What supports early age patterns of fertility in a developing country: the case of Kyrgyzstan

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Abstract. The purpose of the paper is to consider social factors influencing timing of 1st birth fertility in Kyrgyzstan, a country of Central Asia. Like several other developing countries with TFR level between 2.5 and 4, Kyrgyzstan demonstrated no fertility postponement during the recent decade. This disagrees with current timing tendencies in developed countries and also does not fit observations on a large number of developing countries in the 1980-90s, which suggested that increase of mother's mean age at 1st birth was wide spread in them. Our study is based on the MICS2014 survey for Kyrgyzstan (at some analytical steps we also use the DHS2012 data for comparison). We compare risks of entering 1st union and of 1st birth in union for cohorts born between 1965 and 1998. It turns out that the risks become significantly higher for the youngest cohorts. Also education, labor experience and some indicators of gender relations in woman's family are significant for the risks under study. Significant timing differences between women of different ethnicities are also found and possible accounts for these differences are suggested. The factors supporting a stable age pattern of fertility in Kyrgyzstan are of interest for further comparative study on timing in developing countries which should explain the current diversity of timing trends in them.

Key words: fertility timing, fertility postponement, age at 1st birth, developing countries, Central Asia

1.Introduction

Fertility timing and its changes attract much attention in current demographic studies. In countries of developed world, fertility postponement is considered as one of the central demographic shifts of recent decades, associated with so-called Second Demographic Transition (Lesthaeghe 2010). In developing countries, timing tendencies are generally less clear. After Bongaarts' (1999) demonstration that increasing of mother's age at first birth (MAB1) was the dominating tendency in a large sample of developing countries in the 1980-1990s, some subsequent studies on separate developing countries have suggested that timing trends of transition to motherhood were more diverse there after the turn of the century (see Section 2). In some developing countries age patterns of fertility were stable despite total fertility fluctuations after 2000, some others have even showed a 'rejuvenation' of fertility. This makes relevant the question of factors influencing timing in developing countries.

In this paper we attempt to consider this question, mainly dealing with economic and cultural factors, for one of developing countries, Kyrgyzstan (a post-Soviet state in Central Asia). The reason to turn to this country was, first, that it showed preliminary evidence for lack of fertility postponement at least in the recent decade. Besides, that country is multiethnic, with certain sociocultural differences between ethnicities. Evidence on influence of ethnic differences on timing could be relevant for future comparative studies on developing countries, because in many of them significance of ethnicity for some fertility characteristics has been reported.

The paper is organized as follows. Section 2 gives an overview of recent research on timing in developing countries and outlines hypotheses on social factors influencing MAB1 there. Section 3 contains basic information of social developments and fertility trends in Kyrgyzstan, focusing on post-Soviet times. Section 4 represents the survey data we use, and section 5 suggests analysis of timing in relation to some economic and cultural parameters. Since Kyrgyzstan is a country where out-of-union fertility is extremely low, risks of the 1st birth there can be decomposed into

risks of entering the 1st union and of transition to motherhood in 1st union. Therefore we run separate Cox regression models for risks of the two events. In section 6 we discuss results of our analysis.

2. Timing of first birth in developing countries: background and hypotheses

Fertility postponement has been considered in most detailed way for countries of Europe and North America (see Billari at al. 2007, Sobotka 2010, Mills et al 2011, among many others). In studies on those countries, it was understood primarily as a shift of MAB1 to elder years. We will understand it in the same way in the present paper.

Fertility postponement was experienced by most countries of Europe between the 1960s and 1990s. Most of accounts suggested for fertility postponement in developed countries of the West relate it to an ideational shift towards higher value of individual autonomy, gender equality, satisfaction of 'higher order needs'. Changes in family behavior associated to this shift are standardly termed 'Second Demographic Transition' (SDT; Van den Kaa 1987, Lesthaeghe 2010). Growth of women's education was sometimes considered as an independent source of fertility postponement in developed countries (see Billari, Philipov 2004 for a discussion). Fertility postponement in Eastern Europe, however, has got more various accounts, as in most countries of that region it started only in the 1990s (two or three decades later than in most countries of the West), when collapse of state socialism caused serious political turbulence and economic misfortunes. This suggested that insecurity of young adults rather than an SDT-style ideational change could be mainly responsible for the start of fertility postponement and a decrease of desired fertility in those countries (Philipov et al. 2006). Nevertheless, value oriented accounts of the fertility postponement in Eastern Europe are also widely discussed (Sobotka 2008).

Timing issues in developing countries, including 1st birth timing, remain much more poorly documented. A systematic analysis of MAB1 trends on a large geographically diverse group of developing countries was made by Bongaarts (1999), who used data of DHS and WFS surveys for

the last decades of the 20th century. His conclusion was that growth of MAB1 at that time was the prevailing tendency in developing countries he considers. After Bongaarts' study, however, no systematic comparative account of first birth timing tendencies in developing countries has been suggested, to the best of our knowledge. It does not come as a surprise, therefore, that no generalizations on factors underlying MAB1 trends in developing worlds have been put forward (on studies of these factors on some separate developing countries see below). The deficit of comparative studies of MAB1 dynamics in developing countries may be partly explained by lack of satisfactory data on that parameter in many of them. Official statistics on developing countries, apart from regularly being considered rather unreliable, often does not contain mother's mean ages by parities at all, and calculating MAB1 on survey data is related to some serious difficulties (Multrie et al.2012).

Under these conditions, a possible way of approximation of fertility timing trends in developing countries could be based on age specific fertility rates (ASFRs), normally available from official statistics and computable from survey data without special problems. In the present study, we will mainly follow ASFRs as indicators of fertility timing trends, including trends for the start of motherhood. If timing of first birth is shifted between age groups for which ASFRs are available (normally 5 years age groups), we expect that proportions between ASFRs of the relevant age groups are changed. If transition to motherhood is shifted to elder ages, the ASFR of a younger age group where the 1st births were concentrated before the transition becomes smaller comparative to the ASFR of the subsequent age group, in which the number of first births per woman grows. If, by contrast, timing of transition to motherhood is shifted to earlier ages, a reverse change is expected, with a younger ASFR climbing up closer to the neighboring elder one or even overtaking it. Note, however, that when total fertility is decreasing, growth of a younger ASFR proportion compared to the elder one is possible also when higher order births in the elder age group are decreasing, but 1st births fertility remains high and is still concentrated in the younger age group, i.e. timing of transition to motherhood remains stable under decrease of total fertility.

Finally, when proportions of ASFRs remain stable, it is safe to suggest that peak of 1st births is not moved from one age group to another. Given that in most developing countries mean age at 1st birth is below 30, changes of age at 1st birth moving its peak between 5 year age groups are supposed to affect relative proportions of 5 years ASFRs for age of 15-19, 20-24 and 25-29, but less so of the elder ones. Therefore in our study we will concentrate on relative changes of ASFRs of these ages.

To our knowledge, no studies comparing MAB1 trends in a large number of developing countries have appeared after Bongaarts (1999). However, studies on individual developing countries which follow up ASFRs trends allow to suggest that fertility postponement hardly can be treated as the dominating timing development in the developing world after 2000. Consider e.g. studies on fertility in the beginning of 21th century in MENA countries, for many of which Bongaarts reported MAB1 increase in the 1980s-1990s. In Algeria, according to Ouadah-Bedidi and Vallin (2012), the rise of TFR from 2.2 in 2000 to 2.7 in 2008, preceded by its dramatic fall through 1970s-1990s, was mainly due to an increase of fertility rates of ages 15-24, which grew together more than twice as much as the 25-29 ASFR in that period and become closer to, although not higher than it. As shown by Ouadah-Bedidi and Vallin (2012), the growth of the youngest ASFRs was mainly due to a shift of woman's age at first marriage to younger years, which normally results also in the growth of 1st births in those ages in populations where child bearing after marriage is considered as almost obligatory. A similar picture is found in Egypt, where a rise of total fertility from 3.0 in 2008 to 3.5 in 2014 was accompanied by a change of age patterns, with shifting the fertility peak from the age of 25-29 to the age of 20-24 by 2014 (Al Zalak, Goujon 2017). Note that as in both Algeria and Egypt total fertility was raising with the timing shift, there are no reasons to assume that the growth of proportion of the youngest age groups compared to 25-29 was due to a decrease of higher order births in the latter age groups. In another MENA country, Jordan (Cetorelli, Leone 2012), recent ASFRs trends did not point to a shift towards younger start of motherhood, but the opposite shift was not indicated as well. Jordan showed multidirectional

changes of TFR after 2002, with a decline from 4.4 in 1997 to 3.6 in 2007 and a subsequent rebound to 3.8 in 2014, under a rather stable age distribution of fertility, with its peak in the age of 25-29. For one more country with TFR above the replacement level and below 4, Bangladesh, a fertility decline from 3.27 in 1996/97 to 2.71 in 2007 proceeded under stability of ASFRs proportion, with fertility peak in 20-24 (Mostafa Kamal 2010).

In the present paper, we do not study the question of how frequent across developing countries the different timing trends observed in the recent decades are and how they are related to changes of total fertility. Instead, we turn to the question about economic and cultural factors which influence timing of 1st birth fertility in developing countries and possibly underlie the observed difersity of timing trends. Although this question is dealt with in some earlier studies on MAB1 in selected developing countries (e.g. Rindfuss et al. 1983), it is very much understudied in connection to timing phenomena of more recent years. We consider significance of different factors for 1st birth timing in Kyrgyzstan (Central Asia). There are several reason to turn to this country in our study. First, preliminary evidence suggests that its recent trends in reproductive behavior do not involve fertility postponement. Although no ASFRs-based studies on timing in Kyrgyzstan are available so far, it is shown in Spoorenberg (2013) that its TFR could be inflated in the last decades because of fertility shift to younger years[1]. Second, total fertility dynamics in the recent 10-15 years in Kyrgyzstan was similar to the developing countries without fertility postponement mentioned above, as Kyrgyzstan also experienced total fertility decrease without reaching the replacement level (2.1) and its subsequent raise. The similarity in quantum trends makes its sensible to check out whether timing trends are similar, too. Although treatment of only one country of course cannot be the basis for any cross-national generalizations, the study can give possible directions for further research on reasons underlying the fertility timing diversity among developing countries nowadays.

[1] Spoorenberg points to the possibility of both MAB1 lowering and shortening of interbirth spacing. The procedure he uses does not allow to distinguish the two phenomena.

At least three groups of social parameters are discussed in current literature as potentially relevant for 1st birth timing in developing countries. The 1st group of parameters concerns women's education and labor opportunities. Among developing countries where fertility postponement was attested, the role of educational growth in it was argued for e.g. for Indonesia by Breierova, Duflo (2004), and the role of both education and labor market position was shown for Uruguay by Nathan et al. (2016). By contrast, for some countries not experiencing fertility postponement within the recent decades it has been argued that high levels of fertility of the youngest age groups were supported by social conditions under which women either had poor labor market perspectives or were not motivated to take a job (Al Zalak and Goujon 2017 for Egypt).

Second, 1st birth fertility can be related to the degree to which gender and generation asymmetries are pronounced in family relations. Empowerment of elder generations over younger ones or of men over women within family, both phenomena highly expected in many developing countries, have been discussed in their relation to higher fertility e.g. in Mason (2001), McDonald (2000), Lerch (2013). Most of studies of this field concentrated on fertility quantum rather than on timing. However, analysis of some country-specific data suggest that more strict gender and generation asymmetries are related to younger woman's age at 1st marriage, which is most often tightly related to age at 1st birth in developing countries (cf. Dyson, Moore 1983 for India; see also Carmichael 2011 on relation between family organization and age at 1st marriage in a sample of less developed countries). There are several reasons to expect that subordinate position of women and of younger generations in their families can influence fertility timing. First, empowerment of elders can lead to social pressure upon young women to follow their fertility patterns, including timing (see Bongaarts, Watkins 1996 on the role of social pressure in fertility behavior). Second, child bearing can be the central way for a woman to get a high social position for herself in a society with strict gender asymmetries (Salway 2007), in which situation a woman is motivated to become a mother as soon as possible.

Third, ethnicity or religious affiliation can be significant for 1st birth timing. This expectation is based on studies which point to 1st birth timing differences between ethnic or religious groups in developing countries. E.g. Fazle Rabbi and Imrul Kabir (2013) argue that first birth timing differs significantly between Muslim and non-Muslim women in Bangladesh; see also Ngalinda (1998) for a similar conclusion in Tanzania. Rindfuss at al (1983) show significance of both religion and ethnicity for mother's age at 1st birth in developing countries of South-East Asia. Since these differences remain significant when socioeconomic parameters are controlled for, it can be suggested that religion or ethnicity can have their own impact on dynamics of timing.

With this background, in the present paper we study the following hypotheses on timing of 1st birth in developing countries.

Hypothesis 1. Age at 1st birth is positively related to woman's education and labor market opportunities.

Hypothesis 2. Age at 1st birth is negatively related to parameters which point to strict gender and generation asymmetries in family relations.

Hypothesis 3. In a multiconfessional and multiethnic country, age at 1st birth can be significantly different among women of different ethnicities or religious affiliations, even after control for key social parameters.

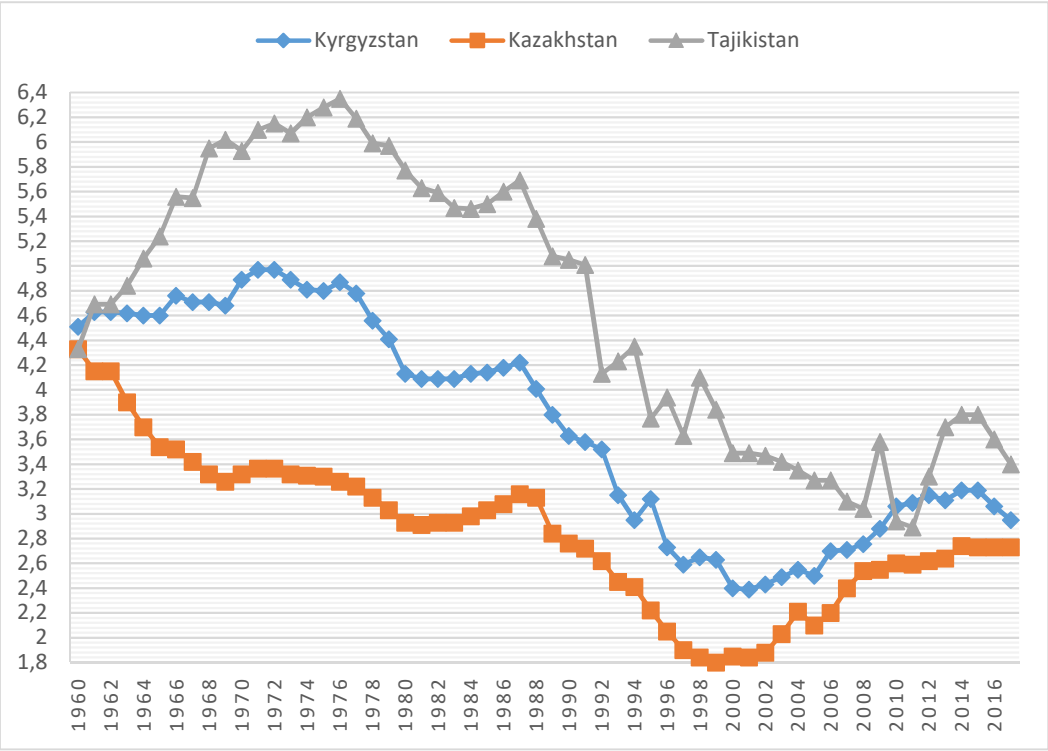
3. Kyrgyzstan: key facts on population and fertility

Kyrgyzstan, with total population of 6.3 million people in 2018, as most of other post-Soviet countries, has undergone a dramatic decrease of fertility after the collapse of the Soviet Union (1991) and its subsequent growth in the 2000s (see Figure 1 for its TFR dynamics compared to some of its neighbours). The decrease in the 1990s can be regarded as a final stage of the fertility decline which started as early as in the 1970s, after a peak in the 1960s. This decline was typical

for the First demographic transition, but it did not reach the replacement level (TFR=2.1) associated with the final stage of that transition. Current fertility in Kyrgyzstan is higher than in its northern neighbor Kazakhstan, but falls behind Tajikistan, the fertility "champion" in Central Asia.

Figure 1:

TFR in Kyrgyzstan, Kazakhstan and Tajikistan, 1960-2017



Source: Based on data available at: http://www.demoscope.ru/weekly/ssp/sng__tfr.php

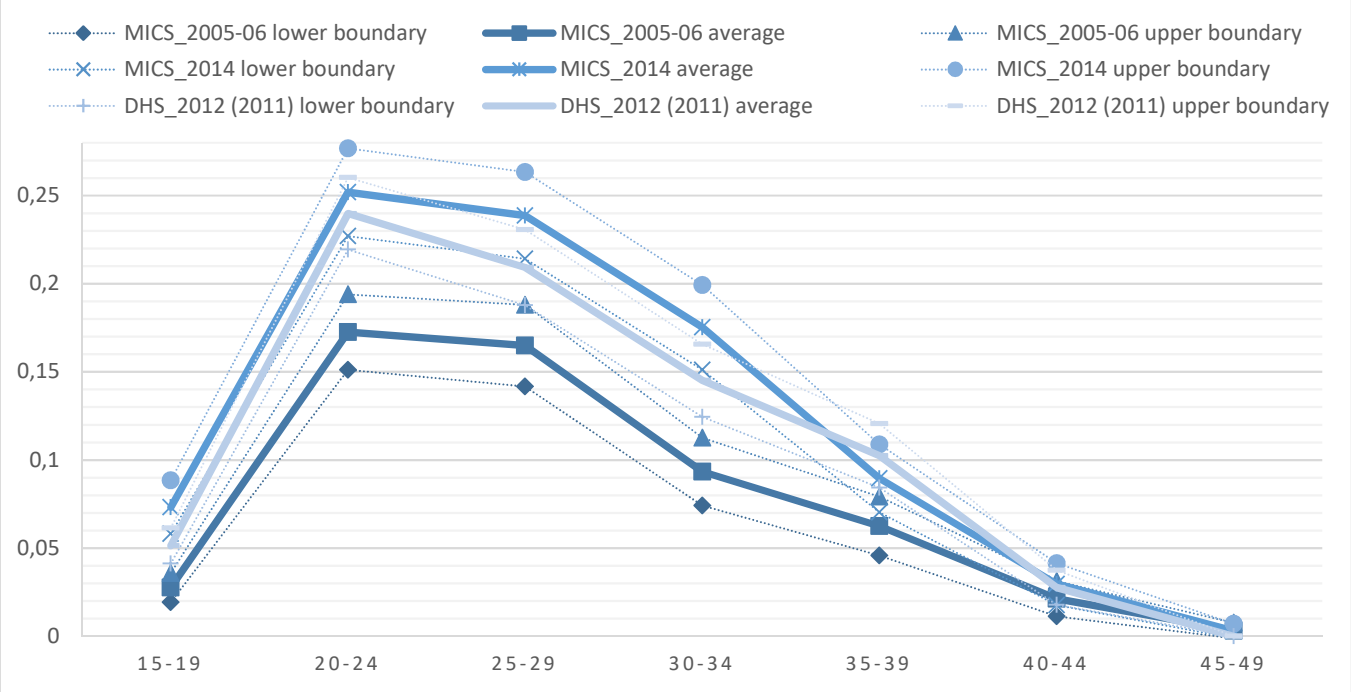
Official data on fertility timing in Kyrgyzstan is available from the Yearbooks at the official site the National Statistical Committee of the Kyrgyz Republic[2]. According to that source, MAB1 was stable in the 2010s: 23 years on average for 2012-2016 and 22.9 for both 2017 and 2018. ASFRs based on census data demonstrate that proportions of age groups in total fertility was also quite stable between the years 1989-2009, with the 20-24 ASFR remaining the highest (Denissenko et al. 2012). At Figure 2, ASFR calculated on the data from the major sample surveys carried out in

[2] http://stat.kg/en/publications/demograficheskij-ezhegodnik-kyrgyzskoj-respubliki/

Kyrgyzstan between 2000 and 2015 are plotted (see the next section on some remarks regarding accuracy of survey data on Kyrgyzstan). Again, it can be seen that age distribution of fertility remained quite stable during this period, with no shift of the fertility peak from the 20-24 to the elder age groups (note that total fertility was for most part growing in the time between the surveys, so it is hardly possible to suggest that the highest proportion of fertility in 20-24 was due to a decrease of fertility in the elder groups because of a decrease of high order births).

Figure 2:

ASFRs in Kyrgyzstan from the surveys (with 95% confidence intervals)



The fertility outside registered marriage amounted to 21.5% in 2018 (it varied between 16.1% and 29.4% from region to region). However, the survey data show very low proportion of births outside actual unions, so the high level of fertility outside registered marriage possibly is explained by the lack of civil registration of actual unions, often confirmed by a religious right.

Kyrgyzstan is a multiethnic country. Its main ethnic groups are Kyrgyz (71% according to 2009 census and 73.5% according to the administrative sources at 2018), Uzbeks (14.3%/14.7%) and Russian (7.8%/5.5%). Kyrgyz and Uzbeks are for most part Muslims, and Russians for most part Orthodox Christians. Together with the other former Soviet Republics of Central Asia, Kyrgyzstan

has also experienced a sizable out-migration after 1991, with ethnic Russians leaving the country most intensively (Tishkov 1994). Other ethnic groups of Kyrgyzstan are widely involved in temporarily labor migration, mainly to Russia. Kyrgyzstan migration survey reported more than 700 thousands of Kyrgyzstan citizens registered in other countries (including 640 thousands in Russia) in 2018 (State migration service under the Kyrgyzstan government, 2019). Russian statistics reported 360-400 thousands of labor migrants from Kyrgyzstan (10% of all labor migrants coming to Russia) in 2016 . Noteworthy, the proportion of women among migrants from Kyrgyzstan to Russia was about 40% in the recent years, which is higher than among most of other migration flows targeting Central and Eastern Europe (FIDH 2016).

Kyrgyz and Uzbeks occupy different areas of the country, with Uzbeks mainly concentrating in its south. Although reislamization was a general trend in Kyrgyzstan and in other post-Soviet countries of Central Asia since the collapse of the Soviet Union, the social role of Islam among local Uzbeks is often considered to be higher, and its forms more 'radical' according to some understandings (cf. Tromble 2014). The level of urbanization is the highest among Russian, who's majority had urban residence already in the time of the Soviet Union. Education level in Kyrgyzstan remained rather stable in post-Soviet time according to censuses data, as the proportion of people with high (tertiary) education among those elder than 15 was 11.0 percent in 1989, 10.5 in 1999, and 12.4 in 2009 (Census data available from http://www.demoscope.ru/weekly/ssp/sng_chi_89.php). Currently, according to National Statistics Office, some decline of tertiary education is observed, mainly because of liquidation of universities outside the capital Bishkek. In the 2012/2013 university year, students comprised 428 of 10 000 of the country's population, but in 2016/2017 their proportion lowered to 298.

Several studies have addressed fertility trends in post-Soviet Kyrgyzstan. Spoorenberg (2015), considering possible explanations of the recent TFR increase in countries of Central Asia, argues that one of its reasons could be timing changes. For Kyrgyzstan, he demonstrates that the growth

of observed TFR was accompanied by downward movement of tempo-adjusted TFR (Bongaarts, Feeney 1998) in the first half of the 2000s. This signals that a tempo shift towards younger fertility conditioned the TFR growth. In the second half of the 2000s the observed and the adjusted TFRs were growing in parallel in Kyrgyzstan, what allows to conclude that at that time quantum growth contributed to the growth of the observed TFR together with the shift to earlier timing. Importantly for the purposes of our study, the comparison of observed and tempo-adjusted TFR gives evidence against fertility postponement in Kyrgyzstan in the 2000s, because in the postponement situation the adjusted TFR is expected to show more positive dynamics than the observed one. Inputs of different parities to the fertility increase in Kyrgyzstan are considered by Spoorenberg (2017), where it is shown that the TFR growth in the 2000s was mainly due to the first and second parities, which took place in all ethnic groups.

The impact of ethnicity upon fertility for Kyrgyzstan is studied in Nedoluzhko and Andersson (2007), where the time period between 1990 and 2005 is considered. Risks of entry into first parenthood among Russians (treated together with other 'European' residents of the country) are found to be lower than among native-speaking Asians, but among Russian-speaking Asians those risks are still significantly lower than among Europeans. Agadjanian et al. (2013), comparing fertility trends among the major ethnic groups of Kyrgyzstan and Kazakhstan between the middle of the 1990s and the middle of the 2000s, show that the reaction of fertility of the ethnic groups to the economic growth of the 2000s had no direct correspondence to their ranking in absolute fertility levels, as only fertility of Russians, the least fertile ethnic group, grew considerably in mid-2000s compared to mid-1990s. The authors explain this by the lower base of fertility of Russians before the start of the economic growth in both countries and by selectivity effects, as Russians who did not leave Central Asia probably were better adapted to local realities than their co-ethnics who preferred to leave the country.

Ethnic and cultural contrasts are reported not only for fertility, but also for union formation in the countries of Central Asia. Thus, Agadjanian and Dammaraju (2011) argue that in Kyrgyzstan, the

probability of entering unregistered cohabitation is highest among European women, lower for Russified Kyrgyz women and still lower for non-Russified Kyrgyz women, whereas for probabilities of marriage the three groups of women range in the reverse order. The more pronounced 'traditionalism' in couple formation is therefore related not just to ethnicity, but also to cultural background of women (this is still more the case for men, among whom more Russified Kyrgyz show even larger excess in probability of cohabitation over non-Russified Kyrgyz than Europeans do). It should be noted that the label of cohabitation (unregistered marriage), used both in census and survey results, can in fact conceal very diverse phenomena in Kyrgyzstan, ranging from the 'European-style' cohabitation to Islamic marriage without state registration. According to (Denisenko et al. 2012), the growth of marriage rates in Kyrgyzstan between 1999 and 2009 left the proportion of unregistered marriages at the stable level of about 8%. Among ethnic Russians, who are mainly non-Muslims and among whom the religious sources of unregistered marriage are less probable, that proportion was nearly twice higher than among Kyrgyz. Very high propensity of marriage among pregnant women in Kyrgyzstan discovered in (Nedoluzhko and Agadjanian 2010) suggest that out-of-wedlock births generally are of low acceptance in the country.

The data considered in this section allow to suggest stability of fertility timing in light of our hypotheses in section 1. Specifically, the stability of education level in the country agrees with the lack of fertility postponement shown by official statistics (Hypothesis 1). The differences between Russians, on the one hand, and Kyrgyz and Uzbeks, on the other in religious affiliation allows to suggest that Russians can differ in timing trends. Timing differences between Uzbeks and Kyrgyz can also be expected on Hypothesis 3 because of their different ethnicities and possibly also because of the contrasts in religious practice and cultural differences.

4. The data

Two representative surveys were used in our analysis. They include Multiple Indicators Cluster Surveys (MICS) conducted in 2014, and the Demography and Health Survey (DHS) conducted in 2012. Both surveys covered a national-level representative sample of women aged 15-49. The

MICS2014, conducted in April – June 2014, covered 6854 women. The DHS was conducted in August – December 2012 and had 8208 women in its individualized record set. The respond rate for women in the MICS2014 is stated to be 96.2%, and for the DHS2012 as 97% in official reports on these surveys.

Here we briefly consider limitations connected with these survey's data. First, their samples did not involve women in temporary labor migration. Births given in the country by those women who have undertaken out-migration before the time of the survey are out of the survey's scope, what can distort both past years period fertility estimates and age-specific cohort fertility estimates. At the same time, migrants often are selective for lower fertility already in their home country. This is especially likely for labor migration, typically undertaken by more educated and less family-oriented women. Because of this, the underregistration of past years fertility of current migrants is likely to result in a bias towards higher meanings of the fertility indicators. Note, however, that this bias is not expected to be more pronounced in younger ages than in elder ones. Indeed, the younger an age point is, the more probable it is that future labor migrants still stayed in the home country by that age, and, therefore, the less probable it is that the survey fertility indicators were biased because of underregistration of in-the-country fertility of future migrants at that age. So, crucially for our purposes, we have no reason to expect that possible underregistration of fertility of future migrants causes a more serious overestimation of fertility in younger ages than in elder ones.[3]

Another limitation was related to possible underrepresentation of childless women. It is often expected that in developing countries unmarried and childless women can get a low representation in a sample because of cultural inappropriateness to remain in this status starting from certain age

[3]Note that results of Russian Census 2010 agree with the suggestion of selectivity of Kyrgyz migrants for lower fertility, as they signal that the completed fertility of real cohorts of Kyrgyz women living in Russia in the time of the Census is much lower in comparison to Kyrgyz living in Kyrgyzstan (not shown here).

(see e.g. (Hull and Hartanto 2009)). Note that (Spoorenberg 2017) argues for an underrepresentation of childlessness in the DHS2012 compared to vital statistics for Kyrgyzstan. In studying 1st birth timing, incorrect proportions of childlessness of course can result in distortions. Our only way to estimate underrepresentation of childless women in the sample surveys was to compare their results with other sources for which the voluntary excluding of this category of women is less expected. We have compared proportions of women having at least one child at different ages between 15 and 40 in 2009 according to Kyrgyzstan Census held in that year and according to the DHS2012 and the MICS2014. For the surveys, it was possible to calculate this proportion retrospectively for 2009 as they contain information of the date of first birth of all fertile women in their samples. Both the MICS and the DHS, indeed, have reported higher proportion of women having at least one child for some age groups compared to the census (the results of the comparison not shown here for reasons of space). It can be seen, however, that in both surveys this underestimation takes place for 25-29 and elder ages. Given that peak of 1st birth fertility was below 25 according to both surveys, we do not expect that this overestimation can seriously distort analysis of 1st birth timing based on the surveys.

5. The analysis

At our preliminary analytical step, we compare cumulative probability to remain childless between neighboring birth cohorts using survey data from both the DHS2012 and the MICS2014. This allows to see whether cumulative probability to have the 1st child at different age points changes from one generation to another. Figures 3 and 4 plot cumulative probabilities of childlessness to different ages by birth cohorts according to DHS2012 and MICS2014. Table A.1 of the Appendix sums up the statistic tests measuring differences in cumulative probability to remain childless between neighboring birth cohorts according to the DHS2012 and the MICS2014. Standard tests for comparison of Kaplan – Meier estimates are used. For each cohort, the cumulative probability to remain childless is estimated for each month starting from the age of exactly 15 years. There

are two cohorts for which both surveys signal a significant difference from the preceding cohort: these are the cohorts born in 1980-84 and in 1990-94. For the 1980-84 cohort a postponement of 1st births compared to the 1975-79 birth cohort took place (a subsequent recuperation for the 1980-84 cohort took place according to the MICS2014, but not according to the DHS2012). For the cohort born in 1990-94, contrary to what would be expected under postponement, cumulative probability of remaining childless was lower than that of the cohort 1985-89 at all ages reached by both cohorts before the survey time. So for only one cohort statistically significant evidence is given for lower cumulative probability of 1st birth compared to the immediately preceding cohort, and for one more cohort, statistically significant evidence for higher cumulative probability of 1st birth compared to its predecessor is found. Of course, this would not be expected if fertility postponement from elder birth cohorts to younger ones were the dominating trend. Note also that similarity of estimations based on the two surveys makes this result more robust.

For a more accurate statistical account of timing trends, Cox regressions were built for the sample of the MICS2014. We have chosen the MICS2014 for the regression analysis as the most up-to-date survey available to us. Two sets of models were run: one for proportional risks of 1st union, starting from the age of 15 years 0 months, and the other one for proportional risks of 1st birth, starting from the month of the first union. Studying risks of 1st birth only among women who have been in partnership made sense for Kyrgyzstan as births outside partnership are still very infrequent in that country. In the sample of the MICS2014, there were only two women who reported to have given birth to a child, but to never have been in a partnership. Only 1.1% of women having a child reported a date of first birth which preceded the date of the start of the first partnership (such respondents were not included in the analysis of 1st birth risks; because of their small proportion, their exclusion hardly could distort the results). Running the two sets of models allowed to disentangle effects of transition to 1st union and to 1st birth in union, what would be impossible if merely risks of 1st birth starting from 15 years were studied. Importantly, the MICS2014 data supplied age at 1st union rather than marriage. This produced some limitation for

our analysis, making it impossible to see whether a child was born in a registered marriage or not. However, it was mentioned above that unregistered unions have got some frequency in the country in the post-Soviet time. Therefore, start of 1st union was more adequate as a precondition for 1st birth than registration of marriage could be. Another limitation was that the MICS data did not allow to distinguish how much time was spent by a woman in her 1st union. However, union breaking was quite an infrequent phenomenon according to the MICS2014, as only 7.5% of women who reported to have ever been in a union called themselves divorced or separated in the time of the survey, and only another 5.7% stated that their current union was not the first one.

A variable indicating birth cohort was included in each model. As in the Kaplan – Meier estimates above, we use 5 years birth cohorts starting from 1965-69. For each cohort relative hazard ratios compared to the referent 1965-69 cohort are considered. Urban/rural residence and education level are included in all models. The education parameter is dichotomic and distinguishes between higher education (studying in a university or an institute, either with completing a degree or not) and lower education levels. To measure the impact of ethnicity, the parameter of mother tongue of the household head was included in the models. In the MICS2014 database, this is the only proxy for ethnicity. Remember that mother tongue rather than reported ethnic self-identification was shown to be significant for marriage behavior in existing studies of post-Soviet Kyrgyzstan (see Section 3).

The MICS2014 survey offered a rather limited set of parameters which can be treated as indicators of gender asymmetries. We use the dichotomic parameter showing whether a woman reported beating of wife by husband as acceptable (we assigned positive meaning to this parameter when the responded reported beating acceptable at least under one condition in a list of conditions proposed in the survey questionnaire). We assume that if a woman accepts domestic violence, this acceptance is most probably imposed by norms and behavior standards which she encounters either among her relatives or in her husband's family. In the models for transition to 1st child, we additionally included age gap between the woman and her partner. Larger age gap between a

woman and her partner is often associated with more strict gender asymmetries in a family (Casterline et al. 1986). As a socio-economic variable, we also used the level of wealth (a quantile wealth index; hazard ratios for women of different quintiles relative to the lowest quintile are considered).

The education, urban/rural residence, having a job and wealth index parameters are time-fixed in our models because the MICS data does not allow to have these parameters varying across woman's life course. Assigning the education level reached by a woman by the time of the survey to all months of her life course included in the analysis seems justifiable because women normally start they higher (tertiary) education in the age of 18-19 in Kyrgyzstan, so only the very early stages of reproductive period remain 'untouched' by the choice to get enrolled for higher education (and even the years between 15 and entering the University are with high probability spent for getting ready for admission exams, what also influences marriage and fertility behavior). Treating level of wealth as a time-fixed variable is justified by its rather undetailed, quintile-based scale, which, under relatively low wealth mobility in Kyrgyzstan, makes improbable for a woman to change radically her position at the scale during the life course (movements between neighboring quintiles are not expected to produce serious distortions)

Table 1 contains descriptive results on the parameters included in our analysis for women born from 1965 to 1998, for the whole sample and for the three major ethnicities.

Table 1:

Distribution of some parameters in the MICS2014 (total and by ethnic groups)

	All	Kyrgyz	Uzbeks	Russians
Urban,%	38,5	35,2	49,1	62,2
Higher education,%	25,4	28,7	8,1	38,1
Accepting domestic violence,%	38,0	37,7	46,6	12,9
Age gap with husband, mean	4,57	4,53	4,85	4,08
Wealth quintiles,%				
Poorest	21,8	24,2	18,6	1,4

Second	19,0	20,9	16,3	1,9
Middle	19,4	17,8	31,5	7,4
Fourth	20,3	17,3	29,5	30,1
Richest	19,5	19,8	4,1	59,2
Having a job (among born in 1989-1998),%	10,0	9,4	6,1	28,7
Access to Internet (among born in 1989-1998),%				
No	1,5	1,3	3,2	1,1
Almost every day	62,0	63,5	36,7	85,9
At least once a week	23,5	23,5	31,5	10,9
Less than once a week	13,0	11,7	28,5	2,2
N	6684	5029	1070	365

Table 2 shows Cox regressions for entering 1st union, and Table 3 Cox regressions for transition from 1st union to 1 child for the whole sample. The following asymmetries between women of different birth years can be seen. First, women of the 1980-84 birth years has significantly lower propensity both for entering the 1st union and giving birth to the 1st child than women of other birth years. Second, the younger generations show significantly higher risks of both events. This is especially highly articulated for transition to motherhood, where both 1990-94 and 1995-98 birth cohorts have risks significantly higher than women of elder generations. For transition to the 1st union, risks are significantly higher only for the 1990-94 birth cohort, and risk ratios with the eldest generation are smaller. Nevertheless, the analysis confirms that no postponement of 1st unions and 1st births took place in the younger cohorts. Russians had significantly lower risks of 1st union compared to Kyrgyz, but for transition to motherhood differences between Russians and Kyrgyz were insignificant.

Both 1st union and 1st birth risks are lower among women with higher education and among urban women. Among our indicators of family relations, acceptance of domestic violence was significantly related to higher risks of both 1st union and 1st birth. Larger age gap between a woman and her husband also had this significance for transition to 1st birth, although with a very small

meaning of the risk ratio. Ethnic differences were also detected by the analysis, as both risks under study were significantly higher among Uzbeks. No significant difference in transition to 1st childbearing in union was detected between Kyrgyz and Russians. Finally, propensity for the 1st union was significantly lower among women of the richest wealth quintile. The impact of wealth on transition to the 1st birth was, however, of low significance.

Table 2:

Risks of transition to 1st union (Cox regressions)

	(1)	(2)	(3)	(4)
Birth cohort				
1965-69	1	1	1	1
1970-74	1,006	1,020	1,019	1,017
1975-79	1,099*	1,097*	1,086	1,082
1980-84	0,885**	0,876***	0,871***	0,868***
1985-89	0,994	0,983	0,978	0,974
1990-94	1,182**	1,177***	1,186***	1,183***
1995-98	0,973	0,964	0,984	0,983
Area				
urban	1	1	1	1
rural	1,235***	1,237***	1,233***	1,177***
Education				
No higher education	1	1	1	1
Higher education	0,558***	0,580***	0,590***	0,600***
Ethnicity				
Kyrgyz		1	1	1
Russian		0,792***	0,824***	0,844**
Uzbek		1,213***	1,201***	1,178***
Accepts domestic violence				
no			1	1
yes			1,176***	
Wealth index				
poorest				1
second				1,014
middle				0,985
fourth				1,031
richest				0,881**
Chi-square	480,813***	552,479***	554,589***	560,835***
-2Log Likelihood	77377,740	77336,277	77305,410	77295,171
N	6304	6304	6304	6304

Table 3:

Risks of transition to 1st birth in union (Cox regression)

	(1)	(2)	(3)	(4)	(5)
Birth cohort					
1965-69	1	1	1	1	1
1970-74	0,995	1,001	0,997	0,985	0,985
1975-79	1,075	1,079	1,071	1,057	1,055
1980-84	0,901**	0,894**	0,891**	0,874**	0,878**
1985-89	1,097*	1,087	1,083	1,062	1,064
1990-94	2,053***	2,038***	2,035***	2,002***	2,002***
1995-98	7,344***	7,236***	7,250***	6,998***	6,998***
Area					
urban	1	1	1	1	1
rural	1,100***	1,116***	1,117***	1,125***	1,122***
Education					
No higher education	1	1	1	1	1
Higher education	0,606***	0,626***	0,632***	0,639***	0,640***
Ethnicity					
Kyrgyz		1	1	1	1
Russian		0,950	0,972	0,967	0,963
Uzbek		1,183***	1,175***	1,174***	1,156***
Accepts domestic violence					
no			1	1	1
yes			1,097***	1,093***	1,094***
Age gap with husband				1,009***	1,009***
Wealth index					
poorest					1
second					0,998
middle					1,009
fourth					1,101*
richest					0,958
Chi-square	952,632***	972,511***	981,505***	1008,837***	1015,724***
-2Log Likelihood	67041,169	67023,350	67014,196	66990,649	66982,233
N	4555	4555	4555	4555	4555

We also ran separate models for woman of birth years from 1989 to 1998. The reason for this was that the MICS data contained some additional parameters for those women which were of interest against our hypotheses. This are having a job at the time of the survey and frequency of using Internet. The latter parameter could be important in light of out hypothesis that more strict gender and generation relations in a family are related with earlier timing of the demographic events. We assume that if a woman can frequently use Internet, that indicated lower control after her

information sources and communication on behalf of her family member (cf. Guiliamo-Ramos et al. (2015)).

Models for transition to 1st birth have shown almost no significant effects for such women, probably because of low number of women in partnership among these cohorts, and are not shown here. Models for transition to 1st union are shown in Table 4. Differences between the cohorts are insignificant, what is not surprising due to smaller period of births included on these models compared to those considered above. However, the models in Table 4 show that the contrasts between urban and rural residence and between education groups do not become weaker to the younger cohorts. The contrast between accepting and not accepting domestic violence becomes even sharper, and the ethnic contrasts discovered in Table 2 persist. Women daily using Internet had significantly lower risks of entering 1st union, and for those who had a job at the time of the survey the risks were almost three times lower than for those not having a job.

Table 4:

Risks of transition to 1st union, women born in 1989-98 (Cox regression)

	(1)	(2)	(3)	(4)	(5)
Birth cohort					
1985-89	1	1	1	1	1
1990-94	0,917	0,909	0,880	1,062	0,976
1995-98	0,746	0,726	0,634	0,909	0,778
Area					
urban	1	1	1	1	1
rural	1,632***	1,600***	1,439***	1,464***	1,282***
Education					
No higher education	1	1	1	1	1
Higher education	0,466***	0,486***	0,467***	0,591***	1,126
Ethnicity					
Kyrgyz		1	1	1	1
Russian		0,581***	0,675*	0,671*	0,792
Uzbek		1,583***	1,626***	1,321***	1,084
Accepts domestic violence					
no					1
yes					1,395***

Currently has a job					
no			1		1
yes			0,351***		0,393***
Access to Internet					
no				1	1
Almost every day				0,541**	0,736
At least once a week				1,198	1,460
Less than once a week				1,259	1,366
Chi-square	117,017***	139,227***	200,351***	223,915***	323,334***
-2Log Likelihood	6384,136	6363,387	6293,260	6291,976	6200,985
N	1482	1482	1482	1482	1482

Figure 3:

Cumulative probability of childlessness at different months from 15 years according to the MICS2014

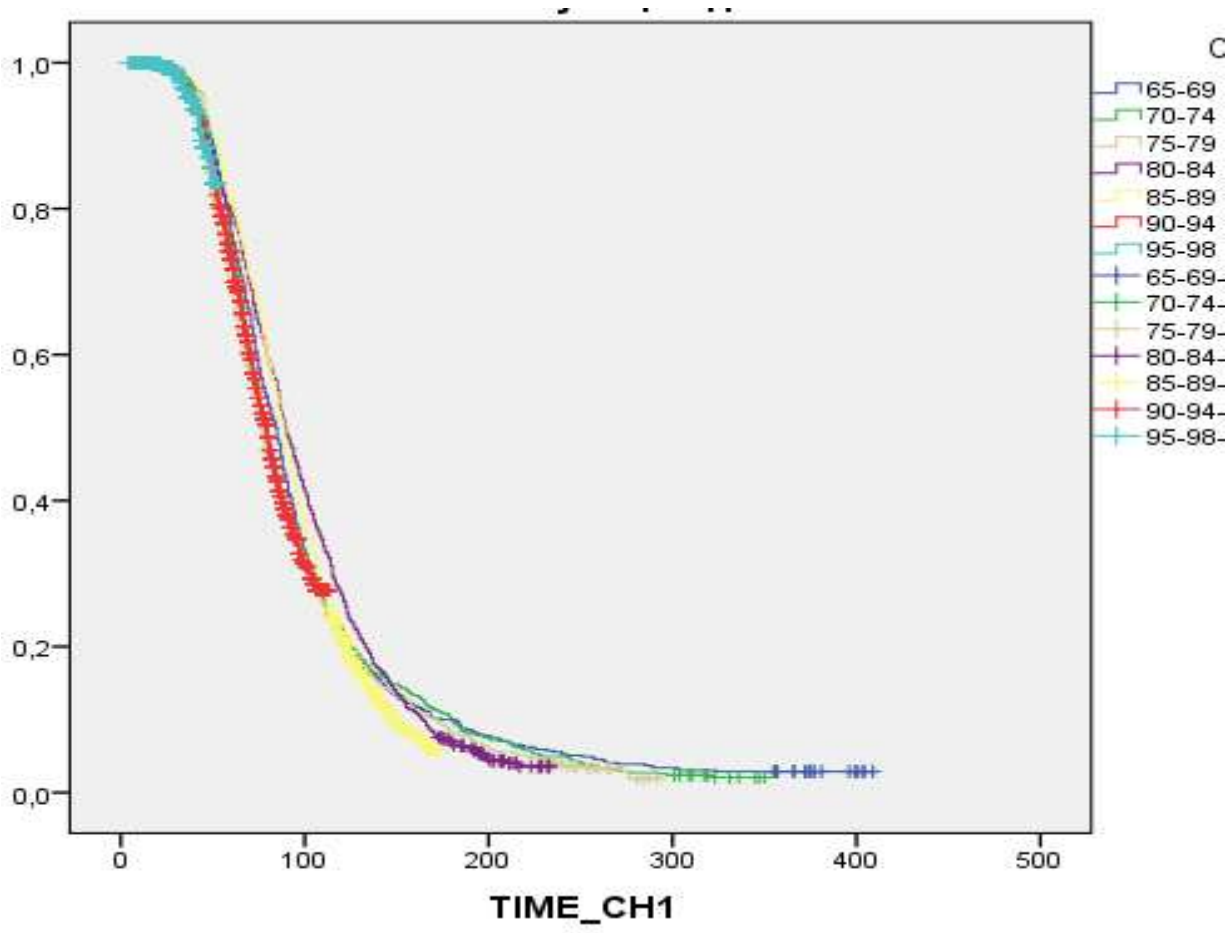
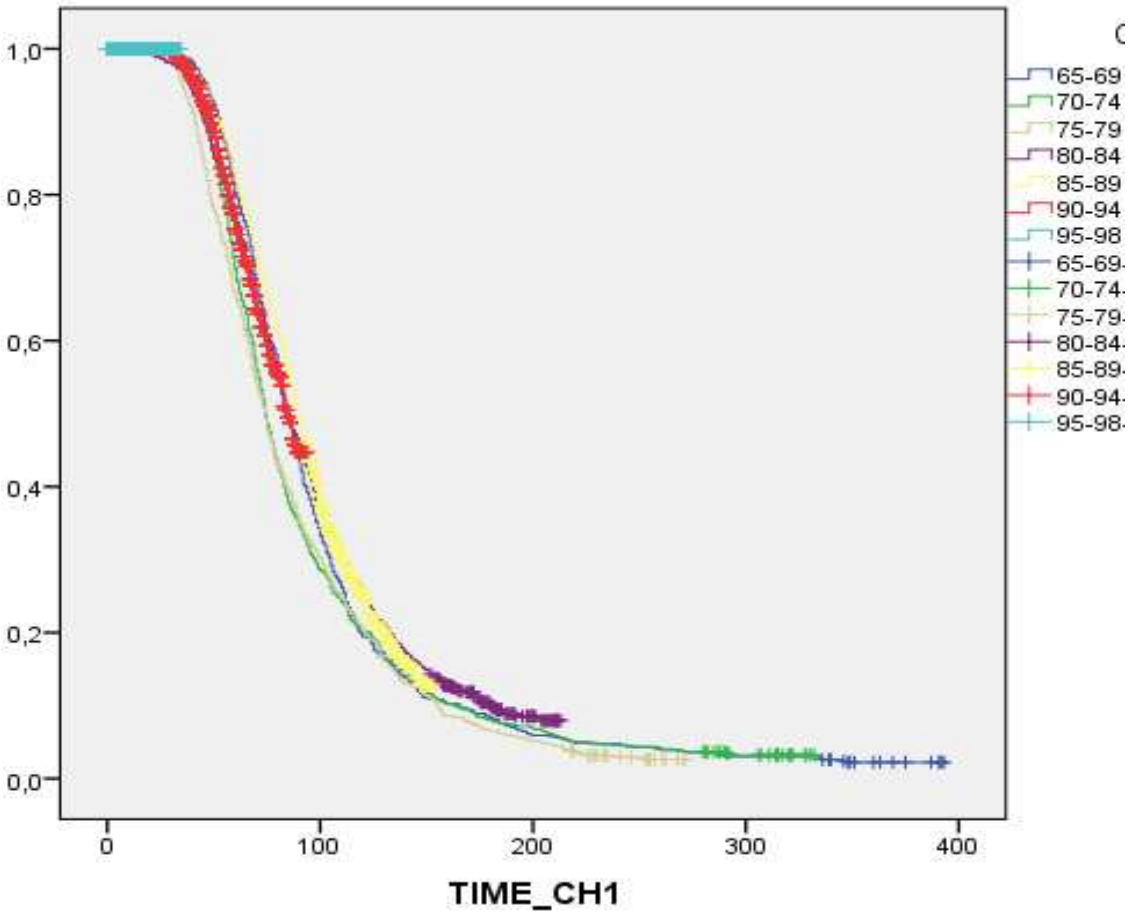


Figure 4:

Cumulative probability of childlessness at different months from 15 years according to the DHS2012



7. Discussion

Our analysis has confirmed that postponement of transition to motherhood was not the dominating tendency in Kyrgyzstan at least from women of the 1965-69 birth cohorts and until the youngest cohort in reproductive age in 2014. The higher risks of entering the 1st union and especially of 1st birth in union shown by the youngest birth cohorts compared to the reference cohort definitely are not compatible with postponement and rather point to 'rejuvenation' of timing of the two events. Note that similar analysis undertaken for post-Soviet countries with firm evidence for fertility postponement showed gradual lowering of risks of both events towards younger generations (see

e.g. Mitrofanova 2017 for Russia). Importantly, the significantly higher risk ratios are observed only for the two youngest cohorts, suggesting that the timing tendency pointed out by the analysis is quite 'new'.

The depressing impact of higher education on risks of both entering the 1st union and of 1st child bearing agrees with similar results on other developing countries (see section 2). We have also seen a similar effect of woman's employment, though we only could analyze its influence on risks of 1st union among the three youngest cohorts. So our observations on education and labor market position of women support our first hypothesis. Lower risks of entering the 1st union among the most wealthy women also can be partly related to higher education level expected in this social stratum. However, since the education parameter retains its significance when considered together with the wealth index (Model 4 of Table 2), it can be suggested that some other characteristics of the richest quintile support postponement of 1st unions. Interestingly, wealth index is insignificant for transition to motherhood, what means that quick child bearing after entering union is typical for the 'upper class' of Kyrgyzstan society as well.

Although our data allowed us to involve only a few parameters indicating generation or gender relations, these parameters appeared to influence timing in the way we hypothesized in Section 2. Higher risks of both events among women accepting domestic violence show that earlier union and 1st childbearing timing is characteristic for women who view family position of wife as strongly subordinate. As this parameter does not lose its significance in the models run only for the younger cohorts, the contrasts in timing of the events between women with different views on norms of gender relations become even stronger among the younger generations. This sharpening of contrast is, however, accompanied by a decrease of proportions of women accepting domestic violence from the elder cohorts to the younger ones. In the MICS2014 sample, the proportion of those who found acceptable for a husband to beat his wife at least under some conditions was gradually lowering from the 1975-79 birth cohort (42.4%) to the 1995-98 birth cohort (23.5%). So

our data suggest that women accepting domestic violence become a 'minority' whose demographic behavior, at least in the aspect of timing of events, comes to a sharper contrast with the rest of the population.

Whereas attitude to domestic violence was an ideational parameter, age gap between partners could, though indirectly, point more 'objectively' to gender asymmetries in a woman's family. The significant relation of larger age gap to higher risks to transition to the 1st child confirms our hypothesis that more strict gender asymmetries support earlier timing, although risk ratios change rather little with each annual increase of the gap (Models 4 and 5 of Table 3). Age gap between partners does not seem to be subject to serious intergenerational changes in Kyrgyzstan, since no statistically significant differences on this parameter between the cohorts included in our study were discovered, with average age gap for all the birth cohorts being at a rather high level of 4.54 according to the MICS2014. So our analysis suggests a family organization parameter which is stable across the cohorts and, at least moderately, supports early timing of the events.

The lower propensity for entering the 1st union among women of the younger cohorts who daily use Internet can be interpreted in light of our second hypothesis, too, as long as we assume that more frequent use of Internet indicates lower control upon a woman on behalf of her family members. However, differences of frequency of turning to Internet can also reflect different quality of network connection in different parts of the country.

Our hypothesis concerning ethnicity was generally confirmed since the parameter of native language of household head, which was used as the proxy for ethnicity in our analysis, was significant both for the 1st union and the 1st birth risks. For both events, risks were the highest for Uzbeks and the lowest for Russians. For the 1st union, however, the risk ratios were higher than for the 1st birth. Besides, for 1st union differences were significant between Uzbeks and Kyrgyz, but not between Russians and Kyrgyz. So our analysis shows that, despite of the close connection between 1st union and 1st birth, impact of ethnicity on risks of these events can be different in a

developing country. At the present stage of the research, we cannot suggest an account for the differences of the impact of ethnicity on the two events. In general, however, it is possible to relate earlier timing of women of some ethnicity to lower social role of women in that ethnicity. Descriptive data from table 1 support this, as Russians outrank both Kyrgyz and Uzbeks in proportions of women with higher education, having a job, having daily Internet access and rejecting domestic violence. Among Uzbek women, in turn, those having higher education are about 3.5 times less frequent than among Kyrgyz, and those having daily access to internet about 1.8 times less frequent. Also, the number of women accepting domestic violence among Uzbeks is the highest, amounting to almost 50%. However, it is important to note that the ethnicity proxy was significant in the models where these parameters were independently included. Therefore, if the interethnic differences really are explained by different degrees of family 'conservatism', some other elements of that 'conservatism' probably come into play, which are not observable in our data.

All in all, on the example of Kyrgyzstan we have seen the tendency to earlier timing of entering 1st union and of transition to motherhood among younger generations compared to elder ones can be detected by statistical analysis in today's developing country. The example of this country also shows that two events can be not completely parallel in their risk trajectories across generations. Furthermore, the two events can also not coincide in parameters influencing their risks. This points to importance of separate consideration of risks of 1st union and 1st birth in developing countries. In countries with a negligible level of out-of-union fertility, like Kyrgyzstan, this makes special sense because general risks of 1st birth there are decomposable in risks of there two events. We have also seen that earlier timing of the events correlates with indicators of subordinate position of women in a family, with her lower education and lack of labor activity outside her household. This suggests that fertility timing is dependent upon 'traditionalism' of family relations, and allows to expect that future trends in timing will be influenced by '(de)traditionalization' trends. This, of course, needs a cross-country confirmation, complicated by differences of parameters of

generation and gender relations available for different developing countries. Finally, our analysis has shown significance of ethnicity for timing. Its influence on timing needs special treatment because it cannot be explained away through interethnic differences in parameters of woman's position in her family, at least in those of them which were available to us. A comparative study of ethnicity-to-timing relation across developing countries is called for.

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Appendix.

Table A.1:

Statistic tests showing significance of differences in cumulative probability of remaining childless between neighboring birth cohorts in Kyrgyzstan according to the MICS 2014 and the DHS2012

	MICS2014			DHS2012		
	Log Rank	Breslow	Tarone-Ware	Log Rank	Breslow	Tarone-Ware
1970-74 to 1965-69	0,640	1,689	1,083	4,719**	18,544***	11,968***
1975-79 to 1970-74	1,401	2,648	2,005	1,257	2,023	1,366
1980-84 to 1975-79	6,419***	22,183***	15,808***	18,135***	25,371***	22,594***
1985-89 to 1980-84	4,187**	0,700	2,106	0,689	5,300**	2,768*
1990-94 to 1985-89	14,272***	22,896***	19,673***	9,379***	12,154***	11,102***

Source: computed on the MICS an the DHS database