

The Impact of Family Policy Expenditure on Fertility in Western Europe

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Abstract

This paper analyzes the impact on fertility of changes in national expenditure on three family policy programs: family allowances, maternity and parental leave benefits, and childcare subsidies. I estimate a model for the timing of births using individual level data from 16 Western European countries that are 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 analysis identifies small but significant fertility effects for expenditure changes on the different family policy programs. Besides confirming the finding in previous literature that a 10% increase in family allowance increases completed fertility by about 1.2%, the results show that a 10% increase in maternity and parental leave benefits increases the proportion of women having children by about 0.5% but has no significant effect on the average number of children conditional on having children. Conversely, a 10% increase in childcare subsidies has no significant effect on the proportion of women having children but increases the average number of children by about 0.4%.

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 rooted in the early 19th century, when medical innovations and rising incomes increased life expectancy (Lee 2003). The fertility decline in Europe, which already began in the late 19th century (e.g., Yule 1906), may have been a response not only to decreasing mortality rates but to increasing returns to education and the increased price of children due to economic development (e.g., Becker 1981).¹ Alternatively, as argued by Galor and Weil (1996), it may have resulted from the increasing opportunity cost of children relative to household income, which resulted from relatively higher wage increases for women than for men as the capital per worker increased.² Whatever its cause, this fertility decline has resulted in below-replacement rate fertility since the mid-1980s across Western Europe.³ Moreover, interestingly, national fertility rates appear to be stabilizing at quite different levels across Western Europe; for instance, Mediterranean countries currently have total fertility rates

¹ Improved investment opportunities in the human capital of children (and a corresponding increase in the incentive to so invest) have raised the cost of children and caused a parental shift toward child quality and away from quantity (see also Willis 1973).

² Other factors that may have influenced fertility include contraceptive innovations, family planning programs (Tsui 2001), increasing retirement provisions (Boldrin et al. 2005), and changing labor market institutions (Adserà 2004). See Lee (2003) for a discussion on various issues related to the global demographic transition and Folbre (1994) for a discussion on the changing consequences of raising children.

³ See Appendix 1. Ireland has had a below-replacement fertility rate since the early 1990s. Over the last two decades, small increases in the total fertility rate have also been observed in several European countries (see Bongaarts 1999, 2002, for a discussion of tempo effects).

below 1.4, while the Nordic countries have total fertility rates around 1.8 (see Appendix 1).

This cross-national variation in Western Europe fertility rates has often been in large part explained in terms of family policy, and in particular labor market policy aimed at creating opportunities for women to combine family and employment (e.g., Chesnais 1996; Ahn and Mira 2002; Adserà 2005; d’Addio and d’Ercole 2005; McDonald 2006; Neyer 2006). An economic explanation focuses, in line with the economic theory of fertility (Becker 1981), on the increasing importance of the opportunity cost of children over time as changing gender roles across Western Europe were accompanied by increased demand for policies that help women combine labor market participation with childrearing. Such a family policy, one that facilitates women’s economic empowerment and reduces the opportunity cost of children (e.g., maternity leave), may yield higher fertility.

Nonetheless, as discussed in more detail below, 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. For instance, Zhang, Quan, and van Meerbergen (1994) report an insignificant effect of maternity leave benefits on fertility for Canada; d’Addio and d’Ercole (2005) report that, in a panel of OECD countries, the length of parental leave has a significantly negative effect but the replacement rate a significantly positive effect on fertility, and Averett and Whittington (2001) report a significantly positive effect of maternity leave availability on fertility for the U.S. One possible reason for this inconclusivity is that labor market policies aimed at households with children—for example, those aimed at creating opportunities for women to combine

family and employment—have many dimensions, including duration, benefit, entitlement, cash or in-kind, and public or mandatory private (see e.g., Neyer 2006). This complexity limits the comparability of a single policy indicator (e.g., length of maternity leave) over time or across countries and thus affects the empirical evaluation of a change in such a policy when not all policy indicators are controlled for.

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. More specifically, this paper focuses on how fertility is affected by changes in public and mandatory private expenditure on family allowances, maternity and parental leave benefits, and childcare subsidies. The empirical framework has two methodological advantages over most previous empirical studies. First, given that fertility decisions are irreversible (i.e., the number of a woman's children can in principle not be reduced by a family policy change), it follows Adserà (2005) in explicitly modeling the timing of births (on an individual level) rather than completed fertility, which would ignore this issue. It also avoids possible simultaneity problems between fertility and family policy expenditures (on a macro level) that may occur in cross country studies (e.g., d'Addio and d'Ercole 2005; Adserà 2004; Gauthier and Hatzius 1997). Secondly, to deal with the complexity of family policy programs, the fertility response analyzed is to a change in the average subsidy a woman receives for a child, which is essentially a combination of all indicators of a policy. For instance, 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. Examining the generosity of a family policy rather than the policy rules allows comparisons over time

and across countries. It also results in an empirical analysis that is closely linked to the economic theory of fertility (Becker 1981), which assumes that the cost of children depends on the consumption of goods and services and parental time inputs, meaning that, *ceteris paribus*, an increase in these direct and opportunity costs decreases the number of children. Thus, the generosity of a family policy directly affects the (expected) cost of a child.

Like those of previous studies, this analysis includes 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, these child subsidies are modeled using the expected or mean subsidy. Not only do Whittington, Alm and Peters (1990) use similar reasoning—the (average) tax value of a personal exemption—to analyze the effect of personal exemption on the national birth rate in the U.S., but Zhang, Quan, and van Meerbergen (1994) provide persuasive empirical support for this approach. That is, their identification of three very distinct tax-transfer programs (family allowances) in Canada that have no differential effect on fertility implies that individuals are mainly concerned with the programs' cumulative value (generosity).

The remainder of the paper is organized as follows. The next section explains the relevancy of this paper for policy and reviews the empirical literature. The third section then 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 fourth and fifth sections, respectively, outline the empirical model and present the estimation results that then form the basis of lifecycle fertility pattern simulations to assess the quantitative impact of changes in family policy program expenditure on the timing and number of births.

POLICY RELEVANCY AND PREVIOUS EMPIRICAL FINDINGS

Quantifying the impact of family policy expenditure on fertility is of interest to policymakers for several reasons. First, most family policies are designed to financially support families with children (e.g., family allowances, an income policy) or provide opportunities for women to remain employed while raising children (e.g., childcare subsidies, a labor market policy). Thus, even though these family policies are not designed as pronatal policies per se, fertility responses can be expected because subsidies for having children affect its cost (e.g., Blau and Robins 1989; Whittington et al. 1990). Another set of costs as yet unapparent in the European family policy debate (but already an issue in the U.S. one; Averett and Whittington 2001) is the additional costs faced, perhaps indirectly, by employers when family-friendly policies actually increase births.

Second, the speed with which the fertility rates have declined in Western Europe and the resulting (extremely) low fertility rates accelerate the aging of populations, which has raised concerns about the future labor supply of young skilled workers and the social cohesion and sustainability of the welfare state (e.g., Lee 2003; McDonald 2006; Neyer 2006). Whereas some may argue that it is already too late to reverse this trend or that proper actions have already been taken, family-friendly policies may soften the trend's impact by keeping more women employed and increasing the future labor supply.

Third, juggling motherhood and a career is likely to affect family well-being by preventing families from attaining the desired number of children (e.g., Chesnais 1998; Adserà 2006). For example, career planning may cause women to postpone maternity until an unknown biological limit, a strategy that is risky not only because fecundity declines with age but because of the health risks involved (e.g., Van Noord-Zaadstra et al. 1991; Gustafsson 2001). As Chesnais (1998) points out, these factors suggest a latent demand for family policy even though the literature provides no empirical evidence that pronatal policies are a response to periods of relative low fertility.⁴ Nonetheless, a family policy aimed at helping women combine employment and childrearing may reduce the gap between desired and realized fertility. Such a family policy may also have long-run financial benefits for families in that it can reduce the wage gap between mothers and other women that results from lower levels of and lower returns to work experience as a result of childbearing (e.g., Waldfogel 1998). In addition, as the gender education gap has decreased, enabling women to work and empowering them is simply making full use of women's economic potential and may benefit economic growth.

Finally, analyzing the Western European situation may provide valuable insights for policymakers elsewhere into accommodating a demographic transition that is associated with changing gender roles. For instance, achieving the UN's third millennium

⁴ Rather than debating this issue in detail, particularly given the difficulty in determining what level of fertility is "too low," I refer the reader to Van de Kaa (2006) for a critical discussion on pronatal policies and Goldstein, Lutz and Rita (2003) for a discussion and recent evidence on family size ideals in Europe. One interesting argument put forward in this literature is that as long as society is willing to pay for the financial consequences of an aging society (e.g., increasing costs of health care and public retirement), lifecycle plans may be adapted to yield preferable lifestyles.

goal of promoting gender equality and empowering women⁵ not only requires investment in education but also the implementation of family policies that accommodate women's economic empowerment.

Previous empirical studies⁶ have suggested that differences in family policy (expenditure) may play an important role in explaining the observed cross-national variation in the fertility rate. Indeed, circumstantial empirical evidence on this issue (Adserà 2005) indicates that part of the cross-national variation in the fertility rate can be explained by variation in the difference between the male and female unemployment rates. This difference may result from the need for changing gender roles, as observed over recent decades throughout Western Europe, to be facilitated by family and labor market policy aimed at creating opportunities for women to combine family and employment. When they are not, as, for example, in Mediterranean countries, the result is relatively higher female unemployment rates and, through reduced income, lower fertility rates.⁷ Chesnais (1996) offers similar arguments, although no empirical evidence, to show that the empowerment of women ensures against low fertility rates. Thus, family or social policy aimed at creating opportunities for women to combine family and employment may play an important role in the economic empowerment of women. That is, an increase in family policy expenditure essentially reduces the opportunity cost of children, thereby

⁵ <http://www.un.org/millenniumgoals/goals.html>. Many developing countries are already experiencing a demographic transition. See for example Prachuabmoh and Mothranon (2003) for the case of Thailand.

⁶ Some such studies also address family planning programs designed to reduce fertility (see e.g., Brackett, Ravenholt and Chao 1978, Tsui, 2001, Angeles, Guilkey and Mroz 2005) and cyclical fertility patterns (see e.g., Butz and Ward 1979); however, these elements are beyond the scope of this paper.

⁷ Adserà (2005) assumes that the income effect dominates the price effect.

producing a cost reduction through which countries may achieve a higher level of fertility.

Nonetheless, as discussed earlier, the direct empirical evidence on this relationship is rather mixed and inconclusive, ranging from the insignificant effects of maternity leave (Zhang, et al. 1994) to a significantly negative effect of parental leave duration but a significantly positive effect of the replacement rate (d'Addio and d'Ercole 2005) to a significantly positive effect of both maternity leave availability (Averett and Whittington (2001) and duration (Adserà 2004). In addition, Lalive and Zweimuller (2005) report that extending the duration of parental leave in Austria (1990) had a significantly positive effect on fertility but reducing it (1996) had no such effect. Likewise, Castles (2003) finds that (aggregate) fertility outcomes are positively associated with formal childcare provisions but negatively associated with publicly funded childcare provisions. In contrast, the empirical findings on the relationship between family (or child) allowances and fertility are unambiguous, showing that, in line with economic predictions (e.g., Becker 1981), transfers to families with children (cash and tax exemption) have a positive and significant effect on fertility (see e.g., d'Addio and d'Ercole 2005; Ermisch 1988; Gauthier and Hatzius 1997; Whittington et al. 1990; Whittington 1992; Zhang et al.).

DATA

The fertility histories of women in 16 Western European countries are taken from the 2004 European Social Survey (ESS 2004, www.europeansocialsurvey.org). The ESS is a biennial survey covering over 20 countries and is designed to be 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. ESS 2004 survey questions probed a wide variety of topics including social and public trust, social exclusion, and well-being and health. I use 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).⁸ These individual level survey data are then supplemented with national expenditures on family allowances, maternity and parental leave benefits, and childcare subsidies from the 2007 OECD Social Expenditure Database (SOCX 2007, OECD 2007b).

Because modeling a woman's complete fertility history up until 2004 (see below) requires that she be observed from age 15 (assumed to be 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. In total, the original sample included 5,337 women; however, 30 observations were removed because information on educational attainment was missing. An additional 51 were excluded because these women reported having given birth before the age of 15, most (33) even before the age of 10. The resulting sample comprises observations for 5,256 women.

⁸ http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm. See also Appendix 2.

Table 1 shows the number of women sampled for each country (first column). As previously mentioned, all women (100%, second column) are observed beginning when they are 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 (third column), 30% gave birth to two children (fourth column), and only 10% gave birth to three or more children (fifth column). In addition, as shown in the last column of Table 1, 7% of the women conceived a child while being educated.⁹ Table 2 shows completed fertility for women aged 35–39, and although the corresponding sample is relatively small, the weighted statistics are in line with national statistics (see also Appendix 1) and the statistics reported in Gustafsson (2001). Appendix 2 shows the age and educational attainment distribution for each sample country.

[Insert Tables 1 & 2 about here]

SOCX 2007 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 ESS 2004. A 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 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 (day care or home help services). Whereas the OECD refers to these programs as family

⁹ Based on the assumption that the child was conceived during the year before its birth.

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. Tables 3–5, respectively, report 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. For constructing these statistics a child is defined as younger than 16, a young child is defined as younger than 5 and an infant is up to the age of 1. To facilitate a cross country comparison, all amounts are real (in 2000 euro) and corrected for purchasing power parities. That is, whereas family allowances have increased in most countries, they have decreased in the Netherlands, the UK, and in Mediterranean countries, and they vary considerably across countries. For example, 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, as Table 4 shows, maternity and parental leave benefits per infant for employed women ranged from 2,842 euro in Ireland to 34,575 euro in Norway. Table 5 illustrates that the mean yearly childcare subsidy per young child for employed women has increased in all 16 countries—particularly in the second half of 1990 in Mediterranean countries—ranging in 2003 from 1,432 euro in Greece to 15,544 euro in Denmark.

[Insert Tables 3-5 about here]

As Tables 3–5 also show, family expenditure on the three different family policy programs over time and across countries also varies considerably. For instance, the Nordic countries implemented family policies like maternity and parental leave at an earlier stage, followed only recently by Mediterranean countries. Moreover, despite EU

efforts to influence national family policy,¹⁰ little convergence is evident (Gauthier, 2002), meaning that considerable variation remains in the provision and modalities of family policies across Europe.

EMPIRICAL MODEL

The first part of the empirical analysis estimates the effects of the covariates on the timing of births using Cox's (1972) proportional hazard model, which imposes no specific functional form on the pattern of duration dependence. Adserà (2005) also employs this model to analyze the effects of male and female unemployment rates on birth timing. The birth parity specific hazard rate is formulated as follows:

$$\lambda_k(t_{ik} | X_i(\tau), Z_{c(i)}(\tau); \beta_k, \gamma_k) = \lambda_{0,k}(t_{ik}) \exp(X_i(\tau)' \beta_k + Z_{c(i)}(\tau)' \gamma_k), \quad (1)$$

where k denotes the birth parity, K denotes the maximum number of births

$k \in \{0, 1, 2, \dots, K\}$, t_{ik} is the number of years a woman (indexed by i) is at risk for giving birth at birth parity k , $\lambda_{0,k}(\cdot)$ is a nonparametric baseline hazard function, $\exp(\cdot)$ is the exponential function, c is a country index, $X_i(\tau)$ and $Z_{c(i)}(\tau)$ are vectors of covariates that are allowed to depend on calendar time τ . The parameters of interest are denoted by

$\beta = (\beta_1, \dots, \beta_K)$ and $\gamma = (\gamma_1, \dots, \gamma_K)$. To account for the fact that the occurrence of conception nine months before birth may be important to the relationship between birth timing and policy variables, the model employs the date of conception rather than the date of birth. However, because the data are yearly, conception is calculated as taking

¹⁰ 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.

place one year before birth. Nonetheless, because still births are excluded, the term “timing of births” still seems the most appropriate.

The covariates included in $X_i(\tau)$ 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 in Western Europe household data typically reveal a negative association between women’s educational attainment and fertility (see e.g., Gustafsson and Kalwij 2006), one that remains unaffected by policy changes or changes in women’s labor market participation. However, because this present analysis does not take into account a woman’s marital and employment history, the model cannot 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.

In addition, the fact that countries with relatively high social security spending (e.g., Nordic countries) also spend relatively more on family policy may cause a spurious correlation between family policy expenditure and fertility (see e.g., Boldrin, De Nardi and Jones 2005). Therefore, the model controls for GDP and (total) public expenditure per capita and includes country effects. These covariates are included in $Z_{c(t)}(\tau)$, where 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, which are country and time specific, are reported in Tables 3–5.

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 were it available, it might be subject to self selection given that women desiring to have children may move into jobs that offer, for example, maternity leave (see e.g., Averett and Whittington 2001).¹¹ To deal with these issues, I assume 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, which is the route through which national expenditure on family policy programs is assumed to affect fertility outcomes on a national level. Identification of this relationship is thus the focus of the empirical analysis.

Estimation

The contribution to the partial likelihood function of individual i at parity k is given by

$$\frac{\exp(X_i(\tau)' \beta_k + Z_{c(i)}(\tau) \gamma_k)}{\sum_{j \in R_i^k} \exp(X_j(\tau)' \beta_k + Z_{c(j)}(\tau) \gamma_k)}, \quad (2)$$

with $R_i^k = \{j : t_{jk} \geq t_{ik}\}$ and $i = \{1, \dots, n\}$. The model is estimated by maximizing the

logarithm of the partial likelihood function for each birth (Cox 1975), and the standard errors are calculated taking into account dependency across births:

$$(\hat{\beta}, \hat{\gamma}) = \arg \max_{(\beta, \gamma)} \sum_k \log \left(\prod_i \frac{\exp(X_i(\tau)' \beta_k + Z_{c(i)}(\tau) \gamma_k)}{\sum_{j \in R_i^k} \exp(X_j(\tau)' \beta_k + Z_{c(j)}(\tau) \gamma_k)} \right). \quad (3)$$

¹¹ Averett and Whittington (2001) argue this point but find no empirical evidence to support it.

As Table 1 has already shown, third births are relatively few; therefore, the parameter vectors and the baseline hazard functions are restricted to be the same for all births after the first birth up to a constant that depends on whether or not the woman has already conceived twice. As a result, K is equal to 2 and $\beta = (\beta_1, \beta_2)$ and $\gamma = (\gamma_1, \gamma_2)$.

Monte Carlo Simulations

Whereas the parameter estimates of the Cox proportional hazard model provide insights into the direction and relative size of the effects of the covariates on the hazard of giving birth, they provide no clear insights into the quantitative effects on the timing and number of births and completed fertility. Therefore, the second part of the empirical analysis simulates lifecycle fertility patterns and examines how they are affected by the covariates included in the model.

The Monte Carlo simulations are carried out as follows. For a group of reference women (the baseline), arbitrarily chosen as being from Sweden and having 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, after which, based on a random drawing from the uniform distribution, it is possible to simulate whether or not each does give birth (see e.g., Law and Kelton 1982). Next, using the estimated hazard rates, and given the (simulated) past fertility outcomes, year-by-year births can be simulated for each woman up until the age of 40. Statistics are then presented as the means of this homogenous reference group; for example, based on the simulation outcomes, the average number of children these women have at age 25. These simulations are then

rerun with one of the reference group characteristics changed so that the observed difference between these and the baseline simulation outcomes can reveal the impact of a change in this characteristic on lifecycle fertility.

The Monte Carlo simulations are performed for 10,000 (identical) women and standard errors are based on 1,000 drawings from the asymptotic distribution around the parameter estimates. Because a Cox proportional hazard model models duration dependence nonparametrically it provides no standard errors for the baseline situation. Standard errors on the differences from the baseline situation are presented.

EMPIRICAL RESULTS

Tables 6 and 7 report the estimation results of the model and the simulation results, respectively. As Table 6 shows, the higher her level of education, the later a woman schedules maternity and the tighter she spaces subsequent births, a relationship between birth timing and educational attainment that is well established in the literature (see e.g., Björklund 2006 and Gustafsson and Kalwij 2006 for an overview). The economic rationale for this finding, in line with Becker (1981), is that, under the assumption that price effects dominate income effects, a higher educational attainment is associated with a higher wage rate and, consequently, 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 children (i.e., a higher demand for quality). Even though the age effects on the timing of a first birth are not identified separately from duration dependence, the age effects for subsequent births are not significant up to the age of 31, after which birth hazard declines. This 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]

The effect of GDP per capita on the timing of births is not significant, which is in line with Boldrin et al.'s (2005) finding of no significant effects of GDP per capita on the total fertility rate in a panel of 8 Western European countries. Social expenditure relative to GDP has a negative effect on the timing of maternity and subsequent births, delaying first and subsequent births and resulting in lower completed fertility. This finding is also in line with Boldrin et al. (2005), who argue that an increase in social security expenditure, and in particular an increase in pension provisions, makes households less dependent on their children and hence decreases the demand for children. In support of this claim, they report a negative association between social security expenditure and the total fertility rate (on a national level).

I now turn to the primary issue of fertility responses to expenditure changes in family allowances (for children), maternity and parental leave benefits, and childcare subsidies. An increase in family allowance significantly affects the timing of births; the yearly allowance a mother expects to receive per child increases the hazard of giving birth to first and subsequent children (see Table 6). This finding is in line with the findings from previous empirical work (e.g., Ermisch 1988; Gauthier and Hatzius 1997; Whittington et al. 1990; Zhang et al. 1994). As Table 6 also shows, an increase in maternity and parental leave benefits results in a significant increase in the hazard rate of first birth, and hence earlier motherhood, but has no significant effect on the hazard rate of subsequent births. Conversely, an increase in childcare subsidy has no significant

effect on the timing of the first birth but significantly increases the hazard rate of subsequent births.

The results given in Table 7, which are based on Monte Carlo simulation, quantify the effects on lifecycle fertility, or age-specific completed fertility, of changes in family policy expenditure on child allowances, maternity and parental leave benefits, and childcare subsidies. In the lifecycle fertility simulation outcomes for a baseline reference group (first column), 86.3% of the women have children before age 40, with an average of 1.9 children (last row). The simulation results in the second column show that a 10% increase in family allowance leads women to schedule births earlier in life, to be less likely to remain childless, and to have more children. Accordingly, childlessness decreases by about 0.6%, and completed fertility increases by about 1.2%. Not only are these effects significant, but the elasticity of completed fertility again conforms to that suggested in the literature. For instance, Gauthier and Hatzius (1997) report that a 25% increase in family cash benefits yields about a 4% increase in the average number of children, while Whittington et al. (1990) report that a 10% increase in the personal exemption increases the general fertility rate by about 1.3 to 2.5%.

[Insert Table 7 about here]

Similarly, as the third column illustrates, 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: childlessness is reduced by 0.5%, thereby raising completed fertility by 0.3%. Nonetheless, whereas this finding of increased completed fertility mirrors that of Averett and Whittington (2001), the results reported here do not support their finding that the effect of maternity

leave on the probability of giving birth increases with birth parity. However, 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. On the other hand, a 10% increase in childcare subsidy has no significant effect on childlessness but significantly increases the number of children maternal women have (fourth column), yielding a 0.4% increase in completed fertility. I am not aware of any comparable numbers in the empirical literature.

SUMMARY AND CONCLUDING REMARKS

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. The model estimates the timing of births using individual-level data from 16 Western European countries that are 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 qualitative conclusion is that fertility responds positively to family policy that explicitly or implicitly subsidizes having children but that 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 a 10% increase in child subsidy through a family allowance program's increased generosity yields a

1.2% increase in completed fertility (see Table 7). However, a family allowance policy subsidizes the *direct* costs of children not the *opportunity* costs of children, which have arguably become more important during recent decades in which changing gender roles may have led to steeply declining fertility rates in Western European countries.

In contrast, maternity and parental leave and childcare provisions, both labor market family policy programs, aim to reduce the opportunity costs of children and facilitate the combination of employment and childrearing. According to the analysis, a 10% increase in maternity and parental leave benefits does result in about a 0.5% increase in the proportion of women having children but has no significant effect on the average number of children conditional on having children. 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 the average number of children (see Table 7).

Overall, these empirical findings suggest that family policy aimed at empowering women by creating opportunities for them to combine family and employment—thereby reducing the opportunity cost of children—yields a higher level of fertility. Moreover, even though the quantitative fertility responses to changes in family policy expenditures identified here are small, given the relatively large increases in family policy expenditure (see Tables 3–5), they are likely to have generated considerable positive fertility responses.

APPENDIX TABLE A1. TOTAL FERTILITY RATES IN OECD COUNTRIES

1970–2004: NUMBER OF CHILDREN BORN TO WOMEN AGED 15–49.

Included in this paper	1970	1975	1980	1985	1990	1995	2000	2004
Sweden	1.92	1.77	1.68	1.74	2.13	1.73	1.54	1.75
Norway	2.50	1.98	1.72	1.68	1.93	1.87	1.85	1.83
Finland	1.83	1.68	1.63	1.65	1.78	1.81	1.73	1.80
Denmark	1.95	1.92	1.55	1.45	1.67	1.80	1.77	1.78
Germany	2.03	1.48	1.56	1.37	1.45	1.25	1.38	1.36
Austria	2.29	1.82	1.62	1.47	1.45	1.40	1.34	1.42
Belgium	2.25	1.74	1.68	1.51	1.62	1.55	1.66	1.64
Netherlands	2.57	1.66	1.60	1.51	1.62	1.53	1.72	1.73
Switzerland	2.10	1.61	1.55	1.52	1.59	1.48	1.50	1.42
United Kingdom	2.43	1.81	1.90	1.79	1.83	1.70	1.65	1.76
Ireland	3.93	3.40	3.25	2.50	2.11	1.83	1.89	1.93
France	2.47	1.93	1.95	1.81	1.78	1.70	1.88	1.91
Portugal	2.83	2.58	2.18	1.72	1.57	1.40	1.55	1.40
Spain	2.90	2.80	2.20	1.64	1.36	1.18	1.24	1.32
Italy	2.42	2.20	1.64	1.42	1.33	1.18	1.23	1.33
Greece	2.39	2.38	2.21	1.68	1.39	1.32	1.27	1.29
Not included in this paper								
Iceland	2.81	2.65	2.48	1.93	2.30	2.08	2.08	2.04
Luxembourg	1.98	1.55	1.49	1.38	1.61	1.69	1.76	1.70
Czech Republic	1.91	2.43	2.10	1.96	1.89	1.28	1.14	1.23
Slovak Republic	2.41	2.53	2.31	2.26	2.09	1.52	1.29	1.24
Hungary	1.97	2.38	1.92	1.83	1.84	1.57	1.32	1.28
Poland	2.20	2.27	2.28	2.33	2.04	1.61	1.34	1.23
Australia	2.87	2.06	1.94	1.87	1.91	1.85	1.76	1.77
New Zealand	3.28	2.58	2.12	1.93	2.12	1.99	1.98	2.01
United States	2.48	1.77	1.84	1.84	2.08	2.02	2.06	2.05
Canada	2.33	1.80	1.68	1.61	1.71	1.62	1.49	1.53
Mexico	6.82	5.87	4.71	4.02	3.35	2.82	2.40	2.20
Japan	2.10	1.90	1.80	1.76	1.54	1.42	1.36	1.29
Korea	4.53	3.47	2.83	1.67	1.59	1.65	1.47	1.16
OECD average	2.72	2.38	2.14	1.89	1.86	1.69	1.63	1.62

Source: OECD (2007a).

**APPENDIX TABLE A2. AGE DISTRIBUTION AND EDUCATIONAL
ATTAINMENT IN 2003 (IN %)**

Country	Age Distribution					Educational Attainment		
	15–19	20–24	25–29	30–34	35–39	ISCED* 0–2	ISCED* 3–4	ISCED* 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.

*** 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

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

Country	Percentage of Women Observed					
	Number of women	Childless	One Child	Two Children	Three Children or More	Conceived During Education
Sweden	283	100	48	31	11	15
Norway	275	100	58	34	15	17
Finland	305	100	45	27	9	14
Denmark	228	100	51	33	12	9
Germany	388	100	54	30	9	3
Austria	371	100	54	36	10	6
Belgium	272	100	52	29	9	6
Netherlands	308	100	56	33	11	6
Switzerland	398	100	43	27	8	3
United Kingdom	345	100	63	38	15	9
Ireland	406	100	50	35	25	6
France	304	100	56	36	12	3
Portugal	376	100	48	22	4	2
Spain	300	100	38	18	2	1
Italy	252	100	37	16	2	3
Greece	445	100	51	32	8	3
All countries	5,256	100	50	30	10	7

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

Note: All women were childless at age 15.

**TABLE 2. MEAN NUMBER OF CHILDREN, PERCENTAGE OF CHILDLESS
WOMEN AGED 36–40, AND AVERAGE AGE AT FIRST AND
SECOND BIRTH**

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 1980–2003 (in %)
	1980	1985	1990	1995	2000	2003	
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. All financial statistics are in 2000 euro and PPP corrected.

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

Country	Year						Change per year 1980–2003 (%)
	1980	1985	1990	1995	2000	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. All financial statistics are in 2000 euro and PPP corrected.

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

Country	Year						Change per year 1980-2003 (%)
	1980	1985	1990	1995	2000	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. All financial statistics are in 2000 euro and PPP corrected.

TABLE 6. ESTIMATION RESULTS

Hazard Rate, Eq. (1) Covariates	Timing of First Birth		Timing of Subsequent Births	
	Estimate	z-value	Estimate	z-value
Spline Function for Age Effects				
Slope for Age ≤ 31			0.010	1.38
Slope for Age > 31 and Age ≤ 35			-0.086	-3.84
Slope for Age > 35			-0.318	-3.56
Two or More Children			-0.897	-17.85
During Education	-0.932	-12.28	-0.031	-0.35
Lower Level of Education, ISCED 0, 1, or 2	0.538	10.43	0.016	0.30
Higher Level of Education, ISCED 5 or 6	-0.285	-6.16	0.112	2.16
Log(GDP Per Capita)	-0.053	-0.45	0.039	0.23
Log(Social Expenditure over GDP)	-0.587	-3.56	-0.451	-2.42
Log(Family Allowance per Child)	0.164	4.42	0.123	2.49
Log(Maternity and Parental Leave Benefits per Infant for an Employed Woman)	0.141	4.21	-0.076	-1.69
Log(Childcare Subsidy per Young Child for an Employed Woman)	0.004	0.17	0.111	3.69
<i>P</i> -value for the Joint Significance of the Country-Specific Effects	0.000		0.000	
Logarithm of (Pseudo) Likelihood Function	-39958			
Number of Women in the Sample	5256			

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

		10% Increase in Family Allowance		10% Increase in Maternity and Parental Leave Benefits		10% Increase in Childcare Subsidies	
Baseline		Difference from Baseline		Difference from Baseline		Difference from Baseline	
<i>Probability of Having Children</i>							
Age Group	Prediction	Estimate	z-value	Estimate	z-value	Estimate	z-value
16–20	0.049	0.001	2.880	0.001	2.690	0.0000	0.110
21–25	0.288	0.004	3.520	0.003	3.340	0.0001	0.140
26–30	0.601	0.006	3.880	0.005	3.610	0.0001	0.140
31–35	0.806	0.005	3.770	0.005	3.480	0.0001	0.130
36–40	0.863	0.005	3.710	0.004	3.390	0.0001	0.120
<i>Average Number of Children Conditional on Having Children</i>							
Age Group	Prediction	Estimate	z-value	Estimate	z-value	Estimate	z-value
16–20	1.100	0.001	0.600	-0.001	-0.620	0.001	0.960
21–25	1.379	0.004	1.910	-0.003	-1.510	0.004	2.620
26–30	1.691	0.008	2.740	-0.003	-0.940	0.006	3.120
31–35	1.999	0.012	2.820	-0.003	-0.830	0.008	3.330
36–40	2.173	0.013	2.840	-0.004	-0.830	0.009	3.280
<i>Average Number of Children</i>							
Age Group	Prediction	Estimate	z-value	Estimate	z-value	Estimate	z-value
16–20	0.054	0.001	2.800	0.001	2.370	0.000	0.440
21–25	0.398	0.007	3.980	0.004	2.550	0.001	1.310
26–30	1.017	0.015	4.240	0.007	2.210	0.004	1.920
31–35	1.614	0.021	4.170	0.007	1.550	0.007	2.490
36–40	1.878	0.022	4.120	0.006	1.180	0.008	2.700

