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The impact of family policy packages on fertility trends in developed countries.

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Abstract:

We examine how far 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 settings on fertility, using data from 18 OECD countries that spans the years 1982 to 2007. Our results confirm that each instrument of the family policy package (paid leave, childcare services and financial transfers) has a positive influence, suggesting that the addition of these supports for working parents in a continuum during the early childhood is likely to facilitate parents' choice to have children. Policy levers do not have similar weight, however: in-cash benefits covering childhood after the year of childbirth and the coverage of childcare services for children under age three have a larger potential influence on fertility than leave entitlements and benefits granted around childbirth. Our findings are robust once controlling for birth postponement, endogeneity, time lagged fertility reactions and for different national contexts, such as economic development, female employment rates, labour market insecurity and childbearing norms.

Keywords: family policies; fertility; demographic economics; female employment; economics of gender
JEL codes: J11, J13, J16, O11

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 generations brought down periodic fertility rates, but this trend was later reversed, mainly in countries where fertility increased significantly among women aged 30 and above and not counterbalanced by a further reduction among the younger (Goldstein et al., 2009).

Other factors help to explain why the fertility rebound happened in some, but not in all OECD countries. Some reference to the economic theory of fertility decision might help to understand the incidence of these factors. Economic theory typically considers fertility as the outcome of a rational decision: a utility-maximisation process balancing costs and benefits of children, subject to an income constraint and preferences for children (Becker, 1981). Raising and educating children are activities that require income, goods and time especially. Having children competes with other time-consuming activities, such as work and leisure, and the decision to have children will also depend on the "quality" of the investments made in children (Becker, 1960). Thus, having children incurs both a direct and visible cost and an indirect and less visible one (Willis, 1973), and the increase of these costs is considered as a key driver of falling *TFR*s since the early 1970s (Hotz *et al*., 1997).

Economic development is a first factor by which fertility behaviour can be affected, as economic advancement leads to an increase in income per capita. In theory, such an increase might alleviate part of the budgetary constraint that can hamper households to have their desired number of children. In that case, economic advancement would lead to an increase in fertility. However, several factors can drive the relation in the other direction. Becker et al. (1990) argue, for example, that when individual investments in human capital increase as in a period of rapid technological progress, families find it optimal to have fewer children, and to provide each child with a high level of human capital. This high level of human capital also leads, at the aggregate level, to high rates of economic growth and a fertility decline, as we observed it during the demographic transition (Barro and Becker, 1989; Doepke, 2004). In addition, an increase in capital intensity of the economy (possibly due to technological progress) is likely to increase the relative wages of women who also benefit from the average increase in their educational attainment (Galor and Weil (1996). Women are thus likely to substitute out of childrearing and into market labour. Both higher wage earnings (and thus savings) and reduced population growth increase the level of capital per worker. Thus, high relative wages for women are both a product of, and a causal factor in, economic growth and fertility decline.

However, the decrease in fertility might happen in a first period only when the possibility to substitute maternal care by goods or purchased service are limited (Day, 2004). In this case, a subsidy to child-care goods and services is likely to prolong the fertility decline because of the high degree of complementarity between childcare goods and parental time. However, trends might reverse in a second period once parents have the opportunity to substitute parental (or maternal) care by goods or purchased childcare service. In all, a high rate of subsidy to child-care goods and services will raise the level of fertility but may postpone the onset of a naturally occurring baby bounce-back.

This prediction meets the empirical findings that economic development is linked to a decline in fertility rates, but only up to a certain stage of economic development. From a certain GDP level on, further economic development is found to stimulate a slight increase in fertility rates, even once controlled for birth postponement (Myrskyla et al., 2009; Luci and Thévenon, 2010). Economic development only partially explains cross-country differences in fertility trends, however, since countries with comparable GDP per capita levels often have different fertility levels. Luci and Thévenon (2010) show that the fertility rebound has been steeper in those highly developed countries where women's labour market participation has also risen significantly. This suggests that the impact of economic development *per se* is small, unless accompanied by better opportunities for women to combine work with family life (Ahn and Mira, 2002; D'Addio and Mira d'Ercole 2005; Luci and Thévenon, 2010; OECD, 2011). In this context, four groups of main factors intersect with economic development that are likely to explain cross-country variations in fertility trends.

First, family policy instruments, that provide parents with cash and in-kind resources or with time to care for children, are likely to influence fertility by supporting families' well-being and parents' work-life balance. Financial transfers might influence the decision to have children if these transfers reduce sufficiently the direct "monetary" cost of raising children (Becker, 1965). Nonetheless, support that enables working parents to combine work with childbirth might also have a high impact since it helps to reduce the opportunity costs of children that occur when parents, and especially women, have to leave paid work to raise children (Willis, 1973; Hotz *et al.*, 1997). Employment-protected leave entitlements after childbirth and childcare services to substitute for parental care are institutional factors that are intended to make children less costly. The evidence of the effectiveness of these family policy instruments is relatively weak, however (for a survey, see Sleebos, 2003; Gauthier, 2007; Thévenon and Gauthier, 2011).

Second, labour market characteristics represent an important dimension of the context in which fertility decisions are embedded. Childbearing is often conditional upon the acquisition of a stable and secure position in the labour market (Blossfeld et al. 2005).In that context, fertility trends are likely to respond to unemployment rates or to the development of temporary work that makes labour market status relatively insecure (Adsera 2004, 2011). By contrast, the guarantees offered by either civil servant status or the legislation protecting employees against dismissal offer some financial security and a capacity to plan for the future that may have a positive influence on fertility (Sobotka, 2004; Koblas, 2011). It is likely, however, that these protections only benefit a minority of households in countries where labour market segmentation remains quite high. In this case, a high degree of employment protection can indicate strong labour market dualization (insiders vs. outsiders), which discourages fertility intentions of the unemployed and of people in precarious employment (Esping-Andersen, 1999; Sobotka et al., 2011).

Third, social norms also play a key role in shaping preferences regarding childrearing, timing of births and gender roles (Lesthaeghe 2010; Liefbroer and Merz 2010; Koblas, 2011). Norms are not fixed, however, and attitudes to childrearing and the gender division of work have been changing considerably over the past decades (Lesthaeghe, 2010). The decrease in marriage rates, and the increase in divorce and in non-marital births are clear markers of these changes. However, the extent to which they have affected fertility rates is not clear-cut. The influence of norms is very likely to change over time, as norms themselves evolve. Such changes are illustrated by the experience of southern European countries, where the decrease in fertility rates was initially slow but then accelerated more rapidly than in other European countries (Kohler et al., 2002). The “resilience” of traditional family norms was initially seen as a key factor that “protected” these countries against fertility decline. However, southern Europe experienced a time-delayed but drastic decrease in fertility, resulting in lowest-low

fertility rates at a time when traditional norms seemed to lose their prescriptive power and clashed with women's increasing labour market participation (Laestheghe, 2010). More recently, the increase in non-marital births seems to signal a greater acceptance of non-standard childbearing patterns in many OECD countries. However, there are large cross-country differences. The share of non-marital births remains low in Japan, Korea or Greece, while births outside marriage represent over half of total births in Estonia, France, Norway, Mexico, Slovenia and Sweden (OECD, 2011).

The above trends suggest that increases in women's educational attainment, in women's labour market participation and in women's earnings have been key drivers of fertility trends. Women's "economic empowerment" thus emerges as a forth important factor for fertility. This "empowerment" of women has already been identified as one cause of the postponement of family formation (Blossfeld, 1995), and was cited as the key explanation for the decrease in fertility rates in developed countries from the early 1970s to the late 1990s (Hotz et al., 1997). In this context, fertility trends are more and more likely to depend on the extent to which policies help households to bear the cost of raising children and to combine work and family life rather than urging parents, and especially women, to choose between children and career development. The timing of births is also key in the decision-making since the period at which potential parents give birth impact their ability the bear both the direct and opportunity costs of children. High cost of children are likely to encourage potential parents to first establish a stable position in the labour market and to wait until they get higher income before starting a family. Thus, family policies are likely to curb the postponement of childbirths by raising opportunities to earn a salary and to combine work and family. Consequences on the total number of children in completed families is more uncertain and would certainly depend on the comprehensiveness of policies, e.g. the complementarity existing between different types of support in cash, time and services. The continuity of

support as children age in order to cover childrearing and education costs might also be key parameter of policies to influence fertility decision.

Against this background, this paper assesses the very important issue of the potential contribution of family policies to cross-national variations in fertility trends. The effect on fertility trends of paid leave entitlements, childcare services and financial transfers to families is analysed for the first time by putting together data on multiple policies for a large set of countries and for an almost three decade time period. Our analysis is based on observations of 18 OECD countries covering the years 1980 to 2007.

Our contribution is fourfold. First, we extend previous findings by considering three main types of policy instruments (cash transfers, parental leave and childcare), whereas former studies mostly concentrate on only one or two aspects. Spending in-cash is divided in two sets to identify separately the support granted around childbirth and those which flows to cover the later cost of raising children. Child care is divided in measures for spending and coverage. Thus, analyse the influence of the mix of different types of family support that supposedly respond to families' needs for time, money and services at childbirth and during the childrearing period.

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

Third, we apply panel data estimation methods that allow addressing several methodological problems. We disentangle the "causal" impact of policy changes from country-constant characteristics that may affect fertility levels by indentifying within-country variations. Instrumenting current policies with lagged observations serve as robustness checks to control for possible time lags of fertility reactions to policy changes as well as for potential

endogeneity of explanatory variables. Efforts are also made to filter out the possible effect of birth postponement on fertility trends.

Forth, we reconcile our results with those of previous studies. Therefore, we compare our findings to those of recent studies providing estimations of the impact of family policies on fertility trends of economically advanced countries.

The first section sheds light on cross-national differences in family support policies since the early 1980s. Particular attention is paid to how policies have developed over the period and to the extent of the support package provided to working parents with children below school age. The second section presents our empirical strategy, before introducing our results. The last section discusses our results in the light of those already established in the literature.

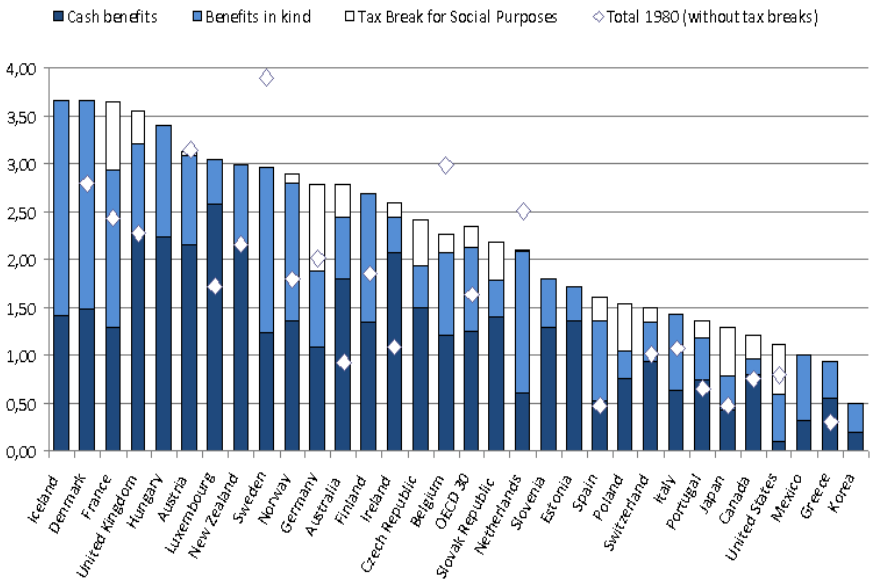
I. Family policies and fertility in OECD countries: data and trends

I.1. Increasing investments for families

A range of family policies exist that may influence the resources of different household types. These include tax benefits and cash transfers, childcare arrangements, and leave provision. The deployment of family policy instruments varies with each country's approach to policy objectives, which do not necessarily refer to fertility issues (Thévenon 2011a; OECD 2011). Nevertheless, global spending for families with children has been considerably increased over the past three decades in most OECD countries as a result of growing concerns from governments about families' well-being and work and family reconciliation. 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% 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.

Figure 1: Public spending on families

% of GDP, 1980-2007



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 in 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.

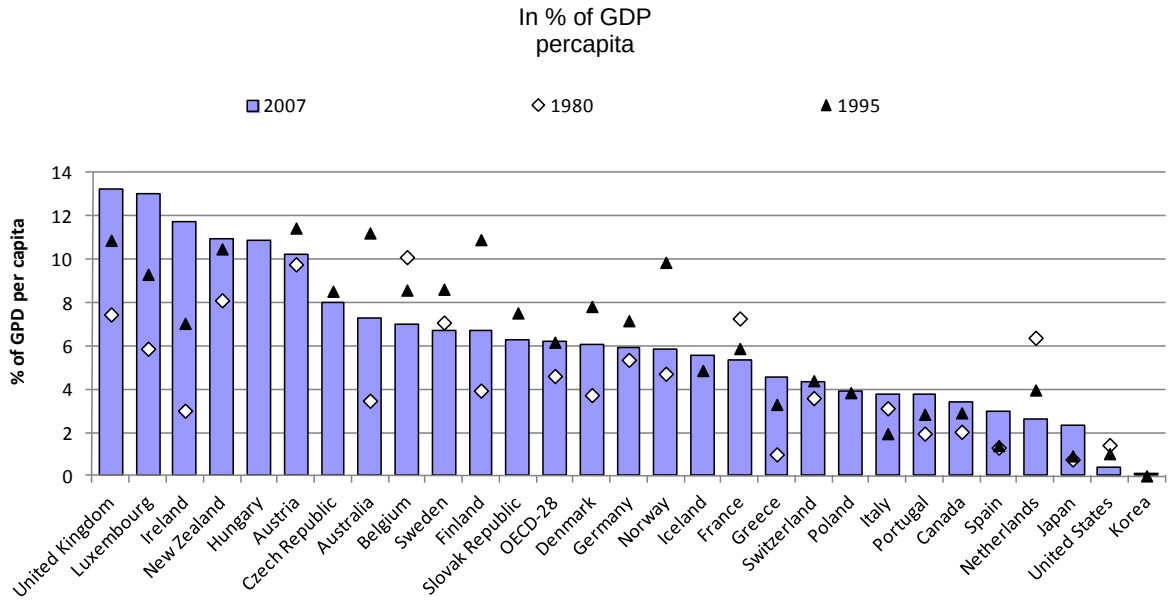
Data source: OECD Family Data Base (2011)

I.2. Financial transfers

The breakdown of spending into broad categories of policy instruments also varies greatly across countries. Financial support can be provided in the form of cash benefits or child-related tax advantages. Cash benefits are twofold: some are paid out after a birth, in the form of birth grants or payments to parents who take leave from employment after a birth. Other benefits are received by parents on a regular basis. They mainly include family allowances, child benefits or working family payments. A number of OECD countries also include one-off benefits such as back-to-school-supplements or social grants (for housing for instance) in this category. Overall, cash payments are often the main group of expenditures, representing 1.25% of GDP on average (Figure 1).

The amounts spent *for each child* relative to GDP per capita provide a more accurate comparison of countries' efforts to support families. Figure 2 shows variations in these amounts rated for children under age 20 (excluding benefits received for childbirth or leave payments). Interestingly, two English-speaking countries appear in opposite positions: the United Kingdom, on the one hand, shows the highest cash expenditure per child, while the United States ranks at the bottom end, together with Korea. Even though the average amounts spent per child increased between 1980 and 2007, expenditure has decreased in several countries over the past decades. More precisely, average spending has decreased in about one third of countries since the mid-1990s.

Figure 2: Spending on cash benefits per child under age 20



Data source: OECD Family Data Base (2011)

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. A large majority of OECD countries provide such tax breaks, but their

relative importance in overall support to families varies quite widely (Figure 1). 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.

I.3. Child-related leave-entitlements

Leave entitlement after childbirth is a second broad category of parental support. Employment is protected during leave, so that parents can resume work after taking time off to care for a newborn infant. Different types of leave entitlement can often be combined. 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. The average duration of maternity leave in 2007 was around 19 weeks across the OECD. Maternity leave is paid in almost all cases, except in Australia and the United States where there is no central government legislation on paid leave (See OECD, 2011, indicator PF2.1 for details).[1] Fathers are also entitled to specific paternal leave at the time of childbirth, but these entitlements cover a short period that varies from 5 to 15 days following the birth.

There are larger variations in parental leave entitlements supplementing the basic rights to maternity and paternity leave across the OECD countries. Employed parents are entitled to 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. These weeks of parental leave are usually taken just after maternity leave, though in some countries they can be taken much later during childhood (often before the child reaches age 8).

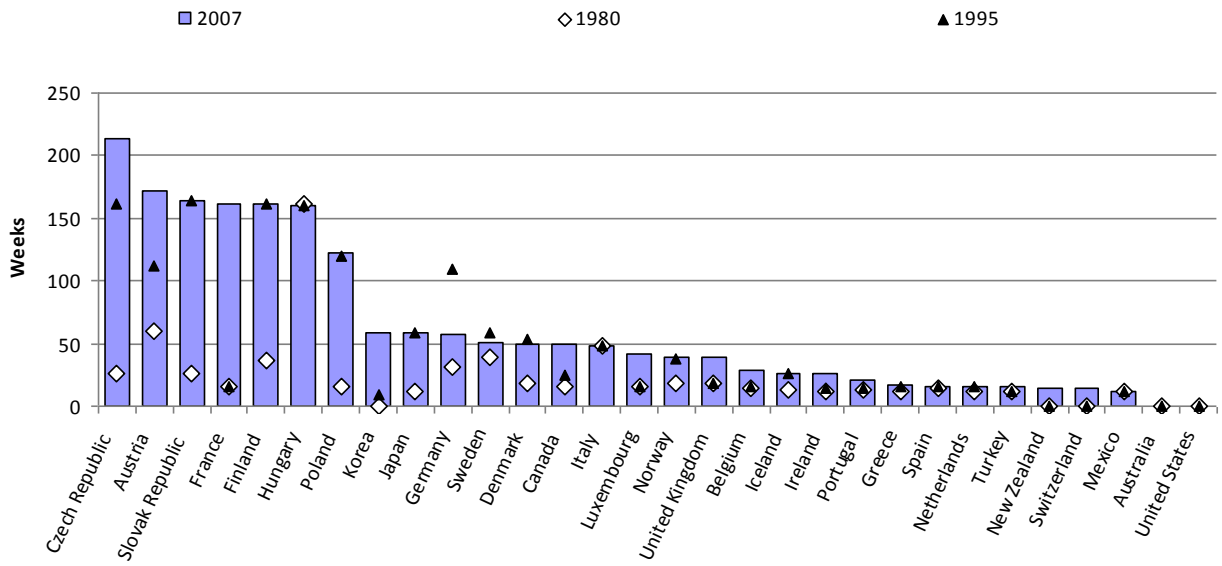
Parental leave payment (all sorts of publicly paid parental leave and birth grants) is a key determinant of parental leave uptake. However, as leave payments do not fully replace the

[1] Paid leave was introduced on 1 January 2011 in Australia.

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. Moreover, women most often do so to care for an infant after the end of their maternity leave. In this case, their absence from work may extend over a long period. Thus, for women who were employed before childbirth, the associated opportunity cost of a child due to work interruption becomes quite high. Figure 3 ads *paid* weeks of parental leave to those of maternity leave entitlements, and shows that women can be out of work for 3 years or more in 6 countries (Austria, the Czech Republic, Finland, France for the birth of a second child, Hungary and the Slovak Republic). Total periods of paid leave are much shorter, 1 year or less in the other countries, because periods of paid parental leave are shorter. Differences in payment rates across countries are not reported here, although they are a key parameter of the actual use of leave entitlements and of the associated spending by governments.

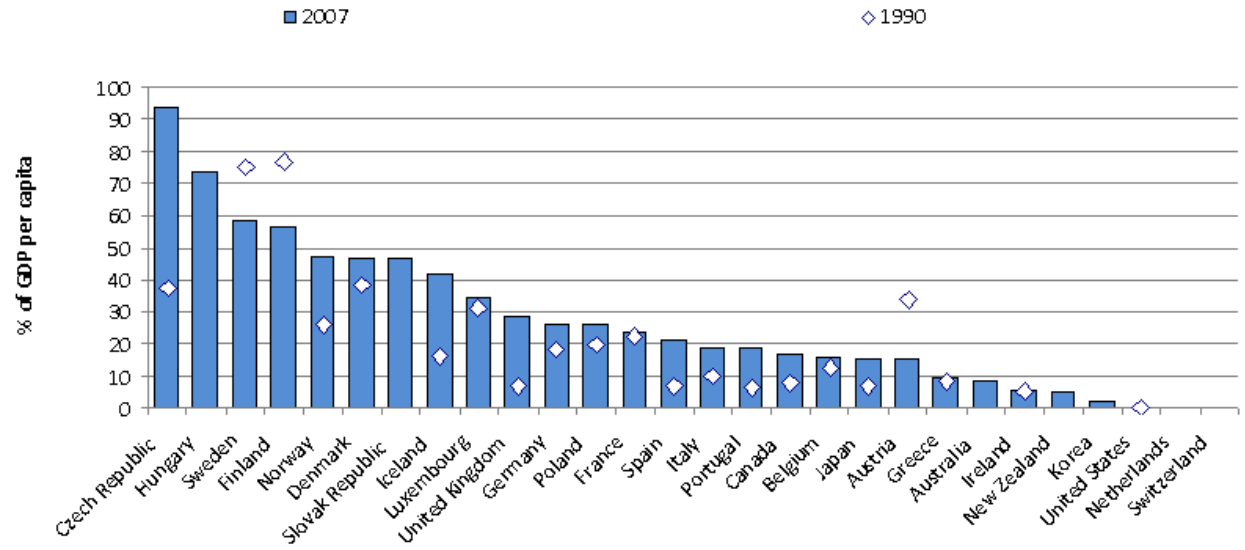
Figure 3 : Childbirth-related leave

Panel A: Number of paid weeks of leave available for mothers



2006 for Italy, 2004 for Portugal. Countries are ranked by number of paid weeks available in 1980. Weeks of maternity and of parental leave that women can take after maternity leave are added. Weeks of “childcare or home-care leave” are also added when relevant.

Panel B: Spending on child-related leave per birth in % of GDP per capita



Data source: OECD Family Data Base (2011)

These differences in duration and payment conditions lead to substantial variations in the amounts of public transfers spent per child, as illustrated in Figure 3 Panel B. These amounts include the "birth grants" paid in some countries to cover expenses associated with childbirth. Spending per birth relative to GDP per capita is especially high in Czech Republic and Hungary where the parental leave period is comparatively long.

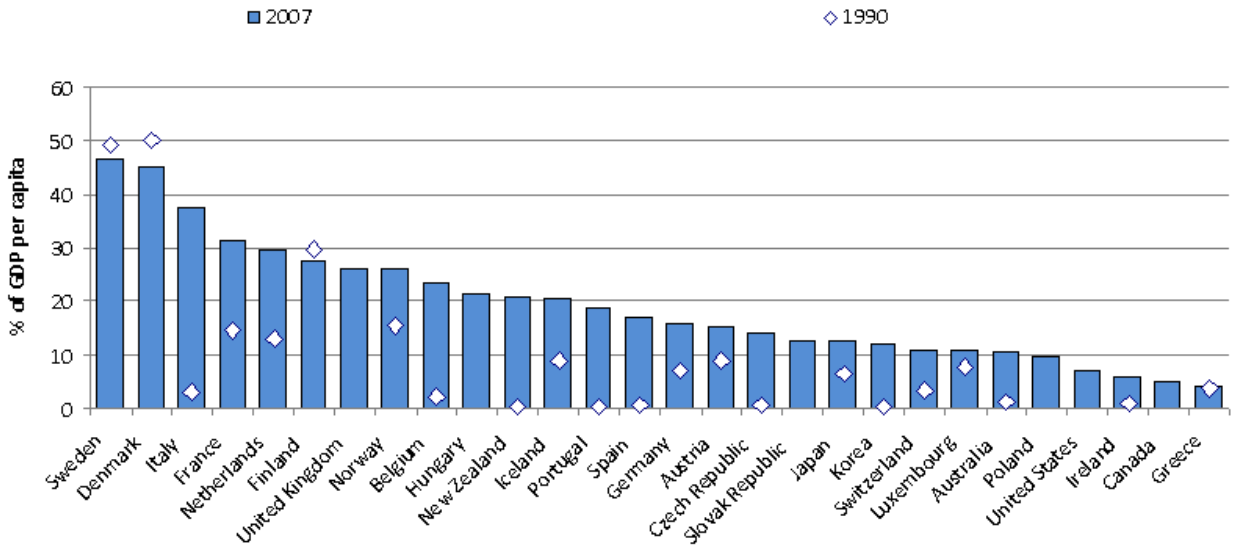
I.4. Childcare services

Finally, childcare services that parents can substitute for personal care are also resources that might influence the decision to have children and to combine work and childbearing. Governments play a key role in subsidizing the provision of childcare services, and trends over the past two decades show that some OECD countries have favoured expansions in in-kind benefits compared to cash transfers and education spending (OECD, 2011). Nevertheless, at almost 0.9% of GDP on average in the OECD, in-kind expenditures for pre-school children still represents no more than 1/3 of the total expenditures for families (Figure 1). Denmark, France, Iceland, Finland and Sweden are the "big" service providers with in-

kind expenditures of over 2% of GDP in total, e.g. more than twice the OECD average. Denmark, Italy and Sweden are also the three countries with highest expenditures per child under age 3 relative to GDP per capita (Figure 4 Panel A).

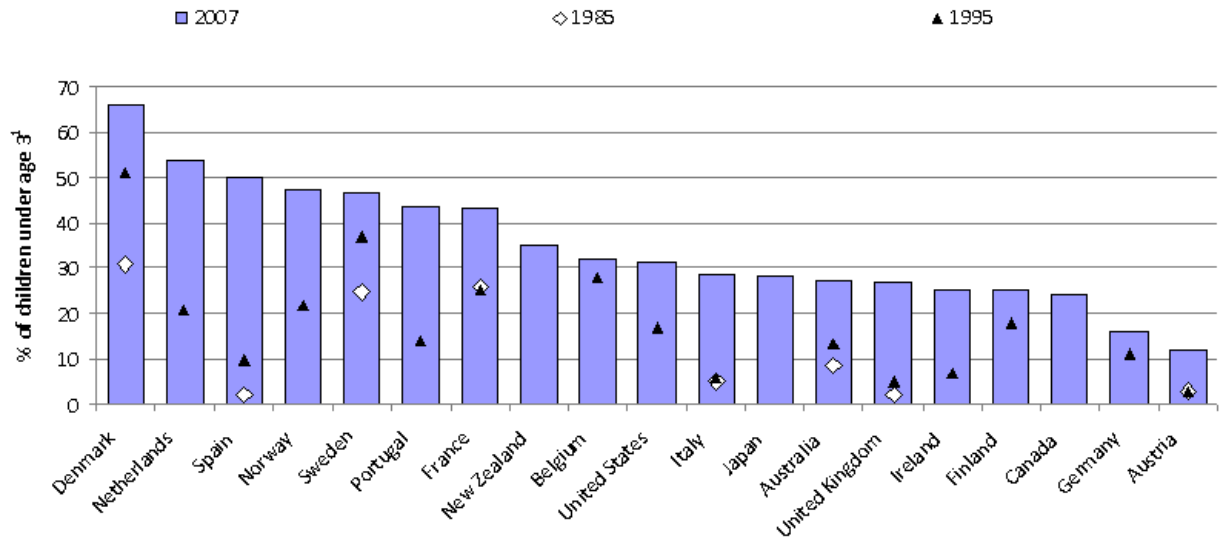
Figure 4: Childcare services for children under age 3

Panel A: Spending on childcare services per child in % of GDP per capita



2006 for Portugal.
Spending includes childcare and day care services, home help for families, and a suite of family social services.

Panel B: Proportion of children enrolled in formal childcare services



Data source: OECD Family Data Base (2011)

The expansion of childcare coverage for children below age 3, as illustrated in Figure 4 Panel B, is one consequence of the increasing investment in childcare services. Differences in coverage are still large, however, between Denmark, where about 2/3 of under-3s have a place in daycare centres, and Germany and Austria, which are located at the other extreme. In Austria, care services cover only 12% of pre-school children.

To sum up, OECD countries have considerably increased their investments 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 decreased in some countries.

Leave entitlements for working parents have also been extended, but parental leave policies vary widely across countries. 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 three 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 (as in Germany) offer shorter periods of leave, often combined with earnings-related payments and special incentives for fathers to take up parental leave. 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. 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).

Last but not least, “in-kind” investments have increased considerably over the last decade as a consequence of growing demand for childcare services. One consequence of these growing

investments is the large increase in the coverage of childcare services for infants and pre-school children. The percentage of under-3s enrolled in formal childcare services still varies widely, however, and is particularly low in German-speaking countries.

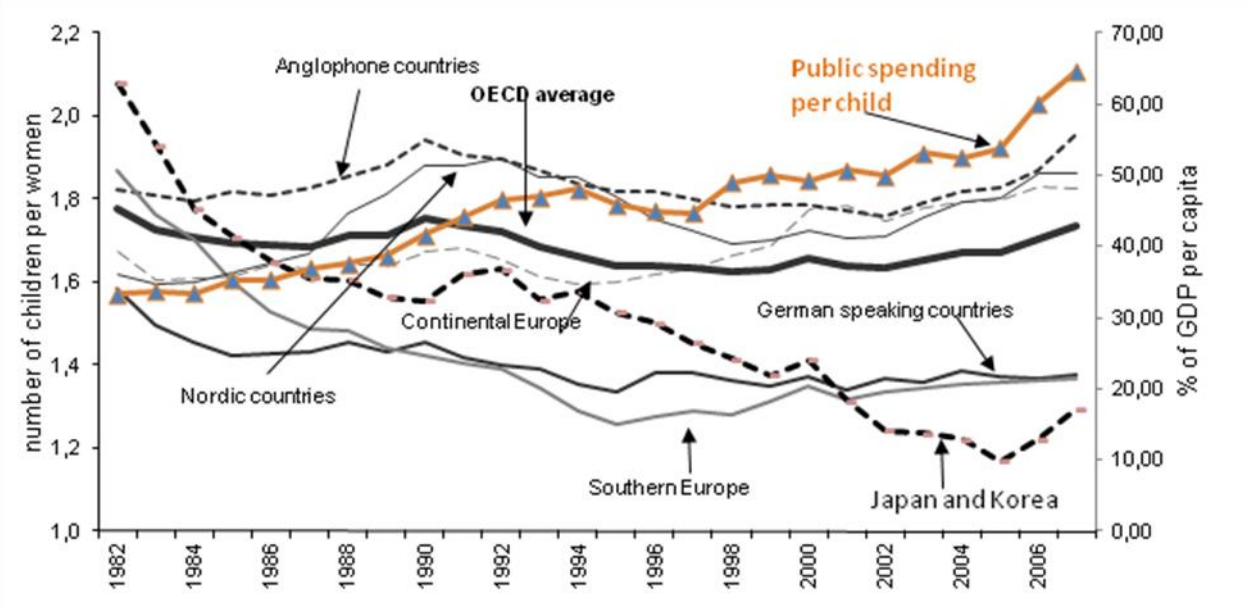
Overall, remarkable differences still exist across countries in the way policy instruments are combined to provide support to families. Differences especially concern the extent and form of support provided to working parents with children under age three (Thévenon, 2011a). In that respect, Nordic countries (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 and focused on preschool aged 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 5 shows variations in fertility trends across OECD countries since the early 1980s. A steep decline can be observed in Japan, Korea, the German-speaking countries and in South European countries, which all continue to face a situation of low fertility. By contrast, a significant re-increase in fertility rates occurred in countries of Continental and Nordic Europe, as in English-speaking countries. Figure 5 also shows that in parallel to the fertility re-increase in several OECD countries, the average public expenditures for families in OECD countries have increased over the same period. An acceleration of this rise started a bit earlier than the re-increase in fertility rates in certain areas, which suggests that the development of

family policies has played a role for the upturn of fertility. In the following, we empirically assess the influence of these policies on fertility trends in OECD countries.

Figure 5: Total fertility rates and average government spending for families

TFR (left-hand side scale) and public spending (right-hand side scale)



Geographical areas are defined as follows: Anglophone (Australia, Canada, New Zealand, United Kingdom, United States); Nordic (Denmark, Finland, Norway, Sweden); Continental (Belgium, France, 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 childbirths. 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, Austria.

II. Empirical Procedure

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 to 2007. Three of the five family policy variables measure public expenditure per child. The two firsts relates to benefits paid to families, divided in two categories to separate the support granted around childbirth from those received at a later stage:

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

- Spending *per birth* (in % 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 % of GDP per capita) (tax transfers and spending for childbirth not included)
- Spending on childcare services *per child* under age three (in % of GDP per capita)

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 women are entitled to take after maternity leave *per se*
- Childcare enrolment of children under age 3 (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, total fertility rates are likely to be biased measures of fertility, as they are sensitive to changes in the mean age of women at childbearing. Birth postponement is likely to decrease this period measure even if the completed family size stays unchanged.
In order to control for changes in the timing of childbirth, we use tempo-adjusted total fertility rates (*adjTFR*) besides general *TFR* as endogenous variable. 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 focuses on the quantum-component of fertility changes. 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.

We empirically test with linear regressions whether our family policy variables p_{it} are associated with fertility response variables f_{it} while controlling for potential side effects.

We run regressions as:

$$f_{it} = \gamma + \beta * p_{it} + \delta X'_{it} + \lambda_i + T'_t \tau + \varepsilon_{it}$$

We use information at the country level (i) as well as on the time period level (t). X_{it} represents the set of control variables. T_t stands for period-specific fixed-effect, λ_i stands alternatively for country random or country fixed-effects, and ε_{it} for country and time-specific random shocks. We are interested in testing the null hypothesis that the coefficient β is zero at a statistical significance level of 5%. If the null hypothesis is rejected, it is reasonable to infer that the policy measure does matter for fertility.

We start with a pooled Ordinary Least Squares (OLS) regression. To deal with heteroscedasticity, we use pooled OLS with robust standard errors[3]. Linear time trends are included (while eliminating the constant in the regression model) to capture year-specific shocks of fertility rates. These time-specific fertility trends risk biasing the estimated impact of family policies on fertility, for example if policies are especially extended when fertility is decreasing rapidly. It is also possible that family policies are extended when fertility is high, in order to support the households' standard of living and to increase the opportunities for women to combine work and family. However, three of our policy variables are measures of public expenditure *per child*, which implies that these measures are –a priori- not affected by increases in fertility.

[3] We also use a bootstrap with 1 000 replications, which computes a bias-corrected and accelerated 95 per cent confidence interval of the OLS-coefficients. In addition, we use OLS with heteroscedasticity-consistent standard errors (hc3 robust standard errors). We find no change in the coefficients' significance in comparison to results obtained by the OLS estimation with robust standard errors. Nevertheless, we acknowledge that it is almost impossible to entirely rule out the problem of obtaining biased estimators caused by heteroskedasticity.

We apply, none the less, a series of panel data methods to reduce the possible risk of obtaining biased estimators due to inverse causality between fertility and family policies. First, we distinguish between within- and between-country variations in order to identify a *causal* effect of policy settings on fertility. We identify between-country variations by performing a Between Effects estimator (BE), which is based on time averages of each variable for each country, and we identify within-country variations by performing a Fixed Effects estimator (FE). A simple FE estimator performs regressions in deviations from country means. Due to this differencing process, the FE estimator eliminates unobserved country-specific variables that are constant over time and therefore reduces the risk of obtaining an omitted variable bias (OVB). The differencing process obtains the same results as when introducing country-specific dummy variables.[4] We also use a two-way Fixed Effects model that combines country-specific dummy variables with time dummies and therefore controls for country-fixed and time-fixed effects. This procedure allows to not only to control for country-fixed-effects, but also for time-shocks, which again reduces, but does not eliminate the problem of obtaining biased estimates due to unobserved variables. By disentangling the impact of policy changes over time from country-constant characteristics that affect fertility levels, the FE estimator allows us to disentangle the impact of policy changes over time from country-constant characteristics that affect fertility levels. The FE estimator therefore reduces potential endogeneity problems.

To further address endogeneity, we estimate the impact of family policies on fertility in a dynamic setting in the following step. We perform an IV-regression in two steps (Two Stage

[4] We compare the fixed effects model to a random effects (RE) model, which captures both within and between-country variation. The RE estimator subtracts a fraction of averages from each corresponding variable and therefore also controls for unobserved country heterogeneity. If the number of observations is large, the RE model is more efficient than the OLS and the FE model, but only on the assumption that the unobserved effects are uncorrelated with the error term. If this is the case, unobserved country-specific variables that are constant over time are captured by an additional residual and the estimators are unbiased and asymptotically consistent. 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. For our data, the fixed effect specification is superior to a random effects specification in controlling for unobserved country-heterogeneity.

Least Squares Estimator) by using time-lagged observations of the five family policy variables as instruments for current observations of these variables. We also introduce our exogenous policy variables as lags in the Fixed Effects model. The use of lagged exogenous variables by the 2SLS and FE estimator lessens the risk of obtaining biased and inconsistent estimators due to inverse causality between the endogenous and the exogenous variables. For example, it is not possible for TFR observed in 2007 to impact child care expenditure in 2004. On the other hand, it is likely that variations in fertility resulting from changes in child care expenditure appear time-lagged. Moreover, we account for the fact that the impact of family policies on fertility is likely to depend on the fertility level at the starting point, as assumed, for example, by Gauthier and Hatzius (1997) and D'Addio and Mira d'Ercole (2005). We obtain this control for the "dynamics of adjustment" by introducing lagged levels of the endogenous variable, i.e. our fertility measure, among the exogenous variables in the 2SLS and FE model.

However, the use of time-lagged variables represents only a "second best" option for controlling for endogeneity, as this procedure can not completely rule out a potential estimation bias caused by inverse 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 to account for possible time delays of fertility responses to policy changes. We therefore estimate our models with one, three and five-year lags to see in how far the timing of policy implementation corresponds to the timing of fertility change.

Further controls for time-constant omitted variables and for time trends are made by applying a First-Difference Estimator[5]. In addition, we apply a System GMM estimation to combine controls for omitted variable bias (OVB), non-stationarity, endogeneity and for dynamics of adjustment. We do not present FDE and GMM results as these models are less appropriate for our empirical analysis than the Fixed Effects models. We identify the two way-FE model as the most appropriate estimation model for the purpose of our analysis.

Finally, we introduce control variables into the two way-FE model, as policy settings and fertility can also be influenced by the economic and institutional context, which can vary not only between countries but also over time. We start with adding 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). In a second step, we control for female employment rates (women aged 25-54). We 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 being 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 in a third step, which allows controlling for the labour market context. Finally, we add the share of non-marital births as proxy for changes and differences in gender and family norms.

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 of the endogenous variable to a certain determinant.

[5] Country-specific variables that are constant over time and time trends are eliminated by using endogenous and exogenous variables as first differences. Regression diagnostics (correlogram, Dickey Fuller 1979) suggest that all time series are difference stationary, implying that FDE controls for non-stationarity (spurious regression). However, for our data, the use of first differences for the exogenous and endogenous variables causes a high loss of significance for the estimated coefficients and a drastic reduction of the goodness of fit, implying that the FDE model is not appropriate for our empirical analysis.

However, we are primarily interested in the sign and significance of the estimated coefficient of our five policy variables and not in the quantification of 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 reducing 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).

III. Regression results

Table 1 shows the regression results for the OLS[6]-, country-fixed effects, country- and time-fixed effects and between effects estimation models.

Table 1: The impact of family policies on fertility: *static setting* for 18 OECD countries (1982-2007)

Endogenous variable:	**total fertility rate (*TFR*)**			
Type of regression:	Pooled OLS (robust SE)	Country Fixed Effects	Country & Time Fixed Effects	Between Effects
Regressors:				
spending on cash benefits per child (%GDPpc)	0.0300***	0.0168*	0.0181**	0.0251
	(6.91)	(2.25)	(2.62)	(1.74)
spending per birth around childbirth(%GDPpc)	0.00216*	0.00348**	0.00681***	0.00319
	(2.54)	(3.04)	(6.00)	(0.57)
nb. paid leave weeks	-0.00176***	0.00102**	0.00136***	-0.00209
	(-3.87)	(2.81)	(4.02)	(-0.88)
enrolment young children (0-2) in childcare	0.00495***	-0.00113	-0.000905	0.00997
	(3.54)	(-1.18)	(-0.70)	(1.00)
spending on childcare services per child (0-2) (%GDPpc)	-0.00145	-0.00244	-0.00228	-0.00593
	(-1.31)	(-1.77)	(-1.62)	(-0.66)
linear time trends	yes	yes	yes	no
country dummies	no	yes	yes	no
time dummies	no	no	yes	no
constant				1.383***
				(7.19)
N	274	274	274	274
nb. of countries:*	18	18	18	18
time period:	1982-2007	1982-2007	1982-2007	1982-2007
R^2:	0.986	0.996	0.997	0.439
R^2 adj.:	0.986 0,345 without time trends	0.996	0.997	0.206
t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001				
*Denmark, Netherlands, Spain, Norway, Sweden, Portugal, France, New Zealand, Belgium, United States, Italy, Japan, Australia, United Kingdom, Ireland, Finland, Germany, Austria.				

The results show that the null-hypothesis stating no impact of family policy settings on fertility can be rejected for four of our five policy variables. All four estimation models suggest a positive impact on fertility of income support over childhood, as measured by

[6] As regression diagnostics suggest that heteroscedasticity is a possible issue in our data, we also use the OLS estimator with "heteroscedasticity-consistent" standard errors. Compared to the regression results of column 1, the use of heteroscedasticity-consistent standard errors changes the t-statistics only marginally and leaves the estimated coefficients and their significance unchanged (results available on request).

spending on cash benefits per child[7]. This is also the case for spending per birth around childbirth (leave and birth grants).

In contrast to the FE regressions, both the OLS and the BE results suggest a negative impact of the number of paid leave weeks and a positive impact of childcare enrolment on total fertility rates. In comparison to the OLS results, the coefficients estimated by the BE model keep their sign, but they all lose significance. At the same time, the goodness of fit increases from 36% to 44% when comparing the OLS model (without linear time trends, results not shown here) to the BE model, whereas the adjusted R^2 decreases from 35% to 21%. Adjusted R^2 represents a corrective for R^2, because R^2 automatically increases with the number of estimated coefficients (i.e. the number of exogenous variables in the estimation equation). Adjusted R^2 penalizes an addition of explanatory variables if they have no real explanatory power. This is the case for our policy variables when focussing on between-country variation only. The lost significance of the estimated coefficients, the increasing R^2 and the decreasing adjusted R^2 indicate that country-specific effects explain most of the fertility variance in the Between Effects model, while between-country differences of family policies are relatively small. Therefore, we consider the BE model as not appropriate for our empirical analysis.

The Fixed Effects model, which focuses on within-country variation, shows significant coefficients for three policy variables (spending on cash benefits per child, spending per child around childbirth, number of paid leave weeks). The significant coefficients confirm that within-country differences of these family policy instruments are larger than between-country differences between these policies. This suggests that fertility variations in our sample are mainly due to changes in the family policy setting *over time*.

[7] We also use an alternative variable which measures income from child benefits including tax allowances for a single-earner couple earning 100% of average earnings. We find a significantly positive impact of this expenditure measure on fertility. However, this variable is only available for a limited number of countries and time periods, and the significance is reduced in comparison with spending on cash benefits per child ($p<0.05$).

The OLS estimation, which captures both within-and between-country variations, shows a negative correlation between the number of paid leave weeks and fertility. However, this negative correlation is likely to emerge due to inverse causality: countries with lowest fertility rates have introduced longer leave (or countries have extended paid leave when fertility rates were lower or declining). As the FE model captures only within-country variations, this model is more appropriate than the OLS or BE model to disentangle the "causal" impact of policy changes over time from country-constant characteristics. Therefore, and due to the fact that fertility variations are found to be mainly caused by changes in policies over time, we consider the FE model as the most appropriate estimation model. When focussing on within-country variations (column 2 and 3), the impact of the number of paid leave weeks on fertility turns significantly positive whereas childcare enrolment becomes insignificant[8].

For all models, expenditure on childcare per child has no significant impact on fertility when including both childcare variables in the regression at the same time. Regressions not reported here show the both childcare coefficients do not change in sign and significance when including either childcare enrolment or childcare expenditure separately.

The adjusted coefficient of goodness of fit (R^2) for the OLS regression is 0.345 before and 0.986 after controlling for time effects, suggesting that time effects play an important role for fertility in our data base. This supports our intention to take time effects more fully into account in the following step.

Table 2 presents therefore regression results with one-year lagged endogenous variables as well as with a one-year lagged endogenous variable among the exogenous variables. These dynamic settings allow accounting for time lagged reactions of fertility to policy changes as well as for potential endogeneity and for dynamics of adjustment. Column 1 and 3 present a

[8] Moreover, FE-coefficients of childcare enrolment are likely to be negative because of the strong correlation of this variable with female employment – the developement of childcare services being largely induced by raising female employment – which has a negative influence on fertility trends (table 3). The negative FE- sign for childcare enrolment does no longer hold once female emploent rates are controlled for (table 3).

2SLS- and a FE-model with lagged exogenous variables. In column 2 and 4, lagged levels of the endogenous variable are added to the exogenous variables for both estimation models.

Table 2: The impact of family policies on fertility: *dynamic setting* for 18 OECD countries (1982-2007)

Endogenous variable:	**total fertility rate (*TFR*)**			
Type of regression:	2SLS	2SLS dynamic	Country Fixed Effects	Country Fixed Effects dynamic
Regressors:				
[spending on cash benefits per child (%GDPpc)] $_{t-1}$	0.0353***	0.00254*	0.0168*	-0.00326
	(8.14)	(2.42)	(2.18)	(-1.13)
[spending per birth around childbirth(%GDPpc)] $_{t-1}$	0.00217*	-0.000788**	0.00240*	-0.000594
	(1.99)	(-3.28)	(2.05)	(-1.35)
[nb. paid leave weeks] $_{t-1}$	-0.00188***	0.0000374	0.000791*	0.00000249
	(-5.07)	(0.44)	(2.07)	(0.02)
[enrolment young children (0-2) in childcare] $_{t-1}$	0.00470***	0.000493	-0.000477	0.000906*
	(3.44)	(1.63)	(-0.48)	(2.46)
[spending on childcare services per child (0-2) (%GDPpc)] $_{t-1}$	-0.000637	0.00119***	-0.0000481	0.00175***
	(-0.39)	(3.38)	(-0.04)	(3.50)
[TFR] $_{t-1}$		0.970***		0.887***
		(70.17)		(38.49)
constant	1.328***	0.0173	1.420***	0.166***
	(40.51)	(0.87)	(30.33)	(4.50)
N	250	250	259	259
nb. of countries:*	18	18	18	18
time period:	1982-2007	1982-2007	1982-2007	1982-2007
R^2:	0.402	0.972	0.095	0.876
R^2 adj.:	0.39	0.971	0.011	0.864
t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001				
*Denmark, Netherlands, Spain, Norway, Sweden, Portugal, France, New Zealand, Belgium, United States, Italy, Japan, Australia, United Kingdom, Ireland, Finland, Germany, Austria.				

With 39%, the adjusted goodness of fit of the 2SLS model with one-year lagged exogenous variables as instruments for current policy observations (column 1, table 2) is somewhat higher than the goodness of fit of the standard OLS regression (column 1, table 1: 34,5%). This suggests that fertility reacts in a time-delayed manner to changes in the policy setting. Increasing the time lag of the instruments (from one to three as well as to five years) further increases the goodness of fit of the 2SLS model (results available on request). This implies that the time-delay of the fertility response tends to exceed one year, which is rather intuitive as fertility changes take at least nine months to be realized.

The signs of the 2SLS results of table 2 differ only from the OLS results in table 1 when controlling for the dynamics of adjustment (column 2). In this case, the estimated coefficient of spending per birth (leave and birth grants) becomes significantly negative, while the estimated coefficient of childcare expenditure per birth becomes significantly positive. The control for the dynamics of adjustment in addition to lagged exogenous variables in the FE model (column 4) leads to the result that both coefficients for childcare enrolment and for childcare expenditure per child turn significantly positive. These sign changes underline the importance for the dynamics of adjustment for fertility, suggesting that the influence of actual family policies on fertility depends on previous fertility levels. It is likely, for example, that if fertility is high, countries tend to provide relatively high levels of investments in childcare per child, because there is a societal demand for child care quality. Yet overall, we observe that the introduction of lagged fertility among the exogenous variables makes up for a very large proportion of variations of the endogenous variable, which is at the expense of the informative value of our model intending to capture the impact of family policies on fertility. This is why we decide to continue our estimations without controlling for the dynamics of adjustment. Furthermore, we observe that the goodness of fit of the FE model is poor in comparison to the 2SLS model, especially when dynamics of adjustments are not taken into account. This indicates that unobserved country-specific variables do play an important role for fertility variations, which are captured by the 2SLS but not by the FE model. This reveals the necessity of adding further control variables to the FE model.

Table 3 shows the regression results of two-way FE estimations (country- and time-fixed effects) with standard robust errors and with several control variables. These control variables account for main factors of fertility besides family policies (economic development, women's emancipation, the labour market context, societal norms). We hereby return to our "static" framework without lags to simplify the interpretability of results. We use TFR as well as

tempo-adjusted fertility rates as endogenous variable to control for birth postponement effects.

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

Endogenous variable:	**total fertility rate (*TFR*)**					**tempo adj. *TFR***	
Type of regression:	Country & Time FE	Country & Time FE	Country & Time FE	Country & Time FE	Country & Time FE	Country & Time FE	Country & Time FE
Regressors:							
spending on cash benefits per child (%GDPpc)	0.0248***	0.0197***	0.0188***	0.0187**	0.0358***	0.0875***	0.0674***
	(3.55)	(3.57)	(3.62)	(2.84)	(5.56)	(6.92)	(6.20)
spending per birth around childbirth (%GDPpc)	0.00548***	0.00264**	0.00228**	0.00217*	0.00205*	0.000563	-0.000646
	(4.83)	(2.97)	(2.99)	(2.48)	(2.09)	(0.45)	(-0.68)
nb. paid leave weeks	0.000931***	0.000734***	0.000671***	0.000604***	0.000571**	0.000514	-0.0000351
	(4.49)	(4.61)	(4.22)	(3.64)	(3.17)	(0.74)	(-0.08)
enrolment young children (0-2) in childcare	0.00289*	0.00403***	0.00213	0.00252*	0.00541***	-0.00539***	0.000943
	(2.38)	(3.33)	(1.78)	(2.06)	(5.12)	(-3.41)	(0.64)
spending on childcare services per child (0-2) (%GDPpc)	0.00184	0.00153	0.00301*	0.00164	-0.00212	-0.0152***	-0.00513**
	(1.37)	(1.24)	(2.61)	(1.36)	(-1.62)	(-6.45)	(-3.03)
ln(GDP per capita)	-24.04***						
	(-5.61)						
ln(GDP per capita)²	1.176***						
	(5.48)						
female employment rate (25-54)		-0.0131***	-0.0186***	-0.0108***	-0.0198***		-0.0184***
		(-4.678)	(-3.77)	(-3.74)	(-7.23)		(-5.72)
women's avr. working hours		0.0000182	-0.000298	0.0000656	0.000239		0.0000351
		(0.09)	(-1.58)	(0.34)	(0.90)		(0.17)
unemployment rate (25-54)			-0.0181***				
			(-4.89)				
labour market protection				0.0145			
				(0.81)			
share of out-of-wedlock births					0.0124***		
					(5.01)		
linear time trends, country and time dummies	yes	yes	yes	yes	yes	yes	yes
N	274	228	228	222	191	161	120
nb. of countries:	18 [1]	16 [2]	16 [2]	16 [2]	14 [3]	11 [4]	9 [5]
time period:	1982-2007	1982-2007	1982-2007	1982-2007	1982-2007	1982-2007	1982-2007
R^2:	0.998	0.999	0.999	0.999	0.999	0.998	0.999
R^2 adj.:	0.998	0.999	0.999	0.999	0.999	0.998	0.999

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

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

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

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

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

[5] Austria, Denmark, Finland, Ireland, Italy, Norway, Portugal, Spain, Sweden

The first column of table 3 shows that all policy variables including childcare enrolment have a positive impact on total fertility rates when controlling for economic development. Furthermore, the impact of economic development on fertility turns out to be convex – a result which is in line with Luci and Thévenon (2010). The two coefficients of GDP per

capita and its square can not be interpreted separately. The positive coefficient of *ln(GDP per capita)²* implies that the second deviation of the estimation equation is positive, which confirms an minimum in the association between GDP per capita and *TFR*. This means that an increase of GDP per capita decreases fertility for small levels of GDP per capita and increases fertility from higher GDP-levels on. Adding GDP per capita to the exogenous variables makes it, however, impossible to interpret the value of the estimated coefficients of all exogenous variables. Three of the four policy variables are spending measures expressed as percentage of GDP per capita. This suggests the existence of strong multicollinearity between the exogenous variables. For this reason, GDP per capita is not longer included when other control variables are added.

Column 2 of table 3 shows the impact of our five policy variables on *TFR* when controlling for female employment in combination with women's average working hours. All policy variables keep their positive coefficient, including childcare enrolment which increases in significance. This suggests that childcare services are important to raise fertility once women get into paid work.

At the same time, female employment is found to be negatively associated with fertility for the two-way FE regression, implying that when female employment increases in one country over the observed time period, fertility tends to decrease. This suggests a conflict between fertility and female employment when there are no policies supporting a combination of work and family life. The finding of a positive impact of all family policies including childcare measures on fertility shows that countries have the possibility of modifying the association between fertility and female employment by providing policies that encourage women's work-life balance. This becomes evident when comparing the FE- to BE- and OLS-results: When estimating the specification of column 2 of table 3 with OLS and BE (not reported here), we find female employment to be positively correlated with fertility, while childcare

enrolment is also positively associated with fertility, suggesting that countries with higher female employment have both higher childcare enrolment rates and higher fertility rates.

The two-way FE-results are similar when controlling for birth postponement by using tempo-adjusted *TFR* as endogenous variable. In particular, a positive impact of spending on cash benefits is confirmed. Other policy variables are less significant for tempo-adjusted TFR, which is probably due to the fact that policies influence the timing of births more than the fertility "quantum". Moreover, the use of tempo-adjusted fertility rates as endogenous variable leads to an important reduction in the number of observations, as for seven out of 18 OECD countries, this variable is not available. As this concerns countries in which the fertility rebound has been rather significant over the last years (like France, the Netherlands, New Zealand, Belgium or the UK), estimation results based on tempo adjusted fertility rates have only limited explanatory power.

Overall, our results show that expenditures on families have an upward incidence on fertility rates, but their impact varies with the type of spending. The influence of cash benefits spent per child over childhood is about seven times larger than the spending made around childbirth with birth grants or parental leave benefits. Fertility is raised at a relatively high cost, however, since an increase of by 25% is needed to raise periodic fertility rates by 0.036 children per woman on average in the OECD (as given by the coefficient of the simpler model in column 2 in table 3). Spending in cash is also the only variable to have a significant impact on adjusted-tempo fertility rates above changes in childbirth timing. The increase in payments and/or the extension the duration of leave entitlement at childbirth have a much weaker influence, and there is no evidence that they significantly influence fertility "quantum", as measured by the tempo-adjusted fertility rates. The increase of childcare service coverage, which often accompanies the development of female employment, is found to increase periodic fertility rates *(TFR), ceteris paribus*. Thus, an increase of childcare service coverage

by 15 point of percentage is predicted to increase the TFR by approximately 0.01 children per women on average (predicted from coefficient of column 2 in table 3).

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.

Finally, increases in the share of non-marital births are found to be significantly positively correlated with an increase in fertility rates, suggesting that the latter goes hand in hand with a broader acceptance of births occurring outside traditional family models.

IV. 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 of economically advanced countries. 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 coverage. Since we use a comprehensive range of policy markers, our results help to understand some of the contradictory results that were obtained by 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 4 summarises the key results of the most recent cross-national studies analyzing the effect on fertility patterns of family policies in the areas of financial support, parental leave

and childcare[9]. Three studies – Gauthier and Hatzius (1997), Adsera (2004) and D'Addio and d'Ercole (2005) – are directly comparable to our study as they use the same measure of fertility – total fertility rates. Hilgeman and Butts (2009) use a different fertility measure which is 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 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 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.

[9] 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 4: Comparison of results of cross-national studies

	Explained variable	Financial transfer	Leave entitlements			Childcare provisions		Country and period covered – methodology
			Duration	*Payment rate of maternity leave*	*Spending per child (all leave included)*	*Spending per child*	*Enrolment rates*	
Gauthier and Hatzius (1997)	Total fertility rates (for women with 1, 2 or 3 and more children separately)	Positive	Positive but statistically insignificant	Negative but statistically insignificant	-	-		22 OECD countries 1970-1990 - Panel data methods
Adsera (2004)	Total fertility rates	-	Positive	-	-	-		28 OECD countries 1960-1997 - Panel data methods-
D'Addio and Mira d'Ercole (2005)	Total fertility rates	Positive	Negative	Positive	-	-		16 OECD countries 1980-1999 - Panel data methods
Hilgeman and Butts (2009)	Achieved fertility at age 18-45	-	Negative	Not significant	-	-	Positive	20 OECD countries, 1995-2000 waves of European or World Value Surveys – cross-sectional multilevel approach
Kalwij, 2010	Timing of birth Completed family size	No effect No effect	Not included	-	Positive No significant effect	No effect Positive	Not included	16 European countries - Event history analysis Information on individual fertility history from the European Social Survey 2004
Luci and Thévenon (2011)	TFR	Positive	Positive	-	Positive	Not significant	Positive	OECD countries 1982-2007 – Panel data methods
	Tempo-adjusted fertility rates	Positive	Not significant	-	Not significant (negative)	Negative	Not significant (positive)	

Besides our study, three other studies consider the duration of paid leave entitlements (Gauthier and Hatzius, 1997; D'Addio and d'Ercole, 2005; Hilgeman and Butts, 2009).

Hereby, D'Addio and 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 d'Ercole (2005). Kalwij (2010) considers only the average leave-related expenditure per child below age one, while in our study we sum up the annual expenditures per child for maternity and paternity leave, for parental leave and for birth grants.

Finally, only 3 studies include information about childcare services. Kalwij (2010) includes childcare expenditures (consistently 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 as well as Gauthier and Hatzius (1997) and D'Addio and Mira d'Ercole (2005) find 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. This finding contradicts Kalwij (2010), who finds no significant effect of gross public family spending per child for European countries, either on the probability of having children or on completed family size.

Results regarding the influence of leave entitlements also vary across studies, which is not unexpected given the potentially ambiguous effect that these entitlements can have on fertility. On the one hand, these entitlements support household income and labour market

attachment 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 5. Similarly to Adsera (2004), we find that an increase in paid leave duration has a positive impact on fertility rates. Gauthier and Hatzius (1997) find a similar positive but not statistically significant result. Controversely, 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, it is not clear whether the duration of leave entitlements increases or decreases fertility, but in any case its effect 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, 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 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.[10] We also find a strong positive effect of childcare coverage on fertility once we control for female employment rates. This highlights the important role of childcare services in avoiding a conflict between childbearing and labour market participation for mothers.

Overall, our results confirm that fertility trends depend crucially on the opportunities for mothers to combine work and family life. Family policy packages appear as important factors to explain why fertility rates are currently and sustainably higher in countries where women have a larger access to the labour market. The different policy instruments (paid leave, childcare services and financial transfers) are found to have a cumulative influence, suggesting that a continuum of support 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 first year after childbirth have a larger potential influence on fertility than leave entitlements and benefits for childbirth. Furthermore, some OECD countries, such as the US for example, do not have comprehensive family policy packages, but still show a fertility rebound. This suggests that unobserved country-specific factors still play an important role. For example, certain unobserved factors may influence fertility behaviour by enhancing the effectiveness of family policy (Thévenon, 2011b). These factors ensure that the policy instruments *comprehensively* support 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

[10] 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).

guaranteeing a stability of policies over time. In addition, other factors besides family policies can also be considered as unobserved factors which are important for fertility, such as specific labour market instruments or attitudes towards the role of women and the state. Individual response to these factors is likely to vary considerably between as well as within countries (Philipov et al., 2009). Whether and how the influence of these macro-level factors varies with individual characteristics is left to future exploration.

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