin{aligned}\log \lambda_E^j(t) =& \gamma_1 \cdot I_{(\text{no. of children}=2)}(t) \\ &+\gamma_2 \cdot I_{(\text{no. of previous empl. spells})\geq 3}(t) \\ &+\gamma_3' \cdot \text{educ}(t) \\ &+\gamma_4 \cdot A_E(t) + \gamma_5 \cdot D_E(t) + \gamma_6 \cdot C_E(t) + \epsilon_E. \end{aligned} \tag{2}$$

[4]It might be that the education should also be taken into account as endogenous, but we will not pursue this question further in this study.

[5]This starting point is chosen because the employment status of the women for the first year after birth cannot be determined due to the fact that most women are on maternity leave in this period. Note that this also means that we remove all births that take place when the previous child is younger than one year. However, this applies only to a very small subpopulation of the women.

[6]This means that we loose a small sub-sample of the women for follow-up, namely those women who give birth to their second child before the first child reaches the age of one year.

Here the education variable is a categorical variable specified as above (and assumed to be exogenous), the same applies for the spline functions for age of the mother, age of the youngest child and calendar year. We also control for the number of children the women has given birth to and the previous number of employment spells.

A similar model is specified for the non-employment process:

$$\begin{aligned}\log \lambda^j_{NE}(t) =& \delta_1 \cdot I_{(\text{no. of children}=2)}(t) \\ &+\delta_2 \cdot I_{(\text{no. of previous non-empl. spells})\geq 3}(t) \\ &+\delta_3' \cdot \text{educ}(t) \\ &+\delta_4 \cdot A^j_{NE}(t) + \delta_5 \cdot D_{NE}(t) + \delta_6 \cdot C_{NE}(t) + \epsilon_{NE}. \end{aligned} \tag{3}$$

The woman is considered at risk of non-employment as long as she is either in employment or registered as being a student.

Unobserved heterogeneity We allow the three unobserved heterogeneity terms ϵ_B, ϵ_E and ϵ_{NE} to follow a 3-dimensional normal distribution (with mean 0) in which the correlation terms are allowed to be non-zero.

3.5 Descriptive Statistics

The distribution of current employment status at the time when the first child of the women reaches the age of one (i.e. at the start of follow-up) is shown in Table 1. Correspondingly, the distribution of the employment variable at the

Employment category	Frequency (%)
Working	85346 (59.7)
At home (non-employed)	46071 (32.2)
Student	11577 (8.1)
Total	142994

Table 1: Description of the employment variable

time the second child turns one (i.e. at the start of the second waiting time) is shown in Table 2. The two distributions look somewhat similar, however, the share of "home-makers" is a little bit larger among the women with two children (37.4%) than among the women with only one child (32.2%). Figure 1 shows the fitted *survival curve* for the waiting time to second birth for the one-child mothers. This curve shows that approximately 80% of the one-child mothers in the study give birth to their second child eventually. Figure

Employment category	Frequency (%)
Working	41972 (57.1)
At home (non-employed)	27539 (37.4)
Student	4045 (5.5)
Total	73556

Table 2: Description of the employment variable

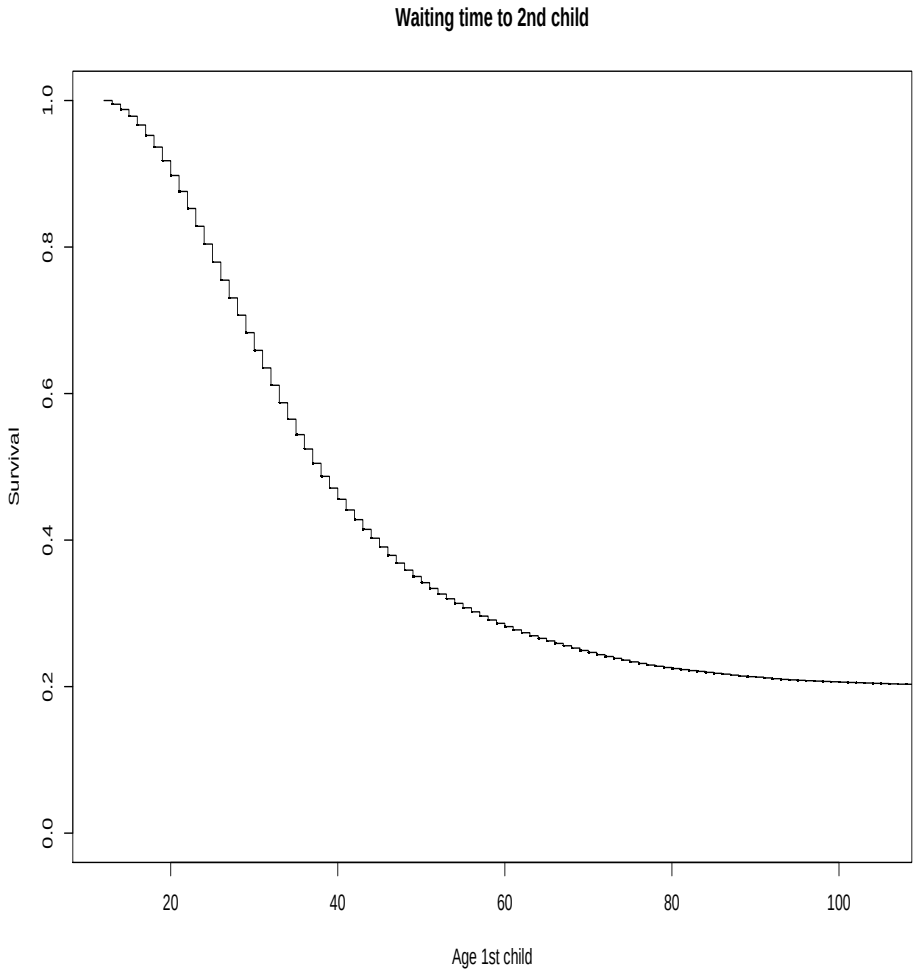

Figure 1: Kaplan-Meier plot of the probability of having the second child as a function of the age of the first child.

2 shows the corresponding curve for the waiting time to third birth (hence, the women included here are the two-child mothers). It can be seen that approximately 40% of the two-child mothers eventually give birth to their third child.

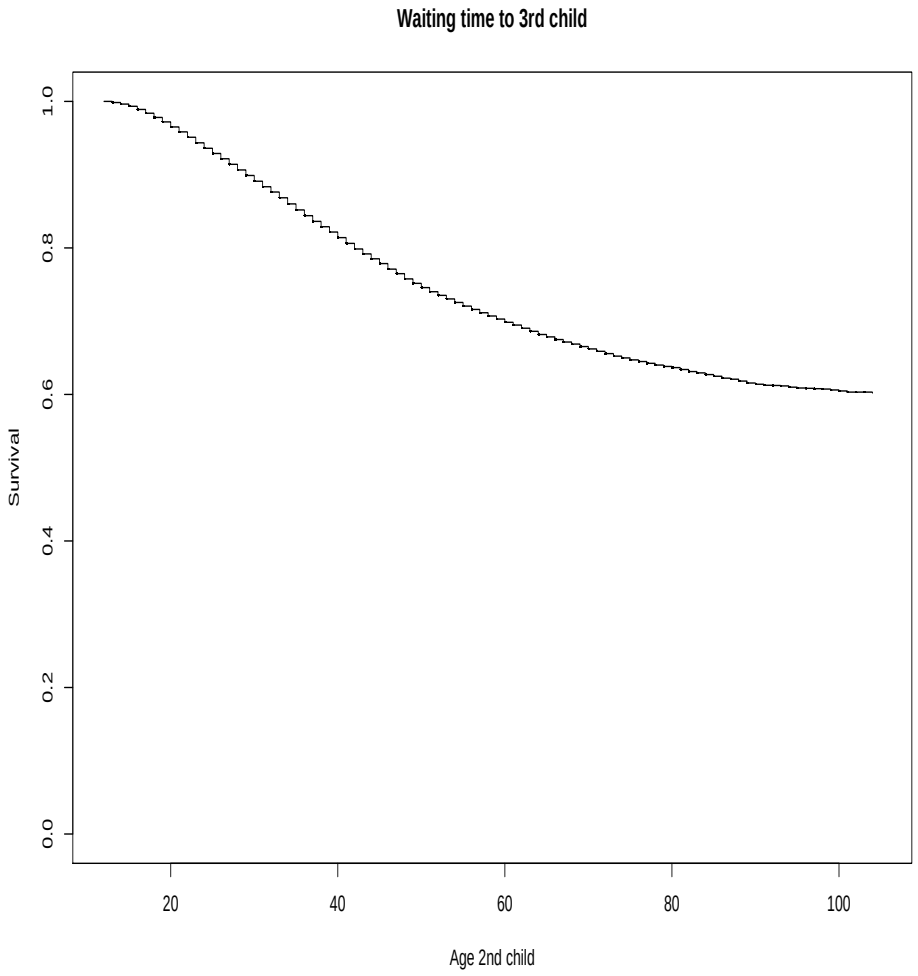

Figure 2: Kaplan-Meier plot of the probability of having the third child as a function of the age of the second child.

4 Results

The results concerning the effect of employment and education are shown in Table 3. The left-most column (referred to as **Model 1**) shows the results from a standard intensity regression model for the effect of employment on the second- and third-birth intensity (without any unobserved heterogeneity). The right-most column (referred to as **Model 2**) shows the results from the model described in Subsection 3.4. We do not report the results concerning the effect of fertility on employment and non-employment since the effect of employment on fertility is our main interest here.

As pointed out by Thygesen et al. (2005) and Gerster et al. (2007) when fitting models to data of a very large size which is the case here, almost any effect will be statistically significant. This, however, does not necessarily mean that the effect is substantively important. For this reason we here refrain from performing formal hypothesis tests.

4.1 The effect of employment on second birth

The results from **Model 1** show that a woman who is currently a home-maker has a rate of having her second child which is 3.8% lower than a women who is currently employed whereas a women who is registered as a student has a rate which is only 37.4% of the rate of a woman who is employed.

When we take into account the possible endogeneity in **Model 2** these results change only a little; the rate ratio of being employed compared to a home-maker is now 0.975, i.e. 2.5% lower. Hence, when taking the possible endogeneity of employment into account, the difference in the second-birth rate when comparing women who are employed and women who are home-makers is very little. But even without doing so, the difference is relatively small. Hence, the progression to parity two for one-child mothers does not depend (very much) on the mother's labour force participation.

4.2 The effect of employment on third birth

The results concerning the effect of employment on third birth from **Model 1** show a rate ratio of 1.134 for home-makers compared to women who are employed. This effect changes to 1.119 when taking the endogeneity into account as is done in **Model 2**. First of all, we note that the effect changes only a little when introducing unobserved heterogeneity into the model; in this case there is still an intensity for home-makers which is 12% larger than for women who are in employment.

	Model 1	Model 2
2nd child:		
Employment:		
Employed (ref)	1	1
Home	0.962	0.975
Student	0.374	0.368
Education:		
Primary	0.772	0.769
Secondary (ref)	1	1
Lower tertiary	1.436	1.449
Higher tertiary	1.649	1.669
3rd child:		
Employment:		
Employed (ref)	1	1
Home	1.134	1.119
Student	0.430	0.422
Education		
Primary	0.850	0.848
Secondary (ref)	1	1
Lower tertiary	1.734	1.745
Higher tertiary	2.252	2.271
Unobserved heterogeneity:		
ϵ_B (fertility)		0.2309
ϵ_E (employment)		1.2919
ϵ_{NE} (non-employment)		0.8288
ρ_1		-0.1541
ρ_2		-0.5290
ρ_3		-0.2406
ln-L	-961985.33	-957511.38

Table 3: Results from models with and without unobserved heterogeneity, respectively. In both models we control for age of the mother, age of the youngest child and calendar year (results not shown).

5 Discussion

In this paper we have modelled the effect of employment on second- and third birth intensities for Norwegian women during the period 1993-2003. We employed both a "standard" intensity regression model in which the

employment process was assumed to be exogenous to the fertility process and a model in which the possible endogeneity was taken into account. We did not control for the women's cohabitational/marital status, however, in our study population we only included women who were either married or cohabiting at the time when the first child was born.

We found that there is almost no difference between mothers who are employed and mothers who are not, when it comes to the intensity of having the second child. On the other hand, our results show that even when we take into account the possible endogeneity of the employment process to the fertility process, women who are non-employed have an intensity of proceeding to the third child which is around 12% larger than for women who are in employment.

There is a complex causal relationship between education, union formation, employment and fertility. We have not taken all of this into account but held our focus on the interplay between employment and fertility. We therefore hesitate to draw very firm conclusions. However, we believe that our results show evidence that there might be a negative *causal* relationship between employment and having a third child, but no negative effect of being employed on having a second child.

This suggests that there are in fact lower opportunity costs of further childbearing for two-child mothers who are home-makers than for two-child mothers who are employed. We would expect that the Norwegian women are in fact among the women in the world facing the lowest opportunity costs of childbearing due to the family-friendly institutional framework as described in Section 1. Evenso, despite these facts, we still see a negative (causal) relationship between employment when it comes to the third child.

There is a strong two-child norm in Norway and most women who become mothers proceed to having a second child. This is not the case for the third child, in which case it is not only a question of timing but also about whether to have the child. Raising children is time consuming and competes with time spent in employment. This might be what is reflected in our result.

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