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Family and Childcare Support Public Expenditures and Short-Term Fertility Dynamics

Summary: In a period of very low fertility, effective family and childcare support policy measures are needed. From a wide range of instruments available to government intervention, we focus on public expenditures effects on short-term fertility. Using a sample of 28 European countries in a panel framework, we found that there is a small positive elasticity of crude birth rate to cash benefits related to childbirth and childrearing provided through social security system. Different public services provided to ease the burden of parents and all other benefits in kind, means or non-means tested, are found to be insignificant. These results are robust to alternative methods of estimation. Controlling for country heterogeneity by religion and by culture, some particularly interesting differences in birth rate determinants were highlighted as well.

Key words: Social security, Fertility.

JEL: H55, I38.

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In the past decades, in most European countries, fertility reached such low levels which are far below the necessary replacement levels. This important demographic dynamic has been a serious concern both for researchers and policy makers. There are two reasons for these concerns.

First, such demographic dynamic, coupled with an ageing population, could have significant negative implications for countries with pay-as-you-go public social security systems, affecting the future sustainability of the welfare state (Ronald Lee 2003; Peter McDonald 2006; Gerda Neyer 2006). These evolutions triggered social spending reforms, leading to a process of convergence of social welfare systems across Europe (Nicole Attia and Valérie Bérenger 2007, 2009). Moreover, higher imbalances in public social security system due to the increasing dependency ratio translate either in crowding out of other desired public expenditure either in higher public debt (European Commision 2009). These possible outcomes affect both the assumed purposes and the financial soundness of the welfare state.

Second, the resulting reduction in labour supply of young skilled workers could affect economic growth if a corresponding increase in productivity does not offset it (David E. Bloom, David Canning, and Günther Fink 2010).

Either way, government intervention through pro-natalist policies is needed. But, in order to be effective, public policies should target adequately the determinants of such demographic dynamic. The literature highlights a wide range of eco-

nomic, social and cultural causal factors for childbirth behavior dynamics (see Joëlle E. Sleebos 2003 for a review).

A wide range of instruments which affect fertility behavior of the population is available for government intervention. Family and childcare support public expenditures could lower the cost of children through child-related cash benefits and provision of subsidized services, like accommodation, and offer support in combining work and family, through subsidized childcare and home help. In this matter, various labor market arrangements could be made in order to ease time constrains faced by the parents, like maternal and parental leaves, and availability of part-time employment. Also, fiscal policy measures could play a significant role through tax reductions and tax credits granted for families with children. Though we acknowledge the importance of all these possible policy instruments and transmission channels, we will restrict our analysis to family and childcare support public expenditures.

Empirical studies realized so far focus on long-term effects of family friendly policies, using different forms of fertility rate as the main variable of interest. This is a natural acknowledgement of the fact that the women behavior regarding childbirth decisions during their entire life is one of the most significant determinants of population dynamics. But such a choice induces complex methodology issues and challenges the researchers in their attempt to identify the proper marginal effect of various instruments of pro-natalist policies. A review of the empirical studies and their findings is presented in the next section.

Instead, this paper narrows the focus on short-term efficiency of family and childcare support public expenditures. Using a panel of 28 European countries, the elasticities of the crude birth rate to three aggregate measures of relevant public expenditures are estimated.

The rest of the paper is organized as follows. In the next section is discussed the literature on family and childcare support public expenditures impact on fertility decision. Section 2 presents the empirical methodology used and the main results. Section 3 concludes.

1. Literature Review

At the core of the assumed relationship between family and childcare policies and childbirth decisions stands the neoclassic economic theory of fertility. The rational choice model developed in Gary S. Becker (1981) and Alessandro Cigno (1991) relies on the idea that the demand for children is a function of individual preferences and the cost of children.

In this context, the policies for family and childcare support could have a positive effect on fertility reducing the cost of children and influencing individual preferences. The complex mechanisms of these various transmission channels and the related empirical evidence are discussed in detail in this section.

The direct cost of a child is the net actual expenditure on that child (excluding any financial benefits that are received through the tax-transfer system because of the child's presence). In this matter, public policies could ease the parents' financial burden by offering free or subsidized public services related to child rearing (like childcare or education). If the parents are aware of the direct costs of children within their

own society and the corresponding public policies, they will include in their childbirth decision function the financial benefits received directly or indirectly from the social security system. This is extremely valuable for many families (especially in the developing countries) for which the cost of child rearing creates a financial burden, which could prove to be an insurmountable barrier in having a child.

The indirect cost of a child for parents is represented by the earnings lost by the parents because of the time spent on childbearing and child rearing. This cost was found to be higher for parents with higher education and a high level of income (Anne H. Gauthier 2007).

In the past decades, the level of education of women has increased in most countries, with negative effects on their fertility. Spending more time for their education resulted in late first childbirth, with fewer years left for other births. The rising age at childbearing is one of the most fertility-depressing factor (John Bongaarts 2001). For developed countries, this trend of delays in childbearing is increasing, persistent and arguably irreversible (Hans-Peter Kohler, Francesco C. Billari, and José A. Ortega 2002).

Also, increasing level of women education boosted their career ambitions, fostered their labour force participation and increased their financial independence. Consequently, the time left for family reduced dramatically, and the individual preference for children weakened. Several studies have provided evidence of a negative relationship between fertility rates and education at the level of individuals (e.g. Martine Corjin and Erik Klizijng 2001; Alicia Adserà 2004). Moreover, highly educated women have a greater awareness of health problems associated with childbirth and of contraceptive technologies, so they are better prepared to avoid undesired pregnancies and births (Anna C. D'Addio and Marco M. D'Ercole 2005). However, Namkee Ahn and Pedro Mira (2002) and Henriette Engelhardt and Alexia Prskawetz (2004) stressed that, in the late period, the sign of this correlation has changed. In this context, it seems that any policy that eases the labour force participation constraint of actual or potential mothers would have a beneficial effect on fertility (Ronald R. Rindfuss and Karin L. Brewster 1996).

As regarding the connection between individual income and fertility, there is quite clear that higher individual earnings increase the opportunity cost of not working in the event of childbirth and childcare. In this context, policies consisting in different kinds of child-related cash benefits and maternity leave benefits are expected to contribute to fertility rate improvement. Supplementing the parents' income, these cash benefits will tend to reduce the opportunity cost associated with having children.

It should be mentioned that in the presence of a cash benefit, a parent could choose not to have an additional child, but to invest more in the children that he already had. Such quality-quantity trade-off made by the parents (Becker and Gregg H. Lewis 1973) could reduce the pro-natalist impact of policies relying on child cash benefits. In fact, a policy will be effective only if the income effect (higher household income will increase parents' demand for children) exceeds the substitution effect (higher household income will also lead to a higher demand for "quality" of children, thereby reducing the number of children demanded by parents) (D'Addio and D'Ercole 2005).

Social security policies aimed at offering to the parents the possibility to combine work and family could lead to a decrease in the indirect costs associated with children and consequently, to an increase in fertility. The success of these kinds of policies may partly explain why countries with high labour force participation rates for mothers have relatively high fertility, and countries with low participation of mothers have unusually low fertility (David Coleman 1999). Increased expenditures on family policy programs that help women to combine family and employment - and thus reduce the opportunity cost of children - generate positive fertility responses (Adriaan Kalwij 2010).

Both of these direct and indirect costs associated with childbearing and child rearing are essential for individual childbirth decisions, but they do not count in the same way. Bruce Chapman et al. (1999) argued that indirect costs are more significant than direct costs in determining whether the first birth decision, while direct costs are more significant in decision-making about later children.

Summarizing, policies such as child and family cash allowances, tax relief for children, subsidies to childcare, and maternity and parental leave benefits are consequently all expected to have a positive effect on fertility by reducing the direct or indirect (opportunity) cost of children or by increasing individuals' income. This assumption is confirmed by the empirical studies realized so far, even if they find a positive but weak relationship between family and child care public expenditure and fertility.

Cross-country analysis suggests that total fertility rates are positively correlated with wider childcare availability, lower direct costs of children, higher availability of part-time jobs for mothers and longer maternity leaves. Taking into account the endogeneity of some of the explanatory variables and allowing for dynamic effects, panel data estimates indicate so far that total fertility rates are positively correlated with cash benefits for families with children, labour market arrangements which allow mothers to combine family and career responsibilities (for a survey, see Gauthier 2007). Individual country empirical studies confirm the results obtained in a multi-country setting. For instance, Joshua Goldstein, Wolfgang Lutz, and Maria R. Testa (2003) had shown that when German welfare state contracted, reducing public expenditure for family and child care support, German families have responded by having fewer or no children. The same dynamic has been documented for Sweden (Britta Hoem and Jan M. Hoem 1997), where fertility responded to positive welfare state initiatives in the late 1980s and has responded in the opposite direction to the rolling back of the welfare state in the 1990s. In the case of Switzerland, Giuliano Bonoly (2008) highlighted the importance of childcare, but also of the level of family benefits as determinants of fertility rates.

2. Methodology and Results

2.1 Data and Methodology

The initial empirical sample consisted in 30 European countries (EU27, Norway, Iceland and Switzerland). Due to some missing observations, Bulgaria and Poland were excluded from the sample. Data for 2000-2008 period were extracted from Eurostat database.

In order to capture short-term fertility dynamics, as dependent variable we used crude birth rate (CBR), which measures the ratio of the number of live births during the year to the average population in that year. The raw values were expressed per 1000 inhabitants.

To depict the effects of pro-natalist public expenditures, some measure of family and childcare support public expenditures should be included as an independent variable in the empirical model. However, given the diversity of public expenditure for family and childcare support, three independent variables of interest where compiled aggregating similar instruments of public pro-natalists policies: all cash benefits related to childbirth and childrearing (CASH), all public services provided to ease the burden of parents (SERVICES) and all other benefits in kind, means or non-means tested (INKIND). All cash benefits granted for parents were grouped into a single variable (CASH), accounting for the fact that the total amount of cash benefits received by the parents and not their variety is the most relevant for childbirth decisions (Gauthier and Jan Hatzius 1997). Second variable (SERVICES) grouped specific services, such as child care, accommodation or home help, provided by the state in order to ease labour market constraints faced by parents and to help them combine family and employment. The third variable (INKIND) comprised other various goods and services publicly provided for families, including reductions in prices, tariffs, fares, and so on. The components for each of these three variables are presented in Table 1, together with a brief description. All raw values for these variables were expressed in percent of gross domestic product.

In order to capture the marginal effect of different types of family and childcare support public expenditures on crude birth rate, three control variables were included into the empirical model: gross domestic product per capita (GDPPC), crude marriage rate (CMR), and unemployment rate (UR).

Crude marriage rate (CMR) is expected to be positively related to birth rate. In many countries marriage is still the norm when it comes to long-term relationships and children are more likely to be born inside marital unions. However, changes in values and attitudes specific to second demographic transition (Ron Lesthaeghe and Hein G. Moors 1996; Dirk J. van de Kaa 2001) affected marital union formation as well. The decreasing strength of the relation between marriage rate and fertility rate was documented in Kohler, Billari, and Ortega (2002).

Gross domestic product per capita (GDPPC) expressed in euro per inhabitant was used as a proxy for economic development and standard of living. When it comes to childbirth decision, an increase in the parents' income could lead either to childbirth (increasing the birth rate) or to higher investments in the children they already have (leaving birth rate unaffected). In terms of the quantity-quality tradeoff the parents face, an increase in income would boost birth rate only if income effect is greater than substitution effect.

Unemployment rate (UR) was used as a proxy for economic uncertainty in the labour market. If expectations regarding future economic situations enter the parents' childbirth decision function then an increase in unemployment is expected to depress the birth rate. So far, empirical evidence highlighted a strong negative effect of unemployment on fertility (see, for instance, Adserà 2004).

All variables were transformed using natural logarithms, so the estimated coefficients will represent elasticities.

Data were grouped in a panel (N=28, T=9). The general structural form of the preferred empirical model is the following:

$$CBR_{it} = \alpha + \beta_1 \mathrm{CASH}_{it} + \beta_2 SERVICES_{it} + \beta_3 INKIND_{it} + \\ + \beta_4 CMR_{it} + \beta_5 GDPPC_{it} + \beta_6 UR_{it} + \epsilon_{it} \quad (1)$$

with $\varepsilon_{it} = \alpha_i + u_{it}$, where α_i is the individual country effect, and u_{it} is an idiosyncratic error component.

Following the procedure described in Cheng Hsiao (1986), a set of poolability tests were employed. The results are shown in Table 3.

For the first test, the null hypothesis of complete homogeneity (both intercept and slope parameters are invariant across countries and across time) was strongly rejected by an F-test ($F(159,56)=107.11$, $p<.001$).

Second test was aimed to assess the null hypothesis of common slope parameters. The result indicated a rejection of the null ($F(162,56)=13.65$, $p<.01$), although the test value is not well above the critical value calculated using Edward E. Leamer's (1978) correction ($F_{crit}=11.74$). Particularly this result should be carefully considered. As pointed out in Hashem M. Pesaran and Ron P. Smith (1995), very often the F-test for common slope parameters rejects the null. Monte Carlo simulations conducted in Maurice J. Bun (2004) confirmed the overrejection of poolability hypothesis in finite samples. Moreover, in panels with $T<10$, as Badi H. Baltagi et al. (2003) pointed out, homogenous panel estimators are the only viable alternative. Given the time length of our panel and the previous arguments, we choose to accept the common slope parameters hypothesis, despite the result of the F-test. However, the rather strong assumption of slopes homogeneity will be relaxed latter, when we will allow for different slopes parameters for different subsamples defined according to religion and culture criteria.

The validity of individual effects was confirmed by a third F-test for the null hypothesis that all $\alpha_i=0$ ($F(27,218)=68.77$, $p<.001$). Individual country effects are useful to capture the unobserved country-specific variation in a single country-specific intercept. This specification focuses on the within country variation over time, every α_i representing a cross-country average of the longitudinal effect. Moreover, this choice will give an additional benefit: controlling for country individual effects reduces the possible omitted variable bias.

Another specification issue which should be addressed regards the inclusion of some time effects in the empirical model. If included, time effects are expected to capture the influence of some developments over time (i.e. external shocks) common to all countries with a certain impact on birth rate. In our case, a specification with time effects might be redundant, since the impact of economic shocks were already captured in gross domestic product per capita (GDPPC) and unemployment rate (UR) control variables included in the model. Nevertheless, given the financial crisis of 2008, a time-control dummy variable was created for this year and inserted in the empirical model. However, it proved to be insignificant and dropped from the empirical specification.

As for estimation methodology, we assumed first that $Cov(X_{it},\alpha_i)\neq 0$ and ran a one-way (cross-section) fixed effects estimation. We followed the Baltagi (2001) estimation procedure, first removing the cross-section mean from both the dependent variable and the independent variables and then performing the regression with the demeaned values. The estimation results are given in column 1 of Table 4. A formal Pesaran's CD test showed evidence of strong cross-sectional dependence (CD test = 7.86, $p<.01$). The presence of heteroskedasticity was confirmed by a modified Wald test for groupwise heteroskedasticity ($\chi^2(28)=1928.00$, $p<.01$). Both tests were reported in lower part of Table 4.

Next, we estimate the empirical model in (1) as a one-way random effects model, assuming $Cov(X_{it},\alpha_i)=0$. The results are given in column 2 of Table 4. In order to decide between fixed effects and random effects empirical specification, a Hausman test was employed. The null hypothesis of the Hausman test is that both estimators are consistent, and the alternative is that only fixed effects estimator is consistent. The low value obtained for the Hausman test ($\chi^2(6)= 2.45$, $p=0.87$) did not led to the rejection of the null, indicating that random effects estimator should be preferred. Moreover, the validity of random effects estimator was confirmed by a Breusch-Pagan LM test ($\chi^2(1)= 763.99$, $p<.01$). Both tests were reported in the lower part of Table 4.

After deriving the functional form for the empirical model which best fits the data, the specific panel data issues like residual autocorrelation and cross-section heteroskedasticity were addressed.

Following Nathaniel Beck and Jonathan N. Katz (1995), it is important to handle the autocorrelation problem adequately before the standard errors of the estimated coefficients to be computed. Wooldridge test for autocorrelation ($F(1,27)= 86.60$, $p<0.01$) pointed out that the null of no first order autocorrelation could not be rejected. We treated this problem as a nuisance in the residuals that has to be corrected, inserting an AR(1) term into the residuals of (1). Specifically, the residuals have been decomposed into an autoregressive component and an idiosyncratic component, in the following manner: $u_{it} = \rho u_{it-1}+ v_{it}$, with $E(v_{it})=0$ and $Var(v_{it})=\sigma^2$ for all i and all t. The consequent estimation results are given in column 3 of Table 4. However, this estimation procedure does not allow correcting for the potential heteroskedastiticy. Thus, it could lead to optimistic standard errors estimates.

As an alternative estimation method, we use Prais-Winsten panel corrected standard errors procedure. The procedure fits linear models when the residuals are not independent and identically distributed (i.i.d.), allowing to correct heteroskedasticity, cross-sectional dependence and autocorrelation. Estimation results, robust to both panel heteroskedasticity and first order autocorrelation, are given in column 4 of Table 4. The results are very similar in terms of magnitude, signs and statistical significance with the previous random effects with AR(1) disturbances estimates.

Also, we run a feasible generalized least squares in presence of AR(1) disturbances and heteroskedasticity. In this case, the results (see Table 4, column 5) should be carefully considered, since $N<T$ is required for this method to be feasible. Otherwise, the method tends to produce optimistic standard errors estimates. However, the results are similar with the ones from previous two estimations.

Given the low sensitivity of the results to the estimation method of, we will use the random effects with AR(1) disturbances estimates as our baseline scenario.

2.2 Results

In our baseline scenario (random effects with AR(1) disturbances), from the three measures of family and childcare support public expenditures used as possible determinants of crude birth rate, only cash benefits are statistically significant.

Given that we used a log-log model, the estimated coefficient of 0.09 represents the elasticity of crude birth rate to cash benefits distributed through social security public system in order to provide family and childcare support. This finding is consistent with other empirical estimates which found a positive but weak relation between cash benefits and fertility rate. For instance, for a sample of OECD countries, Gauthier and Hatzius (1997) estimate that a 25% increase in family allowances would increase fertility rate by about 0.6% in the short-term. Our results show that a similar increase in the total bulk of cash benefits will lead to a higher short-term increase in the birth rate, by 2.25%.

Regarding the main services publicly provided for parents in order to ease their childrearing burden (child care, accommodation, and home help) and other in kind benefits, our estimates pointed out that there is no significant connection with the birth rate. This result is in line with a couple of country studies which concluded that child care provision (the main component of our SERVICES aggregate variable) has no effect on the decision to have first child (see Karsten Hank and Michaela Kreyenfeld 2003 for the case of Western Germany, and Gunnar Andersson, Ann-Zofie Duvander, and Hank 2004 for the case of Sweden). However, this finding failed to confirm the strong positive relation between fertility rates and formal childcare availability found in other panel data estimates (Francis G. Castles 2003; Rindfuss, Karen B. Guzzo, and S. Philip Morgan 2003).

One possible explanation for the fact that only cash benefits were found to be a significant short-run determinant of fertility is that monetary benefits are given more weight by the parents than non-monetary benefits when it comes to childbirth decisions. The reduction in the cost of children associated with the provision of services such as childcare, accommodation or home help, and various other in kind benefits seems to be not properly perceived by individuals.

As expected, birth rate was found to be positively correlated with marriage rate. This finding is also supported by other empirical studies. For instance, in OECD countries married women have a higher fertility rate than unmarried women (D'Addio and D'Ercole 2005). It should be mentioned that this result also points to the fact that reduction in marriage rate will translate in lower fertility. Given recent downwarding trends in family formation and spreading of alternative forms of couple commitment, future decreases in birth rates across Europe could be expected. However, the negative effect of decreasing marriage rate on birth rates could be compensated by the increasing importance of births outside marriage (as a share of all births).

Our estimates indicate a positive and significant relation between gross domestic product per capita and birth rate. For a panel of OECD countries, Adserà

(2004) reported a similar positive effect of gross domestic product per capita on the fertility of women aged 30–34. However, also for a sample of OECD countries, a positive, but not significant relation was documented in Kalwij (2010).

There are two interesting implications of this result. First, given the quality-quantity trade-off that parents face when the income increases, a positive and significant coefficient for gross domestic product per capita shows that in European countries, the substitution effect is weaker than income effect. Second, a positive coefficient for gross domestic product per capita could be considered as an evidence of a pro-cyclical relationship between economic growth and fertility. During economic recessions, often individuals postpone birth decisions (thus lowering the birth rate) until times of economic prosperity (when the birth rate recovers). Our result supports previous empirical evidence in this matter. For instance, Sunnee Billingsley (2010) found evidence of pro-cyclical fertility in former transition economies from Central and Eastern Europe. As well, Gigi Santow and Michael Bracher (2001) identified a strong effect of recessions on first-birth rates in Sweden.

Labour market uncertainty captured in our empirical model by unemployment rate was found to depress birth rate. This result is consistent with other empirical estimates from the literature. For instance, using a discrete-time proportional hazard model for a sample of OECD countries, Kalwij (2010) found that unemployment rate affects negatively the probability of giving birth. Also, a strong negative effect of unemployment on fertility was documented in Adserà (2004).

Summarizing, for our sample of European countries, higher birth rates seems to be associated with high marriage rates, high level of gross domestic product per capita, low unemployment rates, and a high level of government intervention through cash benefits. Publicly provided services for parents and other in kind benefits were found to be insignificant as birth rate determinants.

2.3 Robustness Check – Country Heterogeneity

To account for a possible country heterogeneity bias, the sample was divided in subsamples, taking into account both religion and cultural criteria.

First, the countries of the sample were divided according to dominant religion into three groups: Catholic (Belgium, Czech Republic, Germany, Ireland, Spain, France, Italy, Lithuania, Luxemburg, Hungary, Malta, Netherlands, Austria, Portugal, Slovenia, Slovakia, and Switzerland), Protestant (Denmark, Estonia, Latvia, Finland, Sweden, United Kingdom, Iceland, Norway) and Orthodox (Greece, Cyprus, and Romania). The dominant religion was considered the one with the highest percent of adherents in total population. Up to date information on this matter were extracted from EUREL Project (2012) on-line database.

The results for random effects estimation with AR(1) disturbances for the first two of these subsamples are given in columns 2 and 3 of Table 5. For Orthodox group, given the low number of observations, running a separate regression led to unstable coefficient estimates and proved infeasible. Therefore, the results for this group were considered not relevant and not reported.

Compared with the baseline regression, the estimates for the two subsamples are relatively similar. Nevertheless, some interesting differences emerged between Catholic and Protestant country subgroups.

For both subsamples, cash benefits appeared to be positively associated with birth rate. However, the estimated coefficient lacks statistical significance for Protestant countries. A possible explanation for this fact is that in countries where Reformed Protestantism is the dominant religion, the state responsibility is rather rejected (Sigrun Kahl 2005).

Marriage was found to be positively and significantly correlated with the birth rate only for Catholic countries, accounting for a more traditional and rigid structure of society. However, for Protestant countries, marriage seems to be no longer a significant predictor of birth rate. This finding is consistent with the fact that after the 1990s, the positive correlation between marriage rate and fertility rate weakened across Europe (Patrick Heuveline, Jeffrey M. Timberlake, and Frank F. Furstenberg 2003; Kohler, Billari, and Ortega 2006), and also with the predictions of Second Demographic Transition theory (Lesthaeghe and Moors 1996; van de Kaa 2001) which suggests that in the past decades the society has been driven by the growth of the values of individual self-realization, satisfaction of personal preferences, liberalism and freedom from traditional forces of authority, particularly religion. Moreover, legalization of consensual unions in Nordic countries (all Protestant) increased the strength of these social trends and weakened the institution of marriage.

Although for both subsamples the estimated coefficient is negative, unemployment rate appears to be an insignificant determinant of birth rate for Catholic countries. Even though the sign is the expected one, the lack of significance could be explained by the fact that the willingness to work is far less important in Catholic countries (Kahl 2005).

Second, the sample was divided into two cultural groups using Individualism cultural dimension (see Geert Hofstede, Gert J. Hofstede, and Michael Minkov 2010). Countries with higher than 60 individualism score were included in the Individualist group (Belgium, Denmark, Germany, Estonia, Ireland, Greece, France, Italy, Latvia, Lithuania, Luxemburg, Hungary, Netherlands, Finland, Sweden, United Kingdom, Iceland, Norway, and Switzerland). Countries with lower than 60 individualism score were included in the Collectivist group (Czech Republic, Greece, Spain, Cyprus, Malta, Austria, Portugal, Romania, Slovenia, and Slovakia).

According to Hofstede, Hofstede, and Minkov (2010), in an Individualist country, there is a strong emphasis on individual preferences and self-realization. The interpersonal relations are weak and the family tends to be nuclear. Conversely, Collectivist societies are characterized by strong inter-personal relations, extended families, a high degree of social responsibilities, and the prevalence of pre-determined social choices. In these societies, there are high expectations to receive support from the public authorities.

The regression estimates for these two subsamples are given in columns 2 and 3 of Table 6. The estimated coefficients showed up with the same sign and significance as in the baseline regression. However, some particular comments could be made.

Individualist countries showed a much stronger positive effect of cash benefits on birth rate than Collectivist countries, reflecting the fact that in these societies the freedom of choice which comes with a cash benefit is given a greater value.

Also, marriage rate seems to have a greater impact on birth rate in Individualist countries than in Collectivist ones. Given that in these countries inter-personal relations are rather weak, engagement in a marriage could be a strong indicator that a couple desires children. Another possible explanation for this finding is that, given the prevalence of nuclear family, in Individualist countries, there is also a strong bequests motive for children.

Not least, the negative effect of unemployment rate on the birth rate appeared to be lower in Individualist countries. One possible explanation for this finding is that the higher level of self-confidence in these societies is giving individuals the ability to cope better with economic uncertainty in the labour market.

3. Conclusions

In our sample of 28 European countries, only cash benefits proved to be an effective instrument for boosting birth rate. This result highlights the importance of both direct and indirect costs of children in the child birth decisions. Allowing for country heterogeneity by religion, our results indicated that cash benefits could be a much more effective policy tool in Catholic countries, than in Protestant ones. Also, controlling for cultural differences between countries using Hofstede, Hofstede, and Minkov (2010) cultural dimension of Individualism, we found evidence of increased birth rate sensitivity to cash benefits in Individualist countries, than in Collectivist ones. Public expenditure materialized in different services intended for family and childcare support (like availability of child day care, accommodation and home help) seem to be ineffective as a pro-natalist policy tool. Also, all other in kind benefits related to child birth and child care received by the families through social security system are not significant in improving the birth rate.

These results should be carefully considered, since the three forms of public expenditures for family and childcare support considered in the paper are linked with other non-monetary public policy measures (like availability and duration of parental leave in the event of a child birth) which are also important in childbirth decisions. Nonetheless, further research is needed in order to highlight the combined effect of public expenditures and other policy measures and also the timing of the impact of various transmission channels. As McDonald (2002) mentioned, there can be no single cross-national model for success, stressing the importance of particular settings in which fertility has fallen to low levels in designing policies to support fertility.

As for others determinants of birth rate, marriage rate appeared to be (still) significant, although not for Protestant countries. Also, the positive impact of marriage rate on birth rate seemed to be much stronger in Individualist countries than in Collectivist ones. Controlling for the impact of income on childbirth behaviour, we found no evidence of the quantity-quality trade-off envisaged in the literature, but we found proof of pro-cyclical fertility behaviour. Particularly these findings are robust to alternative methods of estimation and also across various subsamples. Not least, uncertainty in the labour market was found to be a significant fertility depressing factor, although not in Catholic countries.

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Table 1 Description of Family and Childcare Support Public Expenditure Aggregates

Variable	Content	Short description[a]
Cash benefits (CASH)	Income maintenance benefit in the event of a childbirth	Earning-related of flat rate compensations for the loss of earnings due to temporary exit from the labour market in the period of childbirth.
	Birth grant	Lump-sum benefits in case of childbirth.
	Parental leave benefit	Payments made to one parent which interrupted work for early childrearing.
	Family and child allowance	Periodical payments to one parent with dependent children.
	Other cash benefits	Various other lump-sum or periodical payments in order to help families with specific needs, such as lone parent families or families with disabled children.
Services (SERV)	Child day care	Shelter and board provided to pre-school children during the day or part of the day.
	Accommodation	Permanent shelter and board provided to children and families, such as in nursing homes and foster families.
	Home help	Services provided at home to children and/or to persons who care for them.
Other in kind benefits (INKIND)	Other in kind benefits means or non-means tested	Miscellaneous goods provided to families, young people or children, including reductions in prices, tariffs, fares and so on.

Note: [a] According to European Commission (2008).

Source: Author's compilation based on European Commission (2008).

Table 2 Descriptive Statistics

	CBR	CASH	SERV	INKIND	CMR	GDPPC	UR
Mean	10.86	1.44	0.47	0.14	5.14	23744.04	6.98
Median	10.55	1.40	0.30	0.13	4.92	24800.00	6.60
Maximum	16.70	3.28	2.14	0.49	15.07	81200.00	19.50
Minimum	8.20	0.29	0.00	0.00	2.88	1800.00	1.90
Std. dev.	1.67	0.60	0.48	0.12	1.36	14876.46	3.27
Skewness	0.99	0.61	1.70	0.77	3.94	0.83	1.27
Kurtosis	3.80	3.23	5.63	2.69	26.58	4.01	5.28
Jarque-Bera	48.11	16.37	193.74	25.79	6488.24	39.65	122.66
Probability	0.00	0.000279	0.00	0.000003	0.00	0.00	0.00
Observations	252	252	252	252	252	252	252

Source: Author's estimations.

Table 3 Poolability Tests

Null hypothesis	Test	Result
Complete homogeneity (all $\alpha_{it}=\alpha$ and all $\beta_{it}=\beta$)	F(159,56)=107.11	H_0 Rejected
Common slope parameters (all $\beta_{it}=\beta$)	F(162,56)=13.65	H_0 Rejected
No individual effects (all $\alpha_i=0$)	F(27, 218)=68.77	H_0 Rejected

Source: Author's estimations.

Table 4 Crude Birth Rate Regressions

	(1)	(2)	(3)	(4)	(5)
Variables	**OLS fixed effects**	**OLS random effects**	**OLS random effects AR(1)**	**Prais-Winsten PCSEs**	**GLS**
Cash benefits	0.09***	0.08***	0.09***	0.06***	0.07***
	(0.023)	(0.021)	(0.020)	(0.018)	(0.015)
Services	0.01	0.00	-0.00	-0.01	-0.01
	(0.017)	(0.012)	(0.011)	(0.007)	(0.006)
In kind benefits	0.00	0.00	-0.00	-0.00	-0.00*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Crude marriage rate	0.13***	0.13***	0.10***	0.09***	0.08***
	(0.029)	(0.028)	(0.026)	(0.029)	(0.024)
GDP per capita	0.04***	0.05***	0.05***	0.07***	0.08***
	(0.015)	(0.014)	(0.016)	(0.013)	(0.012)
Unemployment rate	-0.07***	-0.07***	-0.05***	-0.04**	-0.03**
	(0.016)	(0.015)	(0.016)	(0.018)	(0.014)
Constant	1.86***	1.81***	1.75***	1.59***	1.50***
	(0.174)	(0.163)	(0.186)	(0.165)	(0.145)
Observations	252	252	252	252	252
Number of countries	28	28	28	28	28
R-squared	0.39	0.36	0.35		
F-test	23.16***				
F-test all $\alpha_i=0$	68.77***				
Wald-χ^2		153.64***	85.66***	98.35***	124.45***
Rho			0.63		
Pesaran CD[a] CD test	7.86***				
Modified Wald[b] $\chi^2(28)$	1929.00***				
Hausman $\chi^2(6)$		2.45			
Breusch-Pagan LM[c] $\chi^2(1)$		763.99***			
Wooldridge[d] F(1,27)		86.60***			

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. All variables are expressed in natural logarithms. [a] Pesaran's CD test for cross-sectional dependence. [b] Modified Wald test for groupwise heteroskedasticity. [c] Breusch-Pagan LM test for the validity of random effects. [d] Wooldridge test for autocorrelation.

Source: Author's estimations.

Table 5 Robustness Check: Country Heterogeneity – Religion

Variables	(1) OLS random effects AR(1) baseline	(2) OLS random effects AR(1) subsample: Catholic	(3) OLS random effects AR(1) subsample: Protestant
Cash benefits	0.09***	0.10***	0.06
	(0.020)	(0.024)	(0.057)
Services	-0.00	-0.03	-0.00
	(0.011)	(0.018)	(0.018)
In kind benefits	-0.00	-0.01**	0.01
	(0.002)	(0.002)	(0.004)
Crude marriage rate	0.10***	0.22***	0.06
	(0.026)	(0.047)	(0.054)
GDP per capita	0.05***	0.07***	0.07**
	(0.016)	(0.023)	(0.033)
Unemployment rate	-0.05***	-0.03	-0.08**
	(0.016)	(0.019)	(0.035)
Constant	1.75***	1.30***	1.74***
	(0.186)	(0.276)	(0.367)
Observations	252	153	72
Number of countries	28	17	8
R-squared	0.35	0.29	0.74
Wald-χ^2	85.66***	81.76***	74.49***
Rho	0.63	0.71	0.60

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. All variables are expressed in natural logarithms.

Source: Author's estimations.

Table 6 Robustness Check: Country Heterogeneity – Culture

Variables	(1) OLS random effects AR(1) baseline	(2) OLS random effects AR(1) subsample: Individualist	(3) OLS random effects AR(1) subsample: Collectivist
Cash benefits	0.09***	0.12***	0.06*
	(0.020)	(0.026)	(0.032)
Services	-0.00	-0.01	0.01
	(0.011)	(0.015)	(0.016)
In kind benefits	-0.00	-0.00	-0.00
	(0.002)	(0.002)	(0.015)
Crude marriage rate	0.10***	0.15***	0.08*
	(0.026)	(0.038)	(0.043)
GDP per capita	0.05***	0.06***	0.06**
	(0.016)	(0.021)	(0.026)
Unemployment rate	-0.05***	-0.03*	-0.08**
	(0.016)	(0.018)	(0.034)
Constant	1.75***	1.60***	1.84***
	(0.186)	(0.231)	(0.307)
Observations	252	162	99
Number of countries	28	18	11
R-squared	0.35	0.39	0.26
Wald-χ^2	85.66***	71.91***	30.56***
Rho	0.63	0.67	0.52

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. All variables are expressed in natural logarithms.

Source: Author's estimations.