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THE TRANSITION TO THE FIRST BIRTH IN FOUR EUROPEAN METROPOLISES

ABSTRACT

A fertility decline and a childbearing postponement appear to be common features of contemporary fertility changes in Europe. In the beginning of the 21st century European fertility was at its lowest level since the Second World War. An early childbearing pattern is being replaced by a late pattern, however, that process is visibly less advanced in Central and Eastern Europe. Furthermore, despite common trends low fertility and delayed parenthood cross-country differences in both fertility levels and its postponement are observed.

Among many comprehensive explanations of these fertility developments changing women's social and economic positions are considered highly relevant. They are related *inter alia* to their increasing access to education and employment. Since in parallel the labour market in European countries has been deeply transformed, especially in the recent two decades, the labour market is becoming increasingly accounted for in studies on fertility and family changes. Difficulties experienced by young persons to develop their professional careers and to stabilise their labour market position, mostly due to labour market instability, economic uncertainty and job precariousness, are pointed out important determinants of the transition to parenthood.

In this study we examine the female transition to the first birth in four European metropolises: Rome, Warsaw, Hamburg and Ljubljana. They represent the most modern segments of the labour market in terms of labour force characteristics (human capital, mobility), and employment structures in four of the EU member states. The analysis is based on the survey, which was carried out in June-September 2006 in Rome, Hamburg, Ljubljana and Warsaw under the EU project 'Job instability and changes in family and household trends. How to cope with these challenges through occupational and social policy actions based on a renewed Lisbon Strategy?'. The project was coordinated by the Giacomo Brodolini Foundation and the Department of Demography, University of Rome "La Sapienza". The countries selected to the study belong to the very low fertility countries (the period TFRs below 1.5) and reveal differences in the postponement of the transition to parenthood. They represent also different labour market structures as well as institutional and cultural settings.

Our aim was twofold: to analyse impacts of age, education and employment of females on timing of a first birth in four metropolises and to check how unobserved heterogeneity modifies our findings. For that purpose two-step procedure has been used. Firstly, the Kaplan-Meier survival curves have been estimated, disaggregated by age, a final level of education, employment status and place of residence. Secondly, two versions of the generalised Gompertz model have been estimated: without and with an unobserved heterogeneity.

Our findings showed that timing of the first child depended strongly on the mother's level of education, her employment status as well as on a birth cohort of women. The younger (i.e. born between 1972 and 1981), better educated (tertiary education) and employed women were prone to give their first birth later than those belonging to the older cohort (i.e. born between 1962 and 1971), less educated (below tertiary education), and staying outside employment. Furthermore, consistently with the fertility behaviour at the country level women living in Warsaw and Ljubljana had their first child sooner than those living in Hamburg. Females living in Rome gave their first birth later than those in Hamburg. Education is the most relevant determinant of postponement, however, it seems to differentiate slightly more fertility behaviour of the older cohorts than the younger ones. Moreover, including an unobserved heterogeneity into the model resulted in a rise of a baseline hazard rate and has strengthened effects of each explanatory variable to be taken into account.

Introduction

Fertility developments observed in Europe since the 1960s resulted in sub-replacement fertility for the continent. Moreover, at the beginning of the 21st century fertility was at its lowest level since the Second World War. As a delay in the transition to parenthood has been witnessed increasingly in European countries, a late pattern is replacing an early childbearing pattern. The early transition to parenthood was characteristic for fertility behaviour in the EU15 in the 1950s and the early 1960s while in Central and Eastern till the 1990s. These fertility changes were accompanied by the postponement of union formation, deinstitutionalisation of the family and its destabilisation. The postponement in partnership and parenthood contributed remarkably to the fertility decline as well as to fluctuations in period TFRs (e.g. Billari 2005a, 2005b; Haintrais 2005, Frejka and Sobotka 2008; Sobotka and Toulemon, 2008).

Despite these common trends towards low fertility and delayed partnership and parenthood, deinstitutionalisation and destabilisation of the family, the onset and intensity of changes were diversified across countries. Moreover, the extent to which delayed births are being recuperated strongly differs among countries. Therefore, the best description of fertility in Europe is that given by Frejka and Sobotka: 'diverse, delayed and below replacement' (2008, p.15). In Western and Northern Europe fertility is characterized by the sub-replacement period TFRs above 1.5, the birth postponement is well advanced and the delayed births are being recuperated at the mother's age of late twenties and thirties. The German-speaking countries as well as countries of Southern, Central and Eastern Europe constitute the very low fertility group (the period TFRs below 1.5), more diverse in terms of postponement and recuperation. As in other EU15 countries, the transition to the first birth has been shifted to older ages in the German-speaking region and in Southern Europe while recuperation effects have been remarkably smaller. On the contrary, in the former socialist countries the postponement process started in the 1990s while recuperation of the delayed births has been weak so far.

In addition, these cross-country diversity in fertility behaviour are accompanied by regional differences within a country. The main differences are observed between urban and rural areas, between more urbanised and less urbanised regions, and also between towns of a different size. Clearly, populations of metropolises are very particular in terms of demographic characteristics. They are younger (due to in-flows for education and job opportunities) and better educated. They also differ from other population groups in terms of

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demographic behaviour and attitudes and opinions. Usually, they tend to get married later, postpone childbearing, more frequently cohabitate and have out-of wedlock children.

Big agglomerations constitute also the most modernised labour market segment in terms of employment structures, technological advancement, skills and flexibility requirements, job mobility, etc. Beside better labour supply characteristics (age, human capital, mobility) also several labour market indicators (employment and unemployment rates, job vacancies, unemployment duration, job turnover, etc.) show better work opportunities as compared to other regions of a country.

Therefore, big agglomerations can be used for studies on family related behaviours under pressures of highly competitive and flexible labour markets, which contribute to the growing incompatibility between the family and labour market participation, in particular labour market participation of women (e.g. Billari, 2005a, 2005b; Del Boca et al., 2005; Del Boca, Locatelli, 2007, Mills 2001, 2008; McDonald, 2002, 2006; Mills, Blossfeld, Klijzing, 2005; Kotowska 2004, 2005, Muszynska, 2007; Matysiak, 2008). Especially, employment instability and job precariousness related to contemporary labour markets with their rising uncertainty, a higher competition and increasing demands for skills and mobility determine difficulties experienced by young persons in their transition to adulthood i.e. to start their labour market careers, to stabilise their economic position as well as to to transit to partnership and parenthood.

Such reasoning was *inter alia* behind the EU project "Job Instability and Changes in Family and Household Trends. How to cope with these challenges through occupational and social policy actions based on a renewed Lisbon Strategy?" (JIFT) financed with the funds of the European Commission. Under that project, coordinated by the Giacomo Brodolini Foundation and the Department of Demographic Sciences of the Rome University "Sapienza" four surveys were conducted in June - September 2006 in four European metropolises: Warsaw, Ljubljana, Hamburg and Rome (Caretta, Deriu (eds.), 2007)[1]. The EU countries selected to participate in the project (two old member states - Italy and Germany and two new member states – Poland and Slovenia) represent the very low fertility countries (in 2006 the period TFRs were between 1.27 ad 1.33), which show, however, remarkable differences in the

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[1] Four institutions were responsible for the country contribution to the project: the Department of Demographic Sciences of the Rome University "Sapienza" for Italy, the Max Planck Institute for Demographic Research of Rostock for Germany, the Institute of Statistics and Demography at the Warsaw School of Economics in Poland, and the Science and Research Centre of Koper of the University of Primorska for Slovenia.

course of postponement to parenthood. In 2006 the mean age at first birth was about 29 years in Italy and Germany, more than 27 years in Slovenia and around 26 years in Poland.

The four countries under consideration represent also the different labour market situation. By referring to some labour market indicators based on the LFS data of 2005, one can notice that the worst labour market situation was in Poland. Poland revealed the lowest employment rate for men aged 15-64 (58.9%) and the highest unemployment rate (16.5%), similarly to indicators for women. Italy and Poland had the lowest employment rates of women aged 15-64 (45.3% and 46.8% respectively) as opposite to Slovenia and Germany with women's employment rates above the EU level (61.3% and 59.6% respectively). Polish women experienced the highest unemployment (the unemployment rate of 19.2%), Slovenian women had the lowest one (6.9%) while that indicator was around 10% in Germany and Italy (Caretta, Deriu (eds.), 2007, Table 1, p.23). One should remember, however, that both Germany and Italy experienced the continuous upward trend in women's labour force participation after the Second World War. Moreover, according to the values of the labour force participation rates of women for the years 1970-1995 in the EU15 countries Italy was included to the country group of the low labour force participation of women while Germany to the group of the medium labour force participation of women (Ahn, Mira, 2002, Matysiak 2008). Poland and Slovenia had the high level of women's labour force participation until 1989. Economic reforms under the transition to market economy resulted in a remarkable decline of labour force participation in Poland contrary to Slovenia which remained in the high women's labour force participation group despite some fluctuations of the relevant indicators.

Italy, Germany and Slovenia did not differ considerably in terms of employment and unemployment rates of males. Men's employment rates oscillated between 69.9% (Italy) and 71.2 (Germany) while unemployment rates ranged between 5.9% (Slovenia) and 8.9% (Germany).

One of the common features of the recent labour market developments is an upward trend in part-time and fix-term jobs. The LFS statistics showed that part-time jobs were more frequent among women in Germany (43.8% of total employment) and Italy (25.6%) against their limited incidence among women in the new member states (14.3% in Poland and 11.1% in Slovenia). When looking at family employment patterns one might suggest that in Germany and Italy part-time work was used also as work-family reconciliation measure while

in Slovenia and Poland its incidence was mostly demand driven (e.g. Aliaga, 2005). Part-time work among men was commonly rare in all countries - the percentage of part-time workers among employed men ranged between 4.6 (Italy) and 8.0 (Poland).

Similarly to the overall upward trend of part-time employment in the EU countries, also jobs based on temporary contracts have been increasing. Poland experienced a rapid increase of temporary jobs from 5.8% in 2000 to 25.7% in 2005 while other countries showed a rather moderate increase to the levels between 12.3% (Italy) and 17.4% (Slovenia).

The countries considered differ not only in terms of the labour market structures but also in terms of institutional settings and gender norms. The general context of fertility and the labour market interrelationships can be discussed in terms of the structural and cultural incompatibilities between work and family (Jóźwiak et al., 2007; Kotowska, Matysiak, 2008). The actual societal opportunities and constraints that are placed on the roles of women as economic providers and home-carers are more or less supportive for women's employment. They are determined by institutional settings (mainly work organisation, institutional child care, leave regulations, tax system), labour market structures, and gender roles. The institutional settings and the labour market structures define the structural incompatibility between work and family (Liefbroer, Corijn, 1999). A structural lag in the adjustment of welfare state institutions to new conditions under which families live, imposed by women's labour market involvement, is usually accompanied by too-slow changes in the perception of women's social roles. Despite their increasing participation in the labour market women's roles are traditionally perceived as predominant care-givers not economic providers. This is called the cultural incompatibility between work and family (Liefbroer, Corijn, 1999).

In Poland and Italy the strong cultural incompatibility between work and family co-exists with the strong structural incompatibility (e.g. Muszyńska, 2007; Kotowska, 2005; Kotowska, Matysiak, 2008). Public care is underdeveloped and the financial assistance for the families is strongly limited. Relatively rigid work arrangements co-exist strong barriers when entering the labour market. In Italy, women are seen as home-makers and main care providers while men are perceived as breadwinners. Therefore, the social acceptance of mothers' employment is relatively weak. In Poland, social attitudes towards women's work are strongly pragmatic: employment of mothers with young children does not receive a strong social acceptance, however, when children are growing up mothers are expected to contribute to the household income. The strong emphasis on the women's contribution to the household budget results from the income levels well below the earnings in the EU15 (Matysiak, 2008).

In Slovenia, institutional settings are supportive for reconciling employment and family while a traditional perception of gender roles is still shared by a remarkable part of population similarly to other post-socialist countries (Philipov, 2005). Therefore, the dual earner model is predominantly practiced, however, it is mostly the dual earner-double burden of women model.

Work organisation, child care proviosion and leave regulations in Germany support parents to combine paid work and child-rearing, presuming that mothers' labour market participation is subordinated to family responsibilities (i.e. she ceases or reduces her economic activity in order to raise young children). Such conceptualisation of women's work is not approved by some population groups, especially by young women. Therefore, both types of work-family incompatibilities exist, however, at the lower level as compared to Italy and Poland.

The aim of the paper is to analyse the transition to the first birth of women living in four metropolises. They represent the most modern segments of the labour markets in the countries which differ in terms of fertility behaviours, labour force participation of women and incompatibilities between work and family defined by institutional settings (family policies), labour market structures and gender norms. We start with some considerations concerning time to the first birth and main research hypotheses. In the subsequent section data and methods are presented. Next, the main results are discussed. In the final section some conclusions are provided.

The research hypotheses

The data of the sample surveys on job instability and family and household trends, conducted in four European metropolises: Warsaw, Ljubljana, Hamburg and Rome, offers a unique opportunity to study fertility behaviours in terms of postponement in countries which represent different family related behaviours, labour market structures, cultural contexts and welfare states.

Transformations of the contemporary labour markets, observed especially in the recent two decades, contribute to difficulties experienced by young persons to develop their professional careers and to stabilise their economic position. As job instability and job precariousness as well as economic uncertainty are increasingly distinctive for the labour market careers and the life course, their relevance for the transition to parenthood is also

increasingly considered (e.g. Billari, 2005a; Del Boca, Locatelli, 2007; Mills 2008; McDonald, 2002, 2006; Mills, Blossfeld, Klijzing, 2005; Kotowska, 2008, Matysiak, 2008). Therefore, one may expect that younger cohorts of women delay more than older cohorts their decision about a first child. Moreover, since our focus is on highly competitive and mobility demanding labour market segments one may suppose that more effort required to start and develop employment career would both reduce fertility of women in employment and delay their first birth as compared with those women who are not in work.

The prolonged education itself is considered as a factor contributing to the fertility delay. Furthermore, investment in human capital determines women's employment decisions and opportunity costs, both affecting fertility levels and its postponement (e.g. Becker, 1991; Gustaffson 2001; Liefbroer, Corijn, 1999). Long-term perspective on costs and benefits of motherhood suggests that better educated women rather postpone childbearing than resign from children (Gustaffson 2001, Liefbroer, Corijn, 1999). In addition, under higher incompatibilities between work and family opportunity costs are higher and education would be effects stronger.

The overall effects supposed above are diversified across agglomerations due to both country-specific factors and individual-specific features. The former group is represented in our analyses by taking into account the place of residence i.e. the agglomerations selected. Here, the dominant component seems to be the advancement in fertility delays at the country level. Therefore, one can expect the differences across four cities would be as they are depicted by the country level indicators (e.g. the mean age at first child). Moreover, since the place of residence variable is a proxy for other macro level differences, one can expect that the relevant model with an unobserved heterogeneity, which accounts for both invisible individual characteristics and macro level determinants, will specify effects of age, education, employment status and place of residence more precisely.

Summing up, we hypothesise that:
- in four cities under consideration the younger women delay more their decisions about the first child than the older women;
- education and the labour market status determine women's decisions about the first child, i.e. the common interrelationship is that the better educated women are more prone to invest in their employment and postpone more their decisions about a first child;

-      despite the fact that education and the labour market status determine similarly transitions to the first child in four cities considered, time to the first birth differs across cities mostly due to the past changes in fertility behaviour. However, the institutional, economic and cultural contexts also matter. Therefore, one can expect that revealed cross-city differences may offer some policy suggestions.

Data and methods

The data used in the empirical analysis are from the surveys "Job instability and family formation process" which was conducted in June - September 2006 in four European metropolises: Warsaw, Ljubljana, Hamburg and Rome. These surveys have been carried out within the international project "Job Instability and Changes in Family and Household Trends. How to cope with these challenges through occupational and social policy actions based on a renewed Lisbon Strategy?" (JIFT) financed with the funds of the European Commission and coordinated by the Giacomo Brodolini Foundation and the Department of Demographic Sciences of the Rome University "Sapienza" (Caretta, Deriu (eds), 2007). Given that the purpose of the study was an investigation of the impact of job instability on family formation and evolution, the questionnaire was predetermined for the people aged 25-44 years. The structured questionnaire was divided into seven sections which included: general data, the leaving home, the entry into union, fertility decisions and intentions, employment, the use of time, and work-family reconciliation strategies. Data were collected through the computer assisted telephone interview (CATI).

For the purpose of that study the sample data on women has been used. The final subsample consisted of 2491 women with fertility histories, educational pathways and labour market transitions. Due to the fact that women with the lowest level of education were not so numerous, two lowest categories of education (i.e. medium and low) were aggregated into one group labelled as 'other'. For mothers the employment status was defined at the time of the first birth while for childless women at the time of an interview.

Table 1 shows the structure of the final subsample used in our analyses by birth cohort, education and employment status. Women of the younger cohort differ from the older cohort in terms of education and employment status. The younger women were better educated (52.8% of high education against 47.5% for the older women) and 76.8% of them was in employment (versus 82.6% among the older women).

Table 1 Structure of the women's subsample by cohort, education and employment status

cohort	education		employment status		total
	high	other	employed	not employed	
1972-1981	56.9	51.7	52.4	61.25	54.3
1962-1971	43.1	48.3	47.6	38.75	45.7
total	50.4	49.6	79.4	20.6	100.0

Source: own calculations based on the JIFT database.

In the first stage of the data analyses the Kaplan-Meier survival curves of the transition to the first birth have been used, disaggregated by age, education, employment status and place of residence.

Next, to test our hypotheses the hazard regression model, namely the generalized Gompertz model (i.e. a piece-wise linear spline in the log-hazards), has been applied. The main baseline timing is the duration since the 15th birthday till the first birth event (expressed in months). The hazard function is as follows.

$$\ln h_j(t) = y(t) + \sum_j \alpha_j x_j \qquad (1)$$

where:

$h_j(t)$ - intensity (hazard) of the first birth, and t – the basic duration variable (time to the first birth);

$y(t)$ - a piecewise linear spline ;

x_j - time-constant covariates:

  – the dummy variable describing the women's birth cohort (0 – women born in 1962-1971, 1 – women born in 1972-1981);
  – the dummy variable for education (0 – women with the lower level of education ("other"), 1 – women with the higher level of education);
  – the dummy variable for the employment status (0 – not employed, 1 – employed)
  – the dummy variables for the place of residence (ref. Hamburg)

α_j – corresponding parameters for the dummy variables.

Additionally, in order to control for invisible individual characteristics an unobserved heterogeneity term has been included into the model. Thus the model is formulated as follows:

$$\ln h_j(t) = y(t) + \sum_j \alpha_j x_j + \varepsilon_j, \qquad (2)$$

where:

ε_j - the random variable for individual heterogeneity (it is assumed to be normally distributed: $\varepsilon_j \sim N(0, \sigma_\delta^2)$).

The aML software (version 2.09) has been used for the estimation of the hazard models (10 and (2) (Lillard and Panis, 2003), while the data preparation was made by the Stata statistical software.

In our this analysis a final level of education has been included as an explanatory variable. According to Hoem and Kreyenfeld (2006) an educational attainment is a time-varying factor in the first-birth process and should be adequately treated in the model. However, due to the small number of cases we have assumed that it is a time-constant variable. Moreover, it is very likely that even if a birth takes place before the university graduation, the enrolment in the educational system postpones this event.

Main results

Firstly, we will present results of non-parametric survival analysis, and then outcomes of estimation performed for the parametric hazard models.

As a non-parametric survival approach the Kaplan-Meier survival curves of the transition to the first birth have been used, disaggregated by age, a final level of education, employment status and place of residence

Figure 1 presents the survival curves of the transition to first birth by 10-years age group. Generally, younger women (aged 25-34 years) had their first child later than older ones (aged 35-44): for example, 52% of women aged 35-44 years had no child at age 30, whereas this proportion for women aged 25-34 years amounted for 68%. Our finding is consistent with results by Deriu et al. (2008), obtained for the five-year age groups, i.e. delays in the transition to the first child are a common feature of fertility behaviour in four cities. Furthermore, they have found that the cross-city differences going from the oldest to the youngest cohorts tend to draw closer (Deriu et al., 2008, 14).
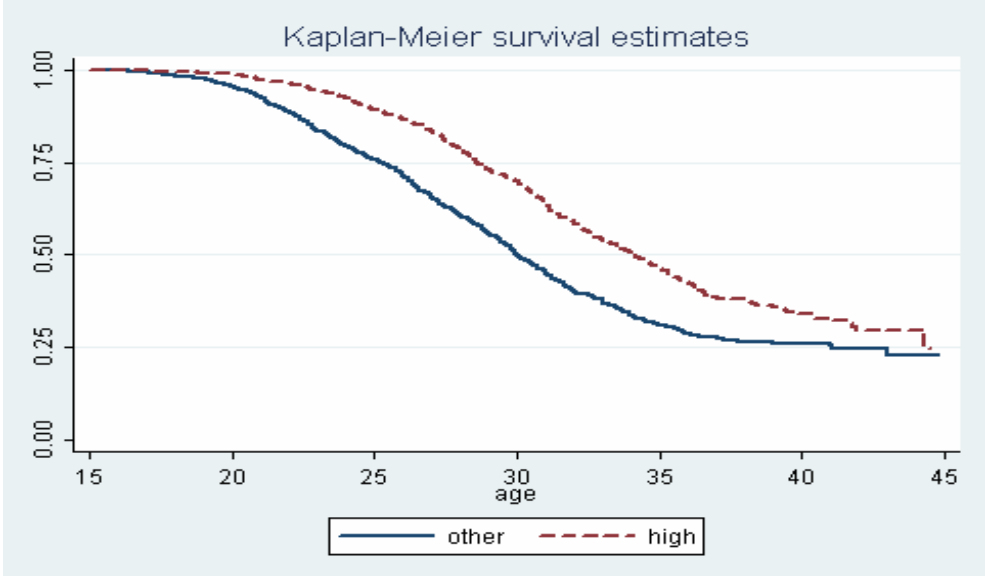
Figure 1 The transition to the first birth: the proportion of childless women by age
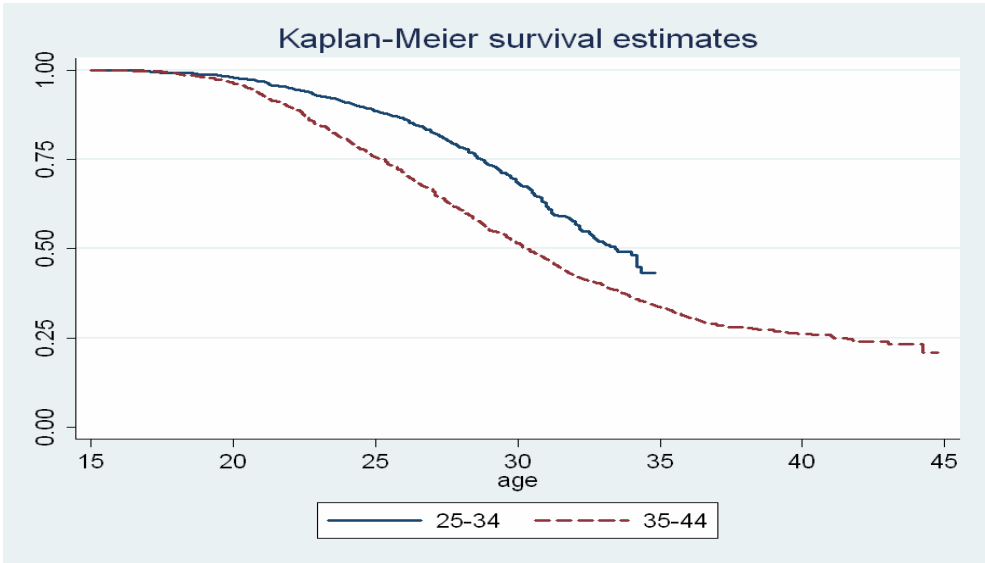
Note: Method: Kaplan-Meier survival plots; the dependent variable: the transition to the first birth measured since 15th birthday.
Source: JIFT database.

As expected, education has a strong impact on delays in the transition to the first birth. Women with the higher final level of education tended to have their first child later than the less educated women did (Figure 2). Almost 70% percent of women with the higher education level were childless at age 30 against only one half of those with the lower level of education.
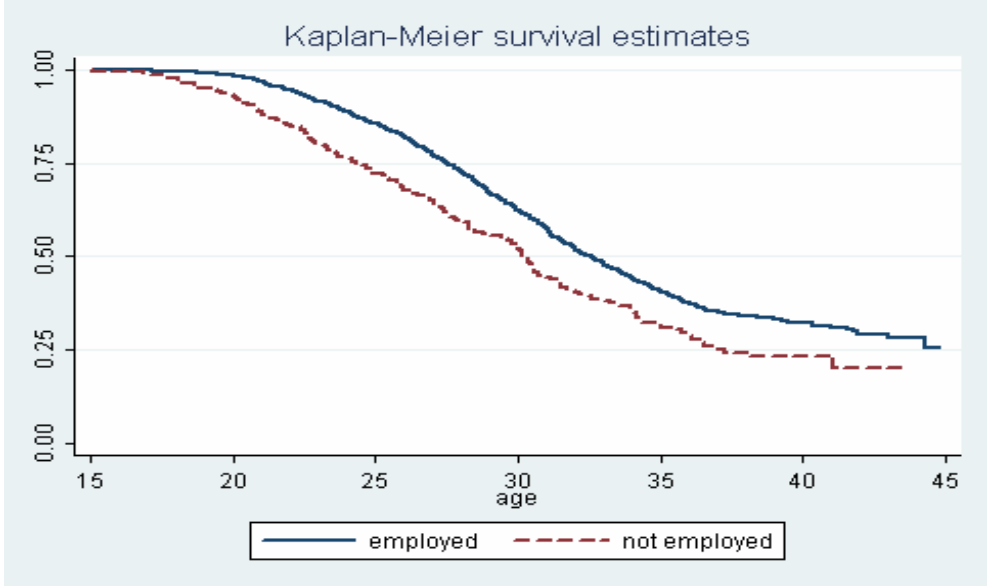
Figure 2 The transition to the first birth: the proportion of childless women by education

Note: Method: Kaplan-Meier survival plots; the dependent variable: the transition to the first birth measured since 15th birthday.
Source: JIFT database

Similarly, the employment status differentiated the transition to motherhood. Generally speaking, employed females had their first child later than those without a job: 62% of women in employment had no child at age of 30 against 52% of women outside employment (Figure 3).

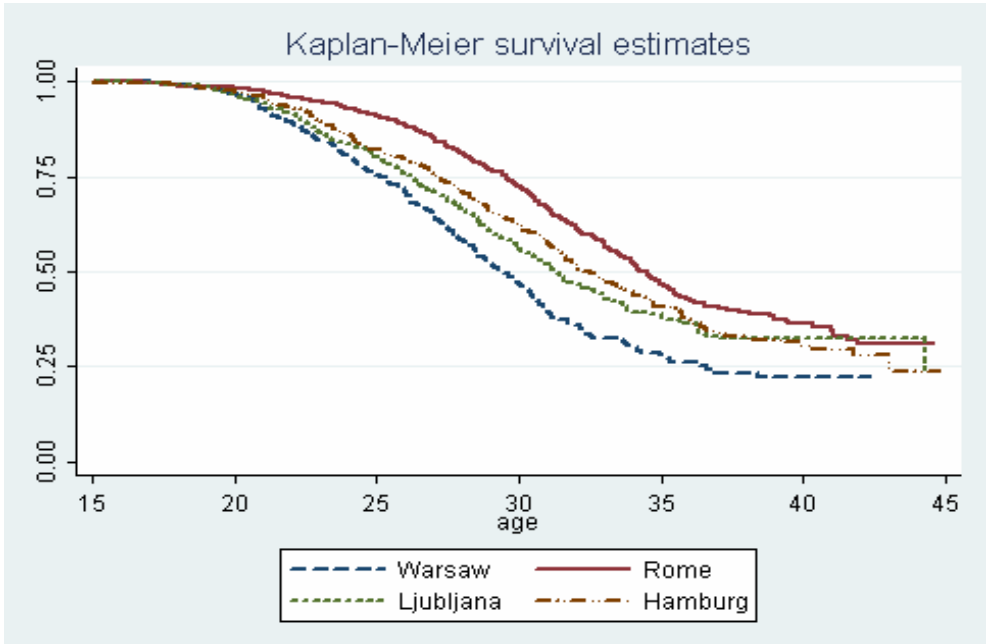**Figure 3 The transition to the first birth: the proportion of childless women by employment status**

Note: Method: Kaplan-Meier survival plots; the dependent variable: the transition to the first birth measured since 15th birthday.
Source: JIFT database.

Last but not least, the place of residence also played an important role in the transition to the first birth. Women in Rome experienced the first birth later and those living in Warsaw had first child earlier than others: 72% of women living in Rome versus 47% of those living in Warsaw had no child by age of 30. Timing of the first birth by women living in Hamburg and Ljubljana was somewhere in-between Italian and Polish women: 62% of those living in Hamburg against 56% of those from Ljubljana had no child by age of 30 (Figure 4).

Combining both age and education one can notice a strong postponement of the first child among the younger, better educated women (Figure 5). Almost 76% of these women were still childless at age 30 versus almost 58% of the less educated women of the same age group. These results may suggest that the young, better educated women were contributing to the observed progress in postponement of the first birth more than the less educated. Moreover, the less educated women of younger cohorts seemed to follow the better educated women of older cohorts – their delay patterns were close. In addition, the gap between the better educated and the less educated women of the same age group slightly decreased. This may suggest that education differentiated more fertility delays among the older cohorts.

Figure 4 The transition to the first birth: the proportion of childless women by place of residence

Note: Method: Kaplan-Meier survival plots; the dependent variable: the transition to the first birth measured since 15th birthday.
Source: JIFT database.

Figure 5 The transition to first birth: the proportion of childless women by age and a final level of education
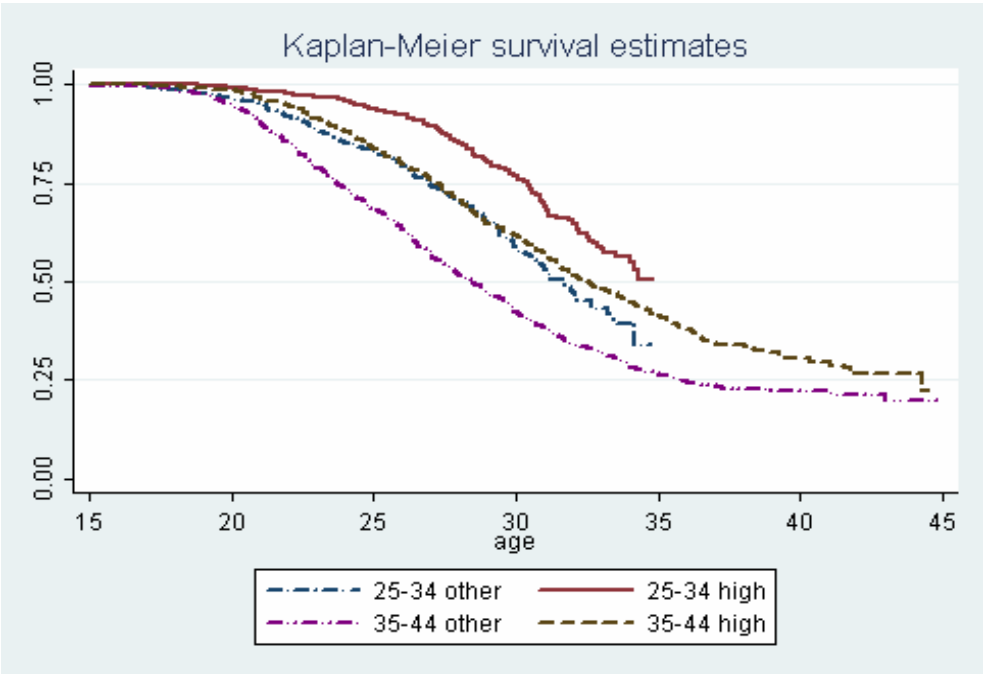
Note: Method: Kaplan-Meier survival plots; the dependent variable: the transition to the first birth measured since 15th birthday.
Source: JIFT database.

Now we will focus on a parametric survival approach. The main results of the analysis are presented in Table 2 for two models estimated: Model 1 without an unobserved heterogeneity and Model 2 with an unobserved heterogeneity. Apart from the heterogeneity terms, the specifications are the same in both models. We start with comments on the results showed by Model 1, then outcomes of Model 2 will be presented.

In the model without the heterogeneity component the baseline risk was reached by splitting time to the first birth into intervals with nodes 60, 180 and 240 months (i.e. at age 20, 30 and 35). These intervals were chosen on the basis of preliminary results with an intention to express as good as possible the process under study.

Table 2   Estimation results of the hazard regression for timing to the first birth

	Model 1				Model 2			
	α	$\exp\alpha$	SE		α	$\exp\alpha$	SE	
constant	-9.125		0.311	***	-10.108		0.383	***
slopes								
age 15-20	0.058		0.005	***	0.066		0.006	***
age 20-30	0.013		0.001	***	0.025		0.002	***
age 30-35	-0.004		0.002	*	0.008		0.003	**
age 35-44	-0.016		0.004	***	-0.012		0.004	**
cohort								
1972-1981	-0.476	0.621	0.060	***	-0.861	0.423	0.096	***
1962-1971	ref.				ref.			
education								
high	-0.626	0.535	0.055	***	-1.259	0.284	0.112	***
other	ref.				ref.			
employment status								
not employed	ref.				ref.			
employed	-0.423	0.655	0.055	***	-0.985	0.373	0.104	***
place of residence								
Warsaw	0.909	2.481	0.071	***	1.593	4.920	0.141	***
Rome	-0.276	0.759	0.078	***	-0.488	0.614	0.123	***
Ljubljana	0.583	1.791	0.075	***	1.156	3.179	0.133	***
Hamburg	ref.				ref.			
SD of heterogeneity	-		-		1.499	4.476	0.113	***
Log Likelihood		-8616.72				-8561.67		
N of women		2491				2491		
N of first births		1238				1238		

Notes: significance ***<0.001, **<0.01, *<0.1.
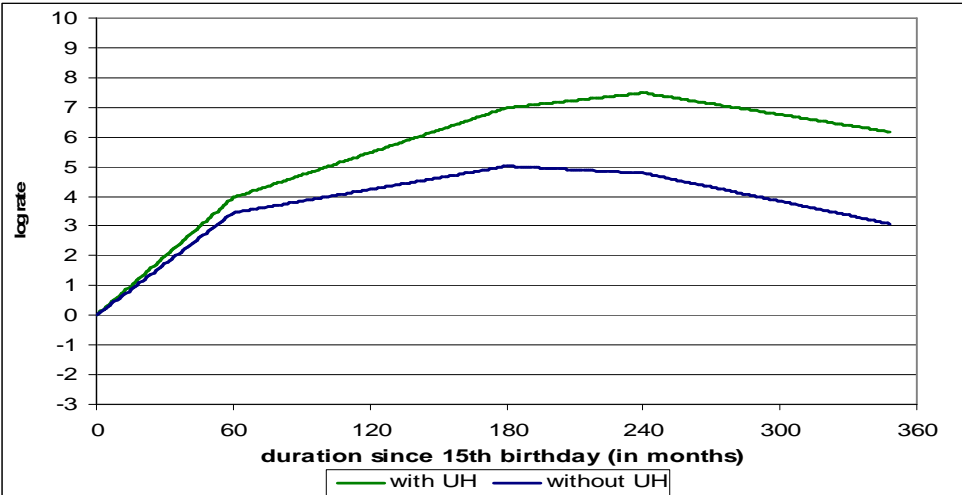Source: own calculation based on JIFT database
Model 1 –without UH
Model 2 – with UH

The baseline hazards are shown in figure 6. Generally, the hazard rate of Model 1 increases till the age of 30 years, when it reaches its maximum, and afterwards slightly

decreases. In this model four explanatory covariates i.e. the birth cohort of women, their education, employment status and place of residence are statistically significant. Obtained results showed that the younger women had by almost 40% lower risk of entering into motherhood than the older ones. Furthermore, as expected, the better educated women had the hazard of first birth by nearly 50% lower than the less educated women. A similar impact is found for the employment status: women having a job showed by 35% lower risk of giving the first birth than those not in employment. As far as the place of residence is concerned, women living in Warsaw and Ljubljana revealed a higher risk of entering into motherhood than those living in Hamburg (by 150% and 80%, respectively), whereas for females living in Rome the risk was lower by 25%. Therefore, Hamburg and Rome are close in terms of a propensity to have the first child. That propensity is remarkably lower than in Warsaw and Ljubljana, which differed stronger in terms of the first birth risk.

Figure 6 Baseline of first birth according to the duration since the 15th birthday

Source: own calculations based on JIFT database.

A comparison of the baseline hazard for two estimated models (without and with the heterogeneity) makes it possible to investigate selection effects produced by the unobserved heterogeneity. As it could be anticipated, after including the unobserved heterogeneity into the model, the baseline hazard for timing of the first birth rose, especially for women aged 20 years and more. In particular, the maximum has shifted to a higher age (35 years). That result suggests that women with the unobserved characteristics that influence their proneness to children, transit to motherhood earlier and thus the share of women prone to give the first birth later rises among the population at risk.

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Additionally, accounting for the unobserved heterogeneity influenced the estimates of the covariates. Firstly, the effect of age on the risk of the first birth is stronger i.e. the younger women had nearly 60 percent lower hazard of first birth. The possible explanation of this phenomenon can be following: the younger cohorts have some unobserved characteristics which influence negatively their proneness to childbearing. This can be linked to changes in attitudes of the younger generations towards family and childbearing as well as towards a professional career. Another explanation may refer to increasing work-family incompatibilities they are confronted with due to the labour market transformation and slow adjustments in the institutional, structural and cultural context.

The estimates of parameters for other explanatory variables considered i.e. education and employment status were also changed in Model 2 with the unobserved heterogeneity term. Similarly to the cohort variable, the impact of education is much more negative than in Model 1: the higher educational level produces by 70% lower risk of the first child in comparison to the lower education level. Also, the estimate for the employment status showed a stronger impact: employed women had the risk of entering into motherhood lower by 60% than those without a job. This finding can be interpreted in a following way: employed women with a higher level of education are characterized by some unobserved features that make them less prone to have children earlier.

As for the place of residence, it was believed that an introduction of the unobserved heterogeneity term into the model would strengthen its effect. In general, the differences across four cities increased, however, women in Rome and Hamburg are still close in terms of their very low propensity to move to motherhood. As previously, women in Rome had the lowest propensity of having a first child (almost 40% lower than women in Hamburg) while women in Warsaw had almost five times higher risk of giving the first birth than those in Hamburg. For women living in Ljubljana this risk was three times higher than in Hamburg.

Conclusion

In this paper we have studied similarities and differences in the transition to the first birth by women in four European metropolises: Rome, Warsaw, Hamburg and Ljubljana by use of the survey data produced under the UE project on job instability and family dynamics. These agglomerations represent the most modern segments of the labour market in terms of labour force characteristics (human capital, mobility) and employment structures in Germany, Italy, Poland and Slovenia – the old and new EU member states. These countries have the

very low fertility (the period TFRs below 1.5) while they are at the different stages in the fertility postponement process: Germany and Italy are well advanced, Poland is at the relatively early stage, and Slovenia is at the medium phase. Age, education, employment status have been selected to be the main determinants of the transition to motherhood. The place of residence variable reflects jointly differences in the economic, social and cultural contexts as well as institutional settings. Since the variables taken into account represent only selected from possible determinants of timing of the first child at the micro and macro levels, one can expect that an unobserved heterogeneity plays an important role in the interrelationships analysed. Therefore, two versions of the hazard model have been estimated to investigate the time interval between the 15th birthday and the first birth: without and with an unobserved heterogeneity. In addition, the Kaplan-Meier survival curves of the transition to the first birth have been used, disaggregated by age, a final level of education, employment status and place of residence.

Delays in the transition to the first child are a common feature of women's fertility behaviour in four cities. The most pronounced postponement of fertility is found in Rome, the least one in Warsaw. Delays patterns in Hamburg and Ljubljana are close.

The Kaplan-Meier survival curves show that among three determinants – age, education and employment - human capital seems to differentiate most fertility behaviour of the women's subgroups, followed by age. By combining both determinants it has been found how advanced is postponement among the younger women with better human capital - almost 76% of these women were still childless at age 30. In addition, differences in fertility postponement by education among the younger women were slightly diminished what might suggest that other factors were becoming more relevant. However, education itself seems to be more important determinant of fertility delays than employment

Estimates of these covariates based on the generalized Gompertz model without an unobserved heterogeneity confirmed that education effects were the strongest while age showed slightly stronger impact than employment on the hazard rate. Accounting for the heterogeneity has strengthen effects of the covariates under study and has slightly modified their ranking – education has remained the most important variable while age and employment have equally influenced the hazard rate.

The agglomeration effect indicated that women in Warsaw and Ljubljana revealed remarkably higher risks of entering to motherhood than women in Hamburg, whose propensity to become a mother was higher than for women in Rome. Under the model with the heterogeneity term that effect is stronger which may suggest that the context matters.

Differences between Ljubljana and Hamburg and between Hamburg and Rome can be attributed, in general, to the level of incompatibilities between work and family. As we have explained already, these incompatibilities are stronger in Italy than in Germany, and in Slovenia more support is given to working parents than in Germany. That interpretation does not work for the results obtained in Warsaw since the general level of work-family incompatibilities in Poland is comparable with that in Italy. The reasonable explanation seems to be the income effect (Matysiak, 2008).

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