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Fertility increase in Central Asia: Why, how?

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After a swift decline during the 1990s related to the collapse of the Soviet Union, the period total fertility rate (TFR) has been stagnating and/or increasing, according to official governmental statistics, in all countries of Central Asia since the late 1990s-early 2000s. With an increase of almost 59 per cent (1 child per woman) between the minimum level of fertility in 1999 and its maximum in 2011, the increase of the period TFR was the higher in Kazakhstan. The fertility increases in the other countries of the region were less important: 29 per cent (i.e. 0.7 child per woman) between 2001 and 2011 in Kyrgyzstan; 13 per cent (i.e. 0.43 child per woman) between 2006 and 2010 in Tajikistan and 12 per cent (0.28 child per woman) between 2003 and 2008 (the last available year) in Uzbekistan. In Turkmenistan, the picture is less clear, mainly due to a lack of recent consistent data, but the available data suggest fertility stagnation since the mid-2000s. So far, the reasons behind these increases and stagnations have not been the subject of strong interest from demographers.

In this study, I take a quasi forensic perspective by investigating different hypotheses that help understanding better the recent changes in the period TFRs across the region: data artifacts (improvement in vital registration system (VRS)), population composition effect, economic context and shifting tempo effect. The comparison of fertility data from the VRS with other estimates from other data sources and/or estimation methods gives confidence that the recent changes are real and that the data artifact hypothesis can be ruled out. The most plausible explanations are to be found in the population composition effect, the economic context and the shifting (fertility) tempo effect. As fertility patterns differ between ethnic groups, the out-migration of large portions of specific ethnic groups influences ultimately the course of fertility at the country level. Further, the effect of the diverse economic fortunes among Central Asian countries is as well considered as a possible factor contributing to the recent fertility trends in the region.

Data and analytical strategy

I focus on the five Central Asian countries, namely Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. While examining all five countries, countries of the region differ in terms of the number of data collection operations conducted, as well as the number of available data sources. Table 1 summarizes the main data used in this study. Both population census and sample survey data are employed to investigate the set of hypotheses. At the exception of Uzbekistan, all countries of the region have conducted two population censuses since the end of the Soviet Union. Sample surveys were conducted in all countries since the mid-1990s, but the degree of availability differs, with access to final reports and/or data for Turkmenistan being usually restricted.

Table 1. Main data sources by country, Central Asia

Data source	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Official/VR data	1990-2011	1990-2011	1990-2010	1990-2006	1990-2009
Census	1959 1970 1979 1989 1999 2009	1959 1970 1979 1989 1999 2009	1959 1970 1979 1989 2000 2010	1959 1970 1979 1989 1995 2012**	1959 1970 1979 1989
Survey	1995 DHS 1999 DHS 2003 WHS 2006 MICS 2010-11 MICS	1997 DHS 2005-06 MICS 2012 DHS*	2000 MICS 2005 MICS 2012 DHS*	2000 DHS 2006 MICS*** 2011-12 MICS**	1996 DHS 2000 MICS 2002 UHES 2006 MICS

Notes: * preliminary report; ** not yet available; *** restricted access. DHS = Demographic and Health Survey; MICS = Multiple Indicator Cluster Survey; WHS = World Health Survey; UHES = Uzbekistan Health Examination Survey.

I use different methods to tackle each of the hypotheses. Under the 'data artifacts' hypothesis, it is assumed that the completeness of the registration of birth information has improved over the recent years. The recent fertility increase or stagnation would therefore be mainly artificial, mirroring such improvement in the completeness of the vital registration system. The cross-comparison of the trends and levels of official VRS-based estimates of total fertility rates with fertility estimates computed from other data sources and estimation methods allows addressing if the recent fertility changes observed in the region were indeed real. If the fertility patterns obtained from other data sources corroborate the official fertility figures, one has to rule out the data artifacts hypothesis as a likely explanation to the recent fertility increase or stagnation in the countries of the region.

The second hypothesis refers to the population composition effect. Populations of Central Asian countries have been since long composed of different ethnic groups whose demographic behaviors differ historically. I examine here the recent changes in the ethnic composition of the population in each country in order to consider if the emigration of large portions of given ethnic groups could have a mechanic effect on the course of fertility.[2] A change in the ethnic composition of the population of Central Asian countries could only shape the course of fertility at the national level if the ethnic groups differentiate themselves in terms of their reproductive behaviors. In this regard, I estimate total fertility by ethnic group based on both population census and sample survey data. To test the 'population composition' hypothesis, I run a simulation of what would have happened to fertility at the national level *if* only the ethnic population composition was changing and the ethnic-specific TFRs are kept constant at their level observed before the recent fertility increase.

The third hypothesis is related to the economic context. I look here at the relations between fertility and economic performance among the countries of the region. As the declines of fertility during the 1990s in the region coincided with the collapse of national economies, one could put forward that the economic recovery and growth could positively influence on the recovery of fertility. Recent studies on European countries showed a pro-cyclical relation (positive correlation) between fertility and economy (Goldstein et al. 2009 and 2013). I use panel regression to test this hypothesis.

In line with the third hypothesis, the harsh economic times might have brought fertility postponement (first births, longer spacing), depressing henceforth the period TFR while economic recovery and better economic performance in the 2000s might have brought a return to somewhat earlier childbearing, inflating the period TFRs. To address this last hypothesis, I look at age-specific data by birth order (UNSD 2013) and apply the Bongaars and Feeney tempo-adjustment (Bongaarts & Feeney 1998). Unfortunately, such data are not available for each of the five countries of the region, but only for Kazakhstan and Kyrgyzstan.

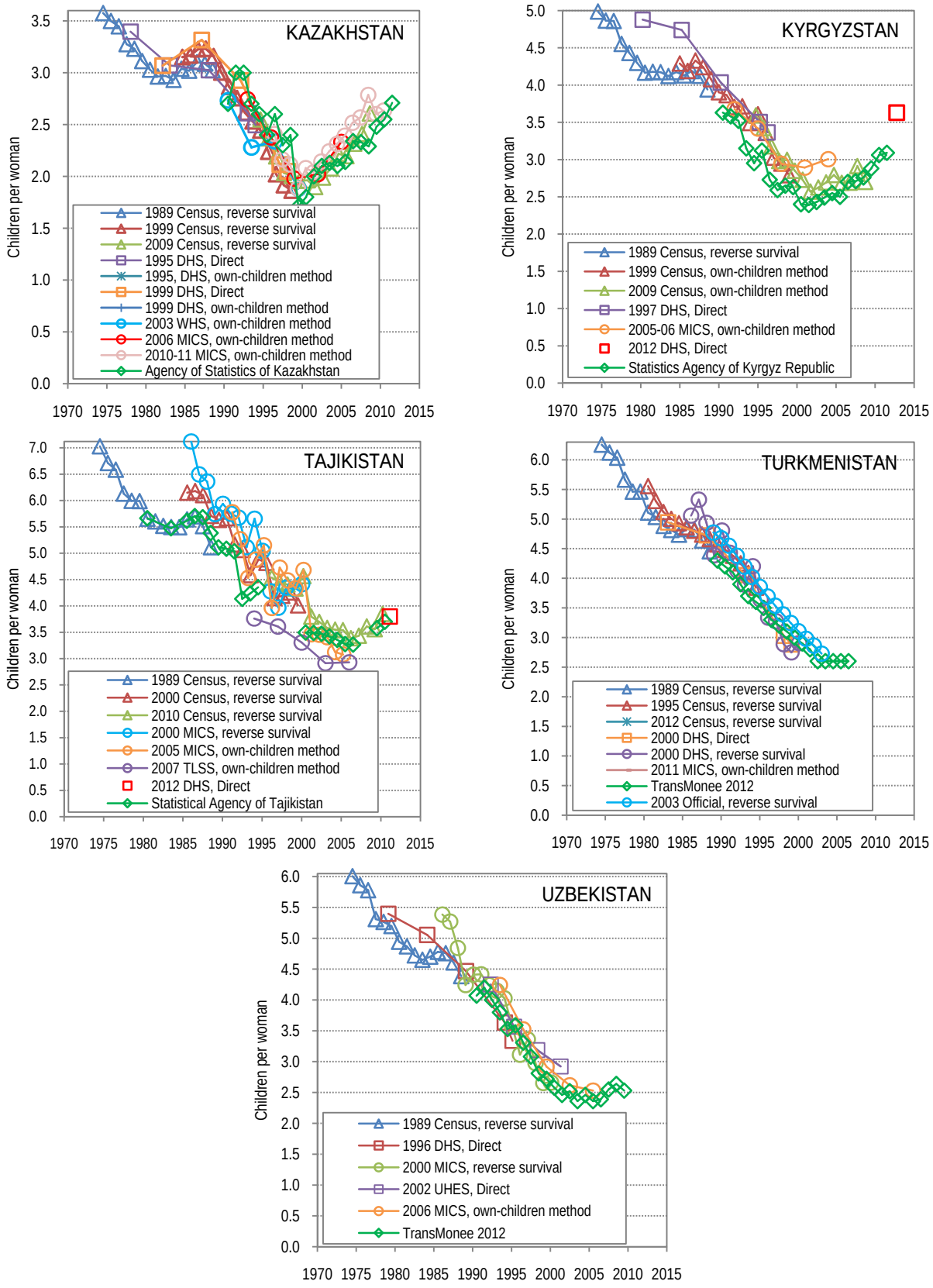
Data artifacts

Census and survey data are first used to address the possibility that the recent fertility increase is the by-product of an improvement in the completeness of the registration of birth information. With the social, economic and political transition and crisis of the 1990s, all governmental services and institutions experienced various kinds of difficulties to continue to function properly. In such context, it can be possible that the swift fertility decline of the 1990s and the subsequent fertility increase are indeed mirroring changes in the completeness of the birth registration. Cross-comparing the trends and levels of official TFR estimates with fertility estimates computed from other data sources and estimation methods allows to address if the recent increases were indeed real.

Figure 1 presents for each of the five Central Asian countries fertility estimates from various sources and estimation methods together with the official fertility data published (or communicated to international agencies) by the respective national statistical office. As many as possible available data sources were considered in order to cross-compare national official governmental fertility figures with the sets of other fertility estimates.

[2] To be noted, while emigration contributed certainly the largest to define the ethnic population composition in Central Asia, other factors have had an effect (i.e. re-identification…).

Figure 1. Fertility estimates from various sources and estimation method, Central Asia



While some differences are to be expected between estimates based on different data sources and estimation methods, what Figure 1 shows is that the fertility declines and subsequent increases or stagnations were not solely recorded in official figures. The same patterns are obtained from the application of indirect estimation methods to survey or census data and corroborated by available published survey results. After a plateau in the late 1980s, period TFRs in Central Asia have declined swiftly during the 1990s and, after having reached a nadir in the late 1990s-early 2000s, started a sustained increase. The increase started the earliest and was the largest in Kazakhstan, while, mainly due to the difficulty to access recent data, it remains difficult to conclude whether fertility has stagnated or increased in Turkmenistan.

In other words, the 'data artifacts' hypothesis is not verified and should therefore be ruled out. The fertility declines and increases or stagnations are not the by-product of changes in the completeness of the registration of birth information. The fertility increases and stagnations observed throughout the Central Asian region are real and alternative factors should therefore be examined in order to explain these recent fertility developments.

Population composition effect

As the estimates based on other data sources and estimation methods corroborate the fertility increases or stagnations observed in the VR data, I look at the changes in the ethnic composition of the population in each of the five countries as a possible explanation to the fertility increase. The changes in the ethnic population composition of the countries of Central Asia are oftentimes considered as the major driving force behind the fertility changes in the region. For the changes in the ethnic composition of the population of Central Asian countries to influence the course of fertility at the national level, ethnic groups must differentiate themselves in terms of reproductive behaviors. To address this issue, TFR estimates by ethnic group should first be examined to see if they differ markedly. Second, a simulation of what would have happened to fertility at the national level *if* only the ethnic population composition was changing can be easily run by keeping constant the ethnic-specific TFRs to a level observed before the recent fertility increase and allowing for change only the population composition. Such *if-based* scenario would allow testing directly the 'population composition effect' hypothesis.

Ethnic-specific TFR

Aside the difference in the number of data sources available for estimating fertility patterns by ethnicity, Figure A1 in Appendix reveals firstly an impressive consistency between estimates derived from different data sources and estimation methods. Second, corroborating previous studies (Agadjanian & Makarova 2003; Agadjanian et al. 2008; Agadjanian & Dommaraju 2011; Agadjanian et al. 2013; Bondarskaya 1994; Darsky & Andreev 1991; Dommaraju & Agadjanian 2008; Spoorenberg 2013), Figure A1 indicates similar distinct fertility patterns by ethnicity in all five Central Asian countries, with the fertility level of women from Slavic/European origin (indicated as 'Russian' on Figure A1) systematically lower than the fertility of other ethnic groups.

Changes in the ethnic population composition

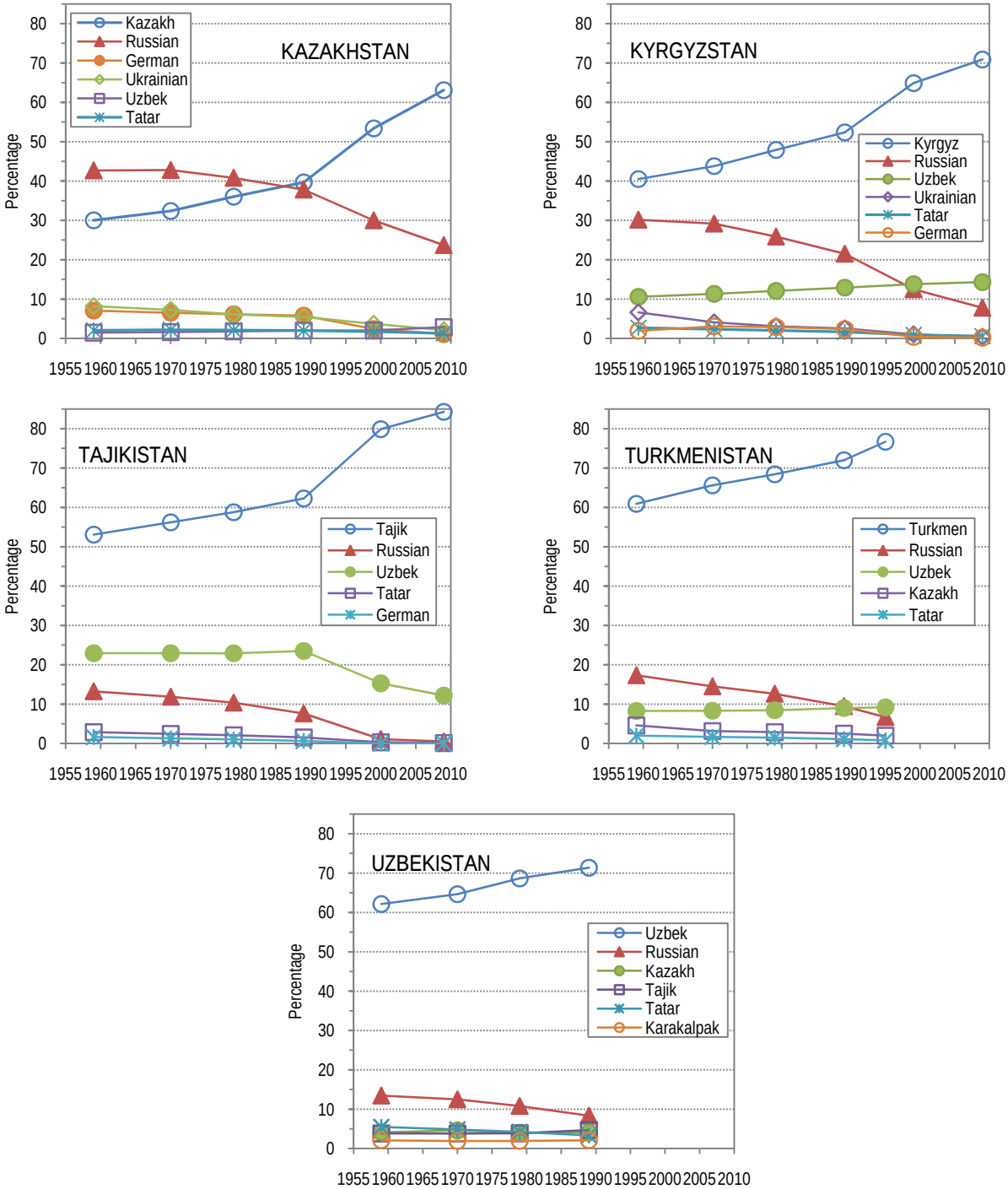
As TFR differs between ethnic groups, a change in the ethnic population composition could affect directly and mechanically the TFR at the country level. The long-term changes in the ethnic composition of the population of each Central Asian country are given in Figure 2. In each country, the end of the Soviet Union has been marked by a redefinition in the ethnic population composition. Indeed, large portions of the population left the Central Asian countries.

In general, the share of the population of the titular ethnicity grew markedly since 1989, with an increase of more than or about 20 percentage points in Kazakhstan, Tajikistan and Kyrgyzstan. In Turkmenistan, while the results of the last census conducted in December 2012 are not yet available, the proportion of the Turkmens increased by about 5 percent between 1989 and 1995, in line with what has been observed elsewhere in the region. In the absence of any census operation since 1989, Uzbekistan is however likely

to have experienced similar changes. According to Maksakov (2011: 143), the number of Russians living in the country declined by 1.7 times, and so did the number of the Ukrainians, Tatars, Jewish, Germans and representative of other nationalities.

Figure 2. Changes in the ethnic population composition, Central Asia, 1959-to most recent census

Sources: - 1959 to 1989 censuses, computed from census tables of the total population by ethnicity available online at (last accessed 16 October 2012): http://demoscope.ru
- For 1995 (Turkmenistan) and 2000 (Tajikistan) census, Interstate Statistical Committee of the Commonwealth of Independent States (2006: 419 & 448).

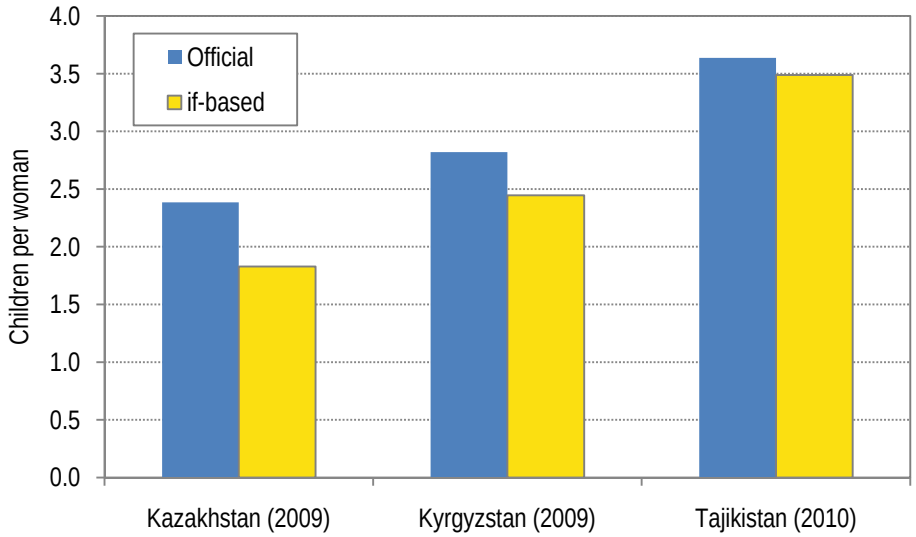


Population composition effect on fertility

These compositional changes in the population of the countries of Central Asia are oftentimes considered as the major driving force behind the fertility increases in the region. To test this hypothesis, I computed hypothetical fertility estimates ('if-based' estimates) for the three countries with recent census data available (Kazakhstan, Kyrgyzstan and Tajikistan) by holding constant the TFR of the main ethnic groups at its level observed around the previous census: 1999 for Kazakhstan and Kyrgyzstan, and 2000 for Tajikistan. The 'if-based' estimates are obtained as weighted average holding constant the ethnic-specific TFR at their 1999 or 2000 level and using the intercensal changes observed in the population percentages as weights. Since the TFR for all ethnicities are not available, the 'if-based' series generally underestimate, however slightly, the 'true' fertility level in the country.

As sketched out in Figure 3, the changes in the ethnic population composition have contributed significantly to the fertility increases in Central Asia. As seen above, this is due to the fact that reproductive behaviors differ among ethnic groups in the region. Undoubtedly, despite the fact that the 'population composition effect' hypothesis could not be tested for Turkmenistan and Uzbekistan, the changes in the population composition have contributed significantly to the fertility increases in Central Asia.

Figure 3. Official and 'if-based' TFR estimates, Kazakhstan, Kyrgyzstan and Tajikistan
Note: See text for details; Turkmenistan and Uzbekistan not included as no recent census is available.



Economic context

Beside the evident role of the population composition changes in understanding the fertility changes in Central Asia, the economic context constitutes a possible concomitant factor helping to understand the fertility changes in the region. Despite having been all affected by the collapse of the Soviet Union, each country experienced differently this break-up depending on its national characteristics. Similarly, all countries benefited of economic recovery and/or growth at the end of the 1990s and during the 2000s. Putting the fertility changes in perspective with the national economic trajectories, one could speculate that the fertility development is possibly driven by the economic context as well (Agadjanian et al. 2013, Spoorenberg 2013). In other words, the distinct economic path followed by each country could have influenced the fertility changes in the 1990s and later in the 2000s. And similarly, because of their given social and political legacies, ethnic groups in each country reacted differently to these economic changes.

The progressive economic recovery of the late 1990s and the succeeding growth of the 2000s have certainly contributed to increase or stabilize gradually fertility. This seems to be particularly the case in Kazakhstan, where the economy has soared since the early 2000s, and where fertility increased by almost 0.9 children per woman. In contrast, the economic recovery in the Kyrgyz Republic, Tajikistan and

Uzbekistan started later and was less vigorous, resulting in lower fertility rebound. The experience of Central Asian countries over the last decades seem to indicate a pro-cyclical relation (positive correlation) between fertility and economy similar to what has been observed recently across European countries (Goldstein et al. 2009: 682-684; Goldstein et al. 2013).

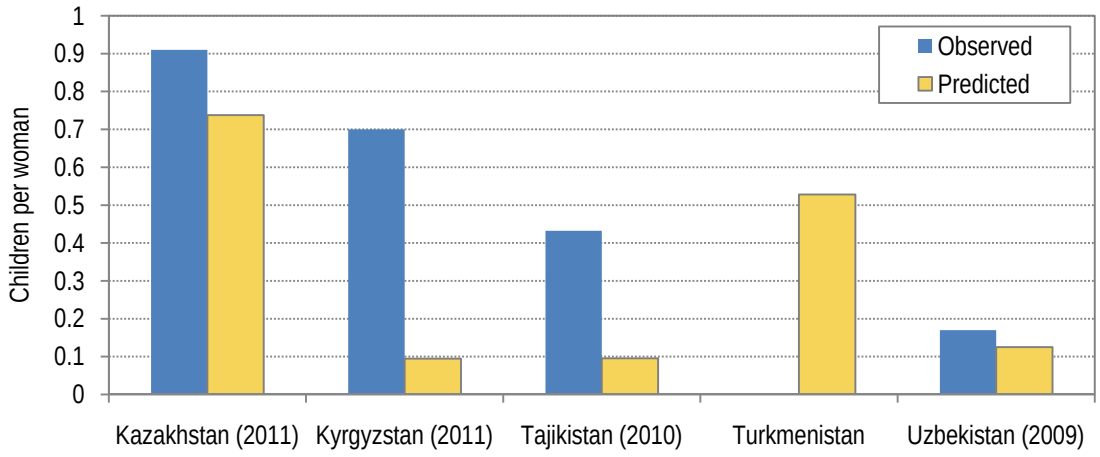
In order to test the effect of the economic context on the period TFR in Central Asian countries, I use the Gross Domestic Product (GDP) per capita (current international $) for the period 2000 to 2011 (World Bank 2013). The reliance on the sole GDP per capita is constrained by the data availability; other economic indicators (e.g. unemployment rate…) are not available for each country of the region. The decision to focus on the period since 2000 was made as it corresponds to the time of a change in the trend of the period TFRs in most of the countries of the region (see Figure 1). I used fixed country effects to control for unobserved variables that might influence the country-specific level of fertility or economic conditions.

According to the results of the regression (not shown), the effect of the GDP per capita is statistically significant to predict period TFR. Every dollar added to the GDP per capita results on a fertility increase of 0.000089 children per woman, pointing to a pro-cyclical relation between period fertility and economic conditions.

Yet, as shown in Figure 4, the GDP per capita is by far not sufficient to understand fully the recent fertility changes in the region. Indeed, according to the results of the regression analysis, the economic variable selected contributes to explain 20 per cent of the variation in period fertility in the region. The cases of Kyrgyzstan and Tajikistan, the two countries with the lowest GDP per capita values, illustrate that other factors have contributed to increase fertility.

Figure 4. Increase from the lowest TFR observed since 2000 to the most recent observed TFR and predicted TFR from economic context, Central Asia

Notes: - Year with the most recent observed TFR given after country's name.
- For Turkmenistan, only the predicted increase is shown as no recent observed TFR is available.



Shifting tempo effect

Directly related to the fact that the economic recovery and growth of the 2000s have positively contributed to the fertility increase is the fact that the recent fertility changes in the Central Asian region could be the by-product of shifting tempo effect. The harsh economic times might have brought fertility postponement (first births, longer spacing), depressing henceforth the period TFR while economic recovery and better economic performance in the 2000s might have brought a return to somewhat earlier childbearing, inflating the period TFRs.

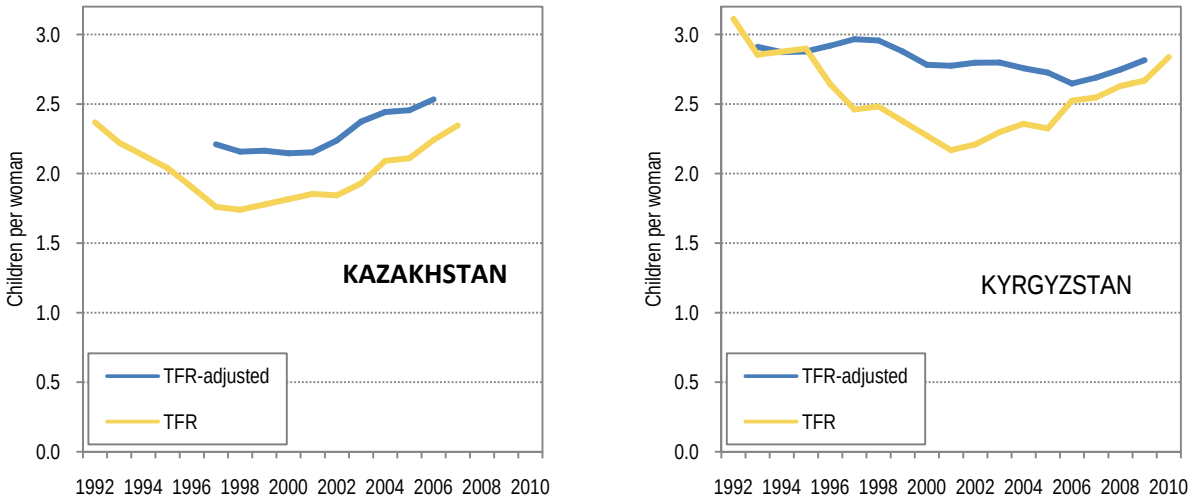
In order test this hypothesis and to determine the role of shifting tempo effect in the recent fertility changes in the region, the Bongaarts and Feeney's tempo-adjustment (1998, 2000) is applied to age-

specific fertility data by birth order (UNSD 2013).[3] Unfortunately, such data are not available for all countries of the region and tempo-adjusted measures of TFR could be computed only for Kazakhstan and Kyrgyzstan. According to official data, these two countries have experienced the largest fertility increase in Central Asia (see Figure 1) and the conclusion drawn from these two countries are likely to shed light on what could have happened to fertility in the other three countries of the region. As the data quality for the earlier years in the 1990s is questionable, results for Kazakhstan are presented since 1996 only.

Tempo-adjusted TFR gives a measure of the level of fertility in the absence of postponement. Despite its underlying assumptions, this indicator is useful to examine whether the fertility increases in Central Asia are due to declining tempo effects or to quantum changes. Figure 5 presents the observed TFR and the tempo-adjusted estimates of the TFR for Kazakhstan and Kyrgyzstan. In both countries, it is clear that tempo effects were at play.

For Kazakhstan, despite the shorter period for which a tempo-adjusted TFR could be computed, the tempo-adjusted and observed TFR have changed almost in parallel since the mid-1990s. In this country, while tempo effect is likely to have played a role in the fertility decline during the 1990s, quantum changes seem to be the main force behind the recent fertility increase. In Kyrgyzstan, the picture is somewhat different. Tempo-adjusted and observed TFRs have converged recently, revealing that a decline in the tempo effect has been the main driver of the recent fertility increase. Yet, over the last years, both TFR series seem to have changed in parallel, revealing that quantum effect is also at work.

Figure 5. Total fertility rate and adjusted total fertility rate, Kazakhstan and Kyrgyzstan
Note: A three-year moving average was applied to the TFR-adjusted to increase stability of the time series.



Conclusion

After a decade of decline following the break-up of the Soviet Union, total fertility rates have increased in Central Asia. Reasons behind these recent upturns have not been the subject of strong interest among demographers. This paper has investigated a series of hypotheses that could contribute to understand better the forces behind the changes in fertility in the region.

As a starting point, it was envisaged that the fertility changes in the region could have been the by-product of data artifacts. The fertility declines and increases could have resulted from changes in the completeness of the coverage of information on births registered in the vital registration system. The cross-comparison of fertility estimates from various data sources and estimation methods ruled out that possibility: both the TFR declines and following increases were real.

[3] While the Bongaarts and Feeney's tempo-adjustment has been applied almost exclusively on data by single year of age, the data for Central Asia are available by five-year age groups only, introducing a small approximation in the procedure.

The alternative hypotheses examined the role of population composition, the economic context and shifting tempo. All three factors have indeed contributed to the fertility upturns recorded in the region. As the average number of children per woman among the titular ethnic group is about one child higher than the level of women of European/Slavic origin, the compositional changes in the ethnic population of the countries of Central Asia have been a major driving force behind the fertility increases in the region.

The economic context has also played a role in the recent fertility changes. Depending on its national legacy and endowment, each country benefited differently the economic recovery and growth. According to our regression model, it seems that the role of the economic context in explaining the recent fertility increase varies across countries of Central Asia, but the economic growth is *positively* related to period TFRs in all countries.

Finally, this analysis has looked at the possible role of shifting tempo effect in the recent fertility increases. Due to data availability, this hypothesis could be tested only on two countries. The application of the Bongaarts and Feeney's tempo adjustment to age-specific fertility data by birth order indicated that the fertility declines were due to shifting tempo effect, while a mixture of tempo and quantum effect seems to drive the recent fertility increases. Furthermore, the results for Kazakhstan and Kyrgyzstan suggest that the contribution of tempo and quantum effects in these increases varies across countries. While future research should look into more details on these patterns, such endeavor will be constrained by the data availability.

The future availability of more census and survey data will undoubtedly help addressing further the fertility changes in Central Asia. This would be particularly true for Turkmenistan, with the availability of the 2012 census helping to remove some of the caveats that could not be addressed properly in this study. Yet, what this paper has shown is that the recent fertility changes in Central Asia is the by-product of a series of non-exclusive factors that contributed jointly and simultaneously to push up the period fertility rates in the region. By stressing the congruent effects on fertility of a series of factors, these increases are hopefully better understood.

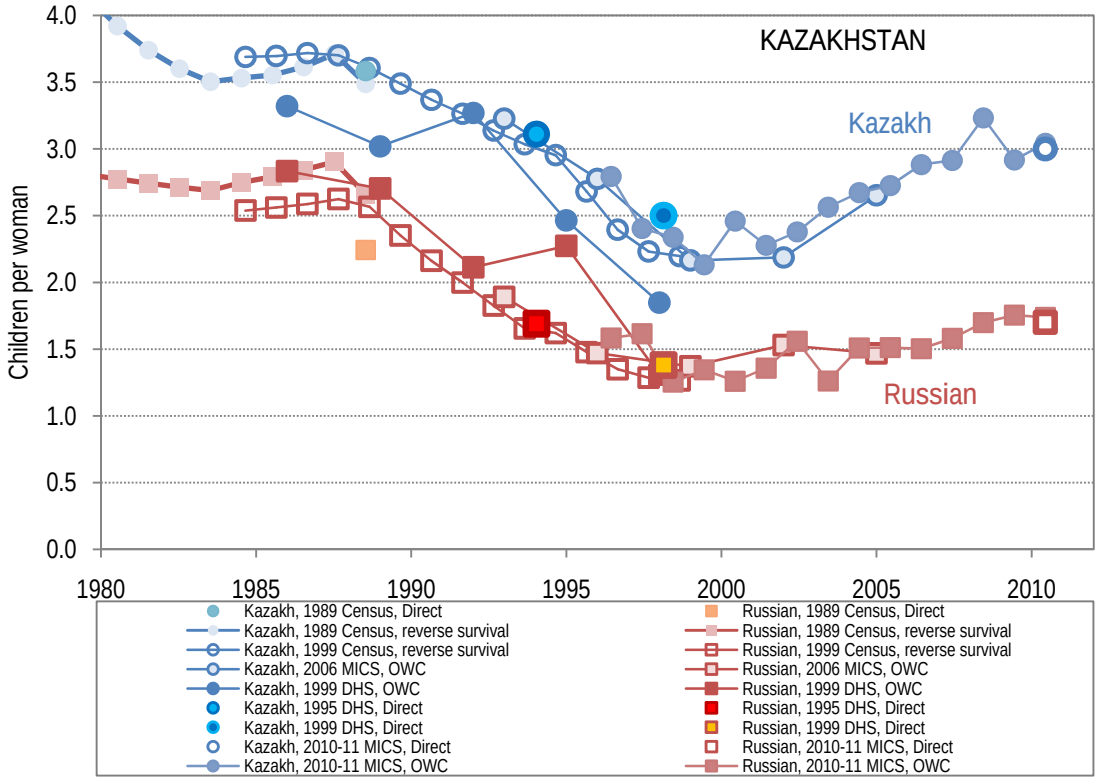
Acknowledgements

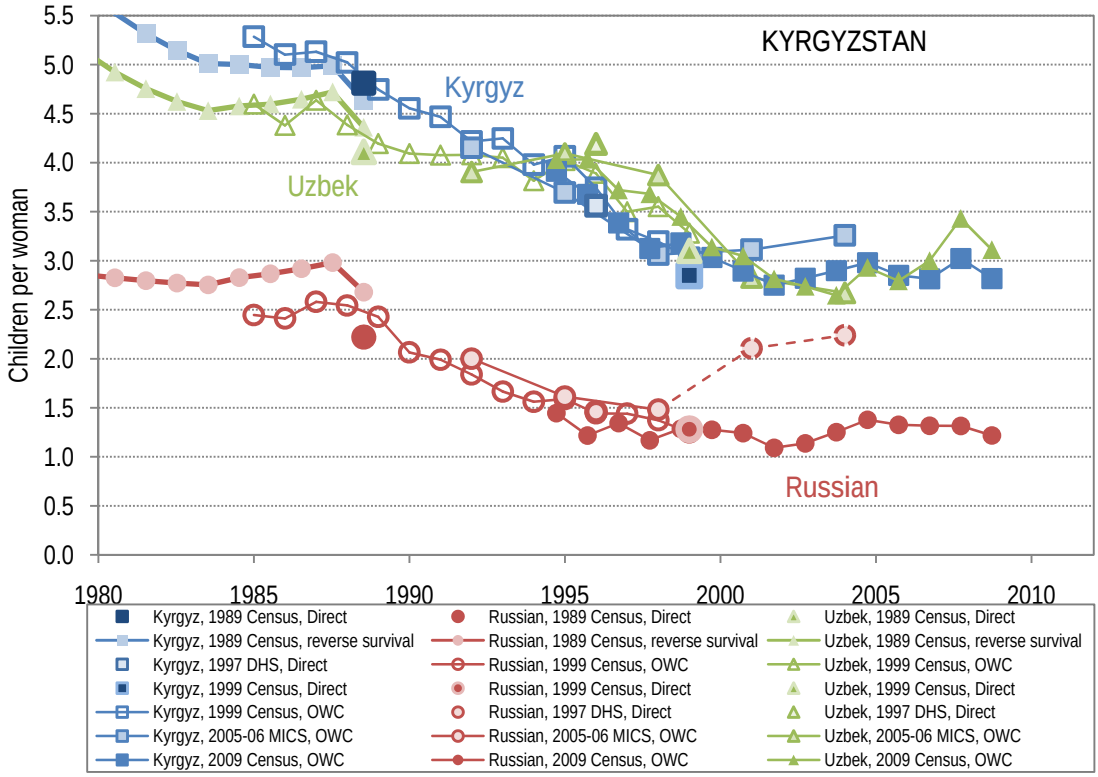
A special acknowledgement is due to Evgeny Andreev for kindly making available population data by age, sex and ethnicity from the 1989 Census of the Soviet Union and his unpublished materials on fertility by ethnicity from the same census.

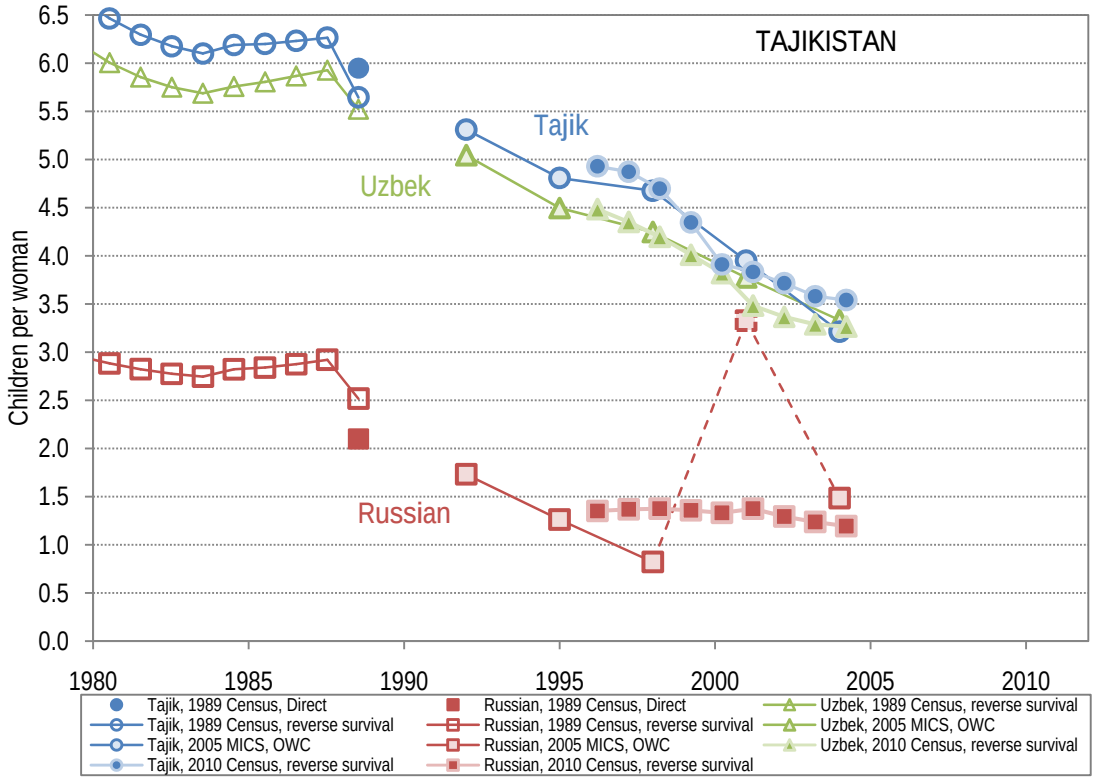
Appendix

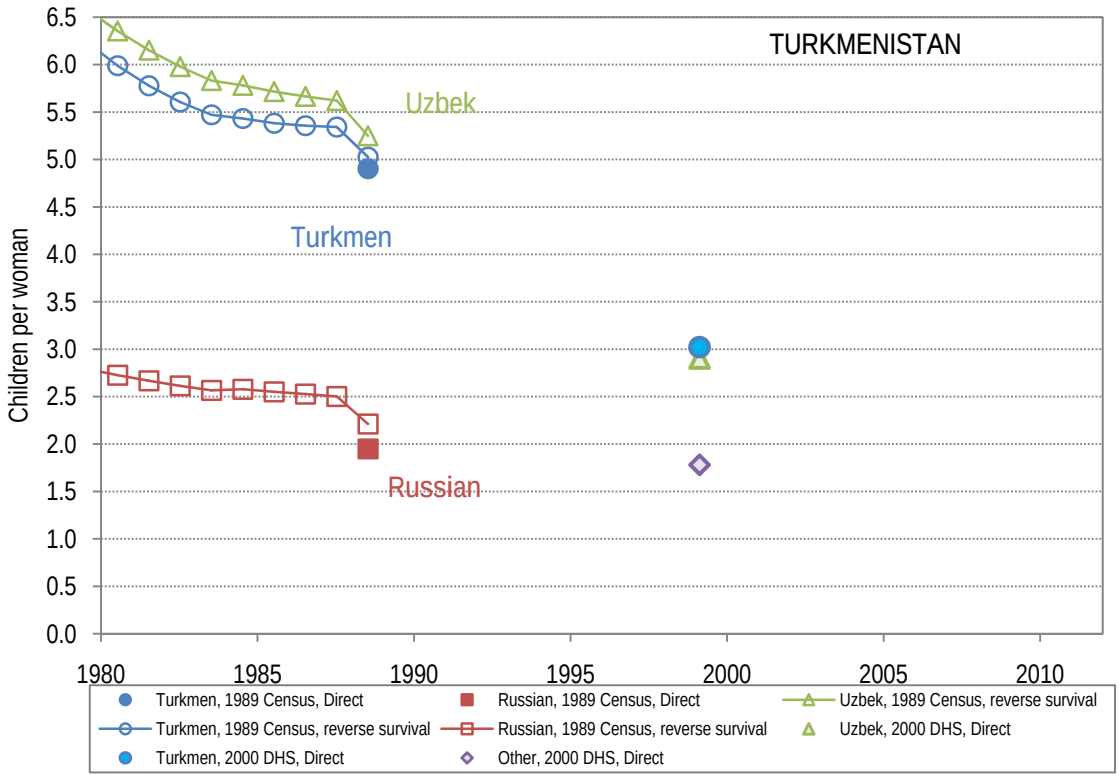
Figure A1. Fertility estimates by ethnic group, Central Asia

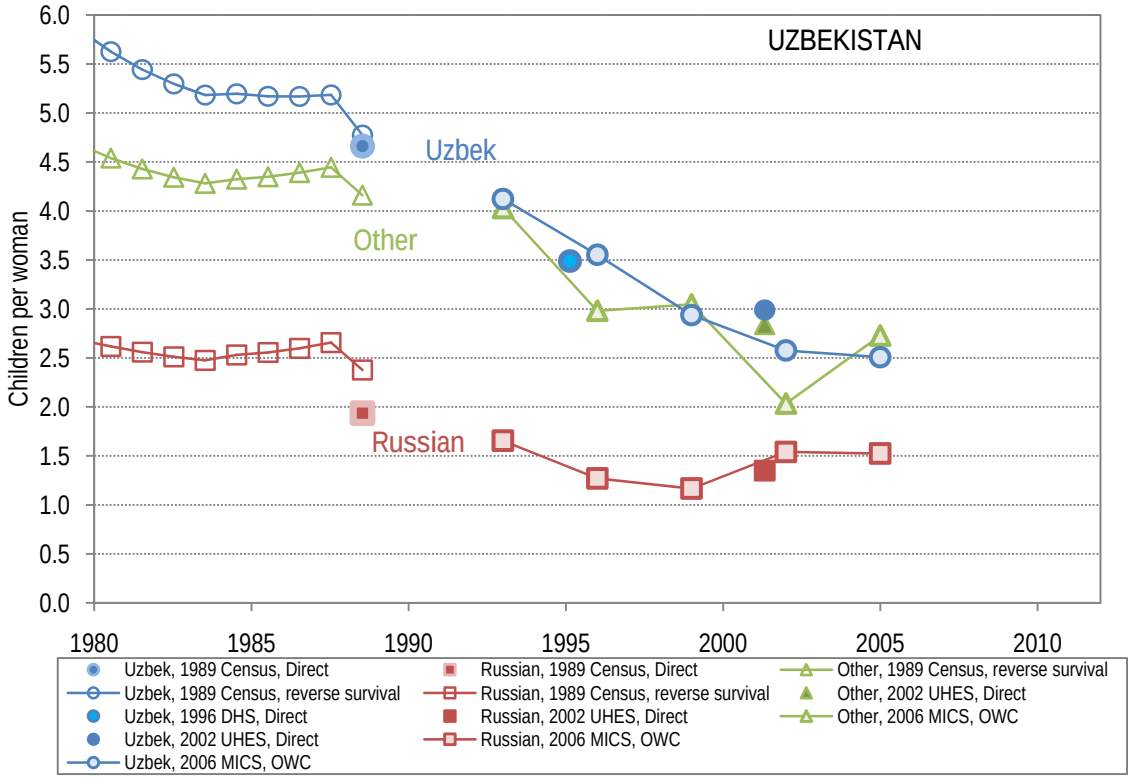
Note: For Tajikistan, estimates based on the 2010 census computed from educational data (i.e. age 6 and above).






TAJIKISTAN
Children per woman
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980
1985
1990
1995
2000
2005
2010
Tajik
Uzbek
Russian
Tajik, 1989 Census, Direct
Tajik, 1989 Census, reverse survival
Tajik, 2005 MICS, OWC
Tajik, 2010 Census, reverse survival
Russian, 1989 Census, Direct
Russian, 1989 Census, reverse survival
Russian, 2005 MICS, OWC
Russian, 2010 Census, reverse survival
Uzbek, 1989 Census, reverse survival
Uzbek, 2005 MICS, OWC
Uzbek, 2010 Census, reverse survival


TURKMENISTAN
Children per woman
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980
1985
1990
1995
2000
2005
2010
Uzbek
Turkmen
Russian
Turkmen, 1989 Census, Direct
Turkmen, 1989 Census, reverse survival
Turkmen, 2000 DHS, Direct
Russian, 1989 Census, Direct
Russian, 1989 Census, reverse survival
Other, 2000 DHS, Direct
Uzbek, 1989 Census, reverse survival
Uzbek, 2000 DHS, Direct


UZBEKISTAN
Children per woman
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1980
1985
1990
1995
2000
2005
2010
Uzbek
Other
Russian
Uzbek, 1989 Census, Direct
Uzbek, 1989 Census, reverse survival
Uzbek, 1996 DHS, Direct
Uzbek, 2002 UHES, Direct
Uzbek, 2006 MICS, OWC
Russian, 1989 Census, Direct
Russian, 1989 Census, reverse survival
Russian, 2002 UHES, Direct
Russian, 2006 MICS, OWC
Other, 1989 Census, reverse survival
Other, 2002 UHES, Direct
Other, 2006 MICS, OWC

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