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ABSTRACT

This paper analyzes the impact on fertility of changes in national expenditure for family allowances, maternity and parental leave benefits, and childcare subsidies. To do so, I estimate a model for the timing of births using individual-level data from 16 Western European countries supplemented with data on national social expenditure for different family policy programs. These latter allow approximation of the subsidies that households with children receive from such programs. The results show that increased expenditure on family policy programs that facilitate women to combine family and employment—and thus reduce the opportunity cost of children—generates positive fertility responses.

Keywords: Duration analysis, public policy, fertility

J.E.L. classifications: C41, H5, J13

INTRODUCTION

Decreasing fertility and increasing life expectancy has aged Europe's population in what is perhaps the final stage of a demographic transition that begun when early nineteenth century medical innovations and rising incomes augmented the expected life span (Lee 2003). The fertility decline in Europe, which had already begun by the late nineteenth century (Yule 1906), may have been a response not only to decreasing mortality rates but also to the increased price of children due to economic development. Increasing returns to education, particularly, have improved investment opportunities in the human capital of children and, correspondingly, have increased the incentive for parents to so invest. Such increases, however, have in turn raised the cost of children and may have caused a parental shift toward child quality and away from quantity (Willis 1973 and Becker 1981).[1] Whatever its cause, this fertility decline has resulted since the mid-1980s in a below-replacement fertility rate across Western Europe[2] and has contributed to the aging of Western European populations. These factors have raised concerns about the future labor supply of young skilled workers and social cohesion and sustainability of the welfare state (Lee 2003; McDonald 2006; Neyer 2006).

Interestingly, national fertility rates appear to be stabilizing at quite different levels across Western Europe; for instance, Mediterranean countries currently have total fertility rates below 1.4, while the Nordic countries have total fertility rates around 1.8 (OECD 2007a). This cross-national variation in Western European fertility rates has often

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[1] I refer to Galor and Weil (1996) for an alternative economic explanation and to Folbre (1994) for a discussion on the changing consequences of raising children.

[2] Ireland has had a below-replacement fertility rate since the early 1990s (OECD 2007a).

been in large part explained in terms of family policy; in particular, labor market policy aimed at creating opportunities for women to combine family and employment (Chesnais 1996; Ahn and Mira 2002; Adserà 2005; d'Addio and d'Ercole 2005; McDonald 2006; Neyer 2006). Theoretical support for this explanation that conforms to the economic theory of fertility (Becker 1981) focuses on the increasing importance of the opportunity cost of children over recent decades as changing gender roles across Western Europe have increased the demand for policies that facilitate women's economic empowerment. Such policies often aim to keep women attached to the labor market while simultaneously enabling them to have the desired number of children (Chesnais 1998; Adserà 2006).[3] An important issue for public policy, therefore, is the extent to which these family-friendly policies that help women combine labor market participation with childrearing, and thereby reduce the opportunity cost of children, result in higher fertility.

Nonetheless, the empirical evidence on the extent to which fertility is affected by family-friendly labor market policies like maternity leave and childcare is scarce and inconclusive. It ranges from the insignificant effects of maternity leave for Canada (Zhang et al. 1994) to a significantly negative effect of parental leave duration but a significantly positive effect of the replacement rate for a panel of OECD countries (d'Addio and d'Ercole 2005) to a significantly positive effect of both maternity leave availability for the U.S. (Averett and Whittington 2001) and maternity leave duration for a panel of OECD countries (Adserà 2004). In addition, Lalive and Zweimuller (2008)

[3] Beyond the scope of this paper are family planning programs designed to reduce fertility (see Brackett, Ravenholt, and Chao 1978, Tsui 2001, Angeles, Guilkey, and Mroz 2005). I refer to Van de Kaa (2006) for a critical discussion on pronatal policies and to Goldstein, Lutz and Rita (2003) for a discussion and recent evidence on family size ideals in Europe.

report that the 1990 extension of parental leave in Austria had a significantly positive effect on fertility, but the 1996 reduction had no such effect. Likewise, Blau and Robins (1989) report insignificant effects on fertility of a childcare tax credit, and Castles (2003) finds that fertility outcomes are positively associated with formal childcare provisions but negatively associated with publicly funded childcare provisions. One possible reason for this inconclusive empirical evidence is that these labor market policies have many dimensions—including duration, benefit, entitlement, cash or in kind, and public or mandatory private (see Neyer 2006)—that limit the comparability of a single policy indicator (e.g., length of maternity leave) over time or across countries. Such limitations affect the empirical evaluation of a policy change when not all policy indicators are controlled for. In contrast, the empirical findings on the relationship between family (or child) allowances and fertility are unambiguous, showing that transfers to families with children (cash and tax exemption) have a positive and significant effect on fertility (see d'Addio and d'Ercole 2005; Ermisch 1988; Gauthier and Hatzius 1997; Milligan 2005; Whittington et al. 1990; Whittington 1992; Zhang et al. 1994).

This paper aims to contribute substantially to the empirical literature on the effect that changing national expenditure on family policy programs has on fertility in Western Europe. Most specifically, it focuses on how the timing of births and completed fertility are affected by changes in public and mandatory private expenditure on family allowances, maternity and parental leave benefits, and childcare subsidies. The empirical framework has several methodological advantages over most of the abovementioned empirical studies. First, following Adserà (2005), the empirical model analyses the timing of births, which is of particular importance given that policy reform may cause women to postpone births, or schedule births earlier, without actually affecting completed fertility. Also, by analyzing the timing of births, this model explicitly allows for the fact that fertility decisions are irreversible; that is, the number of a woman's children can in principle not be reduced by a family policy reform. The empirical model extends on the model of Adserà (2005) by including random individual-specific effects to avoid dynamic selection bias due to unobserved time-constant individual characteristics (see Cameron and Heckman 1998). Second, the empirical model takes into account the complexity of family policy programs (discussed above) by analyzing fertility responses to a change in the mean subsidy a woman receives for a child, which is essentially a combination of all policy indicators. For example, the model evaluates the fertility response to a change in the maternity leave benefit (whether to replacement rate or leave duration) that an employed woman would on average receive in the year she has a child. This approach is persuasively supported by Zhang, Quan, and van Meerbergen's (1994) empirical finding that three very distinct tax-transfer programs (family allowances) in Canada have no differential effect on fertility, implying that individuals are concerned primarily with the programs' cumulative value (generosity). Examining the generosity of a family policy rather than the policy rules allows comparisons over time and across countries.

Finally, the empirical model aims to avoid the estimation of spurious relationships between fertility and family policy expenditure that may have occurred in earlier (cross) country studies when confounding variables at a country level influence the estimated fertility responses (d'Addio and d'Ercole 2005; Adserà 2004; Gauthier and Hatzius 1997; Whittington et al. 1990; Zhang et al. 1994). The model includes country-specific effects to control for time-invariant institutional differences across countries—thereby exploiting the variation over time in family policy expenditure to estimate its impact on birth timing. The model also controls for several time-variant macroeconomic variables (e.g., social expenditure per capita and the national unemployment rate) that the literature identifies as possible confounding variables. Moreover, policymakers may have responded to declining aggregate fertility, or to the (unobserved) socioeconomic changes causing it, by introducing pronatal family policy reform, which may result in confounded policy effects (Milligan 2005). Hence, aggregate fertility, being determined by these socioeconomic changes and possibly correlated with birth timings at an individual level and family policy expenditure at a country level, is potentially a confounding variable. To control for such potentially confounded effects, the modeling of birth timings at an individual level includes countries' crude birth rate and total fertility rate as additional country-level covariates.

The remainder of the paper is organized as follows. The next section describes the individual-level data on women's fertility history for 16 European countries, which are supplemented by OECD data on national family policy expenditure over the 1980–2003 period. The third and fourth sections, respectively, outline the empirical model and present the estimation results that form the basis of the simulations to assess the quantitative impact of changes in family policy program expenditure on birth timing and completed fertility. The last section summarizes the findings and concludes the paper.

DATA

The fertility histories of women in 16 Western European countries are taken from the 2004 European Social Survey (ESS 2004, www.europeansocialsurvey.org), a biennial survey of over 20 countries designed as a representative sample of all people aged 15 and over living in private households in each country. The dataset derived from the ESS 2004 survey comprises second-round data collected in 2004/2005 in face-to-face interviews. The ESS 2004 survey questions probed a wide variety of topics including social and public trust, social exclusion, and well-being and health. This current analysis uses variables derived from the core questionnaire on household demographic composition and the educational attainment of all household members, which the ESS made comparable for women across countries using the 1997 International Standard Classification of Education (ISCED).[4]

Because modeling a woman's complete fertility history up until 2004 (see below) requires that she be observed from age 15 (assumedly the start of her fertile period) through the years 1980 to 2003, the empirical analysis includes women born between 1965 and 1984. Thus, the oldest women enter the sample at age 15 in 1980 and are followed up to the age of 38 years in 2003, while the youngest women enter at age 15 in 1999 and are followed up to the age of 19 in 2003. Whereas the original sample included 5,337 women, 30 observations were removed because of missing information on educational attainment. An additional 51 women were excluded because they reported having given birth before the age of 15, most (33) even before the age of 10. Therefore, the final sample includes a total of 5,256 observations.

[4] http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm. See Appendix Table A1.

Table 1 shows the number of women sampled for each country (first column). As previously mentioned, observations for all the women began when they were 15 years old and childless. For all countries combined, over the observation period, about 50% of the women in the sample gave birth to one child (second column), 30% gave birth to two children (third column), and only 10% gave birth to three or more children (fourth column). In addition, as shown in the last column of Table 1, 7% of the women conceived a child while being educated. Table 2 shows that women aged 35–38 (cohorts 1965–1968) had, on average, 1.76 children. The mean number of children for most countries is somewhat higher than the national statistics reported by the OECD (2007a), possibly because of definitional differences between cohort and total fertility rates.[5] In line with the statistics reported by Gustafsson (2001), Table 2 shows that a considerable percentage of women aged 35–38 were childless (18%) and that, on average, women scheduled births in their late twenties. Appendix Table A1 shows the age and educational attainment distribution for each sample country.

[Insert Tables 1 & 2 about here]

As in the previous studies referenced, the dataset contains no information on the actual cost of a child nor on the subsidy a woman receives for having children or would receive if she had children. However, the child subsidy (i.e., the reduction in the cost of a child) is related to the national average family allowance per child, maternity and parental leave benefits per infant for an employed woman, and the childcare subsidy per young child for an employed woman. Therefore, an approach similar to Whittington, Alm, and

[5] In these countries, cohort fertility rates are somewhat higher than the total fertility rates. See Bongaarts (1999, 2002) for a discussion of the tempo and quantum of fertility.

Peters' (1990) use of the average tax value of a personal exemption to analyze the exemption's effect on the national birth rate in the U.S., I model these child subsidies using the expected or mean subsidy. For this paper, national expenditures on family allowances, maternity and parental leave benefits, and childcare subsidies are taken from the 2007 OECD Social Expenditure Database, SOCX 2007 (OECD 2007b), which contains information on national social expenditure on public and mandatory private programs for the years 1980–2003 for 16 Western European countries that are also included in the ESS 2004. One primary category of SOCX 2007 is social family expenditure, which includes cash benefits (e.g., child or family allowances, maternity payments or childcare support), social services (e.g., childcare), tax breaks (e.g., a tax exemption for families with children), and mandatory private expenditure (e.g., through legislation). These public and mandatory private social expenditures are generally referred to collectively as family expenditures, which are classified for this study as follows: (i) family allowances, (ii) maternity and parental leave benefits, and (iii) childcare subsidies (daycare or home help services). However, even though the OECD refers to these programs as family policy programs, from a different perspective, family allowance is an income-transfer program, whereas maternity and parental leave benefits and childcare subsidies are labor-market programs. The (mean) family allowance per child, maternity and parental benefits per infant for employed women, and childcare subsidy per young child for employed women in selected years are reported in Tables 3–5, respectively. In the construction of these statistics, a child is defined as younger than 16, a young child as younger than 5, and an infant as up to age 1. To facilitate comparisons over time and across countries, all amounts are real (in 2000 euro) and corrected for purchasing power parities.

[Insert Tables 3-5 about here]

Tables 3–5 show little convergence, despite EU efforts to influence national family policy.[6] Rather, they show considerable variation in (the changes in) expenditure on the three different family policy programs. For instance, Table 3 shows that family allowances have increased in most countries, most strongly in Ireland, but have decreased in the Netherlands, the UK, and in Mediterranean countries. In 2003, the mean yearly family allowance per child ranged from 310 euro in Spain to 3,741 euro in Austria. In the same year (see Table 4), maternity and parental leave benefits per infant for employed women ranged from 2,842 euro in Ireland to 34,575 euro in Norway. Nonetheless, over the observation period, maternity and parental leave benefits remained relatively high for countries like Sweden, Austria, France, and Italy, increased strongly in countries like Norway and Switzerland, but decreased in Portugal and Greece. As Table 5 illustrates, the mean yearly childcare subsidy per young child for employed women has increased in all 16 countries—particularly in Belgium and Ireland, and in the second half of 1990 in Mediterranean countries—resulting in 2003 in a range from 1,432 euro in Greece to 15,544 euro in Denmark.

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[6] For instance, the European Union sets minimum standards, such as the Parental Leave Directive (Council Directive 96/34/EC), which introduced the individual right to a three-month parental leave for fathers and mothers. See Hantrais (1997) for a discussion of European family policy. See also Gauthier (2002).

EMPIRICAL MODEL

The first part of the empirical analysis estimates the effects of the covariates on the timing of births using a discrete-time proportional hazard model (Cameron and Trivedi 2005: chap. 17). The timing of births is essentially modeled as a sequence of yearly birth decisions. I define the probability of a woman (indexed by *i*) giving birth after d_{ik} years at birth parity *k* at calendar time *t* as follows:

$$\Pr(B_{ic}(t)=1\,|\,d_{ik}(t),X_{ic}(t),Z_c(t),\eta_i;\theta)=F\left(\lambda(d_{ik}(t);\alpha_k)+X_{ic}(t)'\beta_k+Z_c(t)'\gamma_k+\eta_i\right), \quad (1)$$

where $B_{ic}(t)$ is a random variable equal to one if woman *i* gives birth at time *t* and zero otherwise. *F*(.) is the logistic cumulative distribution function, and *k* denotes the birth parity, $k\in\{0,1,2,..,K\}$. *K* denotes the maximum number of births, $\lambda(.)$ is a nonparametric baseline function for modeling duration dependence, *c* is a country index, $X_{ic}(t)$ and $Z_c(t)$ are vectors of covariates that are allowed to depend on calendar time *t*, and $i\in\{1,..,n\}$. The model explicitly accounts for unobserved individual-specific effects, or random effects, denoted by η_i, which in turn allows for dynamic selection on unobservable time-constant individual characteristics (see Cameron and Heckman 1998). In the context of this paper, η_i can be thought of as a preference for having children. I denote the parameters of interest by $\theta=(\theta_0,..,\theta_K)$, with $\theta_k=\left(\alpha_k,\beta_k,\gamma_k\right)$. I address the possible importance for the birth timing/policy relationship of conception occurring nine months before birth, by using a conception rather than a birth date but designate it as one year previously rather than nine months because the data are yearly. Nonetheless, because still births are excluded, the term “timing of births” still seems the most appropriate.

The covariates included in $X_{ic}(t)$ are a woman's age, to control for such factors as age-related decline in fecundity (Van Noord-Zaadstra et al. 1991), and the woman's educational attainment, whose effect on fertility is assumed to be the same across countries. This latter assumption is empirically supported by Björklund's (2006) finding that Western European household data typically reveal a negative association between women's educational attainment and fertility (see Gustafsson and Kalwij 2006). However, because this present analysis cannot take into account a woman's marital and employment history, the model does not control for either a woman's employment status or a partner's educational attainment. Thus, given that educational attainment may, for instance, affect fertility through differences in employment opportunities (see Kalwij 2000), this model may be considered a reduced form model.

The country-level covariates are included in $Z_c(t)$. Specifically, the family policy expenditure variables are the logarithms of the mean child allowance per child, the mean maternity and parental leave benefit per infant for employed women, and the mean childcare subsidy per young child for employed women. These statistics, reported in Tables 3 –5, are country and time specific. However, as previously pointed out, because confounding country-level variables may yield spurious relationships between fertility and family policy expenditure, the empirical model controls for country-specific effects and for several time-variant macroeconomic variables identified as possible confounding variables. I include GDP per capita and the unemployment rate to control for cyclical fertility patterns (Butz and Ward 1979) not captured by possible cyclical variation in family policy expenditure. In addition, Boldrin, De Nardi, and Jones (2005) report a strong negative relationship between social security spending (and in particular government-provided pensions) and fertility. Social security spending also may be positively related to family policy expenditure and the model therefore controls for (total) social expenditure per capita. The model also includes the female employment rate as an indicator for labor market institutions that facilitate combining employment and childrearing and that can be related to expenditure on the three family policy programs (see d'Addio and d'Ercole 2005). Finally, I include the crude birth rate and the total fertility rate to control for the possibly confounded effects of introducing pronatal family policy reform in response to declining aggregate fertility or the (unobserved) socioeconomic changes causing it, as argued by Milligan (2005).[7]

As previously mentioned, the analysis includes neither the actual subsidy a family receives when, for instance, making use of childcare nor the childcare subsidy that a childless woman would have received had she had a child. Not only do surveys not include such counterfactual information, but even if available, it might be subject to self-selection because women desiring children may move into jobs that offer such benefits as maternity leave (see Averett and Whittington 2001).[8] Hence, this research assumes that women's fertility decisions are influenced by the subsidy they expect to receive from each of the three family policies based on the mean subsidy received by eligible women, the route through which national expenditure on family policy programs is assumed to

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[7] As discussed below equation (1), a conception rather than a birth date is used when modeling the timing of births. Including the total fertility and the crude birth rates does therefore not exclude the possibility of an immediate impact of a particular family policy expenditure on current period conception decisions (and next period births).

[8] Averett and Whittington (2001) argue this point but find no empirical evidence to support it.

affect fertility outcomes. Identification of this relationship is thus the focus of the empirical analysis.

Estimation

A woman enters the panel at age 15 (at time t_i) and remains until 2003 (time T). I model the timing of births as a sequence of birth decisions. Hence, the likelihood function of individual i with an observed sequence of births denoted by $b_{ic} = \left(b_{ic}(t_i),..,b_{ic}(T)\right)$ is as follows:

$$\Pr(B_{ic} = b_{ic} \mid X_{ic}, Z_c, \eta_i; \theta) = \prod_{t=t_i}^{T} \left(\Pr(B_{ic}(t) = 0 \mid d_{ik}(t), X_{ic}(t), Z_c(t), \eta_i; \theta)\right)^{1-b_{ic}(t)}$$

$$\times \left(\Pr(B_{ic}(t) = 1 \mid d_{ik}(t), X_{ic}(t), Z_c(t), \eta_i; \theta)\right)^{b_{ic}(t)} \quad (2)$$

where $B_{ic} = \left(B_{ic}(t_i),..,B_{ic}(T)\right)$, $X_{ic} = \left(X_{ic}(t_i),..,X_{ic}(T)\right)$ and $Z_c = \left(Z_c(t_i),..,Z_c(T)\right)$. The probabilities on the right-hand side of Equation (2) are defined in Equation (1). I treat unobserved individual characteristics (the η_i's) as random effects and assume them to be normally distributed with mean zero and variance σ^2. I estimate the model by maximizing the logarithm of the likelihood function in which the unobserved individual-specific effects are integrated out:

$$\left(\hat{\theta}, \hat{\sigma}\right) = \underset{\left(\theta, \sigma\right)}{\arg\max} \sum_{i=1}^{n} \log\left(\int_{-\infty}^{+\infty} \Pr(b_{ic} \mid X_{ic}, Z_c, \eta_i; \theta) d\Phi\left(\frac{\eta_i}{\sigma}\right)\right), \quad (3)$$

where Φ denotes the standard normal cumulative distribution function. As Table 1 has already shown, third births are relatively few; therefore, the parameter vectors are restricted to being the same for all births after the first up to a constant that depends on whether or not the woman has already conceived twice or three times; that is, $\theta = (\theta_0, \theta_1)$. I calculate the standard errors by taking into account serial correlation and clustering on an individual and a country level (see Moulton, 1990, and Cameron and Trivedi 2005: Chap. 24).

Monte Carlo Simulations

Whereas the parameter estimates of the model outlined above provide insights into the direction and relative size of the effects of the covariates on the birth probabilities, they offer no clear insights into the quantitative effects on birth timing and completed fertility. Therefore, the second part of the empirical analysis simulates lifecycle fertility patterns and examines how they are affected by the family policy expenditure variables included in the model. To be more specific, an increase in family policy expenditure may have only a small effect on the probability of giving birth in a specific year but may have a substantial effect on completed fertility for young women who start planning childbearing based on this increased family policy expenditure. The simulation exercise throws light on such long-run effects.

I perform the Monte Carlo simulations as follows. For a group of reference women (the baseline), arbitrarily chosen as being from Sweden and having an ISCED educational level 3 or 4 (secondary education or postsecondary/nontertiary education), the simulation starts at age 15. The parameter estimates, Eq. (3), enable calculation of the probability that each woman will give birth, following which, based on a random drawing from the uniform distribution, it is possible to simulate whether or not each does give birth (see Law and Kelton 1982). Next, using the estimated birth probabilities, and given the (simulated) past fertility outcomes, I simulate year-by-year births for each woman up until the age of 40 and present the statistics as the means for this homogenous reference group; for example, the average number of children these women have at age 25. I then rerun these simulations with a change in expenditure on one of the three family policy programs, so that the differences between these and the baseline simulation outcomes can reveal the impact of this change on the timing of births and completed fertility. I perform these Monte Carlo simulations for 10,000 (identical) women. The standard errors for the differences from the baseline situation are based on 1,000 drawings from the asymptotic distribution around the parameter estimates.

EMPIRICAL RESULTS

Table 6 reports the estimation results of the model and Tables 7 and 8 report the simulation results. In the following discussion, I use a 5% level of significance. As Table 6 shows, the higher the woman's level of education, the lower the probabilities of first and subsequent births, which results in a negative relationship between fertility and educational attainment that is well established in the literature (see Björklund 2006 and Gustafsson and Kalwij 2006 for an overview). The economic rational for this finding, in line with Becker (1981), is that if price effects dominate income effects, a higher educational attainment is associated with a higher wage rate and thus higher opportunity costs of having children. This dynamic lowers the demand for the quantity of children, and women can schedule maternity later and increase human capital investments in them (i.e., a higher demand for quality). Even though the analysis does not identify the age effects on the probability of first birth separately from duration dependence, the age effects for subsequent births show a significant increase in the birth probability up to the age of 31, after which the birth probability declines with age. This latter finding echoes the empirical evidence on the age-related decline in fecundity for women over 31 (Van Noord-Zaadstra et al. 1991), although of course, other factors may also explain it.

[Insert Table 6 & 7 about here]

As discussed above, the model includes countries' crude birth rate and total fertility rate to control for the possibly confounded effects of introducing a pronatal family policy reform in response to declining aggregate fertility or the socioeconomic changes causing it. As Table 6 shows, the effects of these two variables are (jointly) significant.[9] More important, however, is the effect that including these two variables has on the parameter estimates of the other country-level variables. To illustrate this point, Appendix Table A2 reports the estimation results when the crude birth rate and total fertility rate are not controlled for. A comparison of Table 6 and Table A2 reveals that once these two variables are controlled for, the effects of GDP per capita, social expenditure per capita, and the female employment rate on birth probabilities become (jointly) insignificant;[10] the effects of child allowances become insignificant; and the effects of maternity and parental leave benefits and child care subsidies are reduced (but not significantly).

This finding that the effects of GDP per capita, social expenditure per capita, and the female employment rate on the probabilities of giving birth are individually and jointly insignificant are not in line with the findings in some earlier studies. For instance,

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[9] The Wald-test statistic is equal to 52.1 (4 degrees of freedom, p-value = 0).

[10] The Wald-test statistic is equal to 8.9 (6 degrees of freedom, p-value = 0.18).

Adserà (2004) reports a positive effect of GDP per capita on the fertility of women aged 30–34, d'Addio and d'Ercole (2005) find a positive effect of the female employment rate on the fertility rate, and Boldrin et al. (2005) show a negative association between social security expenditure and fertility. These results from previous cross-country studies are, however, in line with those in Appendix Table A2, suggesting that the relationships may be spurious. As regards the cyclical sensitivity of fertility, as shown in Table 6, an increase in the national unemployment rate has a small and negative effect on the probability of first birth but no significant effect on the probability of subsequent births. Overall, this finding may explain the often reported countercyclical movements of fertility (Butz and Ward 1979).[11]

The primary focus of this analysis, however, is fertility responses to expenditure changes in family allowances (for children), maternity and parental leave benefits, and childcare subsidies. I find that, in contrast to previous empirical findings (Ermisch 1988; Gauthier and Hatzius 1997; Whittington et al. 1990; Zhang et al. 1994), family allowance has no significant effect on birth probabilities (see Table 6). Without controlling for the crude birth rate and total fertility rate, however, the results are in line with previous empirical findings that family allowance has a positive and significant effect on fertility (see Appendix Table A2). This discrepancy suggests that the positive relationship identified in previous empirical work may be spurious. As also shown in Table 6, maternity and parental leave benefits have a significant positive effect on the probability of first birth but no significant effect on the probability of subsequent births. Conversely,

[11] The results in Appendix Table A2 for the effects of unemployment are in line with Kravdal (2002).

childcare subsidy has no significant effect on the probability of first birth but a significant and positive effect on the probability of subsequent births.

[Insert Table 7 about here]

The results given in Table 7, which are based on Monte Carlo simulation, quantify the effects on birth timing and completed fertility of changes in family policy expenditure on child allowances, maternity and parental leave benefits, and childcare subsidies. As mentioned above, these changes in family policy expenditure are effective from the age of 15 when women are assumed to start planning childbearing. In the lifecycle fertility simulation outcomes for a baseline reference group (first column), 88% of the women have children before age 40, with the average being 1.7 children (last row). In line with the estimation results given in Table 6, the simulation results in the second column show that a 10% increase in family allowance has no significant effects on the timing of maternity or on completed fertility. The third column illustrates that although a 10% increase in maternity and parental leave benefits has no significant effect on the number of children borne by maternal women, it significantly affects the probability of having children, reducing childlessness at age 36–40 by about 3.2%. Hence, in contrast to the finding of Averett and Whittington (2001), the effect on completed fertility is insignificant. This absence of any effect of increased maternity and parental leave benefits on subsequent births may result from a concomitant increase in the career prospects of women who have had their first child and are thus free to continue on their career paths. The result is an increase in the opportunity cost of the second child, which may explain the small negative but insignificant effects on subsequent births. Conversely, a 10% increase in childcare subsidy has no significant effect on childlessness but it significantly increases the number of children borne by maternal women (fourth column), yielding a 0.4% increase in completed fertility. I am not aware of any comparable numbers in the empirical literature.

[Insert Table 8 about here]

Even though the quantitative fertility responses discussed above are small (see Table 7), the relatively large changes in expenditure on family policy in Western Europe over the period 1980-2003 (see Tables 3-5) may have generated considerable fertility responses. Table 8 provides insights into this using a Monte Carlo simulation and hereby keeping all other factors affecting fertility constant. The observed changes in the average family policy expenditures are taken from Tables 3-5. Tables 3-5 show that over this period, on average, expenditure on child allowances per child has increased by 26%, expenditure on maternity and parental leave benefits per infant for employed women by 76%, and expenditure on childcare subsidy per young child for employed women by 158%. The baseline predictions are identical to those in Table 7. Table 8 shows that the increased family policy expenditure in Western Europe over the period 1980-2003 had significant effects on the timing of maternity and completed fertility. Childlessness at age 36–40 has reduced by about 19% and completed fertility has increased by about 8.3%.

SUMMARY AND CONCLUSIONS

This analysis of the impact on fertility of changes in national expenditure on family policy programs focuses on family allowances, maternity and parental leave benefits, and childcare subsidies. For this purpose it estimates a model for the timing of births using individual-level data from 16 Western European countries, supplemented with data on national social expenditure for different family policy programs to approximate the subsidies that households with children receive from these programs. The three family policy programs studied here yield different fertility responses.

The first program, family allowance, is an income policy program targeted at households with children that aims to alleviate the financial burden of having children and consequently increase the quality of children. The results show that an increase in child subsidy through a family allowance program's increased generosity has no significant impact on the timing of births or on completed fertility (see Table 7). This finding can be explained by the fact that a family allowance policy subsidizes the *direct* costs of children and not the *opportunity* costs of children, which have arguably become much more important for fertility decisions in recent decades during which changing gender roles have increased the demand for policies that facilitate women's economic empowerment.

In contrast, maternity and parental leave and childcare provisions, both labor market policy programs, aim to reduce the *opportunity* costs of children and facilitate the combination of employment and childrearing. According to the results of this analysis, these family-friendly labor market policy programs significantly affect birth timing and completed fertility—with a 10% increase in maternity and parental leave benefits resulting in about a 3.2% reduction in childlessness at age 36-40—but have no significant effect on completed fertility. Conversely, a 10% increase in childcare subsidies has no significant effect on the proportion of women who have children but results in about a 0.4% increase in completed fertility (see Table 7).

Overall, these empirical findings suggest that increased expenditure on family policy programs aimed at empowering women through opportunities to combine family and employment—thereby reducing the opportunity cost of children—generate positive fertility responses. More specifically, extending maternity and parental leave and childcare provisions causes women to schedule births earlier in life and have more children. Even though the quantitative fertility responses to changes in family-friendly labor market policy expenditure identified here are small, the relatively large changes in expenditure on family policy programs over recent decades in Western Europe have generated considerable fertility responses (see Table 8).

APPENDIX TABLE A1. AGE DISTRIBUTION AND EDUCATIONAL ATTAINMENT IN 2003 (IN %)

	Age Distribution					Educational Attainment		
Country	15–19	20–24	25–29	30–34	35–38	ISCED[a] 0–2	ISCED[a] 3–4	ISCED[a] 5–6
Sweden	5	25	22	23	25	18	33	49
Norway	4	17	22	30	27	5	46	49
Finland	5	21	26	26	23	7	48	46
Denmark	3	16	26	28	26	12	54	34
Germany	4	19	20	25	32	12	75	14
Austria	7	21	13	25	33	59	35	6
Belgium	3	26	25	25	22	12	45	43
Netherlands	3	14	23	31	29	22	50	28
Switzerland	3	15	22	30	30	11	72	17
United Kingdom	5	21	24	27	24	11	57	32
Ireland	7	28	23	21	22	18	56	26
France	5	21	22	25	27	31	21	47
Portugal	4	25	23	28	20	57	27	16
Spain	6	19	28	26	22	42	25	33
Italy	3	20	27	26	23	23	61	16
Greece	3	19	26	27	24	27	55	18
All countries	4	21	23	26	26	24	48	28

Source: 2004 European Social Survey. All statistics are weighted means.

[a] **ISCED 2007**

Level 0 ─ Preprimary education

Level 1 ─ Primary education or first stage of basic education

Level 2 ─ Lower secondary or second stage of basic education

Level 3 ─ (Upper) secondary education

Level 4 ─ Postsecondary nontertiary education

Level 5 ─ First stage of tertiary education

Level 6 ─ Second stage of tertiary education

APPENDIX TABLE A2. ESTIMATION RESULTS WITHOUT CONTROLLING FOR THE CRUDE BIRTH RATE AND THE TOTAL FERTILITY RATE

Probability of Giving Birth [a], Eq. (1)[b]	First Birth		Subsequent Births	
Covariates	Estimate	*z*-value	Estimate	*z*-value
Spline Function for Age Effects				
Slope for Age ≤31			0.139	12.38
Slope for Age >31 and Age ≤35			-0.016	-0.690
Slope for Age >35			-0.277	-3.067
Two or More Children			-1.868	-33.70
Three or More Children			-0.850	-9.168
During Education	-0.884	-10.65	-0.189	-1.636
Lower Level of Education, ISCED 0, 1, or 2	0.953	12.44	0.355	5.138
Higher Level of Education, ISCED 5 or 6	-0.573	-9.471	-0.069	-0.983
Time Trend (in years)	-0.021	-3.735	-0.035	-4.147
Log(GDP Per Capita)	0.841	3.770	1.295	4.990
Log(Social Expenditure Per Capita)	-0.949	-4.435	-1.161	-4.252
Female Employment Rate (in %)	0.011	3.446	0.009	1.868
National Unemployment Rate (in %)	0.002	0.242	0.030	2.740
Log(Family Allowance per Child)	0.180	3.535	0.320	4.438
Log(Maternity and Parental Leave Benefits per Infant for an Employed Woman)	0.204	4.705	-0.062	-0.954
Log(Childcare Subsidy per Young Child for an Employed Woman)	0.018	0.619	0.223	5.354
P-value for the Joint Significance of the Country-Specific Effects	0.000		0.000	
Standard Deviation of the Distribution of Unobserved Individual Heterogeneity (σ)	1.080	13.34		
Logarithm of the Likelihood Function	-16948			
Number of Women in the Sample	5256			

[a] This is based on the date of conception. [b] Duration dependence is controlled for by including dummy variables for each year-duration (for both probabilities).

REFERENCES

d’Addio, A.C. and M.M. d’Ercole. 2005. *Trends and Determinants of Fertility Rates in OECD Countries: The Role of Policies*. Paris: Organisation for Economic Co-operation and Development (OECD).

Adserà, A. 2004. “Changing Fertility Rates in Developed Countries: The Impact of Labour Market Institutions.” *Journal of Population Economics* 17(1):17–43.

———. 2005. “Vanishing Children: From High Unemployment to Low Fertility in Developed Countries.” *American Economic Review*, *Papers and Proceedings* 95 (2):189–93.

———. 2006. “An Economic Analysis of the Gap Between Desired and Actual Fertility: The Case of Spain. *Review of Economics of the Household* 4:75–95.

Ahn, N. and P. Mira. 2002. “A Note on the Changing Relationship Between Fertility and Female Employment Rates in Developed Countries. *Journal of Population Economics* 15 (4):667–82.

Angeles, G., D.K. Guilkey and T.A. Mroz. 2005. “The Determinants of Fertility in Rural Peru: Program Effects in the Early Years of the National Family Planning Program. *Journal of Population Economics* 18:367–89.

Averett, S.L. and L.A.Whittington. 2001. “Does Maternity Leave Induce Births?” *Southern Economic Journal* 68:403–17.

Becker, G.S. 1981. *A treatise on the Family*. 1993 ed. Cambridge, Mass.: Harvard University Press.

Björklund, A. 2006. “Does Family Policy Affect Fertility?” *Journal of Population Economics* 19:3–24.

Blau, D.M. and P.K. Robins. 1989. “Fertility, Employment, and Child-Care Costs.” *Demography* 26(2):287–99.

Butz, W.P. and M.P. Ward. 1979 “The Emergency of Countercyclical U.S. Fertility.” *American Economic Review* 69:318–28.

Boldrin, M., M. De Nardi and L.E. Jones. 2005. “Fertility and Social Security.” Working Paper 11146. National Bureau of Economic Research, Cambridge, Mass.

Bongaarts, J. 1999. “Fertility Decline in the Developed World: Where Will it End?” *American Economic Review*, *Papers and Proceedings* 89(2):256–60.

———. 2002. “The End of the Fertility Transition in the Developed World.” *Population and Development Review* 28(3):419–43.

Brackett, J., R.T. Ravenholt and J.C. Chao. 1978. “The Role of Family Planning in Recent Rapid Fertility Declines in Developing Countries.” *Studies in Family Planning* 9(12):314–23.

Cameron, S.V., and J.J. Heckman. 1998. “Life Cycle Schooling and Dynamic Selection Bias: Models and Evidence for Five Cohorts of American Males” *Journal of Political Economy* 106(2): 262-333.

Cameron, A.C., and P.K.Trivedi. 2005. *Microeconometrics, Methods and Applications*. New York: Cambridge University Press

Castles, F.G. 2003. “The World Turned Upside Down: Below Replacement Fertility, Changing Preferences and Family-Friendly Public Policy in 21 OECD Countries.” *Journal of European Social Policy* 13(3):209–27.

Chesnais, J.-C. 1996. “Fertility, Family, and Social Policy in Contemporary Western Europe.” *Population and Development Review* 22(4):729–39.

———. 1998. “Below-Replacement Fertility in the European Union (EU–15): Facts and Policies, 1960–1997.” *Review of Population and Social Policy* 7:83–101.

Ermisch, J. 1988. “Econometric Analysis of Birth Rate Dynamics in Britain.” *Journal of Human Resources* 23(4):563–76.

Folbre, N. 1994. “Children as Public Goods.” *American Economic Review, Papers and Proceedings* 84(2):86–90.

Galor, O. and D.N. Weil. 1996. “The Gender Gap, Fertility, and Growth.” *American Economic Review* 86(3):374–87.

Gauthier, A.H. 2002. “Family Policy in Industrialized Countries: Is There Convergence?” *Population* 57(3):447–74.

—— and J. Hatzius. 1997. “Family Policy and Fertility: An Econometric Analysis.” *Population Studies* 51:295–306.

Goldstein, J., W. Lutz and M. Rita. 2003. “The Emergence of Sub-Replacement Family Size Ideals in Europe.” *Population Research and Policy Review* 22:479–96.

Gustafsson, S. 2001. “Optimal Age at Motherhood. Theoretical and Empirical Considerations on Postponement of Maternity in Europe.” *Journal of Population Economics* 14:225–47.

——— and A. Kalwij. 2006. *Education and Postponement of Maternity: Economic Analyses for Industrialized Countries*. European Studies of Population, Vol.15, Dordrecht: Kluwer Academic Publisher, Springer.

Hantrais, L. 1997. “Exploring Relationships Between Social Policy and Changing Family Forms Within the European Union.” *European Journal of Population* 13:339–79.

Hoem, J.M. 1993. "Public Policy as the Fuel of Fertility: Effects of a Policy Reform on the Pace of Childbearing in Sweden in the 1980s." *Acta Sociologica* 36(1):19–31.

Hougaard, P. 1999. "Fundamentals of Survival Data." *Biometrics* 55:12–22.

Kalwij, A.S. 2000. "The Effects of Female Employment Status on the Presence and Number of Children." *Journal of Population Economics* 13:221–39.

Kravdal, Ø. 2002. The Impact of Individual and Aggregate Unemployment on Fertility in Norway. *Demographic Research* 6: 263-94

Lalive, R. and J. Zweimuller. 2008 "How does Parental Leave Affect Fertility and Return-to-Work? Evidence from Two Natural Experiments". *Quarterly Journal of Economics*, forthcoming

Law, A.M. and W.D. Kelton. 1982. *Simulation Modelling and Analysis*. New York: McGraw-Hill.

Lee, R. 2003. "The Demographic Transition: Three Centuries of Fundamental Change." *Journal of Economic Perspectives* 17(4):167–90.

McDonald, P. 2006. "Fertility and the State: The Efficacy of Policy." *Population and Development Review* 32(3):485–510.

Milligan, K. 2005. "Subsidizing the stork: new evidence on tax incentives and fertility." *Review of Economics and Statistics*, 87 (3): 539-55

Moulton, B.R. 1990. "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units", *Review of Economics and Statistics*, 72: 334-38.

Neyer, G. 2006. "Family Policies and Low Fertility in Western Europe." Supplement to *Journal of Population and Social Security (Population)* 1: 46–93.

OECD. 2007a. *Factbook 2007: Economic, Environmental and Social Statistics*, Paris.

OECD. 2007b. *The Social Expenditure Database: An Interpretative Guide, SOCX 1980–2003*, Paris (www.oecd.org/els/social/expenditure)

Tsui, A.O. 2001. "Population Policies, Family Planning Programs, and Fertility: The Record." Supplement to *Population and Development Review* 27:184–204.

Van de Kaa, D.J. 2006. "Temporarily New: On Low Fertility and the Prospects of Pro-natal Policies." Pp. 193–211 in *Vienna Yearbook of Population Research*, Vienna: Vienna Institute of Demography.

Van Noord-Zaadstra, B.M., C.W.N. Looman, H. Alsbach, J.D.F. Habbema, E.R. te Velde and J. Karbaat. 1991. "Delaying Childbearing: Effect of Age on Fecundity and Outcome of Pregnaancy. *British Medical Journal* 302:1361–65.

Whittington, L.A. 1992. "Taxes and the Family: The Impact of the Tax Exemption for Dependents on Marital Fertility." *Demography* 29(3):215–26.

———, Alm, J. and H.E. Peters. 1990. "The Personal Exemption and Fertility in the United States." *American Economic Review* 80(3):545–56.

Willis, R.J. 1973. "A New Approach to the Economic Theory of Fertility Behavior." *Journal of Political Economy* 81(2, pt. 2):S14–S64.

Yule, G.U. 1906. "On the Changes in the Marriage- and Birth-Rates in England and Wales During the Past Half Century; with an Inquiry as to Their Probable Causes." *Journal of the Royal Statistical Society* 69(1):88–147.

Zhang, J., J. Quan, and P. van Meerbergen. 1994. "The Effect of Tax-Transfer Policies on Fertility in Canada." *Journal of Human Resources* 29(1):181–201.

TABLE 1. BIRTH COHORTS 1965–1984: FROM AGE 15 THROUGH 1980–2003.

Country	Number of women	Gave birth to one child	Gave birth to two children	Gave birth to three or more children	Conceived During Education[a]
		Percentage of Women			
Sweden	283	48	31	11	15
Norway	275	58	34	15	17
Finland	305	45	27	9	14
Denmark	228	51	33	12	9
Germany	388	54	30	9	3
Austria	371	54	36	10	6
Belgium	272	52	29	9	6
Netherlands	308	56	33	11	6
Switzerland	398	43	27	8	3
United Kingdom	345	63	38	15	9
Ireland	406	50	35	25	6
France	304	56	36	12	3
Portugal	376	48	22	4	2
Spain	300	38	18	2	1
Italy	252	37	16	2	3
Greece	445	51	32	8	3
All countries	5,256	50	30	10	7

Source: 2004 European Social Survey. All statistics are weighted means.
Note: All women were childless at age 15.
[a] Based on the assumption that the child was conceived during the year before its birth.

TABLE 2. MEAN NUMBER OF CHILDREN, PERCENTAGE CHILDLESSNESS, AND THE AVERAGE AGE AT FIRST AND SECOND BIRTH OF WOMEN AGED 35–38 (IN 2003)

Country	Number of Children (mean)	Childless Women (%)	Average Age at First Birth	Average Age at Second Birth
Sweden	1.99	13.9	26.9	30.1
Norway	1.92	13.5	27.0	29.2
Finland	1.78	23.2	27.2	28.8
Denmark	2.00	11.7	27.2	30.5
Germany	1.55	19.9	27.1	29.2
Austria	1.76	17.2	25.6	26.8
Belgium	1.78	13.3	26.9	28.4
Netherlands	1.69	15.9	28.0	29.2
Switzerland	1.53	27.9	28.2	28.8
United Kingdom	1.75	15.8	26.1	27.7
Ireland	2.39	12.0	26.6	28.6
France	1.97	15.1	27.3	27.8
Portugal	1.53	21.5	26.9	28.6
Spain	1.41	23.9	28.8	28.2
Italy	1.47	19.4	27.7	29.3
Greece	1.79	14.7	24.6	25.0
All countries	1.76	17.7	26.8	28.4

Source: 2004 European Social Survey. All statistics are weighted means.

TABLE 3. MEAN FAMILY ALLOWANCE PER CHILD FOR SELECTED YEARS

Country	Year						Change per year
	1980	1985	1990	1995	2000	2003	1980–2003 (in %)
Sweden	1,189	1,255	1,112	1,115	1,201	1,254	0.2
Norway	927	1,030	1,498	1,923	1,485	1,638	2.5
Finland	762	783	852	1,587	1,418	1,376	2.6
Denmark	834	559	1,101	1,351	1,486	1,524	2.7
Germany	984	919	905	991	1,209	1,382	1.5
Austria	1,887	2,013	2,215	2,541	3,181	3,741	3.0
Belgium	2,402	2,275	2,285	2,383	2,290	2,465	0.1
Netherlands	1,228	1,379	1,292	1,221	1,039	990	-0.9
Switzerland	1,078	1,292	1,406	1,519	1,700	1,932	2.6
United Kingdom	1,256	1,399	925	1,012	1,197	1,179	-0.3
Ireland	433	443	518	656	937	1,860	6.5
France	1,523	1,598	1,120	1,315	1,523	1,578	0.2
Portugal	965	490	364	367	413	468	-3.1
Spain	339	141	86	146	185	310	-0.4
Italy	1,331	834	834	487	755	725	-2.6
Greece	1,347	653	409	647	507	657	-3.1
All countries	1,155	1,066	1,058	1,204	1,283	1,443	1.0

Source: 2007 OECD Social Expenditure Database (OECD 2007b). All financial statistics are in 2000 euro and PPP corrected.

TABLE 4. MEAN MATERNITY AND PARENTAL LEAVE BENEFITS PER INFANT FOR EMPLOYED WOMEN IN SELECTED YEARS

	Year						Change per year
Country	1980	1985	1990	1995	2000	2003	1980–2003 (%)
Sweden	23,272	21,990	25,245	25,251	22,520	25,210	0.3
Norway	6,265	6,324	10,629	24,379	31,898	34,575	7.7
Finland	7,279	17,674	26,280	29,009	22,344	24,096	5.3
Denmark	8,272	11,975	12,625	25,751	17,414	21,614	4.3
Germany	4,270	3,873	9,894	14,986	14,359	14,521	5.5
Austria	13,561	13,637	15,560	25,402	19,010	16,257	0.8
Belgium	3,133	3,405	6,629	7,459	8,287	9,936	5.1
Netherlands	1,815	1,796	3,957	3,957	3,559	3,240	2.6
Switzerland	491	441	3,012	3,789	3,613	4,546	10.2
United Kingdom	2,787	2,281	2,679	2,312	3,031	4,087	1.7
Ireland	1,637	2,444	2,026	2,198	2,278	2,842	2.4
France	9,066	7,069	9,816	11,993	13,066	13,699	1.8
Portugal	5,910	3,037	2,279	2,676	3,009	3,805	-1.9
Spain	3,400	3,880	4,570	5,704	6,832	6,712	3.0
Italy	12,548	10,864	7,226	8,388	8,982	11,984	-0.2
Greece	9,192	6,692	7,446	4,062	3,259	4,202	-3.3
All countries	7,056	7,336	9,243	12,189	11,319	12,458	2.5

Source: 2007 OECD Social Expenditure Database (OECD 2007b). All financial statistics are in 2000 euro and PPP corrected.

TABLE 5. MEAN CHILDCARE SUBSIDY PER YOUNG CHILD FOR EMPLOYED WOMEN IN SELECTED YEARS

	Year						Change per year
Country	1980	1985	1990	1995	2000	2003	1980-2003 (%)
Sweden	11,666	11,732	10,390	9,209	12,778	14,190	0.9
Norway	2,325	2,660	3,958	6,254	11,591	8,678	5.9
Finland	3,539	4,672	6,166	7,158	8,169	8,304	3.8
Denmark	9,458	9,742	10,188	11,755	14,143	15,544	2.2
Germany	1,413	1,535	1,781	3,467	3,921	4,286	4.9
Austria	2,321	2,424	2,808	3,355	5,320	5,934	4.2
Belgium	972	938	701	595	6181	8460	9.9
Netherlands	4,170	3,599	4,029	2,744	5,792	6,695	2.1
Switzerland	993	1,041	982	959	2,920	3,692	5.9
United Kingdom	1,473	1,265	942	1,262	4,051	4,667	5.1
Ireland	247	267	216	749	1,521	1,982	9.5
France	1,077	1,346	3,833	4,990	9,692	9,579	10.0
Portugal	40	23	46	75	1,606	1,923	18.3
Spain	278	300	261	210	5,061	5,182	13.6
Italy	2,104	1,776	1,343	1,370	8,349	7,891	5.9
Greece	160	137	1,961	1,290	1,218	1,432	10.0
All countries	2,640	2,716	3,100	3,465	6,395	6,777	4.2

Source: 2007 OECD Social Expenditure Database (OECD 2007b). All financial statistics are in 2000 euro and PPP corrected.

TABLE 6. ESTIMATION RESULTS

Probability of giving Birth [a], Eq. (1)[b]	First Birth		Subsequent Births	
Covariates	Estimate	*z*-value	Estimate	*z*-value
Spline Function for Age Effects				
Slope for Age ≤31			0.142	12.58
Slope for Age >31 and Age ≤35			-0.014	-0.575
Slope for Age >35			-0.274	-3.014
Two or More Children			-1.881	-33.78
Three or More Children			-0.863	-9.305
During Education	-0.876	-10.51	-0.193	-1.663
Lower Level of Education, ISCED 0, 1, or 2	0.957	12.45	0.363	5.229
Higher Level of Education, ISCED 5 or 6	-0.581	-9.542	-0.074	-1.048
Time Trend (in years)	-0.013	-2.326	-0.018	-1.902
Log(GDP Per Capita)	0.009	0.037	0.151	0.478
Log(Social Expenditure Per Capita)	-0.278	-1.186	-0.051	-0.167
Female Employment Rate (in %)	-0.001	-0.165	-0.007	-1.211
National Unemployment Rate (in %)	-0.030	-3.432	-0.009	-0.703
Crude Birth Rate (Births per 1000 people)	-0.117	-2.895	0.020	0.443
Total Fertility Rate	1.690	6.020	1.215	3.498
Log(Family Allowance per Child)	0.019	0.328	0.089	1.186
Log(Maternity and Parental Leave Benefits per Infant for an Employed Woman)	0.159	3.570	-0.102	-1.572
Log(Childcare Subsidy per Young Child for an Employed Woman)	-0.014	-0.486	0.166	3.851
P-value for the Joint Significance of the Country-Specific Effects	0.000		0.000	
Standard Deviation of the Distribution of Unobserved Individual Heterogeneity (σ)	1.093	13.42		
Logarithm of the Likelihood Function	-16943			
Number of Women in the Sample	5256			

[a] This is based on the date of conception. [b] Duration dependence is controlled for by including dummy variables for each year-duration (for both probabilities).

TABLE 7. SIMULATED EFFECTS ON LIFECYCLE FERTILITY OF CHANGES IN FAMILY POLICY PROGRAM EXPENDITURES

	Baseline	**10% Increase in Family Allowance**		**10% Increase in Maternity and Parental Leave Benefits**		**10% Increase in Childcare Subsidies**	
		Difference from Baseline		Difference from Baseline		Difference from Baseline	
Probability of Having Children							
Age Group	Prediction	Estimate	*z*-value	Estimate	*z*-value	Estimate	*z*-value
16–20	0.019	0.000	0.240	0.000	2.160	-0.0000	-0.380
21–25	0.162	0.000	0.290	0.002	3.070	-0.0002	-0.440
26–30	0.489	0.001	0.320	0.005	3.420	-0.0004	-0.470
31–35	0.791	0.001	0.340	0.005	3.220	-0.0004	-0.490
36–40	0.883	0.000	0.340	0.004	2.780	-0.0004	-0.500
Average Number of Children Conditional on Having Children							
Age Group	Prediction	Estimate	*z*-value	Estimate	z-value	Estimate	*z*-value
16–20	1.037	0.000	0.260	0.000	-0.180	0.001	0.520
21–25	1.164	0.001	0.900	-0.001	-0.920	0.002	2.020
26–30	1.379	0.002	1.150	-0.002	-0.860	0.004	2.720
31–35	1.721	0.004	1.210	-0.002	-0.930	0.006	3.090
36–40	1.944	0.004	1.200	-0.003	-1.070	0.008	3.130
Average Number of Children							
Age Group	Prediction	Estimate	*z*-value	Estimate	*z*-value	Estimate	*z*-value
16–20	0.020	0.000	0.270	0.000	2.080	0.000	0.240
21–25	0.189	0.000	0.460	0.003	2.740	0.000	0.160
26–30	0.675	0.002	0.650	0.006	2.560	0.001	0.760
31–35	1.363	0.004	0.910	0.006	1.640	0.004	1.610
36–40	1.718	0.005	1.040	0.004	0.950	0.006	2.080

TABLE 8. SIMULATED EFFECTS ON LIFECYCLE FERTILITY OF OBSERVED CHANGES IN FAMILY POLICY PROGRAM EXPENDITURE OVER THE PERIOD 1980-2003. A 26% INCREASE IN FAMILY ALLOWANCE PER CHILD, A 76% INCREASE IN MATERNITY AND PARENTAL LEAVE BENEFITS PER INFANT FOR EMPLOYED WOMEN AND A 158% INCREASE IN CHILDCARE SUBSIDIES PER YOUNG CHILD FOR EMPLOYED WOMEN (SEE TABLES 3-5).

	Baseline	Difference from Baseline	
Probability of Having Children			
Age group	*Prediction*	*Estimate*	*z-value*
16-20	0.019	0.002	1.810
21-25	0.162	0.017	1.910
26-30	0.489	0.034	2.020
31-35	0.791	0.030	2.060
36-40	0.883	0.022	1.990
Average Number of Children, Conditional on Having Children			
Age group	*Prediction*	*Estimate*	*z-value*
16-20	1.037	0.006	1.570
21-25	1.164	0.027	2.400
26-30	1.379	0.059	2.690
31-35	1.721	0.092	2.850
36-40	1.944	0.109	2.860
Average Number of Children			
Age group	*Prediction*	*Estimate*	*z-value*
16-20	0.020	0.002	1.890
21-25	0.189	0.025	2.140
26-30	0.675	0.078	2.430
31-35	1.363	0.127	2.830
36-40	1.718	0.143	2.990