STARTING OR ENLARGING FAMILIES? THE DETERMINANTS OF LOW FERTILITY IN EUROPE

Policy Paper for the World Bank Central Europe and the Baltics Aging Project (P133203)

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2013

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Research Report for the World Bank's Human Development Department

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September 2013

Abstract

This paper aims at getting a better understanding of the factors that contribute to maintain fertility at low levels in several European countries. A first concern is to figure out whether low fertility in 'lowest-low' countries is due to barriers to start a family or to increase family size. A second challenge is to get a better understanding of how cross-national differences in macro-level fertility outcomes combine with the heterogeneity of individual behaviour within countries. To address these issues, a key point is to look simultaneously at the combined influence of individual and contextual characteristics on fertility behaviour. In this perspective, we first provide an overview of fertility trends with the aim of characterising countries with low fertility. Then, we analyse the extent to which the decision of having a second child depends on individual characteristics and on the labour market situation preceding child conception, while at the same time taking into account each country's institutional context. We find that "successful" labour market integration after the birth of a first child seems to facilitate women's decision of having a second child. A stable and permanent employment position is most likely to create a secure economic environment, which seems to be a crucial condition for women for deciding in favour of a second child. Policies enabling mothers to combine work with family life, in particular the provision of child care for young children, are most likely to encourage women's decision for a second child.

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1. Introduction

Since the late 1960s, birth rates have been falling across the Europe and most economically advanced countries. The timing, intensity and persistence of the fertility decline vary across countries. In some countries the decline is ongoing, but in a growing number of countries total fertility rates have started to increase. The mechanisms behind this reversal are debated. Is it only the consequence of childbearing postponement across generations, or does it reveal more structural changes in the relationships between economic development, women's labour force participation, social norms and fertility behaviour?

Moreover, the re-increase in fertility rates happened in a minority of countries, while some others seem to be stuck at low fertility rates. Explaining these differences is key, as well as getting a better understanding of the factors that made it possible for a re-increase in fertility rates to happen in some countries but not in the others. Recent literature has started to document this issue and emphasized that fertility upswing, as well as economic development, have been accompanied in many countries with structural improvements in the conditions for adults (and especially for women) to combine work and family. The focus of these studies was the explanation of cross-country differences in fertility levels and trends at national level.

Two issues remain to be clarified to move forward. A first concern is to figure out whether low fertility in 'lowest-low' countries is due to barriers to start a family or to increase family size. The situation might vary, however, from one country to others. A second challenge is to get a better understanding of how cross-national differences in macro-level fertility outcomes combine with the heterogeneity of individual behaviour within countries. To address these issues, a key point is to look simultaneously at the combined influence of individual and contextual characteristics on fertility behaviour, as permitted, for example, by the use of multi-level models.

In this perspective, this paper aims at getting a better understanding of the factors that contribute to maintain fertility at low levels in some countries and not in others.

A first part draws an overview of fertility trends in Europe, Central Asia and other OECD countries and summarizes factors that are shown to be important drivers of fertility trends (postponement of childbearing, economic development and the increase in female employment, changes in population composition and in social norms, policy background).

A second part analyzes how country-level differences in fertility combine with heterogeneous individual behaviour within countries.

A first concern is to figure out whether low fertility in 'lowest-low' countries is due to barriers to start a family and/or to increase family size. Cross-section survey data for Europe (EU-SILC 2008) provides information on fertility behaviour that is globally consistent with aggregated demographic data: low-fertility countries are distinct from those with high fertility primarily because of a lower share of women having two or more children. This suggests that in most low fertility countries, the barrier for having a second child is more important than the barrier for having a first child.

A second concern is to identify in how far individual characteristics influence fertility decisions. To identify the barriers for second child arrival, a micro econometric analysis based on longitudinal survey data for Europe (EU-SILC 2005-2008) models women's probability of having a second child as a function of individual characteristics observed before conception

A third part combines the macro- and the micro-level perspective in order to see in how far a country's institutional context, in particular family policies, matter when considering the influence of individual characteristics on fertility behaviour.

The novelty of our econometric analysis is to analyze, in a *large European cross-country perspective*, the determinants of child arrival by focussing on *individual characteristics* observed during a certain period *precisely before conception*, while at the same time taking into account each country's *institutional context.* In particular, we show how women's (and their partner's) *employment situation* before conception is linked to fertility decisions.

The paper is organized as followed: Sections two and three discuss fertility trends and underlying dynamics while comparing macro-level evidence to theoretical arguments and hitherto existing literature on the subject. Hereby, cross-country variations as well as trends over time are taken into account. Section four proposes a micro-level analysis and section five a multi-level analysis of determinants of fertility behaviour in Europe. Finally, section six highlights our main findings.

2. Fertility trends and underlying dynamics

2.1. Fertility rates since 1970

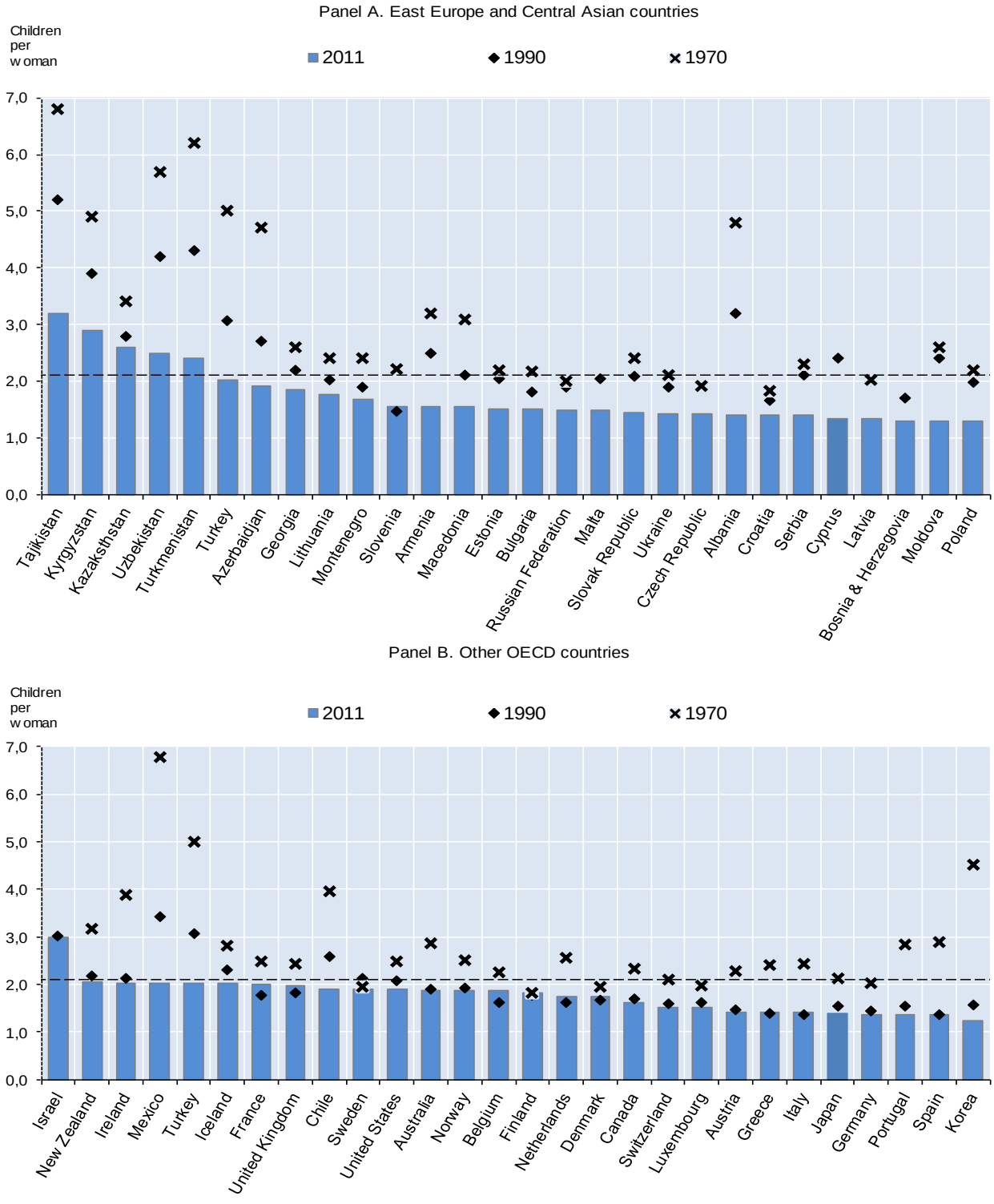
Birth rates have been falling across the region, as illustrated in figure 1 by the sharp decline of Total Period Fertility Rates which fell in most countries well below 2.1 children per woman, the rate required to maintain populations at current levels without migration. The timing, intensity and persistence of the fertility decline vary across countries, however. Two phases, decline – essentially due to combined influence of postponement and – and increase denoting "recuperation" for cohorts who postponed childbearing at later ages.

In general, total fertility rates (TFR) have fallen significantly since the 1970s in Europe and the eastern part of the region, and then stabilised or even increased slightly in the early 2000s[1]. The decline has been especially sharp in countries showing the highest fertility rates in the early 1970s, such as Central Asian countries but also in Mexico, Chile, Turkey or Korea. In Europe, fertility rates were already around or below replacement rate in most countries in 1970, but they kept declining up to the late 1990s in many countries. The sharpest drops of TFRs were in Southern and Eastern regions where fertility rates are still far below the EU average – and below 1.6 infant per women. These so-called "lowest-low fertility countries" have TFRs persistently around or below 1.3 children per woman (Kohler *et al.*, 2006). In 2008, Korea had the lowest TFR at 1.2.

[1] The total fertility rate (TFR) is highly sensitive to the timing of births: children born later in the life cycle induce a decline in the TFR, and final fertility will be underestimated. Some authors have therefore proposed TFR estimates adjusted for variations in the age of mothers at childbirth (Bongaarts and Feeney, 1998, and Goldstein *et al*., 2009).

Figure 1: Decreasing Total Fertility Rates

Change in total fertility rates 1970 - 2011[1]



Countries are ordered by increasing TFR in 2011.
[1] 2007 for Canada, Czech Republic, Estonia and Slovenia; [2] 1971 for Chile; 1980 for Estonia, Israel.
Source: OECD Family database; UN Demographic Statistics.

The persistency of these low fertility rates raises concerns about the decline of the overall population in these countries.

The dynamic was much weaker in the Western and Nordic parts of Europe, where fertility rates are closer to replacement level despite a decrease of TFRs when compared to their level in the early 1970s. Here also, fertility rates re-increased after a period of decline, and the re-increase started relatively early for example in France, or was particularly steep since the start of the new century in the United Kingdom, Finland or Iceland.

Other OECD countries show constrating patterns with, on the one hand, Australia, New Zealand and the United States being among those countries with quite high fertility, and, on the other hand, Japan and Korea being stuck with low rates of fertility.

Most of the Caucasian and Central Asian countries saw also a very sharp decline in the TFR after 1990 and a slight increase after 2005 (Vobecka et al., 2013). Fertility rates in the Caucase – Armenia, Azerbaidjan, Georgia – are now all below replacement rates, as in Ukraine and Russia. By contrast, countries of Central Asia show highest fertility rates, well above replacement levels in 2011. All these countries now have a TFR of less than the 2.1 marker of the population replacement threshold. Recent trends are contrasting across these countries, however. Thus, TFRs have continued to decrease sharply in Tadjikistan, Turkmenistan or Armenia over the last decade, while an upturn of fertility occurred in Kazakhstan, Kyrgyz republic especially, as well as to a lesser extent in Uzbekistan, Ukraine and Russia. In this latter country, total period fertility rates experienced a steep decline from the late 1980s through the mid-1990s, but started to reincrease from 1999 onwards (Frejka and Zakharov, 2012).

Thus, it appears that most countries of the developed world have recently experienced a reincrease in fertility rates after a significant decline of TFRs over the past decades. This trend reversal is much often seen as a logical consequence of the postponement at older ages of childbearing by younger generations (Goldstein et al., 2009; Bongarts and Sobotka, 2012). Such a postponement involves indeed two phases regarding total fertility rates: they are first decreasing because births that were occurring at young ages in the past are no longer taking place; births are taking place at older ages and thus the "recuperation" phasis happens after a certain delay.

Whether the process of postponement fully explain TFRs cycles remains rather indeterminate, however. A first reason is that the postponement of childbearing is accompanied (and partly due) to structural and/or cultural changes affecting fertility decision (Lesthaeghe, 2010; Goldstein et al., 2009). Luci-Greulich and Thévenon (2010) emphasized, in particular, the changes in labour market and in the way fertility behaviour is coordinated to women's labour market decisions, and suggest that the re-increase in total fertility rates happened first and foremost in countries where support to the work-life balance has been enhanced. In this context, the "recuperation" of fertility is likely to be partial, in the sense that these changes towards childbearing at older ages may also be accompanied with lower standards of fertility.

2.2. Influence of the 2008 economic crisis

The recent economic crisis has changed the context in which decisions regarding fertility are taken. In particular, the rise in unemployment creates economic uncertainties which may lead households to put off the decision to have children. The consequences can be short term – if births are simply postponed – or longer term if recession persists over time, and if no catch-up process is observed after the recession.

The evidence on the effect of the ongoing recession on fertility rates is still relatively scarce, one reason being that on most recent fertility behavior is not yet available in all developed countries, another reason being that fertility declines in response to a crisis with a time lag of a few years (Sobotka *et al.*, 2010). Recent evolutions of fertility rates suggest, however, that the rise of TFRs that was observed in many countries since the early 200s has either stopped in many countries, or even reversed in few others (figure 2). Most strikingly, the decrease started early after the 2007 economic shock in the US and become more significant over years with a total decrease of almost 0.2 children per women between 2007 and 2011, where the crisis seems to affect the fertility behavior of the most vulnerable minorities (Mather, 2012)[2].

In Europe, the crisis has been more severe in vulnerable countries such as Spain, Greece or Bulgaria. An important decrease in fertility rates also occurred in Iceland since 2009 and especillay 2010. By contrast, fertility rates continued to decrease in very few countries but especially in Portugal stuck at low fertility level. Goldstein et al. (2013) find a strong association between fertility and unemployment in the Southern, Eastern and Central European countries. Greatest impacts are found at youngest age and for a first birth, which makes sense because unemployment rates have jumped drastically among young people who also can postpone childbearing most easily. This finding is compatible with the idea that fertility plans are much conflicting with securing labour market position but can be revised more easily at younger ages than at ages where there is often less uncertainty about labour market position and less opportunity to adjust fertility plans because of biological constraints.

Significantly enough, the countries with a high level of welfare and family support (France, Norway, but also the UK and Slovenia) are more resilient to the recession: they seem to have succeeded so far in cushioning the impact of the economic shock on fertility.

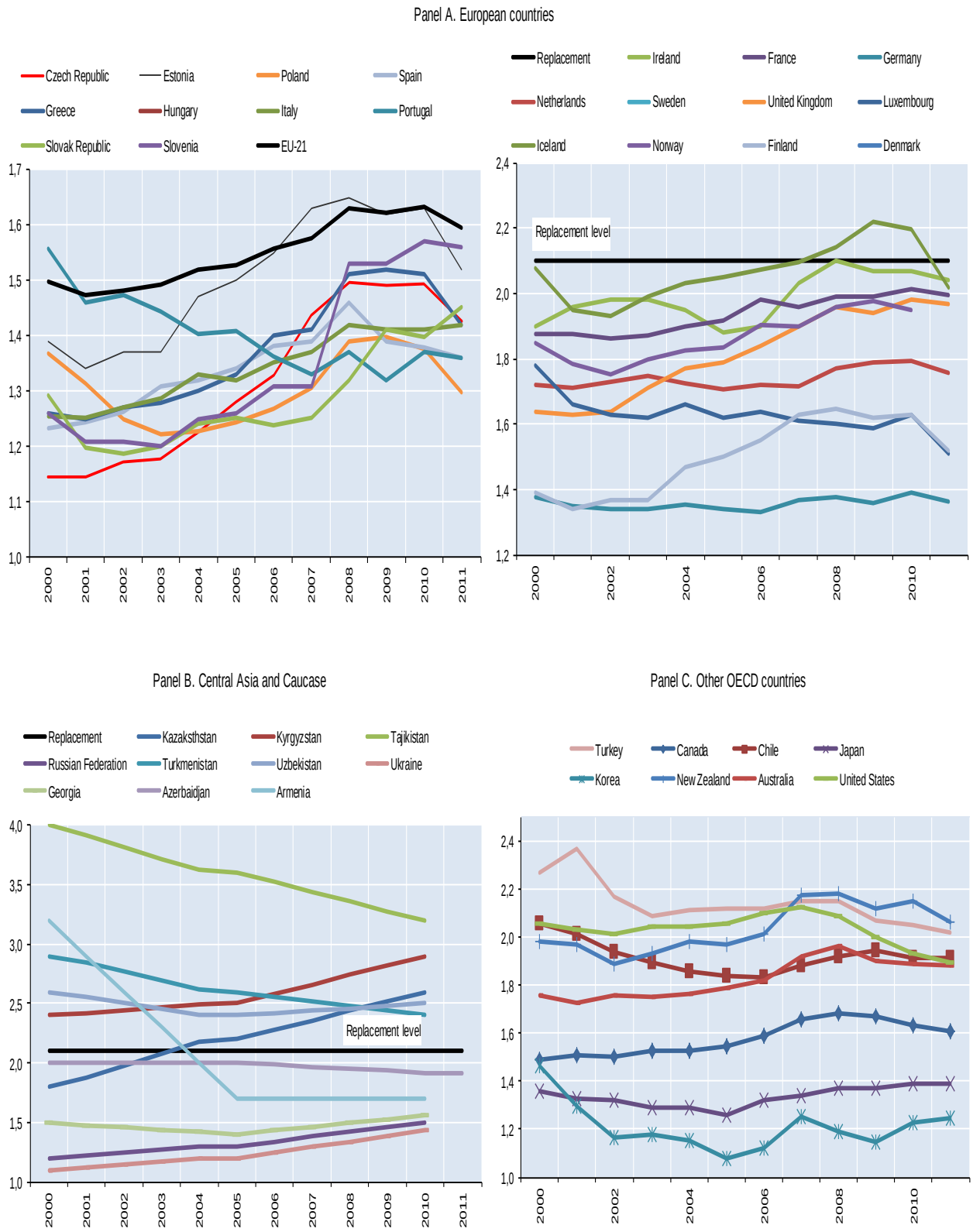
The extent to which the effect of the economic recession will or not persist over time and either be compensated or be conducive to lower completed family size is naturally not known yet[3].

Goldstein et al. (2013) find that fertility rates at younger ages seem to respond to adverse economic conditions, as captured by unemployment rates. Whereas Latvian fertility rates markedly declined in 2009, fertility in the other Baltic countries showed no major downturn in fertility, one explanation possibily being that generous parental leave scheme were introduced shortly before the economic crisis.

[2] Responses in fertility behavior to economic downturns differ across gender and socio-economic status (see OECD, 2011 for a review of results). Low-educated and low-skilled men are likely to show the largest decline in birth rates. For women, available evidence for Germany and Sweden suggests that those with high levels of educational attainment are most likely to postpone childbirth, especially when they have no children; the lower-educated often maintain or increase their rate of entry into motherhood (Hoem, 2000 and Kreyenfeld, 2005 and 2009).

[3] Evidence on the effect of former economic recession suggests that unemployment spells seem to affect the timing of births, but not the achieved family size (Adsera, 2005 and Kravdal, 2002). In France, only repeated spell of long-term unemployment among males seem to have a small negative effect on family size (Pailhé and Solaz, 2012).

Figure 2: TFRs have re-increased in most countries from 1995 onwards



Source: OECD Family database

2.3. Reasons of low-fertility

2.3.1 Postponement of childbirth

The postponement of childbirth can be best reviewed by considering trends in age-specific fertility rates. Broadly speaking, there are two relevant features: 1) a sharp decrease in fertility rates of women aged less than 30 which started almost 5 decades ago in most countries covered here[4]; and, 2) a significant increase in fertility of women in their thirties. Figure 3 shows a marked increase in fertility for women aged 30-34 in most OECD countries since the mid 1990s. Few countries deviate from this general pattern, as age-specific fertility rates continue to decline for all age groups: Korea, Mexico, Japan, but also Albania, Armenia, Azerbaïdja, Kyrgyztan, and Tadjikistan.

The increase in fertility after 30 years of age which is mostly driving the re-increase in total fertility rates since the late 1990s thus illustrates that young women have relatively postponed childbearing in comparison to older generations, but are now "catching-up". However, it is unlikely that the increase in the "postponed" births will lead to a recovery in TFRs to levels recorded in 1980 (Frejka and Sobotka, 2008).

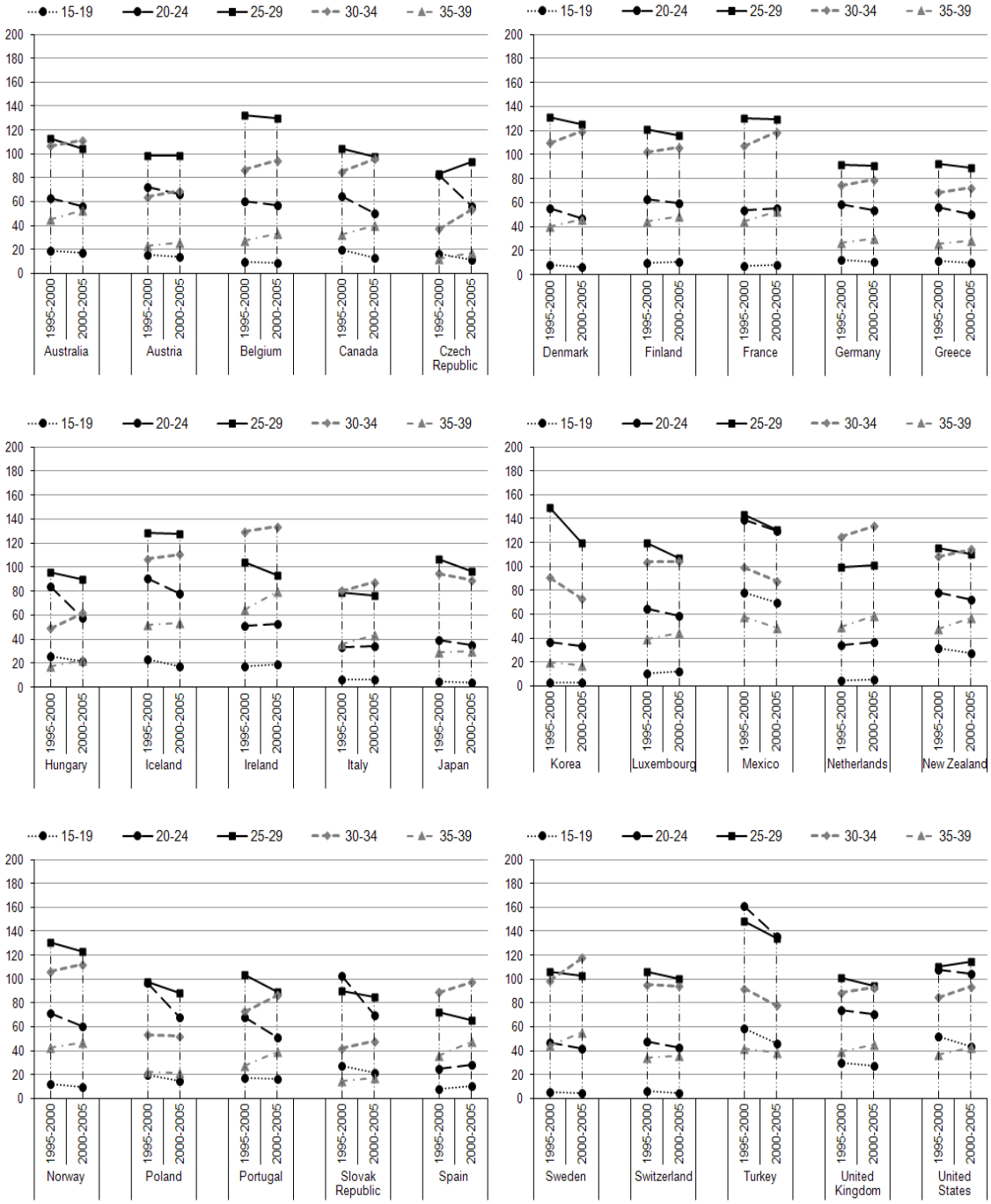
The average postponement of births is the result of women's increasing level of education resulting in higher labour market attachement and career aspiration (OECD, 2011; Goldstein et al., 2009). Postponement is facilitated by the diffusion of modern contraceptive methods, the use of which varies across countries (Frejka, 2008a). The use of modern contraceptives reduces the number of unwanted and mistimed pregnancies and births. It is very likely that modern contraceptive methods have facilitated the changes towards new and more restrictive norms on the ideal family size, but they cannot be seen as a principal cause of contemporary low fertility (Leridon, 2006).

[4] OECD Family database (indicator SF2.3) shows long-term trends in age-specific fertility rates for few countries.

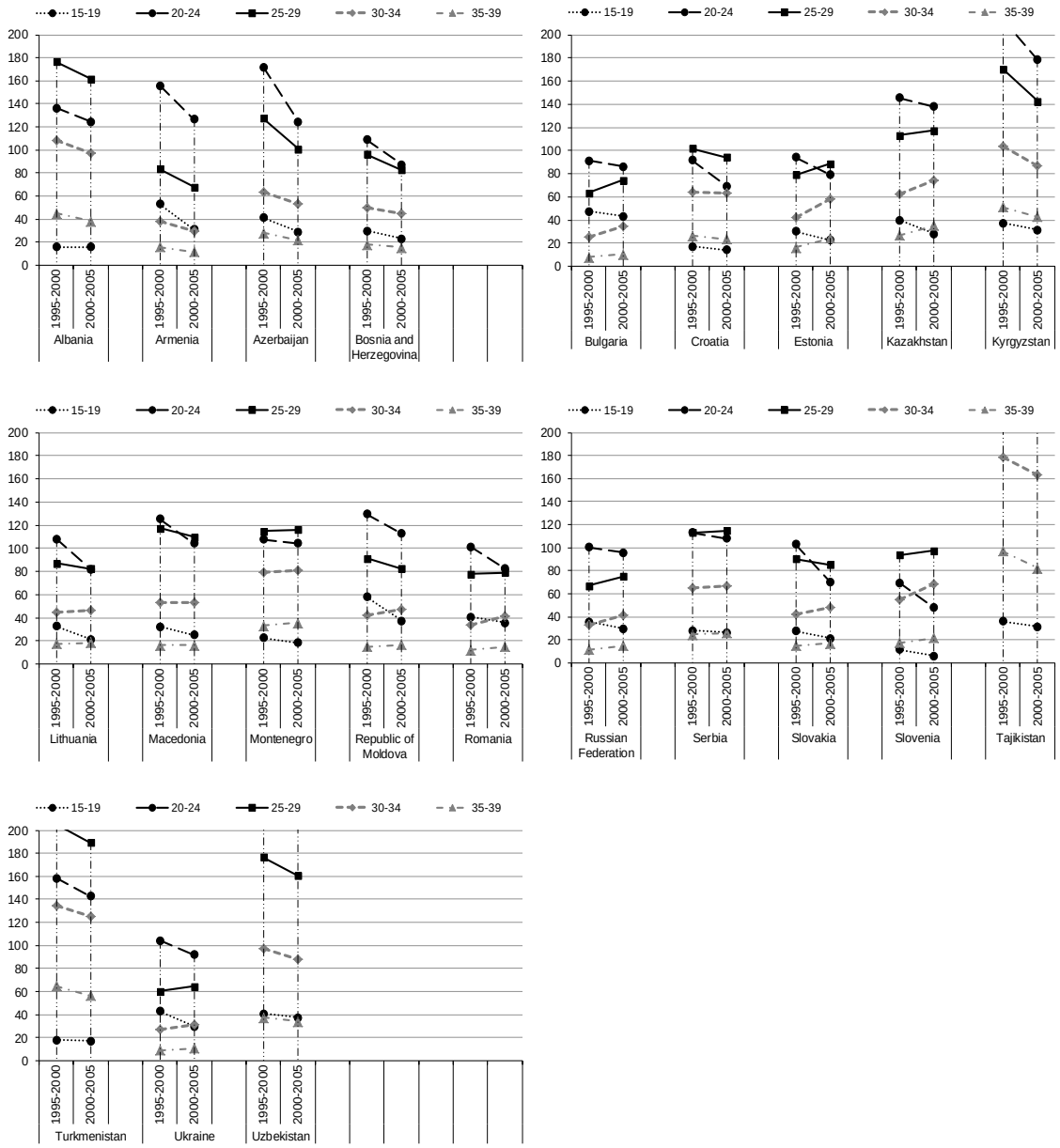
Figure 3: Increasing fertility after 30 years of age

Age-specific fertility rates – number of births per 1000 women

Panel A. OECD countries



Panel B. Eastern and Central Asian countries



Source: United Nations Statistics Division.

2.3.2 Reduction of family size

A look at completed fertility rates (CFR) – i.e. at the number of children women have at the end of their reproductive life - and at distribution of family size gives a better understanding of cross-national differences in fertility. Figure 4 shows the distribution of women born around 1960 (i.e. for women whose fertility period has been "completed") by number of children. It suggests that countries' situation varies most according to the propensity for women to either remain childless or to have two children or more in total over their lifetime.

In all countries, women are most likely to have two children at the end of their reproductive period. The distribution of women according to the final size of their family varies greatly across countries, however.

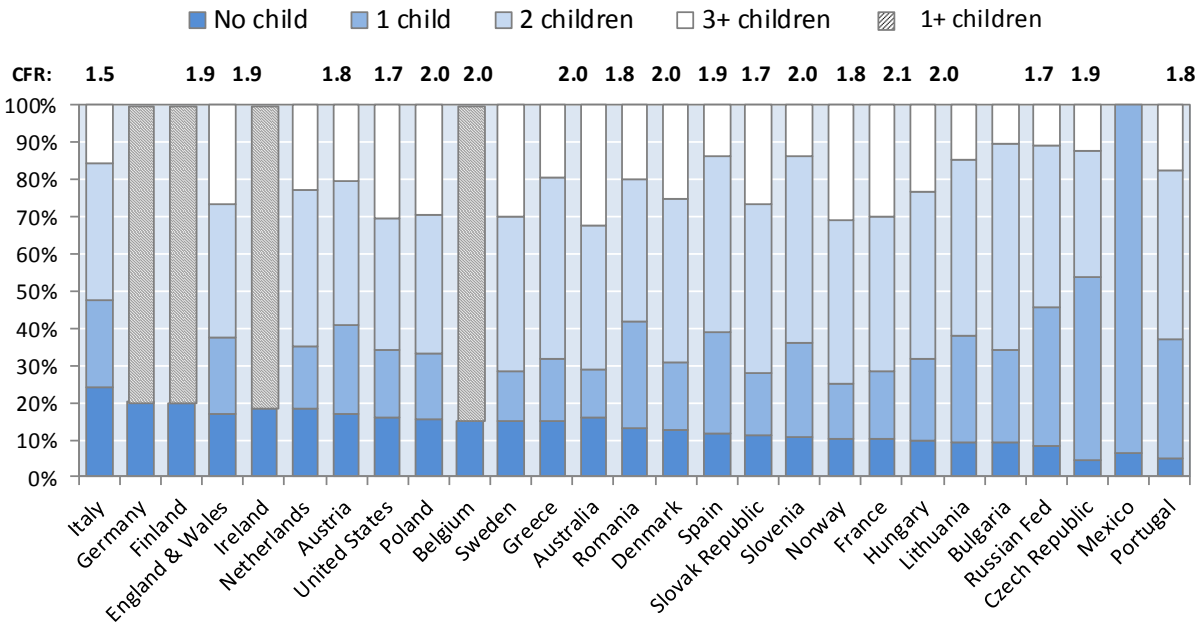
Cohort data suggest that definite childlessness among women at the end of their reproductive period is highest in Italy, Germany and Finland, with above 18% of women born around 1960 remaining childless. Childeness has also been increasing steepily across the cohorts born after 1950 in Austria, Belgium, England and Wales, Greece, Ireland, the Netherlands, and the United States (Breton and Prioux, 2009). More recently, childless women represent a growing share among women born after 1960 in Eastern European countries (Poland, Romania, Hungary especially), but a much lower proportion of women – less than 10% – of women remain childless at the end of their reproductive years in most other Eastern European countries. By contrast, a stable and comparatively low proportion of women remain childless in France and Nordic countries (except in Finland). Childlessness is far less frequent in Eastern European countries which are nevertheless experiencing a period of low fertility.

In general, countries with relatively high rates of definitive childlessness (over 15% of the women age over 45) have CFRs below 1.8 children per woman, but Finland is an exception with a rate above 1.9. High rates of childlessness do not always lead to differences in CFRs. For example, Austria and Spain have very different rates of cohort-childlessness, 22% and 13%, respectively, but the same CFRs of 1.7 children per woman.

In almost all countries, about 10 to 20% of the women have only one child at the end of their reproductive period, but this proportion is over 30% in the Czech Republic, Portugal and the Russian Federation, where very large families are also relatively rare. By contrast, the evolution of recent years shows that Russia and Ukraine are still characterised by a persistent and almost universal progression to the first birth. One-child families have become as frequent or more than families with two children in Russia and Czech Republic, as in other Eastern European countries (Romania, Hungary, Poland Slovakia, Czech Republic) for the most recent cohorts who have completed fertility (Breton and Prioux, 2009; Sobotka, 2011).

Figure 4: Many women have two children, but there are large cross-national variations in completed family size

Achieved fertility by parity distribution: in percent, 1965 or latest available birth cohort[1]



Countries are ranked by decreasing proportion of women with no child at the end of their reproductive period.

The numbers in the chart reflect the Completed Fertility Rate (CFR) which is the number of children actually born per woman in a cohort of women by the end of their childbearing years (normally, women who are 45 or over are considered to have completed their childbearing years; this end-year is often set at 49).

[1] 1963 for Greece, Portugal and Spain; 1960 for England and Wales, Sweden; 1959 for Finland; 1955 for Australia, Belgium, Germany and the United States; 1953 for Norway. Unfortunately, cohort data for the same year are not readily available, but the use of data on cohorts of women born within 10 years of each other provides an adequate picture of the main cross-country differences.

[2] Estimates for the Western Länder of Germany only.

Sources: Andersson *et al.* 2009; Frejka, 2008b; Sardon, 2006; Frejka and Sardon, 2007; and McDonald, 2010.

By contrast, at least 30% of women have three or more children in France, Norway, Poland, Sweden, and the United States (anglophone countries have a relatively low incidence of one-child families and a high incidence of large families, McDonald, 2010). These five countries with a relatively high proportion of large families have high CFRs compared with most European countries (Frejka, 2008b).

The same statistics are not available for countries in Central Asia, but recent studies suggest that the decrease in TFRs has been mainly driven by lower propensities to have a second child, while the frequence of a first birth remained often quite stable. Spoorenberg (2013) therefore emphasizes that, in general, the lifetime progressions to the first birth have remained fairly stable up to the mid-1990s in Central Asia, while the propensity to have a birth of higher order started to decline significantly from the early 1990s onwards. Births of third and higher order have been most affected by the sharp drop – but less significantly in Uzbekistan. As an extreme, the lifetime progressions to fourth and fith births were almost halved during the period. Symetrically, the upturn of fertility rates observed since the early 2000s has been essentially due to increase of high-order births (fifth or higher-order births) in Kazakhstan. In comparison, the fertility rise resulted from an increase of first- and second-order births in the Kyrgyz Republic where third- and fourth-order births have kept declining.In all, high rates of childlessness do not necessarily lead to low fertility rates, if there are many women who have large families.

Two features restrict the recovery in TFRs: childlessness and, for those parents who have children, a decline in the number of large families, i.e. those with 3 or more children. In this context, lowest-low fertility countries (i.e. those with TFRs persistently below 1,6 children per women) are characterised by a sharp decline in the number of large families. For example, less than 15% of cohorts born in 1965 have had 3 children or more in Italy or Spain. In Japan and Korea, the share of women with four children or more in the cohorts with completed childbearing fell from 60% to about 10% in Korea and 5% in Japan.[5] Childbearing, when it occurs, is also heavily postponed in comparison to few decades agos often very late: increases in the age of women at birth of the first child were particularly pronounced, for example, in Germany, Greece, Italy or Spain.

Having at least one child is still very common, even in low fertility countries, but the progression towards a second birth does not happen as frequently or as quickly as it does in high-fertility countries. Then, the propensity to remain childless is also high in some countries with low fertility but not in all - higher than in most other countries. Basically, definitive childlessness is particularly high in South European (Italy, Greece) and German-speaking (Austria, Germany) countries, while it is much less frequent in Central Asia and in the Eastern part of Europe – except Poland – although the share of definitive childlessness is steepily increasing across youngest cohorts. Childlessness also still remains a marginal phenomenon in Japan and Korea with childlessness rates below 4% for the cohorts of women born in 1945 or later. These two countries also stand out from other countries with an extremely low proportion of out-of-wedlock births, showing therefore a strong resilience of traditional norms regarding the entry into motherhood.

As mentioned already, the increase in education enrolment of women is a key factor that explains the postponement of childbearing that is observed everywhere (Blossfeld, 1995; Goldstein et al., 2009). Its effect on ultimate family size seems to vary much across countries, however. A striking feature is the small variations of final family size by level of education in Nordic countries: women with higher levels of educational attainment may delay entry into motherhood but fertility differentials among women progressively decrease with age since women with higher education progressively take over the differential in birth rates and differences in completed fertility by educational level are small, especially in Finland and Sweden (Andersson *et al.* 2009). Also, education levels only seem to have a limited effect on childlessness: its incidence ranges from 11.6 in Norway to 17.3% in Finland for the cohort of women born in 1955-59, and the differences between women with high and low education of 6 percentage point in Norway, but of less than 2 in the other countries.[6] Fields of study and resulting professional occupation seem to matter more for explaining interindividual variations of lifetime fertility in these countries, where the longstanding support to parents' work-life balance has contributed to minimise fertility differences by level of education (Hoem et al., 2006).

[5] In Japan, 73% of women born in 1905/09 had 3 or more children, but this was only 31% for women born in 1935-39 and 27% for those born in 1948-52. Korea shows a similar trend: of women born in 1916-20, 87% had 3 or more children, but this was only 36% for women born in 1950-1954 (Atoh *et al.*, 2004).

[6] An interesting trend change took place in Norway and Denmark: in the early cohorts highly educated women remained childless most frequently; in later cohorts, women with low education are more likely to remain childless. Across Nordic countries there is little variation in levels of childlessness for highly educated women. For the cohorts of highly educated women born in 1955-59, the incidence of childlessness is highest in Finland at 17.1% and lowest in Norway (14.6%). Childlessness differs most among women with low levels of educational attainment, which in Finland is 19.2% for this cohort and 8.6% in Norway.

3. What explains the fertility trends?

There are different factors which affect fertility patterns: economic development, changes in population composition of national territories, in social norms for childbearing and in labour market and policy environnements. The influence of all these factors on fertility trends has received much attention in academic research over the recent years.

3.1. Economic development

The effect of economic development on fertility trends has been recently debated by a few research papers. Based on data for over 100 countries, Myrskylä, Kohler and Billari (2009) argued for the existence of a so-called "inverse J-shaped" relation between the human development index (HDI) and total fertility rates, suggesting an increase in fertility rates from a certain level of human development on. However, Harttgen and Vollmer (2012) revisit this topic and find that the reversal in the HDI-TFR relationship is neither robust to UNDP's recent revision in the HDI calculation method nor the decomposition of the HDI into its education, standard of living and health sub-indices. Moreover, the use of a composite measurement of human development masks the particular contributions of each of the indicator's components (GDP per capita, life expectancy and school enrolment) and thus does not reveal why in some, especially highly developed countries, a rise in fertility comes along with increases in human development.

For this reason, Luci-Greulich and Thévenon (2013) investigated the impact of economic development and its components on fertility in 30 OECD countries from 1960 to today. They find that the strong negative correlation between GDP per capita and fertility does no longer hold for high levels of per capita economic output; the relation instead seems to turn into positive from a certain threshold level of economic development on – although few countries only have already passed the threshold of GDP per capita (around 30,000 USD) which seems to be associated with a re-increase in fertility rates. Furthermore, by decomposing GDP per capita into several components, they identify female employment as co-varying factor for the fertility rebound that can be observed in several highly developed countries. Pointing out to important differences with regard to the compatibility between childbearing and female employment, their results suggest that fertility increases are likely to be small if economic development is not accompanied by institutional changes that improve parents' opportunities to combine work and family life (see below).

In this context, the "lowest-low fertility countries" have much lower fertility levels than the values predicted by the actual level of per caita GDP. For instance, in Japan and Germany, income levels are only somewhat below the estimated turning-point value and very close to those of New Zealand or France: economic development thus does not explain the persistence of low fertility in these two countries.

By contrast, anglophone and Nordic countries as well as Belgium, France and the Netherlands achieve higher TFRs than would be predicted on the basis of their level of income per capita. In France and New Zealand, TFRs are high while GDP per capita is below the estimated turning point. Thus, in these two countries the fertility "rebound" took place at a stage of economic development at which a further decrease in fertility rates could have been expected in the absence of country-specific factors. High fertility countries such as Iceland, Ireland, Norway and the United States are at a stage of economic development which predicts a positive influence of income and consumption growth on fertility.

Strikingly, the line dividing countries below and above predicted fertility levels coincides with the classification of countries with and without significant public and/or flexible workplace supports for the reconciliation of work and family life (Thévenon, 2011). Moreover, co-variation of fertility trends with

the increase in female employment rates found by Luci-Greulich and Thévenon (2010) suggests that the increase in GDP per capita actually captures increased female labour market participation as well as greater reconciliation possibilities that can be bought with increased household income.

In all, it seems that subject to cross-country variation in current outcomes, many countries can expect an increase in economic development to coincide with an increase in TFRs. However, the increase in fertility rates is likely to be small, unless economic development is accompanied by other institutional change in the areas of work and family reconciliation, norms and attitudes towards childbearing, and the direct cost of children.

The relation between fertility and economic development is different in Eastern European countries and Central Asia where countries experienced the end of communism and the transition to market economy. Before this transition, fertility was relatively stable in many former state socialist countries during the 1970s and 1980s when corresponding cohort fertility was exceptionally even (Frejka and Sobotka, 2008). Then in general, despite dramatic changes in their living conditions, women in former state socialist countries did not adjust immediately the onset of their childbearing by not having or postponing the arrival of their first child (Frejka and Sobotka, 2008; Sobotka, 2011; Spoorenberg, 2013). Dramatic drops in fertility rates occurred, however, at a later stage. Nevertheless, despite similar trends, such as plummeting fertility rates and a postponement of childbearing in the 1990s, considerable diversity in family and fertility patterns have emerged during the 1990s and 2000s (Sobotka, 2011). This diversity appears through strong contrasts between countries in the diffusion of cohabitation, non-marital fertility, timing of births and marriages, share of one-child families, as well as abortion rates.

There are important differences in terms of economic prosperity, social stability and the overall success of economic transformation, and the region has become extremely differentiated (Sobotka, 2011). A few countries, especially in post-Soviet Eastern Europe and in the Balkans experienced economic collapse which depressed their GDP levels by one half or more. As of in the early 2000s, Macedonia, Moldova and Ukraine still had lower per capita GDP than in 1989, i.e. before the onset of the transition to market economy. Thus, these countries plus Russia witnessed a protracted crisis with a continuous economic decline over the 1990s marked by huge poverty, sharply deteriorating living standards, and a failure of the governments to provide the essential social and health services[7].

Many Central European countries (especially the Czech Republic and Slovenia), in constrast saw a comparatively smooth economic transition, keeping lower poverty rates, relatively comprehensive social safety net, moderate unemployment levels and a gradual wage increase after 1992.

The transition to market economy introduced also growing inequalities. Labour market and wages became more differentiated by social status, but also regions. The intensity of income inequality also varies across countries: a few countries like the Czech Republic, Slovakia and Slovenia, retained relatively small income differences (GINI), whereas countries of the former Soviet Union and south-eastern Europe saw a massive rise in earning and income inequalities.

In this new contexts, fertility patterns are strongly differentiated between countries and between social groups. Economic transformation seems to have affected fertility rates into two different ways (Sobotka, 2011). On the one hand, first births have remained relatively stable during the difficult time of the 1990s in countries though experiencing the most severe slump in real wages such as Lithuania, Moldova, Russia and Ukraine. As paradoxically pointed by Sobotka (2011), "*poor economic prospects, uncertainty, and low level of social security appear to have contributed to the perseveration of an early*

[7] These changes were actually accompanied by a dramatic drop of life expectancy in many Eastern countries, as especially in Russia where life expectancy for males fell by 7 years, from 64.5 to 57.4 years between 1989 and 1994.

childbearing pattern rather than stimulate its postponement". Similarly in Central Asia, the proposensity to have a first birth has remained rather stable over the 1990s, while second and third births have been more responsive to the end of the Soviet Union (Spoorenberg, 2013). A postponement of the first and second birth occurring over the post-independence years happened in Uzbekistan, Kazakstan and Kyrgyz republic, while changes in the transition to the third birth started before the end of the Societ Union, as a response to earlier structural and/or cultural changes (Schumacher and Spoorenberg, 2010; Spoorenberg, 2013). By contrast, first births were postponed in the more successful economies of central Europe, such as typically in the Czech Republic or in Hungary.

3.2. Population composition

Changes in population composition are also one factor influencing fertility trends since fertility behaviour is not homogeneous within countries and varies across population groups. In general in Europe and the US, fertility rates for foreign-born populations are relatively high in comparison with native-born population (Sobotka, 2010; OECD, 2011). However, since recent migrants often constitute only a small proportion of populations, their effect on the overall TFRs is often small. Hence, while TFRs for foreign-born populations are relatively high, their overall effect on birth rates is limited and ranges from 0.05 to 0.1 children per woman (e.g. between 3% and 8%).

However, differences in fertility behaviour by ethnic groups are a major determinant of recent fertility trends in Central Asia where population movements were exacerbated and the large number of people leaving the region ended in a redistribution of the ethnic composition of the populations of these countries (Spoorenberg, 2013). Thus, Russian females are far less 'at risk' of having a second or third birth in this area. For example, in Kazakhstan, less than 50 per cent of Russian women had a third child in the early 1980s, while the vast majority of Kazakhs gave birth to a third child. In the mid-1990s, this proportion stood 15-20 percentage lower among Russian women while more than 70% of Kazak women had a third child (Spoorenberg, 2013).

3.3. Social norms towards childbearing

Social norms towards childbearing influence fertility decisions as they affect accepted behaviour among relatives, friends and/or other groups in society. Norms help shape preferences regarding childbearing and timing of births, but also concern who should care for children and how work should be matched with family-life choices. Norms are not fixed, however, and expectations regarding childbearing and household division of work have been changing considerably over the past decades (Lestaeghe, 2010).

An important change in attitudes is that, in most countries, marriage is no longer the prerequisite for having children it was few decades ago. Thus, the number of out-of-wedlock births has increased since the early 1970s in almost all OECD countries and encompasses over half of births now in Bulgaria, Estonia, France, Norway, Mexico, Slovenia and Sweden, making marriage almost irrelevant for childbearing. By contrast, a slower rise has been observed in Southern and in Eastern European countries.

During the Soviet era, marriage in Central Asia was early and universal, and quickly followed by a birth (Spoorenberg, 2013). Marriage rates had remained relatively stable during the 1980s in Central Asia, but declined during the 1990s before rebounding during the perestroika period. In general, the changes in marriages have been more pronounced in Kazakhstan than in the Kyryz Republic and in Uzbekistan.

Figure 5 shows that fertility rates are highest in countries where out-of-wedlock childbirths contribute for at least one third of births. By contrast, their contribution to the total of births remain nowadays especially low in low-fertility countries such as Japan, Korea[8] or Italy.

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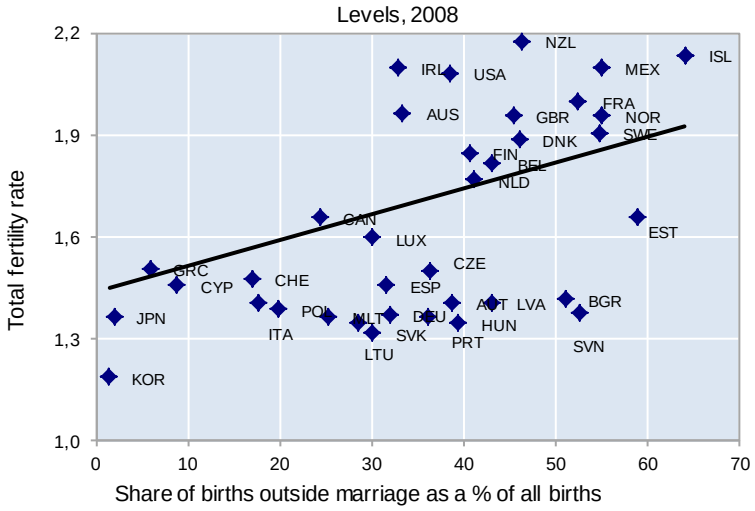
Figure 5: The proportion of births out-of-wedlock is increasing.

Total Fertility Rates and births out-of-wedlock as a proportion of all births



Source: *OECD Family database*, SF2.4 and UNECE.

The sharp decline in marriage rates in these countries give some indication of the ongoing change: with educational attainment among young women equal or superior to that of young men, it is no wonder that young women want to participate in the workforce, and find it increasingly difficult to abandon paid work for homemaking. Hence, they delay and/or forego marriage while large parts of society still expect them to sacrifice their labour market aspirations (Eun, 2007 and Suzuki, 2009). By contrast, other countries with traditional attitudes towards family formation such as Greece and Spain are experiencing a modernization of norms which contributes to a recent increase in TFRs in these countries (Billari, 2008 and Lesthaeghe, 2010). In general, countries where labour market aspirations of young women are most at odds with prevailing traditional norms on marriage, childbearing and gender roles at home are also the countries where low fertility is most persistent.

[8] Japan and South Korea are the two OECD countries where childbirth remains strongly associated with marriage. In these two countries, the postponement and subsequent decline in marriage rates has been the main determinant of the TFR decline up to the late 1990s. The increase in the proportion of never-married women has been particularly steep in Japan (from 7.2% in 1970 to 26.6% in 2000) while in Korea the proportion increased from 1.4% to 10.7% over the same period (Lesthaeghe, 2010). In both Japan and Korea, very few married couples remain childless, and in Japan, marital fertility has remained quite stable over time (Atoh *et al.*, 2004). There has been a recent decline of marital fertility in Korea (Lee, 2009, 2010 and, Suzuki, 2009) which contributes to the growing number of smaller families in that country.

3.4. The cost of children

The economic cost of children is also a determinant of fertility and its evolution, since raising and educating children require income, goods and time especially. Having children incurs consequently both a direct and visible cost and an indirect and less visible one (Willis, 1973; Thévenon and Luci, 2012), and the increase of these costs is considered as a key driver of falling TFRs since the early 1970s (Hotz *et al*., 1997).

Direct costs of children involve the additional consumption incurred by households because of their presence: including housing, food, clothing, childcare, education, transport, leisure, etc. Former surveys[9] of the literature on children costs suggested that a child accounts for approximately 15 to 30% of the budget of a couple without children. The variation depends on several factors like the child's rank of birth, their age, the parents' education and income level and the bargaining power of household members[10]. Nevertheless, both housing and education are key items of spending for families with children. In this context, the rising price of housing, and the prolongement of education – or the growing importance attached by parents to it – are likely to establish a barrier to fertility (OECD, 2011).

Households also bear "indirect" costs when having children, which are due to the fact that parents, usually mothers, will invest time in caring, educating and raising children, rather than paid employment. These costs can be measured by the earnings forgone by parents reducing their working hours or stopping work altogether (opportunity costs). Taking full-time leave or temporary reductions of working hours can also incur costs through any long-term damage to career prospects[11].

3.5. Labour market status

Against this background, public and workplace policies have been progressively introduced in order to help parents combining work and care responsibilities, thus reducing the costs of having children. These policies with changes in attitudes help explain the change in the relationship between female employment and TFRs at the aggregate level across countries shown in figure 6. In 1980, most of the countries with higher female employment rates had low fertility levels (data available for a restricted number of countries). By contrast in 2009-2010, highest fertility rates are observed in countries having high rates of female employment at the same time. Also, and although work and family reconciliation is achieved by different means, Nordic and English-speaking countries are able to combine high female employment rates with high TFRs. The choice between employment and motherhood is least stark in these countries, even though there often remains a trade-off between having large families and female employment at an individual level (Matysiak and Vignoli, 2008). By contrast, many of the lowest-low fertility countries (Albania, Moldova, Romania, Greece, Hungaria, Italy, Japan, Korea, Poland and Spain)

[9] See especially OECD (2011) and Thévenon and Luci (2011).

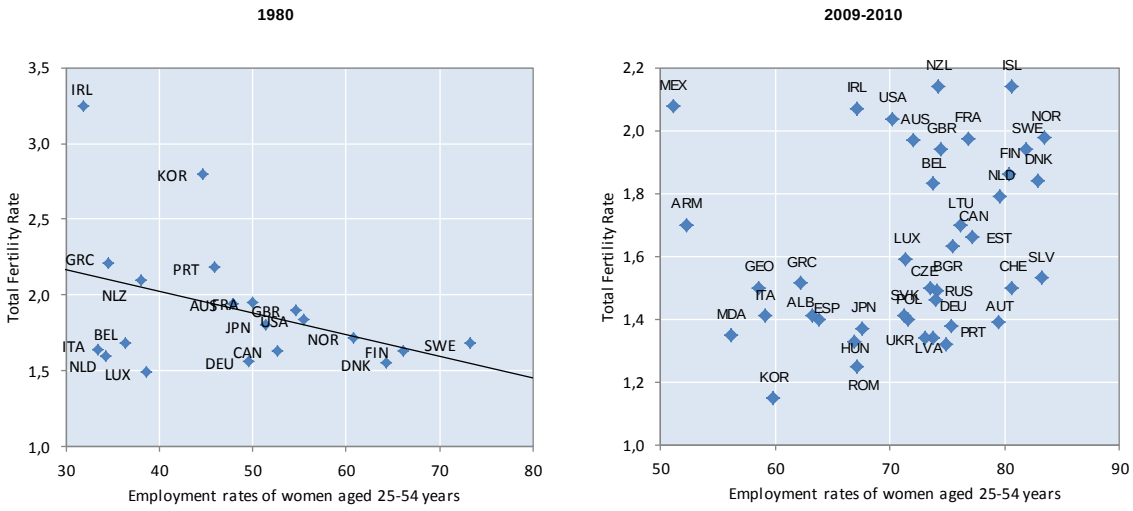
[10] The cost of the first child is often found to be greater than that for each subsequent child, because of economies of scale related to shared infrastructure (e.g. bedrooms) or the re-use of clothes and other articles. The cost of children increases with the age, and growth is concentrated during adolescence and the transition towards adulthood.

[11] One way of measuring these costs is to compare the total earnings forgone by mothers during their career after childbirth with the earnings profile of childless women. The earnings profile of the former compares unfavourably with the latter, the so-called "family gap" (OECD, 2002; Harkness and Waldfogel, 2003; and Davies and Pierre, 2005). For example, Sigle-Rushton and Waldfogel (2007) estimate that a working mother with two independent children (age 25 and 27) in Germany and the Netherlands has, on average, only 42 to 46% of the cumulative earnings of otherwise similar female employees. This is 58% in the United Kingdom, but the "family gap" is much smaller in Finland, Norway, Sweden or the United States where mothers earn 80 to 89% of non-mothers' earnings.

show comparatively low female employment. Neverthess, a change in signs of the correlation between fertility and female employment rates from negative to positive seems to have happened also in Central and Oriental Europe for which Kotowska (2013) finds a steep increase of the correlation during the 2000s.

Figure 6: Motherhood and employment are less incompatible now than in 1985

Female employment and Total Fertility rates, 1980- 2010



Sources: OECD Family database, SF2.1; World Bank data.

The intensity of work is also pointed out as negatively associated with the presence and number of children. Thus, the chance to be employed full-time was of 1.5 times higher or above for childless women than for mothers with children aged 20 to 44 in Spain in Austria, Spain, Hungary, the Netherlands, Poland or the UK over the 1990s until the mid-2000s (Thévenon, 2009). By contrast, the likelihood of working part-time increases with the number of children everywhere, but especially in the Netherlands where the vast majority of employed women works part-time. The analysis of trends in employment status in relation with family status show diverging trends in Europe: while the differences in labour market status with the number of children seems to decrease in some countries like France, the polarisation appears to have increased over time between those women having a full-time job but few children, while women's with a large family are more and more likely to hold a part-time job.

Diverse aspects of labour market conditions matter. First, workplace practices such as long working hours and working weeks make it harder to match work and care commitments and have been found to negatively affect fertility rates (Schmitt, 2012; Luci-Greulich and Thévenon, 2013). By contrast, part-time employment opportunities have a positive effect on fertility rates in OECD countries, especially among women with a higher level of educational attainments (D'Addio and Mira D'Ercole, 2005; Del Boca *et al*. 2009; Adsera, 2011). More than the length of working time being the driving force, Mills *et al.*, 2008 suggest that control over working time strengthens intentions to have children in European countries.

Furthermore, a wide access to permanent positions (such as those in the public sector) is correlated with faster transitions to births, while short-term contracts are associated with delayed fertility instead (Adsera, 2011). Schmitt (2012) suggests that the effect of labour market status on fertility behaviour is country-specific and depends on its embededness in Welfare regimes. For example, he found that occupational uncertainty – part-time work or work with a fixed-term contract – hampers transitions to

parenthood in Germany, but are inconclusive for the UK. Among highly educated women in both Germany and the UK, however, a high degree of labour market integration – shown by high working hours and/or gains in earnings – is found to delay family formation.

The macro-level situation of labour markets seems also to matter. In this regards, high rates of unemployment are conducive to a decrese in fertility rates (Adsera, 2004; Sobotka et al. 2010; Luci-Greulich and Thévenon, 2013), but it is hard to identify a clear effect of the degree of protection granted by labour codes on fertility at national levels (Luci-Greulich and Thévenon, 2013).

Last, the opportunities for mothers to combine work and family life increase when fathers take on a larger share of unpaid work. Emerging evidence from the Nordic countries suggests that involvement of fathers in caring for the first child brings forward the birth of second child (Skrede, 2005; Duvander and Andersson, 2006; Duvander *et al*., 2008; Lappegard, 2009). A more equitable division of unpaid work within households contributes to couple families having additional children.

3.6 Family Policies

In this context, the reduction of the obstacles faced by adults willing to have children has become an issue with growing importance on the policy agenda in many OECD and European countries in spite of some hesitations due to the fact that fertility issues are often considered to be part of the private sphere (OECD, 2011; Philipov, 2011). However, the decrease in fertility rates and its persistence has pressured policy into action in many countries, often with reference to demographic renewal and/or reducing barriers to family formation so that adults can have as many children as they desire. In other words, policies aim to reduce the gap between intended and achieved fertility in many countries, as shown by figure 7.

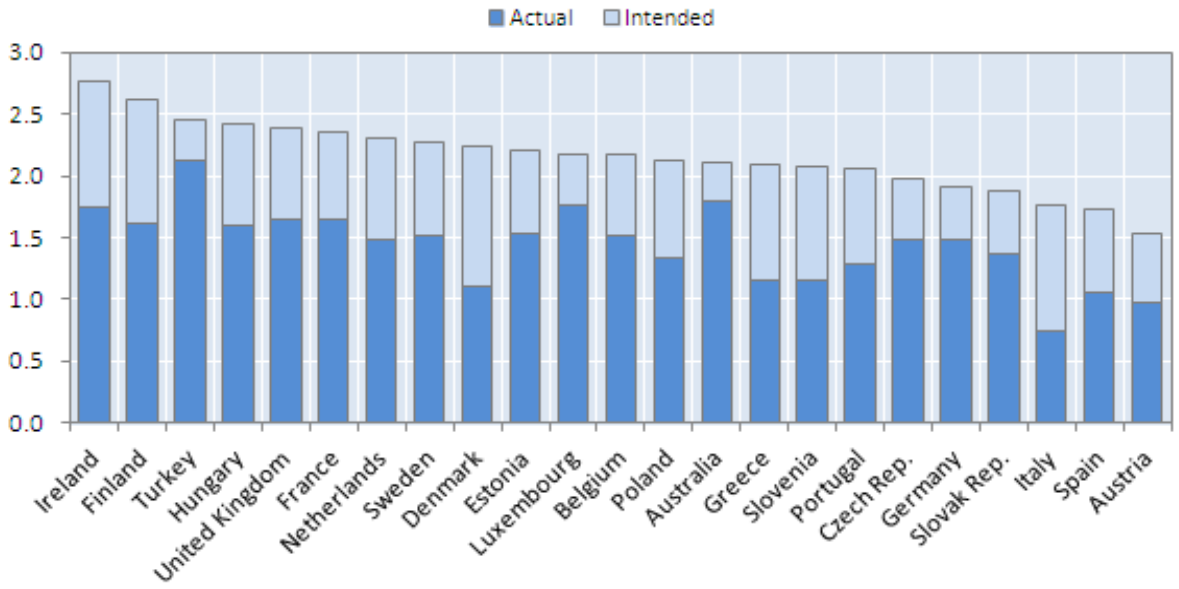
Here, the "ultimately intended family size" is estimated by the addition between the number of children individuals "intend" to have with those already born, for women aged 25 to 39. The ultimate intended size is particularly small in Italy, Spain and Austria where ideals of fertility below the replacement rates have emerged (Goldstein *et al.* 2009). Nevertheless, the significant share of "intended" births highlights the potential barriers households may face in seeking to realise their intentions.

More precisely, the European Commission's Eurobarometer (2006) opinion survey on Childbearing Preferences and Family Issues in Europe reveals that the two-child family is the most frequent ideal in the EU25-countries, with low-fertility countries such as Poland, the Czech Republic, Slovakia, Bulgaria, Spain, Portugal, Germany and Italy affirming the same average fertility intention (2 children) as other European countries. This means that in low-fertility countries, important individual and/or institutional barriers exist which hinder individuals to 'realize their fertility intentions'. When asked for the reason of having less children than intended, individual barriers such as health problems, advanced age or lack of partner are on average in the EU25 as often mentioned as institutional barriers such as difficulties combining work and family life. Unfortunately, no country-specific information is available for this question in the Eurobarometer.

In this context, a widening literature is attempting to assess the influence of policies towards family with children on fertility behaviour (see Thévenon and Gauthier, 2011 for a recent survey).

Figure 7: 'Fertility gap' between intentions and realization

Actual and ultimately intended number of children of women age 25 -39, 2006



Countries are ranked by the decreasing number of ultimately intended family size of respondents. This information is based on survey responses to the question: "And for you personally, what would be the ideal number if children you would like to have or would have liked to have?"

Source: Eurobarometer 2006: childbearing preferences and family issues in Europe.

There is considerable evidence that family policies can influence the timing of births, but it is less clear wwhether family policies actually help to significantly raise completed family size. Some cross-national studies investigate the impact of money transfers, leave and childcare policies and expenditures for families on fertility rates (Gauthier and Hatzius, 1997; Adsera, 2004; D'Addio and Mira D'Ercole, 2005; Hilgeman and Butts, 2009; Kalwij, 2010). Most recently, Luci-Greulich and Thévenon (2013) investigate the impact of these policies on fertility trends in 18 OECD countries over years from 1980 to 2007. They suggest that each instrument of the family policy package (paid leave, childcare services and financial transfers) has a positive influence on average, suggesting that the combination of these forms of support for working parents during their children's early years is likely to facilitate parents' choice to have children. Policy levers are not found to have the same weight, however: in-cash benefits covering childhood after the year of childbirth and the provision of childcare services for children under age three have a larger potential influence on fertility than leave entitlements and benefits granted around childbirth. Moreover, the authors point out important differences in the influence of each policy measure across country groups with different family policy systems. These results based on cross-national comparison of fertility trends converge with studies focusing on country-specific situation and/or analysing more precisely the impact of a single measure or a policy reform.

In all, countries which have recovered comparatively high rates of fertility after a period of decrease have also set policies that help women to combine work with family formation. The effectiveness of policies and/or workplace practices to support childbearing is argued to be a major determinants of the possibility for countries to have high rates of fertility and female employment at the same time. By contrast, countries with low fertility also much often show comparatively low female employment, suggesting that they fail to provide the support needed to combine work and childbearing.

4. Micro-level analysis of fertility behaviour in Europe

Against this backdrop, a key challenge is to get a better understanding of the factors that contribute to maintain fertility at low level in some countries and not in others. While it was clear from the former sections that labour market as well as institutional factors are key in explaining cross-country variations in fertility rates, how these country-level differences combine with heterogeneous individual behaviour within countries remains to be clarified. In this perspective, the next sections provide an empirical investigation of individual fertility behaviour in Europe. The aim is to address three main issues:
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- A first concern is to figure out whether low fertility in 'lowest-low' countries is due to barriers to start a family and/or to increase family size. An empirical analysis of fertility behaviour by birth-order is then required.

- A second concern is to identify individual characteristics such as age and education, but also individual pre-birth conditions such as labour market integration, which influence most fertility decisions.

- A third concern is finally to analyze whether family policies matter when considering the influence of individual characteristics on fertility behavior. Multi-level techniques may allow in this context to see in how far the impact of institutional variables varies among individuals of different characteristics.

To address these concerns, we analyse fertility behaviour on the basis of the EU-Survey of Income and Living Conditions (EU-SILC) which provides cross-section as well as longitudinal data on the characteristics of individuals and households for a wide range of European countries. The main advantage of this survey is the wide country coverage and the comparability of countries, as measures of individual characteristics such as education and measures of individual economic conditions such as labour market status or income are harmonized. We first check whether those countries with comparatively low fertility rates are marked by lower transition into parenthood or rather a lower propensity to increase family size. We find, in line with the suggestions of the former sections, that most low fertility countries are primarly characterised by an underrepresentation of families with two children or more, while few of them show also a significantly higher share of childlessness. For this reason, our microeconometric analysis will focus on the determinants of the birth of a second child.

A two-step analysis of these determinants will be undertaken. In a first step, we analyse the micro-level determinants of a second birth. By using the longitudinal data of the EU-SILC, we pay particular attention to women's individual characteristics *before* procreation of a second child. Particular attention will be paid to women's (and their partner's) activity status before the arrival of a second child. Several studies suggest that job instability coming along with income incertainty, are important reasons to explain low fertility, especially in Eastern European countries such as Poland, Hungary or the Czech Republic which underwent economic transition during the 1990s (c.f. for example Goldstein *et al*., 2009 or Mishtal, 2009). Most of these studies model economic instability as an institutional setting, for example by integrating aggregate unemployment rates in the econometric analysis – a procedure which undermines the heterogeneity of individuals. The microeconometric approach of the present study proposes a deeper insight in this issue by taking into account the labor market situation of each individual, observed precisely during the months before procreation of a second child.

In a second step, we will add information on the family policy contexts to the analysis of individual paths, as derived from the OECD Family database. Multilevel modeling allows studying both the role of individual and of contextual factors in an integrated framework by focusing on potentially

differentiated effects of policies on individual decision making. More precisely, we want to know in how far the impact of policies is heterogeneous among different types of individuals.

4.1. Data

The European Union – Survey on Income and Living Conditions (EU-SILC) is a European survey provided by Eurostat. This survey was created in 2003 as a replacement for the European Community Household Panel (ECHP) and now includes nearly thirty European countries. It gathers harmonized and comparable data at the individual and at the household level on income and living conditions as well as on many individuals' demographic and socio-economic characteristics (sex, age, education, labor market position, parenthood etc.).

EU-SILC is composed of two datasets – one cross-sectional and one longitudinal – both including more and more countries every year since the launch of the survey in 2003. The longitudinal dataset of EU-SILC is a rotational panel of four years which means that individuals are observed for a maximum of four years. Only a subgroup of individuals observed in the cross-sectional dataset is followed up over several years and thus presented in the longitudinal dataset.

The EU-SILC covers the majority of European countries, but the country coverage is much smaller for the early waves (2003, 2004) and the most recent wave (2010, 2011).

For this reason, and due to the fact that we want to avoid our results being affected by the recent economic crisis, we base our econometric analysis of women's probability of having a second child on the waves 2005 to 2008, while we observe women aged 15-45.. The foregoing descriptive analysis of the proportion of women having 0/1/2 and 3 or more children is based on the cross-section data of the year 2008. To approximate completed fertility, we focus on women aged 39 to 45 for this descriptive part of the analysis. .We use cross-section data to increase the number of observations, as there are more observed individuals in the cross-section sample than in the the longitudinal one.

The survey contains information on both individuals and households. It is possible to identify adult women, their partner – if they have any – and the children who live in the household.

The EU-SILC database contains a large number of economic and social variables that capture the situation of individuals and households and that may be considered as determinants of the decision to have child. It displays basic information on age and education level but also variables on individuals' labor market status (reported on a monthly basis), health, housing conditions and information on individual's and household's income. This information is rarely available in other, more 'demographic' surveys[12].

Other surveys exist that contain both demographic and economic variables with individuals followed up for more than only four years, but the limit of these data sets is their national focus since these long-run surveys are generally run in only one given country (the German Socioeconomic Panel or the American Panel Study of Income Dynamics for example).

The advantage of EU-SILC is to propose a comparative perspective of European countries using a harmonized database for a large set of economic variables. Two pitfalls emerge, however.

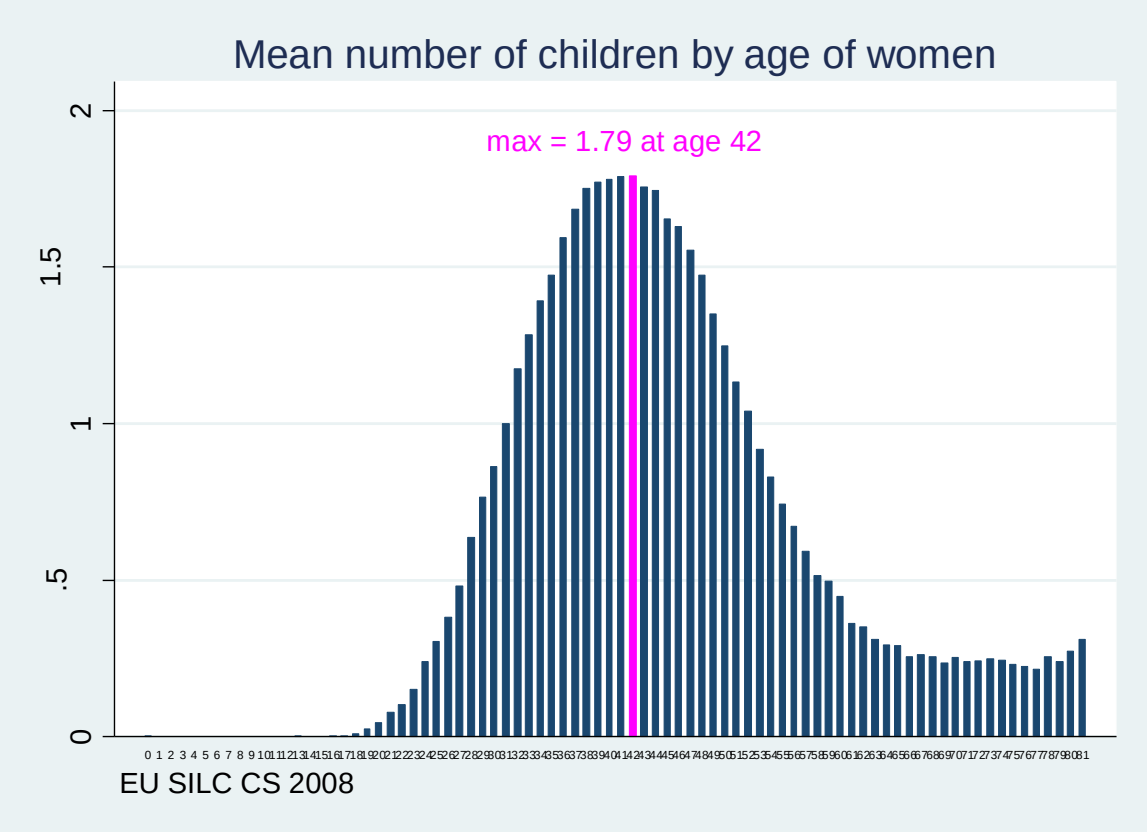
[12] One exception is the Gender and Generations Surveys, but this survey has a very limited country coverage.

First, the rotational design of the longitudinal survey implies that each individual is observed for maximum 4 years only. When analyzing the probability of women of having a second child, our test group consists of women who have had a birth of a 2nd child during the observed period of max. 4 years between 2005 and 2008, except the first observed year, because we want to obtain information about their situation one year before childbirth. Due to the short number of observed years, the number of observed events (arrival of a 2nd child) is not very high in comparison to the control group (women with only 1 child). A restriction to particular cohorts would intensify this problem. We therefore observe all women aged 15-45 for the test group as well as the control group and control our estimates for age.

Second, the EU-SILC does not contain demographic variables in terms of fertility, migration and mortality. The number of children and childbirth is not observed directly. Children are only observed when living in their parents' households, but not for example when they live with the parent's ex-partner or when they already moved out. Therefore, there is a risk of downward bias of observed fertility for women older than 35.

The observed weighted mean of women's age-specific number of children is actually decreasing after the age of 42 (2008 cross-section wave of EU-SILC), as illustrated in figure 8:

Figure 8: Weighted mean number of children by age of women



Thus, for our descriptive analysis of the proportion of women having 0/1/2 and 3 or more children, we limit the age group of women to 39 to 45, i.e. 3 years before and three years after the observed

maximum of 42 years, being aware of the fact that we do not exactly capture but underestimate 'completed fertility'. Consequently, our approximative 'completed fertility rates' do not always correspond to the less biased completed fertility rates that are reported by purely demographic data. However, the classification of countries in high and low fertility countries that we find with the EU-SILC corresponds to the one based on TFRs of the OECD Family Data Base (as well as TFRs given by the World Bank World Development Indicators and completed fertility rates given by the Human Fertility Database. That is, countries with low total and completed fertility rates actually have low completed fertility reported in the EU-SILC (except the low-total fertility countries Slovak Republic, Slovenia, Hungary, Poland and Cyprus for which EU-SILC reports competed fertility rates slightly above 1.5, keeping in mind that completed fertility rates are generally higher than the periodic measure 'total fertility rates' as they control for birth postponement).

Our econometric analysis of the probability for women of having a second child is based on women aged 15-45. We risk losing some observations due to the fact that we falsely interpret the arrival of a second child as first child arrival, because the first child lives not in the mother's household, but for this part of the analysis the potential bias is not as important as for the first part where we try to capture completed fertility.

4.2. Barriers to start a family or to increase family size? The distribution of families by number of children

As discussed in the previous sections, low levels of fertility in European countries can refer to different situations regarding the distribution of families by number of children. Using the EU-SILC database, we intend to discriminate between at least two configurations :

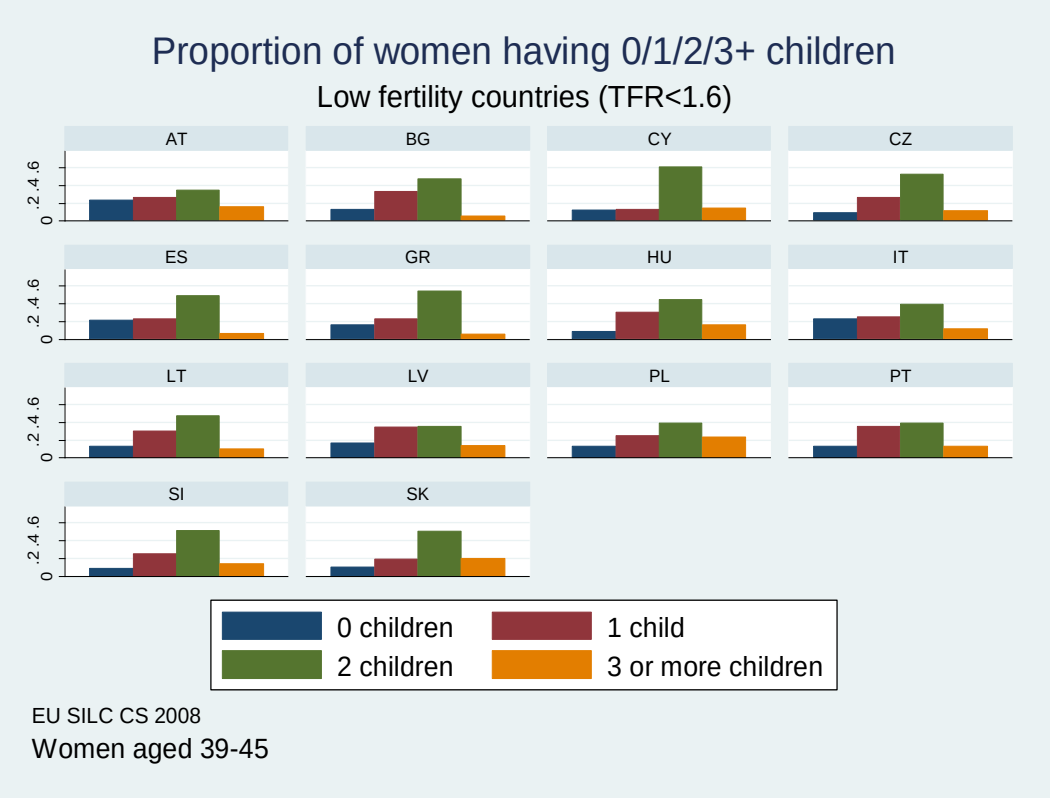
- countries where low fertility is mainly due to a high proportion of childless women
- countries where low fertility is mainly due to a high proportion of one-child families.

Is fertility low in some European countries because a lot of women remain childless? In other words, is the "barrier" to have a first child an important part of the explanation for low fertility rates, particularly in some new member states? Or is it the arrival of children of rank two or more problematic in these countries?

Both barriers can lead to total fertility rates below replacement level. In the first scenario, total fertility rates are low because most women have one child but few have a child of higher rank (homogenous fertility behavior). In the second scenario, total fertility rates are low because one large part of women has two children while another large part stays childless (dichotomous fertility behavior). To see what kind of barrier is dominating, we compare the weighted proportions of women (aged 39 to 45) having 0/1/2 and 3 or more children for each country represented in the 2008 cross-section database of the EU-SILC. For this descriptive analysis, we use the cross-section data base and not the longitudinal one in order to obtain the largest possible number of observations. In the EU-SILC, actually only a subgroup of individuals is followed up and thus represented in the longitudinal database.

Figure 9 presents the the weighted proportions of women (aged 39 to 45) having 0/1/2 and 3 or more children for each country.

Figure 9: Weighted proportions of women (aged 39 to 45) having 0/1/2 and 3 or more children



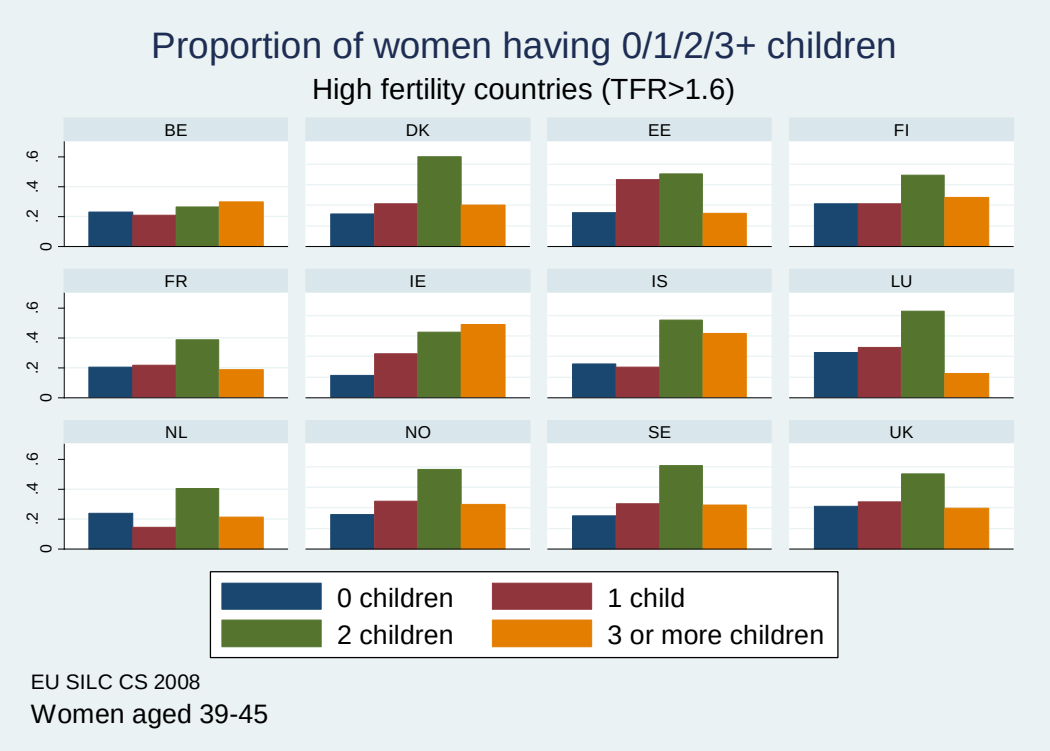
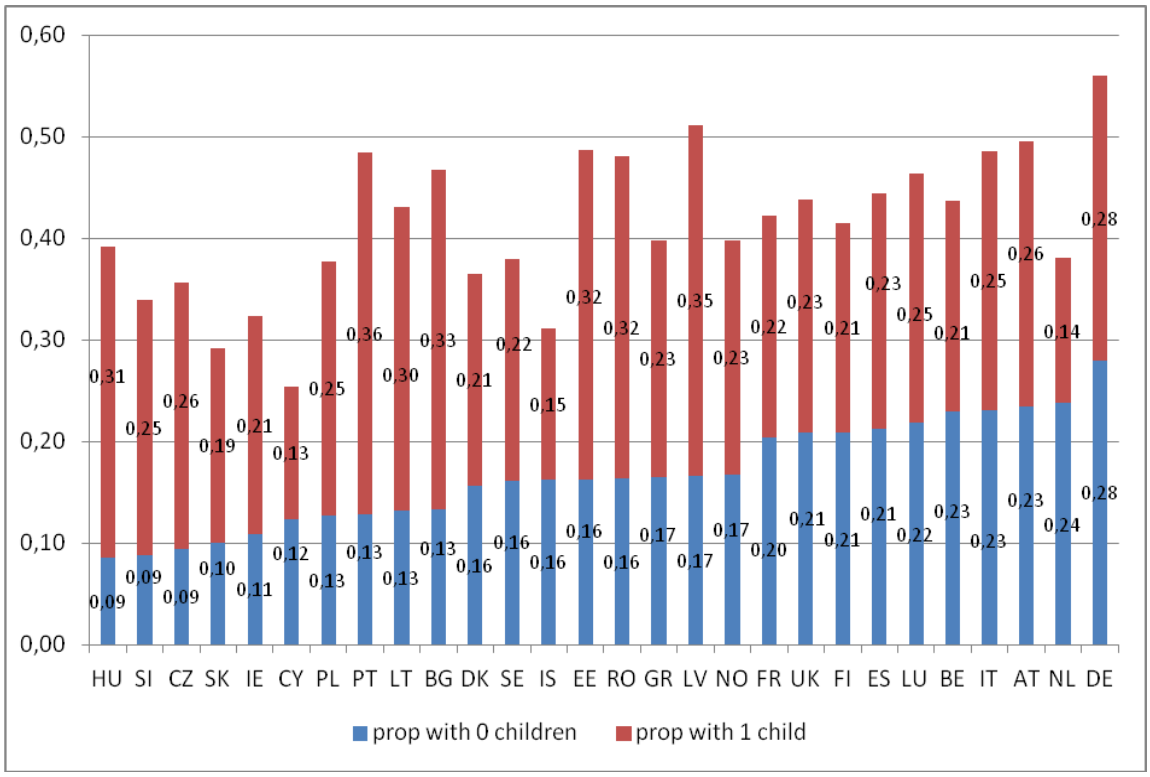


Figure 9 shows results that are quite consistent with country differences observed when discussing variations in completed family size in the former section. In particular, one can see that in all countries – including those with low and high fertility rates –, having two children is the most frequent situation for women aged 39 to 45. However, countries with highest fertility rates (especially Denmark, Finland, France, Ireland and Sweden) display much higher proportions of women with two or more children. This suggests that "barriers" for having a second child seem to be an important parameter discriminating countries with low fertility, especially inHungary, the Czech Republic, Poland, Portugal, Bulgaria, Lithuania and Latvia, where the proportion of childless women is relatively small in comparison to the proportion of women having one child (figure 10). At the same time, figure 9 reveals that in these countries, the proportion of women having 1 child is relatively high in comparison to the cumulated proportions of women having 0 and 2 children. Thus, women in most low fertility countries are indeed not very likely to remain childless, but are relatively numerous to stay with one child only.

Figure 10: Weighted proportions of childless women against women having one child (women aged 39 to 45)



EU SILC CS 2008, women aged 39 to 45

Nevertheless, the proportion of childless women is also considerable in a few low-fertility countries (Austria, Germany, Spain and Italy), which seems to indicate that obstacles to start a family add to those associated with the enlargement of families. Note that for Cyprus, the Slovak Republic and Slovenia, the proportions might be biased due to the fact that, as noted before, the EU-SILC reports higher fertility than the aggregated measures of fertility provided by the OECD Family Data Base for example.

In general, we conclude that in most low fertility countries, the barrier for having a second child seems to be somewhat more important than the barrier for having a first child.

In the following, we thus focus our econometric analysis on the barriers of having a second child. For this part, we use the longitudinal database (waves 2005-2008) in order to obtain information about women's situation before the conception of a second child.We therefore compare women aged 15-45 who have only one child at the beginning and still at the end of the observed period to those who have had a second child over the observed time period.

We nevertheless consider identifying barriers for a first child as a fruitful way of future research. This exercise would be possible but is less evident with the EU-SILC, as focusing on 1nd child arrival implies comparing a very small test group of women with 1st child arrival during the observed period to a very large control group of childless women. Cohort analysis would allow improving this ratio, but the absolute number of observed women of each cohort in the test group would be very small when using the EU-SILC as the observed time period of maximum 4 years is very short. Studies focusing on 1st child arrival therefore usually use national survey data with longer observed time periods (see for example Schmitt (2012) for Germany and the UK and Pailhé and Solaz (2012) for France using Cox duration models to analyze determinants of the timing of having a first child).

4.3. Determinants of the probability of having a second child

4.3.1. Construction of the data base and econometric procedure

We estimate women's probability of having a second child with a logit regression model while taking into account women's, their partner's and household's characteristics observed during a certain period before procreation. With this procedure, we try to capture determinants of parents' decision to have a second child. The time-lag also allows us to reduce endogeneity issues, as parents' situation before the arrival of a second child, for example in terms of income or labor market status, is unlikely to be influenced by the (future) existence of a second child (even though inverse causality can never be completely ruled out).

We use the longitudinal data set of the EU-SILC covering the years 2005-2008 in order to guarantee the largest possible country coverage and to avoid potential effects of the economic crisis on the estimation results. The four-year panel includes micro data on 27 countries: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Spain, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Lithuania, Luxembourg, Latvia, the Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia and the United Kingdom. Table A in the appendix summarizes the availability of EU-SILC longitudinal data on each country for each year. Longitudinal data on Germany are not available anymore since 2006 and data on Malta are not yet delivered in this panel. Besides, even if Romania is present in the 2005-2008 panel, data are incomplete for years 2005 and 2006 so that this country has to be left apart. At the individual level, 26 countries are thus available for the analysis.

The sample is restricted to women aged 15 to 45 years old, this bracket being considered as women's reproductive life span.

In EU-SILC database, children are registered with their own id and are only observed if they live in their parents' household (or with only one of their parents)[13]. Fertility of women is thus not observed directly. It is however possible to link children to their mother and father through two variables (mother id and father id). In this study, we only consider children who live in the same household than their mother (whether the father lives in the household or not). Women's stepchildren, other young family members and children who live only with their father are thus not considered. Once children are 'linked' to their mother in the database, it is possible to calculate the total number of children for each woman and to keep all information needed about each child (sex, age etc.).

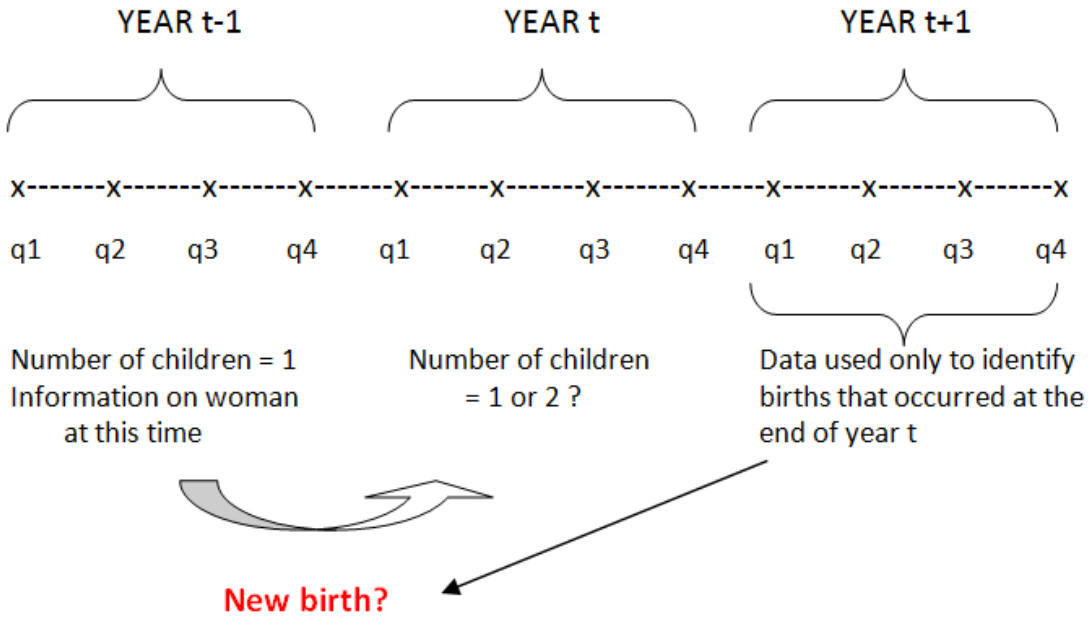
Since fertility is not directly observed in the database, a dummy variable that identifies the birth of child between two years (two interviews) has to be built. This is done by observing at least three consecutive years. In the 2005-2008 panel, not all individuals are observed over the four years. In order to collect information on mothers at the time of conception and to identify births properly, the sample is restricted to women who are interviewed consecutively at least three times:

- those interviewed all four years (2005, 2006, 2007 and 2008),
- those interviewed in 2005, 2006 and 2007 but not in 2008,
- those interviewed in 2006, 2007 and 2008 but not in 2005.

This restriction is necessary since children born in the third and the fourth quarters of each year are generally declared at the interview of the year after. This is because interviews usually take place during the first half of each year. Births that occur at the end of the year are thus not detectable immediately. Three consecutive years of interviews are then needed to identify all births that occur in one given year and to get information on the mother for the year before (when they decide to have a child/time of conception).

[13] This is a limit when calculating the total number of children and births' rank because some older children may havealready left the household when a new birth occurs. This is however rather unlikely since childbirths from the same mother are rarely separated by more than 18 years (which can be considered as a minimum age to leave parents' household).

The following diagram summarizes how data on woman and data on births are collected. In our study, year *t* is either year 2006 or 2007[14]:



In this case (study of a second child arrival), the dependent variable is a dummy that is built as follows:

- Y = 1 if the woman gives birth to a second child at year *t* (test group)
- Y = 0 if the woman does not give birth to a second child in year *t* (whatever happens in year *t+1*) (control group)

The event "second child arrival / no second child arrival" is observed in year *t*. Individual characteristics that we consider as possible determinants of the "event" are observed in year *t-1*. Year *t+1* only served to make sure that we observe all child arrivals of year t. We create for each woman a dummy variable *Y=(0/1)* and then keep only year *t-1*. The therewith obtained cross-section structure of the data base allows us regressing the probability of having a second child on the individual characteristics observed in the year before 'potential' childbirth by using a logit model.

[14] Women who are observed during the four years of the panel are thus considered twice in our sample : once in 2006 (years 2005-2006-2007) and once in 2007 (years 2006-2007-2008). They represent about 30% of our sample.

Box 1 : Details on the composition of the test group and the control group

If a woman who is observed during three years gives birth to a second child in year *t+1*, she will be in the control group ("no child arrival in year t) because we would need wave *t+2* to observe all childbirths in *t+1*. Note that women who are observed during four years (*t-1* to *t+2*) and who have had a second child in *t+1* are represented twice in the data base, once in the control group (as they did not have a child in year *t*) and once in the test group (as they had a second child in *t+1*, observed in *t+1* or *t+2*). Women who have had no second child in year *t* and in year *t+1* are represented twice in the control group.

Women who have twins at second birth are in the test group, but women who have had twins at first childbirth are neither in the test nor the control group. Second childbirth is taken into account even if a third child arrives in the year after second childbirth. Second child arrivals are taken into account even if a first child is observed in the first period but 'disappears' during the observed period (we assume that in this case this child moved out because we observe that these children are usually quite old).

There remains nevertheless a possible bias due to the fact that only those children are observed who live in their mothers' household: women who have a second child during the observed period but have a first child that already moved out before the beginning of the observation (or lives with the ex-partner during the whole observed period) cannot be integrated in the control group, because we are unable to identify their second birth as such. However, children moving back or into their mother's household during the observed period are not falsely considered as second child arrivals as their birth year is observed.

Overall, the event "arrival of a second child" can be observed for 9% of observations in our sample. The test group consists of 867 observations, the control group of 8480 observations. Table 1 presents the number of observations in the test and control group as well as the proportion of "second child arrival" events for each country.

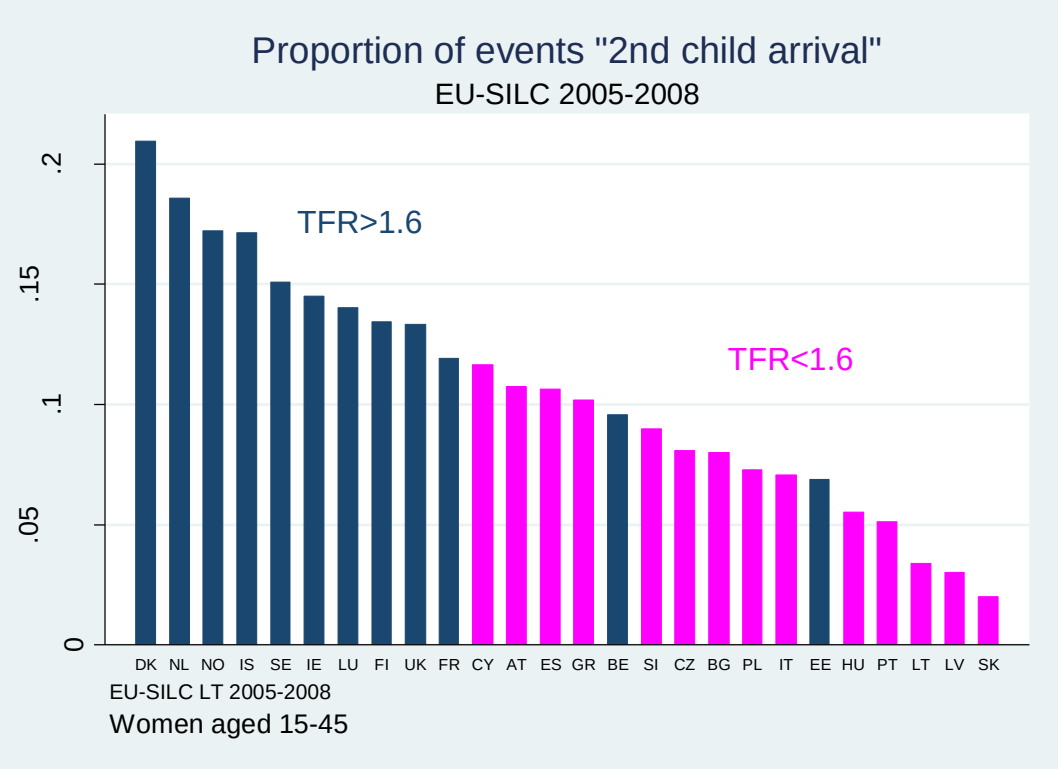
The proportion of "second child arrival" events varies considerably across countries. The picture is quite representative, as we actually observe larger proportions in those countries where total fertility rates (as measured by the OECD Family Data Base and the World Bank's WDI in 2008) are higher, as illustrated by figure 11. Only Belgium and Estonia have proportions ranking in the lower level even though in both countries, total fertility rates are above 1.6.

Table 1: Descriptive overview of the endogenous dummy variable "2nd child arrival"

	Number of observations		prop. of events "2nd child arrival"
	no 2nd child arrival	2nd child arrival	
Austria	266	32	0,11
Belgium	227	24	0,10
Bulgaria	161	14	0,08
Cyprus	129	17	0,12
Czech Republic	727	64	0,08
Danemark	83	22	0,21
Estonia	244	18	0,07
Spain	655	78	0,11
Finland	103	16	0,13
France	731	99	0,12
Greece	229	26	0,10
Hungary	427	25	0,06
Ireland	59	10	0,14
Iceland	29	6	0,17
Italy	1053	80	0,07
Lithuania	285	10	0,03
Luxembourg	460	75	0,14
Latvia	288	9	0,03
Netherlands	193	44	0,19
Norway	149	31	0,17
Poland	880	69	0,07
Portugal	259	14	0,05
Sweden	90	16	0,15
Slovania	162	16	0,09
Slovakia	292	6	0,02
United Kingdom	299	46	0,13
Total	**8480**	**867**	**0,09**

Data Base: EU-SILC LT 2005-2008, women aged 15-45 who already have one child

Figure 11: Proportion of events "2nd child arrival" in high and low fertility countries



Data Base: Women aged 15-45 who have already one child

We now proceed with the construction of our time-lagged regressors.

For the purely microeconometric analysis, we take into account women's individual characteristics such as age, education, health and their labor market status and employment status. We also take into account the age of the first child, the existence of a partner, the partner's labor market status as well as household income. Information about migrant background is unfortunately not available in the EU-SILC longitudinal waves before 2008.

Education, health and employment status are observed at the time of the interview in each year. For these variables as well as for women's age, we take into account the information observed in the calendar year before the year of the event "second child arrival / no second child arrival".

We construct three categories for education (highest ISCED level attained): Low education for pre-primary, primary and lower secondary education, medium education for upper secondary and post-secondary non tertiary education and high education for first stage of tertiary education (not leading directly to an advanced research qualification) and second stage of tertiary education (leading to an advanced research qualification).

We construct a dummy variable called "good health" which equals 1 if women self-perceived health (including health status and chronic illness or condition) is claimed to be very good or good (and not fair, bad or very bad).

Employment status is a categorical variable that is included in two different ways, in terms of occupation[15] (low-skilled manual, high-skilled manual, low-skilled clerical, high skilled clerical) as well as in terms of type of contract (permanent employment, temporary employment, self employed or family worker).

Labour market status (employed, inactive, unemployed, student) is observed on a monthly basis in the EU-SILC. We observe the evolution of labour market status during the three months previous to conception. For "second child arrival", four periods of birth are observed in the EU-SILC (1: January-March; 2:April-June; 3: July-September; 4: October to-December). For children born in period 1, we observe mother's labour market status from January to March in the year before childbirth. For children born in period 2, we observe mother's labour market status from April to June in the year before childbirth. For children born in period 3, we observe mother's labour market status from July to September in the year before childbirth. For children born in period 4, we observe the labour market status from October to December in the year before childbirth. For children without birth period information, we observe mother's labour market status from January to March in the year before childbirth to make sure that labour market status is observed before conception. For women in the control group, we observe the labour market status from January to March in the year before the event "no arrival of a second child".

The observed period of labour market status is limited to three months as we want to make sure that labour market status is observed before conception for those women who have had their second child in the first period of year *t*. We hence observe their labour market status from January to March in the year *t-1*. Not more than three months can be observed as we do not have information for the year *t-2*. All other women are equally observed during three months to avoid distortion. However, a potential bias can nevertheless occur due to cyclical or periodical employment fluctuations, as women's labour market status is observed at different periods in the year. As for the majority of women (large control group), labour market status is observed from January to March, we are unable to include periodical dummies in our estimation model.

We define market status as "stable" if it does not change during the observed period of three months. We thus create five categories, which are "*stable employment*" (full-time and part-time employed and self-employed), "*stable inactivity*", "*stable unemployment*", "*stable student*" and "*unstable*". Note that the category "unstable" reflects all kinds of status changes that happened within the observed three months. We include this category in our model in order to capture all individuals (even though only a small minority is concerned by this category), but its interpretation is limited due to the large heterogeneity within this category (job loss, job take-up, reduction of working hours, extension of working hours…).

We also include information on women's partner in our models. That is, we control for the *existence of a cohabiting, observed partner* (only 3% of cohabiting partners are unobserved in our sample). For those with a partner, we distinguish between partners being in "*stable employment*" and those being "*not in stable employment*" (grouping stable inactivity, stable unemployment, stable student, stable military service and "unstable" labour market status), while "stable" refers to the same three-months period before conception of the 2nd child which is observed for the mother.

Finally, we control for household income. We take into account (the log of) "*total disposable household income*" observed for the year previous to second child birth, which includes gross personal income components (gross employee cash or near cash income), company car, gross cash benefits or losses from self-employment, unemployment benefits, old-age benefits, suvivor's benefits, sickness benefits, disability benefits, educational-related allowances, income from rental of a property or land,

[15] This variable is created using ISCO-88 classifciation : high-skilled clerical : 1 and 2 ; low-skilled clerical: 3, 4 and 5 ; high-skilled manual: 6 and 7 ; low-skilled manual: 8 and 9.

family/children related allowances, housing allowances, profit from capital investments and gross regular inter-household cash transfer (alimonies for example), minus regular taxes on wealth and taxes on income and social contributions.

Note that our household income variable contains income of all kind of household members, including grand-parents. A focus on women's and their partner's income only would imply losing information on transfers that are attributed to the household as a whole and not to individuals (such as housing/family allowances, income from rental of a property or land, profit from capital investments, alimonies). To keep these transfers, we put up with the fact that we observe income of other household members than parents, such as grand-parents for example. At the same time, the geographical proximity and the financial support of grand-parents as a potential determinant of fertility justifies in a certain way including the variable "total disposable household income".

Other information such as "reason for job change", or "number of hours worked per week" are not taken into account in order to keep the number of observations as large as possible. Information on labour market experience (time since first regular job, number of years spent in paid work) is not taken into account to avoid multicollinearity with age, education, labour market status and employment status.

Table 2 gives a descriptive overview of all exogenous variables used in our microeconometric analysis.

Table 2: Descriptive overview of the regressors

	no 2nd child arrival	2nd child arrival
Age (categorial)		
15-24	4%	7%
25-34	36%	66%
35-45	60%	27%
Educational attainment (categorial)		
Low education	21%	18%
Medium education	54%	46%
High education	25%	36%
Age of first child (continuous)	8.6Ø	3.4Ø
Good health (dummy variable)	78%	88%
Stability on the labor market (categorial)		
Stable employment	68% (thereof 20% part-time)	63% (thereof 33% part -time)
Stable unemployment	9%	9%
Stable inactivity	19%	22%
Stable student	1%	1%
Unstable	3%	5%
Partner information (categorial)		
Partner in stable employment	63%	71%
Partner not in stable employment	7%	5%
No partner	30%	24%
Household income (log)	9.64Ø (15400€)	10Ø (22000€)
Employment status 1 (categorial)		
Not working	31%	35%
Low-skilled manual	10%	7%
High-skilled manual	5%	4%
Low-skilled clerical	40%	37%
High-skilled clerical	14%	17%
Employment status 2 (categorial)		
Not working	31%	35%
Permanent employment	53%	51%
Temporary employment	9%	10%
Self employed or family worker	7%	4%

Data Base: EU-SILC LT 2005-2008, women aged 15-45 who have already one child.

4.3.2. Estimation results

We recall that we estimate women's probability of having a second child while taking into account women's, their partner's and household characteristics observed during a certain period before procreation. Due to the way our data base is constructed, as described in the former section, we obtain a cross-section structure allowing to apply a standard logit regression model (with robust standard errors).

Table 3 presents the estimated coefficients of our different micro-econometric models. Table B in the appendix shows the corresponding odds-ratios.

The first column shows the results when estimating the probability of having a second child as a function of women's age, education, health and the age of her first child. Age 25-34 as well as medium education serve as reference category. In comparison to women aged 25-34, women aged 15-24 as well as women aged 35-45 have a lower probability of having a second child during the observed period, indicating an inverse U-shaped curve of the probability of having a second child as a function of mother's age. For education, we observe an U-shaped curve. Low educated as well as high educated mothers have a higher probability of having a second child than medium educated mothers while controlling for age etc. In addition, the more time has passed since the birth of a first child, the lower the probability of having a second child. Finally, healthy women are more likely to have a second child.

The second column shows the estimation results while controlling for mothers' and their partners' employment. Stable employment is modeled here as a 0/1 dummy variable for both men and women (partner's employment equals zero for women without a partner and for women with a partner who is not in stable employment). Women's as well as their partners' stable employment situation is positively associated with fertility, while all other regressors keep their sign and significance. Only low education gets insignificant, suggesting that once we control for stable labour market participation, there is no significant difference between young and middle aged women regarding their probability of having a second child.

In column three, women's activity status is modeled in a more explicit way and we distinguish between women without a partner and those having a partner who is not in stable employment. In comparison to women in stable employment, inactivity and being a student clearly work against the decision to have a second child. At the same time, the probability of having a second child is not significantly higher for women with a partner in stable employment in comparison to women without a partner or a partner without a stable employment situation. This clearly indicates the importance for women of creating an independent and stable economic environment before the arrival of a second child. We observe an insignificant coefficient for 'unstable' due to the large heterogeneity within this category (job loss, job take-up, reduction of working hours, extension of working hours during the observed three months).

Model four compares part-time employed women to those in full-time positions, revealing that part-time employed women have a higher probability of transition to second childbirth than full-time employed women. Model five shows that in comparison to part-time employed women, unemployed and inactive women as well as students have a lower probability of second child arrival. However, due to a low number of observations, we can not distinguish between voluntary and involuntary part-time work and we can not observe the number of hours actually worked in part time. Therefore, we prefer re-grouping part-time and full-time employment for the next model (with household income) and for our multi-level models presented in the next section.

Table 3: Estimation results (estimated coefficients) of the microeconometric model (logit regressions with robust standard errors)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Individual variables								
Intercept	-1.475***	-1.670***	-1.336***	-1.454***	-1.060***	-4.486***	-1.543***	-1.540***
	(0.121)	(0.138)	(0.133)	(0.137)	(0.150)	(0.474)	(0.129)	(0.128)
Age								
15-24	-0.262+	-0.181	-0.137	-0.144	-0.144	-0.0254	-0.180	-0.177
	(0.153)	(0.155)	(0.158)	(0.158)	(0.158)	(0.159)	(0.156)	(0.155)
25-34	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*
35-45	-0.541***	-0.553***	-0.557***	-0.587***	-0.587***	-0.705***	-0.559***	-0.551***
	(0.0936)	(0.0936)	(0.0935)	(0.0948)	(0.0948)	(0.0964)	(0.0936)	(0.0940)
Educational attainment								
Low education	0.209*	0.231*	0.228*	0.210*	0.210*	0.176+	0.258*	0.238*
	(0.103)	(0.104)	(0.104)	(0.104)	(0.104)	(0.105)	(0.105)	(0.104)
Medium education	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*
High education	0.286***	0.260**	0.255**	0.275**	0.275**	0.162+	0.217*	0.247**
	(0.0850)	(0.0856)	(0.0860)	(0.0864)	(0.0864)	(0.0869)	(0.0939)	(0.0861)
Age of first child	-0.167***	-0.169***	-0.169***	-0.164***	-0.164***	-0.151***	-0.170***	-0.169***
	(0.0100)	(0.0103)	(0.0103)	(0.0103)	(0.0103)	(0.0101)	(0.0103)	(0.0103)
Good health	0.275*	0.262*	0.266*	0.258*	0.258*	0.187	0.269*	0.261*
	(0.112)	(0.112)	(0.113)	(0.113)	(0.113)	(0.114)	(0.113)	(0.112)
Stability on the labor market								
Stable employment (ft&pt)		0.184*	*Ref.*			*Ref.*		
		(0.0825)						
Stable full-time employment				*Ref.*	-0.394***			
					(0.101)			
Stable part-time employment				0.394***	*Ref.*			
				(0.101)				
Stable unemployment			-0.0668	0.0513	-0.343*	0.0739		
			(0.136)	(0.140)	(0.151)	(0.138)		
Stable inactivity			-0.250*	-0.127	-0.522***	-0.0939		
			(0.0969)	(0.103)	(0.117)	(0.0998)		
Stable student			-0.906*	-0.776*	-1.170**	-0.849*		
			(0.363)	(0.365)	(0.369)	(0.361)		
Unstable			0.131	0.251	-0.143	0.137		
			(0.185)	(0.188)	(0.196)	(0.187)		
Partner information								
Partner in stable employment		0.149+	*Ref.*	*Ref.*		*Ref.*	*Ref.*	*Ref.*
		(0.0822)						
Partner not in stable employment			-0.164	-0.155	-0.155	-0.0317	-0.157	-0.153
			(0.170)	(0.170)	(0.170)	(0.172)	(0.170)	(0.170)
No partner			-0.140	-0.166+	-0.166+	-0.108	-0.151+	-0.154+
			(0.0882)	(0.0883)	(0.0883)	(0.0889)	(0.0879)	(0.0878)
Household income (log)						0.320***		
						(0.0464)		
Employment status								
Not working							*Ref.*	*Ref.*
Low-skilled manual							0.0240	
							(0.157)	
High-skilled manual							0.450*	
							(0.193)	
Low-skilled clerical							0.212*	
							(0.0921)	
High-skilled clerical							0.322*	
							(0.126)	
Permanent employment								0.245**
								(0.0871)
Temporary employment								0.216
								(0.137)
Self employed or family worker								-0.000901
								(0.187)
Number of observations	9347							
Number of events '2nd child arrival'	867							
Number of countries	26							
Pseudo R^2	0.122	0.124	0.125	0.128	0.128	0.134	0.125	0.124
+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001								
robust standard errors in parentheses								

Model six controls for household income which takes into account income of all household members and includes also cash benefits. Household income, which also represents in a way a secure economic environment, is highly and positively associated with the transition to a second child. When taking into account the financial prosperity of households, inactive (and unemployed) women are not less likely to have a second child than employed women. However, household income is based on all household members including for example grandparents and cannot be divided into individual components. Moreover, integrating household income increases the risk of obtaining biased estimation results due to potential multicollinearity, in particular with labour market participation. For this reason, we let aside household income for the next microeconomic specifications that focus on labour market participation, acknowledging that household income is an important determinant of fertility, which is however and at least in the majority of cases generated by parents' labour market participation. We know from column two, three, four and fivethat women's stable employment is more important for second child arrival than their partner's employment situation.

In model seven and eight, we substitute women's activity status with women's employment status while modeling inactivity as reference category. Column seven shows that women working in high skilled and low skilled clerical occupations as well as in high skilled manual occupations have a significantly higher probability of having a second child than inactive women. This reveals once again the importance of women's labour market integration for the arrival of a second child. Only women working in low skilled manual occupations do not differ from inactive women in terms of second child arrival. Column eight reminds the importance of stability by showing that women in permanent employment are more likely to have a second child than inactive women. On the contrary, women in temporary employment, self-employed women and family workers, who all face a certain way of economic uncertainty, do not differ from inactive women in terms of second child arrival.

Our micro-econometric framework allowed us to estimate the probability of having a second child as a function of different individual variables while observing these variables at the time when women decide to have a second child. We conclude that when keeping constant age, education, the age of first child, health and certain partner characteristics, women's stable labour market integration is associated with a higher probability of having a second child. Successful job market integration after the birth of a first child seems to facilitate women's decision of having a second child, whereas inactivity appears to be a barrier for the arrival of a second child.

This result is interesting as our descriptive statistics showed a lower percentage for women having a second child in stable employment and a higher percentage of women having a second child in inactivity in relation to women having only one child. However, when econometrically controlling for other determinants such as age, education etc., we actually see that women in stable employment have a higher probability of having a second child. This exercise reveals the importance of controlling as much as possible for all potential determinants of fertility. One might think, for example, of institutional factors facilitating women's work-life balance, which may contribute to the fact that women's labour market attachment is positively associated with women's probability of having a second child. Controlling for these institutional factors is thus essential to understand the interactions between female employment and fertility.

Multilevel modeling allows studying to the role of individual and contextual factors in an integrated framework. Therefore, we now add institutional variables such as certain family policy instruments that are measured on an aggregate level, to our estimation models. This tells us whether or not for example a certain family policy variable can be associated with women's higher probability of having a second child. Modeling interactions between contextual and individual variables allows us identifying in how far the effects of family policies on individual fertility behaviour vary among individuals with different characteristics in terms of labour market integration.

5. Multilevel Analysis

5.1. Multi level modeling

Multi-level models have been the subject of renewed interest since the development of large international databases. These models offer an interesting framework enabling both individual and contextual determinants of an observed event to be taken into account. They differ from more traditional techniques such as fixed effects regressions mainly because their goal is not to 'cure' regressions of contextual effects, but to interpret and compare these effects.

These models are thus very useful when individuals are supposed to be 'nested' into higher level structures (Snijders, Bosker, 1999) that may play a role in explaining events that occur at the individual level. This is of particular interest in international comparative research: we can indeed consider that individuals are 'nested' in countries, each country being characterized by specific national institutions or specific economic trends that may play a role on individual choices or situations.

Multi-level models are used here in complement to purely micro-level models since we assume that the decision of having a child may be correlated to some institutions such as family (leave policies, childcare policies etc.) or fiscal policies.

The dependent variable of our models being a dummy, we use binomial logit models. Equations of a binomial logit model are the following:

$$P\left(dv_{ij} = 1 \mid \beta_j\right) = \phi_{ij}$$
$$\log\left[\frac{\phi_{ij}}{1-\phi_{ij}}\right] = \eta_{ij}$$

These equations have specific features in the case of multi-level models. The multi-level methodology proceeds in different steps.

First, we estimate an 'empty' or 'unconditional' model that only includes a random intercept. This empty model simply delivers a picture of countries' relative situations in terms of women's probability of giving birth to a second child.

The intercept is composed of two parts:

- one being the average expected log-odds of having a second child relative to not having one;
- the other, a country-specific effect.

Thus, in the intercept model, the log odds are the following:

$$\log\left[\frac{\phi_{ij}}{1-\phi_{ij}}\right] = \eta_{ij} = \beta_{oj} = \gamma_{00} + u_{0j}$$

This equation can be decomposed in two equations:

A level-1 (individual level) equation:

$$\log\left[\frac{\phi_{ij}}{1-\phi_{ij}}\right] = \beta_{oj}$$

And a level-2 (country-level) equation:

$$\beta_{oj} = \gamma_{00} + u_{0j}$$

Country-specific effects of the empty model (u_{0j}) give a first picture of the position of countries in terms of women's probability of giving birth to a second child.

In a second step, individual variables are introduced to estimate the influence of individual characteristics on the probability of having a second child. The intercept is random, as in the empty model, but coefficients for individual variables are supposed to be the same across countries and are estimated over the whole sample:

$$\log\left[\frac{\phi_{ij}}{1-\phi_{ij}}\right] = \beta_{oj} + \beta_1 age1524 + \beta_2 age3545 + \beta_3 loweduc + \beta_4 higheduc + \beta_5 health + \beta_6 age\_firstchild + \beta_7 stable\_unempl + \beta_8 stable\_inact + \beta_9 stable\_student + \beta_{10} unstable\_emp + \beta_{11} unstable\_partner + \beta_{12} hh\_income$$

Where $\beta_{oj} = \gamma_{00} + u_{0j}$

In a third step, several models are tested where contextual variables are introduced to see how the national context and institutions affect the individual probability of having a second child. In this case, intercept equations include what are called 'level-2 variables' that are national averages of variables which are likely to influence the birth of a second child.

Among macro-economic variables that are likely the birth of a second child, we have tested the effect of a number of institutional and cyclical variables. The significance of coefficients, as well as level-2 covariances, are compared in order to choose the most meaningful models. Introducing macro-variables allows the global influence of some contextual features to be grasped simultaneously with individual effects.

In this step, the equation of the intercept is replaced by the following (model with childcare coverage taken as an example):

$$\beta_{oj} = \gamma_{00} + \gamma_{01} childcare\_coverage + u_{0j}$$

Finally, in a last step, if samples are large enough, multi-level models can be useful to test if the effect of some individual variables differs across countries and to test the effect of contextual variables on some particular socio-demographic groups. This is done by making random some individual variables and by introducing some institutional level-2 variables in their equation (as for the intercept). It leads to the introduction of some interaction terms between micro variables (education, stability in employment etc.) and macro variables (policy variables) in the model. This last step thus consists in allowing not only the intercept of the model but also the slope for some individual variables to be random and to possibly explain them with macro-level variables. In this last step, equations of the coefficients of crossed individual variables become random and can be explained by some macro-variables just as the intercept. For example, coefficients for the variables on labour market stability would be :

$$\begin{aligned}
\beta_{7j} &= \gamma_{70} + \gamma_{71} childcare_coverage + u_{7j} \\
\beta_{8j} &= \gamma_{80} + \gamma_{81} childcare_coverage + u_{8j} \\
\beta_{9j} &= \gamma_{90} + \gamma_{91} childcare_coverage + u_{9j} \\
\beta_{10j} &= \gamma_{100} + \gamma_{101} childcare_coverage + u_{10j} .
\end{aligned}$$

5.2. Results of the multi-level analysis

As explained in the methodological part, multi-level models include several steps. We first estimate an "empty model" with only a random intercept that confirms the position of countries in terms of the probability of having a second child over the period (results not presented here, cf. figure 11).

In a second step we include individual variables in our model that confirms the role variables included in the microeconomic models of section five (results not presented here). More particularly, the role of age, education, age of first child, labour market stability and partner's labour market stability are confirmed. As in micro-models, the introduction of the variable on household's income reduces the significance of some other variables to which income is correlated (education, age, labour market status of both spouses, health etc.). In this model including individual variables and a random intercept, we can witness that the variance of the intercept is highly significant. This indicates that the macro-level matters. Consequently, the following models aim at highlighting the reasons for these differences across countries by introducing some macro variables in the intercept equation. Note that these models are only based on 22 countries, as the OECD Family Data Base does not provide policy measures for Cyprus, Bulgaria, Latvia and Lithuania.

Table 4 shows the estimation results of three models, while odds ratios are presented in table D in the appendix.

The three models are:

1. one model including individual variables and where the random intercept is explained by several macro variables (childcare coverage, maximum length of leave and total cash benefits)
2. one model including individual variables and where the random intercept is explained by child care coverage, including an interaction between child care coverage and activity status.
3. one model including individual variables and where the random intercept is explained by maximum length of leave, including an interaction between maximum length of leave and activity status.

Childcare coverage represents the proportion of children under age 3 who are enrolment in formal care sevices, either home- or centre-based, as provided by the OECD Family Data Base for the year 2007. Figure A in the appendix provides a descriptive overview of this policy measure for a selected group of countries.

Maximum length of leave refers to the addition of maternity weeks with the maximum duration in weeks of the parental leave entitlement not for exclusive use by the father, as calculated by the OECD Family Data Base (indicator PF2.1.).

Total cash benefits is estimated as the sum of cash leave and family benefits that a couple family with 2 children will receive over the 3 years after the birth of a second child, plus the fiscal reduction they will get in comparison to the tax burden born by a childless household with same earnings. Each partner is assumed to receive the average earnings (data computed from the OECD Family Support Calculator[16]).

[16] http://www.oecd.org/els/soc/oecdfamilydatabasethefamilysupportcalculator.htm#calculator

Table 4: Estimation results (estimated coefficients) of the multilevel model

	Model 1	Model 2	Model 3
Individual variables			
Intercept	-2.652*** (0.095)	-2.626*** (0.060)	-2.613*** (0.065)
Age			
15-24	-0.069 (0.166)	-0.047 (0.146)	-0.047 (0.141)
25-34	*Ref.*	*Ref.*	*Ref.*
35-45	-0.669*** (0.093)	-0.639*** (0.089)	-0.632*** (0.085)
Educational attainment			
Low education	0.156 (0.110)	0.138+ (0.076)	0.168* (0.076)
Medium education	*Ref.*	*Ref.*	*Ref.*
High education	0.109 (0.091)	0.109 (0.070)	0.112 (0.068)
Age of first child	-0.152*** (0.012)	-0.147*** (0.009)	-0.145*** (0.009)
Good health	0.180 (0.114)	0.157+ (0.095)	0.149+ (0.090)
Stability on the labor market			
Stable employment (ft&pt)	*Ref.*	*Ref.*	*Ref.*
Stable unemployment	0.081 (0.139)	0.064 (0.166)	-0.084 (0.187)
Stable inactivity	-0.058 (0.102)	-0.097 (0.136)	-0.118 (0.123)
Stable student	-0.827* (0.365)	-0.869*** (0.187)	-0.675** (0.185)
Unstable	0.088 (0.184)	0.247 (0.180)	0.243 (0.184)
Partner in stable employment	0.434 (0.103)	0.426*** (0.080)	0.381*** (0.080)
Household income (log)	0.173* (0.074)	0.168*** (0.049)	0.226 *** (0.053)
Contextual variables			
Childcare coverage (cccov)	0.020** (0.006)	0.015*** (0.004)	--
Maximum length of leave (maxleave)	0.001 (0.002)	--	-0.001 (0.001)
Cash transfers	0.005 (0.007)		
Cross-level effects			
*Stable unemployment*cccov*		-0.029* (0.010)	
*Stable inactivity*cccov*		-0.005 (0.006)	

Table 4 continued:

*Stable student*cccov*		0.010 (0.008)	
*Unstable*cccov*		-0.002 (0.012)	
*Stable unemployment*maxleave*			0.007* (0.003)
*Stable inactivity*maxleave*			-0.001 (0.002)
*Stable student*maxleave*			-0.003 (0.002)
*Unstable*maxleave*			0.001 (0.003)
Random effects			
Variance of the intercept	0.105***	0.285***	0.352***
Variance of the variables of LM stability:			
Stable unemployment		0.708**	0.765**
Stable inactivity		0.348+	0.327
Stable student		0.385	0.446
Unstable		0.580	0.600
Number of observations	8434		
Number of events '2nd child arrival'	817		
Number of countries	22		

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

robust standard errors in parentheses

high education: tertiary education
middle education: upper and post secondary non tertiary education
low education: primary & lower secundary education
"stable employment": full-time and part-time employed and self-employed during 3 months before procreation
"unstable": change in activity status within the 3 months before procreation
employment status: at the time of the interview in the year before second child birth
household income: log of total disposable hh income in the year before second child birth
partner information: cohabiting and observed partner

Table 5 presents a synthesis of the results of models where the random intercept is explained by only one macro variable at a time. Coefficients of individual variables almost do not vary so that we focus on the coefficient of each macro variable when it is introduced alone in the intercept.

Table 5: Estimation results of multilevel models with macro variables introduced one by one in the random intercept

	Coeff.	Std. Err.	p-value
matleave	-0.012436	0.009573	0.209
ftemat	-0.018948	0.019181	0.335
maxleave	-0.001484	0.001333	0.279
ftetot	0.001887	0.002755	0.501
cccov	0.016240	0.004596	0.002
unempl	-0.064290	0.033274	0.068
famben3	0.008565	0.020065	0.674
taxreb3	-0.008695	0.013696	0.532
benreb3	-0.004187	0.010281	0.688
leavben3	-0.003075	0.004777	0.527
totcash3	-0.002302	0.003888	0.560
famben5	0.013496	0.021598	0.539
taxreb5	-0.015303	0.015304	0.330
benreb5	-0.005633	0.012319	0.652
leavben5	-0.004913	0.007570	0.524
totcash5	-0.003240	0.005241	0.543

matleave: Duration of maternity leave (in weeks)
ftemat: Duration of maternity leave in full-time rate equivalent
maxleave: Maximum length of maternity and parental leave for women (paid or unpaid) (in weeks)
ftetot: Maternity and parental paid leave in full time rate equivalent
cccov: Proportion of children under age 3 who are enrolment in formal care sevices, either home- or centre-based
unempl: Unemployment rate (cyclical variable)
famben3/5: Family benefits – received over the first 3 or 5 years after childbirth for a couple family with 2 children
taxreb3: Tax rebate – received over the first 3 or 5 years: fiscal reduction a couple with 2 children will get in comparison to the tax burden born by a childless household with same earnings. Each partner is assumed to receive the average earnings.)
benreb3: Family benefits+tax rebate – received over the 3 or 5 first years
leaveben3/5: Leave benefits – received over the 3 or 5 first years
totcash3/5: Total cash transfer (family benefits + tax rebate + leave benefits) – received over the 3 or 5 first years

Data from the OECD Family Data Base

Results of multilevel models show two main things. First, the only policy variable that displays a significant and positive effect is childcare coverage. Using this sample, no significant effect is found concerning leave schemes (length of leaves – maternity or parental, leave benefits) and fiscal policies (family benefits, income tax rebates). Second, the only other significant variable in our models is the aggregate unemployment rate that reduces the probability of having a second child.

The positive effect of childcare and the relative inefficiency of leave schemes in order to promote fertility shows that reconciliation issues play a crucial role in explaining fertility in European countries. The possibility to combine work and family through childcare appears as a key determinant of fertility whereas the opportunity to stop working through the use of leave schemes does not seem to have such a positive effect.

The negative effect of aggregate unemployment rate has to be analyzed more deeply. This variable is introduced in the model as a proxy that captures the economic situation of a country. This result can then be interpreted as the negative effect of a bad economic situation at the national level on individuals' decisions to have a second child. It is worth noticing however that the correlation between childcare coverage and unemployment rate both measured at the aggregate level is quite high (-0,59). The matrix showing pairwise correlation coefficients can be found in table D in the appendix.

The non significance of variables measuring cash transfers of various kinds (income tax rebates, family benefits, and leave benefits) is somehow surprising. Two kinds of explanations may however be suggested. First, there might be a methodological reason explaining the non significant effect of all these variables: each macro indicator included at the country level should have the same value for all individuals in the country. Indicators on cash transfers have thus been calculated for only one given type of household (a family with two wage earners, each getting the average wage) while their levels vary hugely across types of household. Second, even if individuals can quite easily calculate how much it would cost to have a second child in terms of direct costs, it is likely that they only have a partial view of cash transfers they can get in this case and how this would affect their total cost of living.

In spite of the relatively limited results found when macro variables are introduced one by one in our model a few models have been run in order to have a more comprehensive view of the possible combined effects of different policies.

These models where several macro variables are introduced at the same time in the intercept equation globally confirm our first results. The effect of childcare always remains positive and significant, so that we can conclude that there is a robust relationship between the development of this policy at the national level and fertility at the individual level.

We also have tested the joint effect of the aggregate unemployment level and childcare coverage in order to get which effect dominates since both variables are correlated (results not shown here). It appears that childcare coverage remains positive and significant while the negative effect of unemployment vanishes (it stays negative but becomes insignificant). It should be recalled here that the period studied in this analysis is characterized by relatively limited unemployment rates (compared to the period of crisis that follows) and that this may reduce the negative effect of unemployment on fertility decisions.

Some models where variables on leaves and childcare are introduced have also been tested (but are not shown here), especially because we know that these policies are usually used as substitutes in different countries. We can witness that the effects of leaves become very slightly positive in this case but they remain strongly insignificant.

Finally, a few models have been tested where interaction terms are introduced between the macro and micro level (models two and three of table 4). More precisely, we have tested the differentiated effect of two kinds of policies (childcare and maximum length of leave) on women according to their stability on the labour market. These two models are characterized by some huge problems of convergence given the too limited size of our sample. Further research is necessary to solve this methodological issue (reduction of levels or elimination of countries with too few education per activity status-level for example).

However, our primarily results show that child care coverage is less important for the decision of having a second child for unemployed women in comparison to employed women. On the contrary, the duration of maternity and parental leave is more important for second child arrival for unemployed women in comparison to employed women, probably because in countries with long leave periods, women receive lump-sum cash benefits over this period which compensate in a limited way for foregone earnings. In return, these result imply that child care coverage is more important and leave duration is less important for employed women for the decision to have a second child in comparison to unemployed women.

6. Summary of main findings

- Data on the aggregated level shows that despite the rebound in total fertility rates (TFRs) which occurred in many countries since the mid-1990s, the vast majority of OECD/ European and Central Asian countries have fertility rates below replacement level.

- Disparities in fertility rates stay high, however and recent fertility trends vary much across countries. Many European countries have experienced a steep increase in fertility rates, but several countries (for example Czech Republic, Germany, Greece, Hungary, Italy, Luxembourg, Poland, Portugal, Slovenia, Spain) are stuck at low rates of fertility (i.e. below 1.6) since the early 2000s.

- "Lowest-low" fertility countries have much often experienced significant postponement of family formation and a decrease in the number of two-children and larger families (especially Eastern European countries such as Poland, Hungary, Czech Republic, Bulgaria). Some of them are also characterised by a high rate of 'definitive' childlessness (Germany, Austria, Italy).

- By contrast, countries showing highest fertility rates are those which have made it possible to combine it with high female employment rates, which was not the case thirty years ago.

- Economic development, changes in the norms towards childbearing, the diffusion of oral contraception, and policies helping parents (and especially mothers) to cope with work and care commitments are important determinants of fertility trends.

- Cross-section survey data for Europe (EU-SILC 2008) provides information on fertility behaviour that is globally consistent with aggregated demographic data: low-fertility countries are distinct from those with high fertility primarily because of a lower share of women having two or more children. This suggests that in most low fertility countries, the barrier for having a second child is more important than the barrier for having a first child.

- To identify the barriers for second child arrival, a micro econometric analysis based on longitudinal survey data for Europe (EU-SILC 2005-2008) has modelled women's probability of

having a second child as a function of individual characteristics observed before conception. We control for important factors like age, the age of the first child and health, and find that low educated as well as high educated mothers have a higher probability of having a second child than medium educated mothers.

- In addition and most importantly, we find that women's labour market participation plays a crucial role for the transition to a second child. Women in *stable and permanent employment* are actually more likely to decide in favour of a second child than those in inactivity. Inactivity clearly works against the decision to have a second child, whereas *successful job market integration after the birth of a first child* seems to facilitate women's decision of having a second child.

- At the same time, the probability of having a second child is not significantly higher for women with a partner in stable employment in comparison to women without a partner or a partner without a stable employment situation. This clearly indicates the importance for women of creating an *independent and stable economic environment* before the arrival of a second child. Household income, which also represents in a way a secure economic environment, is highly and positively associated with the transition to a second child.

- Multilevel-models reveal that institutional factors are also important for women's decision to have a second child. Two contextual variables emerge which are both highly connected to women's labour market integration: Child care services for young children (aged 0-2) and unemployment rates.

- A high level of child care coverage facilitates women's work-life balance and thus increases the probability of having a second child. High unemployment rates indicate uncertain economic conditions in terms of income and employment and thus reduce women's probability of having a second child.

- Child care coverage appears to be the most important instrument for women's decision to have a second child in comparison to other family policies such as maternity and parental leave or cash benefits.

- Interacting family policy instruments with women's individual labour market status reveals that for the decision to have a second child, child care coverage is particularly important for employed women in comparison to unemployed women, while leave duration is less important. The duration of maternity and parental leave is more important for second child arrival for unemployed women in comparison to employed women, probably because in most countries with long leave periods, women receive lump-sum cash benefits over this period which compensate in a limited way for foregone earnings.

- To sum up, successful labour market integration after the birth of a first child seems to facilitate women's decision of having a second child. A stable and permanent employment position is most likely to create a secure economic environment, which seems to be a crucial condition for women for deciding in favour of a second child. Policies enabling mothers to combine work with family life, in particular the provision of child care for young children, are most likely to encourage women's decision for a second child.

7. Appendix

Table A: Availability of EU-SILC longitudinal data for European countries

	2003	2004	2005	2006	2007	2008	2009	2010
AT		x	x	x	x	x	x	x
BE		x	x	x	x	x	x	x
BG				x	x	x	x	x
CY			x	x	x	x	x	x
CZ			x	x	x	x	x	x
DE			x	x				
DK	x	x	x	x	x	x	x	x
EE		x	x	x	x	x	x	x
ES		x	x	x	x	x	x	x
FI		x	x	x	x	x	x	x
FR		x	x	x	x	x	x	x
GR	x	x	x	x	x	x	x	x
HU			x	x	x	x	x	x
IE		x	x	x	x	x	x	
IS		x	x	x	x	x	x	x
IT		x	x	x	x	x	x	x
LT			x	x	x	x	x	x
LU	x	x	x	x	x	x	x	x
LV			x	x	x	x	x	x
MT				x	x	x	x	x
NL			x	x	x	x	x	x
NO	x	x	x	x	x	x	x	x
PL			x	x	x	x	x	x
PT		x	x	x	x	x	x	x
RO					x	x	x	x
SE		x	x	x	x	x	x	x
SI			x	x	x	x	x	x
SK			x	x	x	x	x	x
UK			x	x	x	x	x	x

Lecture note: a green cross indicates that data for this year are available in all 4-year rotative panels that contain this year. A red cross indicates that data for this year have been collected but have been made available in a rotative panel delivered one or a few years later (when cross turns green). Boxes in grey represent the four-year panel that is used in our analysis (2005-2008).

Table B: Estimation results (odds ratios) of the microeconometric model (logit regressions with robust standard errors)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Individual variables								
Age								
15-24	0.770	0.835	0.872	0.866	0.866	0.975	0.835	0.838
25-34	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*
35-45	0.582	0.575	0.573	0.556	0.556	0.494	0.572	0.576
Educational attainment								
Low education	1.232	1.260	1.256	1.234	1.234	1.192	1.294	1.269
Medium education	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*	*Ref.*
High education	1.331	1.300	1.290	1.317	1.317	1.716	1.242	1.281
Age of first child	0.847	0.845	0.844	0.849	0.849	0.860	0.844	0.844
Good health	1.316	1.300	1.304	1.295	1.295	1.206	1.309	1.298
Stability on the labor market								
Stable employment (ft&pt)		1.201	*Ref.*			*Ref.*		
Stable full-time employment				*Ref.*	0.674			
Stable part-time employment				1.484	*Ref.*			
Stable unemployment			0.935	1.053	0.710	1.076		
Stable inactivity			0.779	0.880	0.593	0.910		
Stable student			0.404	0.460	0.310	0.428		
Unstable			1.139	1.286	0.867	1.145		
Partner information								
Partner in stable employment		1.161	*Ref.*	*Ref.*		*Ref.*	*Ref.*	*Ref.*
Partner not in stable employment			0.848	0.856	0.856	0.969	0.854	0.858
No partner			0.869	0.847	0.847	0.898	0.860	0.857
Household income (log)						1.378		
Employment status								
Not working							*Ref.*	*Ref.*
Low-skilled manual							1.024	
High-skilled manual							1.569	
Low-skilled clerical							1.236	
High-skilled clerical							1.380	
Permanent employment								1.277
Temporary employment								1.241
Self employed or family worker								0.999

high education: tertiary education
middle education: upper and post secondary non tertiary education
low education: primary & lower secundary education
"stable employment": full-time and part-time employed and self-employed during 3 months before procreation
"unstable": change in activity status within the 3 months before procreation
employment status: at the time of the interview in the year before second child birth
household income: log of total disposable hh income in the year before second child birth
partner information: cohabiting and observed partner

Table C: Estimation results (odds ratios) of the multilevel model

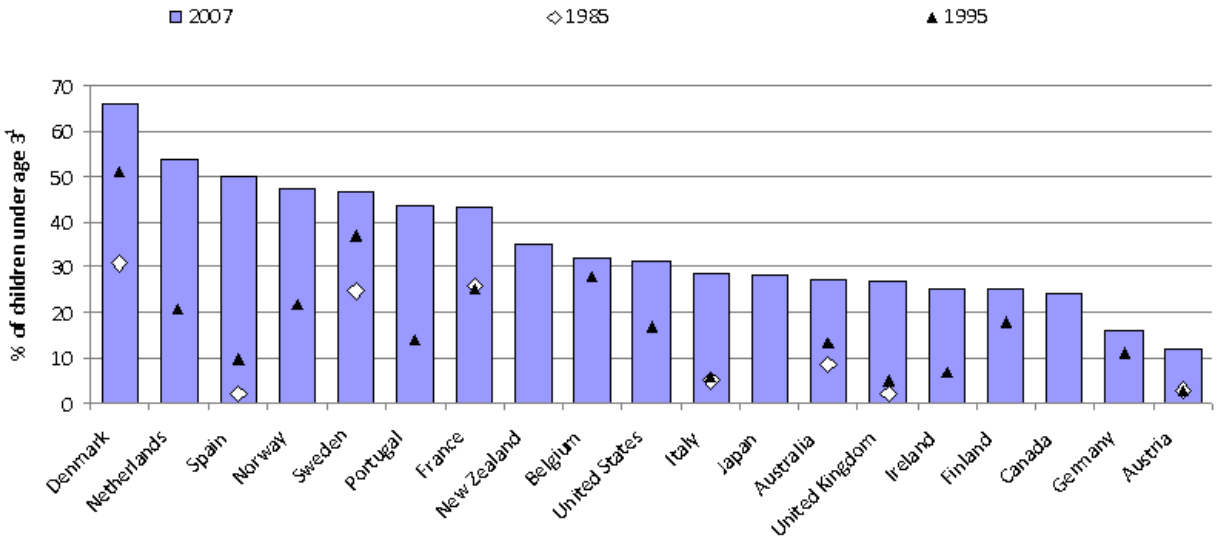
	Model 1	Model 2	Model 3
Individual variables			
Intercept	0.071	0.072	0.073
Age			
15-24	0.933	0.954	0.954
25-34	*Ref.*	*Ref.*	*Ref.*
35-45	0.512	0.528	0.531
Educational attainment			
Low education	1.169	1.148	1.182
Medium education	*Ref.*	*Ref.*	*Ref.*
High education	1.115	1.115	1.118
Age of first child	0.859		0.865
Good health	1.198	1.171	1.161
Stability on the labor market			
Stable employment (ft&pt)	*Ref.*	*Ref.*	*Ref.*
Stable unemployment	1.085	1.066	0.920
Stable inactivity	0.943	0.907	0.889
Stable student	0.438	0.419	0.509
Unstable	1.092	1.280	1.276
Partner in stable employment	1.544	1.531	1.463
Household income (log)	1.189	1.183	1.254
Contextual variables			
Childcare coverage (cccov)	1.020	1.015	
Maximum length of leave (maxleave)	1.001	0.864	0.999
Cash transfers	1.005		
Cross-level effects			
*Stable unemployment*cccov*		0.972	
*Stable inactivity*cccov*		0.995	
*Stable student*cccov*		1.010	
*Unstable*cccov*		0.998	
*Stable unemployment*maxleave*			1.008
*Stable inactivity*maxleave*			0.999
*Stable student*maxleave*			0.997
*Unstable*maxleave*			1.001

high education: tertiary education
middle education: upper and post secondary non tertiary education
low education: primary & lower secundary education
"stable employment": full-time and part-time employed and self-employed during 3 months before procreation
"unstable": change in activity status within the 3 months before procreation
employment status: at the time of the interview in the year before second child birth
household income: log of total disposable hh income in the year before second child birth
partner information: cohabiting and observed partner

Table D: Pairwise correlation coefficients between macro variables

	matleave	ftemat	maxleave	ftetot	cccov	unempl	famben3	taxreb3	benreb3	leavben3	totcash3	inctax3	famben5	taxreb5	benreb5	leavben5	totcash5	inctax5
matleave	1																	
ftemat	0,26	1,00																
maxleave	0,15	0,34	1,00															
ftetot	0,00	0,35	0,54	1,00														
cccov	-0,32	-0,36	-0,57	-0,36	1,00													
unempl	-0,01	0,23	0,58	0,14	-0,59	1,00												
famben3	0,16	0,00	-0,27	0,20	0,20	-0,44	1,00											
taxreb3	0,04	0,12	0,78	0,45	-0,53	0,25	-0,04	1,00										
benreb3	0,12	0,10	0,54	0,50	-0,36	-0,01	0,49	0,86	1,00									
leavben3	-0,04	0,25	0,34	0,90	-0,40	0,01	0,34	0,40	0,52	1,00								
totcash3	0,02	0,22	0,47	0,85	-0,44	0,00	0,45	0,65	0,80	0,93	1,00							
inctax3	-0,25	-0,31	-0,60	-0,10	0,69	-0,47	0,36	-0,50	-0,25	-0,04	-0,13	1,00						
famben5	0,17	-0,02	-0,27	0,23	0,17	-0,46	0,98	-0,02	0,49	0,38	0,48	0,38	1,00					
taxreb5	0,06	0,16	0,77	0,45	-0,58	0,28	-0,17	0,96	0,75	0,38	0,59	-0,56	-0,16	1,00				
benreb5	0,17	0,12	0,49	0,54	-0,39	-0,06	0,50	0,81	0,97	0,58	0,82	-0,23	0,52	0,76	1,00			
leavben5	-0,02	0,24	0,37	0,90	-0,43	0,01	0,30	0,44	0,54	0,99	0,93	-0,08	0,35	0,44	0,61	1,00		
totcash5	0,07	0,21	0,47	0,83	-0,46	-0,02	0,43	0,67	0,80	0,91	0,99	-0,16	0,47	0,64	0,86	0,93	1,00	
inctax5	-0,26	-0,32	-0,53	-0,06	0,67	-0,47	0,41	-0,39	-0,13	0,01	-0,05	0,99	0,43	-0,48	-0,14	-0,03	-0,09	1,00

Figure A: Proportion of children (age 0-2) enrolled in formal childcare services



Data source: OECD Family Data Base (2011)

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