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The Impact of Family Policies on Fertility Trends in Developed Countries

L'influence des politiques familiales sur les tendances de la fécondité des pays développés

Angela Luci-Greulich · Olivier Thévenon

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Abstract We examine how strongly fertility trends respond to family policies in OECD countries. In the light of the recent fertility rebound observed in several OECD countries, we empirically test the impact of different family policy instruments on fertility, using macro panel data from 18 OECD countries that spans the years 1982–2007. Our results confirm that each instrument of the family policy package (paid leave, childcare services and financial transfers) has a positive influence on average, suggesting that the combination of these forms of support for working parents during their children's early years is likely to facilitate parents' choice to have children. Policy levers do not all have the same weight, however: in-cash benefits covering childhood after the year of childbirth and the provision of childcare services for children under age three have a larger potential influence on fertility than leave entitlements and benefits granted around childbirth. Moreover, we find that the influence of each policy measure varies across different family policy contexts. Our findings are robust after controlling for birth postponement, endogeneity, time-lagged fertility reactions and for different aspects of national contexts, such as female labour market participation, unemployment, labour market protection and the proportion of children born out of marriage.

A. Luci-Greulich
Economics Department, Université Paris 1 Panthéon Sorbonne, Paris, France
e-mail: angela.greulich@univ-paris1.fr

O. Thévenon (✉)
INED—Institut National d'Etudes Démographiques, 133, Boulevard Davout,
75980 Paris Cedex 20, France
e-mail: olivier.thevenon@ined.fr

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Résumé Nous examinons dans quelle mesure les tendances de la fécondité réagissent aux politiques familiales dans les pays de l'OCDE. En relation avec la réaugmentation des taux de fécondité observés dans plusieurs pays de l'OCDE, nous testons l'influence de différentes mesures de politiques familiales sur la fécondité, sur un panel de 18 pays pour la période allant de 1982 à 2007. Nos résultats confirment que chaque mesure de cet ensemble (congé rémunéré, services d'accueil de la petite enfance et transferts financiers) ont en moyenne une influence positive sur la fécondité, suggérant que la combinaison de ces formes d'aides aux parents qui travaillent avec de jeunes enfants est susceptible de faciliter le choix d'avoir des enfants. Les différents instruments politiques n'ont toutefois pas le même poids : les prestations financières versées au-delà de la naissance et l'offre de service d'accueil pour les enfants de moins de trois ans ont une influence potentielle plus grande que les droits au congé et les aides financières associées à une naissance. De plus, l'effet de chaque mesure varie selon le contexte global constitué par les politiques familiales. Nos résultats sont robustes à différentes procédures testées pour contrôler les effets de recul de l'âge moyen à la naissance des enfants, traiter les problèmes d'endogénéité ou de décalage dans le temps de la réponse des taux de fécondité aux évolutions des politiques. Les variations de taux d'emploi des femmes, de taux de chômage ou de niveau de protection des marchés du travail sont aussi prises en compte.

Mots-clés Politiques familiales · Fécondité · Économie démographique · Emploi des femmes

1 Introduction

After decades of continuous decline, fertility rates have started to increase again in many OECD countries since the early 2000s. The overall rise is rather limited, with a total fertility rate (TFR) that reached a low of 1.63 in 1999 before rising to 1.71 in 2008, on average, in the OECD countries. However, many countries have experienced a more significant 'rebound', notably in Belgium, Denmark, Sweden, Czech Republic, Finland, France, the Netherlands, New Zealand, Norway, Spain, the United Kingdom and the United States. This reversal is arguably one consequence of the 'postponement' of childbearing across cohorts: delayed childbearing among the younger cohorts brought down period fertility rates, but this trend was later reversed, mainly in countries where fertility increased significantly among women aged 30 and above and was not counterbalanced by a further reduction at younger ages (Goldstein et al. 2009).

This paper studies the extent to which the development of government policies towards families with children in the last decades has contributed to these fertility trends. Its main novelty lies in the effort to consider a comprehensive set of family

policy instruments and to identify the respective influence of each item of in-cash and in-kind support on fertility by taking into account a country's institutional context. The effect of paid leave entitlements, childcare services and financial transfers to families on fertility trends is analysed for the first time by putting together data on multiple policies for a large set of countries and for a period covering almost three decades. An original dataset has been elaborated for this purpose, covering 18 OECD countries and a period from 1982 up to 2007—the year preceding the ongoing economic crisis. Data series were obtained from combined OECD sources (mainly the family and social expenditures databases).

There is considerable evidence that family policies can influence the timing of births (for a survey, see Sleebos 2003; Gauthier 2007; Thévenon and Gauthier 2011), but less evidence that family policies help to significantly raise completed family size. Some cross-national studies investigate the isolated impact of money transfers, leave and childcare policies and expenditures for families on fertility rates (Gauthier and Hatzius 1997; Adsera 2004; D'Addio and Mira d'Ercole 2005; Hilgeman and Butts 2009; Kalwij 2010), but none of them take into account these dimensions all together (the details of these studies are presented in the last section as we confront their results with our own findings presented in the next sections).

Against this background, we assess the contribution of five different family policy instruments to variations in fertility. The panel structure of our data gives more information, variability and efficiency in comparison to time series or cross-sectional data, as it allows us to study the dynamics of adjustment and to distinguish between within-country and between-country variation.

Our contribution is threefold. First, we have broadened our scope with respect to the previous findings by considering three main types of policy instruments (cash transfers, parental leave and childcare), whereas earlier studies mostly concentrate on only one or two aspects. Two types of in-cash benefits are distinguished to separate the support granted around childbirth and the support provided later to cover the cost of raising children. Childcare is divided into spending and coverage. Thus, we can analyse the influence of different types of family support that supposedly respond to families' needs for time, money and services at childbirth and during the childrearing period. In addition, efforts are made to filter out possible effects on fertility of birth postponement and a country's institutional context (women's emancipation, unemployment, labour market protection, cultural child-bearing norms and the general Welfare state setting).

Second, we update previous results by focusing on a time period that covers the recent upswing in fertility rates. A key issue was thus the extent to which policies have contributed to this reversal of fertility trends.

Third, we apply panel data estimation methods that allow controlling for country- and time-invariant variables which is not possible in time series or cross-sectional studies. Most importantly, the data structure allows us to disentangle the 'causal' impact of policy changes from country-constant characteristics that may affect fertility levels by identifying within-country variations. Moreover, advanced estimation methods for panel data allow us to apply several robustness checks in order to control for potential endogeneity, non-stationarity, omitted variable bias (OVB) and for dynamics of adjustment.

We find that fertility trends are influenced by the long-term support parents receive in-cash but also in-kind, with the provision of childcare services that help parents (especially women) to combine work and family life. Our results confirm the positive influence on fertility of a mix of in-cash and in-kind support and suggest that the development of childcare services has a more significant impact on fertility trends at the aggregate level than policies extending leave entitlements. An increase in fertility seems, thus, to be happening as a by-product of better opportunities to combine work and family.

The second section presents theoretical arguments on why policies might matter by focussing on economic determinants of fertility, while the third section sheds light on cross-national differences in public spending on families and fertility in OECD countries since the early 1980s. The fourth section presents our empirical strategy, the fifth section discusses our results and the concluding sixth section puts our results into perspective.

2 Why Policies Might Matter for Fertility

Can family policies explain why in some developed countries, fertility is re-increasing? To understand the potential impact of family policies on fertility, this section presents the main economic determinants of fertility that exist in the theoretical literature.[1]

First of all, increases in income that come along with economic development affect fertility behaviour, but the impact is ambiguous. An increase in income might alleviate parts of the budgetary constraint that may prevent households from having their desired number of children. Thus, children get more 'affordable' with increasing income, which speaks in favour of a *positive income effect* on fertility (Becker 1960). At the same time, when income increases go hand in hand with increases in individual investments in human capital, families may find it optimal to have fewer children, as to provide each child with a higher level of human capital (*quantity/quality trade off;* Barro and Becker 1989; Doepke 2004). In addition, economic growth is also likely to increase women's education and wages (Galor and Weil 1996). Women might thus substitute childrearing against market labour participation due to increasing opportunity costs of staying at home (*negative substitution effect*, c.f. Mincer 1958). Consequently, higher wage earnings for women can be a causal factor of fertility decline (Blossfeld 1995; Hotz et al. 1997). The fertility decrease occurs all the more when the possibility to substitute maternal care by goods or purchased services is limited (Day 2004).

Family policies potentially contribute to re-increases in fertility as they can reduce the costs of fertility, either in monetary terms or in terms of opportunity costs. In this case, family policies would facilitate the income effect to dominate over the substitution effect.

[1] Family policies might influence fertility not only because they affect the economic determinants of fertility, but also because they impact and reflect the institutional and normative setting of a country and a society. However, a detailed discussion of cultural norms and institutional determinants beyond economic factors is outside the scope of this paper.

In highly developed countries, GDP per capita increases might be associated with fertility increases, as parents not only can bear the costs of children more easily but countries are also more likely to invest in family policies such as public childcare infrastructure, childcare subsidies, in-cash benefits, parental leave, etc.

This prediction meets the empirical findings that economic development (or income increase) reduces fertility only up to a certain point. Beyond a certain GDP level, further economic development is found to stimulate a slight increase in fertility rates (Myrskylä et al. 2009). Luci and Thévenon (2010) show that the fertility rebound, which can be observed even after controlling for birth postponement, has been steeper in those highly developed countries where women's labour market participation has also risen significantly over the last decades. This suggests that the impact of economic development on fertility can be positive if accompanied by better opportunities for women to combine work with family life (Ahn and Mira 2002; D'Addio and Mira d'Ercole 2005; OECD 2011). Thus, fertility trends are likely to depend on the extent to which family policies help households to combine work and family life.

Family policies provide parents with cash and in-kind resources and/or with possibilities to care for their children (due to parental leave). By these means, these policies support families' standard of living, help parents to cope with work and care responsibilities, and may thus help parents to realise their fertility intentions. On the one hand, family policies are able to reduce the direct, i.e. monetary costs of children (housing, education) by the help of financial transfers. On the other hand, policies that enable parents to combine work with childbearing (due to childcare services, parental leave) reduce the indirect costs of children caused by forgone wage opportunities (Willis 1973; Hotz et al. 1997). Hence, in a context of increasing aggregate income coming hand in hand with increasing women's emancipation (especially in terms of labour market participation), employment-protected leave entitlements after childbirth and public childcare services are likely to play a key role in re-increasing fertility rates (Rindfuss et al. 2010; McDonald 2006). These work–life balance policies can encourage mothers to continue working, encourage fathers to take a baby break from work and thus enable parents to share their family roles more equally (Gregory and Miller 2008). Therefore, these policies have a strong potential to reduce the gender wage gap. By this means, work–life balance policies are able to reduce opportunity costs for women, which can encourage fertility (OECD 2011).

3 Family Policies and Fertility in OECD Countries: Data and Trends

To estimate the impact of family policies on fertility trends in developed countries, we use five family policy measures as exogenous variables in our empirical analysis. Policy variables were constructed for 18 OECD countries,[2] for which information is available over the years 1982–2007. Three of the five family policy

[2] Denmark, Netherlands, Spain, Norway, Sweden, Portugal, France, New Zealand, Belgium, United States, Italy, Japan, Australia, United Kingdom, Ireland, Finland, Germany, Austria.

variables measure public expenditure per child. The first two concern benefits paid to families, divided into two categories to separate the support granted around childbirth from that received at a later stage:

- Spending per birth (in percentage of GDP per capita), including maternity, paternity and parental leave benefits as well as birth grants
- Spending on cash benefits per child under age 20 (in percentage of GDP per capita) (tax transfers and spending for childbirth not included)[3]
- Spending on childcare services per child under age three (in percentage of GDP per capita)[4]

Two further family policy variables are used to capture leave and childcare policies:

- The number of paid leave weeks, adding maternity leave weeks and the number of parental leave weeks that women are entitled to take after maternity leave per se
- Childcare enrolment of children under age three (as a percentage of the total number of children of this age group)

For most of our empirical analysis, we use Total Fertility Rates (TFR) as endogenous variable. The TFR by year and country is the best *available* measure to compare fertility trends between countries. However, TFR are likely to be biased measures of fertility, as they are sensitive to changes in women's mean age at childbearing. Birth postponement is likely to lower this period measure even if the completed family size stays unchanged. In order to control for changes in the timing of childbirth, we control our regression results for increases in mothers' age at childbirth. We also use tempo-adjusted fertility rates (adjTFR) besides general TFR as endogenous variable. Table 1 gives an overview of all variables used in our empirical analysis.

The deployment of family policy instruments varies with each country's approach to policy objectives, in which fertility issues may or may not play a part (Thévenon 2011; OECD 2011). Nevertheless, global spending for families with children has increased considerably over the past three decades in most OECD countries as a result of growing concerns on the part of governments to promote families' well-being and to reconcile work and family life. Figure 1 shows that the share of GDP spent by governments for families—disregarding expenditures on compulsory education—rose from an average of around 1.6 % in 1980 to 2.0–2.4 %

[3] The amount spent per child is calculated on the basis of the total number of children under age 20. Since the age limit of children for which a family can receive family benefits varies across countries, it has been set at age 20 to obtain a comparable population basis. Moreover, the levels of family and child benefits are likely to be higher in richer countries, i.e. countries with higher GDP per capita. For this reason, the generosity of support can be more usefully measured by comparing the relative effort made by countries to support families with children, which is given by the proportion of income per capita that countries devote to child benefit. It is also likely that fertility will respond to changes in this relative-to-average income measure over time.

[4] Expenditures per child are calculated on the basis of the total number of children under age three, whether or not they are enroled in childcare. A more accurate measure would be to consider only those children covered by childcare services, but time series on the number of children enroled in childcare services are not available.

Table 1 Summary statistics for 18 OECD countries, 1982–2007

Variable	Obs	Mean	Std. Dev.	Min	Max
Total fertility rate (TFR)	$N = 518$	1.9	0.27	1.16	3.23
	$n = 18$				
	$T = 28$				
Tempo-adjusted fertility rate	$N = 266$	1.85	0.22	1.34	2.36
	$n = 13$				
	$T = 20.4$				
Spending on cash benefits per child (%GDPpc)	$N = 517$	5.8	3.4	0.37	14.44
	$n = 18$				
	$T = 27.2$				
Spending per birth around childbirth (%GDPpc)	$N = 426$	22.07	21.68	0	107.36
	$n = 18$				
	$T = 22.4$				
No. paid leave weeks	$N = 551$	36.22	40.62	0	172
	$n = 18$				
	$T = 28.9$				
Enrolment young children (0–2) in childcare	$N = 341$	22.2	15.17	0.9	66
	$n = 18$				
	$T = 17.9$				
Spending on childcare services per child (0–2) (%GDPpc)	$N = 440$	15.4	14.64	0.06	53.39
	$n = 18$				
	$T = 23.1$				
Female employment rate (25–54)	$N = 500$	65.37	13.11	27.3	89.6
	$n = 18$				
	$T = 26.3$				
Women's avr. working hours	$N = 357$	1735.08	168.09	1244.73	2229.13
	$n = 17$				
	$T = 21$				
Unemployment rate (25–54)	$N = 476$	6.48	3.33	1.16	20.89
	$n = 18$				
	$T = 25$				
Labour market protection	$N = 434$	2	1.03	0.2	4.1
	$n = 18$				
	$T = 22.8$				
Share of non-marital births	$N = 415$	27.27	14.32	1	56
	$n = 18$				
	$T = 21.8$				
Mean age of mothers at 1st childbirth	$N = 359$	27.01	1.42	24.02	30.7
	$n = 18$				
	$T = 27.1$				

Data sources OECD Family, Social Expenditures and Employment Databases

N is the number of observations, n refers to the number of countries (e.g. the observation units), and T is the average number of period for which each variable is available

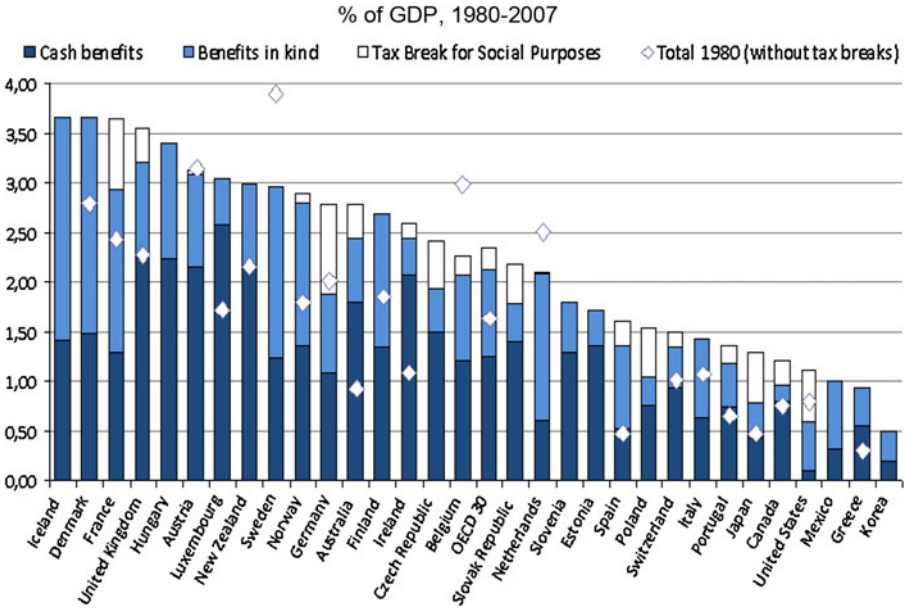

Fig. 1 Public spending on families Note: Countries are ranked in decreasing order of total family benefit spending in 2007. Expenditure includes child payments and allowances, parental leave benefits and childcare support (e.g. spending on childcare and preschool services for children under school age). Spending on health and housing support also assists families, but is not included here. For additional details, see data source. *Data source* OECD (2011)

in 2007 in the OECD. Yet, cross-country differences in the total amount transferred to families remain large, with Denmark, France, Iceland and the United Kingdom spending over 3.5 % of GDP for families, compared with just over 0.5 %, for example, in Korea.

The breakdown of spending into broad categories of policy instruments also varies greatly across countries. Overall, cash payments are often the main group of expenditures, representing 1.25 % of GDP on average. Child-related tax breaks are also quite widespread among OECD countries. Only 6 out of 32 OECD countries do not grant any specific tax deductions to families. Tax-related transfers for families include tax allowances on earned income, tax credits or tax deductions for services such as childcare. As Fig. 1 shows, a large majority of OECD countries provide such tax breaks, but their relative weight in overall support to families varies quite widely. They are the main levy to support families in the United States and represent a large share of the overall money transferred to families in France and Germany.

Some OECD countries have favoured developing in-kind benefits over cash transfers and education spending. Nevertheless, at almost 0.9 % of GDP on average in the OECD, in-kind expenditures for pre-school children still represent no more than 1/3 of total expenditures for families. Denmark, France, Iceland, Finland and Sweden are the 'big' service providers with total in-kind expenditures of over 2 % of GDP, i.e. more than twice the OECD average. A detailed description (and

illustration) of variations over time and across countries of each of our five family policy variables can be found in Luci and Thévenon (2012).

Note that there are many different types of leave entitlements after childbirth in OECD countries. First, working mothers are entitled to a period of maternity leave (or pregnancy leave) around the time of childbirth which protects the health of the working mother and her children and guarantees that she can return to her job within a limited number of weeks after childbirth. Fathers are also entitled to specific paternal leave at the time of childbirth, but these entitlements cover a much shorter period. Then, parental leave entitlements allow employed parents to benefit from additional weeks of 'parental' and/or 'childcare' leave if they want to continue caring for their child beyond the standard period of maternity or paternity leave. Parental leave payment (all kinds of publicly paid parental leave and birth grants) is a key determinant of parental leave uptake. However, as leave payments (lump-sum benefit or wage substitution[5]) never fully replace the leave-taker's salary, and since women very often earn less than their partners, they are more likely than men to take all or the majority of the leave entitlement. Differences in duration and payment conditions of parental leave lead to substantial variations in the amounts of public transfers per child in terms of parental leave in OECD countries.

Childcare coverage for children below age 3 is increasing in most OECD countries, but differences in coverage and spending are still large. In Denmark, about 2/3 of under-3-year-old children have a place in day care centres, whereas in Austria, care services cover only 12 %. The most noticeable is also the relatively high enrolment rate of children in the US, despite the comparatively low public spending in this country. The development of the private sector explains this figure. This points to the absence of a strict linear relation or implication between the level of government spending and the coverage rate. This is not surprising since public investments depend not only on coverage rates, but also on parameters such as quality of services and the number of care hours available.

To sum up, OECD countries have considerably increased their expenditures to support families over the past decades. All types of support have been expanded to some extent: in-cash transfers towards families with children have been increased in many countries since the early 1980s, but the relative share of GDP per capita invested per child has grown at a slower rate since the mid 1990s or has decreased in some countries. Overall, remarkable differences still exist across countries in the way policy instruments are combined to provide support to families. Differences especially concern the extent and form of support provided to working parents with

[5] Overall, two types of leave schemes can be distinguished. First, countries which were pioneers in introducing parental leave entitlements provide comparatively long periods of leave (up to 3 years) with flat-rate payments, which make a return to the labour market difficult, especially for low-qualified women. Second, countries where leave entitlements were introduced later and/or reformed recently offer shorter periods of leave, often combined with earnings-related payments and special incentives for fathers to take up parental leave (Nordic countries, Germany). This second type of leave scheme promotes a combination of work and family life for both parents and encourages mothers to participate in the labour market before and after childbirth. Overall, a polarization between countries can be observed between the two leave schemes over time. Only Germany has radically changed its leave policy scheme from the first to the second type, resulting in a drastic reduction in the number of paid leave weeks from 2007 on (a period not covered in the present study).

children under age three (Thévenon 2011). In that respect, Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) outdistance the other OECD countries, providing comprehensive support to working parents with very young children (below 3 years of age). English-speaking countries (Australia, Canada, Ireland, United Kingdom New Zealand and the United States) provide much less in-time and in-kind support to working parents with very young children, while financial support is greater but very much targeted on low-income families and on preschool children. Continental and Eastern European countries form a more heterogeneous group with a more intermediate position. Two exceptions are France and Hungary, which provide relatively generous support for working parents compared with other countries of this group.

Figure 2 shows that in parallel to the fertility upturn in several OECD countries, average public expenditures for families in OECD countries increased over the same period.

However, a steep decline in TFR can be observed in Japan, Korea, German-speaking countries and in southern European countries, where fertility still remains low. By contrast, fertility rates have recovered strongly in countries of Continental and Nordic Europe, and in English-speaking countries. In some cases, this rise in public expenditures for families started to accelerate slightly before the fertility rebound.

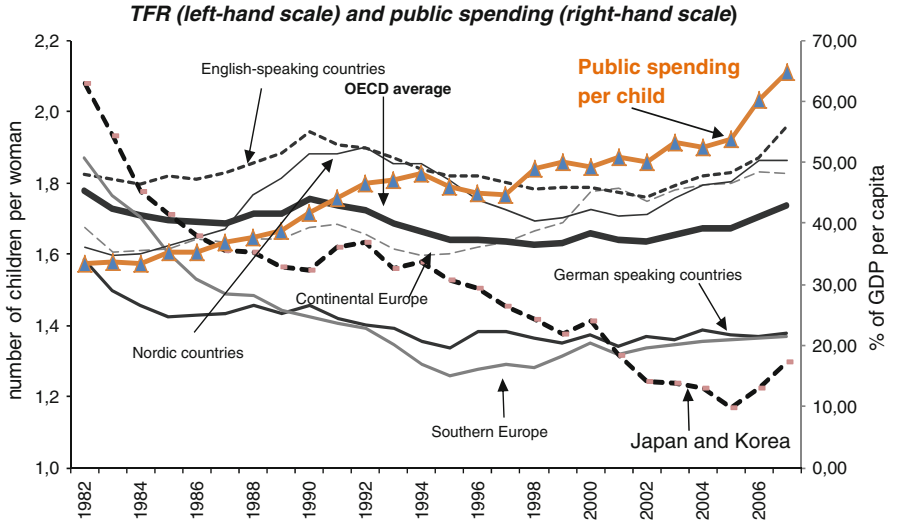

Fig. 2 Total fertility rates and average government spending for families TFR (*left-hand scale*) *and public spending* (*right-hand scale*) Geographical areas are defined as follows: Anglophone (Australia, Canada, New Zealand, United Kingdom, United States); Nordic (Denmark, Finland, Norway, Sweden); Continental (Belgium, France, the Netherlands); German-speaking (Austria, Germany); Southern Europe (Greece, Italy, Spain). Government spending per child includes expenditures on family benefits, childcare services, leave and other payments made around childbirth. The average is calculated for 18 countries for which data are available, including Denmark, Netherlands, Spain, Norway, Sweden, Portugal, France, New Zealand, Belgium, United States, Italy, Japan, Australia, United Kingdom, Ireland, Finland, Germany and Austria

In the following, we empirically assess the influence of these policies on fertility trends in OECD countries. Our empirical analysis aims at answering whether and how far the development of family policies is able to contribute to increases in fertility.

4 Empirical Procedure

We empirically estimate the linear impact of family policy variables on fertility while using information at the country level as well as on the time period level.[6] Several methodological issues are important to deal with in order to obtain accurate estimates of the influence of policy instruments. Potential bias due to the omission of explanatory factors that can be correlated with policies is addressed here notably by using a two-way Fixed Effects estimation model which helps controlling for unobserved fixed country characteristics as well as for time effects. Since these period effects can vary across countries, we also include in our specification country-specific time trends that capture idiosyncratic changes in national contexts. To distinguish between within- and between-country variations, we compare the results of the model with fixed effects with those of a Between Effects model.

Besides the control for potential methodological problems, we also test different specifications in order to control for birth postponement and other side effects that might influence fertility besides family policies, such as women's economic emancipation and a country's labour market characteristics. Last but not least, the influence of policies might vary across countries and more profoundly across Welfare States. These variations will then be scrutinized by measuring the influence of policy instruments conditional to the variations in family policy patterns.

In the following we describe the different steps of our empirical analysis in more detail, starting with the equation summarising the estimated model:

$$f_{it} = \alpha_i + \beta * p_{it} + \lambda X_{it} + T_t + c_i t + \varepsilon_{it} \quad (1)$$

where f_{it} stands for fertility and p_{it} stands for our policy variables. X_{it} denotes other time-varying factors. T_t stands for period-specific fixed effect and $c_i t$ denotes country-specific time trends, α_i stands for country fixed effects and ε_{it} stands for country and time-specific random shocks.

The introduction of country fixed effects produces the same effect as when performing regressions in deviations from country means, i.e. it eliminates unobserved country-specific variables that are constant over time. The FE estimator

[6] Preliminary checks of data properties were done to verify that regression results are affected by potential non-stationarity or cross section dependence of data series (see Luci and Thévenon 2012 for details). Stationarity tests for individual country time series as well as panel unit root tests were, therefore, carried out. The results show that nonstationarity of fertility and policy variables in levels cannot be ruled out. However, the assumption of stationarity of first difference variables is not rejected in most cases by individual country and panel unit root tests. This suggests that System GMM estimations, which includes first differences as instruments might be an accurate way to control for non-stationarity of data series (Blundell and Bond 1998). Then, a Pesaran (2004) test of cross section dependence provides strong evidence for the presence of cross section correlation within the sample. The two-way fixed effects transformation eliminates cross section dependence in the data if policy parameters and the influence of the unobserved common factor(s) are identical across countries.

thus reduces the risk of OVB and also controls for the fact that fertility can be set at different levels across countries. By cutting out country heterogeneity, the FE estimator disentangles the impact of policy changes over time from country-constant characteristics that affect fertility.

Reverse causality can also create biases in the estimation of the influence of family policies on fertility trends. Measures of public expenditure *per child* are, in principle, not affected by increases in fertility, which limits (but does not eliminate) potential endogeneity problems. To further limit potential biases caused by endogeneity, a Two-Stage Least Squares model using time-lagged exogenous policy variables as instruments has been also carried out, of which results are shown in the Annex. Finally, we apply a System GMM estimator which controls for reverse causality, omitted variable bias, non-stationarity and dynamics of adjustment at the same time.

In the next step, we control the Two-Way FE model for birth postponement by adding mothers' age at first childbirth to the regressors, and by substituting the endogenous variable TFR with tempo-adjusted fertility rates (adjTFR). The tempo-adjusted fertility rate is intended to measure fertility levels within a given period in the absence of postponement (Bongaarts and Feeney 1988; Sobotka 2004). By weighting TFR by changes in women's mean age at childbirth, this adjusted measurement focusses on the quantum component of fertility changes.[7]

We compare the two-way FE model to a between effects and a random effects model (Hausman test, significance, goodness of fit) and find the FE model to be superior.

Next, we introduce a series of control variables among the regressors to our preferred estimation model, the country and time fixed effects estimation with country-specific time, as policy settings and fertility can also be influenced by the economic and institutional context. We control for female employment rates (women aged 25–54) and also add female average working hours to compensate for the fact that women's full-time equivalent employment rates are not available for large parts of our sample. We control for these variables, as the measured impact of family policies on fertility risks will be biased if policies affect female employment and women's working hours, which are correlated with fertility. For the same reason, we add unemployment rates (ages 25–54) and a measure for employment protection, which allows controlling for the labour market context. We also add the share of non-marital births as a proxy for changes and differences in gender and family norms.[8]

[7] However, *adjTFR* only corresponds to a pure quantum measure of fertility on the assumption of uniform postponement of all stages, i.e. an absence of cohort effects (Kohler and Philipov 2001). Consequently, *adjTFR* only controls imperfectly for tempo effects.

[8] The addition of control variables certainly causes multicollinearity problems. A correlation between exogenous variables implies that interpreting the estimated coefficients becomes difficult, as we cannot ascribe the change in the endogenous variable to a certain determinant. However, we are primarily interested in the sign and significance of the estimated coefficient of our five policy variables and not in quantifying the estimated impact of our control variables on fertility. As we consider the economic context, women's emancipation and societal norms as important factors for fertility, we prefer to reduce the risk of an omitted variable bias (OVB) by putting up with multicollinearity. At the same time, we abstain from introducing further control variables (one might think, for example, of access to and costs of housing and health care as other important determinants of fertility) to not further increase the problem of multicollinearity (and endogeneity) as well as to not further reduce the number of observations.

A final issue we look at is whether the effects of policies are the same in all countries, or dependent on their overall 'welfare state' context. In the models estimated so far, the effects are indeed assumed to be the same across countries, which is debatable as it suggests that policy measures have the same effective influence in all countries. It might be the case, however, that the effect of policies varies with the broad context of Welfare States which assign different roles to men and women and to public policies in providing welfare to families (Esping-Adersen 1999; Thévenon 2013). In order to investigate such possible heterogeneity, we run regressions that include interactions with country clusters taken from the categorization of family policy regimes provided by Thévenon (2013). Country dummies are thus replaced by dummies for four different patterns identified from the combination of a large range of key dimensions of family policies (English-speaking, Southern European, Nordic and Continental Welfare States as explained in the previous section), and then interacted with each of the policy variable.[9] The estimation model now takes into account multiplicative interaction between family policy variables and their context of implementation.

Fertility is now modelled as follows:

$$f_{it} = WS_i + \beta_2 p_{it} WS_i + \beta_1 X_{it} + T_t + c_i t + \varepsilon_{it} \quad (2)$$

where the marginal effect ($\beta_2 WS_i$) of policy variables p_{it} is now assumed to be conditional on countries' Welfare State context (see Brambor et al. 2006 for more information on this type of models).

5 Regression Results

Columns 1 and 2 of Table 2 show the regression results for the OLS and the two-way fixed effects model, both with country-specific (linear) trends.

The OLS regression explains 35 % of the overall variation (without time trends). The FE regression obtains a goodness of fit of 14 % (without time trends and dummies), i.e. 14 % of the variations can be explained by between-country variations.

Even though within-country variations of family policies and fertility are smaller than overall variations, the fixed effects model produces more significant coefficients of policy variables, indicating that variations of policies over time within a country are important to explain the fertility variations in our dataset. The null hypothesis stating no impact of family policy settings on fertility can be rejected for three of our five policy variables: The FE results suggest a positive impact on fertility of income support over childhood, as measured by spending on cash benefits per child. This is also the case for spending per birth around childbirth

[9] Another approach to investigate heterogeneity consists in running estimations for each category of countries separately. However, the small sample size of each category leads to insignificant parameters which prevent us from showing the results. In this context, a more convincing approach is the one described above with dummies for types of welfare states replacing country dummies (and not complementing them in order to avoid over-specifications). Country-specific linear time trends are also dropped to avoid over-specification.

Table 2 The impact of family policies on fertility for 18 OECD countries (1982–2007)

Endogenous variable	Total fertility rate (TFR)			Tempo adj. TFR
Type of regression	Pooled OLS	Time and country fixed effects	Time and country fixed effects	Time and country fixed effects
Regressors				
Spending on cash benefits per child (%GDPpc)	0.0185** (2.72)	0.0424*** (4.70)	0.0421*** (4.62)	0.0843*** (6.83)
Spending per birth around childbirth (%GDPpc)	0.00136 (1.39)	0.00438*** (4.42)	0.00458*** (4.11)	0.000379 (0.32)
No. paid leave weeks	−0.0000603 (−0.22)	−0.0000193 (−0.08)	−0.000107 (−0.42)	−0.000869* (−2.09)
Enrolment young children (0–2) in childcare	0.000868 (0.68)	0.00675*** (3.78)	0.00785*** (4.45)	−0.000620 (−0.45)
Spending on childcare services per child (0–2) (%GDPpc)	−0.000709 (−0.67)	0.00279 (1.54)	0.00250 (1.30)	0.00137 (0.81)
Mean age of mothers at 1st childbirth			−0.0974*** (−3.79)	
Country-specific time trends	Yes	Yes	Yes	Yes
Time dummies	No	Yes	Yes	Yes
Country dummies	No	Yes	Yes	Yes
Constant	1.484*** (27.33)			
N	274	274	215	161
No. of countries*	18[a]	18[a]	16[b]	11[c]
Time period	1982–2007	1982-2007	1982–2007	1982–2007
R^2 (without dummies and time trends)	0.357 (overall)	0.137 (within)	0.388 (within)	0.552 (within)
R^2 adj.	0.345	0.051	0.314	0.505

t statistics in parentheses, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$. They are based on the estimation of robust standard errors

[a] Australia, Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK, USA

[b] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, New Zealand, Norway, Portugal, Spain, Sweden, UK

[c] Austria, Denmark, Finland, Ireland, Italy, Japan, Norway, Portugal, Spain, Sweden, USA

(leave and birth grants) and childcare enrolment. Expenditure on childcare per child has no significant impact on fertility when both childcare variables are included simultaneously in the regression. Regressions not reported here, which show that the two childcare coefficients do not change in sign or significance when either childcare enrolment or childcare expenditure are included separately.

Due to the higher significance of the estimated coefficients, we consider the fixed effects model as more appropriate for the purpose of our analysis in comparison to the OLS model. Moreover, as the FE model captures only within-country variations, this model is more appropriate than the OLS model for disentangling the 'causal' impact of policy changes over time from country-constant characteristics. Finally, the FE model reduces a potential OVB by eliminating country-specific variables that are constant over time.

We now control the Fixed Effects model for birth postponement. We add the mean age of mothers at first childbirth as control variable (column 3), and we substitute the endogenous variable TFR by tempo-adjusted fertility rates (column 4). Column 3 shows that within-country increases in the mean age of mothers at first childbirth goes hand in hand with decreases in TFR. At the same time, all significant policy variables keep their significance level and their positive sign even when controlling for birth postponement, suggesting that a combination of financial transfers and work–life balance policies is likely to encourage fertility. Similar results are obtained when substituting the mean age of mothers at first childbirth by their average age at childbirth when all their children are considered. The policy variables keep their sign and significance. However, the coefficient of mothers' average age childbirth, all children considered, is insignificant (results available on request). When TFR is substituted with tempo-adjusted fertility rates, childcare enrolment and spending per birth around childbirth lose significance. However, it would be imprudent to conclude that childcare coverage influences the timing of births more than the fertility 'quantum', because the use of tempo-adjusted fertility rates as endogenous variable considerably reduces the number of observations, since for 7 out of 18 OECD countries this variable is not available. As this concerns countries in which the recent fertility rebound has been quite large (such as France, the Netherlands, New Zealand, Belgium or the UK), estimation results based on tempo-adjusted fertility rates have only limited explanatory power.

Results for the Between Effects-, the 2SLS- and the System GMM-model are presented and discussed in the Appendix.

We now add further control variables to our FE specification. These control variables account for important factors of fertility besides family policies (women's emancipation, the labour market context and societal norms[10]). Table 3 presents the regression results.

For all specifications, all significant policy variables turn out to have a positive impact on fertility. Columns 1 and 2 present estimates of the impact on family

[10] We also add the log of GDP per capita (measured at purchasing power parity in constant 2005 US $) and its squared term to the five policy variables. This procedure allows controlling for a convex impact of economic development on fertility, as suggested by Luci and Thévenon (2010). GDP per capita turns out to have a convex but insignificant impact on TFR, as family policies seem to capture most of the fertility variations (results available on request).

Table 3 The impact of family policies on fertility: addition of *control variables*

Endogenous variable	Total fertility rate (TFR)				
Type of regression	Time and country fixed effects				
Regressors					
Spending on cash benefits per child (%GDPpc)	0.0371*** (4.07)	0.0191** (3.04)	0.0252*** (3.89)	0.0194** (2.84)	0.0298*** (3.86)
Spending per birth around childbirth (%GDPpc)	0.00507*** (3.83)	0.00292* (2.29)	0.00231* (2.01)	0.00285* (2.16)	0.00163 (1.18)
No. paid leave weeks	−0.000167 (−0.65)	0.000463* (2.09)	0.000430* (2.08)	0.000514* (2.24)	0.000620* (2.51)
Enrolment young children (0–2) in childcare	0.00473* (2.21)	0.00889*** (4.11)	0.00672** (3.12)	0.00860*** (3.60)	0.00789*** (4.08)
Spending on childcare services per child (0–2) (%GDPpc)	0.00332 (1.87)	0.00259* (2.07)	0.00277* (2.35)	0.00255 (1.89)	0.00178 (1.17)
Female employment rate (25–54)	0.0158** (3.23)	−0.000267 (−0.06)	−0.00586 (−1.47)	−0.000678 (−0.16)	−0.00326 (−0.60)
Women's avr. working hours		−0.000629** (−2.73)	−0.000767*** (−3.65)	−0.000621** (−2.70)	−0.000630* (−2.50)
Unemployment rate (25–54)			−0.0149*** (−3.82)		
Labour market protection				0.0178 (0.73)	
Share of out-of-wedlock births					0.00767 (1.75)
Country-specific linear time trends, country dummies and time dummies	Yes	Yes	Yes	Yes	Yes
N	268	228	228	222	191
No. of countries	16[a]	16[a]	16[a]	16[a]	14[b]
Time period	1982–2007	1982–2007	1982–2007	1982–2007	1982–2007

t statistics in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, based on the estimation of robust standard errors

[a] Australia, Astria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, New Zealand, Norway, Portugal, Spain, Sweden, UK

[b] Australia, Astria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, New Zealand, Norway, Portugal, Spain, Sweden

policies while controlling for women's labour market participation. These estimates actually give the most important insight into the drivers of fertility presented in this paper. Column 1 shows that employment rates for women (aged 25–54) are positively correlated with TFR, while childcare enrolment is barely significant. Once we add women's average working hours to the control variables (column 2), however, childcare enrolment becomes a lot more significant, and childcare expenditure and the number of paid leave weeks also becomes significant. At the same time, financial transfers lose their importance for fertility. The fact that women's working hours are negatively correlated with fertility reveals that work–life balance policies such as childcare services and parental leave are important for fertility once women enter paid work. Even though financial transfers seem to be less important in comparison to work–life balance policies for women who work and want children at the same time, they are still relevant. This suggests that a mix of different family policies is the most efficient way to support families with children, as the needs of parents and children are very heterogeneous, not only between countries, but also between groups within countries.

Finally, adding further control variables to the exogenous variables does not change our conclusions. A mix of work–life balance policies and financial support is confirmed to be the most effective strategy to enable parents to realise their fertility intentions. Labour market insecurity, as measured by unemployment, has a significantly negative impact on fertility. This suggests that most households require financial security and a predictable future to start a family or to have more children, as underlined by Adsera (2011) and Sobotka et al. (2011).

Labour market protection and the share of non-marital births are both found to be insignificant. Both coefficients become significantly positive after female employment and female working hours are dropped, while the significance of family policy parameters does not change (results available on request).

Finally, Table 4 reports the results of regressions where Welfare State dummies are introduced and interacted with policy variables. We use TFR as endogenous variable, the five policy variables interacting with Welfare State dummies as endogenous variables, and we control for female labour market participation and women's average working hours. Here, coefficients of family policies measure the influence of family policies conditional to each Welfare State context. Variations in the association between policy variables and the TFR reveal the role of idiosyncratic characteristics attached to the different Welfare State contexts which seem to affect the effectiveness of policies.

The effect of coverage of childcare services for children under age three on fertility rates is found to be positive and strong in all welfare states except in the English-speaking countries. Nevertheless, the positive association fades when women's labour force participation is controlled for in Southern Europe, which suggests that an increase in childcare coverage has not been strong enough to boost both fertility and female employment rates at once. By contrast, the coefficient on childcare coverage gains in magnitude and statistical significance for Nordic countries once the variables on female labour market situation are included in the estimation. This suggests that fertility rates are, in these countries, raised by a

Table 4 The impact of family policies on fertility by types of Welfare States

Endogenous variable	Total fertility rate (TFR)	
Regressors		
Spending on cash benefits per child (%GDPpc)		
«Continental» Welfare States	0.008	−0.015
	(0.94)	(−1.51)
«English-speaking» Welfare States	*−0.000*	−0.003
	(−0.01)	(−0.37)
«Southern European» Welfare States	*0.041**	0.034
	(2.06)	(1.60)
«Nordic» Welfare States	*0.119****	0.06***
	(8.02)	(5.23)
Spending per birth around childbirth (%GDPpc)		
«Continental» Welfare States	0.003***	0.004***
	(3.50)	(4.49)
«English-speaking» Welfare States	*0.001*	0.001
	(1.17)	(1.01)
«Southern European» Welfare States	*−0.009*	−0.016***
	(−1.78)	(−4.04)
«Nordic» Welfare States	*−0.002*	−0.000
	(−0.60)	(−0.12)
No. of paid leave weeks		
«Continental» Welfare States	−0.000*	0.000
	(−2.30)	(1.71)
«English-speaking» Welfare States	−0.001	0.003
	(−0.31)	(1.19)
«Southern European» Welfare States	*−0.010****	−0.014
	(−4.19)	*(−1.81)*
«Nordic» Welfare States	*−0.003***	*0.003**
	(−3.14)	*(1.99)*
Enrolment young children (0–2) in childcare		
«Continental» Welfare States	0.007***	0.005*
	(3.66)	(2.44)
«English-speaking» Welfare States	*−0.000*	*0.005*
	(−0.07)	*(−1.56)*
«Southern European» Welfare States	*0.007****	*0.000*
	(4.24)	*(0.21)*
«Nordic» Welfare States	*0.003*	*0.010****
	(1.12)	*(5.85)*
Spending on childcare services per child (0–2) (%GDPpc)		
«Continental» Welfare States	−0.001	0.000
	(−0.68)	*(0.54)*

Table 4 continued

Endogenous variable	Total fertility rate (TFR)	
«English-speaking» Welfare States	*−0.002*	*−0.004*
	(−0.60)	*(−1.04)*
«Southern European» Welfare States	*0.002*	*0.002*
	(1.17)	*(1.03)*
«Nordic» Welfare States	*0.011***	*0.000*
	(2.80)	*(0.00)*
Female employment rate (25–54)	–	0.0008
	–	(0.35)
Women's avr. working hours	–	−0.0004*
	–	*(−2.12)*
N	274	228
No. of countries	18	18
Time period	1982–2007	1982–2007

t statistics in parenthesis, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

All models include time and welfare state dummies, as well as country linear time trends in column 1 but their single effects are not reported. *t* statistics in parentheses from robust standard errors. Categorization of countries as follows: 'English speaking': Australia, Canada, Ireland, New Zealand, United Kingdom, United States; 'Southern European': Italy, Spain, Portugal; 'Nordic countries': Denmark, Finland, Norway, Sweden; 'Continental': Austria, Belgium, France, Germany, the Netherlands. Country-specific linear time trends are dropped to avoid over-specification

greater coverage of childcare services regardless of women's situation in the labour market.

Then, spending on cash benefits appears to be more important for fertility in Nordic than in the other areas where the related coefficient is not statistically significant. This suggests that the provision of support in-cash is especially effective in countries where the living costs are relatively high.[11]

The impact of spending per birth around childbirth on *TFR* appears to be positive in Continental countries, while the association between the two variables is either not statistically significant or negative in South Europe when controlling for female employment. Weeks of paid leave appear to also have a very weak role everywhere, but a negative association with fertility rates seems to hold in Southern countries, where only few weeks of maternity leave are paid even though they can be prolonged with a period of unpaid parental leave (not accounted here). A possible explanation of these findings is that the increases in spending on leave and birth grants, as well as in the duration of paid leave, may reflect the higher opportunity cost that working women have to bear when they have children in these countries where the development of childcare facilities started much later than in most others and where the lack of labour market flexibility makes the returns to work after a childbirth more difficult (Pissarides et al. 2005). By contrast, working women on

[11] Kurkowiak (2012) shows that price levels indexes for household final consumption are comparatively higher in Norway, Denmark, Sweden and Finland than in most other European countries.

leave receive earnings-related payment for a longer period in Nordic countries, where children are also more likely to be covered by childcare facilities upon the expiry of parental leave. Such a context makes it more likely for a lengthening of paid leave to have a positive incidence of fertility rates, as suggested by the positive (but weakly significant) coefficient obtained with the estimation controlling for female labour market situation.

6 Discussion

How do our results corroborate previous findings? In order to answer this question, we compare our findings to those of recent cross-national key studies which provide some assessments of the impact of family policies on fertility trends in economically advanced countries.[12] The findings of these studies differ for reasons such as the use of different fertility indicators and different policy variables, as well as different geographical and period coverages. Since we use a comprehensive range of policy markers, our results help to understand some of the contradictory results obtained by the former studies. The interpretation of our result is limited, however, by the fact that variations in TFR are a consequence of both changes in fertility timing and in the total number of children, and tempo-adjusted fertility rates provide debatable estimates of variations in fertility 'levels'. Comparing our results to those of other studies using other measures gives a clearer picture of the scope and limits of our own results. By doing so, some general conclusions on policy effectiveness can be drawn.

Table 5 summarises the key results of the most recent cross-national studies analysing the effect on fertility patterns of family policies in the areas of financial support, parental leave and childcare.[13]

Three studies—Gauthier and Hatzius (1997), Adsera (2004) and D'Addio and Mira d'Ercole (2005)—are directly comparable to our study as they use the same measure of fertility—TFR. Hilgeman and Butts (2009) use a different fertility measure, the number of children ever born for women aged 18–45. Kalwij (2010) uses retrospective data on fertility history to differentiate the influence of policies on the timing of births and completed family size.

Family policy characteristics are also captured with different indicators. A first difference lies in the way the generosity of financial support for families is measured. D'Addio and Mira d'Ercole (2005) use the difference in net disposable income of a single earner family with two children and average earnings compared to those of a childless household with same earnings to approximate the financial

[12] We review here only studies based on cross-national data, but many micro-level studies for single countries are available. For a more complete review, see Sleebos (2003) or Thévenon and Gauthier (2011).

[13] The list of key contributions could easily be extended if our aim was to survey the literature, which is beyond the scope of the present paper. In general, the evidence suggests that while family benefits do significantly reduce the direct and indirect costs of children, their effect on fertility per se is limited. Furthermore, while family benefits have an effect on the timing of births, their effect on the final fertility choices of individuals is contested (Thévenon and Gauthier 2011).

Table 5 Comparison of results of cross-national studies

		Gauthier and Hatzius (1997)	Adsera (2004)	D'Addio and Mira d'Ercole (2005)	Hilgeman and Butts (2009)	Kalwi (2010)		Present study
Explained variable		Or 3 and more children separately)	Total fertility rates	Total fertility rates	Achieved fertility at age 18–45	Timing of birth	Family size	Total fertility rates
Country and period—methodology		22 OECD countries 1970–1990—Panel data methods	28 OECD countries 1960–1997—Panel data methods	16 OECD countries 1980–1999—Panel data methods	20 OECD countries, 1995–2000 waves of European or World Value Surveys—cross-sectional multilevel approach	16 European countries—Event history analysis Information on individual fertility history from the European Social Survey 2004		OECD countries 1982–2007—Panel data methods
Childcare provisions	Enrolment rates				Positive	Not included		Positive
	Spending per child	–	–	–	–	No effect	Positive	Positive
Leave entitlements	Spending per child (all leave included)	–	–	–	–	Positive	No significant effect	Positive
	Payment rate of maternity leave	Negative but statistically insignificant	–	Positive	Not significant	–		–
	Duration	Positive but statistically insignificant	Positive	Negative	Negative	Not included		Positive
Financial transfer		Positive	–	Positive	–	No effect	No effect	Positive

support received by families. This covers family support provided by tax allowances as well as by cash benefits (although variations across different household types are not accounted for). By contrast, both Gauthier and Hatzius (1997) and Kalwij (2010) only consider family cash benefits. Gauthier and Hatzius (1997) measure the generosity of family benefits as a percentage of average wages, while Kalwij (2010) considers the average amount of public expenditures per child below age 16 for employed women. In our study, we use both approaches and obtain similar results for both measures of financial support.

Besides our study, three other studies consider the duration of paid leave entitlements (Gauthier and Hatzius 1997; D'Addio and Mira d'Ercole 2005; Hilgeman and Butts 2009). Hereby, D'Addio and Mira d'Ercole (2005) as well as Gauthier and Hatzius (1997) consider maternity leave only, whereas our study also takes into account the number of weeks of maternity and parental leave. Leave payment conditions are also assessed differently: replacement rates during maternity leave are taken into account by Gauthier and Hatzius (1997) and D'Addio and Mira d'Ercole (2005). Kalwij (2010) considers only the average leave-related expenditure per child below age one, while in our study we sum the annual expenditures per child for maternity and paternity leave, for parental leave and for birth grants.

Finally, only three studies include information about childcare services. Kalwij (2010) includes childcare expenditures (consistent with his expenditure-based approach), while Hilgeman and Butts (2009) test the impact on fertility of enrolment of children below age 3 in formal childcare. Our study includes both childcare expenditure and enrolment.

The results of the cited studies are quite diverse but some general conclusions can be drawn. The present study, like those of Gauthier and Hatzius (1997) and D'Addio and Mira d'Ercole (2005) but conversely to Kalwij (2010), finds that cash transfers have a positive effect on fertility. We also find that the average amount of cash benefits granted in the period after the year of childbirth has a large positive impact on TFR. This impact is confirmed when adjusted-tempo fertility rates are taken into account to control for changes in the timing of births, suggesting that these cash benefits impact not only the timing of births but also have a quantum effect on fertility.

Results regarding the influence of leave entitlements also vary across studies, which is not unexpected given the potentially ambiguous effect of these entitlements on fertility. On the one hand, these entitlements support household income and labour market participation around the time of childbirth, which has a positive effect on fertility. However, as entitlements are often conditional on employment, they encourage men and women to postpone childbirth (which has a negative effect on overall fertility) until they have established themselves in the labour market. This ambiguity is likely to explain the variable results reported in Table 3. Similar to Adsera (2004), we find that an increase in paid leave duration has a positive impact on fertility rates once we control for female employment and female working hours. Gauthier and Hatzius (1997) find a similar positive but not statistically significant result. Controversially, D'Addio and Mira d'Ercole (2005) find a negative impact, but their model does not control for the development of childcare services for children below 3 years of age. However, leave duration tends to be longer in countries where the provision of childcare services, which parents can substitute for

parental care, is less developed. In these circumstances, it is very likely that the identified negative impact of leave duration captures partially the impact of a shortage of childcare services for very young children. In all, we find that the effect of the duration of leave entitlements is small.

The income received for childbirth in the form of payments associated with leave or birth grants also affects fertility behaviour, as pointed out by the different studies. D'Addio and Mira d'Ercole (2005) find a positive impact of maternity leave payments on fertility rates, while Gauthier and Hatzius (1997) find an insignificant impact. Our study, which combines a comprehensive measure of different kinds of payments received for childbirth, finds a small positive effect of leave payments on fertility. This small influence on TFRs (but not on the tempo-adjusted measures) is likely to illustrate a timing effect on childbearing, as suggested by Kalwij (2010) who finds that leave-related expenditures impact the timing of births but not completed fertility levels.

Evidence from cross-country and national studies almost invariably points to a positive effect of formal childcare on fertility patterns. Kalwij (2010) finds that childcare subsidies have no effect on the timing of births, but do have a positive effect on second and higher-order births and completed family size. Hilgeman and Butts (2009) find a significant effect of childcare enrolment on the total number of children ever born for women aged 18–45 in the early 2000s.[14] We also find a strong positive effect of childcare provision on fertility. This highlights the important role of childcare services in avoiding a conflict between childbearing and labour market participation for mothers. We find that not only family policy instruments but also female employment is positively correlated with fertility. The finding of a negative impact of female working hours on fertility suggests that possibilities to combine work and family life play an important role in women's decision to have children once they are actively participating in the labour market.

Moreover, when combining family policies with female employment and women's working hours, we find that all policy instruments (paid leave, childcare services and financial transfers) have a cumulative positive influence on fertility, suggesting that a continuum of support, especially for working parents, during early childhood is likely to facilitate parents' choice to have children. Nordic European countries and France are examples of this mix. Policy levers do not have similar weight, however. We find that in-cash and in-kind benefits covering the 1st year after childbirth have a larger potential influence on fertility than leave entitlements and benefits for childbirth.

Certain unobserved factors influence fertility behaviour by enhancing the effectiveness and coherence of the family policy mix (Thévenon 2013). Our results suggest that the effect of each policy measure on fertility varies with the Welfare State contexts which provide a more or less comprehensive support to households making the decision to have children and/or to combine work and family life. It also suggests that the relative influence of policy variables will vary all together, with for

[14] National studies for Nordic countries corroborate the positive effect of childcare on fertility rates (Rindfuss et al. 2010). They also find that reductions in the cost to parents of affordable good-quality childcare can have a substantial effect on fertility rates, especially when childcare provision is widespread (Mörk et al. 2009).

example, the provision of childcare facilities for children under age three having a larger influence in the continental area where the support in-cash is relatively advanced. Similarly, fertility rates are more sensitive to the duration of paid leave in Nordic countries where female employment rates and the provision of childcare services are higher than in most other countries. Other factors which are not identified may also have a role if they ensure that policy instruments support effectively parents' work–life balance, for example by avoiding a gap in the sequence of support between the expiry of leave entitlements and the provision of childcare services, by providing childcare services that match parents' working hours, or by guaranteeing a stability of policies over time.

Last, the results obtained when controlling for change in the timing of births and with tempo-adjusted rates of fertility suggest that policies can have quantum effects on fertility, i.e. parents do not only change the timing of childbirth, but they actually decide to have *more* children. However, the controls for birth postponement applied in this paper are imperfect. More accurate controls are necessary to be able to identify the pure quantum effect of family policies. Combining macro data with individual observations facilitates these controls. Micro data can reveal when, *in a life cycle perspective*, family policies encourage parents to have (additional) children. How family policies are linked to age-specific fertility is left to future exploration.

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Appendix

Robustness Checks

We compare the Fixed Effects model to a Between Effects (BE) and a Random Effects (RE) model. Results of the Between Effects model are presented in column 1 in Table 6. Results of the Random Effects model are available on request. We use a Hausman (1978) test to invalidate the hypothesis that the unobserved country effects are not correlated with the error term in the RE model. The test suggests that the fixed effect specification is better than a random effects specification for controlling for unobserved country heterogeneity. The BE estimation obtains insignificant coefficients for all policy variables. The insignificance along with the high R^2 and the relatively low adjusted R^2 indicate that unobserved country-specific effects explain most of the fertility variance in the Between Effects model. We, therefore, consider the BE model to be inappropriate for our empirical analysis and conclude that the country and time fixed effects estimation with country-specific time trends (column 2 of Table 2) is best suited to capture the impact of family policies on fertility. This means that variations of policies over time within a country are most important to explain fertility variations in comparison to between-country and overall variations.

Table 6 The impact of family policies on fertility: robustness checks

Endogenous variable	Total fertility rate (TFR)			
Type of regression	Between effects	2SLS[1]	2SLS[2]	System GMM[3]
Regressors				
Spending on cash benefits per child (%GDPpc)	0.0251 (1.74)	0.0364*** (4.98)	0.0341*** (4.16)	0.0139** (3.01)
Spending per birth around childbirth (%GDPpc)	0.00319 (0.57)	0.00583*** (4.99)	0.00529*** (3.64)	−0.00094 (−0.81)
No. of paid leave weeks	−0.00209 (−0.88)	0.000402 (1.69)	−0.000168 (−0.77)	−0.0000974 (−0.23)
Enrolment young children (0–2) in childcare	0.00997 (1.00)	0.00912*** (5.48)	0.0133*** (3.72)	0.00414** (2.66)
Spending on childcare services per child (0–2) (%GDPpc)	−0.00593 (−0.66)	0.00592 (1.95)	0.00661 (1.38)	0.0017 (0.89)
(TFR) $t-1$				0.713** (11.87)
Country-specific time trends	No	Yes	Yes	No
Time dummies	No	Yes	Yes	Yes
Country dummies	No	Yes	Yes	No
Constant	1.383*** (7.19)			0.269** (2.62)
N	274	253	195	59
No. of countries[a]	18	18	18	18
Covered time period	1982–2007 (yearly observations)	1982–2007 (yearly observations)	1982–2007 (yearly observations)	1985, 1990, 1995, 2000, 2005
R^2	0.439 (between)			
R^2 adj.	0.206			
Sargan (p value)				0.035
Sargan-difference (p value)				0. 078

Table 6 continued

Endogenous variable	Total fertility rate (TFR)			
Type of regression	Between effects	2SLS[1]	2SLS[2]	System GMM[3]
Instruments for first differences equation				First lag of all exogenous variables
Instruments for levels equation				First difference of all exogenous variables

t statistics in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[a] Australia, Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK, USA

[1] Time and Country fixed effects (with robust SE) with 1-year lags of childcare variables as instruments

[2] Time and Country fixed effects (with robust SE) with 5-year lags of childcare variables as instruments

[3] System GMM on 5-year observations with lagged TFR among exogenous variables

Subsequently, we control our fixed effects model for endogeneity. Therefore, we introduce time-lagged exogenous variables, i.e. we instrument childcare expenditure and childcare coverage with its time-lagged levels, which also takes into account time-lagged adaptations of fertility to changes in a country's childcare context. One-year as well as 5-year lags are applied and results are presented in columns 2 and 3 of Table 6 (a discussion of the methodology is presented in the appendix). The results confirm a significant impact of spending on cash benefits; spending per birth and childcare enrolment when controlling for potential endogeneity. The estimated coefficient of childcare enrolment is higher for the model with 5-year lags than for the model with 1-year lags and the FE model presented in table, suggesting a considerable time-delayed response of fertility to changes in the supply of childcare facilities. This time delay seems to exceed 1 year, which is rather intuitive as fertility changes take at least 9 months to be realised.

The last column in Table 6 presents results of a System GMM estimation, which not only controls for endogeneity (along with OVB and non-stationarity), but also for dynamics of adjustment (by introducing a lagged endogenous variable among the regressors). Accounting for these dynamics is important as the impact of family policies on fertility is likely to depend on the countries' initial fertility level, as assumed, for example, by Gauthier and Hatzius (1997) and D'Addio and Mira d'Ercole (2005). In order to significantly reduce the number of instruments, which is necessary to avoid an over-identification of the model, the GMM estimation is based on data containing observations for every 5 years (1985–2005). The System GMM results confirm a positive impact of spending on cash benefits and childcare enrolment for fertility.

Between Effects Estimation (Column 1)

The between effects estimator is based on time averages of each variable for each country and, therefore, focusses on between-country variation, i.e. the BE estimator allows answering the question if and how far policy differences between countries explain differences in fertility between countries. Estimation with a mean group estimators (MG) also capture the heterogeneous influence of policies on fertility trends across countries (Pesaran and Smith 1995). However, since our panel is relatively short and especially unbalanced, the standard errors obtained with this procedure are quite high and probably overestimated (Coakley et al. 2001). *T* statistics might be affected, while the pooled and fixed effects estimators have an efficiency advantage over the mean group estimator in small *T* samples. For this reason, we do not report the results of MG estimation. They are available on request.

2SLS Estimations (Columns 2 and 3)

The use of lagged exogenous variables lessens the risk of obtaining biased and inconsistent estimators due to reverse causality between the endogenous and the exogenous variables. For example, TFR observed in 2007 cannot impact childcare expenditure in 2006. At the same time, it is likely that variations in fertility resulting from changes in childcare expenditure appear time-lagged. Of course, the use of

time-lagged variables represents only a 'second best' option for controlling for endogeneity, as this procedure cannot completely rule out a potential estimation bias caused by reverse causality. The best option would be to substitute each family policy variable by a proper instrumental variable that is highly correlated with the family policy variable but not correlated with fertility. As variables which meet these requirements are not available, we put up with lagged observations as instruments for current policy observations. At the same time, the use of lagged exogenous variables allows us to account for possible time delays in fertility responses to policy changes. We, therefore, estimate our models with 1-year lags as well as with 5-year lags to see how far the timing of policy implementation corresponds to the timing of fertility change.

System GMM Estimation (Column 4)

Besides capturing the dynamics of adjustment (lagged TFR as exogenous variable), the System GMM estimation helps to control for endogeneity and omitted variable bias, and limits the risk of spurious regressions due to non-stationarity (Blundell and Bond 1998). To do so, the System GMM estimator combines a set of first-differenced equations with equations in levels as a 'system', and uses different instruments for each estimated equation simultaneously. This involves the use of lagged levels of the exogenous variables as instruments for the difference equation, and the use of lagged first differences of the exogenous variables as instruments for the levels equation. The use of lagged exogenous variables is useful to limit inconsistencies raised by possible endogeneity, while difference variables control for omitted (time constant) variables as well as for non-stationarity. Our analysis of time properties of the data (Appendix) suggests that all time series are difference stationary, implying that System GMM controls for non-stationarity by the integration of first-differenced equations. The controls are imperfect; however, as lagged levels are likely to be poor instruments for differences, and differences are likely to be weak instruments for levels. Moreover, the use of so many instruments produces a risk of model over-identification. In order to reduce the number of instruments, we apply the System GMM estimator to reduced data which contain only observations of every 5 years (1985–2005), highlighting long-term variations. Column 4 shows that lagged levels of fertility capture most of the fertility variations, i.e. the control for dynamics of adjustment lessens the informative value of the model intending to capture the impact of family policies on fertility. Moreover, the relatively small p values of the Sargan tests (not significantly higher than 0.05) suggest that our model still risks being over-identified. Hence, we prefer to continue robustness checks (Table 3) with the Fixed Effects specification.

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