

Women's employment in post-socialist Poland: a barrier or a precondition to childbearing?

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Abstract

In this paper, we model interdependencies between fertility and women's employment in post-socialist Poland, a country that experienced a rapid decline in fertility and employment after 1989. In view of the fact that finding and maintaining employment became difficult, a hypothesis has been formulated that women postpone childbearing until they find a job. Testing this hypothesis requires taking into account women's plans regarding the number of children and involvement in paid work. This is done by the simultaneous estimation of three hazard models: transition to birth, employment entry and employment exit. Our results reveal a strong conflict between fertility and women's work. However, they also indicate that women do not perceive employment as a barrier, but rather as a precondition to childbearing. This finding is consistent with our research hypothesis. We conclude that better prospects for women's employment can result in fertility increase. Appropriate policies aimed at easing incompatibilities between fertility and women's work are highly desired, but their effective implementation should be preceded by a better understanding of the nature of woman's needs.

1. Introduction

Interdependencies between fertility and women's labour force participation are a prominent research issue in demography, sociology, and economics. One of the reasons for this state of affairs is the changing age structure of populations in an increasing number of countries, posing a serious threat to the sustainability of social security systems, economic growth, and social cohesion. An increase in women's labour force participation in the short-term and demographic renewal in the longer term could alleviate the negative consequences of population ageing (European Commission 2005, 2006, 2007). It is, however, unclear whether it is possible to increase female labour force participation without negative repercussions on fertility. This is a highly policy-relevant question, in particular in the post-socialist countries where a rapid decline in childbearing as well as in women's employment was recorded, following the onset of the political and economic change of the early 1990s.

The focus of this paper is on Poland, a country that had one of the highest birth rates in Europe during the 1980s and became the lowest-low fertility country not longer than a decade after the economic transformation had begun. This rapid plunge in childbearing is claimed to be caused by changing structural and institutional conditions of living and working as a family. On the one hand, the consumer aspirations and the individual responsibility for securing certain living standards have increased. On the other hand, it became much harder to earn an income, given the strong unemployment pressure, instability of employment contracts, and growing importance of education and workers' flexibility in finding and maintaining a job (Kotowska 1999, Kotowska et.al. forthcoming). Since childrearing in Poland is mainly perceived as a mother's duty, it became much more difficult for women to compete successfully in the labour market (Kotowska and Sztanderska 2007). In this context a hypothesis was formulated that females, in a fear of jeopardizing their employment prospects, postpone childbearing until they establish a better position in the labour market (Kotowska et.al. forthcoming).

This hypothesis presupposes that women are rational actors who think prospectively and formulate strategies. They are able to anticipate consequences of childbearing on their performance in the labour market and adjust the current fertility behaviours to the future employment plans. Likewise, with a prospect to have a child they decide about their present employment – they can either take up or give up a job whatever they find more conducive to their fertility intentions. Unravelling this mechanism of decision-making is crucial for understanding interdependencies between childbearing and women's labour force participation and consequently for formulating appropriate public policies. Unfortunately,

although for nearly four decades, a great abundance of studies has been conducted in this field, in various countries, the majority failed to fully account for women's plans and preferences. As a result the mechanism underlying fertility and female employment has not been well comprehended (Willekens 1991, Bernhard 1993, Ni Bhrolchain 1993, Schröder 2005).

The objectives of this paper are twofold. First, we address the hypothesis presupposing an adjustment of fertility behaviours to the changing conditions of labour force participation in the post-socialist Poland (*adjustment hypothesis*). Second, we propose to apply the multi-process hazard model for studying the interdependencies between fertility and women's employment. This method developed by Lillard (1993) and Lillard et.al. (1995) allows for a correlation between the person-specific unobserved heterogeneity terms pertaining to each process. In this way women's plans and preferences regarding childbearing and paid work are taken into account and the potential endogeneity of each transition with respect to all others is eliminated.

The structure of the paper is as follows. First we present the theoretical framework that guides the paper and provides arguments for our modelling strategy (Section 2). This section is followed by the background information on the Polish context, in which fertility and employment decisions have been taken since 1989 (Section 3). Section 4 discusses the methodological developments aiming at eliminating the endogeneity bias, Section 5 describes the data, and Section 6 introduces our modelling approach. The results are presented in Section 7, followed by Section 8, which summarises and discusses the findings.

2. Theoretical framework

The theoretical framework that guides this paper relies on the assumption that the majority of fertility and employment behaviours are outcomes of rational choice¹. This assertion is very likely to be true, given the legally guaranteed gender equality in the educational and labour market opportunities as well as the large availability of high-quality methods of birth control. The economic theory of fertility and female labour supply is adopted in order to describe the process of decision-making. According to this theory the decision about involvement in paid work and the number of children is made by maximizing the utility from employment and children, given the time and financial constraints (e.g. Mincer 1963, Becker 1965, 1993, Willis 1973). In this process, women anticipate consequences of available

¹ Note that we do not assume all fertility and employment behaviours to be planned. In our modelling approach the unexpected outcomes are also allowed.

options and evaluate them from the perspective of their needs. The combination of childbearing and paid work that yields the best set of consequences, or in other words, the highest expected utility, constitutes the final choice.

The complexity of the interrelationship between fertility and women's work lies in the relation between the income effect and the substitution effect. Since children require financial investments the former implies that women's employment facilitates childbearing. The magnitude of this effect increases with the extent of woman's contribution to the financial needs of the household. The substitution effect represents a time conflict between childrearing and paid work. It is determined by the level of opportunity costs that are mainly associated with woman's stock of human capital or woman's wages. Its magnitude depends also on the opportunities of combining family and work, defined by the welfare state policies, labour market structures and the attitudes toward working mothers (e.g. Brewster and Rindfuss 2000, Gornick et.al. 1998, Muszynska 2007). Both effects operate at the same time and influence the final choice of a woman. Disentangling the impact of the substitution effect from the income effect is an important step in understanding women's fertility and employment behaviours.

Although financial aspects of woman's work are undoubtedly important determinants of fertility and employment decisions females' behaviours can be also triggered by other motives, related to women's personality traits (de Bruijn 1999, Pollak and Watkins 1993, Robinson and Harbison 1980, Siegers 1991, Willekens 1991). In fact, financial necessities are located close to the bottom of the Maslowian hierarchy of needs (Maslow 1943). Once they are satisfied, woman's behaviour begins to be driven by the higher-order needs. Self-actualisation need is particularly relevant in studying fertility and employment behaviours (Willekens 1991). According to Hakim (2000, 2003) women's preferences regarding the way of satisfying this need are heterogeneous. While the family-centred women reach self-fulfilment through higher attachment to the family, for the work-centred involvement in paid employment is crucial. Adaptive females are in-between these two extremes and wish to combine family and work, without prioritising any of them. Understanding the motivations that drive women's behaviours is another important step in the search for a causal mechanism underlying fertility and women's employment.

Existence of individual needs implies selection. Females who for some reasons are interested in participating in the labour force (the work-oriented) are different from those oriented at a family and will make different fertility and employment decisions, irrespective of any true causal relationship between childbearing and paid work. Hence, while the former

tend to abandon childbearing, the latter withdraw from employment prior to conception with a plan to have a child. Such inclination, to give up one activity (employment or childbearing) with a prospect to get involved in the other, is called *adverse selection*. It leads to an overestimation of the negative relationship between fertility and women's work if the individual needs are not accounted for. In contemporary advanced societies *positive selection* is, however, more likely to be in force. This is due to the predominance of the adaptive women and the fact that some of the family-centred women work for pay (Hakim 2000, 2003). These women want to work and have children and hence they tend to perceive employment as a precondition to childbearing. As a result they decide to enter employment first and begin to realise their fertility intentions after their situation in the labour market is stable enough, i.e. they have a job they can return to after birth. Such behaviours lead to an underestimation of the negative relationship between the two variables if the individual needs are not controlled for.

In the light of what was written above two research objectives should be reached if interdependencies between fertility and employment are to be understood and appropriate policies to be formulated. First, the magnitude of the conflict between fertility and women's work should be estimated net of the income effect and other aspirations of women. Second, the motivations regarding these two spheres of life should be recognised. Although interdependencies between fertility and women's work have attracted a lot of attention among the researchers for the recent four decades, these goals have been hardly achieved. This is due to the fact that the vast majority of the empirical micro-level studies failed to account comprehensively for women's needs. As a result, the effects they yield refer to the observed behaviours and do not reflect the real conflict between fertility and women's work. The estimates of the impact of women's employment on childbearing in the former socialist countries represent the most apparent illustration of this problem. Given traditional opinions about the gender roles prevailing in this region and the declining support for working mothers since the onset of the economic transformation (Kotowska *et.al.* forthcoming, Muszynska 2007, Lück and Hoffäcker 2003, Stropnik 2003) one could expect the incompatibilities between fertility and women's work to be particularly strong in this part of Europe. However, in the meta-analysis of the studies researching the association between fertility and women's employment across the EU member states and the US, Matysiak and Vignoli (2008) found that the estimates for the impact of female work on childbearing are least negative in post-socialist countries. This finding was attained net of the cross-study differences in the method applied and cohorts covered. Furthermore, some studies of the post-socialist countries

established even significantly positive effects of women's employment on childbearing in the period following 1990 (Kreyenfeld 2004 for East Germany and Robert and Bukodi 2005 for Hungary). We believe these findings are biased due to a positive selection that might be in force in the post-socialist countries. In this context, the financial necessities, on the one hand, and internalisation of the working mother role model during the state socialism together with a rising educational attachment of women in post-socialist period, on the other hand, may incline women to establish a stable position in the labour market before giving birth. We test this hypothesis for Poland.

3. Changing fertility patterns in Poland – a response to the new conditions of labour force participation?

The profound changes in fertility patterns Poland has been experiencing since 1989 are reflected in a remarkable decline in fertility for women of all ages as well as in a postponement of childbearing (Figures 1a-1b). Over 14 years of economic transformation the period Total Fertility Rate (TFR) dropped from 2.09 in 1989 to 1.22 in 2003, placing Poland among the lowest-low fertility countries. Slight improvement in fertility has been observed only in recent years: the TFR rose by 0.05 by 2006. This increase is probably due to the recuperation in childbearing at higher ages, a process related to fertility postponement. While in 1989 first births to women aged 20-24, 25-29 and 30-34 accounted for 55%, 21% and 6% of all first births, in 2005 these figures were 37%, 39% and 12% respectively². At the same

Figure 1a. Period Total Fertility Rate, Poland 1950-2006

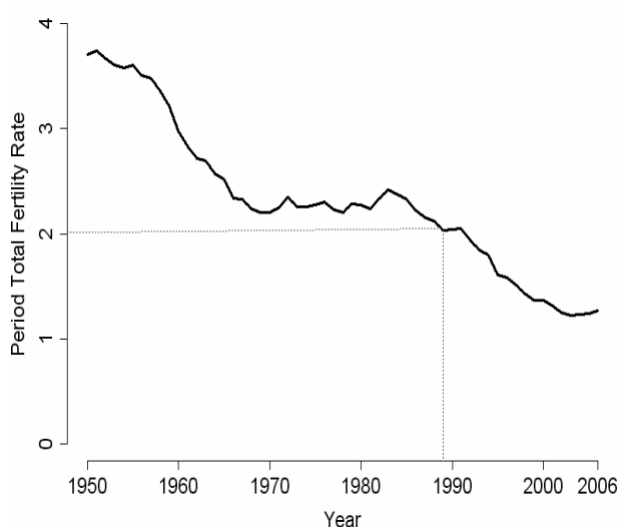
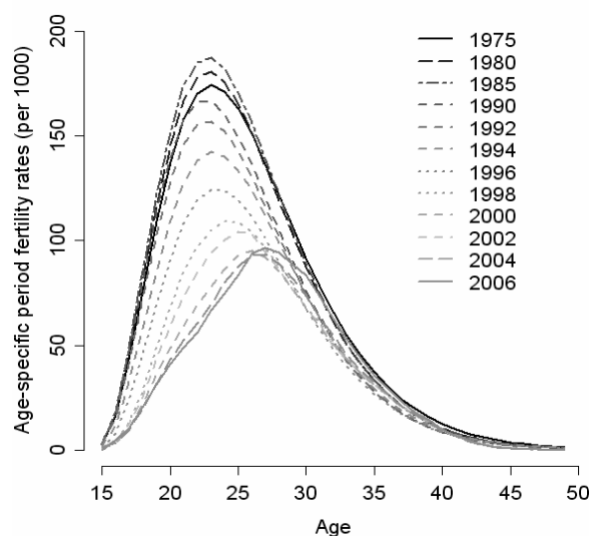


Figure 1b. Age-specific fertility rates, Poland 1975-2006



Source: Central Statistical Office of Poland

² Author's calculation based on CSO data.

time the mean age at first delivery rose from 23.3 to 25.7 years. According to the estimates by Sobotka et.al. (2005) these tempo distortions are responsible for around 45% of the 1990-2002 decline in the number of births, net of the changes in the age structure of the female population.

Despite the negative developments in fertility family and children still have an important position in the value system of Poles. Among the countries participating in the International Population Policy Acceptance Survey (IPPAS)³ Poles, together with Lithuanians and Hungarians, appeared to set relatively high priority to marriage, strongly opposed de-institutionalisation of the family, and relatively often expressed a belief that children, family and home ensure happiness and self-fulfilment (Pongracz and Spèder 2008, Stankuniene and Maslauskaitė 2008). Hence, it is not surprising that people in Poland would like to have more children than they have in reality. According to the data from Eurobarometer survey of 2006 the gap between the actual and desired number of children by women aged 25-34 equals to 0.86, which is at the EU-25 level. Only 2% of childless women aged 15-39 do not plan to have any children and as many as 72% intend to have at least two children while the figures for the EU-25 amount to 11% and 63% respectively (Testa 2006). Yet these relatively high fertility intentions seem to be very sensitive to the economic conditions. The IPPAS that was conducted in Poland during the economic slowdown yields lower number of intended children, which is mainly due to an increase in the percentage of the undecided (see Table 1).

Table 1. Intended number of children, childless women

| Country | Data source | No children | One | Two | three | Four or more | Don't know | Total |
|---------|---------------------------------------|-------------|------|------|-------|--------------|------------|-------|
| Poland | IPPAS 2001 (women aged 18-39) | 8.6 | 8.0 | 41.4 | 8.0 | 0.8 | 33.1 | 100.0 |
| Poland | Eurobarometer 2006 (women aged 15-39) | 2.0 | 15.0 | 58.0 | 10.0 | 4.0 | 12.0 | 100.0 |
| EU-25 | Eurobarometer 2006 (women aged 15-39) | 11.0 | 9.0 | 43.0 | 13.0 | 3.0 | 20.0 | 100.0 |

Source: Testa (2006) and author's calculations on IPPAS 2001

Given the still high attachment to family in Poland, the post-1989 fertility decline is attributed to the structural and institutional processes of the economic transformation rather than to ideational changes that were more in force in Western Europe (Kotowska 1999, Kotowska et.al. forthcoming). The former started in 1989 and resulted in a serious

³ The International Population Policy Acceptance Survey was carried out under the DIALOG Project funded by the European Commission under the 5th Framework Programme. The survey was conducted in 15 European countries in the years 2000-2003: Austria, Belgium(Flanders), Cyprus, Estonia, Germany, Italy, Hungary, Finland, the Czech Republic, Lithuania, the Netherlands, Poland, Romania, Slovenia. In Poland it was run in November 2001 on the sample of 4,505 individuals aged 18-64.

reorganisation of the state and the society, and consequently led to a profound change in the conditions of gaining an income and participating in the labour force. The withdrawal of the state from its role as an employer as well as provider of financial support and social services accompanied by the establishment of private companies resulted in an increase of individual responsibility for one's economic well-being. The household became more dependent on its own resources, in particular on the ability to earn income. At the same time, securing the income has become much more difficult. The economic reforms and globalisation processes since the mid-1990s amplified the labour market competition and consequently led to an increase in difficulties in finding and maintaining employment. These difficulties were additionally intensified by the influx of the numerous cohorts of the post-war baby boomers' descendants to the labour market. As a result, Poland experienced a severe fall in employment and unemployment, so far an unknown phenomenon, spread rapidly (Table 2). In the first three years of the economic transformation the total employment rate fell from 71.5% in 1988 to 59.9% in 1992. This negative trend slowed down in the 1994-1998 period and intensified again thereafter. A slight improvement has been observed only since 2003⁴. The labour market situation of the youth deteriorated most strongly. While in 1988 44% of persons aged 15-24 were employed, in 1992 this percentage amounted to 32% and in 2003 to 20%. At the same time the unemployment rate in this age group jumped to 23% in 1992 and doubled within the next decade, reaching levels twice as high as the total unemployment rate. The labour market entrants became also most exposed to instability of employment contracts. Since 2001 the percentage of the youth employed on a temporary basis has been increasing and reached almost 70% by 2006.

Growing competition in the labour market led to a rapid increase in employers' requirements regarding skills, mobility, and flexibility of workers. As a consequence, the conflict between time spent with the family and time devoted to work-related activities, including investments into human capital, has been severely intensified (Kotowska 2004, 2005). Although the social policy could have developed some instruments directed at supporting reconciliation between family and work not much had been done in that respect. The undertaken reforms of family benefits and the leave scheme have not responded to the changing conditions of living and working as a family, but were rather imposed by the deficiencies in the state budget (Balcerzak-Paradowska et. al. 2003, Kotowska et.al.

⁴ In 2003 employment rate amounted to 51.4%. In the later years a slight improvement was observed with employment rate of 54.5% in 2006.

Table 2. Labour force indicators, Poland 1988-2006

| | | 1988 | 1992 | 1995 | 1999 | 2003 | 2006 | 1988 | 1992 | 1995 | 1999 | 2003 | 2006 | 1988 | 1992 | 1995 | 1999 | 2003 | 2006 |
|---|-------|------|------|------|------|------|------|-------|------|------|------|------|------|-------|------|------|------|------|------|
| | | MEN | | | | | | WOMEN | | | | | | TOTAL | | | | | |
| Labour Force (% of Population) | 15-24 | 49.1 | 49.2 | 43.9 | 37.9 | 38.2 | 37.5 | 40.0 | 40.4 | 35.6 | 31.5 | 30.5 | 30.7 | 44.3 | 44.8 | 39.7 | 34.7 | 34.4 | 34.2 |
| | 25-34 | 95.3 | 94.9 | 94.5 | 93.4 | 92.9 | 92.8 | 74.0 | 74.3 | 74.7 | 74.7 | 77.0 | 77.0 | 84.6 | 84.7 | 84.7 | 84.1 | 85.1 | 85.0 |
| | 35-49 | 93.6 | 92.1 | 90.2 | 89.4 | 89.3 | 89.3 | 85.0 | 84.6 | 82.6 | 81.2 | 81.7 | 80.4 | 88.5 | 88.4 | 86.4 | 85.3 | 85.5 | 84.8 |
| | 50-64 | 70.3 | 57.8 | 55.6 | 58.4 | 55.0 | 56.9 | 52.1 | 39.9 | 38.4 | 41.6 | 39.1 | 36.7 | 52.3 | 48.2 | 46.5 | 49.5 | 46.6 | 46.2 |
| | Total | 79.0 | 76.4 | 73.9 | 72.3 | 70.2 | 70.1 | 64.0 | 62.6 | 61.0 | 59.8 | 58.4 | 56.8 | 71.5 | 69.4 | 67.4 | 65.9 | 64.2 | 63.4 |
| Employment (% of Population) | 15-24 | 49.1 | 36.5 | 31.1 | 27.2 | 22.1 | 26.9 | 39.3 | 28.2 | 23.5 | 21.4 | 17.0 | 21.0 | 44.3 | 32.3 | 27.3 | 24.3 | 19.6 | 24.0 |
| | 25-34 | 95.3 | 83.3 | 83.3 | 81.9 | 75.4 | 81.3 | 73.6 | 60.6 | 61.4 | 63.3 | 59.8 | 65.6 | 84.6 | 72.1 | 72.5 | 72.7 | 67.7 | 73.5 |
| | 35-49 | 93.6 | 83.0 | 81.3 | 81.4 | 75.9 | 80.2 | 83.3 | 74.8 | 73.0 | 72.1 | 67.6 | 70.0 | 88.5 | 78.9 | 77.1 | 76.7 | 71.7 | 75.1 |
| | 50-64 | 70.3 | 53.3 | 51.4 | 53.4 | 47.3 | 50.8 | 52.1 | 37.1 | 35.9 | 38.9 | 34.4 | 33.1 | 52.3 | 44.7 | 43.1 | 45.7 | 40.5 | 41.5 |
| | Total | 79.0 | 66.9 | 64.7 | 63.6 | 56.7 | 60.9 | 64.0 | 53.1 | 51.8 | 51.6 | 46.2 | 48.2 | 71.5 | 59.9 | 58.1 | 57.5 | 51.4 | 54.5 |
| Temporary employment (% of employment) | 15-24 | na | na | na | 12.6 | 52.5 | 65.4 | na | na | na | 13.3 | 55.1 | 69.7 | na | na | na | 12.2 | 53.7 | 67.3 |
| | 25-49 | na | na | na | 4.4 | 17.3 | 25.3 | na | na | na | 3.0 | 14.6 | 22.7 | na | na | na | 3.5 | 16.0 | 24.1 |
| | 50-64 | na | na | na | 6.7 | 12.2 | 18.6 | na | na | na | 5.1 | 7.3 | 13.9 | na | na | na | 5.1 | 9.9 | 16.5 |
| | Total | na | na | na | 5.7 | 20.4 | 28.4 | na | na | na | 4.4 | 17.3 | 25.9 | na | na | na | 4.6 | 18.9 | 27.3 |
| Unemployment (% of Labour Force) | 15-24 | 0.0 | 25.9 | 29.0 | 28.3 | 42.0 | 28.3 | 0.0 | 30.1 | 33.8 | 32.0 | 44.3 | 31.6 | 0.0 | 27.8 | 31.2 | 30.0 | 43.0 | 29.8 |
| | 25-34 | 0.0 | 12.2 | 11.8 | 12.3 | 18.9 | 12.4 | 0.0 | 18.4 | 17.7 | 15.3 | 22.3 | 14.9 | 0.0 | 14.9 | 14.4 | 13.6 | 20.4 | 13.5 |
| | 35-49 | 0.0 | 9.9 | 9.8 | 8.9 | 15.0 | 10.2 | 0.0 | 11.6 | 11.6 | 11.2 | 17.2 | 13.0 | 0.0 | 10.7 | 10.7 | 10.0 | 16.1 | 11.5 |
| | 50-64 | 0.0 | 7.7 | 7.6 | 8.5 | 14.1 | 10.7 | 0.0 | 6.9 | 6.6 | 6.5 | 12.1 | 9.7 | 0.0 | 7.4 | 7.1 | 7.6 | 13.2 | 10.2 |
| | Total | 0.0 | 12.4 | 12.5 | 12.0 | 19.3 | 13.1 | 0.0 | 15.1 | 15.1 | 13.8 | 20.8 | 15.1 | 0.0 | 13.6 | 13.7 | 12.8 | 20.0 | 14.0 |

Source: 1988 – ILO LABORSTA database, 1992-2006 - LFS data from OECD Database on Labour Force Statistics, data on temporary employment - Eurostat New Cronos Database

forthcoming). Moreover, the cuts in the expenditures on public childcare resulted in its serious deterioration. Currently, the coverage rates in Poland are one of the lowest in the EU - in 2003 only 2% of the under-threes and 52% of the pre-schoolers attended public day care centres.

Given the traditional beliefs about the woman’s main role as the care provider prevailing in Poland (Lück and Hoffäcker 2003, Muszynska 2007) one could expect that under the new conditions of labour force participation the involvement of women in paid employment will deteriorate much more than in the case of men. Indeed, women did experience higher unemployment and various micro-level studies, controlling for the education level, family situation, as well as job characteristics, show that it was more difficult for females to find a job and remain employed (Góra 1996, Sztanderska and Grotkowska 2007b). Furthermore, both macro-level indicators as well as micro-level studies, provide evidence that having young children does reduce women’s involvement in the labour market, but has either no or even a positive effect on men (see Figures 2a-2b; Sztanderska and Grotkowska 2007a,b, Matysiak 2007). Surprisingly, during the economic transformation the employment rate of women aged 25-34 declined even slightly less than that of men (Table 2). While in 1992 the drop in female employment rate, relative to 1989, was only by 1 percentage point lower than in the case of men, in 2003 this difference amounted to 6 percentage points.

Figure 2a. Employment rate, persons aged 25-44, Poland 2005

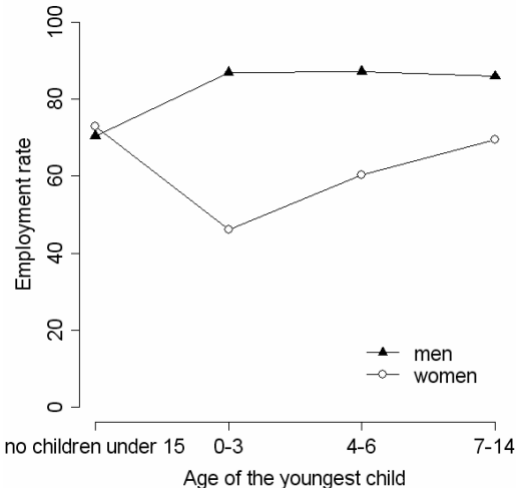
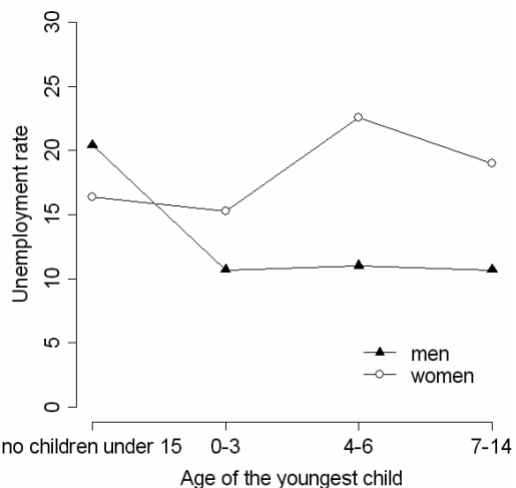


Figure 2b. Unemployment rate, persons aged 25-44, Poland 2005



Source: author’s calculations on LFS, 2nd quarter 2005

Hence, in spite of larger difficulties experienced in the labour market women were highly motivated to remain employed. Given the economic difficulties, as described above,

one could expect that financial necessities are mainly responsible for this determination. In fact, the IPPAS data show the relative importance of the materialistic values in the post-socialist countries compared to the Western countries where the post-materialistic values are fairly prominent (Kowalska and Wróblewska 2008). Hence, in order to get a job and remain employed females in Poland developed various strategies. One of them was the increased participation in education. Although educational attainment rose strongly for both sexes, this process was much more pronounced for women. As a result, in 2006 the ratio of female to male university graduates aged 25-34 was 3:2⁵. One can say that this investment paid off, given that the gender employment gap for university graduates is close to zero against 20 percentage points for those with vocational education (Kotowska and Sztanderska 2007: 35). Fertility postponement is suggested in the literature as another adjustment strategy developed by women in order to get a job and remain employed (Kotowska et.al. forthcoming). Strong cultural (traditional gender norms), institutional (lack of appropriate policies in support of working parents), as well as structural (high employment instability among the labour market entrants) incompatibilities between family and work threaten the prospects of labour market (re-)entry after birth and may encourage women to delay fertility decisions until they establish a stable position in the labour market. This hypothesis is tested in the following sections of the paper.

4. Endogeneity of fertility and women's work: methodological developments

Since conception and employment decisions are made jointly individual plans and preferences regarding involvement in paid work and childbearing influence both - women's fertility and labour market behaviours. These plans and preferences have been, however, rarely accounted for in empirical studies due to unavailability of appropriate data. Yet, their omission from the analysis leads to an endogeneity bias in the estimation of the relationship between women's work and fertility. This means that the employment (child status) variable in the model of fertility (female labour force participation) is not only correlated with the dependent variable but also with its error term.

The majority of attempts to eliminate the endogeneity bias have been made by economists who searched for a proper methodological approach rather than tried to collect suitable data. With an objective to estimate the direct impact of fertility on female employment, net of woman's intentions, needs, and life-goals they aimed at computing the

⁵ According to the LFS data, in 1992 the percentage of university graduates among persons aged 25-34 amounted to 8.7 for women and 7.1 for men. In 2006 these figures were equal to 33.1 and 22.1 respectively.

effect of an unplanned child on female work. Instrumental variables estimation method was proposed to deal with this issue in the first stage. This requires replacing variables describing fertility with instrumental variables, i.e. exogenous to women's employment but highly correlated with fertility. Assuming that the biological capacity to bear children is mostly unaffected by the couple's choice, Rosenzweig and Schultz (1985) tried to estimate the couple-specific fecundity and to use it as an instrument. An even more innovative approach was suggested by Rosenzweig and Wolpin (1980) who treated twins in the first birth as an unplanned child outcome and compared the labour force participation of mothers with twins first to the labour force participation of other mothers. Angrist and Evans (1998) and Carrasco (2001) suggested the use of sibling sex composition and the observed correlation between having two children of the same sex and further childbearing. The idea underlying this approach was to eliminate the bias in the estimates of the impact of children on labour force participation caused by fertility planning. Although all these studies were undoubtedly considered as innovative, at the same time they illustrate serious difficulties with finding proper instruments. The proposed instrumental variables are either not available and hard to estimate (like couple specific-fecundity) or their use results in a serious sample selection (mothers, mothers of at least two children) or the number of studied events is very low (multiple births).

Due to these difficulties, Heckman and MaCurdy (1980, 1982) proposed to model female labour force participation using a fixed-effect model. This allows controlling for the woman-specific unobserved taste for work that is constant over the life-time. Likewise, Nakamura and Nakamura (1985) suggested using the labour market status in the previous year as a proxy for work-orientation. The problem with these approaches is, however, that female labour force participation and fertility are not only influenced by woman-specific taste for work, but also by woman-specific unobserved preference for children. Hence, the proposed solutions do not eliminate the endogeneity bias.

These problems with modeling fertility and female employment led to the conclusion that the variables should be analysed jointly (Ermisch 1990, del Boca and Locatelli 2006). Hence, in a number of studies researchers investigated the impact of a set of observed and unobserved exogenous determinants on the probability of having a newborn and being employed at the same time (Di Tommaso 1999, Francesconi 2002, del Boca 2002, del Boca et.al. 2005). These studies do not yield any estimates of the effects of fertility on employment and vice versa, since they assume that all fertility and employment outcomes are the results of decision-making, thus are caused by a set of exogenous factors and the observed relationship

between the two variables is spurious. Given that some women may become pregnant against their plan, may be infecund, loose a job, experience an unforeseen promotion or unexpected job satisfaction the proposed approach is not satisfying.

In this study we do not have data describing woman's financial and higher-order needs, pertaining to neither family nor employment. Given the methodological developments presented above, we propose to model childbearing and women's work jointly, but we allow the possibility that some of the fertility and employment outcomes are unexpected. This is achieved by estimating a multi-process hazard model developed by Lillard (1993) and Lillard et.al. (1995). This method allows for controlling for the unobserved woman-specific tastes for work and children in the fertility as well as employment equations. In this way the bias in the impact of fertility (women's employment) on women's employment (fertility) caused by endogeneity is eliminated and a direct relationship between the two variables is estimated. Finally, the advantage of the multi-process hazard model over the instrumental methodology is that it does not require searching for instruments and allows for an assessment of the correlation between the person-specific unmeasured heterogeneity components (Lillard and Panis 1996). To the best of our knowledge, so far this method has been used for studying the interdependencies between fertility and women's employment only for United Kingdom (Aassve et.al. 2006).

5. Data

The data for our analysis is derived from the Employment, Family and Education Survey⁶. This is a retrospective survey conducted in October and November 2006 on a representative sample of 3,000 women born in 1966-1981 and their partners. These women were 8-23 years old in 1989. Thus the majority of their reproductive and employment careers took place under the new market conditions. The dataset contains their education, employment, partnership, fertility and migration histories since the age of 15, recorded on a monthly basis. Unfortunately, since over 50% of partners refused to participate in the survey we decided to conduct our analysis on the full sample of women, with the cost of losing the information about men.

Based on this data, we created three detailed event histories for each individual: having (another) child, entering and exiting employment. Since only women who have a

⁶ The survey was prepared at the Institute of Statistics and Demography (Warsaw School of Economics) under the project "Cultural and structural conditions of female labour force participation in Poland" led by Irena E. Kotowska. The data was gathered thanks to the financial support of the Ministry of Science and Higher Education.

partner choose between employment and childbearing we limited our sample to married and cohabiting women. Moreover, due to the fact that after 1989 Poland experienced major economic and societal changes we restricted the analysis to the events happening after this year. Therefore each woman is followed since union formation or since 1989, whatever comes later. The observation is censored at the date of the interview, unless the union was dissolved. If the person separates from the partner but enters another union she is observed again since that date. Finally, women who gave birth before 1989, experienced multiple births or had any foster or adopted children are excluded from the sample. Altogether the sample covers 2,231 women, 2,147 of them formed no more than one union⁷.

Individuals are defined as employed if they are in any paid employment (including short-term contracts), are self-employed or have a status of a helping family member. Women on maternity leave are treated as employed, and those on parental leave as not employed. Mothers who gave birth during the parental leave and started the maternity leave are counted as not employed either. A woman is classified as exiting employment when she becomes not employed. Therefore, cases when a person remains continuously employed but changes a job, switches from part-time to full-time or from temporary to permanent contract are not counted as changes in employment status.

6. Research method

In order to analyse fertility and employment jointly we built a model of three interrelated processes: childbearing, employment entry, and employment exit. Each of these transitions is specified as a hazard function, conditional on exogenous and endogenous covariates, as well as potentially correlated person-specific unobserved heterogeneity factors:

$$\ln\{h_j^C(t)\} = \mathbf{a}_1^C A(t) + \mathbf{a}_2^C T(t) + \mathbf{a}_3^C B_j(t) \cdot p(t) + \mathbf{a}_4^C U_k(t) \cdot c(t) + \mathbf{a}_6^C E(t) + \sum_l \mathbf{g}_l^C w_l(t) + \mathbf{e} + \mathbf{m}_j^C \quad (1)$$

$$\ln\{h_j^{EN}(t)\} = \mathbf{a}_1^{EN} A(t) + \mathbf{a}_2^{EN} T(t) + \mathbf{a}_3^{EN} NE_j(t) + \mathbf{a}_4^{EN} U_k(t) + \mathbf{a}_5^{EN} p + \mathbf{a}_6^{EN} C(t) + \sum_l \mathbf{g}_l^{EN} w_l(t) + \mathbf{l}^{EN} s(t) + \mathbf{x} + \mathbf{m}_j^{EN} \quad (2)$$

$$\ln\{h_j^{EX}(t)\} = \mathbf{a}_1^{EX} A(t) + \mathbf{a}_2^{EX} T(t) + \mathbf{a}_3^{EX} E_j(t) + \mathbf{a}_4^{EX} U_k(t) + \mathbf{a}_5^{EX} p + \mathbf{a}_6^{EX} C(t) + \sum_l \mathbf{g}_l^{EX} w_l(t) + \mathbf{l}^{EX} s(t) + \mathbf{h} + \mathbf{m}_j^{EX} \quad (3)$$

⁷ A consensual union that was converted into marriage is counted as one union.

where h_j^C - is the hazard of conception j (measured 7 months before birth j), h^{EN} - hazard of employment entry for non-employment spell j , h^{EX} - hazard of employment exit for employment spell j . Each woman is observed over the duration of one or more unions. At the time of first union formation she is under the risk of conceiving a child. This is usually the first child, unless a woman had children out of union before. Once the child has been born, the woman becomes at risk of a higher-order conception, and so on. All conceptions are specified within one hazard function. The in- and out-of-employment transitions are defined similarly, with the difference that they are mutually exclusive. At the time of first union formation a woman may be in or out of employment. If she is employed, she is under the risk of exiting the labour-market and as soon as this happens, she becomes exposed to entering employment again.

The baseline log hazards are composed of multiple clocks of duration dependence, each represented by a piecewise linear spline function of time⁸. The baseline log hazard of conception j is a sum of time since age 15, $A(t)$, calendar time since 1989, $T(t)$, time since k -th union formation, $U_k(t)$, time since birth j , $B(t)$ in case of second and higher-order conception episodes, and time since employment entry, $E(t)$. Time since union formation, $U_k(t)$, is introduced in interaction with the child status variable, $c(t)$, and time since birth j , $B(t)$, in interaction with the birth order, $p(t)$. In this way $U_k(t)$ is defined separately for the childless and the mothers, and $B(t)$ for women with one child and women with at least two children. The baseline hazard of employment entry is composed of time since age 15, $A(t)$, calendar time since 1989, $T(t)$, time since k -th union formation, $U_k(t)$, time since conception j , $C(t)$, and time since employment exit, $NE(t)$, in case of second and higher order employment episodes. The same set of time-related factors builds the baseline hazard of employment exit, with the exception of $NE(t)$ which is replaced by time since employment entry, $E(t)$. Note that some of the spline functions switch on conditioned on the occurrence of an event, like birth, or conception, or employment entry/exit.

Several endogenous and exogenous covariates are assumed to shift the baseline hazards. The endogenous covariates are an intercept in the conditional spline for employment, $E(t)$, denoting entry into work in the hazard of conception j , and a variable indicating birth order in the hazards of employment entry and exit, $p(t)$. The set of exogenous covariates, $w(t)$, includes variables describing the human capital, such as completed education level and work-

⁸ Piecewise linear splines are used to approximate continuous functions, by using functions that are linear within each a priori defined interval (see Lillard 1993). For each interval a slope of the linear function is estimated. Following linear functions are connected with each other at the end of the previous interval.

experience (only in the employment equations), as well as urban / rural place of residence, and home ownership (only in the equations for hazard of conception j). Unfortunately, we could not control for women's economic situation nor the labour market status of the partner since this kind of data was not collected in the survey. Furthermore, the repeated-event equations contain dummy variables, indicating the order of the spell. In the hazard of conception j this is $p(t)$, denoting number of children born to a woman, in the equations for employment $s(t)$, representing order of employment and order of non-employment spell, respectively.

Finally, each of the hazard equations includes two random heterogeneity components: \mathbf{e} , \mathbf{x} and \mathbf{h} are person-specific, while \mathbf{m}_j^C , \mathbf{m}_j^{EN} , \mathbf{m}_j^{EX} are transition-specific. The unobserved heterogeneity components \mathbf{e} , \mathbf{x} , and \mathbf{h} are constant across all conception, non-employment and employment spells respectively and denote woman-specific unobserved propensity to have a child, to enter and to exit employment correspondingly. Thus \mathbf{e} represents woman's family-orientation or her long-term plan on the number and timing of children, whereas \mathbf{x} and \mathbf{h} express woman-specific attitude towards work, i.e. her work-orientation, or her long-term plan on the involvement in paid employment. These orientations at work and family can be driven by financial as well as self-actualisation needs, and thus, they should not be interpreted only in the sense of Hakim's preference theory. The person-specific heterogeneity components are assumed to be jointly normally distributed and are represented by:

$$\begin{pmatrix} \mathbf{e} \\ \mathbf{x} \\ \mathbf{h} \end{pmatrix} \sim N \left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \mathbf{S}_e^2 & \mathbf{r}_{ex} & \mathbf{r}_{eh} \\ \mathbf{r}_{xe} & \mathbf{S}_x^2 & \mathbf{r}_{xh} \\ \mathbf{r}_{he} & \mathbf{r}_{hx} & \mathbf{S}_h^2 \end{pmatrix} \right) \quad (4)$$

If fertility and employment are endogenous the woman-specific unobserved propensity to have children, \mathbf{e} , is correlated with the woman-specific unobserved propensities to participate in paid employment, \mathbf{x} and \mathbf{h} ($\mathbf{r}_{ex} \neq 0$ and $\mathbf{r}_{eh} \neq 0$). The correlation sign defines the selection type. Positive selection takes place if the woman's unobserved propensity to have children, \mathbf{e} , is positively correlated with the woman's unobserved propensity to enter employment, \mathbf{x} , but negatively correlated with the propensity to exit employment, \mathbf{h} , ($\mathbf{r}_{ex} > 0$ and $\mathbf{r}_{eh} < 0$). In the opposite case, i.e. if $\mathbf{r}_{ex} < 0$ and $\mathbf{r}_{eh} > 0$, we have to do with adverse selection. Furthermore, a

correlation between \mathbf{x} and \mathbf{h} is also possible since women's choices between employment and non-employment are very likely to be driven by the same set of unobserved characteristics.

The identification of the model parameters is ensured by the fact that the analysed events are repeated and the person-specific unobserved heterogeneity components are fixed over individuals' life-times.

7. Findings

In this section we present estimation results of the model proposed in Section 6. In Table 3 we show estimated parameters of the unobserved heterogeneity terms (standard deviations and correlations). The estimation results for the mutual impacts of fertility and women's employment are presented in Table 4 and in Figures 3a-3b. The full models are shown in the Appendix (Tables 5-7). The first column in each of the Tables 4-7 contains the estimates of the model where the woman-specific unobserved characteristics are not taken into account. In the second column we present the parameters after controlling for unobserved heterogeneity. Finally, column three includes the estimates from the multi-process hazard model (i.e. after allowing the correlations between the person-specific residuals). We start the discussion with the estimates for the correlations between the unobserved heterogeneity terms (Section 7.1). We further continue with a description of our findings as regards the impact of employment on childbearing (Section 7.2) and the impact of fertility on employment entry and exit (Section 7.3). In Section 7.4 we briefly discuss other determinants of fertility and women's work.

7.1. Positive or adverse selection?

In all of our hazard regressions standard deviations of the person-specific residuals are significant (Table 3). This implies that there is a portion of woman-specific heterogeneity that was not accounted for by our covariates. It represents a person-specific orientation towards family in the conception equation and a person-specific orientation towards paid work in the employment equations. Controlling for these orientations has an effect not only on the estimates of the impacts of employment and fertility, but also on other covariates.

Furthermore, the person-specific unobserved heterogeneity terms are significantly correlated. This means that the hazard of conception is influenced not only by family- but also by work-orientations. Likewise, the transitions into and out of employment are determined by

women's long-term plans toward paid work as well as toward childbearing. The woman-specific unobserved propensity to conceive is positively correlated with the unobserved propensity to enter employment ($\mathbf{r}_{ex} > 0$) and negatively correlated with the unobserved propensity to exit employment ($\mathbf{r}_{eh} < 0$). These findings are consistent with the hypothesis on positive selection. The majority of women who plan to have a child select themselves into employment first. They decide to conceive only after they establish a stable position in the labour market they can return to after birth. Due to this reconciliation strategy the estimates of the mutual impacts of fertility and employment obtained from the single-process hazard models are biased. The direction and size of this bias are discussed in Sections 7.2-7.3.

Table 3. Estimates of unobserved heterogeneity and correlations

| Standard deviations of unobserved heterogeneity terms: | | |
|---|--------|-----|
| Fertility | 0.38 | *** |
| | (0.06) | |
| Employment entry | 1.05 | *** |
| | (0.07) | |
| Employment exit | 0.90 | *** |
| | (0.07) | |
| Correlations between unobserved heterogeneity terms: | | |
| Fertility and employment entry | 0.39 | ** |
| | (0.13) | |
| Fertility and employment exit | -0.26 | * |
| | (0.15) | |
| Employment entry and exit | -0.31 | *** |
| | (0.09) | |

Note: significance: '*'=10%; '**'=5%; '***'=1%.

7.2. Effects of employment on fertility

Since the effect of employment on childbearing is modelled in a form of conditional spline it allows capturing not only the impact of being employed, but also the impact of entering employment and employment duration. The estimation results presented in column 1 of Table 5 suggest, however, that none of these effects are significant. The impact of employment entry on childbearing changes after we eliminate the estimation bias caused by a failure to account for family orientations. It turns out that entering employment lowers the conception hazard by 9% (Table 4). This decline in the relative risk is caused by a presence of the family-oriented among women taking up a job. The value of this relative risk declines further from 0.91 to 0.82, after the endogeneity of employment is eliminated. This estimate represents a true and direct effect of employment entry on the conception hazard. It indicates that were there no positive selection taking up a job would lower the risk of pregnancy by

18%. The estimate of the impact of paid work on conception risk yielded by the single-process hazard model is thus upward biased. It consists of two counteracting components: the direct and negative effect, reflecting the time conflict, and the indirect and positive effect, caused by the unobserved preference of women to have a job before giving birth.

Table 4. Mutual impacts of fertility and employment, relative risks

| | without unobserved heterogeneity (1) | controlling for unobserved heterogeneity (2) | controlling for endogeneity (3) |
|--|---|---|---------------------------------------|
| Effects of employment entry on conception | | | |
| not employed | 1 | 1 | 1 |
| employment entry | 0,92 | 0,91 * | 0,82 *** |
| Effects of conception on employment entry | | | |
| no children | 1 | 1 | 1 |
| 1 st conception | 0,44 *** | 0,45 *** | 0,42 *** |
| 2 nd conception | 0,45 *** | 0,39 *** | 0,31 *** |
| 3 rd or higher conception | 0,44 *** | 0,33 *** | 0,22 *** |
| Effects of conception on employment exit | | | |
| no children | 1 | 1 | 1 |
| 1 st conception | 2,93 *** | 3,34 *** | 3,57 *** |
| 2 nd conception | 2,02 *** | 2,51 *** | 2,97 *** |
| 3 rd or higher conception | 2,13 *** | 2,83 *** | 3,68 *** |

Note: significance: '*'=10%; '**'=5%; '**'=1%.

7.3. Effects of fertility on employment

The effect of fertility on employment is measured by two variables: age of the youngest child, specified as a conditional duration spline, and parity.

Pregnancy, birth and having a young child seem to strongly diminish the chances of a woman to enter employment (Figure 3a). The highest negative effect can be attributed to pregnancy and the period around birth. Compared to the childless, first conception lowers the risk of entering employment by 56%, whereas the birth by 80%. As the child grows up, the risk of taking up a job increases by 63% annually and a woman with a three-year old is by only 14% less likely to start working than the childless. A similar pattern in the intensity of entering employment is observed for all parities. The magnitude of this effect does not depend on the birth order, as long as we do not control for woman-specific unobserved orientations toward work and family (Table 4). This finding would be striking since the higher number of children means in practice larger time conflict and more frequent family-related work interruptions. A weak negative parity effect is revealed, however, after we take the unobserved woman-specific propensity to work into account. This suggests that work-oriented women are present among mothers with higher number of children. Controlling

additionally for the woman-specific unobserved propensity to conceive further strengthens the negative parity effect. It occurs that in the absence of positive selection the second conception lowers the risk of employment entry by 68% and the third or higher conception by 78%, which gives respectively by one fourth and one half stronger effects than in the case of first conception. These estimates of the impact of birth order represent the true and direct effect of parity on employment entry. The insignificant parity effect yielded by the single-process hazard model is thus upward biased. It consists of two counteracting components: the direct negative effect, reflecting the time conflict, and the positive indirect effect, caused by the fact that women tend to enter employment with a prospect to have a(nother) child.

Figure 3a. Effects of child’s age on employment entry

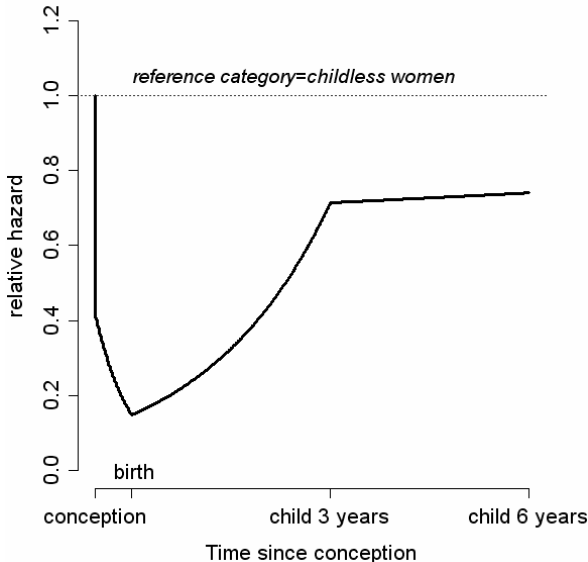
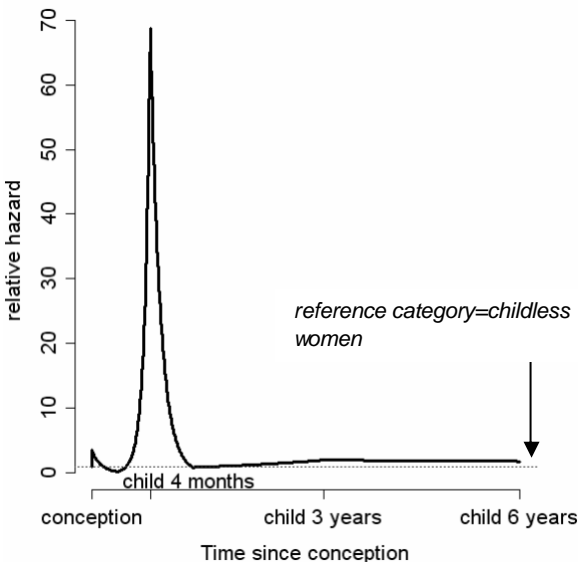


Figure 3b. Effects of child’s age on employment exit



The impact of pregnancy, birth and having a young child diminishes the chances of holding onto a job even more than the chances to get a job (Figure 3b). Conception leads to a threefold increase in the risk of employment exit. If a woman remains employed the risk decreases along the pregnancy, which is probably due to job guarantees before birth and during the maternity leave. However, when the child is 4 months old the hazard of employment exit increases rapidly. This effect can be possibly attributed to the fact that women decide to use their right for parental leave. As the child grows up, the hazard of employment exit gradually declines. This trend is observed until the child reaches 1 year. Afterwards another, albeit much weaker, increase in the risk of employment exit is observed and it reaches the maximum when the child is 3 years old. This effect might be caused by job

dismissals to women returning from parental leaves. What is worse, however, the risk of employment exit does not decline as the child ages. A similar pattern in the hazard of employment exit is observed for all parities. The magnitude of the effect seems, however, to be lower for second and higher birth orders (Table 4). This effect is caused by positive selection. After we control for work- and family-orientations the effect of third and higher birth order becomes insignificantly different from the effect of the first child. Surprisingly, although the positive impact of the second birth increases it still remains slightly lower than that of the first. These estimates of the impact of family size represent the true and direct effects of parity on employment exit. Thus the negative effect of the birth order on the hazard of employment exit, yielded by the single-process hazard models, is downward biased. It consists of two counteracting components: the direct insignificant effect and the negative indirect effect, caused by the fact that the majority of women who leave employment do not plan to have a child while out of work.

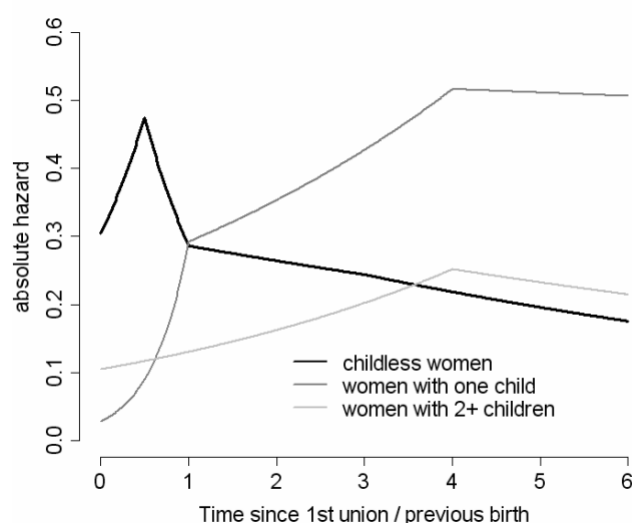
Finally, it should be noted that the positive selection seems to have a stronger impact on the second and higher-order births than on the first child. Given the estimation parameters in the equations for employment entry and exit, one can see that the impact of the first conception is not so sensitive to the controls for the woman-specific family and work orientations as the effects of the higher-order births are. This suggests that the decision to have a first child depends less strongly on the employment status than the decision to have another child.

7.4. Brief review of other determinants of fertility and employment

Childbearing and employment are also strongly determined by women's past fertility and labour market performance as well as various socio-demographic characteristics, like age, partnership status, human capital (education, work experience), place of residence, and home ownership. In this section we briefly discuss their impact, referring to the estimates from the multi-process model (see column 3 in Tables 5-7).

The first child within a union is most likely to be conceived within the first six months since union formation (Figure 4). Three years later the conception risk is already twice lower. The hazard of conceiving a second child increases most strongly within the first year after birth and continues to grow in the following three years, albeit at a lower pace. A similar pattern is observed for the hazard of the third and higher order birth, though the conception rate is about two times lower. Conceiving the first child out of a union lowers the risk of another conception by 35%.

Figure 4. Hazard of conception by the number of children



As regards the effect of age the conception hazard goes up most strongly in the youngest age group, 15-20, and later it stabilises until the age 30 (Figure 5a). Net of all other effects, the 20-30 year-olds are 2.5-times more likely to conceive than women aged 15. After a woman reaches 30 the conception risk begins to fall, by 10% annually, and the 40-year-olds are over three times less likely to conceive than the 20-year-olds. Age influences also employment patterns (Figure 5b). The intensity of entering employment increases strongly for the youngest, aged 15-20, probably school graduates, and begins to decline afterwards. At the same time the risk of employment exit is relatively high for women up to 35, and declines substantially for higher ages.

Figure 5a Effect of age on conception hazard

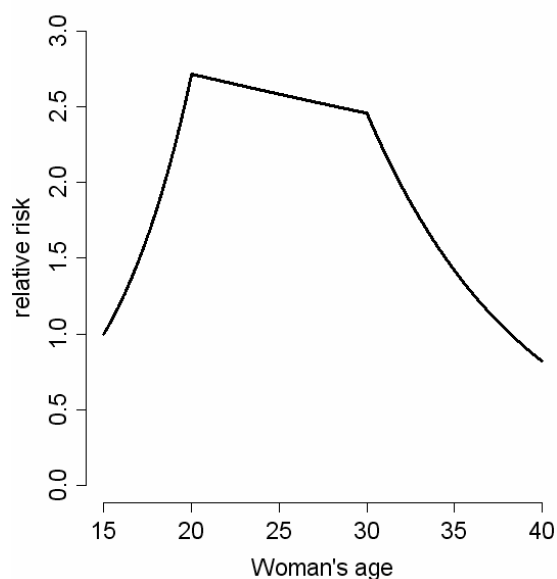
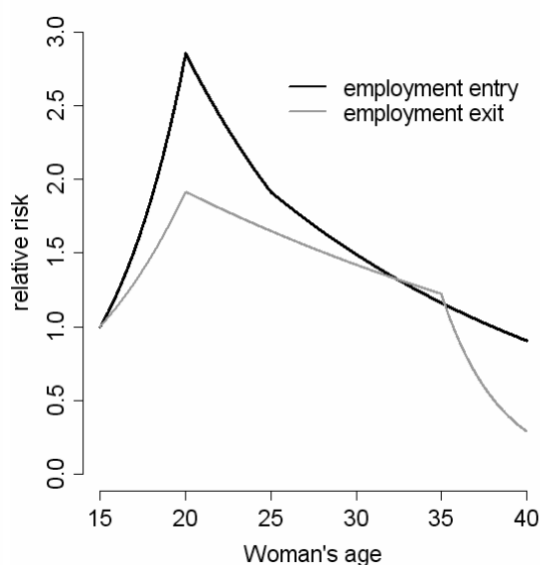


Figure 5b. Effect of age on the hazards of employment entry and exit



The estimation results confirm a significant deterioration in fertility over time. Net of all other effects we were able to control, the intensity of childbearing is falling by 3.5% each year. The patterns of entering and exiting employment over time are more complex, albeit rather weak. Among others, the 1998-2003 seem to be the darkest years in the labour market, over the whole period under study, which is reflected in the declining intensity of entering and rising risk of leaving employment. Indeed, due to the economic slowdown the situation in the labour market in this period was relatively difficult.

Married women are twice as likely to have a(nother) child as those cohabiting. Albeit marriage does not affect employment entry it reduces the risk of employment exit. Positive correlation between marriage and women's labour force participation has been already found by Kotowska and Abramowska (2003).

As it has been found in other countries as well (e.g. Kreyenfeld 2002, Kravdal 2001), the conception risk declines with an increase in education level. For instance, women with tertiary education are by 35% less likely to have a child than women with primary education. Exactly the opposite finding is established as regards the impact of human capital on the chances of finding and maintaining a job. Women with tertiary education face an over 6-times higher risk of entering employment and 5-times lower risk of exiting employment than the primary educated. The direction of the impact of work-experience is similar, albeit much lower in magnitude.

The last set of covariates includes the place of residence and home ownership. Living in urban areas as well as lack of own house or flat substantially decrease the conception risk. The conception hazard is particularly low for persons co-residing with parents or parents-in-law. Furthermore, dwelling in urban areas increases the risk of exiting employment, but does not affect employment entry.

7. Conclusions

In this paper we modelled interdependencies between fertility and women's work in post-socialist Poland. We set two research objectives. First, we aimed at testing the adjustment hypothesis presupposing that under the new conditions of labour force participation women postpone childbearing until they establish a position in the labour market. The rationale for formulating this hypothesis was the observed declining intensity of childbearing along with the growing uncertainty in the labour market, on the one hand, and the existing strong necessity to earn an income in order to maintain the family, on the other hand. Second, we intended to show how one can eliminate the endogeneity bias in the

estimates of mutual impacts of fertility and women's employment caused by the lack of data on women's individual needs. The proposed statistical method is the multi-process hazard model. This method allows for a correlation of the person-specific unobserved heterogeneity components, pertaining to each transition. In this way women's plans and preferences regarding childbearing and paid work are taken into account and the potential endogeneity of each process with respect to all others is controlled for.

Our analysis revealed a strong time conflict between fertility and women's employment in post-socialist Poland, estimated net of woman's plans and preferences regarding childbearing and paid work. This is reflected in the 18%-decline in the hazard of conception following employment entry. The impact of childbearing on paid work is even stronger. First conception lowers the intensity of employment entry by twofold and increases the intensity of employment exit 3.5-times. Conceptions of higher order reduce the risk of taking a job even more, but do not raise the hazard of exiting employment anymore. The intensity of entering and maintaining a job increases as the child ages, but does not reach the pre-birth level.

This strong conflict between fertility and women's employment is not observed directly from the estimates obtained from the single-process hazard models. This is due to the fact that women seek to have a job before giving birth. This finding is consistent with the research hypothesis pertaining to the first of our research objectives. Note, however, that the employment-first strategy is developed mainly with respect to second and higher order births. This means that employment is perceived as a precondition to subsequent childbearing, but is less important for a decision about the first child.

Our study has clearly showed that the existence of positive selection leads to an underestimation of the mutual negative impact of one variable on the other if women's preferences and plans regarding fertility and paid work are not accounted for. Referring to our second research objective, this capability of estimating the real time conflict between childbearing and females' paid work demonstrates the superiority of the multi-process hazard model over the single-process hazard model. This approach is highly recommended if comprehensive data on women's needs is not available, which is most often the case.

Nevertheless, although this statistical method allowed us to estimate the time conflict between fertility and women's work net of the income effect and any other aspirations of a woman, we were not able to recognise the nature of woman's needs. It is thus not clear to us, whether the selection to employment before birth is caused by financial necessities or a desire of women to pursue family and work careers in parallel, irrespective of the material situation.

Given the economic developments that occurred in Poland after 1989, reflected in a rising individual responsibility for securing the living standards on the one hand, and the increasing uncertainty in the labour market on the other, one can expect that material aspirations are currently an important motive for woman's work. It is very likely, however, that the self-actualisation needs will gain on significance in the future along the improvement in the economic situation of the households and the strong increase in educational attainment of young Poles. This issue requires more detailed data, but is certainly worth attention in future research.

This study is an important contribution from the policy-making perspective. First, it provides information on the magnitude of the time conflict between fertility and women's work in the post-socialist Poland. Second, it demonstrates that in spite of the strong incompatibilities between fertility and economic activity, women do not perceive employment as a barrier but rather as a precondition to childbearing. This employment-first strategy has its advantages as well as disadvantages. On the one hand, under the unfavourable conditions of labour force participation it obviously leads to fertility postponement. On the other hand, however, it reflects women's interest in both, the economic activity as well as motherhood. It seems thus that measures directed at alleviating the conflict between childrearing and labour force participation as well as reducing the uncertainty in the labour market could moderate the tempo effect and lead to fertility increase. This is highly desired from the perspective of alleviating the negative consequences of the changing age structure of the population.

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APPENDIX

Table 5 Parameter estimates for conception hazard

| | without unobserved heterogeneity | | controlling for unobserved heterogeneity | | controlling for endogeneity | |
|--|--|------|--|------|-----------------------------------|------|
| | (1) | | (2) | | (3) | |
| | Coeff. (st.error) | Sig. | Coeff. (st.error) | Sig. | Coeff. (st.error) | Sig. |
| Time since union formation (for the childless) | | | | | | |
| intercept | -1,03 (0,36) | *** | -1,19 (0,38) | *** | -1,19 (0,38) | *** |
| 0-0,5 year (slope) | 0,75 (0,28) | *** | 0,87 (0,28) | *** | 0,89 (0,28) | *** |
| 0,5-1 year (slope) | -1,11 (0,22) | *** | -1,02 (0,22) | *** | -1,01 (0,22) | *** |
| 1-3 year (slope) | -0,13 (0,06) | ** | -0,08 (0,06) | | -0,08 (0,06) | |
| >3 year (slope) | -0,14 (0,03) | *** | -0,11 (0,03) | *** | -0,11 (0,03) | *** |
| Time since first birth (for mothers of one child) | | | | | | |
| shift for 1st birth | -3,37 (0,39) | *** | -3,58 (0,41) | *** | -3,59 (0,41) | *** |
| 0-1 year (slope) | 2,36 (0,23) | *** | 2,38 (0,23) | *** | 2,36 (0,23) | *** |
| 1-4 years (slope) | 0,18 (0,05) | *** | 0,19 (0,05) | *** | 0,19 (0,05) | *** |
| >4 years (slope) | -0,02 (0,03) | | -0,01 (0,03) | | -0,01 (0,03) | |
| Time since the second or later birth (for mothers of at least two children) | | | | | | |
| shift for 2nd or higher order birth | -1,87 (0,4) | *** | -2,23 (0,43) | *** | -2,26 (0,43) | *** |
| 0-4 years (slope) | 0,21 (0,04) | *** | 0,21 (0,05) | *** | 0,22 (0,05) | *** |
| >4 years (slope) | -0,08 (0,04) | * | -0,08 (0,05) | * | -0,08 (0,05) | * |
| First birth out of union | | | | | | |
| yes | -0,46 (0,09) | *** | -0,43 (0,1) | *** | -0,43 (0,1) | *** |
| Time since union formation | | | | | | |
| 0-2 years (slope) | -0,57 (0,1) | *** | -0,57 (0,1) | *** | -0,58 (0,1) | *** |
| 2-5 years (slope) | -0,19 (0,04) | *** | -0,17 (0,04) | *** | -0,17 (0,04) | *** |
| >5 years (slope) | -0,10 (0,02) | *** | -0,09 (0,02) | *** | -0,09 (0,02) | *** |
| Partnership status (ref=cohabiting) | | | | | | |
| married | 0,62 (0,07) | *** | 0,67 (0,08) | *** | 0,68 (0,08) | *** |

Table 5 Parameter estimates for conception hazard, continued

| | without unobserved heterogeneity | | controlling for unobserved heterogeneity | | controlling for endogeneity | |
|--|----------------------------------|------|--|------|-----------------------------|------|
| | (1) | | (2) | | (3) | |
| | Coeff. | Sig. | Coeff. | Sig. | Coeff. | Sig. |
| | (st.error) | | (st.error) | | (st.error) | |
| Age (ref=15) | | | | | | |
| 15-20 years (slope) | 0,16 | ** | 0,19 | ** | 0,20 | *** |
| | (0,07) | | (0,08) | | (0,08) | |
| 20-25 years (slope) | -0,02 | | -0,01 | | -0,01 | |
| | (0,02) | | (0,02) | | (0,02) | |
| 25-30 years (slope) | -0,02 | | -0,01 | | -0,01 | |
| | (0,02) | | (0,02) | | (0,02) | |
| 30-40 years (slope) | -0,11 | *** | -0,12 | *** | -0,11 | *** |
| | (0,03) | | (0,03) | | (0,03) | |
| Time since 1989 | | | | | | |
| slope | -0,03 | *** | -0,03 | *** | -0,04 | *** |
| | (0,01) | | (0,01) | | (0,01) | |
| Time since employment entry | | | | | | |
| shift for employment entry | -0,09 | | -0,09 | * | -0,19 | *** |
| | (0,05) | | (0,06) | | (0,07) | |
| employment duration (slope) | 0,01 | | 0,01 | | 0,01 | |
| | (0,01) | | (0,01) | | (0,01) | |
| Education level (ref=primary) | | | | | | |
| tertiary | -0,36 | *** | -0,46 | *** | -0,44 | *** |
| | (0,1) | | (0,11) | | (0,11) | |
| secondary | -0,20 | ** | -0,26 | *** | -0,25 | *** |
| | (0,08) | | (0,09) | | (0,09) | |
| vocational | -0,10 | | -0,14 | | -0,13 | |
| | (0,08) | | (0,09) | | (0,09) | |
| in school | -0,67 | *** | -0,74 | *** | -0,75 | *** |
| | (0,1) | | (0,11) | | (0,11) | |
| Place of residence (ref=rural) | | | | | | |
| urban | -0,29 | *** | -0,32 | *** | -0,32 | *** |
| | (0,04) | | (0,05) | | (0,05) | |
| Home ownership (ref=home owner) | | | | | | |
| co-residing with parents | -0,18 | *** | -0,19 | *** | -0,18 | *** |
| | (0,04) | | (0,05) | | (0,05) | |
| rent | -0,11 | * | -0,12 | * | -0,11 | * |
| | (0,06) | | (0,07) | | (0,07) | |
| other | -0,13 | | -0,17 | | -0,17 | |
| | (0,17) | | (0,18) | | (0,18) | |

Note: significance: '*'=10%; '**'=5%; '***'=1%.

Table 6 Parameter estimates for hazard of employment entry

| | without unobserved heterogeneity | | controlling for unobserved heterogeneity | | controlling for endogeneity | |
|---|----------------------------------|------|--|------|-----------------------------|------|
| | (1) | | (2) | | (3) | |
| | Coeff. | Sig. | Coeff. | Sig. | Coeff. | Sig. |
| | (st.error) | | (st.error) | | (st.error) | |
| Spell order * time since employment exit | | | | | | |
| intercept | -2,07 | *** | -2,85 | *** | -2,67 | *** |
| | (0,46) | | (0,53) | | (0,54) | |
| shift for second order spell | -0,77 | *** | -1,71 | *** | -1,61 | *** |
| | (0,22) | | (0,25) | | (0,25) | |
| 0-0,5 year (slope) | 2,46 | *** | 3,46 | *** | 3,41 | *** |
| | (0,43) | | (0,46) | | (0,46) | |
| >0,5 year (slope) | -0,09 | *** | -0,02 | | -0,02 | |
| | (0,02) | | (0,02) | | (0,02) | |
| shift for third and higher order spell (ref=second spell) | 0,37 | *** | 0,05 | | 0,12 | |
| | (0,07) | | (0,1) | | (0,1) | |
| Time since union formation | | | | | | |
| slope | 0,00 | | 0,03 | | 0,05 | ** |
| | (0,01) | | (0,02) | | (0,02) | |
| Partnership status (ref=cohabiting) | | | | | | |
| married | 0,00 | | 0,06 | | 0,10 | |
| | (0,09) | | (0,12) | | (0,12) | |
| Age (ref=15) | | | | | | |
| 15-20 years (slope) | 0,14 | | 0,22 | ** | 0,21 | ** |
| | (0,09) | | (0,1) | | (0,1) | |
| 20-25 years (slope) | -0,13 | *** | -0,09 | *** | -0,08 | *** |
| | (0,02) | | (0,03) | | (0,03) | |
| 25-40 years (slope) | -0,06 | *** | -0,05 | ** | -0,05 | ** |
| | (0,02) | | (0,02) | | (0,02) | |
| Time since 1989 | | | | | | |
| 1989-1994 (slope) | 0,06 | | 0,10 | * | 0,10 | * |
| | (0,05) | | (0,06) | | (0,06) | |
| 1995-1998 (slope) | 0,00 | | 0,00 | | 0,00 | |
| | (0,03) | | (0,03) | | (0,03) | |
| 1999-2003 (slope) | -0,06 | *** | -0,07 | *** | -0,07 | *** |
| | (0,02) | | (0,02) | | (0,02) | |
| 2004-2006 (slope) | 0,06 | ** | 0,06 | * | 0,06 | * |
| | (0,03) | | (0,03) | | (0,03) | |
| Time since conception | | | | | | |
| shift for conception (2nd month) | -0,82 | *** | -0,81 | *** | -0,87 | *** |
| | (0,21) | | (0,21) | | (0,21) | |
| 2-9 months (slope) | -1,39 | *** | -1,83 | *** | -1,87 | *** |
| | (0,39) | | (0,39) | | (0,39) | |
| 9 months - 3 years (slope) | 0,49 | *** | 0,53 | *** | 0,53 | *** |
| | (0,04) | | (0,04) | | (0,04) | |
| > 3 years (slope) | 0,01 | | 0,02 | | 0,01 | |
| | (0,02) | | (0,02) | | (0,02) | |
| Conception order (ref=first) | | | | | | |
| second | 0,02 | | -0,14 | | -0,29 | *** |
| | (0,07) | | (0,09) | | (0,1) | |
| third or higher | 0,00 | | -0,31 | * | -0,65 | *** |
| | (0,13) | | (0,17) | | (0,2) | |

Table 6 Parameter estimates for hazard of employment entry, continued

| | without unobserved heterogeneity | | controlling for unobserved heterogeneity | | controlling for endogeneity | |
|--|----------------------------------|------|--|------|-----------------------------|------|
| | (1) | | (2) | | (3) | |
| | Coeff. | Sig. | Coeff. | Sig. | Coeff. | Sig. |
| | (st.error) | | (st.error) | | (st.error) | |
| Education level (ref=primary) | | | | | | |
| tertiary | 1,57 | *** | 1,99 | *** | 1,90 | *** |
| | (0,12) | | (0,18) | | (0,19) | |
| secondary | 0,47 | *** | 0,67 | *** | 0,58 | *** |
| | (0,11) | | (0,16) | | (0,17) | |
| vocational | -0,05 | | 0,03 | | -0,06 | |
| | (0,11) | | (0,16) | | (0,17) | |
| in school | -0,06 | | -0,12 | | -0,23 | |
| | (0,14) | | (0,18) | | (0,19) | |
| Work experience (ref=less than 3 years) | | | | | | |
| 3-6 years | 0,19 | ** | 0,22 | ** | 0,20 | * |
| | (0,08) | | (0,1) | | (0,1) | |
| >6 years | 0,33 | *** | 0,24 | * | 0,21 | |
| | (0,1) | | (0,14) | | (0,14) | |
| Place of residence (ref=rural) | | | | | | |
| urban | 0,11 | * | 0,15 | * | 0,10 | |
| | (0,06) | | (0,08) | | (0,08) | |

Note: significance: '*'=10%; '**'=5%; '***'=1%.

Table 7 Parameter estimates for hazard of employment exit

| | without unobserved heterogeneity | | controlling for unobserved heterogeneity | | controlling for endogeneity | |
|--|----------------------------------|------|--|------|-----------------------------|------|
| | (1) | | (2) | | (3) | |
| | Coeff. (st.error) | Sig. | Coeff. (st.error) | Sig. | Coeff. (st.error) | Sig. |
| Time since employment entry | | | | | | |
| intercept | -3,16 (0,93) | *** | -3,72 (1,04) | *** | -3,64 (1,04) | *** |
| 0-0,5 year (slope) | 1,72 (0,41) | *** | 2,76 (0,47) | *** | 2,76 (0,47) | *** |
| >0,5 year (slope) | 0,01 (0,02) | | 0,05 (0,03) | * | 0,04 (0,03) | * |
| Time since conception | | | | | | |
| shift for conception (2nd month) | 1,07 (0,24) | *** | 1,21 (0,24) | *** | 1,27 (0,25) | *** |
| 2-7 months (slope) | -6,29 (0,81) | *** | -7,13 (0,83) | *** | -7,13 (0,83) | *** |
| 7-11 months | 10,56 (0,42) | *** | 11,59 (0,46) | *** | 11,62 (0,46) | *** |
| 11-18 months (slope) | -6,96 (0,26) | *** | -6,69 (0,26) | *** | -6,65 (0,26) | *** |
| 19-43months (slope) | 0,54 (0,1) | *** | 0,42 (0,1) | *** | 0,42 (0,1) | *** |
| >43 months (slope) | -0,02 (0,02) | | -0,04 (0,03) | | -0,04 (0,03) | |
| Conception order (ref=first) | | | | | | |
| second | -0,37 (0,08) | *** | -0,28 (0,09) | *** | -0,19 (0,1) | * |
| third or higher | -0,32 (0,14) | ** | -0,17 (0,17) | | 0,03 (0,2) | |
| Age (ref=15) | | | | | | |
| 15-20 years (slope) | 0,15 (0,19) | | 0,14 (0,2) | | 0,13 (0,2) | |
| 20-35 years (slope) | 0,01 (0,02) | | -0,02 (0,02) | | -0,03 (0,02) | |
| 35-40 years (slope) | -0,25 (0,11) | ** | -0,28 (0,11) | ** | -0,29 (0,11) | ** |
| Time since 1989 | | | | | | |
| 1989-1994 (slope) | 0,02 (0,06) | | 0,02 (0,06) | | 0,03 (0,06) | |
| 1995-1998 (slope) | -0,01 (0,03) | | -0,01 (0,03) | | -0,01 (0,03) | |
| 1999-2003 (slope) | 0,03 (0,02) | | 0,04 (0,02) | * | 0,05 (0,02) | ** |
| 2004-2006 (slope) | 0,08 (0,03) | ** | 0,10 (0,04) | *** | 0,10 (0,04) | *** |
| Time since union formation | | | | | | |
| slope | 0,00 (0,01) | | 0,00 (0,02) | | -0,01 (0,02) | |
| Partnership status (ref=cohabiting) | | | | | | |
| married | -0,16 (0,09) | * | -0,22 (0,12) | * | -0,24 (0,12) | ** |

Table 7 Parameter estimates for hazard of employment exit, continued

| | without unobserved heterogeneity | | controlling for unobserved heterogeneity | | controlling for endogeneity | |
|---------------------------------------|--|------|--|------|--------------------------------|------|
| | (1) | | (2) | | (3) | |
| | Coeff. (st.error) | Sig. | Coeff. (st.error) | Sig. | Coeff. (st.error) | Sig. |
| Education level (ref=primary) | | | | | | |
| tertiary | -1,42 (0,14) | *** | -1,64 (0,19) | *** | -1,61 (0,2) | *** |
| secondary | -0,69 (0,11) | *** | -0,82 (0,16) | *** | -0,82 (0,17) | *** |
| vocational | -0,29 (0,11) | *** | -0,34 (0,16) | ** | -0,35 (0,16) | ** |
| in school | -0,86 (0,16) | *** | -0,99 (0,2) | *** | -0,97 (0,21) | *** |
| Work-experience | | | | | | |
| 0-3 years (slope) | -0,27 (0,05) | *** | -0,28 (0,06) | *** | -0,29 (0,06) | *** |
| 3-6 years (slope) | -0,15 (0,04) | *** | -0,14 (0,04) | *** | -0,13 (0,04) | *** |
| >6 years (slope) | -0,10 (0,03) | *** | -0,10 (0,03) | *** | -0,09 (0,03) | *** |
| Spell order (ref=first) | | | | | | |
| second | 0,63 (0,09) | *** | 0,45 (0,12) | *** | 0,48 (0,12) | *** |
| third or higher | 1,05 (0,13) | *** | 0,56 (0,19) | *** | 0,65 (0,19) | *** |
| Place of residence (ref=rural) | | | | | | |
| urban | 0,25 (0,06) | *** | 0,27 (0,08) | *** | 0,27 (0,08) | *** |

Note: significance: '*'=10%; '**'=5%; '***'=1%.

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