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The causal effects of the number of children on female employment - do European institutional and gender conditions matter?

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Abstract

This paper contributes to the discussion on the effects of the number of children on female employment in Europe. Previous research has usually either (1) compared these effects across countries assuming exogeneity of family size or (2) used methods which deal with endogeneity of family size but focused on single countries. We combine these two approaches by taking a cross-country comparative perspective and applying quasi-experimental methods.

We use instrumental variable models, with multiple births as instruments, and the harmonized data from the European Survey on Income and Living Conditions (EU-SILC). We first examine the cross-country variation in the effects of family size on maternal employment across the groups of European countries with similar welfare state regimes. Next, to measure the impact of welfare state regimes in a more precise way, we implement the Index for the Conditions of Work and Family Reconciliation, i.e. a synthetic indicator that captures the impact of family policies, social norms and labour market conditions. This step gives us an opportunity to investigate whether the revealed cross-country differences in the magnitude of the effect of the family size on maternal employment can be attributed to the diversity of European institutional arrangements as well as cultural and structural conditions for combining employment and family duties.

Keywords: family size effects, reconciliation of work and parenthood, female labour supply

JEL: J13; J18; J21; J22

CONTENTS

I. MOTIVATION

The aim of this paper is to investigate the variation in the magnitude of the effect of the number of children on female employment. This research question has gained much interest in demographic, sociological and economic research already in the 1980s and consequently has been addressed in numerous empirical studies. Previous studies have some methodological shortcomings, however. Most of them usually employ methods which assume that childbearing decisions are exogenous with respect to labour market decisions (see Matysiak and Vignoli 2008 for overview). This means these studies fail to account for unobserved characteristics that jointly affect fertility and employment outcomes, such as unmeasured orientation at work or family. A failure to account for unobservables leads to a bias in the estimated effect of the family size on women's employment due to selection of individuals with high family orientation into the group of the employed or non-employed. Hence, many of previous studies show associations between family size and female employment instead of causal effects. Some recent studies tried to account for this problem by implementing statistical methods which allow controlling for unobserved time-constant characteristics, assuming that orientation at family and paid work does not change over time (Aassve et al. 2006, Matysiak 2009, Matysiak and Vignoli 2013). This assumption is not plausible, however, as fertility and employment preferences may change with a birth order and work experience. There are only few studies which succeeded in accounting for both time-constant and time-varying unobserved characteristics of women, taking the endogeneity of family size into account. These studies provide evidence for single countries only, which makes it difficult to comprehend the mediating role of the institutional context for the incompatibility of work and family. Moreover, the institutional setup of these countries is rather limited as these are such countries as the US (Rosenzweig and Wolpin 1980; Angrist and Evans 1998; Jacobsen et al. 1999) or developing countries (Cruces and Galiani 2007; Caceres-Delpiano 2012). Almost no evidence on causal effects of the family size on women's employment exists for European countries. Hence, it remains to be established whether and how strongly the family size affects

female labour market opportunities across countries with differential institutional arrangements and cultural and structural conditions.

In this paper we combine three methodological solutions that provide a more in-depth insight into how the number of children affects women's employment and how this effect depends on the country institutional and cultural conditions. First of all, we compute causal effects of the family size on women's employment. To this end we implement a twin-first approach, proposed in the seminal paper by Rosenzweig & Wolpin (1980) and applied in a number of recent empirical studies (Rosenzweig and Wolpin 1980; Angrist and Evans 1998; Bronars and Grogger 1994; Jacobsen et al. 1999; Cruces and Galiani 2007; Vere 2011; Caceres-Delpiano 2012). The key idea of this approach is to exploit information on multiple births, which are essentially an outcome of a random process and not a result of deliberate decisions.

Second, we examine the variation in the effects of family size on women's employment. We compare the magnitude of possible effects across European countries, which represent a huge diversity in institutional cultural and structural conditions that may prevent or facilitate combining labour market and family career (Brewster and Rindfuss 2000; Ahn and Mira 2002; Engelhardt et al. 2004). Although most European governments pursue the goal of raising employment, also among women with children, the progress in implementing these policies differs strongly across countries. This makes Europe an interesting laboratory for research on how family policies mediate the impact of childbearing on female employment. Recently, the comprehensive micro data samples from almost all European countries have been collected within a Survey of Income and Living Conditions, which makes it possible to take advantage of European diversity for research purposes.

Finally, we make an attempt to identify the main causes of the differences in the magnitude of the family size effect. To this end, we use a quantitative index of conditions for work and family reconciliation (ICWFR) which has been initially proposed by Matysiak (2011) and recently updated by Matysiak and Węziak-Bialowolska (2013). It takes into account family

policy measures, labour market structures, and gender norms that have been theoretically argued and empirically shown to be relevant for women's fertility and employment choices. We implement ICWFR in order to further investigate how the context moderates the impact of family size on female employment.

Our paper is structured in the following way: in Section 2 we make an overview of theories concerning conflict between work and parenthood, in Section 3 we elaborate on the European institutional and cultural context that may moderate the scale of this conflict, Sections 4 and 5 describe data and methods used in this study and Section 6 presents the results. Section 7 summarizes our findings and discusses opportunities for further research.

II. LITERATURE REVIEW

The relationship between family size and female employment is very well grounded in existing sociological and economic theories. Sociological theories stress that due to a number of cultural and economic factors, the primary responsibility for childcare lies with mothers (Lehrer & Nerlove 1986). Both work-related duties and childcare may be an important source of rewards and satisfaction for women, nevertheless, due to the time constraints, women need to decide how to best divide their time between paid work and taking care of children. This notion has been referred to as the role incompatibility hypothesis (Brewster & Rindfuss 2000).

Similar concepts have been developed in the neo-classical economic models of women's labour supply (Mincer 1970; Mincer & Ofek 1982, Even 1987, Leibowitz et al. 1992, Joesch 1994, Rønsen and Sundström 2002). In these models the time that a parent, usually a mother, supplies on the labour market is a choice variable that is jointly determined with the time devoted to childrearing. A parent will take up a job only if her or his market wage exceeds the value of time spent at home (a reservation wage). According to this model the impact of family size on parental involvement in the labor market can be positive, as children increase financial needs of the family (income effect), but it can be also negative, if the income effect is

surpassed by an increase of a parent's time spent at home caused by an arrival of the child (price effect).

In view of the economic theory, the effects of family size on employment are more likely to be negative for women with low earning potential, high taste for children and low orientation at paid work as well as women living in affluent households. The effect of the family size on women's employment should also depend on the country context. The value of women's time is expected to be higher in countries where mother's work is less institutionally supported (e.g. countries with poor childcare provision or inflexible working hours) or less socially accepted (Gornick et al 1997, Esping-Andersen 1999, Stier and Lewin-Epstein 2001). Taking up a job in such countries is more 'costly' for a mother as she needs to purchase childcare on the market and violate the prevalent gender norms.

The abundant empirical research on the topic confirmed that children exert a negative influence on women's employment (e.g. Felmlee 1993, De Graaf and Vermeulen 1997, Drobnic 2000, Giannelli 1996, Taniguchi and Rosenfeld 2002, Budig 2003). This evidence comes mainly from single country studies or studies that implement two or three country comparisons. There are already fewer multi-national studies which would allow drawing conclusions on the magnitude of the effect across country contexts (for a recent review, see Steiber & Haas 2012). One of the few studies have been carried out by Pettit and Hook (2005), who use cross-sectional data on 19 European countries and compare employment rates of childless women with those of women in households with small children. Their findings suggest that small children affect women's employment significantly less in countries that provide public childcare and parental leave, while national gender cultures lack explanatory power regarding cross-national differences in women's employment. Similar conclusions have been reached by Steiber and Haas (2009) for 26 countries and Uunk (et al. 2005) for 13 European countries. Finally, using data for 18 OECD countries Nieuwenhuis et al (2012) demonstrated that labour market structures (unemployment rates and the size of the service sector) are responsible for

explaining part of the cross-country differences in the effects of parenthood on women's employment, additionally to family policies.

The comparative studies mentioned above all use cross-sectional data and treat family status as an exogenous variable explaining labour market status of mothers. The assumption of exogeneity of family size seems rather strong given that the literature stresses that women who are more career oriented may actually prefer to have smaller families (Hakim 2003; Francesconi 2002; Lehrer & Nerlove 1986). If we disregard this issue, we may easily draw wrong conclusions about the relationship between family size and female employment chances.

There are only a number of studies that do control for endogeneity of family size (Rosenzweig and Wolpin 1980; Angrist and Evans 1998; Jacobsen et al. 1999; Cruces and Galiani 2007; Caceres-Delpiano 2012). They are usually limited to one country only (Rosenzweig and Wolpin 1980; Angrist and Evans 1998; Jacobsen et al. 1999) or, if comparative, they study developing countries (Cruces and Galiani 2007; Caceres-Delpiano 2012). Hence, there is no evidence on the moderating effects of the country context on women's employment that would not be possibly biased by selection.

III. EUROPEAN CONTEXT

European countries are strongly diversified as regards the conditions for work and family reconciliation, shaped by family policies, labour market regulations and prevalent gender norms. Not surprisingly, there have been many attempts to classify them in that respect (Esping-Andersen 1999, Lewis and Ostner 1995, Anttonen and Sipilä 1996, Gauthier 1996, Gornick et al. 1997, Letablier 1998, Trifiletti 1999, Korpi 2000, Bettio and Platenga 2004). Although these classifications differ in the way some countries are assigned to certain family policy and attitudinal models, there is a general agreement that the most favourable conditions for combining paid work with rearing children are observed in Nordic Europe. These countries stand out for their exceptionally well-developed childcare services and

individualised rights to parental leaves (Leira 2002) as well as liberal attitudes toward working mothers (Treas and Widmer 2000, Muszyńska 2007). At the other extreme, Southern Europe is characterised by very limited institutional support for working parents in terms of public childcare provision and very conservative attitudes towards women's involvement in any public sphere of life, including labour market attachment (Lueck and Hoffaecker 2003, Mencarini and Tanturri 2006).

The conditions for work and family reconciliation in other parts of Europe are more nuanced. Public provision of childcare services in Belgium and France is nearly equally as good as in Nordic countries, but the implemented policies aim rather at ensuring the well-being of families and children, rather than supporting gender equity as it is the case in Nordic Europe (Gauthier 1996). Consequently, the attitudes toward working mothers are already slightly more traditional there (Matysiak 2011). Austria and Germany score already lower in terms of their support for working mothers. In fact, mothers in these two countries have been long encouraged by the family benefit, leave and tax system to stay at home to care for children and even despite some recent changes in reconciliation policies the childcare provision in the two countries remained poor and their opening hours are short. At the cultural level, women are still perceived there as supplementary income providers, who are expected to undertake paid work only if they do not have small children (Treas and Wimder 2000; Muszyńska 2007). In these countries the increase in women's employment was mainly possible due to expansion of part-time jobs. Similar situation took place in the Netherlands, which are known for widely widespread part-time employment opportunities, mainly used by women, but the social acceptance of mothers' employment and public provision of childcare are relatively poor in this country (Lewis et al. 2008).

The Anglo-Saxon countries constitute another, specific, group of countries where the cultural barriers for female work are not very strong, but the public childcare support is rather poor. Although childcare services can be easily purchased on the market, their costs on the

parents are usually high. The advantage of this country group is the flexibility of its labour market – even though it is quite easy to lose a job there it is also relatively easy to find a new one (Adsera 2004, 2005).

Finally, the specificity of Central and Eastern Europe (CEE) is related to the legacy of the state socialism. During socialist times, women were expected to play the roles of both income and care providers (Siemienska 1997; Pascall and Manning 2000) and the state provided extensive childcare services either in the form of free-of-charge childcare facilities or in crèches and kindergartens attached to the state-owned enterprises. Although the social expectation toward women's roles has virtually not changed after the collapse of state socialism (Lueck and Hoffaecker 2003), the expenditures on reconciliation policies were largely reduced and most of the state-owned enterprises went bankrupt or privatised. Only some of the CEE countries attempted to rebuild the welfare support for working parents in the 2000s. As a result, family policy models in this part of Europe have become more and more diverse with Slovenia and Estonia offering most generous support to working mothers and Czech Republic, Slovakia and Poland pursuing familialism (Szelewa and Polakowski 2008, Matysiak, 2012).

IV. DATA AND METHODS

ANALYTICAL STRATEGY

As it has been noted in Section 2, a mother's decision to be employed depends on her preferences toward paid work, tastes for children, financial situation of the household and earning potential of her partner as well as her earning capacities. This implies that we would need to control for all these variables for a proper estimation of the effect of the family size on mother's employment. In practice it is usually impossible as researchers usually lack data which would provide full information on these aspects. In particular, we are not able to observe women's orientations at paid work and family. A number of theoretical and empirical studies suggest that women with a comparative advantage in market work display stronger

preferences for smaller families (Hakim 2003; Francesconi 2002; Lehrer & Nerlove 1986). If this is the case, then research which ignores the role of female preferences and treats family size as exogenous may overestimate the negative effects of childbearing on the labour market opportunities of mothers.

Furthermore, various unobserved characteristics such as earning potential and tastes for paid work, childcare and leisure may vary across various life phases. Specifically, the presence of children in the family significantly affects female preferences for these three types of activities (Joshi 1998; Blau and Kahn 2005; Matysiak 2011). Hence, after each birth, and especially after the first one, that marks transition to parenthood, individual preferences may actually change. This means that even sophisticated methods of analysis, which control for unobserved time-constant characteristics of women, might still lead to misleading conclusions.

An experimental setting, where women could be randomly sorted into various "treatment groups" with exogenously defined number of children would be ideal for addressing this research problem. For obvious reasons, organizing such an experiment is not possible. However, Rosenzweig and Wolpin (1980) have proposed a method to exploit an experiment which occurs naturally due to occurrence of multiple births. The basic idea is to use the data on multiple births in order to construct a proper "control group" for women with a given number of children. Women who experienced multiple births may be regarded as a random "sample" that may be used for comparisons with females that experienced births of singletons. Thus, information on twin births can be applied to construct an instrumental variable and to get unbiased estimates of the impact of the number of children on women's employment. For example, women who have just one child can be compared to women who have two children as a result of a multiple birth. This approach has been referred to as the twin-first approach.

The twin-first approach is regarded as comparable to a natural experiment, it gives the opportunity to control for simultaneity of family size and employment decisions among

mothers without making any specific assumptions on the distribution or temporal stability of the unobserved factors which jointly affect women's family-related and employment-related decisions (Moffit 2005). Still, it does have some drawbacks. First of all, it does not allow us to measure the effect of the change in female labour supply as the number of children grows from no children at all to one child - following this approach gives the opportunity to measure the family size effects only at parity two or higher only. Second, the occurrence of multiple births correlates with some demographic variables such as mother's age at birth, in particular since older mothers are more likely to undergo infertility treatment, or race (Martin and Park, 1999). These demographic information are, however, often available in the data and can be controlled for in regression models. Another potential issue is that raising children born in multiple births may affect labour market outcomes differently than raising children from single births and this difference may depend on the age of children. Taking care of newborn twins can be more time intensive than taking care of one newborn and his or her older brother or sister. At older ages, however, economies of scale may reduce the amount of time invested in taking care of twins compared to parents of two children who are at different ages. For example, since children born in multiple births often attend the same classes, parents need to spend relatively less time on helping them with homework (Rosenzweig & Zhang 2009). However, even if such differences in the effects of twins and other children on women's labour market outcomes exists indeed, they should be similar in all the European countries. Given that our interest lies mostly in the relative differences in the magnitude of the family size effect on female employment, this potential drawback of twin-first approach is not necessarily problematic.

DATA

So far, there have been rather few studies using the „twin-first approach" approach because of lack of data large enough to provide sufficiently large samples and detailed demographic information. In this study we are fortunate to have access to the European Survey of Income and Living Conditions (EU-SILC), which includes large samples and thus

allows identifying a suitable number of mothers who experienced multiple births. Additionally, the survey provides data on labour market situation of respondents and the structure of their families. It has been started in 2004 and it is carried out every year under auspices of Eurostat. It provides harmonised comparable data for most countries in Europe. Based on these data, cumulated from period 2004-2011, we can analyse and compare the effect of childbearing on mother's employment in thirty European countries (all the members of the European Union and additionally in Norway, Iceland and Switzerland).

We restrict our sample to women with children aged 18-35, whose oldest child is less than 12 years old. We exclude from our analysis women, for whom the relevant information on the labour market outcomes was missing. We distinguish women, who gave birth to two children in the same year and in the same quarter as mothers of twins. Only for some countries, for which the information on the quarter of birth was missing, we used only the data on the year of childbirth for identifying mothers of twins and we controlled for this fact in our analyses. There were very few women who gave birth to triplets or experienced other types of multiple births, so such cases were excluded from analysis. We use all national EU-SILC samples apart from samples from surveys carried out in Malta, Cyprus and Switzerland. These countries lack description of the institutional and cultural setting relevant to our analysis, besides Switzerland has been included in the survey only recently. The total number of mothers that experienced twin births in the first birth amounts to 1719. The twinning probability amounts to 1.27, which is in line in the existing literature on multiple births (Martin and Park, 1999). The sample used in the analysis includes 135 340 mothers. Due to missings in the data on hours of work, the sample that we use in this part of our analysis involves 132 222 mothers.

We focus on two measures of women's labour market involvement: probability of doing work, which captures the extensive margin of female labour market involvement, and the number of hours worked, which captures the intensive margin. The probability of doing

paid work is defined based on information on the current economic activity status, which distinguishes between (1) working full time (2) working part-time (3) unemployment (4) studying (5) retirement (6) disability and (7) compulsory military service (8) fulfilling domestic tasks and care responsibilities (9) other forms of inactivity. We classify first two categories as involvement in work, whereas other labour market statuses are classified as being out of work. EU-SILC provides also information on the number of hours usually worked per week in the main job among working women. Regarding women who were not working, we assumed zero hours of work, so that this outcome variable is not conditional on the labour market status.

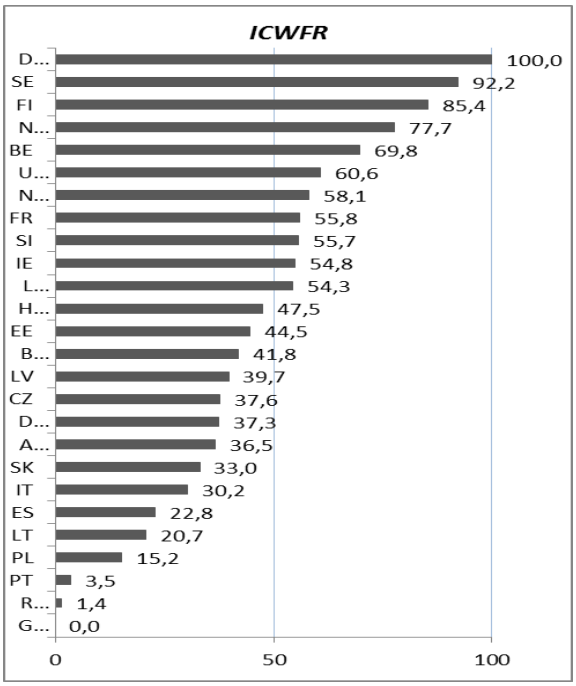
We pool the data for all countries in order to investigate the variation in the effects of children on mother's employment between groups of countries that have similar institutional, cultural and structural setting for work and family reconciliation. The country groups were specified according to the commonly applied classification of welfare state regimes described in Section 3. The first group that we distinguish consists of Nordic countries (Denmark, Finland, Island, Norway and Sweden), the second category includes Belgium and France, the third consists of Austria, Germany, Luxembourg and the Netherlands, the fourth of Anglo-Saxon countries (UK and Ireland). Finally, the last two groups cover Southern European countries (Spain, Italy, Portugal and Greece) and Central and Eastern European countries (Czech Republic, Hungary, Poland, Slovakia, Romania, Bulgaria, Slovenia, Estonia, Latvia and Lithuania).

Country classifications, as the one presented in Section 3, usually yield useful knowledge about the general ideology underpinning the family policy or attitudinal regimes. Nonetheless, they do not provide us with information about the absolute magnitude of barriers experienced by parents in combining work and family in a given country. In fact, from the country classification presented above we can easily conclude that the rules of reconciling work and family in German speaking countries are different than in the Anglo-Saxon countries

but we do not get informed where it is easier to combine the two activities. Besides, even though countries classified together may be similar in terms of the ideology underpinning a given family policy regime they may be heterogeneous with respect to the overall magnitude of the barriers to work and family reconciliation.

Therefore in the second step of our analyses, in order to better investigate how the conditions for work and family reconciliation mediate the effect of family size on mother's employment, we make use of an index for the conditions for work and family reconciliation (ICWFR) developed by Matysiak (2011) and updated as well as improved methodologically by Matysiak & Węziak-Białowolska (2013). This index takes into account all the macro-level factors that have been theoretically argued and empirically shown to be relevant for women's fertility and employment choices: family policy measures, labour market regulations, and gender norms. The values of this synthetic indicator are presented on Figures 1. The index has been scaled in such a way that take values from 0 to 100, with higher values implying more favourable conditions for combining work with parenthood. The index describes the conditions for work and family reconciliation around the mid 2000s.

Figure 1 Index for the country-specific conditions for work and family reconciliation (ICWFR), around mid 2000s



Source: Matysiak & Węziak-Białowolska (2013)

MODEL SPECIFICATION

In principle, if the randomisation of women with children was perfect, we could simply compare the employment rates of women with singletons and women with twins. However, to address the problems of relationship between the risk of multiple births and age and to improve the precision of our estimates, we use two stage least squares (2SLS) instrumental variable models. In the regression framework, we can control for individual-level characteristics of women as well as cross-country variation in the institutional setup and cultural conditions. We can also see if the country-specific institutional or cultural factors moderate the impact of family size on female employment by means of introducing interaction terms implemented in line with Woolridge (2002) suggestion.

In the first step, we divide the European countries in groups which – as described in Section 3 – share similar institutional settings. We choose a specification of 2SLS instrumental

variable models which allows us to see if there is variation in the causal effects of family size on maternal employment across the specific groups of European countries:

$$nchild = \alpha_0 + \alpha_1 multi_1 + \alpha_2 X + \alpha_3 country + \alpha_4 int1 + \varepsilon$$

$$work = \beta_0 + \beta_1 \overline{nchild}_1 + \beta_2 X + \beta_3 country + \beta_4 int2 + \varepsilon$$

where nchild is the total number of children, multi is an indicator that a given women has experienced a multiple birth, X is a vector of control variables that includes age and age at first birth as well as country-wave fixed effects, int1 captures interaction between country group and an experience of multiple birth, int2 measures interaction between country group and the number of children and country is a set of dummy variables for groups of countries.

In the next step, we use the ICWFR in order to assess if the cultural or institutional factors modify the impact of the number of children on female labour market outcomes:

$$nchild = \alpha_0 + \alpha_1 multi_1 + \alpha_2 X + \alpha_3 country + \alpha_4 indicator + \alpha_5 int3 + \varepsilon$$

$$work = \beta_0 + \beta_1 \overline{nchild}_1 + \beta_2 X + \beta_3 country + \beta_4 indicator + \beta_5 int4 + \varepsilon$$

Here, we follow the same notation as in the first specification, but the interaction terms differ; int3 captures interaction between indicator and an experience of a multiple birth and int4 measures interaction between indicator and total number of children, whereas country captures the fixed effects for specific countries.

V. EMPIRICAL RESULTS

DESCRIPTIVE STATISTICS

In order to get some preliminary insight about the impact of the number of children on female labour market attachment, we present the maternal employment rates (Figure 2) and the number of working hours among mothers (Figure 3) by number of children under 12 as calculated based on EU-SILC data. In general, the number of children is clearly negatively

associated with employment opportunities among European mothers. Having two children instead of one is associated with a difference in employment rates of 17 percentage points. Having a family with three children decreases employment chances by 32 percentage points. Among mothers with four children or more, employment rates are close to zero.

These effects vary very strongly depending on a country group, though. As we can see on Figure 2, in Nordic countries employment rates of mothers with one child and those with two children are very close to each other. Only the third and next children are related to a strong decrease in the employment rates in these countries. In the French-speaking western European countries, the difference in employment rates among mothers with one child and those with two children is also rather small as compared to the rest of Europe. In German-speaking western European countries the gap in employment rates of mothers according to the number of children that they raise is already larger. However, it is evident that the strongest penalty for increasing the family size can be observed in Anglo-Saxon countries, Southern Europe and in CEE countries. In these countries, giving birth to a second child is associated with a decrease in employment chances by about 20-30 percentage point and extending family size beyond parity two brings the probability of having a job close to zero.

Figure 2 Maternal employment rates by number of children

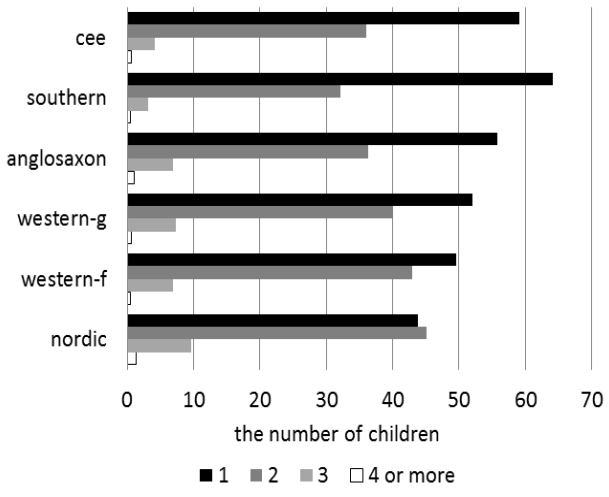
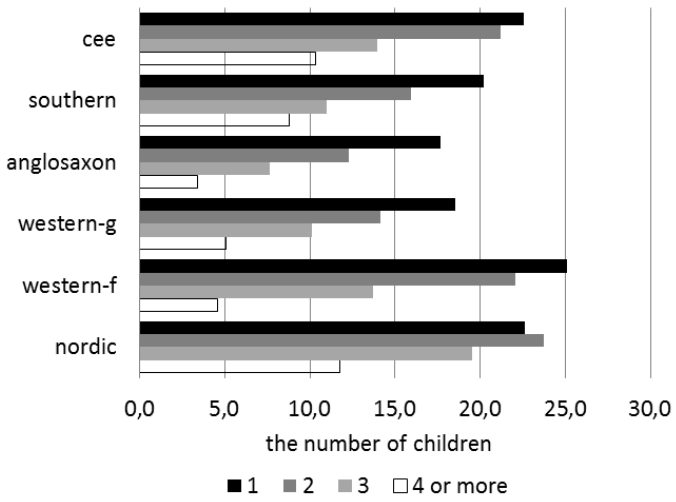


Figure 3 Number of hours worked by mothers by number of children



Source: EU-SILC data.

While the aggregate employment rates capture the way that opportunities of having a job is affected by family size, an indicator of the number of hours worked shows the intensity of labour market involvement. Some women may respond to the increase in the work-family conflict after the birth of the second child by reducing the working time rather than by simply withdrawing from the labour market. Again, the gaps in the numbers of hours worked by mothers according to the number of their children vary strongly across countries. In Nordic countries women with two children work one hour longer on average than women with one child, and a decrease in the number of working hours can be only seen among women with at least three children but even then it is modest as compared to other European countries. The negative effects of the number of children tend to be strong in Western Europe, both the French-speaking and German-speaking countries, and in the Anglo-Saxon countries. In countries of Southern Europe and Central and Eastern Europe the gap in the number of hours worked by mothers with different number of children is rather modest, which may be related to low availability of part time work in this region .

COUNTRY CLUSTERS ANALYSIS

The above descriptive analysis shows associations rather than genuine relationships between the family size and female labour supply. Obviously, women select into groups of mothers with different number of children based on a number of factors, and yet these factors play diverging role in different European countries. In the next step, we carry out regression analysis in order to see how the effect of the number of children varies across countries after we eliminate the selection effect of observed and unobserved characteristics of mothers. In Table 1 we report the results from IV regression where we "randomise" women according to the number of their children by using data on twin births. In order to see how the effect differs depending on whether we control for unobserved characteristics of women, as a "baseline" we also report results from ordinary OLS regression, which has identical specification but does not imply a quasi-experimental design.

Table 1 The results from regression of female employment and hours of work on family size – fixed effects for country groups.

	Probability of work				*Working hours*			
	OLS		IV		OLS		IV	
	b	se	b	se	b	se	b	se
No of children	-0,18***	(0,00)	-0,16***	(0,04)	-7,18***	(0,18)	-6,57***	(1,70)
Interaction terms (ref.Western-german):								
Nordic x No of children	0,08***	(0,01)	0,23***	(0,06)	2,40***	(0,23)	8,77***	(2,45)
Western-French x No of children	-0,02**	(0,01)	0,10	(0,09)	-1,08***	(0,28)	2,79	(3,28)
Anglosaxon x No of children	-0,02**	(0,01)	-0,05	(0,09)	-0,21	(0,30)	0,20	(3,28)
Southern x No of children	0,01	(0,01)	-0,01	(0,06)	0,10	(0,24)	-0,84	(2,15)
CEE x No of children	0,03***	(0,01)	0,10*	(0,06)	0,92***	(0,21)	4,92**	(2,11)
Nordic	0,05***	(0,01)	-0,23**	(0,11)	5,82***	(0,44)	-5,37	(4,15)
Western-French	0,22***	(0,01)	0,02	(0,15)	11,47***	(0,53)	4,73	(5,53)
Anglosaxon	-0,07***	(0,01)	-0,01	(0,15)	-1,78***	(0,57)	-2,28	(5,63)
Southern	-0,01	(0,01)	0,02	(0,09)	3,63***	(0,43)	5,01	(3,46)
CEE	-0,03***	(0,01)	-0,14	(0,09)	5,34***	(0,38)	-0,50	(3,44)
Age	0,05***	(0,00)	0,04***	(0,00)	1,80***	(0,02)	1,42***	(0,07)
Age at 1st birth	-0,02***	(0,00)	-0,01***	(0,00)	-0,73***	(0,02)	-0,36***	(0,07)
Missing quarter of birth	0,16***	(0,00)	0,16***	(0,00)	4,64***	(0,17)	4,31***	(0,19)
Non-EU origin	-0,16***	(0,00)	-0,16***	(0,01)	-4,97***	(0,19)	-4,91***	(0,20)
Constant	-0,24***	(0,01)	-0,23***	(0,07)	-12,25***	(0,56)	-11,07***	(2,79)
N	135340		135340		135340		135340	

Source: EU-SILC data. Note: *p<0.10, ** p<0.05, *** p<0.01. Fixed effects for survey years included in the regression.

Both OLS and IV results show a decline in the probability of working with an increase in the number of children. This effect is less pronounced in the IV regression which is in line with previous studies, which have shown that women who are less work-oriented select into the group of mothers with more children. Furthermore, our findings demonstrate that the effect of family size on mothers' employment is the weakest in Nordic countries, followed by CEE countries. According to our IV estimates there are no significant differences in the effects of the number of children on mothers' employment across the remaining country groups. This means that an increase in the number of children has an equally negative effect on mothers' employment in Southern Europe, Western European countries as well Anglo-Saxon countries.

The results illustrating the effects of family size on the number of working hours are similar. An increase in the family size leads to a decline in the number of working hours and this effect is weaker in the IV regression than in the OLS regression. This difference between the two models suggests that among women with the same number of children women with a strong taste for children are more likely to reduce the number of working hours. The negative effect of family size on the number of working hours is least pronounced in Nordic countries, followed by CEE countries, and seems to be most pronounced in Anglo-Saxon countries although it has to be admitted that the difference in this effect between this country group and the German-speaking countries is not significant.

In general, our findings confirm that family size has a negative effect on mothers' employment in terms of a job take-up as well as the number of working hours. This effect is, however, substantially weaker in Nordic and CEE countries.

ANALYSIS WITH ICWFR INDICATOR

In the previous section we showed that the negative effect of family size on mothers' employment is weakest in Nordic countries, where the state support for work and family reconciliation as well as the social acceptance of mothers' employment are the weakest. In order to test, however, whether country-specific conditions for work and family reconciliation

are indeed responsible for the observed cross-country variation in the effect of family size on women's employment, we replaced the country groups with the Index for the Conditions of Work and Family Reconciliation (ICWFR) into our models.

According to our model estimates, presented in table 2, the interaction between the family size and ICWFR is positive. It means that the negative impact of family size on mothers' employment This effect is illustrated on Figures 4 and 5. They show the predicted probabilities of working and predicted number of working hours in 2011 by the number of children and the ICWFR for a woman who is of EU origin, gave birth at the age of 27 and is currently 35. It is clear from these graphs that the probability of working and the time spent at work decline with the number of children in all country contexts apart from those where the conditions for combining paid work and care are very good (ICWFR=100). Furthermore, the decline in the probability of working and the time spent at work is the stronger the poorer the reconciliation conditions. For instance, in countries where the ICWFR is close to 75 the probability of working declines from 0.89 to 0.85 (i.e. by 4 percentage points) and the number of working hours from 28.1 to 26.1 (i.e. by 2 hours) with an increase in the number of children from one to three. In countries where ICWFR is around 25 the declines are much more pronounced, namely the probability of working declines from 0.86 to 0.58 (i.e. by over 27 percentage points) and the number of working hours from 28.6 to 17.8.5 (i.e. by 10.8 hours).

Table 2 The results from regression of female employment and hours on the family size – the moderating role of ICFR.

	Probability of work				*Hours of work*			
	OLS		IV		OLS		IV	
	b	se	b	se	b	se	b	se
No of children	-0,19***	(0,00)	-0,20***	(0,04)	-7,71***	(0,15)	-7,57***	(1,35)
Interaction ICWFR x nochild	0,00***	(0,00)	0,00***	(0,00)	0,02***	(0,00)	0,09***	(0,03)
ICWFR	0,00***	(0,00)	-0,00	(0,00)	0,02***	(0,00)	-0,10**	(0,05)
Age	0,05***	(0,00)	0,04***	(0,00)	1,83***	(0,02)	1,49***	(0,07)
Age at 1st birth	-0,02***	(0,00)	-0,01***	(0,00)	-0,79***	(0,02)	-0,45***	(0,07)
Missing quarter of birth	0,05***	(0,00)	0,05***	(0,00)	-1,21***	(0,13)	-1,36***	(0,14)
Non-EU origin	-0,17***	(0,00)	-0,17***	(0,00)	-6,16***	(0,19)	-6,32***	(0,19)
Constant	-0,29***	(0,01)	-0,24***	(0,06)	-7,39***	(0,51)	-5,28**	(2,12)
N	132222		132222		132222		132222	

Source: EU-SILC data. Note: *p<0.10, ** p<0.05, *** p<0.01. Fixed effects for survey years included in the regression.

Figure 4. Predicted probabilities of working by number of children and ICWFR

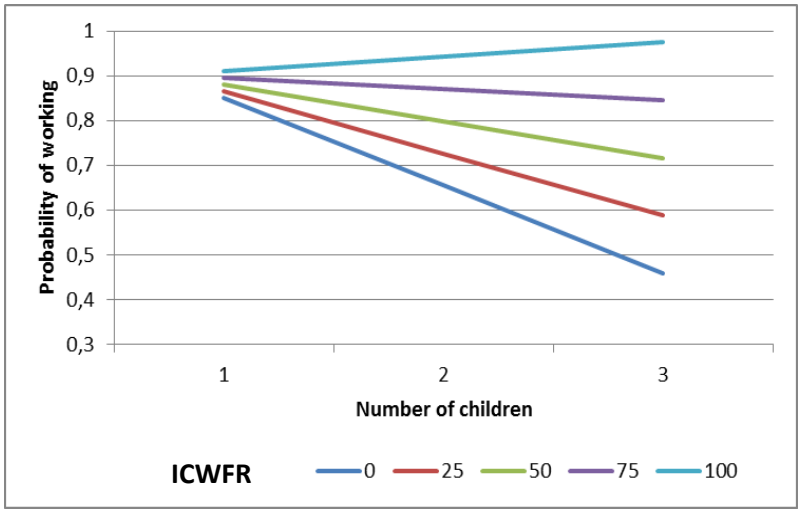
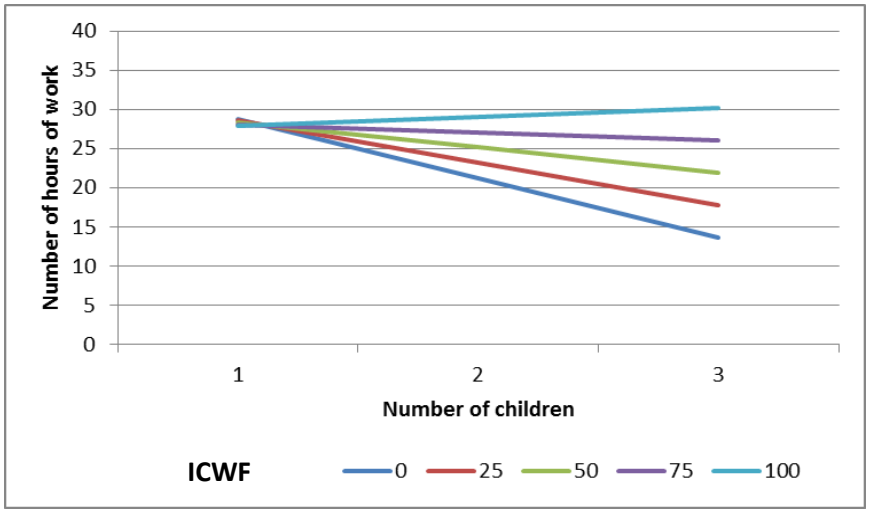


Figure 5. Predicted number of hours worked by number of children and ICWFR



Source: EU-SILC data. Predicted probabilities were calculated for a woman who is of EU origin, gave birth at the age of 27 and is currently 35 in 2011.

VI. DISCUSSION OF KEY FINDINGS

The aim of this paper was to investigate the role of the conditions for work and family reconciliation for the effects of family size on women's employment. Contrary to most of the previous research on the topic, we were able to account for selection of family-oriented women into the pool of mothers. It was achieved by applying a twin-first approach to the cross-country comparative data for Europe. Our findings lead us to three important conclusions. First, they confirm that an increase in family size lowers the probability of working for women or leads them to cut down on working hours. This effect is negative regardless of the fact whether we control for selection or not, but in the former case it is much weaker. This suggests that previous research, which did not take selection into account, has likely overestimated the negative effect of family size on women's employment. Second, our findings corroborate that the effect of the family size on women's employment depends on the country-specific institutional and cultural context and that this effect is weaker in countries which are most supportive to work and family. Our in-depth analyses into this issue which employ the Index of the Conditions for Work and Family Reconciliation show, moreover, that the role of the public support for work and family reconciliation should not be underestimated as the reductions in mothers' employment resulting from an increase in the family size e.g. from one to three are very strong in low-support countries (the probability of working declines by more than 27 percentage points and the number of working hours by at least 10) and negligible in high-support countries.

Additionally, our findings show that there must be also other country-specific factors, apart from those that ease or hinder the reconciliation between paid work and family that affect mothers' employment. This conclusion is drawn on the basis of the finding which shows that the negative effect of family size on mothers' employment is relatively weak in the post-socialist countries of Central and Eastern Europe. In most of the countries in this region the conditions for combing paid work and care are relatively difficult due to poor childcare arrangements and traditional gender norms. This finding is in line with previous research on CEE countries which shows that women's employment in this region is to a lower extent affected by family size as

well as that working women are less likely to postpone childbearing than women in other European countries (Kreyenfeld 2004, Matysiak and Steinmetz 2008, Matysiak and Vignoli 2008, 2013). Financial incentives or socialization with the model of a working mother might be two possible factors that explain this phenomenon.

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ANNEX

Table A1. Sample distribution according to the group of countries

	mothers with twins at 1st birth	other mothers	total
0	287	20,893	21,180
1	129	10,714	10,843
2	249	18,457	18,706
3	114	7,334	7,448
4	389	25,246	25,635
5	551	50,977	51,528
Total	1 719	133,621	135,340

Source: EU-SILC data.

Table A2. Associations between socio-demographic characteristics and the probability of a twin birth at first birth

	coef	se
Age	-0.000***	(0.000)
Age at 1st birth	0.002***	(0.000)
Education attainment (ref. no primary)		
primary	0.001	(0.002)
lower secondary	0.001	(0.001)
upper secondary	-0.000	(0.002)
tertiary	-0.002	(0.002)
missing education	-0.001	(0.004)
Missing quarter of birth	0.002*	(0.001)
Non-EU origin	0.003**	(0.001)
constant	-0.019***	(0.003)
N	135340	

Source: EU-SILC data.

Table A3. First stage equation – OLS estimates of the number of children

	first_stage	
	b	se
Age	0.11***	(0.00)
Age at 1st birth	-0.11***	(0.00)
Twins at 1st birth	0.74***	(0.01)
Country cluster (ref. Western-german)		
Nordic	0.11***	(0.01)
Western-french	0.08***	(0.01)
Anglosaxon	-0.03***	(0.01)
Southern	-0.14***	(0.01)
CEE	-0.20***	(0.01)
Missing quarter of birth	0.10***	(0.01)
Non-EU origin	0.02***	(0.01)
constant	1.14***	(0.02)
N	135340	

Source: EU-SILC data.

Note: fixed effects for survey years included in the regression.

REFERENCES

Aassve, A., Burgess, S., Propper, C., Dickson, M. Employment, family union and childbearing decisions in Great Britain. Journal of the Royal Statistical Society Series a-Statistics in Society. 2006;169;781-804.

Adserà, A. Changing fertility rates in developed countries. The impact of labor market institutions. J. Population Econ. 2004;17;17-43.

Adserà, A. Vanishing Children: From High Unemployment to Low Fertility in Developed Countries. Amer. Econ. Rev. 2005;95;189-193.

Ahn, N., and Mira, P. (2002). A note on the changing relationship between fertility and female employment rates in developed countries. Journal of Population Economics, 15(4), 667–682.

Angrist, J. D and Evans, W. N, (1998). Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size, American Economic Review, vol. 88(3): 450-77.

Anttonen, A. & Sipila, J. 1996, 'European Social Care Services: Is It Possible To Identify Models ?', Journal of European Social Policy, vol. 6, no. 2, pp. 87-100.

Baker, M., Gruber, J., & Milligan, K. (2008). Universal child care, maternal labor supply, and family well-being. Journal of Political Economy, 116(4), 709-745.

Bettio, F. and J. Plantega 2004. Comparing care regimes in Europe. Feminist Economics 10: 85-113.

Blau, F. D., & Kahn, L. M. (2005). Changes in the labor supply behavior of married women: 1980-2000 (No. w11230). National Bureau of Economic Research.

Brewster, K. L., and Rindfuss, R. R. (2000). Fertility and women's employment in industralised nations. Annual Review of Sociology, 26, 271–296.

Bronars, S. G., & Grogger, J. (1994). The economic consequences of unwed motherhood: Using twin births as a natural experiment. The American Economic Review, 1141-1156.

Budig, M.J. 2003, 'Are women's fertility and employment histories interdependent? An examination of causal order using event history analysis', Social Science Research, vol. 32, pp. 376-401.

Cáceres-Delpiano J. (2012). Can We Still Learn Something From the Relationship Between Fertility and Mother's Employment? Evidence From Developing Countries, Demography 49(1): 151-174.

Cruces, G. and Galiani, S. (2007). Fertility and female labor supply in Latin America: New causal evidence, Labour Economics, vol. 14(3): 565-573.

De Graaf, Paul and Edwig Vermeulen. 1997. Female Labour-Market Participation in the Netherlands: Developments in the Relationship between Family Cycle and Employment, in H-P. Blossfeld and C.Hakim (eds.), Between Equalization and Marginalization. Women working Part-Time in Europe and the United States of America. Oxford: Oxford University Press pp. 191-209.

Drobnič, Sonja and Ewa Frątczak. 2001. Employment Patterns of Married Women in Poland, in H-Drobnič, Sonja. 2000. The Effects of Children on Married and Lone Mothers' Employment in the United States and (West) Germany, European Sociological Review 16(2):137-157.

Engelhardt H., Kogel T.,Prskawetz A. (2004) Fertility and women's employment reconsidered: A macro-level time-series analysis for developed countries, 1960–2000. Population Studies 58(1) 109-120.

Esping-Andersen, G. (1999). Social foundations of postindustrial economies. Oxford: Oxford University Press.

Even, W.E. 1987, 'Career interruptions following childbirth', Journal of Labor Economics, vol. 5, no. 2, pp. 255-77.

Felmlee, D. 1993, 'The dynamic interdependence of women's employment and fertility', Social Science Research, vol. 22, pp. 333-60.

Francesconi, M. 2002, 'A joint dynamic model of fertility and work of married women', Journal of Labour Economics, vol. 20, no. 2, pp. 336-80.

Gauthier, A. H. (1996). The state and the family: A comparative analysis of family policies in industrialized countries. Oxford: Clarendon Press.

Giannelli, Gianna Claudia. 1996. Women's transitions in the labour market: A competing risks analysis on German panel data, Journal of Population Economics 9(3): 287-300.

Gornick, J. C., M. K. Meyers, and K. E. Ross. (1997). Supporting the employment of mothers: Policy variations across fourteen welfare states. Journal of European Social Policy 7: 45-70.

Hakim, C. 2003, 'A new approach to explaining fertility patterns: preference theory', Population and Development Review, vol. 29, no. 3, pp. 349–74.

Jacobsen J. P., J. Pearce III W. and J. L. Rosenbloom, (1999). The Effects of Childbearing on Married Women's Labor Supply and Earnings: Using Twin Births as a Natural Experiment, Journal of Human Resources, vol. 34(3): 449-474.

Joesch, J.M. 1994, 'Children and the timing of women's paid work after childbirth: A further specification of the relationship', Journal of Marriage and the Family, vol. 56, no. 2, pp. 429-40.

Joshi, H. 1998. The opportunity costs of childbearing: More than mothers' business. Journal of Population Economics (1998) 11: 161–183

Killingsworth, Mark R. and James J. Heckman (1986), "Female Labor Supply: A Survey," in Orley Ashenfelter and Richard Layard (eds.) Handbook of Labor Economics, Vol. 1. Amsterdam: North Holland, pp. 103-204.

Korpi, W. (2000). Faces of inequality: Gender, class, and patterns of inequalities in different types of Welfare States. Social Politics 7: 127-191.

Kreyenfeld, M. 2004, 'Fertility decisions in the FRG and GDR: an analysis with data from the German Fertility and Family Survey', Demographic Research, vol. 3, no. 11, pp. 275–318.

Lehrer, E. & Nerlove, M. 1986, 'Female labour force behavior and fertility in the United States', Annual Review of Sociology, vol. 12, pp. 181-204.

Leibowitz, A.J., Klerman, A. & Waite, L.J. 1992, 'Employment of new mothers and childcare choice: Differences by children's age', The Journal of Human Resources, vol. 27, pp. 112-33.

Leira, A. 2002, Working Parents and the Welfare State. Family Change and Policy Reform in Scandinavia, Cambridge University Press.

Letablier, M.-T. 1998, 'Comparing family policies in Europe, Periodic Progress Report No1 of the Thematic Network "Working and Mothering: Social Practices and Social Policies", Area III: Research into Social Integration and Social Exclusion in Europe', paper presented to the TSER Programme of the European Commission, 1st TSR Seminar, Lund, November 26-28, 1998.

Lewis, J. & Ostner, I. 1995, 'Gender and the evolution of European social policies', in S. Leibfried & P. Pierson (eds), European social policy: Between fragmentation and integration, Brookings Institution Press, Washington DC, pp. 159-93.

Lewis, J., Knijn, T., Martin, C. & Ostner, I. 2008, 'Patterns of Development in Work/Family Reconciliation Policies for Parents in France, Germany, the Netherlands, and the UK in the 2000s', Social Politics: International Studies in Gender, State and Society, vol. 15, no. 3, pp. 261-86.

Lück, D. & Hofäcker, D. 2003, 'Rejection and acceptance of the male breadwinner model: which preferences do women have under which circumstances?', Globalife Working Paper, no. 60.

Martin, J. A., & Park, M. M. (1999). Trends in twin and triplet births: 1980–97. National vital statistics reports, 47(24).

Matysiak, A. 2009, 'Employment first, then childbearing: Women's strategy in post-socialist Poland', Population Studies-a Journal of Demography, vol. 63, no. 3, pp. 253-76.

Matysiak, A. 2011, Interdependencies between Fertility and Women's Labour Supply, Springer, Dordrecht.

Matysiak, A., 2012, Fertility developments in Central and Eastern Europe: the role of work-family tensions. Demografia – The English Edition

Matysiak, A. & Steinmetz, S. 2008, 'Finding their way? Female employment patterns in West Germany, East Germany, and Poland', European Sociological Review, vol. 24, no. 3, pp. 331–45.

Matysiak A. and D. Vignoli (2008) Fertility and Women's Employment: A Meta-analysis, European Journal of Population Volume 24(4): 363-384.

Matysiak, A. & Vignoli, D. 2013, 'Diverse Effects of Women's Employment on Fertility: Insights From Italy and Poland', European Journal of Population / Revue européenne de Démographie, pp. 1-30.

Matysiak, A. & Węziak-Białowolska, D. 2013, 'Country-specyfic conditions for work and family reconciliation: an attempt at quantification', ISD Working Paper, vol. 31.

Moffit R. (2005). Remarks On The Analysis Of Causal Relationships In Population Research, Demography 42(1): 91–108

Muszyńska, M. 2007, Structural and cultural determinants of fertility in Europe, Warsaw School of Economics Publishing, Warsaw.

Nieuwenhuis, R., Need, A. & Van Der Kolk, H. 2012, 'Institutional and Demographic Explanations of Women's Employment in 18 OECD Countries, 1975–1999', Journal of Marriage and Family, vol. 74, no. 3, pp. 614-30.

Pascall, G. & Manning, N. 2000, 'Gender and social policy: comparing welfare states in Central and Eastern Europe and the former Soviet Union', Journal of European Social Policy, vol. 10, no. 3, pp. 240–66.

Pettit, B. & Hook, J. 2005, 'The structure of women's employment in comparative perspective', Social Forces, vol. 84, no. 2, pp. 779-801.

Rønsen, M. & Sundström, M. 2002, 'Family Policy and After-Birth Employment Among New Mothers – A Comparison of Finland, Norway and Sweden', European Journal of Population/Revue européenne de Démographie, vol. 18, no. 2, pp. 121-52.

Rosenzweig, M. R., & Zhang, J. (2009). Do population control policies induce more human capital investment? Twins, birth weight and China's "one-child" policy. The Review of Economic Studies, 76(3), 1149-1174.

Siemieńska, R. 1997, 'Values and Attitudes Conditioning the Females Presence in the Labour Market', in R. Siemieńska (ed.), Around Problems of Occupational Equality by Gender, Scholar Publisher Company, Warsaw, pp. 61-83.

Rosenzweig M. R. and Wolpin K. (1980). Life-Cycle Labor Supply and Fertility: Causal Inferences from Household Models, Journal of Political Economy 88(2): 328-348.

Steiber, N., & Haas, B. (2012). Advances in explaining women's employment patterns. Socio-Economic Review, 10(2), 343-367.

Stier, H., Lewin-Epstein, N. & Braun, M. 2001, 'Welfare regimes, family-supportive policies, and women's employment along the life-course', American Journal of Sociology, vol. 106, no. 6, pp. 1731-60.

Szelewa, D.and M.P. Polakowski. 2008. Who cares? Changing patterns of childcare in Central and Eastern Europe. Journal of European Social Policy 18(2):115-131.

Taniguchi, H. & Rosenfeld, R.A. 2002, 'Women's employment exit and re-entry: differences among whites, blacks and Hispanics', Social Science Research, vol. 31, pp. 432-71.

Treas, J. & Widmer, E.D. 2000, 'Married women's employment over the life course: attitudes in cross-national perspective', Social Forces, vol. 78, pp. 1409-36.

Trifiletti, R. 1999, 'Southern European welfare regimes and the worsening position of women', Journal of European Social Policy, vol. 9, pp. 49-64.

Uunk, W., Kalmijn, M. & Muffels, R. 2005, 'The Impact of Young Children on Women's Labour Supply: A Reassessment of Institutional Effects in Europe', Acta Sociologica, vol. 48, no. 1, pp. 41-62.

Vere, J. P. (2011). Fertility and parents' labour supply: new evidence from US census data Winner of the OEP prize for best paper on Women and Work. Oxford Economic Papers, 63(2), 211-231.

Weiss, Yoram. "On the Optimal Lifetime Pattern of Labour Supply." Economic Journal 82 (1972): 1295–1315.

Weiss, Yoram, and Gronau, Reuben. "Expected Interruptions in Labour Force Participation and Sex-Related Differences in Earnings Growth." Review of Economic Studies 48 (1981): 607–19.

Wooldridge, J.M. (2002) Econometric analysis of cross section and panel data , The MIT press.

Wrohlich, Katharina (2011) : Labor supply and child care choices in a rationed child care market, Discussion Papers, German Institute for Economic Research, DIW.