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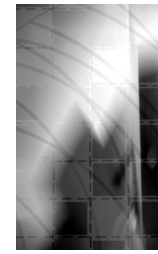
*Published in:*
Work, Employment and Society

*Publication date:*
2010

*Document Version*
Publisher's PDF, also known as Version of record

**Work, employment and society**

BSA Publications Ltd®
Volume 24(3): 487–507
[DOI: 10.1177/0950017010371651]





# Childbirth and cohort effects on mothers' labour supply: a comparative study using life history data for Germany, the Netherlands and Great Britain

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**ABSTRACT**

The negative effect of childbirth on mothers' labour supply is well documented, though most studies examine only the short-term effects. This study uses retrospective life history data for Germany, the Netherlands and Great Britain to investigate the long-term effects of childbirth on mothers' labour supply for successive birth cohorts. Probit estimates with correction for selection into motherhood and the number of births show strong drops in participation before first childbirths and strong recovery after the birth of the last child, especially in Great Britain. Younger cohorts display a less sharp decline in participation around childbirth and a faster increase in participation in the 20 years after childbirth, especially in the Netherlands. However, mothers' participation rates do not return to pre-birth levels in any of the countries studied here. Labour market conditions and institutional public support seem to contribute to explaining the cross-country variation in participation after childbirth.

**KEY WORDS**

career preferences / childbirth / female labour supply / gender regime / life history data

## Introduction

Studies in economics and sociology show that childbirth has a negative effect on women's labour market participation. A childbirth (Drobnic, 2000), the number of subsequently born children (birth sequence), and the timing of these births (Miller and Xiao, 1999) exert a substantial effect on mothers' labour supply over the life course. However, the evidence to date is mostly based on a comparison of (repeated) cross-sectional data. Exceptions are Kenjoh (2005) and Vlasblom and Schippers (2006), who used panel data, but with relatively short time horizons. An alternative is to use life history data covering the entire life course (Manzoni et al., forthcoming).

This article's contribution to the literature is threefold. First, it uses unique retrospective life history data to provide comparative evidence on the effect of childbirth on the labour supply of mothers from subsequent birth cohorts in three different labour markets and gender regimes (Lewis, 1992), that is, Germany, the Netherlands and Great Britain. Second, the empirical model of mothers' labour supply examines the entire fertility history of women by incorporating the birth sequence and timing of subsequent childbirths. Third, the anticipation and recovery effects of subsequent childbirths on mothers' labour supply are modelled from two years before childbirth up to 20 years afterward. The main idea is that changes in women's labour market behaviour across birth cohorts and over the life course reflect the increasing labour market dynamics and cohort-related changes in females' working time preferences due to individualisation or emancipation trends, changes in educational attainment, shifts in occupational structure, and changing policies to support women's labour market participation.[1] The main research questions are as follows:

**1**) To what extent does the birth of a first child affect women's labour supply, and what is the effect of subsequent childbirths?
**2**) To what extent does the birth of a child affect the labour market participation of subsequent birth cohorts differently?
**3**) To what extent are the findings different across countries and gender regimes, and which factors might be responsible for the observed differences?

The following sections discuss the theoretical and empirical background of the study, the data and research design, descriptive findings, and the results from the model estimations. The final section draws conclusions and discusses further implications for research and policy.

## Theoretical and empirical background

This study departs from an 'agency structure' perspective, according to which labour market decisions are believed to be affected by 'rational choice' (Hakim, 2002) and structural constraints (Ginn et al., 1996). However, it is not only

agency or choice, as Hakim's preference theory suggests, but also contextual and structural constraints that matter for explaining women's decisions to participate in the labour market (Pfau-Effinger, 1993). There has been ample debate and supporting evidence to show that in particular contexts, family-related time, money constraints and the lack of labour market opportunities determine women's employment and occupational choices (Crompton and Le Feuvre, 2000; Gash, 2008; Healy, 1999). Secondly, Hakim's ideas of women's advancement and of stable career preferences are challenged since labour market preferences can change over the life course and can be affected by the institutional and labour market context. For that reason this study compares females' choices across three different institutional contexts, while the empirical model explicitly allows female labour market choices to change at any point in their career. Changes in the labour supply of mothers across cohorts can therefore result from a number of changes: shifts in preferences or norm behaviour, institutional changes associated with equal opportunities and child care policies, changes in educational attainment, or shifts in occupational and employment structures and mobility patterns (Crompton and Le Feuvre, 2000).[2] This study's main focus, however, is on changes in participation patterns around childbirth, by cohort.

The interdependence of the labour supply of male and female partners has received a great deal of attention in the literature (Becker, 1981; Drobnic et al., 1999). Becker (1981) expected that partners specialise in either labour market participation or home production, depending on their respective competitive advantages. Generally speaking, men are expected to specialise in labour market activities and women in home production, especially after childbirth. However, Becker's theory ignores the heterogeneity implied in male and female working time patterns (Dex et al., 1998). Evidence shows that single parents behave differently from married or cohabiting couples (Kalmijn and Luijkx, 2006).

Childbirth exerts a negative effect on women's labour force participation (Dekker et al., 2000; Drobnic, 2000; Gornick, 1994; Rosenfeld and Birkelund, 1995; Stier et al., 2001; Van der Lippe, 2001). However, women's labour behaviour is significantly dissimilar across the three regimes. The regimes share historically the 'male breadwinner' type of welfare regime, which has evolved over time into a 'dual earner' gender regime, though with rather different gender labour supply patterns (Lewis, 1992; Lewis et al., 2008). The labour market context and the education or occupational structure can also affect these supply patterns. The 'child effect' is, therefore, not equally strong across European welfare states (Gornick, 1994). Furthermore, younger generations of women are more likely to continue working after childbirth in longer-hours jobs than older generations.

The main question is to what extent the birth of a first child and subsequent children leads to dissimilar changes in women's labour supply in the three employment regimes. The British regime is characterised by a lower level of family support, as indicated by the availability of childcare services (De Henau et al., 2006), and by leaving work/family reconciliation predominantly a private

responsibility (Lewis et al., 2008). Public support for mothers' employment is much stronger in Germany and the Netherlands, where parental leave schemes are more generous. Though women's participation rates are not very different (62% in Germany, 66% in the UK, and 68% in the Netherlands in 2007), they are very dissimilar for mothers with children. Vlasblom and Schippers (2006: 335) show that in the 1980s and 1990s the participation of women with one and two children at first childbirth was, respectively, 66 and 54 percent in the Netherlands, 31 percent for both in the UK, and 11 and 12 percent in Germany.

The availability of part-time jobs is essential for the participation of women. Delsen et al. (2007) show that demand-side factors such as the growth of the service sector, the need to extend operating hours, and the greater flexibility part-time employment offers employers can explain the rise of part-time work. The share of part-timers varies from 42 percent for British women and 46 percent of German women to 75 percent for Dutch women in 2007, though women work much shorter hours in Germany and the Netherlands than in Great Britain. The Netherlands is therefore characterised as a 'one-and-a-half earner' gender regime. The birth of a child is therefore likely to exert a larger adverse effect on the labour participation of mothers in Great Britain than in the other countries. Because of the greater availability of good-quality part-time jobs in the Dutch labour market, the birth of a child can be expected to have a smaller negative effect on the labour market participation of Dutch women (Fouarge and Muffels, 2009). Because of the lower level of public support for mothers in the unregulated British labour market compared to Germany and the Netherlands, British mothers are expected to re-enter the work force more quickly after birth to earn a living.

The labour market participation of women has increased across subsequent birth cohorts (Goldin, 2006). Institutions have adapted, by supplying extended parental leave and childcare services, to better accommodate the needs of combining care and work (Lewis et al., 2008; Uunk et al., 2005; Vlasblom and Schippers, 2006). The occupational structure has also changed in favour of female employment because of a shift to service employment. However, these changes in institutions and the labour market context are relatively recent and affect younger cohorts of women more than older cohorts. Therefore, the birth of a child is expected to have a smaller effect on the labour supply of younger cohorts than on that of older cohorts. Larger cohort differences are expected for the Netherlands because the labour market participation rate over cohorts increased faster there than in the other two countries. This might signal significant changes in work preferences and/or institutional context across cohorts (such as the increased availability of part-time jobs). Furthermore, the pace of recovery after childbirth is expected to be steeper for younger cohorts. Eventually, the drop in participation before childbirth is expected to be more pronounced for first childbirths than for subsequent ones, as is shown by Vlasblom and Schippers (2006). The authors argue that women anticipate the arrival of a second child by reducing their participation already before their first childbirth, indicating their different work orientation. Likewise, the pace of

recovery after a first childbirth is supposedly more pronounced for women with one child than for those with more children.

## Data and methods

### Life history data

This study uses life history data for Germany, the Netherlands and Great Britain, in which individuals are asked retrospectively about their work career and demographic events.[3] For Germany, the data are from the German Life History Survey (GLHS) (Mayer, 2007), a study of eight cohorts born between 1919 and 1971, which allows the construction of a complete retrospective career, marital and fertility history. The data for the Netherlands are from four retrospective life history surveys based on (stratified) random samples of the Dutch population that gathered retrospective monthly information on work histories, changes in family structure and marital situation.[4] For Great Britain, the data are from the British Household Panel Survey (BHPS). The labour market, marital and demographic histories are constructed from retrospective information gathered in the second wave (1992) and supplemented by information from the panel waves (Maré, 2006).[5]

Women were selected, and their employment spells as well as demographic events identified on a monthly basis, starting from the first labour market entry – after leaving full-time education – up to the situation at the time of interview. Due to differences in legal retirement age, the analyses include Dutch and German women aged 18–65 and British women aged 18–60.

### Empirical model

To assess the impact of first and subsequent childbirths on women's employment, a probit regression model explaining the probability to be employed in each month preceding and following childbirth is estimated. The analyses consider differential effects for various birth cohorts of women and the sequence of childbirths, while controlling for other characteristics. To capture possible anticipation and recoup effects of childbirth on mothers' labour supply, two time variables are included that measure the time before ($t^b$) and after ($t^a$) birth. However, the relation with time is nonlinear, as shown in Figure 1, which depicts mothers' participation rates from 24 months before and up to 240 months after first childbirth. The effect of time before and after birth on labour supply follows a 'saddle-shaped' pattern, meaning that it decreases prior to birth (anticipation) but increases after birth (recovery) in a curvilinear way. This pattern is captured by a linear and quadratic time trend.

A probit model is estimated instead of a panel regression model. The main reason is that, because of the interdependency of mothers' subsequent childbirth decisions, the data was redesigned into a mother–birth dataset for each of

the childbirth sequences.[6] The probit model accounts for the differential career effect of first childbirth as well as that of each subsequent child by the mother's birth cohort. Up to three birth events are modelled and the model controls for additional births.

Given the unobserved index variable $y_i^*$, the labour market outcome $y_i = 1$ is observed if $y_i^* > 0$ and $y_i = 0$ if $y_i^* \leq 0$. $\text{pr}(y_{it} = 1) = \Phi(\beta X_{\text{it}})$, where $y$ indicates the labour supply of female $i$ in month $t$ (with $y_{it} = 0$ when out of employment), $\Phi(.)$ is the standard normal cumulative distribution, $X_{it}$ are the time-constant and time-varying covariates, and $\beta$ is the set of associated coefficients. The model can be written as

$$\begin{aligned}\text{pr}(y_{it} = 1) = \alpha + \beta_{1b}(t_{it}^{b} * C_i * S_{it}) + \beta_{2b}((t_{it}^{b})^2 * C_i * S_{it}) \\ + \beta_{1a}(t_{it}^{a} * C_i * S_{it}) + \beta_{2a}((t_{it}^{a})^2 * C_i * S_{it}) + \gamma V_{it} + \varepsilon_{it} \quad (1)\end{aligned}$$

where $t^b{}_{it}$ and $t^a{}_{it}$ are time trends for the 24 months before and 240 months after childbirth, $C_i$ represents the dummies for each birth cohort $j$, $S_{it}$ is the birth sequence of children, $\alpha$ is a constant term, and $\beta_{1b}$, $\beta_{2b}$, $\beta_{1a}$, $\beta_{2a}$, and $\gamma$ are vectors of coefficients to be estimated. Here $\varepsilon_{it}$ is a normally distributed error term.[7]

The birth sequence variable ($S_{it}$) distinguishes among the first child in a one-child family, the first child in families with more children, the second child in a family with two children, and the second and third children in families with more children. The birth cohort dummies ($C_i$) allow one to capture the major shifts in female labour supply that took place in the last century. The following birth cohorts are distinguished in the Netherlands and Great Britain: 1900–1930, 1931–40, 1941–50, 1951–60, and 1961–70. In Germany, a distinction is made between the 1919–21, 1929–31, 1939–41, 1949–51, 1954–6, 1959–61, 1964, and 1971 cohorts. The model allows for different estimates of the child effect, depending on the birth sequence of subsequent children and the mother's birth cohort. The vectors of parameters $\beta_{1b}$, $\beta_{2b}$, $\beta_{1a}$, and $\beta_{2a}$ capture the anticipation and recovery effects of subsequent children born in the various cohorts.[8]

The matrix of covariates ($V_{it}$) includes controls for educational level,[9] age at first childbirth, and marital status and a dummy for four or more children. Since no information on career orientations or preferences is available in the data, the mother's age at first childbirth is used as a proxy, just as in Vlasblom and Schippers' (2006) study. The assumption is that the lower the age at first childbirth, the more likely mothers are to be family oriented or 'home centred' and to reduce the labour supply around childbirth. Likewise, the higher the age, the more 'work centred' women are and the less likely they are to interrupt their careers. Education level is included to capture the rising level of education across cohorts and because more highly educated women can be expected to be more career oriented and therefore have lower withdrawal rates around childbirth. Differences in marital status are controlled for, since previous studies find marriage to have negative effects on women's labour supply (Kalmijn and Luijkx, 2006; Stier et al., 2001). More traditionally oriented women are more

likely to marry and interrupt their careers (Drobnic et al., 1999), whereas career oriented mothers are more likely to stay single or be in cohabitation relationships (Vlasblom and Schippers, 2006).[10]

### Self-selection into motherhood

Depending on the birth cohort, between 10 and 20 percent of each sample never become mothers. Mothers can differ systematically from non-mothers in characteristics unobserved by scientists, such as career intentions or occupational choices (Del Boca and Sauer, 2006). If such factors also influence employment decisions, ignoring the selection process underlying the childbirth decision will bias the estimates.

In a first step, a tobit selection model is estimated to account for the probability of becoming a mother and the number of children. The model takes the form $y_i^* = Z_i\beta + u_i$, with $u_i \sim N(0, \sigma_u^2)$, with $y_i^*$ being an index variable where the outcome $y_i = 0$ if $y_i^* \leq 0$ and $y_i = y_i^*$ if $y_i^* > 0$. Here $\text{pr}(y_i > 0) = \Phi(-Z_i\beta/\sigma_u)$, where $\Phi(.)$ is the standard normal cumulative distribution. In the model, $y_i$ equals zero when a woman never becomes a mother, $Z_i$ are covariates, and $\beta$ represents the coefficients to be estimated. The model controls for marital status, educational level, and birth cohort. Identification is ensured by the inclusion of interaction terms between birth cohorts and the two other variables in the selection model, which are omitted in the outcome equation. The tobit residuals are retrieved from the selection model and included as an additional explanatory variable in the outcome model (1).[11] The residuals turn out to be significant in Germany and Great Britain, but not in the Netherlands.

Three alternative specifications of the probit model are estimated:

- *Model I (baseline)* includes the main effects for all the control variables (that is, education, marital status, age at first birth, and tobit residuals), birth cohort, and the dummies for birth sequence and time before and after childbirth.
- *Model II* adds to Model I the two-way interaction between the dummies for the time before and after childbirth and the birth sequence, since the anticipation and recoup effects are expected to differ by birth sequence.
- *Model III* adds to Model II the three-way interactions between birth sequence, the time dummies, and birth cohort, since fertility history and its effect on mothers' participation are expected to be different across birth cohorts.

## Descriptive findings

Table 1 presents descriptive findings on mothers' participation rates at childbirth and some background characteristics by birth cohort, birth sequence, and country.

**Table 1** Mothers' participation rates and background statistics by birth cohort, birth sequence and country

| | *First birth of one* | | | | *First of more births* | | | | *Second birth* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % Married | Education level | % Employed | Age at first birth | % Married | Education level | % Employed | Age at first birth | Age at second birth | Number of children | % Employed |
| *Germany* | | | | | | | | | | | |
| 1919–21 | 79.3 | 1.5 | 36.6 | 25.9 | 82.9 | 1.3 | 39.3 | 24.6 | 28.6 | 2.8 | 30.7 |
| 1929–31 | 90.3 | 1.3 | 30.6 | 26.6 | 93.0 | 1.2 | 29.6 | 24.9 | 28.7 | 2.9 | 22.3 |
| 1939–41 | 88.3 | 1.4 | 48.1 | 25.4 | 95.1 | 1.4 | 31.6 | 23.7 | 27.2 | 2.6 | 18.4 |
| 1949–51 | 94.2 | 1.6 | 41.7 | 25.1 | 92.8 | 1.3 | 34.1 | 22.7 | 26.1 | 2.3 | 14.6 |
| 1954–6 | 88.4 | 1.8 | 28.1 | 27.0 | 93.2 | 1.8 | 34.4 | 24.0 | 27.2 | 2.3 | 18.4 |
| 1959–61 | 87.2 | 1.8 | 26.2 | 25.5 | 91.4 | 1.8 | 22.1 | 22.5 | 25.5 | 2.3 | 11.7 |
| 1964 | 89.9 | 2.2 | 14.3 | 28.7 | 87.9 | 2.0 | 7.6 | 25.4 | 28.5 | 2.3 | 9.2 |
| 1971 | 88.2 | 2.0 | 8.9 | 24.9 | 88.3 | 1.6 | 2.8 | 22.1 | 24.8 | 2.2 | 2.8 |
| Total | 87.3 | 1.7 | 27.7 | 26.2 | 89.6 | 1.5 | 27.0 | 24.2 | 27.7 | 2.5 | 18.4 |
| *Netherlands* | | | | | | | | | | | |
| 1900–1930 | 100.0 | 1.7 | 0.0 | 29.1 | 90.0 | 2.0 | 15.0 | 27.1 | 29.4 | 3.4 | 8.2 |
| 1931–40 | 92.5 | 1.9 | 17.5 | 29.1 | 94.4 | 2.0 | 19.1 | 25.8 | 28.4 | 2.9 | 12.7 |
| 1941–50 | 91.5 | 2.5 | 37.2 | 27.4 | 96.1 | 2.4 | 28.7 | 25.1 | 27.7 | 2.4 | 15.2 |
| 1951–60 | 95.5 | 2.8 | 60.2 | 30.1 | 96.4 | 2.7 | 51.6 | 26.4 | 29.1 | 2.5 | 30.6 |
| 1961– | 96.5 | 2.8 | 75.1 | 27.9 | 97.7 | 2.7 | 60.1 | 25.8 | 28.2 | 2.3 | 41.1 |
| Total | 95.3 | 2.7 | 61.0 | 28.4 | 96.2 | 2.5 | 49.3 | 25.8 | 28.4 | 2.5 | 26.0 |
| *Great Britain* | | | | | | | | | | | |
| 1900–30 | 94.8 | 1.6 | 24.9 | 29.5 | 94.8 | 1.6 | 17.1 | 25.8 | 29.6 | 2.9 | 13.5 |
| 1931–40 | 91.4 | 2.0 | 24.3 | 27.0 | 97.8 | 2.0 | 14.2 | 24.4 | 27.3 | 3.0 | 16.1 |
| 1941–50 | 85.7 | 2.4 | 27.6 | 27.8 | 92.0 | 2.5 | 21.8 | 24.3 | 27.1 | 2.6 | 20.8 |
| 1951–60 | 86.7 | 2.8 | 49.2 | 28.5 | 91.0 | 2.8 | 28.7 | 24.7 | 27.3 | 2.6 | 23.3 |
| 1961– | 67.9 | 2.9 | 48.4 | 24.8 | 72.2 | 2.6 | 29.0 | 22.0 | 24.3 | 2.4 | 20.3 |
| Total | 85.2 | 2.3 | 35.2 | 27.7 | 91.2 | 2.3 | 21.7 | 24.5 | 27.5 | 2.7 | 18.8 |

*Source:* Germany, GLHS 1981–99; Netherlands, FNB 1992, 1998, 2000, HIN 1995; Great Britain, BHPS 1991–2003.

Broadly speaking, in Great Britain and the Netherlands, mothers' participation rates as well as their education levels have increased across cohorts. The percentage of employed mothers at first childbirth is larger if there is only one child than if there are more children. For younger cohorts, employment rates seem on average highest in the Netherlands and Great Britain. Dutch mothers postpone first childbirth longer and may therefore be more career oriented.

Figure 1 shows labour market participation rates before, at and after first childbirth. The pattern confirms the results of Vlasblom and Schippers (2006): mothers tend to reduce the labour supply already before first childbirth.

Although the general pattern is similar in all three countries, there are noticeable differences. As expected, pre-birth participation rates are highest and their decrease around childbirth largest in Great Britain, though mothers seem to recover faster after birth. In Great Britain, mothers' participation rates drop sharply to about 25 percent at childbirth, but increase to more than 35 percent already after five years, to 55 percent after 10 years, and to 70 percent after 20 years. In the Netherlands they decline to 34 percent and keep declining up to five years after first childbirth but then increase slowly to 40 percent after 20 years. In Germany, the drop is nearly as dramatic as in Great Britain but the recovery is much slower: participation increases gradually to 50 percent after 20 years. However, in none of the countries do the participation rates return to their initial level. Even in Great Britain, 20 years after childbirth, participation is still 15 percentage points lower than pre-birth levels.

## Model estimation results

Table 2 presents the marginal effects from the probit model. They are calculated for the means of the continuous variables (time, age) and as the difference from the reference category for the categorical variables (education, birth sequence, marital status, birth cohort). For ease of interpretation, the effects of the interaction terms of birth sequence, cohort, and time before and after childbirth are not reported in Table 2 but are shown graphically in Figures 2 and 3.[12]

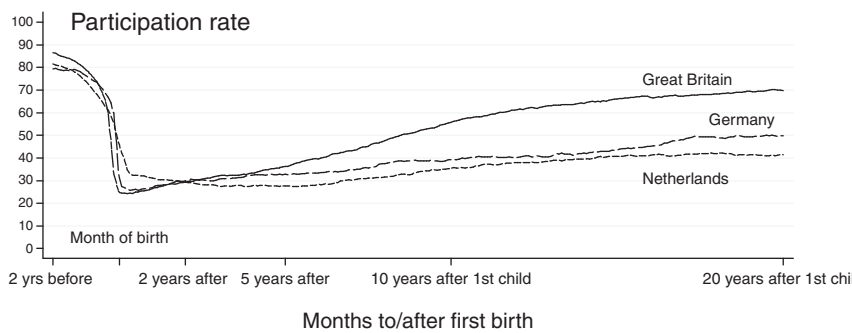


**Figure 1** Mothers' participation rates by time to and after first childbirth by country
*Source*: Germany, GLHS, 1981–99; Netherlands, FNB 1992, 1998, 2000, HIN 1995; Great Britain, BHPS 1991–2003.

**Table 2** Marginal effects of childbirth and birth cohort on mothers' labour market participation: probit regression with tobit selection (main effects only)

| | *Germany* | | | *Netherlands* | | | *Great Britain* | | |
|---|---|---|---|---|---|---|---|---|---|
| *Models* | I | II | III | I | II | III | I | II | III |
| *Birth sequence* | | | | | | | | | |
| First birth of one | 0.119** | 0.041 | −0.001 | 0.056* | 0.096** | 0.089** | 0.110** | 0.163** | 0.163** |
| Second birth of two | −0.002 | −0.101** | −0.123** | −0.002 | −0.025** | −0.027** | 0.059** | 0.005 | 0.005 |
| Second of more | −0.043** | −0.047* | −0.062** | −0.019** | −0.038** | −0.036** | −0.015 | −0.006 | −0.005 |
| Third of more | −0.019 | −0.073** | −0.093** | 0.003 | −0.023* | −0.024* | 0.060** | 0.049** | 0.050** |
| *Time dummies* | | | | | | | | | |
| Time to birth | −0.041** | −0.070** | −0.026** | −0.017** | −0.036** | −0.025** | −0.042** | −0.083** | −0.066** |
| Time after birth | 0.002** | 0.0003 | −0.001** | 0.001** | 0.000** | 0.002** | 0.004** | 0.003** | 0.003** |
| Time before squared | −0.138** | −0.234** | −0.046* | −0.046** | −0.102** | −0.030* | −0.123** | −0.236** | −0.164** |
| Time after squared | −0.002* | 0.003** | 0.006** | −0.0001 | 0.002** | −0.005** | −0.008** | −0.003** | −0.001 |
| Time after fourth child | −0.081* | −0.089* | −0.085* | −0.055** | −0.068** | −0.066** | −0.076** | −0.096** | −0.098** |
| *Education level (ref.: low)* | | | | | | | | | |
| Medium low | 0.040 | 0.038 | 0.040 | 0.027 | 0.028 | 0.028 | 0.076** | 0.075** | 0.077** |
| Medium high | −0.048 | −0.055 | −0.054 | 0.071** | 0.077** | 0.076** | 0.065* | 0.064* | 0.065* |
| High (university) | 0.103* | 0.101* | 0.108** | 0.239** | 0.256** | 0.255** | 0.177** | 0.179** | 0.182** |
| *Marital status (ref.: married/cohabited)* | | | | | | | | | |
| Single | 0.337** | 0.263** | 0.261** | 0.093** | 0.043 | 0.042 | 0.158** | 0.085** | 0.088** |
| Divorced/separated | 0.179** | 0.172** | 0.173** | 0.053 | 0.052 | 0.053 | −0.014 | −0.020 | −0.021 |
| Age at first birth | 0.001 | 0.001 | 0.001 | 0.004** | 0.004* | 0.004* | −0.004** | −0.005** | −0.005** |
| *Birth cohort (ref.: 1900–30, De: 1919–21)* | | | | | | | | | |
| 1931–40 (De:1929–31) | −0.113** | −0.121** | −0.147** | 0.037 | 0.038 | 0.037 | 0.138** | 0.143** | 0.134** |
| 1941–50 (De: 1939–41) | −0.116** | −0.122** | −0.168** | 0.100** | 0.102** | 0.099** | 0.149** | 0.155** | 0.137** |
| 1951–60 (De: 1949–51) | −0.059* | −0.061* | −0.132** | 0.219** | 0.232** | 0.240** | 0.175** | 0.183** | 0.155** |
| 1961– (De: 1954–56) | −0.047 | −0.046 | −0.142** | 0.313** | 0.327** | 0.355** | 0.112** | 0.119** | 0.079* |
| (De: 1959–61) | −0.062* | −0.063 | −0.177** | | | | | | |
| (De: 1964) | −0.046* | −0.042 | −0.173** | | | | | | |
| (De: 1971) | −0.126** | −0.141** | −0.292** | | | | | | |

**Table 2** *(Continued)*

| | *Germany* | | | *Netherlands* | | | *Great Britain* | | |
|---|---|---|---|---|---|---|---|---|---|
| *Models* | I | II | III | I | II | III | I | II | III |
| *Interactions* | | | | | | | | | |
| *Two–way:* | | | | | | | | | |
| Birth sequence x time before/after | No | Yes (Fig. 2) | No | No | Yes (Fig. 2) | No | No | Yes (Fig. 2) | No |
| *Three–way:* | | | | | | | | | |
| Birth sequence x time before/after x cohort | No | No | Yes (Fig. 3) | No | No | Yes (Fig. 3) | No | No | Yes (Fig. 3) |
| *Selection into motherhood* | | | | | | | | | |
| Tobit residuals | –0.021* | –0.019 | –0.023* | –0.004 | –0.002 | –0.003 | –0.041** | –0.037** | –0.039** |
| Pseudo R squared | 0.086 | 0.098 | 0.103 | 0.113 | 0.132 | 0.134 | 0.128 | 0.148 | 0.148 |
| N individuals | | 2878 | | | 2841 | | | 3022 | |

*Notes:* De=Germany * $p<0.05$ ** $p<0.01$

*Source:* Germany, GLHS 1981–99; Netherlands FNB 1992, 1998, 2000, HIN 1995; Great Britain, BHPS 1991–2003.

More highly educated mothers tend to participate to a greater extent in all three countries, but especially in Great Britain and the Netherlands. Compared to married women, single women are more likely to participate in Germany and Great Britain than in the Netherlands. The higher the age at first childbirth, the higher the participation in the Netherlands, but the lower the participation in Great Britain.[13] These findings suggest that career oriented women are less likely to interrupt their careers in the Netherlands due to stronger employment support for working mothers than in Great Britain. The time variables confirm the saddle shape of the participation curve before and after childbirth.

Birth cohort effects confirm the descriptive information in Table 1. In the Netherlands and Great Britain, participation rates increase steadily for younger birth cohorts (Model I). This pattern suggests that the availability of part-time jobs tends to raise mothers' labour market participation. For Germany all cohorts participate less than the oldest cohort, born around 1920, though the differences become smaller for subsequent cohorts.[14]

Figure 2 depicts the participation rates as calculated from the parameter estimates of Model II. For all countries, withdrawal rates are smaller at first childbirth when only one child is born than when more children are born. This finding suggests that career oriented women are less likely to interrupt their careers than family oriented women. The drop in participation around first childbirth – both for mothers with only one child and for those with more children – is, as expected, large in Great Britain. This finding is likely explained by fewer working time opportunities in firms allowing mothers to combine work and care or a lack of public support for mothers in Great Britain.

Examining the anticipation effects, one can see that the curves are more negatively sloped for first childbirths than for second or third childbirths in all three countries. Mothers with two or three children tend to participate less since they withdrew already at first childbirth, suggesting also that they are more family oriented.

The recovery effects are different across countries. In the Netherlands, mothers with only one child seem to recoup at a lower pace than in Germany or Great Britain. This may reflect stronger preferences for non-working time in the Netherlands or constraints in the supply of childcare facilities. As expected, British mothers exhibit the strongest pace of recovery, reflecting the stronger work norms in a double earner employment regime. In all countries, mothers seem to recover less quickly when the childbirth is not the last and more children follow (first and second births in families with more children). This may signal their stronger family orientation, compared to women with only one child. When the child is the last one born (first child in a one-child family, second child in a two-children family, or third child), mothers seem to recover more quickly, which may be associated with reduced time constraints associated with the other children being older and needing less care.

Figure 3 depicts the participation rates as calculated from the parameter estimates of Model III. First, younger cohorts in the Netherlands and Britain

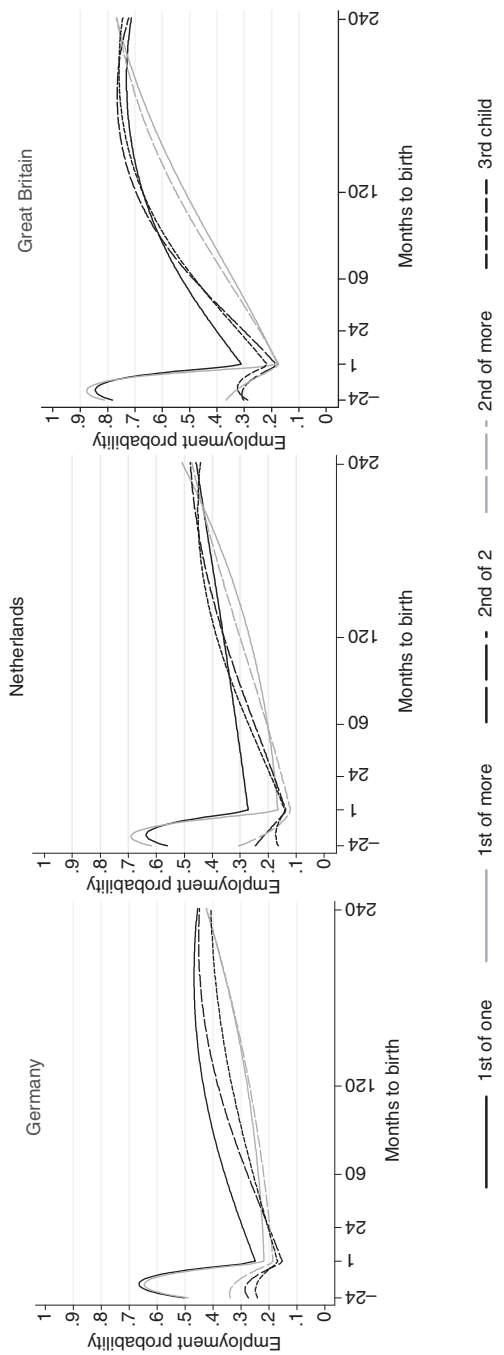


**Figure 2** Estimated mothers' labour supply (Model II): probit estimates of two-way interactions between birth sequence and time to/after childbirth by country

*Source*: Germany, GLHS, 1981–99; Netherlands, FNB 1992, 1998, 2000, HIN 1995; Great Britain, BHPS 1999–2003.

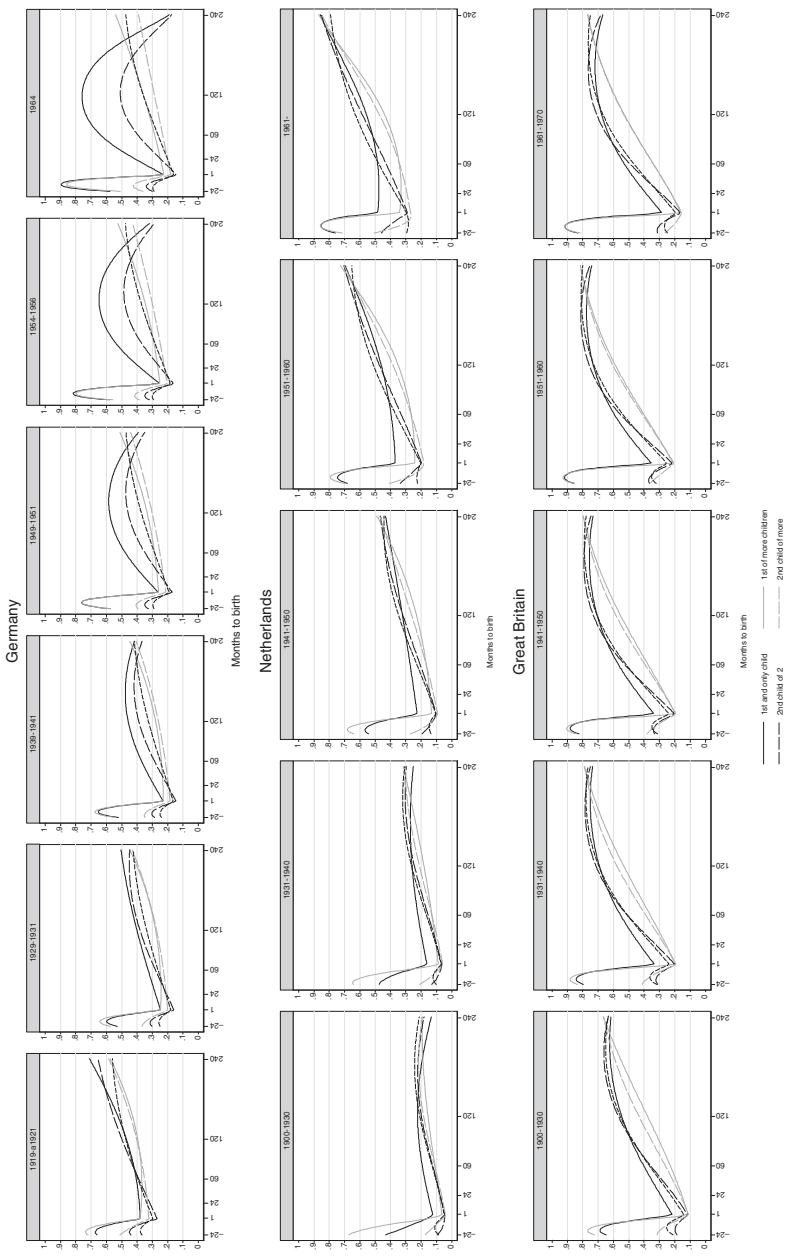


**Figure 3** Estimated mothers' labour supply (Model III): probit estimates of three-way interactions between birth sequence, time to/after birth, and birth cohort by country
*Source*: Germany, GLHS 1981–99; Netherlands FNB 1992, 1998, 2000, HIN 1995; Great Britain, BHPS 1991–2003.

tend to participate more than older cohorts, even after controlling for education level, marital status, and age at first birth. Second, in all countries the steepness of the decline in labour participation in the two years preceding the first childbirth is significantly larger for younger cohorts, either in a one-child family or in a family with more children. This means that subsequent cohorts tend to stay employed longer but when they stop working, they do so closer to the time of birth. Third, the pace of recovery is significantly steeper for subsequent cohorts, indicating that mothers from younger cohorts tend to return to the labour market more rapidly than their predecessors. Fourth, in all countries – but especially in the Netherlands and Germany – a larger variation in the pace of recovery after childbirth across cohorts is found between the various birth sequences, signalling increasing diversity of the life course.

For German and British mothers belonging to the younger cohorts, the curves for the first child in one-child families and the second child in two-child families are more strongly saddle-shaped than for otherwise similar Dutch mothers. This suggests that German and British mothers belonging to the younger cohorts increase their participation strongly in the first 10 years after the birth of the last child, whereas Dutch women increase their participation at a slower but steadier pace. In Great Britain cohort differences in participation after childbirth are much smaller than in the other countries, suggesting that older cohorts already recovered more quickly after childbirth. The Netherlands displays the most dramatic increase in participation rates across cohorts, with younger cohorts appearing to differ more in terms of their career patterns than older ones, but this is also the case in Germany, where they participate less. More and more women from the younger cohorts combine work and care after the birth of the third child – which is often the last. This finding seems to signal the increasing financial needs associated with having children, the greater availability of working time options, and the shifting preferences of the younger generations of mothers to combining work and care.

## Conclusions and discussion

The main contribution of this study is to document the long-term effects of childbirth on the labour supply of mothers belonging to different cohorts in Germany, the Netherlands and Great Britain. Life history data for three distinct labour markets and gender regimes are used with a view to supporting mothers' employment. An empirical model is elaborated upon in which selectivity into motherhood is controlled for by using a tobit selection model in the first step and a probit model in the second step to explain mothers' labour supply. The model accounts for birth sequence and the timing of births over the life course. The main findings are as follows. First, more mothers withdraw from the labour market around childbirth in Great Britain, but they also return at a faster rate into paid employment in the 10 years following childbirth compared to the other countries. Second, successive cohorts display lower withdrawal rates before and at childbirth and higher participation rates 20 years following childbirth, especially in the

Netherlands. Third, younger birth cohorts show a larger diversity in participation patterns over the life course dependent on the birth sequence and timing of births, particularly in Germany and the Netherlands. In all countries, when the child is not the last one, women recover less quickly. This is especially the case for Dutch women belonging to the younger birth cohorts. The results may signal the stronger family orientations of mothers with more children, though younger cohorts seem to recoup more quickly than older ones.

The three countries historically share the same male breadwinner type of gender regime and they all – in the last decade – seem to strive to enhance mothers' labour supply, though with different levels of success. The results show increasing participation rates for younger cohorts in all countries, even when women have more children, suggesting that they either exhibit stronger preferences for combining work and care or are exposed to more favourable institutions that more adequately support them in combining work and care compared to older cohorts. The findings across countries suggest that younger cohorts of women, because of their improved education coupled with a larger availability of working time options and stronger institutional support (especially in Germany and the Netherlands), have stronger preferences for combining work and care and are better able to realise these preferences.

A policy lesson that can be drawn from the larger diversity in life courses among the younger birth cohorts pertains to existing income and employment support systems becoming more life course tuned or targeted to take into account the different career preferences of younger cohorts. The findings also suggest that regimes providing a wider portfolio of income and employment support options – as in the Netherlands – may help create more jobs for women, either full or part-time, owing to shifting social norms in favour of female participation in employment. However, additional policy efforts are required if one wishes to equate females' post-birth participation rates to pre-birth levels. Further evidence for a larger number of countries is needed to disentangle the effects of choices and structural constraints indicated by changes in fertility behaviour, career orientations, labour market conditions, and policy and gender regimes.

## Acknowledgements

We would like to thank seminar participants of the Amsterdam School for Social Science Research, the 2008 RC28 Spring Meeting, the 2008 Equalsoc meeting, and two anonymous reviewers of *Work, Employment and Society* for their valuable comments.

## Notes

1 The effect of education on attitude towards economic choices is documented in, for example, Crompton and Lyonette (2005).

2 Vlasblom and Schippers (2004) suggest that changes in behaviour are the most likely driving force behind the increase in female employment in Europe.
3 Gutierrez-Domenech (2005) uses similar data but with shorter time horizons.
4 The four surveys are as follows: the Netherlands Family Survey 1992–3, FNB1992; the Survey Households in the Netherlands 1995, HIN1995; the Family Survey Dutch Population 1998, FNB1998; and the Family Survey Dutch Population 2000, FNB2000 (see e.g. De Graaf et al., 2000).
5 As of 1999, the BHPS includes respondents from Scotland and Wales, and since 2001 includes respondents from Northern Ireland, making the panel cover the entire UK. However, as we use the 1991–2001 waves the majority of respondents are from Great Britain.
6 Another reason is that since women are observed for long periods of time, it seems untenable to assume, as in panel regression, that unobserved individual effects are fixed or stable over time, particularly when a major life event such as childbirth is being considered. For estimation of the probit model on the pooled data, the standard errors of the parameters are corrected to account for the clustered nature of the data.
7 The equation represents Model III.
8 In the three-way interactions, cohort is entered as a continuous variable to limit the number of coefficients to be estimated.
9 Education is measured according to the CASMIN classification scheme in Germany (Müller et al., 1990) and the ISCED classification in the Netherlands and Great Britain.
10 Unfortunately, our data do not allow a proper distinction between married and cohabiting women. However, this is not a major issue, since this distinction is mostly relevant for younger cohorts.
11 Because of space constraints, the results from the tobit regressions are not reported here but are available from the first author upon request.
12 In Figure 3, the main effects of the cohorts pertain to upward or downward shifts of the curves across graphs. The main effects of the birth sequences pertain to upward or downward shifts of the curves within a graph. The time interactions are reflected in the curvatures of the various curves within and across graphs.
13 Including an interaction term between age at first birth and education level shows that all interaction effects are insignificant for the Netherlands. In Great Britain, the interaction effect for 'medium-high' education is negative, but small and only significant at the 10 percent level. In Germany, a small negative interaction effect is found for the 'medium-low' educational level.
14 The difference for the youngest cohort is larger, which could be due to the fact that women were on average younger at the time of the survey.

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**Date submitted** February 2009
**Date accepted** February 2010