Family formation during the Hungarian societal transition: trends in postponement and the differential impact of policy changes

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Abstract

In this paper we focus on two questions concerning family formation during the Hungarian societal transition. First, to what extent has the dynamics of economic activity and wellbeing changed the timing of first union formation and first birth? Second, what has the impact of policy changes during the transformation been? We use a unique and recent micro-level dataset: the Hungarian Social and Demographic Panel Survey, released in 2002. We estimate survivor functions to illustrate the dramatic changes that have taken place among Hungarian birth cohorts. We then use semi-parametric hazard regression models with time-varying covariates for the timing of first union and first birth to disentangle the interplay between cohort, period effects and individual-level characteristics. Our results indicate that the decline in economic activity had a severe impact on family formation. Nevertheless, certain policies have exacerbated this effect, and policy changes during the 1990s had an asymmetric impact --- depending on the social status of individuals.

Introduction

During the 1990s, the countries of Central and Eastern Europe (CEE) have experienced far-reaching and rapid changes in institutional settings, societal structures, and in the general functioning of the economy as well as the structure of the economic activity. These multifaceted and parallel changes have created a new system of conditions for individual and social action, and have profoundly affected demographic trends[1]. Though we generally tend to assume that demographic behavior is characterized by a high level of inertia, the radically new circumstances following the collapse of the Iron Curtain have inevitably modified the earlier practices of family formation. Family formation and fertility in CEE countries had indeed been rather stable during the socialist period, with relatively short-term fluctuations that could be associated to policy changes (Frejka, 1980). After 1989, there has been a sharp decline in fertility all over the region. This brought CEE countries to join Italy and Spain at the so-called "lowest-low" fertility levels, with Period Total Fertility Rates (PTFR) below 1.3 children per woman (Kohler et al., 2002). This rapid fertility decline has been generally preceded and/or accompanied by a postponement of first union formation and first births, although the pace of postponement has varied across the region[2].

Apart from the sharp decline in fertility, CEE countries also experienced fundamental changes in other fertility-related behaviors, again at a varying pace across the region. Cohabitation has become more widespread especially among young adults; the proportion of extramarital births has sharply increased; the divorce rate has remained at the high levels already experienced during the socialist period; there has been a sharp postponement in leaving the parental home – to mention only a few of the most significant changes. Nor are these processes unique by international comparison (Billari, 2004). Radical changes in a similar direction have occurred in the former

[1] Detailed socio-economic analyses of family- and fertility-related changes and studies of demographic in Central and Eastern Europe can be found for instance in Kučera et al. (2000); Macura (2000); Adamski et al., (2003); Kotowska and Jóźwiak, (2003); Rychtarikova (2001) and Kamarás (2003).

[2] Indeed, part of the decline in total fertility rates (and likewise in total first marriage rates) is due to measurement problems. It is well-known that in presence of fertility postponement period measures of fertility can be substantially distorted (Bongaarts and Feeney, 1998; Bongaarts, 2002), and this is also true in lowest-low fertility situations (Kohler et al., 2002).

socialist countries since 1990, although at slightly differing velocity. In most Western European countries, changes in behavior began well before the nineties; Ron Lesthaeghe and Dirk van de Kaa (1986; van de Kaa, 1987) have introduced the term "Second Demographic Transition" to describe these processes, although the use of this term for CEE countries is subject to debate (see for instance Sobotka et al., 2003).

In this paper we focus on the Hungarian societal transition. Hungary shares with other CEE countries the collapse of the former socialist system and some of the trends in the 1990s, but is also distinctive from several points of view that are particularly important when we study family formation. We exploit a very recent and unique data source, which provides us with unprecedented insights into the impact on demographic behavior of the system change from a State-regulated redistributive economy to a market economy. Firstly, our aim is to analyze to what extent societal transformation - a system change - affects young individuals' family formation. In particular, we focus on the extent to which the decline in economic activity – and consequently young individuals' wellbeing – has changed the timing of the formation of the first union and the transition to parenthood. Secondly, we are interested in investigating the specific impact of changes in family policies introduced in Hungary during the 1990s on patterns of family formation[3].

To conduct our main analyses we use a unique and recent micro-level data set: the Hungarian Social and Demographic Panel Survey ('Turning Points of Life Course', HSDPS from now on). This survey is part of the "Generation and Gender" Programme coordinated by the Population Activities Unit of UN/ECE that has been in active preparation since the early 2000s (UN, 2000). The HSDPS – conducted in 2001 and released in 2002 – is thus the first one in the new generation of demographic surveys that will allow to shed light on the determinants of family and fertility decisions in CEE countries after the fall of the Iron Curtain. Its retrospective information on fertility and partnership histories provides detailed information on young individuals' demographic behavior before and during the transformation period. We use estimates of the survivor function to illustrate some of the dramatic

[3] By focusing on economic factors and family policies, we do not deny that changes in values, and/or in preferences could have influenced the mode of the rapid population change, but in this stage of the research these kind of questions could not be easily tested.

changes that have taken place among Hungarian birth cohorts. The analysis is extended by using semi-parametric hazard regression models with time-varying covariates on the timing of first union formation and of first birth, in order to disentangle the interplay between cohort and period effects and individual-level characteristics, also by controlling for macro-level variables. Our results indicate that despite the fact that the decline in economic activity had a severe impact on family formation, certain policies have exacerbated this effect. In fact we find that these policy changes has an asymmetric impact across the population – depending on the social status of individuals.

The paper is structured as follows. We first describe the background on the Hungarian societal transformation, for what concerns demographic trends on the one side and economic changes on the other side. Then we discuss more in detail the role of structural and policy changes that took place during the transformation. After shortly discussing the data and methods, we present the results of our analyses.

Background

Before entering into detailed analyses of family formation during the 1990s in Hungary, it is essential to review the context in which these demographic changes have taken place. Unfortunately this context is a complex web of interlinked socioeconomic relationships. We can point to at least three important driving forces after 1989: 1) general structural shifts, predominantly in the labor market; 2) the decline in economic activity; and 3) changes in family policies. Of course one cannot consider these factors as independent of each other. Economic decline is a consequence of the less effective economy of the Communist era and more concretely a result of the system change of the economy. It is likely that changes in social and family policy are provided as a response to the decrease of the economic performance of the economy. Furthermore, these changes could have influenced individuals' demographic behavior, partly through economic constraints, partly to the emergence of new life styles – partly through changes in preference structures.

It is not at all clear that these changes would influence individuals in a uniform manner. It is for instance quite possible that individuals belonging to different social strata are affected by these upheavals differently[4]. Nevertheless, it is important to disentangle the impact of various factors, and considering the society as heterogeneous, or as stratified, with groups and individuals adapting differently to the changes. This is crucial for our understanding of demographic changes, not only in terms of its consequences but also in terms of understanding what is needed from a policy-maker's perspective. Before considering these various dimensions of societal change it is useful to review trends in family formation in Hungary.

As is well known in the literature, in Hungary the Period Total Fertility Rate has fallen quite dramatically during the Nineties[5]. In 1989 PTFR in Hungary stood at 1.82, whereas by 2001 it had fallen to 1.31, after an all-time low in 1998 at 1.28. As is also well known, the PTFR was moving in a quite cyclical manner whereas the Cohort Total Fertility Rate (CTFR) remained stable for several decades prior to 1989 (Kamarás, 2003). Nevertheless the decline during the 1990s is a quite remarkable drop by any standard. Figure 1 shows further details of this decline. The first graph in Figure 1 (upper left corner) shows the number of live births per 1000 women for four different age groups. This shows that (not unexpectedly) the drop in fertility in Hungary has been mainly driven by declines in fertility rates for the age group between 20 to 24 years. However those being in their late 20s were not untouched as well. In fact the fertility rate in the first group is roughly halved from 1990 to 2001. Other age groups, in contrast, show fairly stable fertility levels over the same period, although the trend is somewhat downward sloping, apart from the oldest age group. Analyses of cohort data confirm this trend; for instance, the cumulated cohort fertility rates up to the 27th birthday have fallen from around 1.4 for cohorts born 1930 and 1950 to 0.89 for the cohort born in 1973. In the latter figure, Hungary shows the lowest figure of all CEE countries with the exception of Slovenia (Frejka and Sardon, 2003).

Looking at the second graph (upper right hand corner of Figure 1) we can see the development of first marriage rates. Here there is a distinct downward trend among

[4] See a detailled hypotheses about possible differentiating factores (Spéder, 2003)

the youngest age groups, which is consistent with the downward trend in childbearing: reduced marriage rates are followed by reduced fertility rates and vice versa. One should note however that cohabitation, which is not included in these figures, started to expand at the end of the eighties, and the expansion accelerated during the nineties, exacerbating these downward trends (Kamarás, 1999). We will pick up the issue of cohabitation later in the paper. The last graph in Figure 1 shows figures for the timing of events: mean age of at birth, mean age at first birth, and the mean age of first marriage. As we could expect, all these figures show an upward trend. In fact, the onset of the "postponement transition" in the timing of age at first birth can be, for Hungary, traced back to as early as 1990 (Kohler et al., 2002). Overall, Figure 1 provides a good indication of the extraordinary demographic changes taking place after 1989: dramatically declining birth and marriage rates manifested by a strong postponement of marriage and first births. We now turn to the factors that have been and still are influential in these changes.

FIGURE 1 ABOUT HERE

The first factor we consider is economic recession Unraveling the link between economic recession and demographic behavior is not a straightforward task. Though it seems intuitively clear that recession must have an adverse effect on childbearing decisions – for instance – the mechanisms in which these influences take place is less obvious (Macura et al, 2000). Moreover, disentangling the magnitude of these effects is even more difficult[6]. In Hungary, the fact that during the early 1990s economic activity fell together with a surge in inflation rates meant that real wages, and thus income declined. From a financial point of view the implication is clear: couples have generally been less able to afford having children and starting a family. This is perfectly consistent with the observed postponement of childbearing and family formation, as well as the decline in birth and marriage rates. In Table 1 we show some key figures to describe the decline in economic activity during the period of interest. The first column shows GDP figures standardized at 1989 levels. As is clear, there was a dramatic drop from 1989 to 1992, from which point economic activity started to

[5] A detailed analysis of the Hungarian situation can be found in Spéder (2002).

pick up again – though the 1989 level was not reached until 2000. The second column shows the real consumption levels – also standardized at year 1989. The index for consumption levels has remained higher than the index for economic activity for several years. It is clear that during those years, excess borrowing or running down savings took place. The third column in Table 1 shows the employment rate among women. As expected, this shows a downward trend, reaching a bottom level in 1997, for then to increase again. Obviously these figures are correlated with the economic downturn.

In the last column of Table 1 we have included a well-known measure for inequality: the decile ratio 1/10 (Atkinson and Micklewright, 1992). This figure shows that during the transformation period the Hungarian society experienced a profound increase in income inequality. As has been documented elsewhere that also poverty rates rose to dramatic heights during this period (World Bank, 2001). This of course prompts the question whether the economic downturn has affected individuals in the Hungarian society differently – depending on their social status for instance, and whether this has had different impact on demographic behavior for the very same groups. From these raw data it seems likely that the economic stagnation brought about a differentiation in material well-being leading to a growth in social inequalities. The fact that income differences between the lowest and the highest income deciles doubled in a time period of ten years is a strong indication of the severity of the transformation for many. It is a widely held view that not only income per se matters for family and fertility trends, also important is the income distribution and its dynamics (e.g. Demeny 2003). Unfortunately, the quantification of such differentials is largely based on assumptions, as no empirical analysis has so far been able to disentangle these effects. However, it is clear that the growth in inequality has been strong and that families at large have become more impoverished. If our assumptions are correct, the diminishing material resources affected the population in a differentiated way could have acted also to differentiate fertility behavior. Ceteris paribus, more children must have been born among the more prosperous, while the groups in a disadvantaged position must have had fewer children. Of course following

[6] The discussion on the impact of German reunification on fertility in the former GDR is an example that shows the difficulties in the identification of the impact of the massive socioeconomic transformations following the fall of socialism (Witte and Wagner, 1995; Kreyenfeld, 2003).

the way of thinking of Easterlin, we should also consider rising aspiration levels. If the rise of the aspiration is higher among those being more well-off, then it could mean, that these very same individuals would "feel" or "perceive" a higher level of economic pressure. If we examine the different cohorts between the ages of 18–49 by their material situation, we find that those in the lowest income quintile have far more children than those in the highest quintile[7]. Of course, that is partly due to the longer postponement in the higher social strata. Therefore it can also be seen from the data that at higher ages the income situation have less influence on the number of children although the effect does not disappear. Unfortunately, income figures are *ex post* and so we cannot know what the material circumstances of the families were before (*ex ante*) they had children. We must also take into account that although the birth of children reduces material well-being because of the concomitant consumption needs, it can also encourage adaptation, for example by acquiring additional income.

TABLE 1 ABOUT HERE

The picture is modified if we examine the average number of children as a function of educational level, which is closely related to income-earning ability. This factor has the advantage that under present conditions in Hungary it stabilizes after a certain age, and we can hypothesize that it cannot change after childbearing[8] consequently it is rather an *ex ante* type of variable. In the case of women, completed fertility declines for higher levels of schooling, but in the 40–49 years age group there is no difference among those with secondary and higher education. In the case of men, those with secondary education have fewer children already in the generation in their thirties, while among those aged 40–49 years the men with the highest levels of education have the most children. Though the raw data do not seem to contradict this assertion (see Spéder 2002), we will here show that certain family policies in fact worked against those who have been better off.

[7] The data have been taken from the investigation on "Turning points of the life-course" conducted in 2001/2002. 16,394 persons aged 18–75 years were questioned about the main components of their demographic behaviour. (For more details on the research, see: Spéder, 2002b). The present study dealt only with those under 50 years because they are the ones whose childbearing practice has been most affected by the transformation. The differences in the number of units for the various criteria is due to the fact that interviewees did not answer all questions (e.g. income). We used the concept of equivalent income (e=0.73), what is a well used measure for material well-being situation.

[8] Although there are examples of women using child care leave for further training.

Structural and policy changes

In addition to the economic downturn, the Hungarian society also experienced profound structural policy changes, some of which we have already touched upon, and that we should not run the risk of underestimating. One of the most essential characteristics of the transition from socialism to capitalism in CEE countries is the reversal of the asymmetry in the labor market. Socialism has in general been characterized by a shortage of labor, or in other words, a society with near full employment. The reversal is manifested through a change in which surplus of labor has become the norm (Kornai, 1980). The new labor market environment has imposed a completely new reality for the average worker. Of course this closely relates to the economic recession as outlined above: a recession leads unavoidably to higher unemployment, and Hungary is no exception to this. By 1992, unemployment rates had surged to unprecedented levels. Thus, not only did real wages decline, but a large proportion of the population was without labor income. A likely response to such a change in individuals' economic circumstances is to delay family formation until it is considered affordable. An additional factor, which likely exacerbated the delay in childbearing, is the increased level of uncertainty. The rise in unemployment changed a labor market in which workers used to have a high level of bargaining power. In the new emerging system of the 1990s, employers ended up having the upper hand, substantially reducing the bargaining power of the employees. Thus, finding employment is no longer associated with having a secure job market situation. The very real risk of loosing one's job is likely to further delay the onset of family formation[9]. Of course the rise in unemployment has also made it more difficult for young individuals to enter the job market, and thus finding long term and stable jobs. Spéder (2001) has shown that young individuals were considerably more vulnerable to the changes in the labor market compared to the older generation. An additional factor concerns education. One of the new policies introduced during the nineties was a considerable expansion of the educational system. Therefore, it is likely that young individuals facing a tough labor market preferred to remain longer in the educational

[9]Ranjan (1999), for instance, shows using a simplified model that in presence of income uncertainty it is rational to postpone childbearing.

system, as well as increasing the number of young individuals entering longer education. As is well documented in other literature, this is also likely to delay the onset of family formation (see the review of Kohler et al., 2002).

Social transformation is a very complex concept that includes structural, multifaceted, and parallel social changes. Institutional rebuilding is inherent in these processes. The direction of public policy is of course an important subject during these changes. Changes in the public policy programs can influence directly or indirectly population changes. Though family-related policies are often regarded as the most important, changes in unemployment insurance or housing policy could also have profound impact. In our study we focus on family policy changes, given that this is the most probable influencing factor in the processes of family formation. The policy changes are generally clustered into two types: 1) changes in the design of the programs, and 2) changes in the real values of the various benefits. Concerning the design of family policies radical changes did indeed take place and has been and still are an important factor in the transformation to the new market economy in Hungary. The socialist system prior to 1989 was generally associated with a very supportive attitude to families and childbearing. Family allowances were generous and – importantly – universal and partly employment-related. In 1995, there was a dramatic turn in family policies in the sense that they changed from being universal to become means tested. This new set of measures was known as the "Bokros package", and it had the implication that only those relatively worse off were entitled to family allowances. Ceteris paribus this meant that couples with high income – mostly those with higher education – were suddenly no longer eligible for family support. Could this lead to lower fertility among high-income individuals? It is not easy to answer this question. On one hand these couples will necessarily have a higher income and therefore be in a better position to afford and maintain a family; nevertheless, family allowances were still of substantial amount also for the better off. In contrast, the worst-off families would not necessarily recognize these large changes. For them state welfare and particularly family allowances represented an important source of livelihood. Of course they were still eligible for family allowances after it became means-tested with the Bokros package.

In assessing these changes we should also consider another aspect that has to do with individuals loosing their "trust" in the stability of family policies. Even after the transformation, until 1995 families had experienced a continuous expansion in the family programs. Though the increases did not always followed the rate of inflation, individuals and couples were accustomed with an ever increasing family support program. The introduction of the Bokros package in 1995 signaled to the population at large that family policies would not necessarily be equally "predictable" in the future. Given that fertility decision very much depends on predictable circumstances – this might have exacerbated the direct effect of the Bokros package itself. A particularly interesting feature of the Hungarian setting, in terms of testing the effect of family policies, is the change of government in 1998. The new government put the family back onto the agenda. More specifically, the system of means testing was abolished, and family allowances were again made universal. In addition the support to families was increased, and new tax-based benefits were introduced. These peculiar events in the history of family policies in Hungary created a quasi-natural experiment, an ideal setting for studying to what extent – if any – changes in family policies actually affect family formation. Moreover, since the policy change were asymmetric in that only those being generally better off were hit by the Bokros package, it provides the opportunity to see if the effects were indeed differentiated by socio-economic class. We will turn to this question later in the paper.

Finally we should also consider the decline in the real value of welfare benefits. It is clear that the devaluation of family allowances was quite substantial during the nineties. Soaring inflation levels accompanied by nominally constant welfare benefits, most individuals experienced a real decline in the value of family allowances. This has been an important factor in the increasing poverty rate during the period.

Data and statistical methods

We use data from the Hungarian Social and Demographic Panel Survey (HSDPS), which was conducted between 2001 and 2002. This is part of the Generation and

Gender Program, and is essentially the first wave of an ongoing panel, in which the second and third waves will be conducted in 2004 and 2007, respectively (See Spéder 2001 for further details). The data is rich in information concerning the situation of individuals at the time of the survey. Items capture issues such as housing, income, deprivation, transfers, individuals' qualifications, main activity, values and attitudes, and satisfaction – to mention a few. Importantly for the purpose of this paper, this data also includes full retrospective information on childbearing and union formation – including cohabitation histories[10]. The unique value of this survey is that it captures individuals' and couples' union and childbearing histories during the transformation of the 1990s. Of course it also includes the same information for couples and individuals who experienced their reproductive behavior prior to 1989. This gives us unique opportunities to study how family formation differed during the nineties from that of the socialist system. We will present results on women only, as results for men are similar.

Our individual-level statistical analyses are based on Kaplan-Meier non-parametric estimates of the survivor functions for cohort-based description, and on semi-parametric estimation of time-to-event for explanatory analyses. In our descriptive analyses, we include the timing of first childbearing, first union and cohabitation. For the semi-parametric analysis we focus on timing of first union and of first births as the principal events in family formation. For the Kaplan-Meier estimates we divide individuals into 8 different cohort groups: Cohort 1:1978 +; cohort 2:1972 – 1977; cohort 3:1965 – 1971; cohort 4:1958 – 1964; Cohort 5:1951 – 1957; Cohort 6:1944 – 1950; Cohort 7:1935 – 1943; Cohort 8: - 1934. In this setting the two youngest female cohorts (cohort 1 and 2) can be seen as those who started family formation during the economic transformation. In fact cohort 1 is likely to start family formation in the latter part of the nineties, whereas cohort 2 is likely to start in the beginning of the nineties[11]. It is interesting to see therefore, to what extent these cohorts behave differently, and of course to what extent both of these cohorts behave differently compared to the remaining cohorts, who started family formation prior to 1989.

[10] Educational and job histories will be collected in the second wave in 2004.
[11] From the analysis of cohort fertility we know that completed fertility in Hungary has been stable around 2 children for cohorts born until the mid 1950s, where cohort fertility levels have risen, before starting to fall again for cohorts born in the mid 1960s (Billari and Kohler, 2002; Frejka and Sardon, 2003, Kamarás, 2003).

Results and discussions

Cohort trends: survivor functions

Figure 2 shows Kaplan-Meier estimates of the survivor function for the timing of leaving the parental home, first union, first cohabitation, and first birth. There are striking differences between the cohorts for all of these events. Not surprisingly the main difference lies with the two youngest cohorts. Considering the timing of the first union (upper left corner) we see that both of the youngest cohorts delay the union formation considerably. Interestingly, there are also striking differences between the two youngest cohorts. In effect the estimates confirm that there is a continued delay in childbearing during the transformation. An interesting feature of using this recent data source is that we are able to analyze the diffusion of cohabitation across cohorts. The pattern is shown clearly in the upper-right corner. Cohabitation has slowly but steadily become more widespread across cohorts. Interestingly, the prevalence of cohabitation of the two youngest cohorts is very similar, prompting the question whether the diffusion of cohabitation has come to a halt[12]. Another interesting feature is the strong delay in leaving the parental home (lower-left corner). Again, given the economic hardship most young individuals have been facing during the nineties this does not come as a surprise. Our data indicate that a very likely coping strategy for young adults during this time is to share their accommodation with their parents. Of course this might also be correlated with the expansion of the educational system: as young individuals stay longer at school they also tend to delay the transition out of the household. Overall, however, this pattern strongly suggest that young individuals of the younger cohorts have to wait until a higher age before they become economic self-sufficient, and thereby manage to start their own household[13]. Finally we consider the

[12] Of course our estimates do not show to what extent cohabitation can be seen as having replaced marriage as a stable form of partnership. Our data do indicate that the majority of cohabiations tend to end up in marriages after a relatively short time interval. Thus, although cohabitation has become a much more common way to initiate a partnership, it does not seem to have replaced marriage – in contrast to some scandinavian countries.

[13] We also performed Kaplan-Meier estimates by educational attainment and region of residence. Although there are clear differences between the educational groups for all of these events, they do find that they normally intersect over time. Thus, education tends to postpone these events, but do not necessarily imply that higher educated women are less likely start childbearing or a union. As for

estimates for the transition to motherhood, which is given in the lower right corner. Not surprisingly the pattern follows very much that of union formation. As was the case with union formation, there is also here a significant difference between the two youngest cohorts. As is quite clear from these estimates – it seems highly unlikely that the younger cohorts will catch up with the older ones. Though the delay in timing of first birth largely follows the delay in union formation union a comparison between the graphs in the upper left corner (union formation) and the lower right corner (first birth) reveal that the delay in the former seems less severe than what is the case for latter, indicating that the interval between the formation of a first union and the transition to parenthood is widening.

FIGURE 2 ABOUT HERE

Individual-level hazard regressions

The semi-parametric approach provides several insights - which cannot be easily caught by using Kaplan-Meier estimates alone or similar aggregate-level data. The most important benefit is the ability to include a greater range of explanatory variables at the micro- and macro-level, as well as allowing for interactions between these variables. Importantly in our case is the ability to control for period effects. Clearly, the distinct differences between cohorts, as reported in the non-parametric analysis above, might be the result of strong period effects: given the dramatic upheavals during the nineties, we would naturally expect that period effects are of enormous importance. The semi-parametric estimation we is essentially a Cox hazard regression model with time-varying covariates (see i.e. Blossfeld and Rohwer, 2002), which can be formally presented in the following way (with *t* referring to age):

$$h_i(t) = h_0(t)\exp(\beta_1 x_{i1} + ... + \beta_k x_{ik})$$

In this model the baseline hazard $h_0(t)$, the dependence on age, is left unspecified, and can thus take any form, whereas the *k* covariates enter linearly. The model can be easily estimated by using the method of partial likelihood developed by Cox (1972).

region of residence we do find that those who line in Budapest delay most of these demographic events, whereas there is no difference between the other regions.

However, the model does impose that the covariates affects the hazard of experiencing the event of interest in a proportional manner. This is of course not always the case, though overcoming this problem is normally simple by using an interaction of the covariates violating the proportionality assumption with age[14]. Consequently our specifications will contain quite a few of these interactions. Any estimation of a proportional-hazard model that fails the proportionality assumption may produce biased parameter estimates. Here we test for the proportionality assumption throughout, and our final specification, as presented in the following tables, the assumption is found to hold [15]. In addition, period and macro-level economic variables can be included in the model as time-varying covariates.

Our main specifications concentrate on the timing of first birth and the timing of first union. The variables we include are as follows: Cohort (now collapsed into four groups only), Period (defined over 1990, 1992, 1995, and 1998), educational level (time constant – i.e. this will be completed educational attainment), residential area, and some other family background variables[16]. In addition, we include a range of interaction terms. Many of these are included simply to deal with the proportionality assumption of the Cox model. However, some of them are of paramount interest in our study. In particular, we have built interaction variables for period effects and educational attainment, and between period effects and region of residence. These are crucial in the sense that they will distinguish any period effects, possibly capturing important family policy changes, for different groups. For instance, they will be able to identify whether the change from universal benefits prior to 1995 to means testing after 1995, would have a different impact on educational groups. As we have argued this might very well be the case, since those with high education, and therefore high income, would suffer more from this policy change. Those with low income, would naturally be eligible for benefits under the new regime of means testing, and would therefore not be affected.

[14] Interacting coavariates with age is the standard remedy for dealing with non-proprtionality. Do note however, that including age as a variable on its own does not make sense in the Cox proportional hazard model.

[15] We also estimated alternative model formulations. In particular we estimated several piecewise constant linear models. However, these estimates produced similar parameter estimates to the Cox model. Since the shape of the baseline hazard is not paramount interest in this application we present only the estimates of the Cox model.

[16] These are the number of siblings of the respondent and a dummy variable for whether the respondent lived with both parent at age 15.

Results concerning the transition to motherhood are presented in Table 4. The most striking results are the strong period effects. These estimates are reported in the third block from the top, and indicate that as individuals progressed through the changes of the nineties, they all increased their level of delay into both union formation and childbearing. Interestingly there is no immediate effect after the first two years. The impact only hits after 1992, which coincide with the onset of mass-unemployment. Though we know from Figure 1 that from this point onward the economy slowly started to improve, we see that the rate of union formation and childbearing declined continuously. Having controlled for these period effects we also see that there is little difference between the cohorts in terms of entering the first union. There are, however, significant differences between the cohorts in terms of timing of first childbirth. In particular we see that the cohorts born between 1944 and 1971 have a higher rate of first childbirth, compared to those born between 1944 and 1957. This is consistent with the fact that the two middle cohorts are representative of reproductive behavior at the height of the socialist era. The youngest cohort, those born after 1972, in contrast, significantly delay the onset of childbearing compared to all other cohorts. We also include interactions between time periods (i.e. period effects) and age. Though the primary aim of these variables is to satisfy the proportionality assumption of the Cox model, they do in fact some interesting features of the period effect. Considering timing of first birth first, we see that the period effects tend to have a much stronger impact for individuals of younger ages. Lets consider these in turn. For the first time period we have seen that the overall effect is insignificant (block 3). But the estimates in block 4 we see that individuals of the younger ages are significantly affected by the changes in this period. Thus, among individuals of the youngest ages, the transition had an impact from a very early onwards. However, there is no significant age differential during the following period. After 1996 however, younger individuals are again affected in an adverse way. Then interestingly, in the last time period, the adverse impact becomes extremely strong. This coincides with the election of the new government, which as we already mentioned put the family back onto the public agenda. It is therefore somewhat surprising that there should be such a strong differentiation between individuals of different age groups. The impact is considerably smaller when we look toward timing of the first union. We also see a

significant difference between young and older individuals, but the impact is nowhere near as strong as it is for timing of first birth.

Moving onto the estimates for the other covariates we see that individuals and couples with high education strongly delay both union formation and the onset of childbearing. The sixth block in Table 2 shows interactions between educational levels and time periods. As already discussed, these interactions will identify whether the changes that took place during the nineties had different impact on those with high levels of education – compared to those with lower education. Looking at the timing of first birth event we do detect some very interesting result. For time period 4 (i.e. 1996 – 1998) we that those with high education had a lower rate of childbearing compared to those with low education. This suggests that the introduction of means tested benefits did have an adverse impact on individuals in the highest income brackets. Figure 3 demonstrates this pattern quite clearly.

Figure 3 shows ratio of the relative risks of first union and first births between educational levels (as estimated by the interaction between time periods and educational level). Note that educational level is here collapsed into a simply dummy variable taking the value 1 if the individual had high education - zero otherwise. The reference ratio is 1, before the 1990s. Overall these estimates are fairly stable apart with the exception of first births in the period which coincides with the introduction of means testing for child allowances. Means-testing implied of course that those relatively less well off – those with low level of education – would be eligible for the benefits, whereas those with higher income (i.e. high educational level) would not. Interestingly after means-testing was abolished in 1998, our estimates no longer show significant adverse impact for those with education. Another interesting feature of these estimates is that union formation remains unaffected by these policy reforms throughout. Though there has been a long standing debate concerning whether family policies actually have any real impact on demographic behavior (see i.e. Gauthier, 2001), our results seems fairly clear that – at least adverse- policy changes may have a significant impact.

TABLE 2 AND FIGURE 3 ABOUT HERE

We include similar period interactions with region of residence (block 8). Though those living in Budapest have a lower rate of both union formation and onset of childbearing (block 7), there does not seem to be any strong impact from the changes that took place through the 1990s. Thus, in this case, the period effects seem to have a fairly uniform effect throughout. As for the remaining two background variables we do not find any strong direct effects, though they do have a differential effect once interacted with age.

Hazard regressions incorporating economic macro variables

We now estimate micro-level hazard regression models trying to explain period effects using economic macro-level variables, and checking whether the footprints of an impact of the change in family policies are robust when controlling for economic trends. Obviously there is a range of different macro variables that might be of interest here. However, our choice is largely determined by the availability of sufficiently reliable macro figures that goes sufficiently far back. The variables we include are GDP and inflation levels. These are the only reliable macro series that go as far back as 1980. However, even this limits our analysis, in that we are unable to include the complete sample as reported in table 2[17]. Here we limit the analysis to women who became at risk of first union and first childbearing in 1980—this is sufficient to include periods before and after the transition. Thus, any women who were older than 15 in 1980 are excluded from the analysis. As a result we redefine cohorts into two groups: a young cohort, women born between 1974 and 1984, and an "old" cohort – women born between 1964 and 1974. The young cohort are women who would generally experience the first family formation event during the upheavals of the 1990s, whereas the majority of the oldest cohort would have started family formation well before 1990. Table 3 contains the results for this sub-sample. The results are largely in line with table 2. Qualitatively all estimates are similar, though we do notice that when using the younger sub-sample – we find time effects to be stronger. Moreover, women having obtained higher education have now a stronger delay to both union formation and childbearing. Finally we also notice that there are stronger effects between women who live in Budapest and those who do not, where

[17] GDP levels do exist prior to 1980 but are not considered particularly reliable (reference?)

the former delays the transitions to a much larger degree than what was the case in table 2.

TABLE 3 ABOUT HERE

Tables 4 and 5 report results when macro variables are included. Both macro variables are interacted with three time periods as a means to assess whether the impact varies over time. The periods are given as 1) prior to 1987, 2) between 1987 and 1993, and 3) 1993 up to present. The reason for making this division is very different social and economic situations these periods had. For instance during the 1980s, Hungarian society was characterized by stability and economic growth. After the major changes in the early nineties, characterized by economic upheavals and soaring unemployment, GDP started to pick up again from 1993 and onwards. These periods represent therefore quite different settings where any macro influences might have different effects.

The estimates associated with GDP levels are somewhat surprising. For all three time periods the estimates are negatively significant, with slightly stronger impact in the last two periods. A negative effect, indicates of course, that as economic activity, generally associated with higher employment rates, individuals tend to delay childbearing. In contrast, in times with falling levels of economic activity and lower employment, individuals tend to accelerate childbearing. In general this suggest, that any income effects generated from increased economic activity, does not translate into increasing childbearing. Instead, women might choose to enhance their work career as economic activity picks up. The negative relationship is particularly easy to see in the period from 1993 to present. From Table 1 we can see that from this point GDP starts to pick up again, after a sharp decline. At the same time we can see from Figure 1 that during this time women generally delay childbearing, implying that the negative parameter estimate associate with GDP is as we would expect. However, it is more difficult to see the negative association when going to the first two periods.

An extremely striking feature of the parameter estimates listed in Table 4 is that once GDP is included, the original time effects as discussed in the previous section – remains very strong. Thus, economic activity and employment rate does not seem to

have any crucial impact in why women are delaying family formation so strongly during the nineties. Turning to impact of inflation we see further interesting results. First, the parameter estimates associated with inflation are negative for all time periods. But this is not unexpected. Higher inflation implies a higher level of uncertainty and reduced consumption capabilities. Consequently, we would expect such changes to have a negative impact on childbearing and union formation. What is of particular significance here is that once we inflation is controlled for all the time effects become insignificant. This is a quite remarkable result, but not necessarily unexpected. Inflation soared during the nineties, which is the period in which Hungary saw the most significant delay in childbearing. The question is, of course, what does inflation here signify? The most likely explanation is that inflation indicates uncertainty and social insecurity at large. As such, our results seems to indicate that individuals' perception of future uncertainly is a much stronger driver than the more real economic circumstances, here captured by the GDP figures.

TABLES 4-5 ABOUT HERE

Concluding remarks

In this paper we have exploited a new dataset that captures the demographic changes that have taken place in Hungary over the last few decades. By matching this data set with macro information, we have been able to analyze the impact of changes in important economic indicators on changes in family formation during the societal transformation in Hungary. Our results indicate that the decline in economic activity and rising uncertainty had severe impact on family formation. Though difficult to disentangle our results consistently indicate that individuals' increasing perception of uncertainly has played the most important role.

The data has also enabled us to exploit an interesting type of social experiment that throws light on the impact of family policies on family formation. Specifically, we found that changes in family policies that affected only those well off, normally those with higher education, contributed to exacerbating the ongoing trend in the postponement of childbearing. As a general result, this indicates that the impact of

family policies on childbearing choices is important, and might have reversed effects if removed. Of course, given the short term life of the policy change we can not separate the impact on timing of fertility from the impact of quantum, although we may expect that postponement per se has an impact on total fertility.

As new data are collected, we expect that linking individual-level demographic histories with macro-level changes in Central and Eastern Europe will provide new information on both the impact of societal transformation and the effect of specific changes in family policies.

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Figures and tables

Figure 1. Trends in family formation, Hungary 1985-2000.

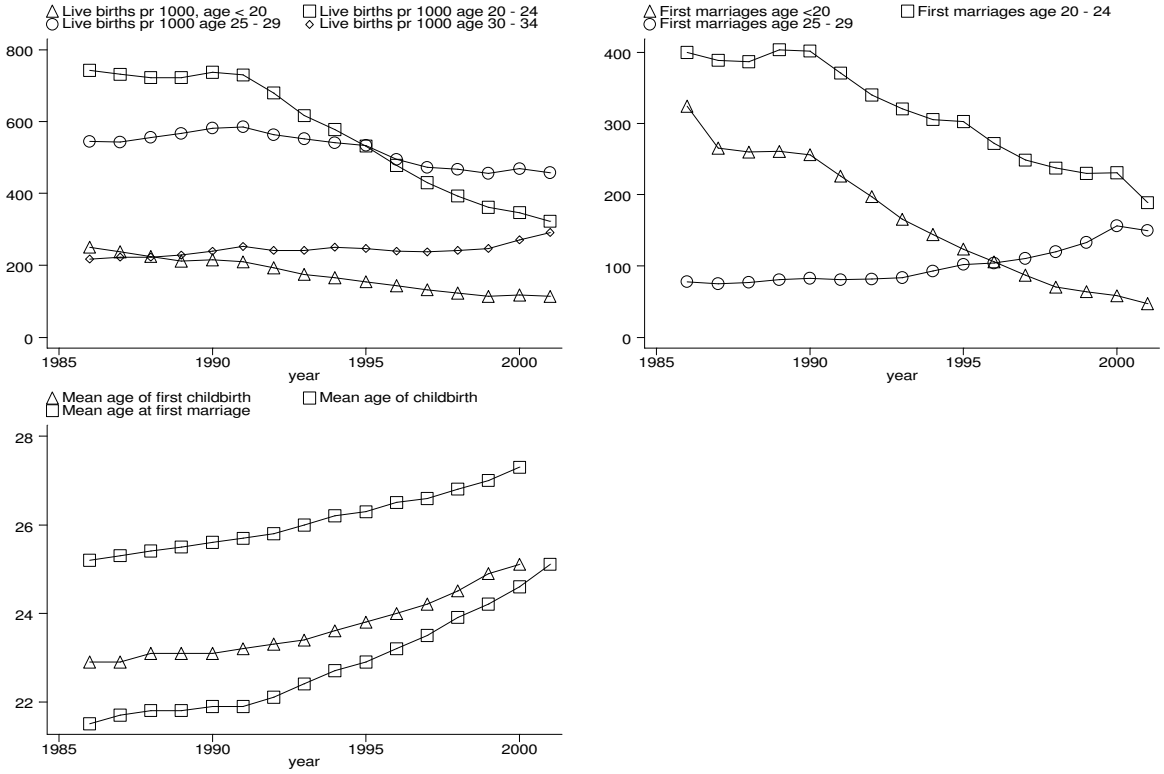

Figure 2: Kaplan-Meier estimates of timing of first birth, first union, first cohabitation, and leaving home, for eight cohort groups. Hungarian female cohorts.

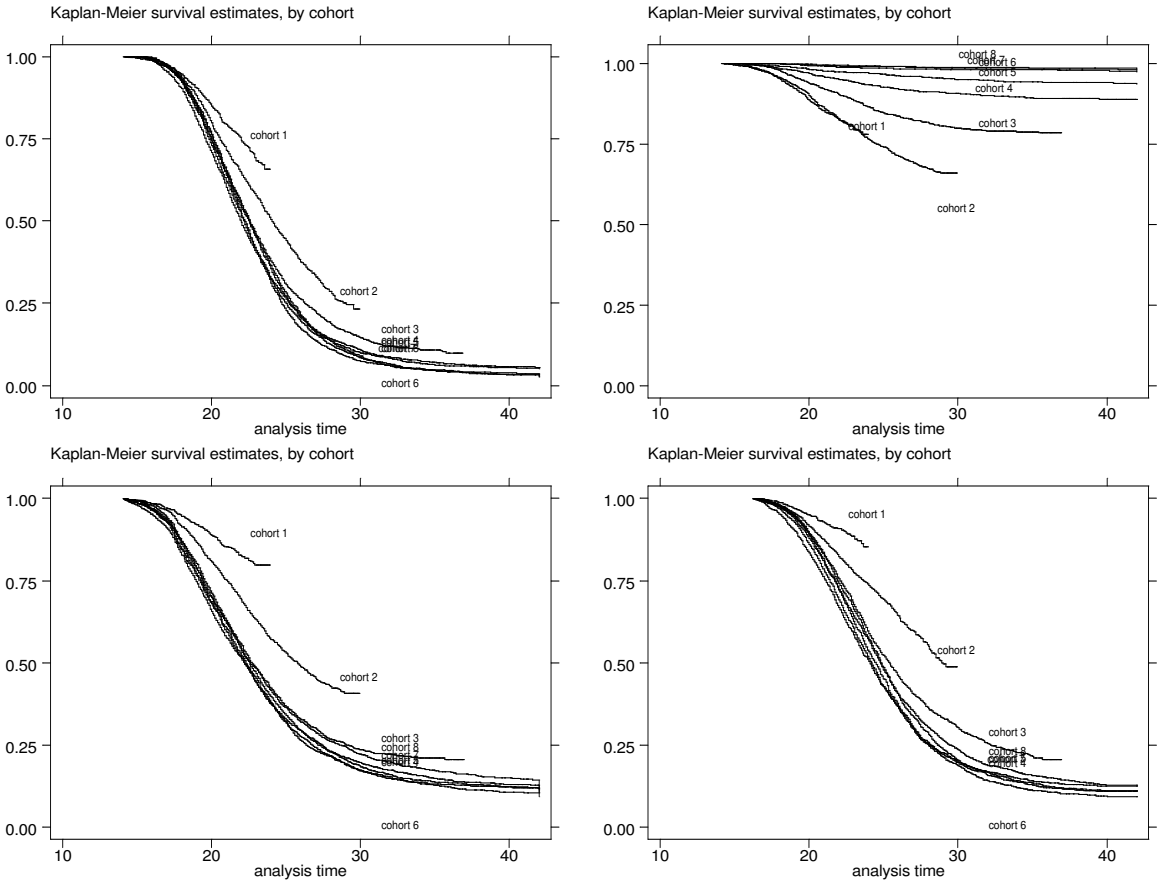

Figure 3. Dynamics of the ratio of the relative risks between higher and lower educated women (ratio before 1990 taken as a baseline)

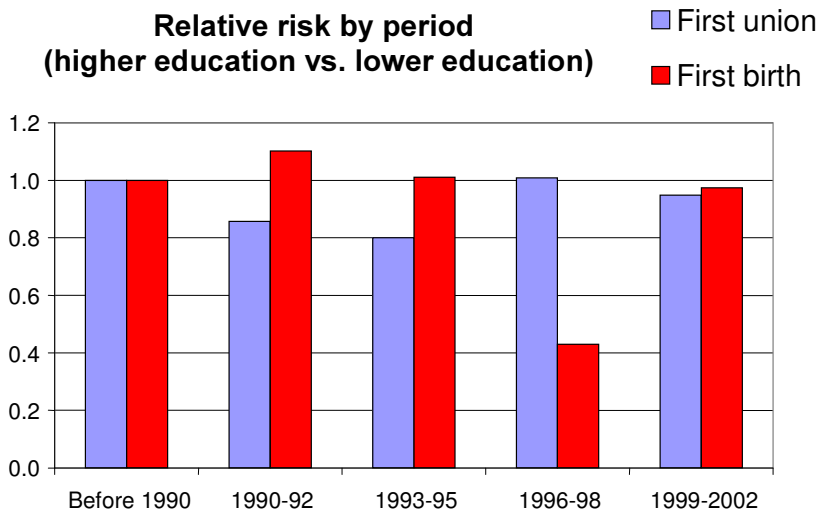

Table 1. Economic indicators for Hungary, 1987-2000

Year	GDP 1989=100	Per capita Consumption 1989=100	Percentage of employed women	Decile ratio 1/10
1987	-	-	-	4.6
1989	100	100	-	-
1990	96	96	-	-
1991	85	90	-	-
1992	82	90	54.2	6.0
1993	82	93	50.6	-
1994	84	93	49.3	-
1995	85	86	46.1	7.4
1996	86	83	44.5	7.5
1997	90	85	44.3	-
1998	95	89	47.5	-
1999	99	93	48.5	7.2
2000	104	98	48.8	7.6

Source: Statistical yearbook of Hungary, Tóth, 2002, employment figures for women collected from the Labour Force Survey

Table 2. Results of hazard regression models on the timing of first union and of first birth (including cohort and period effects, all cohorts included).

	First union			First birth		
	Rel.R.	z		Rel. R.	z	
Cohort 1: 1972 +	0.935	-0.471		0.704	-2.797	***
Cohort 2: 1958 - 1971	1.038	0.519		1.261	3.859	***
Cohort 3: 1944 - 1957	1.011	0.214		1.155	3.352	***
Cohort & age interactions						
Cohort 1 * Age<22	1.002	0.013		1.633	2.481	**
Cohort 2 * Age<22	1.162	1.792	*	1.118	1.406	
Cohort 3 * Age<22	1.135	1.973	**	1.072	1.109	
Time period 2: 1990 - 1992	0.912	-0.663		1.010	0.084	
Time period 3: 1993 - 1995	0.750	-2.336	**	0.705	-3.349	***
Time period 4: 1996 - 1998	0.635	-3.343	***	0.784	-2.178	**
Time period 5: 1999 to present	0.640	-3.074	***	0.646	-3.440	***
Time and age interactions						
Time period 2 * Age < 22	1.082	0.512		0.731	-2.036	**
Time period 3 * Age < 22	1.059	0.348		1.078	0.430	
Time period 4 * Age < 22	0.995	-0.028		0.714	-1.668	*
Time period 5 * Age < 22	0.672	-2.064	**	0.387	-4.307	***
High education	0.375	-17.402	***	0.227	-16.029	***
High education * Age>=23 and <26	3.478	11.946	***	6.558	16.516	***
High education * Age >= 26	2.456	11.342	***	2.917	9.931	***
Education and time interactions						
High education * Time period 2	0.858	-0.919		1.102	0.567	
High education * Time period 3	0.801	-1.454		1.011	0.072	
High education * Time period 4	1.008	0.057		0.430	-4.374	***
High education * Time period 5	0.949	-0.388		0.974	-0.182	
Live in Budapest	0.815	-3.971	***	0.706	-7.551	***
Live in Budapest * Age<22	0.790	-3.711	***	0.754	-3.910	***
Region and time interactions						
Live in Budapest * Time period 2	1.240	1.368		0.805	-1.148	
Live in Budapest * Time period 3	1.028	0.186		1.070	0.447	
Live in Budapest * Time period 4	1.199	1.333		1.273	1.542	
Live in Budapest * Time period 5	1.102	0.767		1.175	1.111	
Many siblings	0.934	-1.379		0.990	-0.254	
Many siblings * Age < 22	1.202	3.126	***	1.351	5.328	***
Lived with both parents (at 14)	1.014	0.212		1.033	0.578	
Lived with both parents * Age < 22	0.793	-2.960	***	0.769	-3.438	***

Table 3. Results of hazard regression models on the timing of first union and of first birth (including cohort and period effects, only cohorts born after 1964 included).

	Union			First birth		
	Rel. R.	z		Rel.R.	z	
Cohort 1	0.907	-0.750		0.758	-1.520	
Cohort & age interactions	0.832	-1.000				
Cohort 1 * age <22	0.760	-0.760		1.076	0.330	
Cohort 1 * age >=23 & <26				1.478	1.170	
Time period 2: 1990 - 1992	0.956	-0.300		0.792	-1.690	*
Time period 3: 1993- 1995	0.688	-2.650	***	0.600	-4.100	***
Time period 4: 1996 - 1998	0.553	-4.000	***	0.477	-5.510	***
Time period 5: 1999 - present	0.596	-2.950	***	0.327	-6.760	***
Time and age interactions						
Time period 2 * Age < 22	0.996	-0.020		1.123	0.620	
Time period 3 * Age < 22	1.075	0.410		1.494	2.130	**
Time period 4 * Age < 22	1.144	0.630		1.684	2.040	**
Time period 5 * Age < 22	0.701	-1.510		1.142	0.460	
High edu.	0.286	-8.730	***	0.127	-7.330	***
High edu. * Age>=23 & <26	4.615	6.450	***	14.256	8.070	***
High edu. * Age >= 26	2.863	6.790	***	4.163	4.970	***
Education and time interactions						
High education * time period 2	0.857	-0.710		1.236	0.790	
High education * time period 2	0.777	-1.220		0.955	-0.190	
High education * time period 2	1.084	0.420		0.437	-2.970	***
High education * time period 2	1.038	0.190		0.986	-0.050	
Live in Budapest	0.645	-2.860	***	0.573	-3.070	***
Live in Budapest * Age < 22	0.835	-1.410		0.779	-1.430	
Region and time interaction						
Live in Budapest * period 2	1.515	2.030	**	0.856	-0.550	
Live in Budapest * period 3	1.189	0.880		1.225	0.880	
Live in Budapest * period 4	1.442	1.970	**	1.494	1.750	*
Live in Budapest * period 5	1.325	1.540		1.360	1.370	
Many siblings	0.950	-0.440		1.070	0.680	
Many siblings * age < 22	1.952	4.880	***	2.196	5.780	***
Lived with both parents (at 14)	0.942	-0.660		0.967	-0.410	
Lived with b/parents * age < 22	0.750	-2.570	***	0.777	-2.040	**

Table 4. Results of hazard regression models on the timing of first union and of first birth (including cohort and period effects as well as economic indicators in levels, only cohorts born after 1964 included).

	GDP in levels (1980=100)			Inflation in levels (1980=100)		
	Rel.R.			Rel.R.		
Cohort 1	0.795	-1.210		0.813	-1.090	
Cohort & age interactions						
Cohort 1 * age <	1.112	0.450		1.189	0.740	
Cohort 1 * age >= & <	1.724	1.570		2.026	2.040	**
Time period 2: 1990 - 1992	0.681	-2.290	**	0.973	-0.180	
Time period 3: 1993- 1995	0.469	-3.700	***	0.992	-0.050	
Time period 4: 1996 - 1998	0.413	-3.540	***	1.137	0.530	
Time period 5: 1999 - present	0.351	-4.480	***	1.452	1.040	
Time and age interactions						
Time period 2 * Age < 22	1.436	1.810	*	1.391	1.670	*
Time period 3 * Age < 22	1.854	3.030	***	1.801	2.900	***
Time period 4 * Age < 22	2.005	2.390	**	1.985	2.370	**
Time period 5 * Age < 22	1.484	1.300		1.511	1.370	
GDP period prior to 1987	0.987	-1.880	*			
GDP period 1987 – 1993	0.983	-2.410	**			
GDP period 1993 – 2002	0.982	-2.670	***			
Inflation period prior to 1987				1.001	0.810	
Inflation period 1987 – 1993				0.999	-3.420	***
Inflation period 1993 – 2002				0.999	-4.650	***
High edu.	0.132	-6.800	***	0.131	-6.820	***
High edu. * Age>=23 & <26	12.430	7.380	***	12.586	7.420	***
High edu. * Age >= 26	3.714	4.410	***	3.733	4.430	***
Education and time interactions						
High education * time period 2	1.315	0.980		1.322	1.000	
High education * time period 2	1.032	0.120		1.024	0.090	
High education * time period 2	0.456	-2.420	**	0.453	-2.440	**
High education * time period 2	1.071	0.260		1.056	0.210	
Live in Budapest	0.536	-3.090	***	0.535	-3.100	***
Live in Budapest * Age < 22	0.823	-1.050		0.824	-1.040	
Region and time interaction						
Live in Budapest * period 2	0.898	-0.370		0.901	-0.360	
Live in Budapest * period 3	1.288	1.040		1.286	1.030	
Live in Budapest * period 4	1.492	1.480		1.497	1.490	
Live in Budapest * period 5	1.443	1.540		1.446	1.550	
Many siblings	1.001	0.010		0.995	-0.040	
Many siblings * age < 22	2.451	6.180	***	2.463	6.210	***
Lived with both parents (at 14)	0.954	-0.550		0.953	-0.560	
Lived with b/parents * age < 22	0.810	-1.600		0.813	-1.570	

Table 5. Results of hazard regression models on the timing of first union and of first birth (including cohort and period effects as well as economic indicators with trend, only cohorts born after 1964 included).

	GDP with trend 3		Inflation with trend 3	
Cohort 1	0.953	-0.350	0.973	-0.200
Cohort & age interactions	0.834	-0.920	0.900	-0.530
Cohort 1 * age <	0.854	-0.430	1.016	0.040
Cohort 1 * age >= & <				
Time period 2: 1990 - 1992	0.888	-0.680	1.224	1.210
Time period 3: 1993- 1995	0.604	-2.490 **	1.180	0.930
Time period 4: 1996 - 1998	0.540	-2.450 **	1.335	1.220
Time period 5: 1999 - present	0.744	-1.220	2.754	3.110 ***
Time and age interactions				
Time period 2 * Age < 22	1.104	0.540	1.077	0.410
Time period 3 * Age < 22	1.147	0.720	1.125	0.620
Time period 4 * Age < 22	1.298	1.070	1.308	1.100
Time period 5 * Age < 22	0.764	-1.050	0.793	-0.920
GDP / Inflation				
GDP period prior to 1987	0.988	-2.010 **		
GDP period 1987 – 1993	0.986	-2.490 **		
GDP period 1993 – 2002	0.984	-2.890 ***		
Inflation period prior to 1987			1.000	0.340
Inflation period 1987 – 1993			0.999	-3.650 ***
Inflation period 1993 - 2002			0.999	-5.300 ***
High edu.	0.262	-8.310 ***	0.261	-8.350 ***
High edu. * Age>=23 & <26	4.338	5.780 ***	4.400	5.840 ***
High edu. * Age >= 26	2.798	6.110 ***	2.820	6.160 ***
Education and time interactions				
High education * time period 2	0.948	-0.230	0.950	-0.220
High education * time period 2	0.864	-0.670	0.860	-0.690
High education * time period 2	1.274	1.050	1.259	1.000
High education * time period 2	1.146	0.640	1.116	0.510
Live in Budapest	0.692	-2.210 **	0.690	-2.230 **
Live in Budapest * Age < 22	0.801	-1.630	0.803	-1.610
Region and time interaction				
Live in Budapest * period 2	1.449	1.750 *	1.447	1.750 *
Live in Budapest * period 3	1.130	0.600	1.134	0.610
Live in Budapest * period 4	1.230	0.940	1.235	0.960
Live in Budapest * period 5	1.253	1.180	1.254	1.190
Many siblings	1.004	0.030	0.995	-0.040
Many siblings * age < 22	1.867	4.380 ***	1.880	4.430 ***
Lived with both parents (at 14)	0.969	-0.330	0.974	-0.280
Lived with b/parents * age < 22	0.699	-3.030 ***	0.698	-3.040 ***