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 that has been 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. We test the robustness of our findings by controlling for birth postponement and for different national contexts, such as economic development, women's economic empowerment, labour market insecurity and family norms. We apply advanced estimation methods for macroeconomic panel data to control for endogeneity, omitted variable bias and non-stationarity. Our results suggest that a coherent policy mix supporting parents' work-life balance is likely to increase fertility. We discuss our results in light of the other studies assessing the impact of family policies on fertility trends.

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

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Introduction

After decades of continuous decline, fertility rates have started to re-increase in many OECD countries since the early-2000s. The overall rise is rather limited, with a total fertility rate *(TFR*) that reached a minimum at 1.63 in 1999 before rising up to 1.71 in 2008 on average in OECD countries. However, many countries have experienced a more significant "rebound", which has been particularly significant in Belgium, Denmark, Sweden, Czech Republic, Finland, France, the Netherlands, New Zealand, Norway, Spain, the United Kingdom or the United States. This reversal is arguably one consequence of the "postponement" of childbearing across cohorts: periodic fertility rates first decreased owing to younger generations delaying childbirths; this trend was reversed mainly in countries where the number of women giving birth once they turned to their thirty years of age and over grew significantly (Goldstein et al., 2009).

Other factors come in to play that explain why the fertility rebound happened in some, but not in all OECD countries. Economic development has been identified as one important factor, as fertility trends appear to be positively correlated with advanced economic development – though negatively linked to the earlier stage of economic development (Myrskyla et al., 2009; Luci and Thévenon, 2010). At high GDP levels, further economic development is likely to stimulate a slight increase of fertility rates. Economic development, however, explains cross-country differences in fertility trends only partially since countries with comparable levels of GDP per capita often achieve different fertility levels. Luci and Thévenon (2010) show that fertility rebound can only be observed in those highly developped countries where the participation of women in the labour market is high at the same time. Thus, the impact of economic development *per se* might be 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). In this context, four groups of main factors intersect with economic development for explaining cross-country variations in fertility trends.

First, family policy instruments that provide cash and in-kind resources for families are likely to influencing 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 that parents bear when raising children (Becker, 1965). Nonetheless, supports delivered to working parents to combine work with childbirth might also have a high impact since they help reducing 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). The provision of employment-protected leave entitlements after childbirths, on the one hand, and of childcare services which can substitute to parental care, on the other hand, are institutional factors that are especially expected to make children less costly. The evidence of the effectiveness of these family policy instruments is, however, relatively mitigated (for a survey, see Sleebos, 2003; Gauthier, 2007; or Thévenon and Gauthier, 2011).

Labour market characteristics are also an important dimension of the context in which fertility decisions are embedded. Their influence on fertility has been amplified with the growing prevalence of two-earner families and the increased participation of women in the labour market. This has contributed to the postponement of childbirths in situations where childbearing is often conditioned to the acquisition of a stable and secure position in the labour market (Blossfeld, 2005). In that context, fertility trends are likely to respond to unemployment rates or to the development of temporary work that make labour position relatively unsecure. By contrast, the guarantees offered by either public employment status or the legislation protecting employees against dismissal offer some financial security and

planability that is likely to have a positive influence on fertility (Sobotka, 2004; Koblas, 2011). It is likely, however, that these protections only benefit to a minority of households in countries where labour market segmentation remains quite high. In this case, a high degree of employment protection can signal a strong labour market dualisation (insiders vs. outsiders), which discourages fertility intentions of unemployed and of people in precarious employment (Esping-Andersen, 1999; Thévenon 2004).

Social norms play also a key role in shaping preferences regarding childrearing, regarding the timing of births and regarding gender roles (Lesthaeghe 2010; Liefbroer and Merz 2010). Norms are not fixed, however, and attitudes regarding childrearing and the gender division of work have been changing considerably over the past decades (Lesthaeghe, 2010). The decrease in marriage rates, and the opposite increase in the number of divorce, as well as the increase in the number of out-of-wedlock births are clear markers of these changes. However, the extent to which these changes have affected fertility rates is not straightforward. The influence of norms is indeed very likely to change over time, as norms themselves evolve. The experience of South European countries illustrates such changes, as in these countries, the decrease in fertility rates was first refrained but then occured much steeper than in other European countries (Kohler et al., 2002). The "resilience" of traditional family norms was first seen as a key factor that made these countries not experiencing declines in fertility. However, the time-delayed drastic fertility decline to the fact that Southern Europe experienced lowest-low fertility rates at a time when traditional norms started to loose their prescriptive power and clashed with women's increasing labour market participation. More recently, the erosion of traditional family norms and the greater acceptance of non-standard family and childrearing patterns have gone hand in hand with re-increases in fertility rates in some OECD countries. There is no single relation, however. The number of births outside marriage has increased in almost all OECD countries over the past decades, but their share of the total number of births remains low in Japan, Korea or Greece, while they contribute to over half of the total number of births in Estonia, France, Norway, Mexico, Slovenia and Sweden (OECD, 2011).

The above mentioned trends suggest that both changes in social norms and increases in women's economic "empowerment" have been key drivers of fertility trends. The increase in women's educational attainments, which comes hand in hand with an improved access to employment and income, gives women more power to fulfill their own aspirations and to influence household choices. This "empowerment" of women has already been identified as one cause of the postponement of family formation (Blossfeld, 1995), and was pointed out as the key explanation of the decrease in fertility rates in developed countries from the early 1970s to the late 1990s (Hotz et al., 1997). In this context, the evolution of fertility is more and more likely to depend on the extent to which policies can help households to combine work and family life, instead of forcing women and men to choose between children and career development.

Against this background, this paper assesses the contribution of family policies to cross-national variations in fertility trends. The influence of paid leave entitlements, childcare services and financial transfers to families on fertility trends is analysed with data for OECD countries covering a period of 25 years from 1980 to 2007. Our contribution is threefold. First, we extend previous findings by taking into account the three main types of policy instruments all together, whereas former studies mostly concentrate on only one or two aspects – the lack of available data being the main reason of such restriction. Thus, we look at the influence of the mix of different types of family support that supposedly respond to families' needs in time, money and service at childbirth and during the childrearing period. Second, we update previous results by looking especially at a time period covering the recent

upswing of fertility rates. A key issue is thus the extent to which policies have contributed to this reversal of fertility trends. Last but not least, we apply panel data methods that make possible to disentangle the "causal" impact of policy changes from country-constant characteristics that may affect fertility levels. Effort is also done to filter out the effect that birth postponement might have on fertility trends. This clear-cut distinction helps reconciling our results with those of previous studies.

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

Family policies in OECD countries: trends and key characteristics

Money, time and childcare support are key resources needed by households to have and raise children (Becker, 1965). As these costs rise, children become less affordable for actual and potential parents. Policy can affect fertility patterns in different ways. First, they may help households fulfil their fertility intentions by reducing the direct financial cost to parents or by reducing the indirect cost of children by relaxing the constraints that adults face in combining work and family. Second, reducing the costs of children may influence preferences on family size. However, for this to occur, policy support has to be sufficiently comprehensive and consistent over time (Thévenon and Gauthier, 2011).

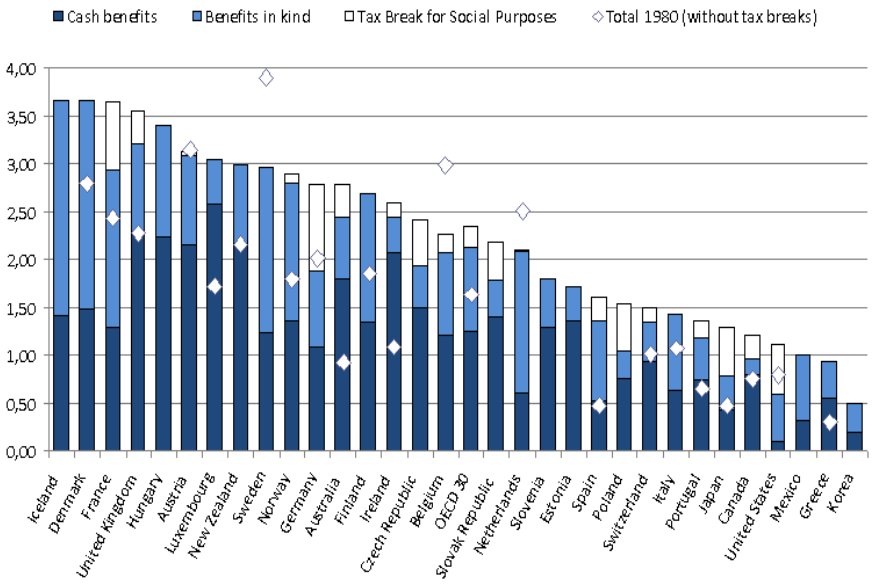
A range of family policies may influence the resources of different household types. These include tax benefits and cash transfers, childcare arrangements, and leave provisions. The arrangement of family policy instruments varies with each country's approach to policy objectives (Gornick, Meyers, and Ross 1997; Esping-Andersen, 1999; Meulders and O'Dorchai 2007; Thévenon, 2011). Cash, fiscal and in-kind supports for families have been introduced and developed at different times and serve a variety of family policy objectives. In most OECD countries, family policy instruments were often not specifically introduced to address fertility concerns, but to prevent family poverty. Today, the reconciliation of work and family life has become an important concern for family policies in many, but not all OECD countries. (OECD, 2011). Differences in size and key characteristics of family policies are described in the following paragraphs, whereas we consider not only cross-country differences but also changes over time.

Increasing investments for families

Global spending for families with children has been considerably increased over the past three decades as a result of growing concerns about families' well-being. Figure 1 shows that the share of GDP spent by governments for families – disregarding the expenditures on compulsory education – rose from an average of around 1.6% in 1980 to 2%-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, while just over 0.5 percent were spent, 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. The OECD average is calculated as the un weighted average of all available OECD countries. 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. No data on tax breaks for Chile, Estonia, Greece, Hungary, Israel, and Slovenia. Tax breaks are not used in Denmark, Finland, Iceland, Italy, Luxembourg or Sweden. Coverage of spending on family may be limited as such services are often provided, and/or co-financed, by local governments. This leads to large gaps in measurement of spending in Canada and Switzerland. Local governments also play a key role in financing childcare. This can make it difficult to get an accurate view of public support for childcare across a country, especially but not exclusively, in federal countries. Data is missing for Australia and Turkey. Estimates for 1980 are based on social expenditures data and do not include tax breaks.

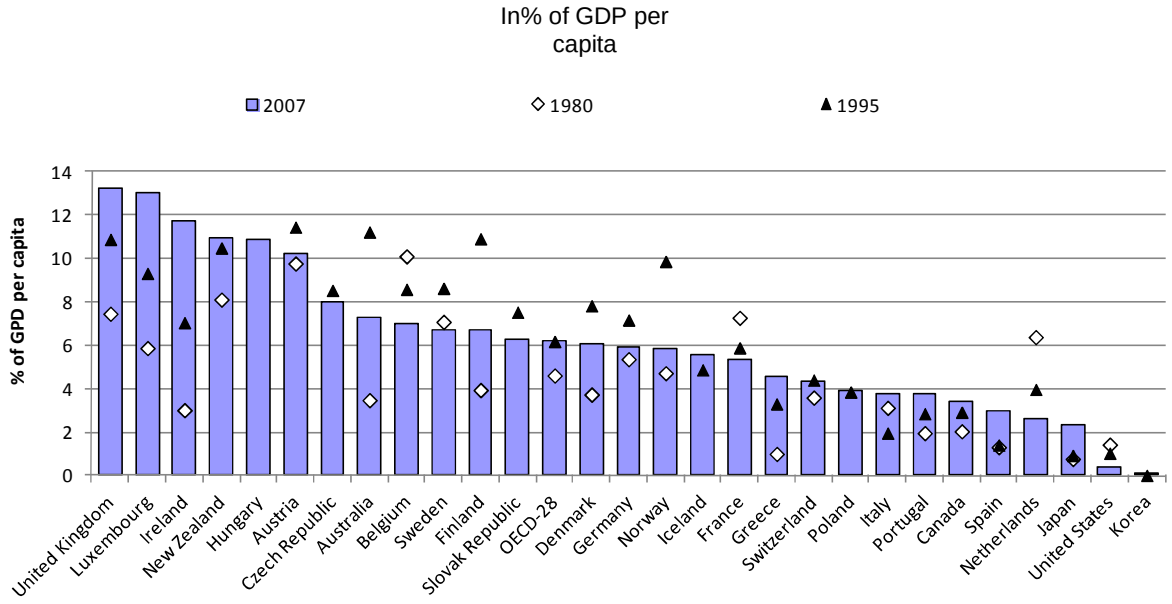
Data source: OECD Family Data Base (2010)

Financial transfers

The breakdown of spending into broad categories of policy instruments also varies greatly across countries. A first type of support is provided by financial support that occurs by two means: cash benefits and child-related tax advantages. Cash benefits are twofold: some benefits are granted around childbirth, as birth grants or as payment that can be received during the period for which parents leave employment after childbirth. Other benefits are paid for children on a regular basis. These benefits include mainly family allowances, child benefits or working family payments. A number of OECD countries also include on-off benefits such as back-to-school-supplements or social grants (for housing for instance) in these amounts. Overall, cash payments are often the main group of expenditures, adding up to 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 (disregarding the benefits received around childbirths or with leave payments). Interestingly, two English-speaking countries appear in an opposite position: the United Kingdom, on the one hand, showing the highest in-cash expenditure per child, while the United States stand at the bottom end, together with Korea. Even though the average amounts spent per child increased between 1980 and 2007, several countries also experienced expenditure decreases over the past decades. More precisely, about one third of countries experienced a decrease in the average spending since the mid-1990s.

Figure 2: Spending on cash-benefit per children under age 20



Data source: OECD Family Data Base (2010)

Child-related tax breaks are also a 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. The large majority of OECD countries provide such tax breaks, but their relative importance in the overall support to families varies quite widely (Figure 1). They are the main levy to support families in the United States and count for an important share of the overall money transferred to families in France and Germany.

Child-related leave-entitlements

Entitlements to leave employment after childbirth are a second wide set of support supplied to parents. Employment is protected during leave, so that parents can resume work after they have taken leave for some weeks. Different type of leave entitlements can often be combined. First, working mothers are entitled to a period of maternity leave (or pregnancy leave) at around the time of childbirth which protects the health of working mothers and their children and guarantees a return to the previous 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 jobs (See OECD, 2011, indicator PF2.1 for details).[1] Fathers are also entitled to specific rights to care for children at the time of childbirth, but these entitlements cover a short period that varies from 5 to 15 days following the birth.

Larger variations across the OECD countries come from parental leave entitlements supplementing the basic rights to maternity and paternity leave. Employed parents are entitled to additional weeks of "parental" and/or "childcare" if they are willing to care for their child for some period after maternity and paternity leave. These weeks of parental leave are most

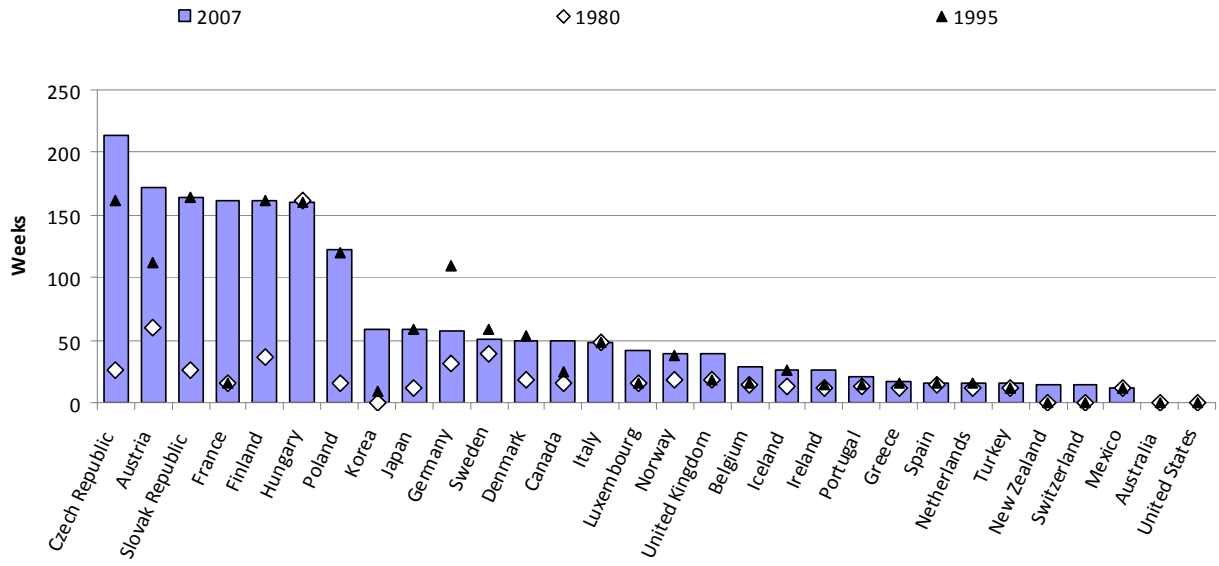
[1] Paid leave was introduced on 1 January 2011 in Australia.

usually taken just after maternity leave, though in some countries they can be taken much later during childhood (often before the child reaches the age of 8 years).

Payment is a key determinant for parents to take leave. However, as the payment received during leave does not offer a full replacement of the salary, and since wives very often earn lower incomes than their husbands, women are more likely than men to take over all or the majority of the leave period. Moreover, women most often do so to care for a newborn child in the aftermath of maternity leave. In this case, their absence from work can be prolonged. Thus, for women who were employed before childbirth, the associated opportunity cost of a child due to work interruption becomes quite high. Figure 3 adds *paid* weeks of parental leave to those of maternity leave entitlements, and shows that women can be out of work for around or more than 3 years 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, around or below 1 year in the other countries because periods of parental leave and of parental payment are shorter.

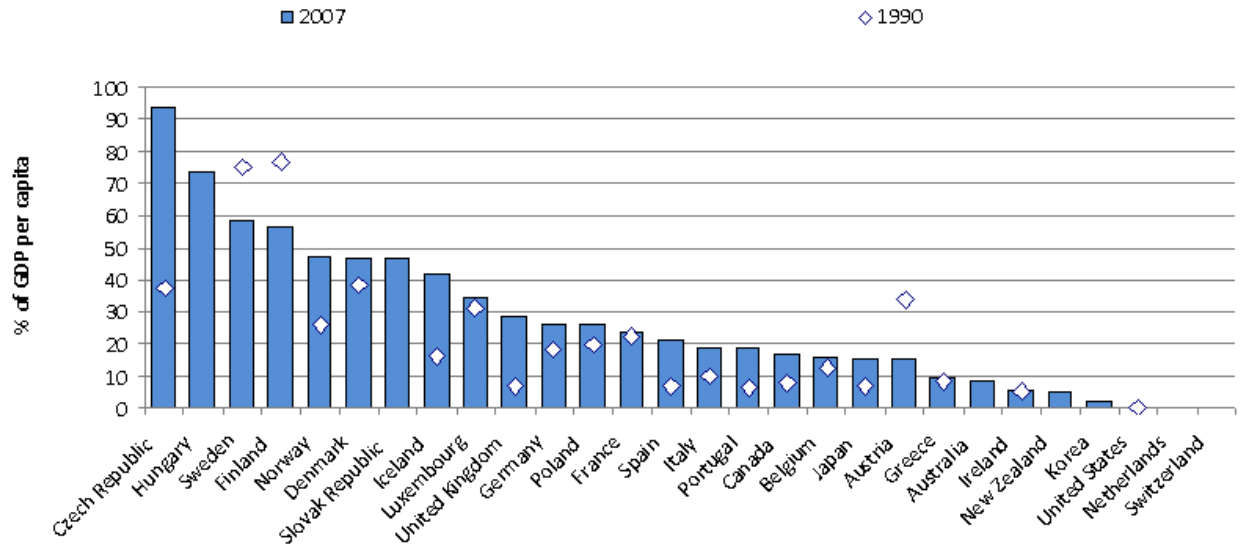
Figure 3 : Childbirth-related leave

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



Data source: OECD Family Data Base (2010)

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



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.

Data source: OECD Family Data Base (2010)

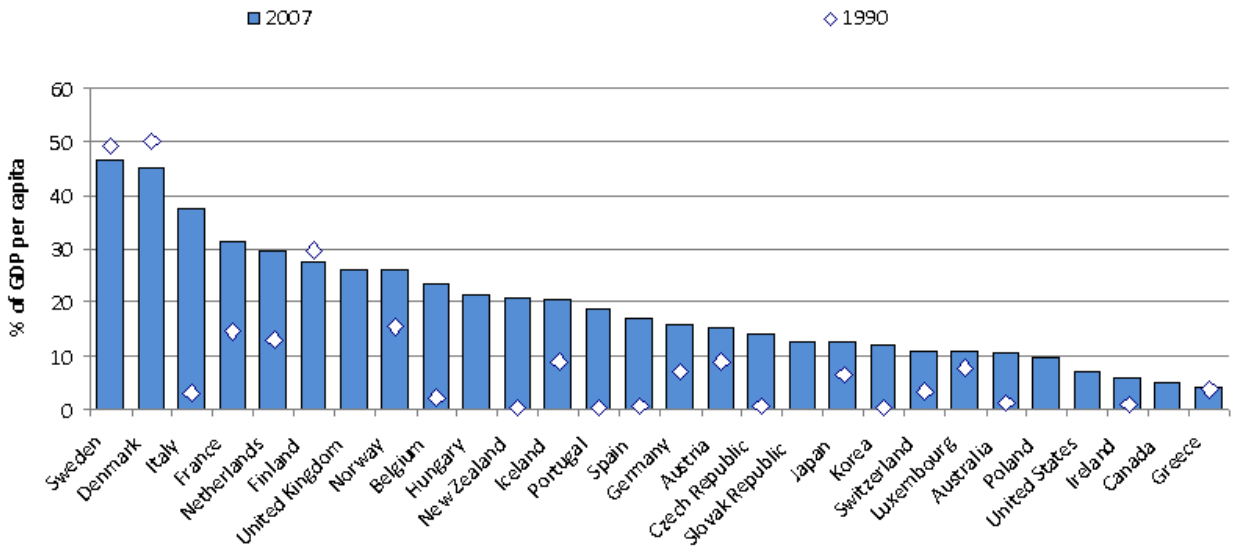
These differences in duration and payment conditions lead to substantial variations in the amounts spent per childbirth, as illustrated in Figure 3 Panel B. These amounts include the "birth grants" paid in some countries around childbirth to cover the expenses due to childbirth. Spending per birth relative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

Childcare services

Finally, childcare services that parents can substitute to 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 end education spending (OECD, 2011). Nevertheless, at almost 0.9% of GDP on average in the OECD, in-kind expenditures for children under school age still represent 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 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

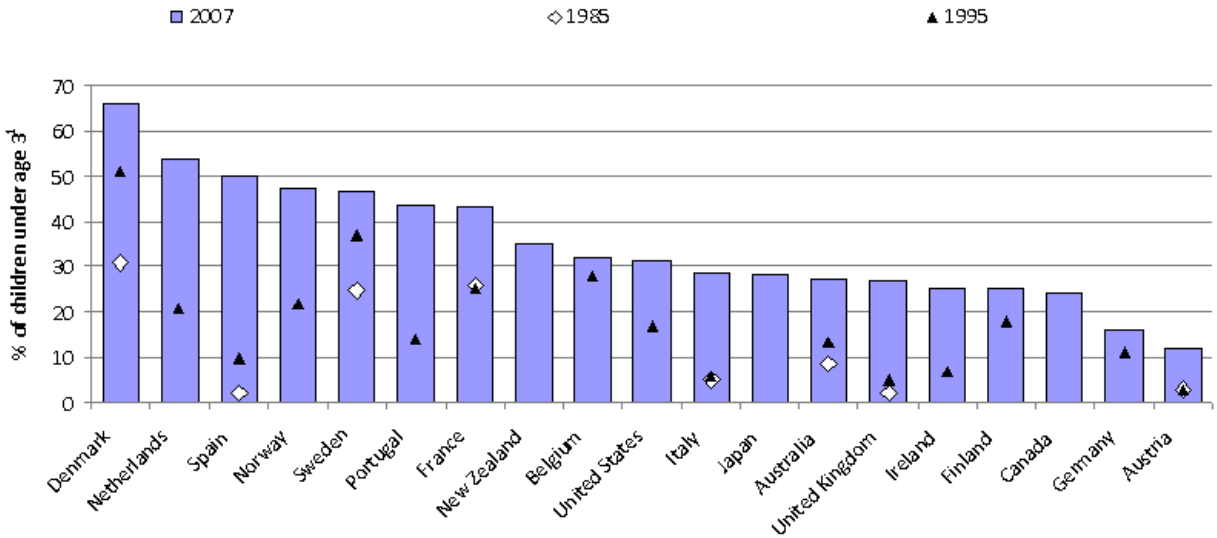
Panel A: Spending on childcare services per child in % of GDP per capita



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

Data source: OECD Family Data Base (2010)

Panel B: Proportion of children enrolled in formal childcare services



Data source: OECD Family Data Base (2010)

The expansion of child care coverage among children below the age of 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 children under the age of 3 find a place in day care centers. Germany and Austria are located at the other extreme. In Austria, care services cover not more than 12% of children under preschool age.

To sum up, OECD countries have considerably widened their investments to support families over the past decades. All types of supports 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. Differences were marked when parental leave entitlements were first introduced, and remained broadly constant, in spite of policy reforms that introduced limited changes except in few cases as recently in Germany. On the one hand, countries which were pioneers in introducing parental leave entitlements provide comparatively long periods of leave (up to three years), with rather low flat-rate payment (as in France for example). This parental leave scheme encourages particularly low qualified mothers to stay at home for child-rearing. On the other hand, countries where parental or childcare leave entitlements were introduced later and/or reformed recently (as in Germany) show shorter periods of leave, earnings-related payments and special incentives for fathers to take up parental leave, which encourages a combination of work and family life for mothers.

Last but not least, investments "in-kind" have especially increased over the last decade as a consequence of a growing demand for childcare services. One consequence of these growing investments is the large increase in the coverage of childcare services for children at or under preschool age. The percentage of children under age 3 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 together to provide more or less comprehensive support to families. Differences concerns especially the size and form of support allocated to working parents with children under the age of three (Thévenon, 2011). In that respect, Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden) outdistance the other OECD countries with comprehensive support to working parents with very young children (under 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 larger but very much targeted on low-income and focuses on preschool aged children. Continental and Eastern European countries form a more heterogeneous group with a more intermediate position. France and Hungary stand especially out of this group with relatively large support for working parents compared to other countries of this group.

Empirical Procedure

To analyze the impact of family policy packages on fertility trends in developed countries, we first specify our estimation model by defining our endogenous and exogenous variables. We then test several estimation methods with the intention to identify a causal effect of policy settings on fertility. Therefore, we distinguish between within- and between-country variations. Focussing on within-country variations allows us to disentangle the impact of policy changes from country-constant characteristics that affect fertility levels. Once the impact of policy changes on fertility is established, we apply several robustness checks. Hereby, we control for the dynamics of adjustment and add several control variables to the estimation model. We also address several methodological problems like endogeneity, non-stationarity and omitted-variable-bias.

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* implies only an imperfect control for tempo effects.

We use several family policy measures as exogenous variables in our empirical analysis. Instead of estimating their impact on fertility one-by-one, we combine them in the estimation model, as we suggest that the mix of policy instruments is more determining for fertility as single measures. For example, we consider the simultaneous control for the number of paid leave weeks in combination with childcare policies as important, as these variables can be interconnected. If countries increase the duration of paid leave, they tend to invest less in child care services as mothers are expected to stay at home to care for their children.

Policy variables have been constructed for 18 OECD countries[2], for which information is available over the years 1982 to 2007. Core family policy settings are captured by 5 variables, illustrated in the descriptive section above. Three of them measure public expenditure per child. By means of these three kinds of expenditures, governments attend to achieve three objectives: to complement families' income at childbirth, to complement families' income in the years after childcare and to provide childcare services:

- Spending on cash benefits per child under the age of 20 (in % of GDP per capita). (This measure includes cash benefits but not tax transfers[3])
- Spending on maternity leave per birth including birth grants (in % of GDP per capita)
- Spending on childcare services per child under the age of three (in % of GDP per capita)

In addition, 2 more 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 the age of 3 (in percentage of the total number of children of this age group).

We start with an Ordinary Least Squares (OLS) regression. Linear time trends are included (while eliminating the constant in the regression model) to capture year-specific shocks on

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

[3] 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. However, this variable is only available for a reduced number of countries and time periods.

fertility rates that may alter fertility responses to policy context. Then we compare a Fixed Effects models to a between-country estimator, as we consider it important to disentangle the impact of family policy differences within countries from cross-country variations to assess role of policies. The Between Effects estimator (BE) is based on time averages of each variable for each country. The Fixed Effects model (FE) performs regressions in deviations from country means. Due to the use of deviations from country means, FE eliminates unobserved country-specific variables that are constant over time. 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.

In a second step, a dynamic setting is used to account for the dynamic of adjustment and to allow time lagged fertility responses caused by policy changes. The introduction of lagged levels of the endogenous variable among the exogenous variables controls 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). Lagged exogenous variables in the estimation model allow for some time delay in fertility response to policy change. We do not simply use lagged exogenous variables in the estimation equation, but we perform an IV-regression in two steps (Two Stage Least Squares Estimator) by using lagged observations of the five family policy variables as instruments for current observations of these variables. Moreover, the use of lagged exogenous variables lessens the risk of obtaining biased and inconsistent estimators due to inverse causality between the endogenous and the exogenous variables[5]. However, the use of time-lagged exogenous variables only implies an imperfect control for endogeneity. Besides 2SLS, we apply the dynamic setting to the FE estimator.

Further controls for time-constant omitted variables and for time trends are made by applying a First-Difference Estimator[6]. In addition, we apply a System GMM estimation to combine controls for OVB, non-stationarity, endogeneity and for dynamics of adjustment[7]. We do not

[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 choose between the FE and the RE model. The Hausman test statistics suggests that the difference of the estimation results of the fixed and the random effects models is systematic. This implies that the hypothesis that the unobserved country effects are not correlated with the error term in the RE model must be rejected. Hence, for our data the fixed effect specification is superior to a random effects specification in controlling for unobserved country-heterogeneity.

[5] For example, it is not possible that *TFR* observed in 2007 impacts child care expenditure in 2004. On the other hand, it is likely that variations in fertility that lead back to changes in child care expenditure appear time-lagged

[6] 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.

[7] The System GMM estimator (Arellano and Bover 1995, Blundell and Bond 1998) combines a set of first-differenced equations with equations in levels as a "system", using 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. Therewith, the System GMM model proposes the most comprehensive control for a variety of econometric pitfalls for large macroeconomic panel data sets. However, lagged levels are likely to be poor instruments for differences, and differences are likely to be weak instruments for levels (Roodman 2009; Stock and Yogo 2002). Moreover, when applying System GMM, our estimation model is seriously over-identified. In order to pass the Sargan-tests, we have to base our estimations on 5-year-observations to reduce the number of instruments. This data transformation reduces the number of observations by 75%. Within-country variation becomes therewith seriously limited, which affects the significance of our regression results. Therefore, we consider the GMM model as not appropriate for our empirical analysis.

present FDE and GMM results as these models shape up as less appropriate for our empirical analysis compared to the Fixed Effects models.

A further robustness test consists of introducing control variables into the estimation model, as policy settings and fertility can also be influenced by the institutional context, which can vary not only between countries but also over time. We control for women's economic empowerment by adding female employment rates (women aged 25-54) to the exogenous variables. We add female average working hours at the same time to compensate for the fact those women's full-time equivalent employment rates are not available for large parts of our sample. We also add unemployment rates (ages 25-54) and an employment protection-measure to the model in order to control for the labour market context. Finally, we add the share of out-of-wedlock births as proxy for changes and differences in gender and family norms.[8] To avoid biased estimation results due to multi-collinearity, we do not include GDP per capita as control variable, which is indirectly correlated with all contextual variables and directly correlated with the three family policy measures expressed as expenditure in percentage of GDP per capita.

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

We run regressions as:

$$f_{it} = \gamma + \beta * p_{it} + control\ variables_{it} + \varepsilon_{it}$$

We use information at the country level (i) as well as on the time period level (t). 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.

Regression results

Table 1 shows the regression results for the OLS[9]-, FE-, two way FE- and BE- estimation models.

[8] Other policy-related context characteristics have been introduced, among others child mortality and home ownership as a proxy of housing support. However, the number of observations is not sufficiently high to get statistically significant parameters.

[9] As regression diagnostics suggest that heteroscedasticity is a possible issue in our data, we also use the OLS estimator with "heteroscedasticity-consistent" standard errors, i.e. robust standard errors. As the number of observations is relatively small, we also use OLS with HC3 robust standard errors proposed by Davidson and MacKinnon (1993). In addition, we estimate a model using a bootstrap with 1000 replications, which computes a bias-corrected and accelerated 95% confidence interval of the OLS-coefficients. For this method, no assumptions about the sampling distribution or about the statistic are needed. 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.

Table 1

Endogenous variable:	total fertility rate (*TFR*)			
Type of regression:	Pooled OLS	Fixed Effects	Two Way Fixed Effects	Between Effects
Regressors:				
spending on cash benefits per child (%GDPpc)	0.0300***	0.0168*	0.0181**	0.0251
	(7.30)	(2.25)	(2.62)	(1.74)
spending on maternity leave (%GDPpc)	0.00216*	0.00348**	0.00681***	0.00319
	(2.16)	(3.04)	(6.00)	(0.57)
nb. paid leave weeks	-0.00176***	0.00102**	0.00136***	-0.00209
	(-5.00)	(2.81)	(4.02)	(-0.88)
enrolment young children (0-2) in childcare	0.00495***	-0.00113	-0.000905	0.00997
	(3.84)	(-1.18)	(-0.70)	(1.00)
spending on childcare services (0-2) (%GDPpc)	-0.00145	-0.00244	-0.00228	-0.00593
	(-0.99)	(-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	0.996	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 of income support over childhood, as measured by spending on cash benefits per child, on fertility. This is also the case for spending on maternity leave.

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 child care enrolment on total fertility rates. In comparison to the OLS results, the coefficients estimated by the BE model keep their sign, but they all loose 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 punishes 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. The significant coefficients confirm that within-country differences of family policies are larger than between-country differences, and fertility variations in our sample are mainly due to changes in the family policy setting over time.

The OLS estimation, which captures both within-and between-country variations, shows a negative correlation between the number of paid leave weeks and fertility. 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, 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 child care enrolment gets insignificant.

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

The adjusted coefficient of goodness of fit (R^2) for the OLS regression is 0.345 without and 0.986 with controlling for time effects, suggesting that time effects play an important role for fertility in our data base. This supports our intention to take into account time effects more adequately in the following step.

Table 2 presents regression results based on dynamic settings. Column 1 and 3 present a 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

Endogenous variable:	total fertility rate (*TFR*)			
Type of regression:	2SLS	2SLS dynamic	Fixed Effects	Fixed Effects dynamic
Regressors:				
[spending on cash benefits per child (%GDPpc)] $_{t-1}$	0.0309***	0.00190*	0.0168*	-0.00326
	(7.27)	(1.97)	(2.18)	(-1.13)
[spending on maternity leave (%GDPpc)] $_{t-1}$	0.00169	-0.000737***	0.00240*	-0.000594
	(1.64)	(-3.40)	(2.05)	(-1.35)
[nb. paid leave weeks] $_{t-1}$	-0.00187***	0.0000581	0.000791*	0.00000249
	(-5.01)	(0.71)	(2.07)	(0.02)
[enrolment young children (0-2) in childcare] $_{t-1}$	0.00517***	0.000626*	-0.000477	0.000906*
	(3.82)	(2.17)	(-0.48)	(2.46)
[spending on childcare services (0-2) (%GDPpc)] $_{t-1}$	-0.000567	0.00101**	-0.0000481	0.00175***
	(-0.38)	(3.27)	(-0.04)	(3.50)
[TFR] $_{t-1}$		0.977***		0.887***
		(75.52)		(38.49)
constant	1.362***	0.00983	1.420***	0.166***
	(42.90)	(0.51)	(30.33)	(4.50)
N	259	259	259	259
nb. of countries:*	18	18	18	18
time period:	1982-2007	1982-2007	1982-2007	1982-2007
R^2:	0.380	0.973	0.095	0.876
R^2 adj.:	0.368	0.972	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.

We first compare the 2SLS results to the OLS results in table 1. The signs of the 2SLS results differ only when controlling for the dynamics of adjustment (column 2). The estimated coefficient of spending on maternity leave turns significantly negative, while child care expenditure gets significantly positively correlated with total fertility rates[10]. The Fixed Effects model with control for the dynamics of adjustment (column 4) also suggest a positive impact of both child care enrolment and child care expenditure on fertility.

The control for the dynamics of adjustment suggests that the influence of family policies on fertility depends on the original fertility level. It is likely that if fertility is high, investments in childcare are also rather high, which leads to a positive correlation between both variables.

The goodness of fit of the FE model is small in comparison to the 2SLS, 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 regression results of two way FE estimations with control variables, while a "static" framework is kept in order to focus on long-run associations. We control for side effects on fertility by using *TFR* as well as tempo adjusted fertility rates.

[10] Increasing the time lag of the exogenous variables (3-5 years) increases the goodness of fit of the model, implying that fertility reacts time-delayed to changes in the policy setting.

Table 3

Endogenous variable:	total fertility rate (*TFR*)				tempo adj. *TFR*	
Type of regression:	Two Way Fixed Effects	Two Way Fixed Effects	Two Way Fixed Effects	Two Way Fixed Effects	Two Way Fixed Effects	Two Way Fixed Effects
Regressors:						
spending on cash benefits per child (%GDPpc)	0.0197***	0.0188***	0.0187***	0.0358***	0.0875***	0.0674***
	(3.70)	(3.75)	(3.37)	(5.72)	(6.40)	(6.14)
spending on maternity leave (%GDPpc)	0.00264**	0.00228*	0.00217*	0.00205*	0.000563	-0.000646
	(2.83)	(2.58)	(2.40)	(2.14)	(0.37)	(-0.57)
nb. paid leave weeks	0.000734**	0.000671**	0.000604*	0.000571*	0.000514	-0.0000351
	(3.04)	(2.94)	(2.52)	(2.38)	(0.65)	(-0.06)
enrolment young children (0-2) in childcare	0.00403***	0.00213	0.00252*	0.00541***	-0.00539**	0.000943
	(3.59)	(1.89)	(2.24)	(4.64)	(-3.16)	(0.54)
spending on childcare services (0-2) (%GDPpc)	0.00153	0.00301*	0.00164	-0.00212	-0.0152***	-0.00513**
	(1.29)	(2.60)	(1.43)	(-1.62)	(-7.24)	(-2.88)
female employment rate (25-54)	-0.0131***	-0.0186***	-0.0108***	-0.0198***		-0.0184***
	(-5.68)	(-7.60)	(-4.81)	(-8.18)		(-6.31)
women's average working hours	0.0000182	-0.000298	0.0000656	0.000239		0.0000351
	(0.10)	(-1.61)	(0.36)	(1.09)		(0.15)
unemployment rate (25-54)		-0.0181***				
		(-4.88)				
labour market protection			0.0145			
			(0.79)			
share of out-of-wedlock births				0.0124***		
				(5.04)		
linear time trends	yes	yes	yes	yes	yes	yes
country dummies	yes	yes	yes	yes	yes	yes
time dummies	yes	yes	yes	yes	yes	yes
N	228	228	222	191	161	120
nb. of countries:	16 [1]	16 [1]	16 [1]	14 [2]	11 [3]	9 [4]
time period:	1982-2007	1982-2007	1982-2007	1982-2007	1982-2007	1982-2007
R^2:	0.999	0.999	0.999	0.999	0.998	0.999
R^2 adj.:	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] Australia, Astria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, New Zealand, Norway, Portugal, Spain, Sweden, UK

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

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

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

When controlling for female employment in combination with women's average working hours, all policy variables turn out to have a positive impact on total fertility rates. Once controlled for women's "empowerment", childcare enrolment has a positive impact on *TFR*. This suggests that child care services are important to raise fertility once women get into paid work.

At the same time, female employment is negatively associated with fertility for the two way FE regression, suggesting a conflict between fertility and female employment when there are no policies supporting a combination of work and family life. When we estimate the specification of column 1 with OLS (not reported here), we find female employment positively correlated with fertility, while child care enrolment also is positively associated with fertility. This finding again shows that the distinction between within- and between-country variations is highly relevant for our analysis. The FE-results suggests that when female employment increases in one country over the observed time period, fertility tends to decrease. However, countries have the possibility to interfere in this association by providing child care services. This becomes evident due to the OLS-result, which suggests that countries

with higher female employment also have higher child care enrolment rates and higher fertility rates at the same time.

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".

Labour market insecurity, as measured by unemployment, has a significantly negative impact on fertility. This suggests that most households demand financial security and a foreseeable future to found a family or to have more children.

Finally, increases in the share of out-of-wedlock births are found to be significantly positively correlated with fertility, suggesting that the erosion of traditional family norms goes hand in hand with re-increases in fertility. It seems that in modern societies, patchwork families and lone parents become more and more socially accepted, which comes along with higher levels of fertility and female employment.

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. Findings of these studies differ for reasons such as the use of different fertility indicators and different policy variables as well as a different geographical and period coverage. Since we use a comprehensive 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, however, limited due to 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 the variations in fertility "levels". Comparing our result to those of other studies using other measures helps to more accurately comprise the scope and limit of our own results. By doing so, some general conclusions on policy effectiveness can be drawn.

Figure 5 summarises the key results of the most recent cross-national studies analyzing the effect of family policies in the areas of financial support, parental leave and childcare on fertility patterns[11]. 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 between 18 and 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 those of a childless household with same earnings to

[11] 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 (Sleebos, 2003; Gauthier, 2007; Thévenon and Gauthier, 2011).

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.

Figure 5: Comparison of results

	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 Tempo-adjusted fertility rates	Positive	Negative	-	Positive	Negative	Positive	OECD countries 1982-2007 – Panel data methods

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. Leavev 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 1 while 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 the childcare services. Kalwij (2010) includes child care expenditures (consistently with his expenditure-based approach), while Hilgeman and Butts (2009) test the impact of enrolment of children below age 3 in formal child care on fertility. Our study includes both child care expenditure and child care 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 find that the average amount of cash benefits per child has a positive impact on TFR, which is confirmed when adjusted-tempo fertility rates are taken into account to control for changes in the timing of births. This result contradicts those of Kalwij (2010), who found no significant effect of gross public family spending per child on the probability to have children or on completed family size for European countries.

Results regarding the influence of leave entitlements also vary across studies, which is not unattended given the a priori ambiguous effect that these entitlements can have on fertility. On the one hand, these entitlements support household income and labour market attachment around 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 less than 3 years of age. However, leave duration tends to be longer in countries where the provision of childcare services, which parents can substitute to 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 deficit in childcare service 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 around childbirth by payment associated with leave or birth grants also affect 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 leave payments with leave duration, finds a small positive effect of leave payments on fertility. However, leave payments might affect the timing of births more than than the size of the completed family, as argued 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 between 18 and 45 in

the early 2000s.[12] Our evidence is however less clear, as we also found a strong positive effect of cross-national differences in both enrolment rates and spending on childcare services on TFRs, but the influence of an increase in childcare availability over time does not appear to be always significant. A positive impact of childcare service provision recurs once female employment rates are controlled. This suggests that at high levels of female employment, an increase in childcare provision is associated with an increase in fertility rates. Thus, childcare services emerge as a key factor for fertility as they allow parents – and particularly mothers - to combine childrearing with labour market participation.

Overall, our results confirm that fertility trends depend crucially on the opportunities for mothers to combine work and family life. Family policy packages can have a significant role to increase these opportunities. The more countries comprehensively combine paid leave, chilcare service and financial support to reduce barriers for parents to combine work and family life, the higher is the probability that the family policy mix is positively associated with fertility. Nordic European countries and France appear hereby as trailblazers offering a coherent mix of support for all family types. These countries suggest that continuous monetary support over childhood has to be combined with all-day child care services for children of all ages in order to allow parents to return to the labour maket after parental leave.

Finally, our results show that family policies do contribute to explain, but can not explain all fertility differentials over time and between countries. In the USA, for example, fertility is on a relatively high level but at the same time federal public family policies are more limited. And in New Zealand and Australia, for example, the end of birth postponement is found to play a major role for the fertilty rebound. Thus, besides family policies, the labour market context, gender and family norms and the progress of birth postponement also emerge as influential factors for fertility.

[12] 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 parental fee paid for affordable good-quality childcare can have a substantial effect on fertility rates, especially when coverage of childcare is widespread (Mörk, *et al.*, 2009).

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