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Marriage and fertility change in post-Soviet Tajikistan

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ABSTRACT

FACULTY OF LAW, ARTS AND SOCIAL SCIENCES
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MARRIAGE AND FERTILITY CHANGE IN POST-SOVIET TAJIKISTAN

by David Michael Clifford

Abstract

This thesis, structured into four separate but related papers, uses survey birth history data to examine marital and fertility change in post-Soviet Central Asia, with a particular focus on Tajikistan.

The first paper, 'Through civil war, food scarcity and drought: fertility and nuptiality during periods of crisis in post-Soviet Tajikistan', presents recent trends in marriage and fertility rates in Tajikistan since 1989. The fluctuating pattern of change illustrates the importance of three specific crises: the period of peak fighting in the civil war in 1992, which led to a decrease in birth registration but may also have contributed to a real decline in fertility in the worst affected areas in 1993; a food crisis in 1995, leading to immediate and significant declines in marriage and fertility; and a drought in 2000-01, which also led to marriage and fertility declines.

Given the significant changes in nuptiality in Tajikistan, the next stage of the thesis places these changes within a wider Central Asian context. The second paper, 'Marrying more and earlier: age-period interaction in trends of first union formation in transitional Central Asia', documents the significant increase in rates of first union formation in Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan in the late 1980s and early 1990s, showing that this increase was most marked at younger ages. The third paper, 'Tajikistan shows the biggest collapse of all: comparing declines in union formation in post-Soviet Central Asia', examines rates of first union formation in these countries in the post-Soviet period. It finds a significant decline in union formation across the region, but also clear differences between the republics in terms of the extent of the decline. Tajikistan, which experienced the most severe post-Soviet declines in food security, had the highest rate of union formation in the late-Soviet period but the lowest rate by the turn of the millennium.

The fourth paper, 'Spousal separation, selectivity and contextual effects: exploring the relationship between international labour migration and fertility in post-Soviet Tajikistan' contributes to the sparse literature on the impact of temporary migration on fertility in origin areas. Fertility and migration models are solved simultaneously to account for cross-process correlation. There is clear evidence for a short-term disruptive effect of spousal separation, but it is too early to assess the implications for completed fertility.

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Declaration of Authorship

I, …….,

declare that the thesis entitled [enter title]

…….…….
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and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
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- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission.

Signed: ……..

Date:…….

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The collapse of socialism in Eastern Europe and the former Soviet Union offers 'potentially rich material for an examination of the effects of dramatic sociopolitical and economic change on marital and fertility behaviour' (Agadjanian 1999:30).

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1. Introduction

This thesis aims to describe and understand recent national-level trends in marriage and fertility in Tajikistan. There is an established literature on marriage and fertility change in post-socialist Central and Eastern Europe. In contrast, relatively little is known about the demography of post-Soviet Central Asia – and the few existing studies have tended to focus on Kazakhstan, Kyrgyzstan and Uzbekistan. Indeed, of all the former socialist countries in Europe and Central Asia, perhaps least of all is known about trends in Tajikistan[1].

This thesis, structured into a series of four papers, helps to address this research need.

Chapter 2, 'Through civil war, food scarcity and drought: fertility and nuptiality during periods of crisis in post-Soviet Tajikistan', establishes the nature of recent demographic change in the country. It uses survey birth history data to calculate trends in marriage and fertility rates since the late 1980s, a span of years encompassing three particular periods of crisis. The changes in marriage rates, in particular, are found to be significant.

Chapters 3 and 4 help to place these changes in nuptiality in Tajikistan within a wider Central Asian context. Chapter 3, 'Marrying more and earlier: age-period interaction in trends in first union formation in transitional Central Asia', focuses on trends in marriage during the transitional years immediately before and after the end of the Soviet Union – the *perestroika* and early-independence period. Chapter 4, 'Tajikistan shows the biggest collapse of all: comparing declines in first union formation in post-Soviet Central Asia', focuses specifically on the post-Soviet years.

[1] In each of the other Central Asian Republics, a nationally representative Demographic and Health Survey (DHS) has been carried out, under the auspices of MEASURE DHS, in the post-independence period. Results from the analysis of the fertility data from these surveys have been published by Kasiev et al. (1998), Sharmanov and Weinstein (2000), Nazarov et al. (2001), and Kamilov et al. (2004) for Kyrgyzstan, Kazakhstan, Turkmenistan and Uzbekistan respectively. However, MEASURE DHS have not carried out a DHS in Tajikistan. A smaller-scale demographic survey was carried out under the auspices of the United Nations Population Fund (UNFPA), but the results were never widely circulated.

Chapter 5, 'Spousal separation, selectivity and contextual effects: exploring the relationship between international labour migration and fertility in post-Soviet Tajikistan', returns the focus from the regional to the country level. While chapters 2-4 are more descriptive, chapter 5 examines the association between two aspects of Tajikistan's post-Soviet demography. By illustrating the scale of labour migration, and reflecting on its possible impact on fertility, it serves to introduce an important area for future research.

Each chapter is designed to be 'free-standing', capable of being read and understood independently. Each contains information on the substantive context, a review of the relevant literature, and an explanation of how the paper adds to existing research. These will not be further elaborated on here.

Instead, this introductory section aims to explain the thinking behind the methods used in this thesis. First, it explains in detail the reasons for using survey birth history data in preference to vital registration data. Second, it explains the particular focus on examining aggregate-level temporal trends from a period perspective, and the reasons for favouring particular demographic measures over others. Finally, there is a brief introduction to Tajikistan - including a map, which may be of interest to the reader when specific places or regions are mentioned within one of the chapters.

1.1 Rationale for using survey data

Survey birth history data are preferred to official vital registration data for two reasons. First, and most importantly, there are problems with the under-registration of marriages and births in Central Asia. Second, birth history data allow the calculation of trends in marriage and fertility unaffected by compositional effects associated with migration and changing population composition.

1.1.1 Inadequacy of official data: the problems of underregistration

Under-registration of births has traditionally been a problem in Central Asian vital registration figures (Anderson and Silver 1989). Jones and Grupp (1987:39) document the sources of error. The first relates to the fact that registration has always

been primarily dependent on citizens' initiative since the primary purpose of the Soviet system was 'not to compile a statistical record for demographic purposes, but to establish legal certification for Soviet citizens'. Registration coverage has therefore been dependent on the particular balance of incentives and disincentives to register at a particular place and time. In Central Asia, opponents during the early stages of Soviet rule advocated non-registration of female births as a means to evade laws regarding school attendance and age at marriage. The lack of incentive to register a child who dies soon after childbirth, meanwhile, also contributes to under-registration. A second source of error relates to the efficacy of the registration machinery, and the quality of information transmission, as duplicate records of births are forwarded from the local registry agencies to *raion* (district) and then *oblast* (regional) statistical offices. Since this is apt to vary over time, so too is the coverage and quality of vital registration data. In Tajikistan, quality was seen to improve as the Soviet era progressed, with data from the 1970s onwards seen as more complete than in preceding decades (Jones and Grupp 1987:44). This is because the use of maternity homes' or hospitals' medical records provided a valuable cross-check of the citizen-initiated register. As the proportion of births in a medical institution increased as time progressed, so did the potential for validation of the register. A third source of underregistration, compared to the World Health Organisation criteria adopted by most countries, has been the 'less rigorous' Soviet definition of live birth, where births ending in infant death are more likely to be classified as stillbirths or miscarriages (Aleshina and Redmond 2003:6). In Tajikistan, this definition has continued to be used in the post-independence period.

Temporal variation in coverage makes the analysis of fertility change using vital registration data difficult. While the coverage of vital registration in Tajikistan had increased by the 1970s, since independence in 1991 it has decreased. A fee for birth registration was introduced – a particular disincentive for registration in a context where living standards were decreasing. As of 2000, this fee was equivalent to $3 – the average monthly salary of a health worker (United Nations Development Programme 2000). In the Soviet era, registrations were likely to be updated when a hitherto unregistered child entered school (Jones and Grupp 1987), at the age of seven in Tajikistan (Dikaev 2005). After independence, however, primary school enrolment declined, partly because of the introduction of charges for textbooks and meals and

the growth of fees to supplement teacher wages (Falkingham 2000; United Nations Development Programme 2000). Some parents could not afford to educate their families, so their children remained unrecorded (Davlatova 2002). Meanwhile, as the healthcare system has deteriorated and costs for services have increased, so the proportion of births that take place in a medical institution has progressively decreased – from 94% in the years to 1989, to 58% in 1998-9, with concomitant rises in the proportion of births in the home (Falkingham 2003). This undermines the potential for validation of the citizen-initiated register.

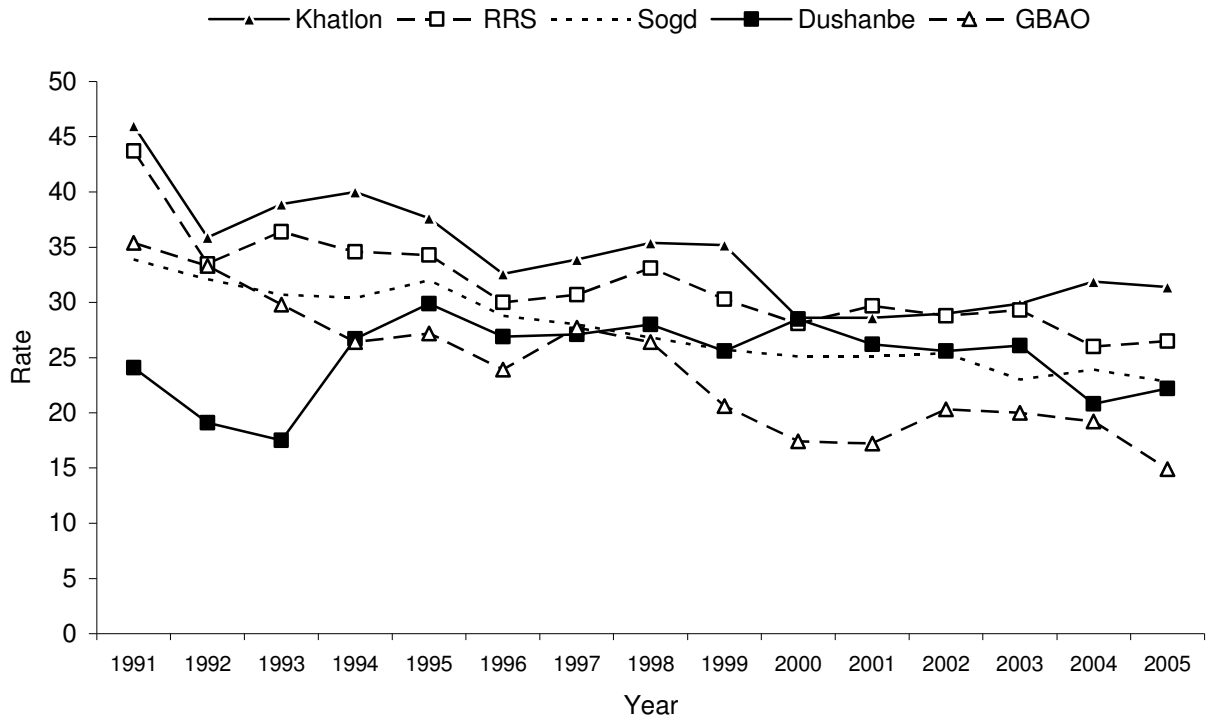
In sum, the quality of vital registration data has decreased. In terms of fertility, only 75% of children aged under 6 years in 2000 in Tajikistan had been registered (United Nations Children's Fund 2001). In terms of marriage, official registration has always been 'of little importance to Tajiks' compared to the religious ceremony *nikoh* (Harris 2004:39). Dikaev (2005) reports one estimate which suggests only half of all marriages are registered. Overall, the 'reliability and relevance' of vital registration data have become 'a cause of concern for both the Government and the international community' (United Nations Population Fund 2004:2).

1.1.2 Out-migration and changes in population composition

Not only are estimates of marriage and fertility rates from survey data unaffected by under-registration - they are also a more accurate picture of past demographic change among the currently resident population. In common with other ex-Soviet republics, Tajikistan experienced a significant out-migration of the non-titular (non-Tajik) population in the years immediately preceding and subsequent to independence. Jews and ethnic Germans settled in Israel, the United States and Germany (Harris 1998a:657). The emigration of Uzbeks and, in particular, Russians was also significant: by April 1993, about 300,000 Russians are estimated to have left (Kolstoe 1995). In the 1989 census, 388,481 Russians were recorded as living in Tajikistan (7.6% of the total population), compared to just 68,171 (1.1%) in the 2000 census; for Uzbeks, the corresponding figures were 1,197,841 (23.5%) and 936,703 (15.3%), though some of this may reflect ethnic reidentification of Uzbeks as Tajiks in 2000 (Rowland 2005).

Since Russian fertility has always been appreciably lower than that among the ethnically Tajik population, the change in population composition caused by Russian out-migration may have an upward influence on fertility as measured by registration data (or a downward influence if population totals used as denominators in the calculation of rates do not take adequate account of their emigration). The decline in the urban Russian population was even more acute in Tajikistan than elsewhere in Central Asia (Rowland 2005) and therefore the compositional effect on vital registration trends is potentially the most significant. To illustrate, the increase in the crude birth rate in Dushanbe evident in official figures in the early 1990s (Figure 1.1) probably reflects the increasingly Tajik composition of the capital as Russians emigrated in large numbers.

Figure 1.1 Crude birth rate[1] in Tajikistan's five regions, 1991-2005



1 Live births per 1,000 people. Source: Goskomstat (2006)

Since in many ways it is the currently resident population which is of most interest in demographic analysis – now overwhelmingly Tajik (79.9%, compared to 62.3% in 1989) - survey data allow the calculation of trends in marriage and fertility unaffected by compositional effects introduced by migration and changing population composition.

1.2 Rationale for approach

The majority of the thesis (chapters 2-4) is based on the description of aggregate trends in marriage and fertility, from a period perspective.

1.2.1 Description of aggregate change over time

The focus on aggregate change over time, as Ní Bhrolcháin and Dyson (2007:1) argue, lies at the core of the demographic tradition: 'aggregate phenomena and demographic change through time should be at the heart of demography, and therefore represent a central object of causal investigation in the discipline'. But, as they point out, most recent demographic research has neglected both the aggregate and the temporal. To a large extent, this has reflected the preponderance of household survey data, which tend to be cross-sectional in nature and which tend to collect information on individual rather than aggregate level variables. A typical approach has attempted to explain variation in a demographic outcome in a regression framework using these individual-level covariates. Causal analysis at a higher level has been neglected. This is important since relationships at an individual level need not hold at an aggregate level, and since potentially interesting macro-level explanations are ignored. In the current context, marriage and fertility in Tajikistan could be explained as a function of age, region, ethnicity, educational status and income – at the expense of analysing the aggregate changes over time, and the way in which these relate to macro-level social and economic changes during *perestroika* and after independence.

The approach in chapters 2-4 of this thesis, therefore, represents a conscious attempt to consider the aggregate and the temporal. Trends in marriage and fertility are interpreted, in the words of Ní Bhrolcháin and Dyson (2007:29), 'in the nature of old-fashioned quantitative investigation', using 'a form of *bricolage*, knitting together diverse strands of evidence'.

1.2.2 Period perspective

This thesis takes a period, rather than cohort, perspective to the measurement of marriage and fertility change. Statistically, it is the period perspective which provides

the prime source of temporal variation in fertility rates: there is more empirical evidence for consistency in the fertility behaviour of different cohorts at a particular point in time than for a particular cohort across different points in time (Ní Bhrolcháin 1992; 1996:600). Even Ryder (1983:739), traditionally seen as a champion of the cohort approach, recognises that the form of the measure should be specific to the hypothesis. In this case, interest lies in assessing the potential impact of the particular circumstances of the *perestroika* and post-independence periods, and the associated dramatic social and economic changes, on marriage and fertility rates. Trends in marriage and fertility are the 'dependent variable' requiring explanation (Ní Bhrolcháin 2008) and, since changes in particular periods are the potential explanators, it would seem wise to adopt a period framework when measuring these trends (Ní Bhrolcháin 1992; 1996).

1.2.3 A 'fair' representation of temporal change

Given the focus on analysing trends in marriage and fertility, the period measures used in this thesis must provide a 'fair' representation of temporal change (Ní Bhrolcháin 2008:14). For this reason it is important to relate the event (first marriage, or a birth of a particular order) to the correct 'exposure' (only those women 'at risk' of experiencing the event). The resulting 'intensities' of marriage and childbearing represent decremental type 1 rates (*'taux de première catégorie'*), rather than the non-decremental type 2 'incidence' rates (*'taux de deuxième catégorie'*) which do not exclude from the exposure those women who have already experienced the event. Since the proportion of women 'at risk' fluctuates over time, trends in incidence rates are influenced by these purely compositional changes, providing a potentially misleading guide to changes in underlying intensities. Feeney and Yu (1987), analysing trends in order-specific fertility in China, show the difference that this compositional effect can make. Similarly, Sobotka (2004) presents various scenarios of change in first birth patterns, comparing trends based on incidence and intensity rates, to illustrate the importance of relating the occurrence of demographic events to the correct exposure.

In classical demographic analysis, intensity rates have been calculated using life-table methods. More recently, event history analysis, a generalisation of life-table

techniques, has come to prominence (see Hoem 1993). This has the advantage of accommodating multiple covariates in a regression framework without necessitating the calculation of life-table functions for particular population subgroups separately. It also accommodates covariates which may change over the life course. In this thesis, rates of first union formation to women who have never been in a union, and rates of first births to childless women within union, are calculated using exponential proportional hazards (PH) models (see, for example, Harrell 2001; Rodríguez 2007). The exponential PH model is extended in chapters 3 and 4, adding an interaction between calendar period and age group, relaxing the assumption of proportional hazards in order to examine trends in union formation for different age groups. Trends in higher order births in chapter 2 are estimated using a discrete-time logistic model: unlike the models for first union and first birth, where women drop out of exposure after experiencing the event, women remain 'at risk' of a further birth at each parity. In this case, the compositional influence on the temporal trend is removed by controlling for changes in the distribution of women by age, parity and duration since previous birth.

Recent developments in the literature have proposed that, as well as controlling for compositional changes in the population at risk, fertility measures should adjust for changes in the timing of childbearing. Such a timing effect, it is argued, results in period measures that represent 'distorted versions' (Ryder 1971:115) of true fertility levels, misleadingly depressed in periods where cohorts are 'postponing' births and misleadingly inflated when births are being 'brought forward'. Bongaarts and Feeney (1998:275) propose dividing order-specific total fertility by the change in the order-specific mean age at childbearing to obtain the total fertility 'that would have been observed in a given year had there been no change in the timing of births during that year'. Kohler and Philipov (2001) extend this adjustment to incorporate changes in the variance, as well as the mean, of the age-fertility schedule, while Kohler and Ortega (2002) apply this more general adjustment to childbearing intensities rather than incidence rates. Winkler-Dworak and Engelhardt (2004) apply comparable adjustments for the analysis of trends in first marriages.

It is important to note the reason for these adjustments. Bongaarts and Feeney's (1998:286) primary motivation is to provide a better measure of 'the level of

completed fertility implied by current childbearing behavior'; similarly, Kohler and Ortega (2002:93) aim 'to assess the cohort fertility that results from period fertility patterns'. In other words, their aim to is learn about the longer-run implications of current fertility rates for completed family size. But where the aim is to describe and understand trends in marriage and fertility rates, these rates become the dependent variable rather than as a tool to aid forecasting. In this context, the changes in the timing of fertility [or marriage] 'are not distorting to measures of period fertility [or marriage] because real tempo change is part of what we.. should be trying to explain' (Ní Bhrolcháin 2008:17)[2]. In this thesis, therefore, instead of adjusting the relevant demographic measures, the effect of any change in the timing of marriage or childbearing is retained.

1.2.4 A 'textured' account of fertility change

Single figure summary measures of the level of fertility in a particular period 'may conceal parity-, age- or duration specific probabilities that go beyond pure differences of level' (Ní Bhrolcháin 2001:6). This is true both of the conventional total fertility 'rate', a synthetic measure based on a hypothetical cohort experiencing the age-specific incidence rates of a particular period, and of analogous synthetic cohort measures which adjust for changes in the composition of women by parity, age and/or duration since previous birth (for example, those based on the period parity progression system of measurement: Feeney and Yu 1987; Ní Bhrolcháin 1987). For example, and of particular relevance to the study at hand, research on post-socialist fertility decline in Eastern Europe and the Former Soviet Union in the early 1990s shows a marked distinction between the dramatic decline in higher order births, on the one hand, and the robustness of first order births on the other (Bulgaru et al. 2000; Steshenko 2000; Perelli-Harris 2005) – a distinction that a synthetic, aggregated measure alone would fail to make. It is clear that 'fertility is not a unitary phenomenon' (Ní Bhrolcháin 1996:249).

[2] Indeed, 'if a "change in pace" occurs during a particular period, this should be reflected in the fertility measure(s) for that period. Such change should not be ascribed to some notional underlying cohort – it is a property of the period' (Ní Bhrolcháin 1992:612).

Disaggregated rates are therefore needed to illuminate the particular trends in each stage of fertility behaviour. These component trends will differ 'to the extent that the separate stages of family formation are influenced by different external factors – whether social, cultural or economic – and that.. trends in these determinants are not uniform' (Ní Bhrolcháin 1996:249). This resonates with Agadjanian's (1999:426) hypothesis that, when faced with periods of crisis, 'people do not change all components of their demographic behaviour equally and uniformly' and that changes in nuptiality may not necessarily mirror changes in wider reproductive behaviour. Therefore, as well as presenting trends in total fertility, this thesis presents disaggregated rates to explore possible differences in the component fertility trends: rates of first union formation (to women who have never been in a union), rates of first births (to childless women within union), and progression to higher order births (for those who have already had a child). This not only ensures that each event is related to the correct exposure; it also represents, compared to a single synthetic measure alone, 'a much richer output of indexes… useful in description and analysis' (Hoem 1993:290) and hence a more textured account of fertility change.

1.3 Introduction to Tajikistan

Mountainous and landlocked Tajikistan, after Uzbekistan and Kazakhstan the third most populous state in Central Asia, had a total *de jure* permanent population of 6.1 million according to the 2000 census, 74% living in rural areas (Rowland 2005). As Harris (2004:24-25) summarises, Tajikistan is geoculturally divided into two: the majority speak Tajik and, nominally at least, follow Sunni Islam; a minority in the physically isolated GBAO (Gorno-Badakhshan Autonomous Oblast; see Figure 1.2) speak Pamiri and are Ismaili. In pre-Soviet times, the oasis culture of the Tajiks (and Uzbeks) contrasted with the semi-nomadic Kyrgyz and Kazakhs; by 1920, the whole of what is now Tajikistan had come under Soviet rule (Harris 2006:25). At the time of independence in 1991, Tajikistan was the poorest of all Soviet republics yet, compared to many developing countries, had relatively high human development indicators, including almost universal literacy, reflecting the Soviet legacy of social development (Falkingham 2000). Since then, Tajikistan has experienced the most acute social and economic problems of any post-socialist country, including a civil war between 1992 and 1997 and periods of acute food shortages. Therefore, of all the

countries in Eastern Europe and the Former Soviet Union, Tajikistan offers particularly 'rich material for an examination of the effects of dramatic sociopolitical and economic change on marital and fertility behaviour' (Agadjanian 1999:30).

Figure 1.2 Map of Tajikistan

Source: http://geology.com/world/tajikistan-map.gif

2. Through civil war, food scarcity and drought: fertility and nuptiality during periods of crisis in post-Soviet Tajikistan

Abstract

The post-Soviet republics of Central Asia have been neglected in the demographic literature. This paper uses survey birth history data to reconstruct marriage and fertility rates in Tajikistan since independence, and in particular during three specific crisis periods: the period of peak fighting in the civil war in 1992, which led to a decrease in birth registration but may also have contributed to a real decline in higher-order fertility in the worst affected areas; a food crisis in 1995, leading to immediate and significant declines in marriage and fertility rates; and a drought in 2000-01, which led to a further decline in marriage and fertility rates. The paper serves to illustrate the demographic impact of periods of acute social and economic crisis. It ends by emphasising the importance of context to an understanding of post-socialist demographic change, given Tajikistan's lack of agricultural self-sufficiency which left the population particularly vulnerable to the collapse of Soviet central planning.

Keywords: post-Soviet, Central Asia, Tajikistan, fertility, nuptiality, civil war, food crisis, drought

2.1 Introduction

The collapse of socialism in Eastern Europe and the former Soviet Union offers 'potentially rich material for an examination of the effects of dramatic sociopolitical and economic change on marital and fertility behaviour' (Agadjanian 1999:426). There are a number of studies examining recent marital and fertility changes in Central and Eastern Europe (for example, Conrad et al. 1996; Kučera et al. 2000; Macura 2000; Kohler and Kohler 2002; Sobotka 2002; Philipov and Dorbritz 2003; Sobotka 2004; Perelli-Harris 2005; Kotowska et al. 2008; Sobotka et al. 2008; Zakharov 2008). However, the post-Soviet republics of Central Asia have been relatively neglected in the demographic literature (Gentile 2005). This paper seeks to address this research need by analysing marriage and fertility change in post-Soviet Tajikistan.

Tajikistan, after Uzbekistan and Kazakhstan the third most populous state in Central Asia, had a total *de jure* permanent population of 6.1 million according to the 2000 census, 74% living in rural areas (Rowland 2005). In terms of the study of post-Soviet fertility change, Tajikistan is of particular interest. First, traditionally it had the highest fertility of the Soviet republics. Census data show that Tajikistan had the highest average annual rates of population growth in the Soviet Union in each of the periods 1959-1970, 1970-79 and 1979-1989 (Anderson and Silver 1989). Studies in Eastern Europe have documented the effect of post-socialist and post-Soviet change, and the effect of dramatic social and economic crisis, in a context where fertility was already at or approaching replacement level. The effect on 'pre-transitional' populations like Tajikistan (Anichkin and Vishnevskii 1992:61) is less well documented. Second, of all the ex-socialist and ex-Soviet states, Tajikistan has experienced the most acute social and economic problems since independence. In particular, Tajikistan's population has been subject to three specific shocks: a civil war between 1992 and 1997; a food crisis in 1995; and a drought in 2000-01, which also led to severe food shortages. Tajikistan's experience therefore offers an opportunity to contribute to the literature on the demography of conflict and of food crises.

2.1.1 Post-socialist fertility decline in Europe and Central Asia

Post-socialist fertility decline in Europe has been substantial. Ex-communist Europe is now the lowest fertility region in the world after the dramatic decline in period fertility during the 1990s, with total fertility ranging between 1.1 and 1.4 in 2002 (Sobotka 2002). Declines in countries of Central Europe, which experienced a relatively successful post-socialist economic transition, have been attributed more to new opportunities, ideational change and the 'Westernisation' of fertility behaviour. Here, the decline in fertility has been characterised by the postponement of first births.

In contrast, declines in southeastern Europe and ex-Soviet European states, which have experienced the most difficult post-socialist transition, have been attributed more to the depth of social and economic crisis in these countries (Macura 2000; Philipov and Dorbritz 2003; Sobotka 2004). Shrinkage in national economies, together with the removal of the three pillars of the former socialist system – guaranteed employment, subsidised and stable pricing, and social benefits and services (Standing 1996:230) – combined to bring dramatic declines in living standards. In Belarus, for example, 'the slowing of the economy, skyrocketing inflation, destabilisation of the production sphere, increasing unemployment... impoverishment of the population' and associated uncertainties generated by the crisis 'undoubtedly' affected fertility (Shakhotska 2000:36). Unlike in Central Europe, in the first half of the 1990s first order birth rates in ex-Soviet and southeastern Europe were robust, and total fertility decline was driven by reductions in second and higher birth orders (see, for example, Steshenko (2000), Perelli-Harris (2005) for Ukraine; Bulgaru et al. (2000) for Moldova; Kohler and Kohler (2002) for Russia; Stankuniene (2000) for Lithuania; Katus et al. (2000) for Estonia; Aassve et al. (2006) for Albania), though increases in the mean age at first birth in these countries since the mid-1990s are indicative of a decline in period first order rates (see TransMONEE 2006).

Central Asia is culturally, historically and demographically very different from post-Soviet Europe. Nevertheless, both regions have emerged from what Sobotka (2002:42) has termed the 'socialist greenhouse' – an environment which had served to encourage childbearing, or at least undermine reasons to reduce it. Further, during this transition countries in both regions have faced severe economic crises. But while

a number of academic studies have documented fertility change in post-socialist and post-Soviet Europe, there is not a comparable literature on fertility change in post-Soviet Central Asia. The available evidence, however, suggests that fertility trends in post-Soviet Central Asia show certain parallels with those in post-Soviet Europe. First, there are indications of substantial declines in period fertility. Vital registration data collated by UNICEF (TransMONEE 2006) suggest larger absolute declines than in post-Soviet Europe, and comparable relative declines: between 1989 and 2003, total fertility fell from 4.3 to 2.6 in Turkmenistan, from 3.8 to 2.5 in Kyrgyzstan, and from 2.8 to 2.0 in Kazakhstan; between 1990 and 2003, from 4.1 to 2.4 in Uzbekistan; and between 1989 and 2000, from 5.1 to 3.7 in Tajikistan. Second, there are indications that, as in post-Soviet Europe, fertility reached a peak in 1987 and then declined thereafter (Becker and Hemley 1998; Agadjanian 1999). Third, in the first half of the 1990s fertility decline specifically involved the reduction of higher order births. Thus Agadjanian and Makarova (2003:471) argue that post-independence economic hardship in Uzbekistan in the early 1990s acted to discourage births 'beyond the minimally acceptable one child'. Similarly, Agadjanian et al. (2008a) show that first birth rates in Kazakhstan were relatively stable, in comparison to rates at higher orders, until the mid-1990s, consistent with an increase in the share of first births in total fertility during this period (Becker and Hemley 1998). From the mid-1990s, however, there is evidence for a decrease in the rate of first births within marriage in Kazakhstan (Agadjanian et al. 2008a), and a decrease in the first marriage rate in Kazakhstan and Uzbekistan (Dommaraju and Agadjanian 2008). However, no information is available on order-specific change in post-Soviet Tajikistan. Changes in nuptiality in Tajikistan, and their contribution to fertility change, have also not been addressed.

2.1.2 Fertility during food crises and civil war

There is strong evidence that food crises reduce fertility in the short-term. Galloway (1988), examining the response of vital rates to annual fluctuations in grain prices in nine pre-industrial European countries, finds a decrease in fertility most evident one year after the price shock, and a fertility rebound in the second year. There was also a very close correspondence between the rise in food prices and a decline in conceptions during the South Asian famines of the nineteenth and twentieth centuries

(Dyson 1991a; 1991b). Similarly, Lindstrom and Bernahu (1999) find evidence for a decrease in conception probabilities during years of drought and famine in Ethiopia in the 1970s and 1980s, often followed by a rebound in the following year.

Direct evidence to assess the relative importance of biological factors, such as an increase in amenorrhoea and spontaneous abortion because of malnutrition, and behavioural factors, such as a decrease in marriage rates, an increase in migration and spousal separation, or an increase in conscious fertility control, is often lacking in studies of this kind. However, Bengtsson and Dribe (2006), for a pretransitional population in Sweden, argue that the strong fertility response in the first six months after a grain price shock points to the importance of deliberate fertility control, and the ability to anticipate years of economic difficulty. Dyson (1991a) finds evidence for a similar almost 'anticipatory' fertility response which, in contrast with the more delayed mortality effects, tends to favour behavioural explanations over biological ones. Indeed, Bongaarts (1980) and Menken et al. (1981) conclude that while periods of severe famine and starvation can significantly reduce fecundity, chronic malnutrition has only a minor biological effect on fertility levels. Thus Lindstrom and Bernahu (1999) attribute declines in marital fertility to a combination of the unintentional influence of increases in spousal separation through temporary migration and the intentional decision temporarily to postpone births in crisis periods. Since we know that nuptiality tends to decrease during years of grain price shocks (Galloway 1988), decreases in the marriage rate can also be an important contributor to decreases in overall fertility levels.

These behavioural factors are also likely to play an important role during periods of military conflict. Lindstrom and Bernahu's (1999) study showed that, as well as fluctuating during periods of famine, conception probabilities decreased during peak years of military unrest. Agadjanian and Prata (2002) similarly find evidence for a drop in fertility during wartime in Angola, followed by a subsequent post-war rebound. On the other hand, Khlat et al. (1997) find no evidence for a significant decline in fertility in Beirut, Lebanon, during the civil war – though these results should be treated with a certain caution given the assumptions made in the indirect estimation of fertility levels (National Research Council 2004). Differing responses to war reflect Sillanpää's (2002) argument that the demographic impact varies

according to the length and severity of the conflict, together with the ability of the population to adapt and the extent of spousal separation.

2.2 Post-Soviet Tajikistan: economic decline, civil war and food crises

Tajikistan has experienced acute social and economic problems since independence. The extent of the crisis is difficult to overstate. Tajikistan had been dependent on subsidies from Moscow during the Soviet era – making up 47% of total government revenues, the highest proportion in the USSR; it also had the highest inter-republic trade deficit (Foroughi 2002). The withdrawal of subsidies and the disruption of trading relationships, together with the transition to a free-market economy, led to dramatic economic declines (Falkingham 2005). By 1996, GDP was just 39% of 1989 levels (TransMONEE 2006), the biggest decline in Central Asia, while its GDP per capita of $1,041 (purchasing power parity) in 1998 made it one of the poorest countries in the world (United Nations Development Programme 2000). Annual average inflation was 4% in 1990, then increased to 112% in 1991, the year of independence, before soaring to 1,157% in 1992 and 2,195% in 1993 (Economist Intelligence Unit 1997a). It did not decline to double figures until 1997. Real wages in 1994 were estimated to be 6% of 1989 levels, which represents the most dramatic decline in any post-socialist or post-Soviet country (TransMONEE 2006). Unemployment increased (Falkingham 2000) while the system of social welfare collapsed (United Nations Development Programme 2000; De Soto et al. 2001). Vast swathes of the population were plunged into poverty. By the end of the millennium, 95% of the population were classed as living below the official minimum subsistence level (Falkingham 2003). The ability of the population to adapt through subsistence agriculture has been hampered not only by the difficult mountainous terrain, but also by the inherited Soviet system of collectivised land geared towards the production of cotton (see Duncan 2000).

In sum, Tajikistan - which was the poorest of the Soviet republics, with average income in 1988 around 50% of that in the Russian Federation (Atkinson and Micklewright 1992:134) - has also experienced the most severe social and economic problems since independence, with a population among the least able to adapt to the changes thrust upon it. No sphere of Tajik life has been left unaffected. Education

has been in decline, with enrolment, attendance and attainment all impacted (Falkingham 2000; United Nations Development Programme 2000). The health care system has deteriorated (Falkingham 2003) while outbreaks of infectious disease have increased. Life expectancy declined for both men and women (United Nations Children's Fund 2001:7).

In addition, over and above dramatic economic decline and social change, Tajikistan's population has been subject to three specific shocks: a protracted civil war, lasting until 1997 but with peak fighting in the latter half of 1992, which represented the most bloody civil unrest in the post-Soviet republics; a food crisis in 1995, stemming from an acute shortage of grain; and a drought in 2000-01, which also led to severe food shortages. This paper aims to assess whether there is evidence to suggest that these periods of crisis had a negative effect on marriage and fertility levels.

2.2.1 Civil War

Figures for the number of casualties in the civil war, between supporters of the Communist party government and a coalition of groups in 'opposition', are hard to establish; the International Crisis Group (2001) estimate that 60,000 to 100,000 people were killed between 1992 and 1997, from a total population of 5.1 million (at the time of the 1989 census). Many more were displaced by the conflict: 500,000-600,000 people were internally displaced, mainly people in and around Kurgan-Tyube fleeing to the capital Dushanbe (and some to Gorno-Badakhshan Autonomous Oblast); an estimated 70,000-100,000 fled to Afghanistan (Foroughi 2002; Lynch 2002), the majority of whom had returned to their permanent place of residence by the end of 1993. The most severe fighting took place in the last six months of 1992 in Kurgan-Tyube and Kulyab (both in what is now the region of Khatlon) (Brown 1998), though the capital Dushanbe and the Region of Republican Subordination (RRS) were also affected. By the beginning of 1993, the outcome of the civil war had been effectively decided after Communist forces took control of Dushanbe (Atkin 1997).

2.2.2 Food crisis in 1995

By the mid-1990s, the economic crisis had already affected household food consumption. Falkingham et al. (1997) cite unpublished World Bank data, based on Family Budget Surveys, to illustrate the decline in per capita food consumption in Tajikistan: from 1990 to 1993, there was a decrease of 50% in meat consumption, with declines of 40% for milk, 19% for vegetables and 20% for bread. This is reflective of a change in diet composition, in which expenditures on bakery products and vegetables were more stable than those on protein (Babu and Reidhead 2000), which Howell (1996) interprets as a 'reductive' response to the economic crisis. The population became more dependent on the traditional staple of bread, the cheapest source of calories.

Throughout the Soviet era, Tajikistan was dependent on the import of grain from other republics; in the early post-Soviet years, with food security no longer the responsibility of Soviet central planning, trading links and payment mechanisms took time to be fully established. As the World Food Programme (1996) reports, stocks of grain were drawn down to very low levels and the government was unable to establish any strategic reserves, while imports were severely restricted:

> 'Tajikistan has a very limited ability to mobilise adequate cereal supplies through commercial imports. The accumulated debt exceeds GDP, and nether the Government nor the central bank have significant foreign currency reserves. Production of the main barter commodities – cotton and aluminium – has fallen sharply and is inadequate to cover essential imports… Trading partners are not willing to provide cereals on credit terms. The capacity to import has been further reduced by high world market cereal prices and poor harvests in the Russian Federation and Kazakhstan, the traditional suppliers. Cereal prices are higher than they have been for a decade. With Tajikistan land-locked, the sources of cereals are limited.' (World Food Programme 1996, paragraph 24)

The poor cotton crops in 1994 and 1995 contributed to the crisis. Around 420,000 tonnes of cotton seed had been delivered by the end of October 1994, around half the

Soviet-era level (Economist Intelligence Unit 1994a), with a similarly low crop in 1995 (Economist Intelligence Unit 1996b). This further limited the ability of government to fund grain imports. Imports in 1994-1995, nearly half of which were aid, were just half of the 1993-1994 level, leading to sharp declines in total cereal availability (Table 2.1). Shortages of flour and basic foodstuffs, leading to social unrest in Dushanbe and other major cities, were reported in late 1994. Russian troops were drafted in to guard the flour and bread factories in Dushanbe (Economist Intelligence Unit 1994a).

Table 2.1 Average cereal availability and utilisation in Tajikistan 1990-95 (thousand tons)

	Average 1990-92	**1993/4**	**1994/95**
Total availability	1720	1135	674
Opening stocks	*350*	*80*	*26*
Production	*270*	*255*	*239*
Imports	*1100*	*800*	*409*
Utilisation	1720	1135	674
Food use	*870*	*660*	*498*
Feed use	*400*	*309*	*60*
Other uses	*200*	*140*	*110*
Closing stocks	*250*	*26*	*6*
(Per capita consumption, kg/pa)	(160)	(120)	(90)

Source: FAO Global Information and Early Warning System, in World Food Programme (1996)

The acute shortage of grain at this time prompted dramatic increases in bread prices. During the Soviet period, subsidised food prices had helped to maintain food security. Following independence, the first government of Tajikistan lifted controls on 80% of goods in January 1992 (Kaser 1997), but bread prices continued to be partly state-controlled. However, rationed state bread only provided for a fraction of people's needs. The price of open market bread, meanwhile, increased sixfold in the first six months of 1995 (Grand et al. 2001). In May 1995, at the same time as a new currency was introduced, the government announced a 150% increase in the price of state bread and flour products; in August, it announced the complete lifting of these price controls, with the Tajik prime minister arguing the move was unavoidable given that bread products were 'four or five' times higher in neighbouring Uzbekistan (Economist Intelligence Unit 1995b:40). The impact of these price rises was accentuated by a severe shortage of cash in the republic. Many state employees had

not been paid since January 1994, while others had only been paid in kind (Economist Intelligence Unit 1995a). Meanwhile, the devaluation of the new national currency from May 1995 contributed to the bankruptcy of most of the collective (*kolkhoz*) and state (*sovkhoz*) farms, which were the main source of livelihood for rural households. Until 1995, the *kolkhoz* had still been able to pay their workers a small salary, despite the decrease in production and the disruption caused by the civil war (Grand et al. 2001).

The food crisis was widespread and acute. The preceding years of economic crisis had left the population even more reliant on bread, and therefore particularly to vulnerable to changes in its availability and price. The scarcity of flour, rationing of bread and increase in prices in 1995 was therefore a major problem: 'families found themselves compelled to sell their last livestock and any other valuables they still possessed in order to purchase a few sacks of flour to feed their families for a couple of months' (Harris 1998a:665). Harris (2004:29) argues that 'many people suffered significant hunger over a period of many months', and that it was only the aid from international relief agencies that prevented famine[3].

The shortage of grain persisted into early 1996, with further significant increases in bread prices (Economist Intelligence Unit 1996a). However, the food supply crisis in 1995 prompted the government to increase the production of wheat on *kolkhoz* farms and to allocate 50,000 hectares of farmland for household use (Grand et al. 2001). It also prompted households to change their behaviour. Harris (1998a:665-6) notes that, after 1995, villagers decided to devote more of their private household plots to growing wheat, rather than vegetables. The increase in the price of wheat also served to stimulate production. Therefore, domestic grain output rose to a record 548,000 tonnes in 1996, up from 249,000 in 1995 (Economist Intelligence Unit 2001c).

[3] There is historical precedent for the 1995 food crisis in Tajikistan. As Harris describes (Harris 2006:26), in the early part of the twentieth century, just as in the Soviet period, the population in what is now Tajikistan was reliant on grain imports after the Tsarist government persuaded local farmers to plant cotton rather than grain. Just as in 1995, these imports were then disrupted – in this case during WW1 when the train lines were cut, stopping grain arriving from the north. In the absence of any international aid, there was a serious famine, estimated to have killed almost a million people (Etherton 1925:154).

Consistent with this increased local availability, 'wheat prices have risen by less than inflation, and there has been no evidence of severe shortages since May 1996' (Economist Intelligence Unit 1997b:30). Indeed, at the time of a later report (Economist Intelligence Unit 1998b), bread had been in general widely available, and prices had stabilised, since mid-1996.

2.2.3 Drought in 2000-01

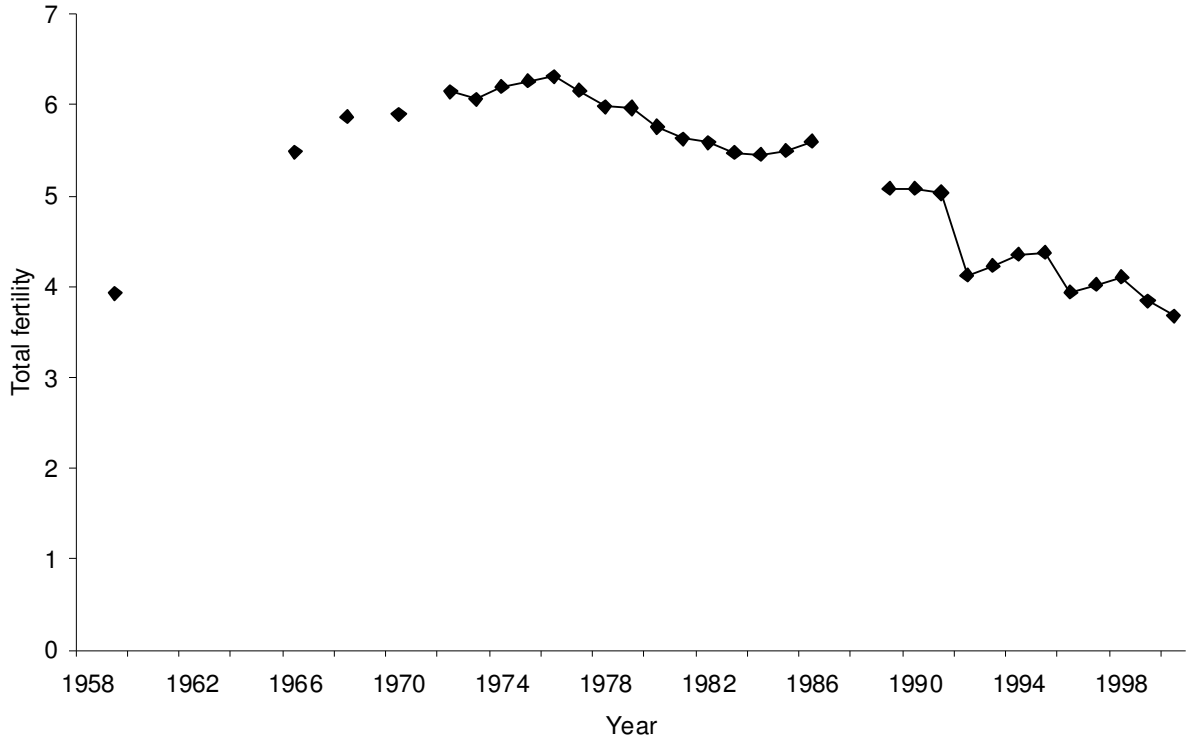
Domestic grain production remained high in 1997 and, although heavy rains damaged part of the crop in 1998 and 1999, production levels were still much higher than before the agricultural changes prompted by the food crisis in 1995. But while land reform had increased the area of land devoted to wheat, yields were falling owing to a lack of credit for purchasing agronomic inputs (Economist Intelligence Unit 2000). Tajikistan remained far from grain self-sufficiency, with an estimated 300,000-500,000 tonnes of wheat flour imports required annually for minimum consumption needs (Economist Intelligence Unit 1998a). International aid provided 100,000 tonnes per year. In 1997 and 1998 Tajikistan liberalised its previously restrictive trade regime (McHugh and Gürgen 1999), which helped to facilitate commercial imports and kept a ceiling on bread prices (Economist Intelligence Unit 1998a). But food security remained a big issue. Flour prices remained high in comparison to household income. In rural areas, in the absence of income from the *kolkhoz*, many came to rely heavily on their own wheat production from household plots. More generally, the suite of social and economic shocks in the post-Soviet era had undermined any capacity to cope with further shocks such as a poor harvest.

In 2000 and 2001, Tajikistan suffered a severe drought, estimated to be the worst for 70 years. Annual rainfall was below the long term average across the country. Most significantly, rainfall in March and April in both years – the key months for the wheat crop cycle - were low, averaging less than half of the long term average (FAO/WFP 2001). This led to an almost total failure of the rainfed wheat crop and, as a result of low river levels stemming from reduced glacial snow reservoirs combined with poorly maintained irrigation systems, significant drops in the irrigated wheat yield (FAO/WFP 2000). Overall, wheat production dramatically declined from 475,000 tonnes in 1999 to 255,000 thousand tonnes in 2000 (Economist Intelligence Unit

2001c:40) and 300,000 tonnes in 2001 (World Food Programme 2003). This had a serious effect on food security. There was a 63.6% increase in price of foodstuffs in 2000 (Economist Intelligence Unit 2001c). Especially vulnerable were those in rural areas whose household crop had failed. The situation was particularly acute in the second year of drought in 2001, as people had exhausted whatever coping strategies remained[4]. As many as one million people faced malnutrition and potential starvation (Economist Intelligence Unit 2001a) and were dependent on international aid. Following the drought conditions in the 1999/2000 and 2000/2001 cropping season, rain during the 2001/02 cropping season was in line with the long term average, and production in 2002 recovered to 1999 levels.

2.3 Tajikistan's fertility in historical perspective

Figure 2.1 Total fertility in Tajikistan based on vital registration data, 1959-2000



Note: Rates pre-1989: plotted rate in 1975 refers to 1974-5; 1976 refers to 1975-6, etc. No data found for 1987 and 1988. Sources: Jones and Grupp (1987) for 1959-1974; *Vestnik Statistiki* (Goskomstat multiple years) for 1975-1986; TransMONEE (2006) for 1989-2000.

[4] The head of the International Federation of Red Cross' mission in 2001 reported that 'people have already sold parts of their homes including doors and windows. They now have nothing left to sell.. We have seen children digging among rat holes in wheat fields, searching for grain hoarded by the rodents for the winter' (IRINCAS 2001).

Traditionally in Tajikistan, as elsewhere in Central Asia, demand for children has been high (Tabyshalieva 1997). But in Pre-Soviet times, and into the Soviet era until after World War II, realised family size was limited by high levels of infant and child mortality associated with epidemics of measles and other diseases (Harris 2004). It was not until the 1960s that living standards and medical facilities were sufficient to reduce mortality and effect rapid population growth (Harris 2002). Fertility rates also increased (Anichkin and Vishnevskii 1994), with vital registration data showing increases of 50% by the mid-1970s (Lutz and Scherbov 1994) (Figure 2.1). This probably reflects a real increase in fertility - owing to a reduction in breastfeeding, improvements in nutrition and a reduction in the spousal age difference - but also increasingly complete birth reporting as the Soviet registration system developed (Jones and Grupp 1987).

Patriarchal and patrilocal social relations have been important in underpinning a high demand for children. Men's status is dependent on the number of their (male) children, while a wife's standing in a family also improves with childbearing. It is therefore perhaps the 'social traditions that have grown up round Islam, rather than the religion itself' (Harris 2002:225), that have encouraged large family sizes. Further, in rural areas, children provide a much needed source of labour. Soviet era influences have also played an important role: as Harris (2002:218) summarises, 'benefits paid to mothers of large families, cheap housing, free education and health care, free plots of land for members of communal and state farms, and the low costs of essential food stuffs all made it possible for most families to afford the economic costs of many children without too much hardship'. In many ways, the system represented an artificial 'greenhouse' environment, in which state population policy was important in shaping family decisions and, even amongst the urban population, reproduction was not impacted by career choices (Sobotka 2002). Indeed, the pronatalist Soviet regime, concerned about the low fertility of its European population, made no attempt to take account of the very different demographic trends in its Central Asian populations (Barbieri et al. 1996). Ironically, it was perhaps in Central Asia that its pronatalist policies had most influence.

It was not until the mid-1970s that family planning programmes began to be introduced following concern about high population growth rates in the region. In

Tajikistan, the intrauterine device (IUD) was introduced around 1980 – but while demand was high among women, they often met resistance from their husbands or mothers-in-law and, in any case, supplies were limited (Harris 2002). Nevertheless, according to vital registration data, fertility peaked in 1976 at 6.3 children per woman and had declined to 5.45 by 1984. Pre-independence declines in fertility were largely restricted to those aged 35 years and over and probably largely reflected trends in the urban population, where access to modern contraceptives was easier (Harris 2002:219). Thereafter, as elsewhere in the Soviet Union, fertility increased slightly following the introduction of family policy measures (United Nations Economic Commission for Europe 2000:182), reaching a peak in 1987. Fertility subsequently started to decline, mirroring wider Soviet trends, and had reached a figure of 5.04 by the time of independence in 1991 (TransMONEE 2006). Despite this decline, by the end of the Soviet era, Tajikistan was still regarded as 'pre-transitional' (Anichkin and Vishnevskii 1992:61). Central Asia had the highest fertility rates in the Soviet Union, with Tajikistan showing the highest rates of all (Turner 1993) and the ideology of large families 'well established' among the local population (Harris 2002:219).

2.4 Data and Method

Under-registration of births has traditionally been a problem in Central Asian vital registration figures (Anderson and Silver 1989), and the quality of registration data has declined further since independence. Aleshina and Redmond (2003) report that, even in a context of ex-Soviet countries, under-registration in Tajikistan is particularly acute. In total, only 75% of children under 6 in 2000 had been registered (United Nations Children's Fund 2001). Overall, the 'reliability and relevance' of vital registration data have become 'a cause of concern for both the Government and the international community' (United Nations Population Fund 2004:2). Owing to an increase in the under-registration of births, in the post-independence period 'total fertility rates in Tajikistan are probably much higher than most [vital registration] statistics would suggest' (Gentile 2005:8). However, some attempt to correct for under-registration is made. Indeed, many children who are unregistered at the time of birth are registered at a later date, often at the age of seven when children start attending school, since non-registered children cannot be enrolled. Annual estimates of fertility are corrected to reflect these late registrations; at the end of 2007, the

estimate for 2000 was in the process of being corrected. The vital registration figures are much improved by this adjustment, but should still be used with an element of caution.

This paper therefore uses birth and marriage histories from two nationally representative sample surveys, in preference to vital registration data, to reconstruct marital and fertility trends since independence: the 2003 Tajikistan Living Standards Survey (TLSS), and the 2005 Multiple Indicator Cluster Surveys (MICS). Both surveys included a female questionnaire, for women aged 15-49 at the time of the survey, with a section on the fertility history of respondents. The numbers of women interviewed were 6,196 and 10,626 respectively. Unlike the MICS, where only the dates of a woman's first and most recent births were recorded, the TLSS contains a complete birth history – making it most suitable for analysing trends in total fertility and higher order births. Meanwhile, unlike the TLSS, the MICS recorded the month and year of a woman's first marriage, making it the most suitable for analysing changes in nuptiality and first births within marriage[5].

Use of survey data is not without its drawbacks. First, since the surveys collected birth history information for women aged 15-49 years at the time of the survey, data are truncated in periods before the survey, with fertility rates based on a progressively younger sample of women as we go back in time (see Ní Bhrolcháin 1993). To ensure comparability across time for periods before the survey, rates are calculated based on the births and exposure of women aged 15-34 years, for periods where the age distribution of women is complete up to age 35 years (1989 onwards)[6]. This is likely to yield a conservative estimate of fertility decline, since it excludes any

[5] Many religious wedding ceremonies (*nikoh*) in Tajikistan are not officially registered (Dikaev 2005). Therefore, in the MICS survey, women were asked the question 'In what month and year did you first marry or start living with a man as if married?' This is a more accurate reflection of the date of union than the date of marriage registration and, given the significant under-registration issues, a more complete one. Throughout this thesis, the terms 'rate of first marriage' and 'rate of first union formation' are used interchangeably; both refer to measures calculated on answers to this question.

[6] Truncation is less of an issue for trends in first unions and first births, which are concentrated at a relatively young age in Tajikistan: traditionally an unmarried woman over the age of 20 is in danger of being considered an 'old maid' (Tabyshalieva 1997:52). Therefore, these rates are calculated based on events and exposure for women aged 15-29 years inclusive, for 1986 onwards.

reductions in fertility among women aged 35 and over. Second, reported birth history data are vulnerable to the omission or displacement of births (Potter 1977) - though this is perhaps less of an issue in Tajikistan, with the Soviet legacy of very high literacy levels, than elsewhere in the developing world. Unlike the 2005 MICS, women's dates of birth are not provided in the 2003 TLSS. Only the woman's age *x*, in completed years, is provided. For the purposes of the analysis, the woman is assumed to be exactly *x* and a half years old at the time of the survey.

The starting point in the analysis is the calculation of annual total fertility estimates for 15-34 year olds (hereafter $TFR_{15\text{-}34}$) using the TLSS. Importantly, fertility estimates from surveys are subject to sampling variability (Dyson and Murphy 1985). It is therefore important to assess the statistical significance of differences between adjacent annual estimates. Following Handwerker (1988) and Ren (2004), standard errors for each of the annual estimates of total fertility, and the covariance between adjacent estimates, are calculated using Tukey's jackknife, with replicates based on the survey primary sampling units. In turn, these are used to calculate confidence intervals for the difference in total fertility between two adjacent years of interest.

Interest also lies in unpacking changes in overall fertility into the component trends in first unions, first births within unions, and higher order births. Rates of first union formation (hereafter, 'rates of first marriage'), specific to those women who have never been in union (hereafter, 'unmarried' women), are calculated using a simple proportional hazards model:

$$\lambda_{ij} = \lambda_j \exp\{\mathbf{x}_i'\beta\} \tag{2.1}$$

In this model, λ_{ij} is the hazard corresponding to woman *i* in age group *j*, λ_j is the baseline hazard for age group *j*, and $\exp\{\mathbf{x}_i'\beta\}$ is the relative risk, a proportionate increase or decrease in the rate associated with the covariate characteristics $\mathbf{x}_i$[7]. The chosen age groups chosen broadly reflect 'early' (15-17), 'peak' (18-20) and 'late' (21-29) ages at first union. Since interest lies in describing overall trends in union

[7] See Rodríguez (2007) for a helpful introduction to proportional hazard models.

formation, dummy variables for calendar year are the only other covariates included. A similar model, with the same baseline categories, was used to describe trends in the rate of first births to childless women. To more specifically examine rates of first birth to childless women *within* first union, a model was specified with process time *t* representing time since first union and the baseline hazard divided into years (12 months or less since union; 13-24; 25-36; 37-48; 49-60 and more than 60 months)[8].

Trends in higher order fertility are analysed using discrete-time logistic regression[9] (Yamaguchi 1991). A woman months table was created. For each month *t* of woman *i*'s childbearing history between the ages of 15-34, the table contains her age, parity, and the time in months since her previous live birth. The model is specified as:

$$\log\left(\frac{p_{it}}{1-p_{it}}\right) = \beta_0 + \sum_k \beta_k P_{kit} + \sum_l \beta_l X_{lit} \qquad (2.2)$$

where p_{it} is the probability of a live birth[10] to woman *i* in month *t* and P_{kit} is a vector of dummy variables representing period effects in the form of calendar years with coefficients β_k. X_{lit} represents a vector of controls for parity, age, age squared and duration since previous birth (less than one year; one to two years; two to four years; four to seven years; and greater than seven years), with coefficients β_l. Since the

[8] In the MICS survey, the month but not the date of first union was recorded. In calculating exposure time between date of first union and date of first birth, unions were assumed to take place on the 15th of the month. In total, 332 first births (8% of the total of 4,216 between 1986 and 2005 in the sample) were excluded: 15 first births to women who had never been in first union, and 317 births with an estimated conception date before marriage.

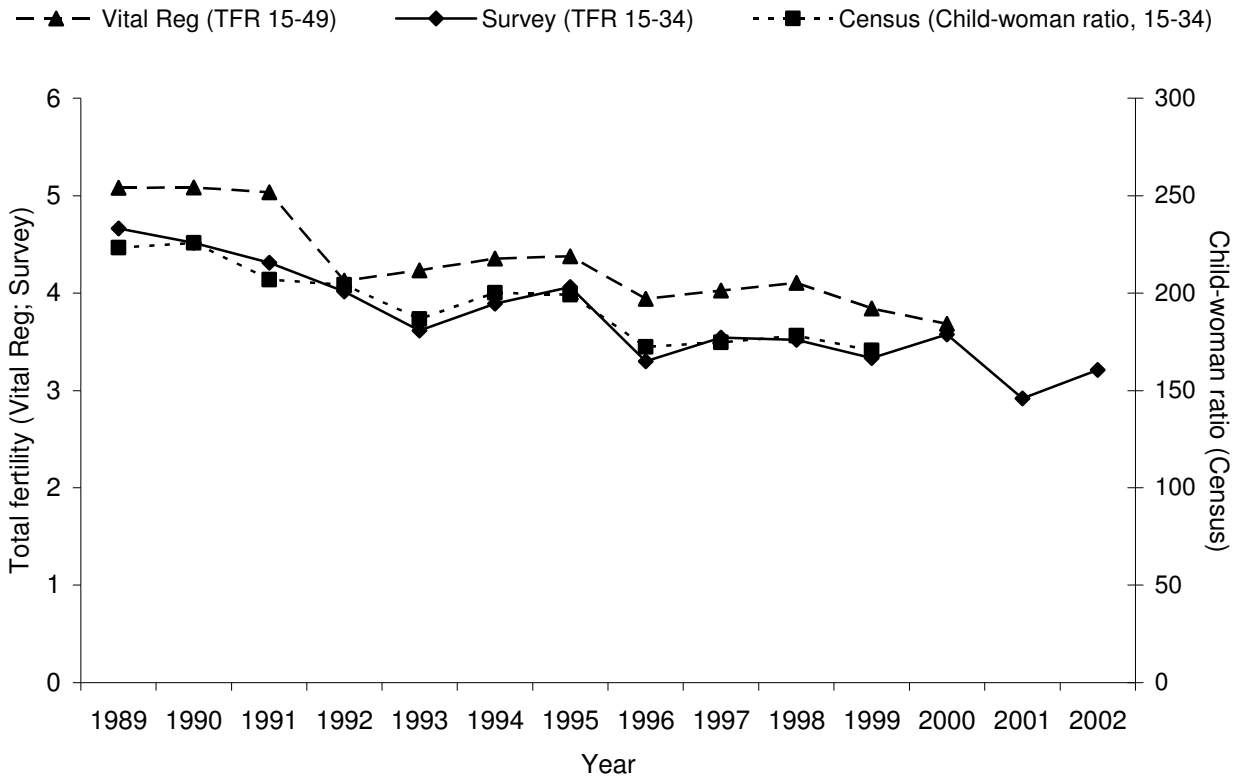
[9] Higher order births are pooled together in this model to increase the power of tests for differences in fertility between periods.

[10] Modelling the log-odds of a birth in a given month is preferred to shifting back the date of birth by nine months and modelling the log-odds of a conception. Focusing only on conceptions does not account for any period effects on fertility acting, for example, through changes in the rate of spontaneous abortions. Ideally, one would use a series of models to estimate separately period effects on conceptions within union, and on spontaneous abortion after conception, but these data are not available.

focus is on higher order births, all woman months at parity 0 are excluded from analysis[11].

2.5 Results and Discussion

Figure 2.2 Fertility trends in Tajikistan, 1989-2002, based on three different sources



Note: for explanation of child-women ratio, see footnote 13 (page 30).
Sources: vital registration: TransMONEE (2006); survey: analysis of TLSS (2003) data; census: calculations using data published in Tajikistan State Committee on Statistics (2001).

Figure 2.2 presents variations in fertility levels in Tajikistan since 1989 according to three different sources: vital registration (TFR_{15-49})[12], TLSS survey (TFR_{15-34}) and

[11] A covariate for the woman's highest educational level was also included but, since made it no difference to the nature of the temporal trend, was not retained. A multilevel model was fitted which included a random parameter to allow for the correlation of observations across months at the woman level. Since this parameter was not significant, the multilevel model was not used.

[12] No official registration data on age-specific fertility rates for Tajikistan are available after 1995 from TransMONEE (2006), precluding calculation of the TFR_{15-34} for direct comparison with the survey estimate.

census (child-woman ratio$_{15\text{-}44}$[13]). Trends revealed by each of the sources – especially the census and survey data – show considerable agreement. All three sources show a decline in fertility since independence in 1991. The survey and census data suggest that fertility had also been declining in the years immediately before independence, consistent with 1987 being a peak fertility year across the Soviet Union (Becker and Hemley 1998; Agadjanian 1999). Most interestingly, all three sources show that the post-Soviet trend has been far from a consistent, year-on-year decline. Indeed, fertility levels have fluctuated, to an extent which is unusual in comparison to the Soviet era (Figure 2.1), illustrating the importance of particular crisis periods.

2.5.1 Civil War

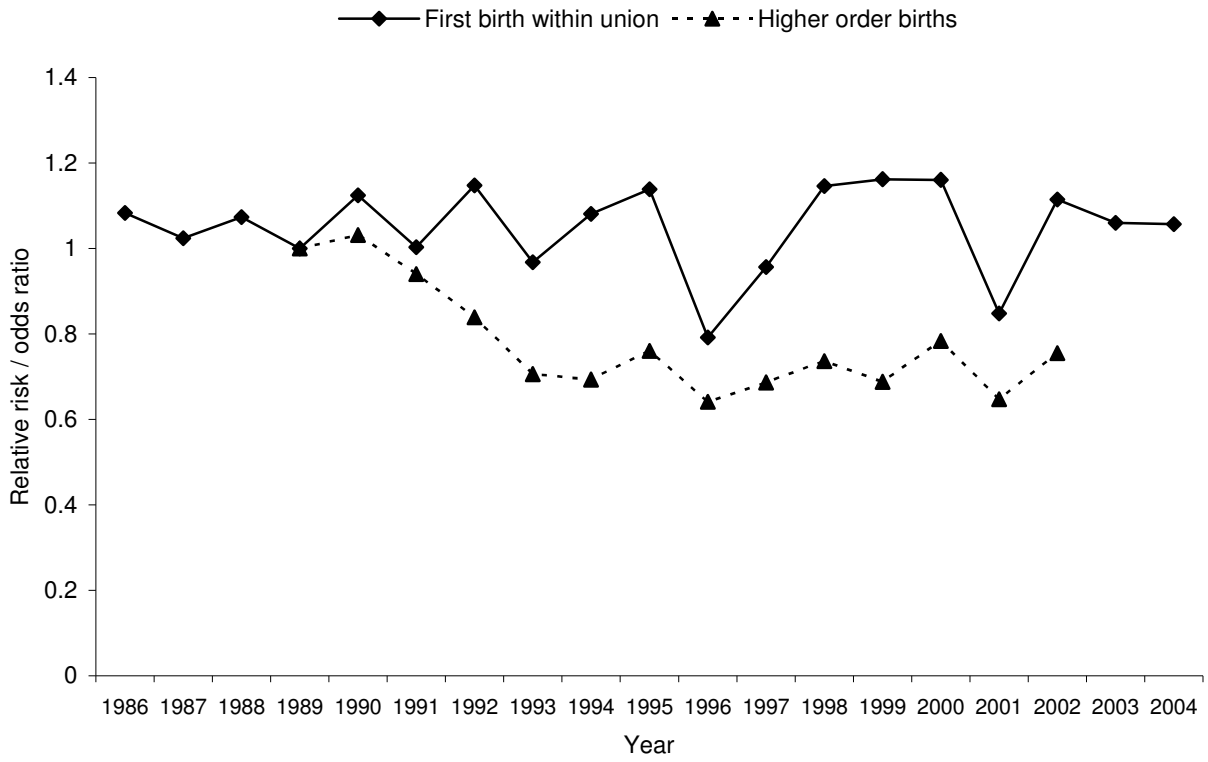
Vital registration data show a very sharp fall in TFR$_{15\text{-}49}$ from 1991 to 1992, compared to the more gradual decline apparent in survey and census data (Figure 2.2). This probably reflects the breakdown in the registration system during the most intense period of fighting in the civil war in the latter half of 1992 – a conclusion which is supported by regional registration data (Figure 1.1 in Chapter 1) showing that this decline was particular to Khatlon, RRS and Dushanbe, the three regions most affected by the war. The survey and census data show a decline in fertility from 1992 to 1993, but at a similar rate to the decline in preceding years, suggesting that the intense fighting had little impact on aggregate fertility levels. Similarly, while the odds of a higher order birth was significantly lower in 1992 than in the preceding year (odds ratio 0.84; 95% CI, 0.72-0.98; p=0.024[14]), this is not especially distinctive in the context of previous year-on-year declines (Figure 2.3). Overall, at the national

[13] The census in Tajikistan took place in January 2000, time *t*. Here the child-woman ratio in 1999 is calculated as the number of children aged 0 years at *t* per 1,000 women aged 15-34 years at *t*. In the same way, the child-woman ratio for 1998 is the number of children aged 1 year at *t* per 1,000 women aged 16-35 years at *t*. Whipple's index provided no evidence for strong age heaping in the census data. The ratio calculated here is conditional on survival of the children, as well as the women, until the time of the census so does not control for any changes in infant mortality across the period.

[14] This, and subsequent, *p*-values from model estimates are results of Wald tests assessing the significance of a calendar year coefficient at the 5% level, compared with a reference comparison year. Standard errors were adjusted to take account of the surveys' sample design.

level, there is more evidence for a decrease in birth registration than a decrease in fertility as a result of the conflict.

Figure 2.3 Relative risks of a first birth within union[1], 1986-2004; and odds ratios of a higher order birth[2], Tajikistan 1989-2002 [Reference year: 1989]

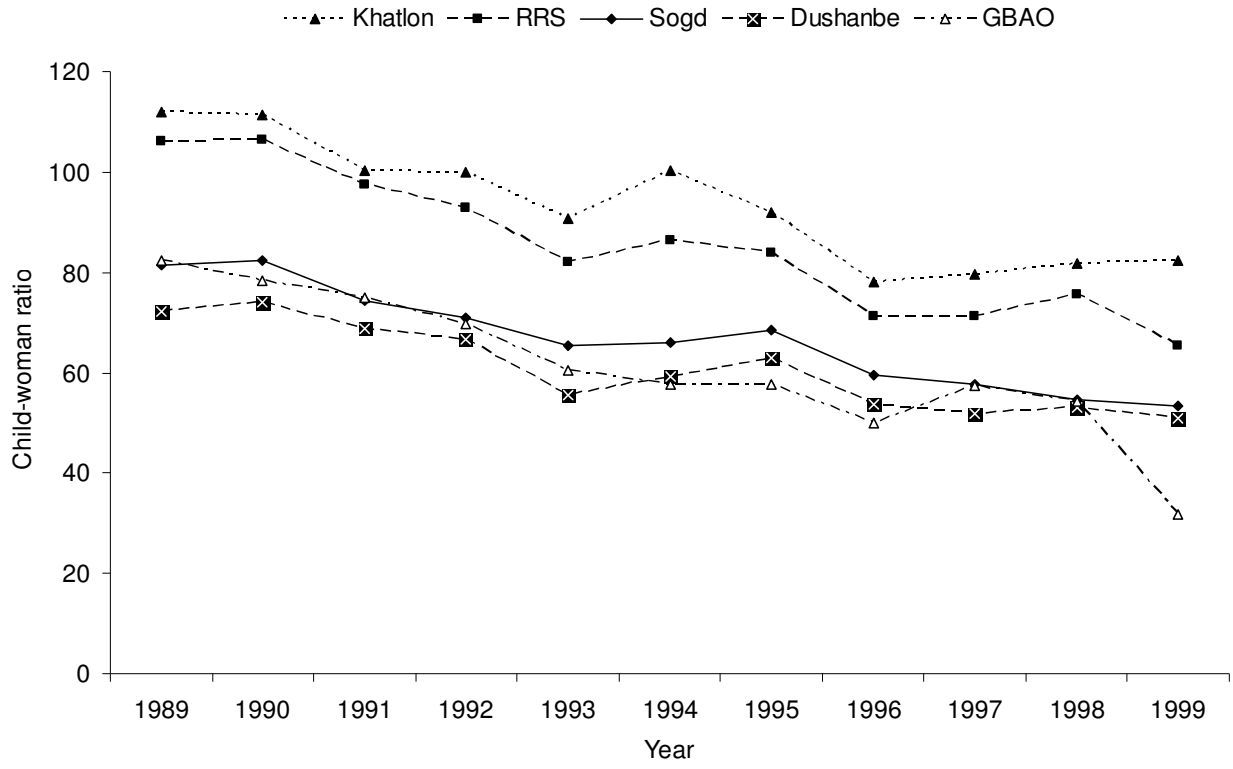


1 For women aged 15-29 inclusive. Results of piecewise-constant hazard model. See table A2 in Appendix for model coefficients.
2 For women aged 15-34 inclusive. Results of logistic regression controlling for parity, duration since previous live birth, age and age squared. See table A1 in Appendix for model coefficients.
Source: 1 analysis of MICS (2005); 2 analysis of TLSS (2003).

Nevertheless, at the regional level, there is some evidence for a greater decline in fertility in 1993 in Khatlon, RRS and Dushanbe, the places most affected by the conflict. Limits placed on disaggregation by sampling variability preclude survey estimates specific by annual period and region. However, the 'child-woman ratio' census estimates by region in Figure 2.4 do indeed show the greatest decline in these three regions – and only in these regions is there a significant rebound in fertility in 1994. Therefore, there is some indication, in line with the findings of Lindstrom and Bernahu (1999) and Agadjanian and Prata (2002), of a decline in births in places affected by intense military conflict, followed by a post-conflict rebound. This probably reflects the impact of spousal separation. Meanwhile, detecting the direct effect on fertility of war-related mortality is compromised by the retrospective nature

of the census and survey data, which is conditional on female survival to the date of data collection.

Figure 2.4 Regional fertility trends in Tajikistan, 1989-1999: estimates using the 2000 census



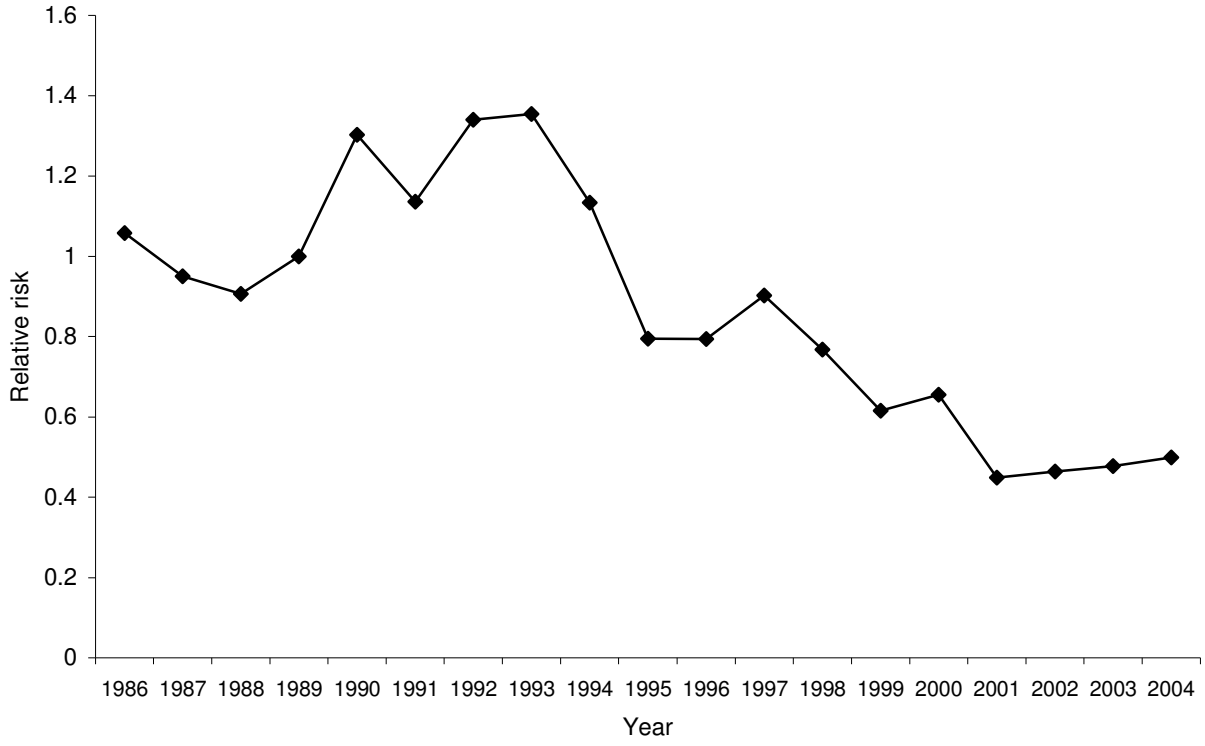
Note: for explanation of child-women ratio, see footnote 13 (page 30).
Source: calculations using data published in Tajikistan State Committee on Statistics (2001).

2.5.2 Food crisis and drought

There is a sharp decrease in fertility between 1995 and 1996 (survey difference in $TFR_{15\text{-}34}$ 0.77; 95% CI, 0.38-1.15; $p<0.001$). From 1994 to 1995 there were sharp declines in first marriages to unmarried women (relative risk 0.70; 95% CI 0.55-0.89; $p=0.003$) (Figure 2.5). Given the very strong link between first marriage and first birth in Tajikistan[15], this was a major contributor to the fertility decline in 1996.

[15] Across all the women in the survey to have had a first birth within marriage, almost 40% (65%) had their child within the first year (18 months) of marriage.

Figure 2.5 Relative risks of a first union[1], 1986-2004 [Reference year: 1989]



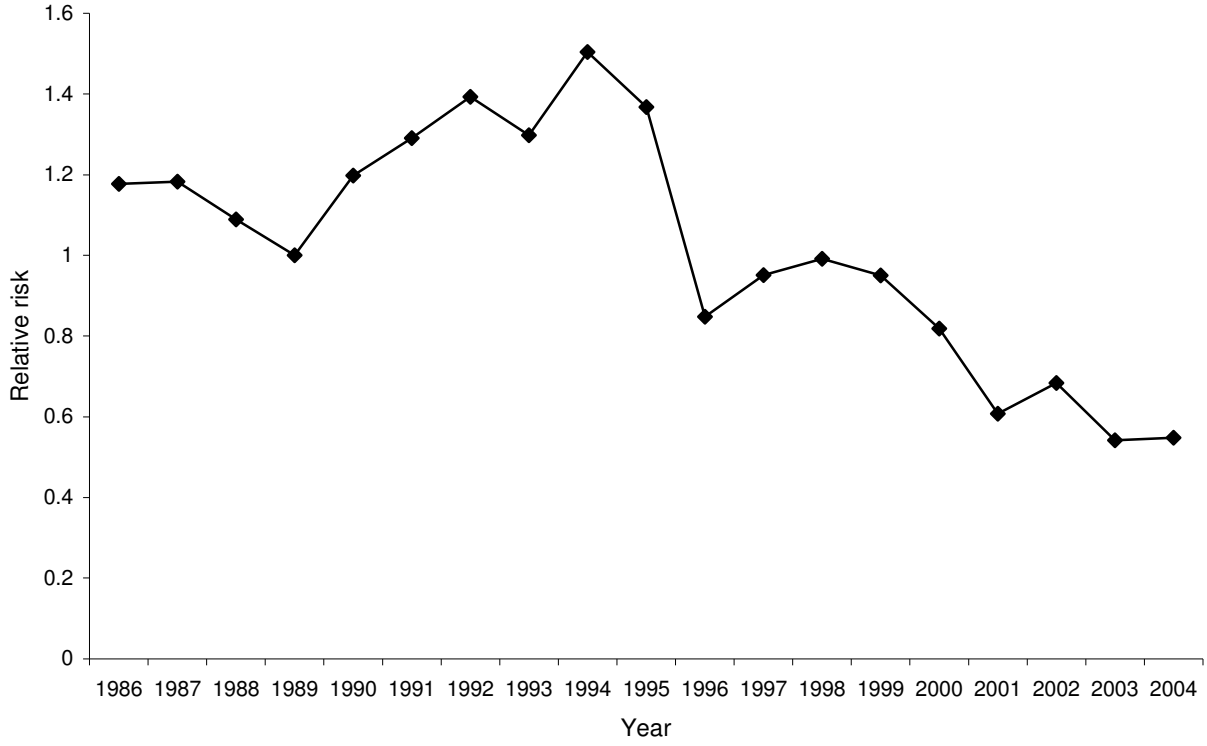
1 For women aged 15-29 inclusive. Results of piecewise-constant hazard model. See table A3 in Appendix for model coefficients.
Source: analysis of MICS (2005).

However, as Figure 2.3 shows, there were also declines in the rate of births within marriage. There is strong evidence for a decline in first births to childless women within marriage from 1995 to 1996 (relative risk 0.69; 95% CI 0.55-0.87; p=0.002). Together with the decline in the rate of first marriage, this had a cumulative impact on the decline in the overall rate of first births to childless women from 1995 to 1996 (relative risk 0.62; 95% CI 0.50-0.78; p<0.001) (Figure 2.6). The odds of a higher order birth also fell significantly from 1995 to 1996 (odds ratio 0.84; 95% CI 0.74-0.96; p=0.008) (Figure 2.3). Overall, there is a suite of converging evidence - including distinctive decreases in overall fertility apparent in vital registration, census and TLSS survey data, and distinctive decreases in the rate of first marriage and rate of childbearing within marriage from MICS and TLSS data – which is consistent with a reduction in fertility because of the 1995 food crisis.

As we might expect, since the population as a whole had been reliant on imports for its grain supply (including in rural areas, where cotton dominated agricultural

production), census data suggest that the demographic effect of the grain shortage in 1995 was spatially pervasive (Figure 2.4).

Figure 2.6 Relative risks of a first birth[1], 1986-2004 [Reference year: 1989]



1 For women aged 15-29 inclusive. Results of piecewise-constant hazard model. See table A4 in Appendix for model coefficients.
Source: analysis of MICS (2005).

Since the vital registration figures for 2000 onwards are yet to be adjusted for under-registration, and the census took place in 2000, only survey data are available to investigate the most recent fertility trends (Figure 2.2). Nevertheless, the distinctiveness of the estimated decrease in total fertility from 2000 to 2001 (survey difference in TFR_{15-34} 0.65; 95% CI, 0.27-1.03; $p<0.001$) is consistent with the importance of the drought. Interestingly, there is no evidence for a decline in the rate of marriage, or in the rate of childbearing within marriage, during the first year of the drought. During the second year, however, when the population experienced the cumulative impact of two consecutive poor harvests, there are significant declines. From 2000-2001, there is a decline in the rate of marriage (relative risk: 0.68; 95% CI 0.53-0.88; $p=0.003$) (Figure 2.5), the rate of first births within marriage (relative risk: 0.73; 95% CI, 0.59-0.91, $p=0.004$) (Figure 2.3), the overall rate of first births (relative

risk: 0.74; 95% CI, 0.60-0.92, p=0.007) and the odds of a higher order birth (odds ratio 0.83; 95% CI, 0.73-0.94; p=0.004) (Figure 2.3).

The strong marriage and fertility responses to the crisis in 1995 and the drought in 2000-01 in Tajikistan provide further support, following from Galloway (1988), Lindstrom and Bernahu (1999) and Bengtsson and Dribe (2006), to suggest that periods of acute food shortage and high prices can have a significant demographic impact. Further, just as Bengtsson and Dribe (2006) and Dyson (1991a; 1991b) document an immediate, almost 'anticipatory' fertility response to food shortage, so the response is also immediate here. The 1995 crisis developed over the winter of 1994-95, when imports were only half of the 1993-94 level (Table 2.1). Fertility declined significantly in 1996 (Figures 2.2, 2.3 and 2.6). The swift nature of the response to the crisis points towards the importance of behavioural factors in the fertility decline. Indeed, during the 1995 crisis an acute drop in the marriage rate was a key contributor to the fertility decline – especially so given that in Tajikistan births outside of marriage are rare.

However, there is also evidence for a decrease in the rate of first births within marriage, and a decrease in higher-order births, in 1996 and 2001. Contraceptive prevalence in Tajikistan is low: in 1991, among sexually active individuals, current use of modern methods was estimated at 3% (Turner 1993). By 1999 this had increased to an estimated 30% (Falkingham 2000), with use confined to women at higher ages and parities. However, prevalence in 1995 was almost certainly lower than this, and contraceptive use at older ages would not explain the decrease in the rate of first births within marriage. If the reduction in births represented the deliberate postponement of childbearing, this must largely reflect the use of traditional methods. Bengtsson and Dribe (2006) judge that, in a population in pre-industrial Sweden without modern methods, deliberate control was the main mechanism through which fertility was related to economic fluctuations.

Biological explanations should also be considered. While Bongaarts (1980) and Menken et al. (1981) conclude that chronic malnutrition has only a minor biological effect on fertility levels, acute malnutrition can have a significant impact. Stein and Susser (1975) document trends in fertility during the Dutch Famine in 1944-5,

illustrating a distinct fall in the number of births nine months after the onset of acute starvation in the worst affected areas. They identify a 'threshold' calorific value below which the nutritional impact on fertility becomes evident and conclude that the famine probably affected one or more of the 'preconditions' for fecundity: on the woman's side, her capacity for ovulation, fertilisation and nidation; for the couple, the man's capacity for ejaculation and insemination. While they consider ineffective nidation (resulting in spontaneous abortion) as the least likely of the preconditions to have been a major cause of infecundity in the Dutch Famine context, other studies do place emphasis on the importance of nutrition to levels of intra-uterine mortality. Pebley et al. (1985), for example, examining data for rural Bangladesh, reports that mother's nutritional status – in terms of both pre-conception weight and weight gain during pregnancy – is significantly related to foetal mortality. Pregnancies conceived during May and June have a higher risk of failure than those conceived at other times, which may be related to the timing of conception in relation to the 'lean' period of June to October, before the rice is harvested. Scott and Duncan (2002), meanwhile, use historical data for England from a number of parishes for particular periods from the sixteenth to the eighteenth century to examine the seasonal relationship between nutrition and pregnancy outcomes. They conclude that 'the regular oscillation in the grain prices and the annual hungry season could cause periods of acute malnutrition in the working classes which could fall in one or more of the trimesters of pregnancy, with serious consequences for the unborn child' (p.232), including, at worst, perinatal death.

The psychological stress of a crisis can induce amenorrhea. Cai and Feng (2005), for example, find evidence for an increase in foetal loss during the Cultural Revolution among well-nourished urban Chinese women, showing that the biological impact of periods of turmoil are not restricted to direct nutritional effects but can also act via an increased level of social stress. A decrease in coital frequency, through a loss of libido or temporary spousal separation because of migration, is a further possible reason for the decreases in births within marriage in 1996 and 2001. Hionidou (2002) argues that contraception was not a major factor in the decrease in conceptions during famine on the Greek island of Syros, but that the decrease instead largely resulted from a loss of libido stemming from the psychological effect of the crisis. Saito (2002), meanwhile, cites literary evidence for an increase in the 'floating' male

population, in search for food and work, during famines in Japan, with the separation of men and women a major factor in fertility declines in these periods. Indeed, Menken et al. (1981) advocate more vigorous searches for data which are able to provide evidence for the temporary separation of spouses during food crises. In the Tajik case, Harris (1998a:661) points to the mid-1990s as a time in which men in the Gharmi villages of Khatlon decided to become migrant workers in other parts of the Soviet Union, while reports at the time suggest that the drought in Tajikistan in 2000-01 prompted many men to leave the country to find work (OCHA 2000; World Food Programme 2001). Given the low prevalence of modern contraceptive methods, temporary labour migration may have been a contributor to the decline in the rate of childbearing within marriage from 1995 to 1996, and from 2000 to 2001.

There are, therefore, many possible mechanisms for the decrease in the rate of first births within union, and in the odds of a higher order birth, in 1996 and 2001. As Bongaarts (1980:568) concludes, 'a lack of sufficiently detailed data makes it impossible to estimate accurately the contributions made to the fertility decline from each of these factors'. It seems likely that a combination of factors were responsible, but explanations involving biology (whether through acute malnutrition or psychological stress) and spousal separation seem more reasonable than those focusing on deliberate postponement, given the low prevalence of modern contraception. Whatever the reason for the declines, there is evidence for a rebound in higher order fertility, and in the rate of first births within marriage, following the 1995 and 2000-01 crises (Figure 2.3). In contrast, there was a longer lasting impact on marriage levels (Figure 2.5). Indeed, the 1995 case in particular not only involved food shortage but a number of more lasting economic changes. Food shortages eased from mid-1996 but bread, following the end of subsidies, was now much more expensive than before. Further, the bankruptcy of most of the collective (*kolkhoz*) and state (*sovkhoz*) farms, following the rapid inflation in 1995, led to persistent under- or non-payment of workers in the following years (Grand et al. 2001). These changes, particularly in the Tajik context when the ceremony itself is traditionally very expensive and a focus for conspicuous demonstrations of wealth (Tett 1996), undermined people's ability to finance the costs of a wedding and family formation. Galloway (1988) also notes that the effects of economic crisis on marriage can be prolonged, while Palloni et al. (1996:107) argue that 'when the economic effects of

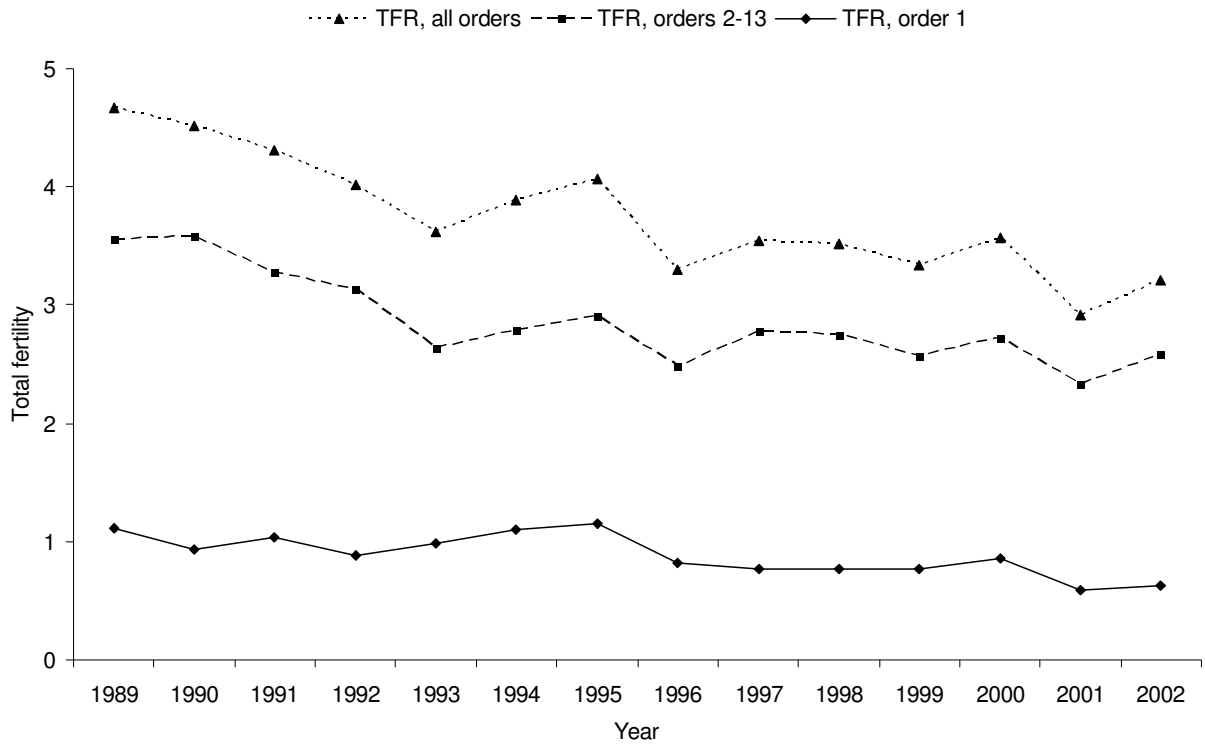
the crisis are long-lasting, a more permanent disequilibrium in the marriage markets sets in, and the making up of postponed marriages ceases to be a feasible option. The consequence is an increase in the proportion of members who never marry'. This describes the Tajik situation well; sustained low marriage rates since the mid-1990s will inevitability translate to an increase in the never-married. Large scale labour migration, as well as influencing fertility within marriage, is likely also to be a factor in the prolonged marriage decline, given qualitative accounts of a sharp imbalance in the sex ratio (for example, Harris 1998a). Indeed, labour migration from Tajikistan has become widespread: Olimova and Bosc (2003), using survey data, estimate that in 26% of Tajik households at least one household member had worked abroad at some point between 2000 and 2003.

2.5.3 Overall trend

Just as in Kazakhstan (Agadjanian et al. 2008a), Uzbekistan (Agadjanian and Makarova 2003) and ex-Soviet Europe (for example, Perelli-Harris 2005), fertility decline in Tajikistan in the early 1990s was driven by reductions at higher orders while first order rates were stable (see Figure 2.7, which summarises the component trends in total fertility). In contrast, from the mid-1990s, fertility decline has been effected through a decrease in the rate of first births to childless women. In turn, since - outside of particular crisis periods - the rate of first births to childless women within marriage has remained relatively stable (Figure 2.3), and since conceptions outside of marriage are rare[16], this has been driven by a decrease in the rate of first marriage (Figure 2.5). Meanwhile, rates of birth at higher orders have remained relatively stable since the mid-1990s (Figure 2.3). It should be acknowledged that, since the analysis is restricted to women aged 34 and under, there could have been a significant reduction in fertility at higher ages which has remained undetected. Nevertheless, for the ages considered, it is clear that the decline in higher order births to in the late 1980s and early 1990s has not been sustained (Figure 2.7).

[16] 332 first births (8% of the total in the sample) were estimated to have been conceived before marriage (see footnote 8, page 29).

Figure 2.7 Total fertility (TFR_{15-34}) trends by birth order in Tajikistan, 1989-2002



Source: analysis of TLSS (2003).

This lack of decline at higher orders may reflect unmet need for contraception rather than a lack of impetus among the population for fertility decline. Indeed, the women in villages in which Harris (1998b:200) conducted her research 'made it very clear that their major concern was control over their fertility'. In the poorer families, 'both men and women.. are desperate to limit their fertility. Although their ideal number of children remains four to six, most young couples know they will not be able to cope with so many without a large improvement in their financial situation and that realistically they should have no more than two' (Harris 2002:220-221). Thus, Harris' (2002:220) judgement is that fertility would fall further if adequate access to contraceptives could be supplied. It is true that contraceptive use has increased. Results from the Multiple Indicator Cluster Surveys carried out by UNICEF estimate modern prevalence at 27% in 2000 and 34% in 2005, with the IUD by far the most popular method and contraceptive use confined to women at higher ages and parities (TransMONEE 2006). However, this remains the lowest rate in Central Asia, compared to 42% in Uzbekistan (in 2002), 39% in Kazakhstan (1999), 36% in Kyrgyzstan (1997), and 35% in Turkmenistan (2000) (Westoff 2005).

2.6 Conclusions and future research

This paper contributes to the sparse literature on the demography of post-Soviet Central Asia. It focuses on Tajikistan, a republic with the highest population growth rate during the Soviet era. It finds parallels with the pattern of fertility change in other post-Soviet republics in Central Asia and Eastern Europe, with fertility decline initially driven by decreases at higher orders before first order declines from the mid-1990s.

The paper also contributes to the literature on the demography of conflict and of food crises. It shows that the sharp decline in official fertility data during the peak in fighting in Tajikistan in 1992 probably reflects a decrease in birth registration, though there is also some evidence that the fertility decline from 1992 to 1993 was greatest in areas worst affected by the conflict. Most significantly, it finds a suite of converging evidence consistent with a sharp reduction in nuptiality and fertility during the 1995 food crisis. It also finds evidence for a further reduction in nuptiality and fertility during the second year of the 2000-01 drought.

Tajikistan's experience illustrates the importance of context in understanding the demographic effects of post-socialist economic crisis. Mountainous Tajikistan has one of the lowest ratios of arable land per head in the world (Economist Intelligence Unit 2001b) and, particularly at the time of independence, much of this was devoted to the production of cotton. Therefore, during the Soviet era, Tajikistan was dependent on grain imports. This lack of self-sufficiency left the population particularly vulnerable to the collapse of Soviet central planning, which had assured minimum consumption levels and food security. When, by the mid 1990s, the government could no longer afford to import sufficient grain, a food crisis was inevitable. In contrast, Kazakhstan, for example, was a net exporter of grain during the Soviet period, did not experience a comparable food crisis in the mid-1990s, and was not affected by the 2000-01 drought. Its post-Soviet demographic experience is likely to be very different to that of Tajikistan. Therefore, further research comparing the particularities of marital and fertility change in the different Central Asian republics would be valuable. The demography of post-Soviet Central Asia remains an under-researched field.

3. Marrying more and earlier: age-period interaction in trends of first union formation in transitional Central Asia

Abstract

The literature on the recent demographic history of Central Asia is sparse. This paper uses survey data to calculate trends in first union formation in the region during the transitional years immediately before and after the end of the Soviet Union – the *perestroika* and early post-independence years. Results show a sharp increase in the rate of first union formation in Kyrgyzstan, Tajikistan and Uzbekistan, with rates peaking in the early 1990s at around a third higher than 1988 levels, and a smaller relative increase in Kazakhstan. There is also evidence for a clear age-period interaction effect: increases were most marked at younger ages, while rates for older unmarried women remained relatively stable. Possible explanations for the increase in union formation are discussed, including the impetus provided by the strengthening of 'conspicuous consumption' in wedding ceremonies, and the role of marriage as a reaction to the uncertainties of the transitional period.

Keywords: Central Asia, nuptiality, union formation, *perestroika*, post-Soviet, conspicuous consumption, uncertainty

3.1 Introduction

The republics of Central Asia experienced dramatic social and economic changes in the late- and post-Soviet years. However, relatively little is known about the region's demographic trends over the period (Gentile 2007). This paper describes trends in first union formation in four of the five Central Asian republics: Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. While chapter 4 will focus solely on the post-Soviet period, this chapter focuses specifically on trends in first union formation during the transitional years immediately before and after the end of the Soviet Union – the *perestroika* and early post-independence years.

3.1.1 Union formation in pre-Soviet and Soviet Central Asia

Women in Central Asia have traditionally married at an early age. In pre-Soviet times, girls often married in their early teens (Jones and Grupp 1987; Tett 1996). Marriages were arranged by close family members and involved the payment of a *kalym* or bride price paid by the bridegroom or his family (Abdullaev and Akbarzadeh 2002:171; De Santi 2006). Following marriage, women become part of the husband's household, typically a large extended family. The *kelin* ('incomer') had a lowly position within her new household, though her status improved with childbearing, particularly if she gave birth to sons (Falkingham 2000). The Soviet system attempted to transform family life in Central Asia. However, while laws were passed banning marriage without the consent of the bride and banning the payment of *kalym*, these practices remained widespread throughout the Soviet era, and there were still occasional instances of polygamy (Atkin 1989; De Santi 2006). Meanwhile, despite Soviet efforts to reduce wedding expenditure, the traditional elaborate and lengthy festivities remained popular. These examples illustrate that, despite widescale social change, tradition has remained important. As in Eastern Europe, a sharp distinction arose between public and family life, with the family the only remaining 'private' institution and non-official form of socialisation (Sobotka 2002).

It is equally true, of course, that there were dramatic increases in the participation of women in education and employment during the Soviet era. The spread of compulsory education for women, first to age 14 years and then to age 17 years, was

particularly important to the gradual increase in the age at first marriage – and more so than the legislation introduced to raise the legal minimum age for both sexes, which could be subverted if so desired by delaying official marriage registration for several months or years after the *nikoh* Muslim ceremony (Tett 1996). By the end of the 1980s, very early marriages were rare – with women typically marrying in their late teens or early twenties. Overall, however, and partly because of isolation from trends towards Islamisation and feminism beyond the Soviet Union (Harris 2004), 'traditional patterns of behaviour continued to dominate gender relations' (Falkingham 2000:9) – and this was reflected in demographic behaviour. Marriage remained nearly universal and there was a swift progression from marriage to childbearing (Tabyshalieva 1997). Non-marital births were relatively rare, particularly in Uzbekistan and Tajikistan, representing an estimated 4% and 7% of total births in 1989 respectively, compared to 12% in Kazakhstan and 13% in Kyrgyzstan (TransMONEE 2006).

There are also differences in nuptiality between the republics. In pre-Soviet times, as Jones and Grupp (1987) explain, sex roles tended to be more egalitarian among the semi-nomadic Kyrgyz and Kazakhs - with women playing a more active economic role and with more independence in everyday life - than in the oasis cultures of the Uzbeks and Tajiks, where female roles were more restrictive, women occupied a more subordinate role within the household system and daughters were married off at an earlier age. These differences are reflected in Soviet-era education and labour statistics, with the ratio of females to males with completed secondary education consistently higher in Kazakhstan and Kyrgyzstan than in Tajikistan and in Uzbekistan from 1959 to 1979 (Jones and Grupp 1987:214), and with a higher proportion of working-age women involved in the non-agricultural workforce in the former two republics (Jones and Grupp 1987:216). Correspondingly, while the average age at marriage of females increased across Central Asia during the Soviet period (Coale 1993), rates of early marriage – in terms of the number married per 1,000 women aged 16-19 – in 1970 were higher in Tajikistan and Uzbekistan than Kyrgyzstan and Kazakhstan[17] (Jones and Grupp 1987:226).

[17] The respective rates per 1,000 are 249, 217, 201 and 123 in Tajikistan, Uzbekistan, Kyrgyzstan and Kazakhstan.

3.1.2 Union formation in transitional Central Asia

Very few studies have examined trends in family formation in Central Asia in the years immediately preceding and subsequent to the end of the Soviet Union in 1991. However, Dommaraju and Agadjanian (2008) use survey data to calculate probabilities of first union formation over this period. They show that the probability of first marriage for unmarried women in Kazakhstan, Kyrgyzstan and Uzbekistan changed relatively little from the mid-1970s to towards the end of the 1980s. In contrast, they note a sharp increase in the probability of marriage from 1988 in Kyrgyzstan and Uzbekistan, with rates peaking in the early post-independence years – though the increase in the rate of first union formation in Kazakhstan was relatively modest. Dommaraju and Agadjanian's study lends support to the findings of Agadjanian and Makarova's (2003) study focusing on Uzbekistan. Using retrospective survey data from 1996, they find that women who reached marriageable age during the *perestroika* period before independence were more likely to have married by a given age than those from preceding cohorts.

Agadjanian and Makarova (2003) present four possible explanations for the distinctiveness of the *perestroika* period in terms of first union formation. First, the trend for 'conspicuous consumption' in wedding ceremonies was strengthened as economic restructuring, including the legalisation of private business activity, promoted the accumulation of private wealth. The aim of the 'restructuring' of the Soviet economy was to develop a more efficient Soviet, yet still socialist, economy which would provide an improved standard of living for its citizens (Buckley 1992). The focus was on decentralisation and increasing the scope for decision making at a local level, reflected in the shift in control of state enterprises from ministries to workers' collectives. State enterprises became free to determine output based on demand. Meanwhile the 1988 Law on Cooperatives, enacted to encourage individual entrepreneurial behaviour, permitted private ownership of businesses in certain sectors. The widespread changes during the *perestroika* era were such that they were considered a watershed in people's lives: indeed, Koroteyeva and Makarova (1998:588) argue that 'the deep social transformations in Uzbekistan were in fact initiated not so much by the economic reforms of the newly independent Uzbek state but by the economic climate of Gorbachev's perestroika in the later years of the

Soviet system'. During the Soviet-era economy of shortage there were limited outlets for spending money and this situation intensified during *perestroika*, such that a 'monetary overhang' – excess cash relative to available goods, given price controls – developed in the late 1980s (Klugman and Schieber 1996:13). It is in this context in which, Agadjanian and Makarova (2003) argue, conspicuous consumption in wedding celebrations gained further impetus. While, as elsewhere in the Soviet Union, marriages were already a platform for family demonstrations of wealth, their fieldwork suggests that the scale of celebrations in Uzbekistan had reached new heights by the end of the 1980s – to such an extent that 'the race to affirm and display the family's socioeconomic position through lavish wedding ceremonies may have prompted many families to marry off their daughters earlier' (p.459). A second possible reason for the increase in first union formation in Uzbekistan, according to Agadjanian and Makarova (2003), is that the concomitant increase in dowry requirements may have encouraged families to marry their daughter before any further increases.

The third possible explanation relates to the increase in Uzbek nationalism during this period - which may have helped encourage the traditional preference for early marriage, particularly in the early post-independence years. Indeed, as Kandiyoti and Azimova (2004:237) argue, life-cycle ceremonies are important to Uzbek identity and weddings at this time became occasions in which the return to 'authentic' Uzbek forms, including preference for 'traditional' rather than European dress, was evident. Fourth, the rapid changes of the *perestroika* period, and rumours of future changes, may have encouraged families to find a husband who would look after their daughter in uncertain times (Agadjanian and Makarova 2003). Indeed, the role of uncertainty has been considered in explanations of demographic changes in post-Soviet Europe: Sobotka (2003; 2004) relates the lack of postponement of childbearing, compared to the increase in the female mean age at first birth in post-communist Central Europe, to poor economic prospects and uncertainty. He draws on Friedman et al.'s (1994:382) theory of the value of children, which presents marriage as one of the 'global strategies' in which rational actors seek to reduce uncertainty regarding 'whole strings of future courses of action' by 'bind[ing] themselves to courses of action which are largely independent of future states of the world'. In the Central Asian context,

arranging a marriage for a son, or particularly a daughter, in the uncertain years of transition may have been seen as an important means of securing their future.

This paper seeks to build on the research of Agadjanian and Makarova (2003) and Dommaraju and Agadjanian (2008). First, by using different survey data, it aims to corroborate the sharp increase in rates of union formation during the transitional years. Second, by including Tajikistan as well as Uzbekistan, Kazakhstan and Kyrgyzstan in the analysis, it extends the description of trends to four of the five Central Asian Republics[18]. Tajikistan is an interesting case because it is the only one of these republics to have experienced a civil conflict in the years of transition. The International Crisis Group (2001) estimate that 60,000 to 100,000 people were killed between 1992 and 1997, from a total population of 5.1 million (at the time of the 1989 census). As Brown (1998) reports, the most severe fighting took place in the last six months of 1992 and was concentrated in Kurgan-Tyube and Kulyab (both in what is now the region of Khatlon). Given past studies illustrating the demographic impact of war (for example, Lindstrom and Berhanu 1999; Agadjanian and Prata 2002), it will be interesting to examine the distinctiveness of trends in first union formation in Tajikistan, particularly at the time of the peak fighting in 1992, compared to neighbouring republics. Indeed, on the one hand, given the results of Agadjanian and Makarova (2003) and Dommaraju and Agadjanian (2008) for other countries in the region, we might expect a significant increase in the rate of union formation during the period – but, on the other hand, the civil conflict might be expected to have had a disruptive influence on aggregate trends in nuptiality. Third, by including an interaction between age and calendar year in models of first union formation, the paper considers possible differences in the trends of union formation for different age groups of unmarried women. It therefore tests for a change in the age distribution of first union formation as well as examining the trend in the overall rate.

[18] While MICS3 survey data for Uzbekistan, Kazakhstan, Kyrgyzstan and Tajikistan are available for academic research, data for Turkmenistan are restricted (http://www.childinfo.org/mics3_surveys.html)

3.2 Data and Method

Official data on first union formation in Central Asia are inadequate for a reliable assessment of temporal trends. In Tajikistan, for example, even before independence, the date of marriage registration with Soviet authorities was never a reliable indicator of the date of the religious ceremony *nikoh*, after which the couple would live together. Underage marriages were concealed from the authorities by delaying registration at the civil registry office (ZAGS), sometimes for several years. Even for 'legal' marriages, there might be a gap before registration, while some couples disregarded registration altogether. As Harris (2004:39) summarises, compared to the *nikoh*, 'civil registration was of little importance to Tajiks' and was viewed simply as a means of providing access to resources like family allowances. In the post-independence context, with the virtual collapse of the social security system (see Falkingham 2000), the motivation for registration has further reduced – particularly given the introduction of a registration fee. Qualitative accounts suggest that polygamy in Tajikistan has increased since independence (Tabyshalieva 1997), but since this is illegal these unions are also unrecorded. Overall, Dikaev (2005) reports one estimate which suggests that only half of all marriages in Tajikistan are now officially registered. Under-registration is also a problem in other Central Asian states (Dommaraju and Agadjanian 2008).

Therefore, because of the inadequacy of official data, survey data are used to calculate rates of first union formation in late- and post-Soviet Central Asia. The latest round of Multiple Indicator Cluster Surveys (MICS3), carried out by UNICEF, represent the most recent data available. They are nationally representative sample surveys with a women's questionnaire, for those aged 15-49 at the time of the survey, which included questions on union formation. Specifically, women were asked the question 'In what month and year did you first marry or start living with a man as if married?' This is a more accurate reflection of the date of first union than the date of marriage registration and, given the significant under-registration issues, a more complete one. Surveys were carried out in Tajikistan (2005), Kyrgyzstan (2005/6), Kazakhstan (2006) and Uzbekistan (2006), with 10,626, 7,043, 14,719 and 14,205 women

interviewed respectively. In a small number of cases where month or year of first union was missing, these data were imputed[19].

For each country, rates of first union, specific to those women who have never been in union (hereafter, 'unmarried' women), are calculated using a simple proportional hazards exponential model:

$$\lambda_i = \lambda \ \exp\{\mathbf{x}_i'\beta\} \tag{3.1}$$

In this model, λ_i is the hazard corresponding to individual *i*, λ is the baseline hazard when $\mathbf{x}_i$=0, and $\exp\{\mathbf{x}_i'\beta\}$ is the relative risk, a proportionate increase or decrease in the rate associated with the covariate characteristics $\mathbf{x}_i$. Taking logs, we obtain the additive log-linear model:

$$\log \lambda_i = \alpha + \mathbf{x}_i'\beta \tag{3.2}$$

where α is the log of the baseline hazard. Initially, since interest lies in describing overall trends in first union formation, dummy variables for calendar year are the only covariates and age intervals are not included. This is equivalent to assuming a constant baseline hazard across process time *t*, time since 15th birthday. However, since each survey collects information for women aged 15-49 at the time of the survey, data are truncated in periods before the survey (see Ní Bhrolcháin 1993). To ensure comparability across time, rates are calculated based on first unions, and exposure to first unions, for women aged 29 or under, for periods where the age distribution of women is complete up to age 30. Thus rates are reconstructed for a period of 20 years before each survey. Since first unions in Central Asia are concentrated at a relatively young age - traditionally an unmarried woman over the

[19] Age at first union, which was also asked in the surveys, was used as the basis for imputation. The Tajikistan survey data contained the highest proportion of missing dates: of 6571 women ever to have been in a union, 282 months of union and 216 years of union were imputed, while 12 women missing both date of union and age at union information were excluded.

age of 20 is in danger of being considered an 'old maid' (Tabyshalieva 1997:52) - truncation is not a significant problem.

Interest also lies in examining trends in first union formation for different age groups. A piecewise exponential model can be specified where the process time *t*, time since 15th birthday, is split into age intervals *j*, assuming a constant hazard within these intervals:

$$\log \lambda_{ij} = \alpha_j + \mathbf{x}_i' \beta \tag{3.3}$$

The age intervals chosen broadly reflect 'early' (15-17), 'peak' (18-20) and 'late' (21-29) ages at first union. Implicitly, under the proportional hazards assumption, the effect of the calendar year covariates is assumed to be the same for all age intervals *j*. However, the model is extended to allow for the relaxation of this assumption. Specifically, an interaction between the age intervals and calendar year is included in the model to allow for differences in trends in first union formation for different age groups of unmarried women:

$$\log \lambda_{ij} = \alpha_j + \mathbf{x}_i' \beta_j \tag{3.4}$$

where β_j represents the effect of a calendar period for age interval *j*.

The survey also collected information on, for example, place (urban/rural) and region of residence, and the woman's educational background, but these were not used as covariates since all relate to the time of the survey only. Hoem and Kreyenfeld (2006a; 2006b) warn against an anticipatory approach which conditions on the future. In any case, the focus here is on national-level trends.

3.3 Results

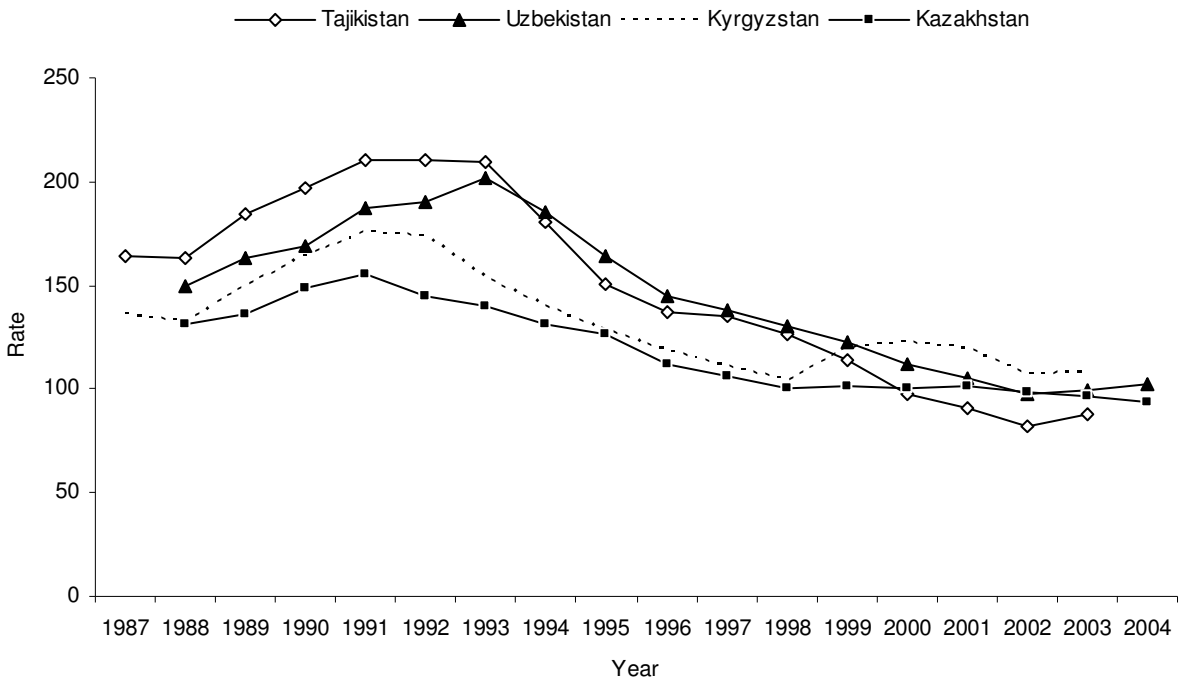
Figure 3.1 presents trends in first union formation for women in late- and post-Soviet Tajikistan, Uzbekistan, Kyrgyzstan and Kazakhstan. In the late Soviet period, marriage rates were higher in Tajikistan and Uzbekistan than in Kyrgyzstan and Kazakhstan, reflecting long-standing cultural differences regarding gender and familial systems (Jones and Grupp 1987). In all four republics, there were increases in the rate of first union formation during the late 1980s and early 1990s. This is in line with Dommaraju and Agadjanian's (2008) results for Uzbekistan, Kyrgyzstan and Kazakhstan, and those of Agadjanian and Makarova's (2003) study focusing on Uzbekistan. The increases were most significant in Tajikistan, Uzbekistan and Kyrgyzstan, where rates peaked at around a third higher than 1988 levels (Table 3.1). The relative increase in the rate of first union formation in Kazakhstan was smaller, corroborating the relatively stable trend in first union formation over the period found by Dommaraju and Agadjanian (2008)[20]. Following the peak in the early post-independence years, rates of first union formation declined sharply; this is discussed in more detail in chapter 4.

To explore changes in the rate of first union formation for different ages in Central Asia, an interaction was included between calendar year and age group in the survival model of union formation for each country (equation 3.4). In each case, adding these interaction terms significantly improved the fit of the model. Results are presented in Figure 3.2 and Table 3.2. In all four republics, the increase in rates of first union formation in the early 1990s was most marked at younger ages. Indeed, by the early

[20] The relatively small increase in first union formation in Kazakhstan is not simply a function of its ethnic makeup. It is true that Russians represent a bigger proportion of the population than in the other Central Asian republics: of the women interviewed in the survey, 26% lived in households where Russian is the mother tongue of the household head, compared to 11%, 1% and 4 % in Kyrgyzstan, Tajikistan and Uzbekistan respectively. However, interestingly, Russians in Kazakhstan have had higher rates of first union formation than Kazakhs (Agadjanian 1999; Dommaraju and Agadjanian 2008). Indeed, when the hazard models presented in Section 3.2 were re-run examining rates of union formation for the titular ethnic group only in each country (i.e. considering models with an interaction between ethnicity and year), the distinctiveness of the Kazakh pattern remained: Kazakhs in Kazakhstan showed a much smaller increase in the rate of union formation during the late 1980s and early 1990s than Kyrgyz in Kyrgyzstan, Uzbeks in Uzbekistan and Tajiks in Tajikistan.

1990s the rate of marriage for unmarried women at ages 15-17 was more than double the 1988 level in Kyrgyzstan, Tajikistan and Uzbekistan, and almost double the 1988 level in Kazakhstan. This ties in with the accounts of Koroteyeva and Makarova (1998:594) and Kuzibaeva (2001), who note an increase in marriages to young, and even underage, women in Uzbekistan during the transition years. Moreover, while there are also significant increases in the rate of first union formation at ages 18-20 in all four republics over the period, the rate at older ages (21-29) was – with the exception of Kyrgyzstan - relatively stable. Therefore, the nature of the age-period interaction effect is clear. While there was an increase in the overall rate of first union formation in the Central Asian republics, there was also a shift in the age at union distribution. Compared to the late 1980s, unmarried women in the early 1990s were not only marrying more but also at an earlier age.

Figure 3.1 Rate of first union formation[1] in Central Asia (three-year moving average)



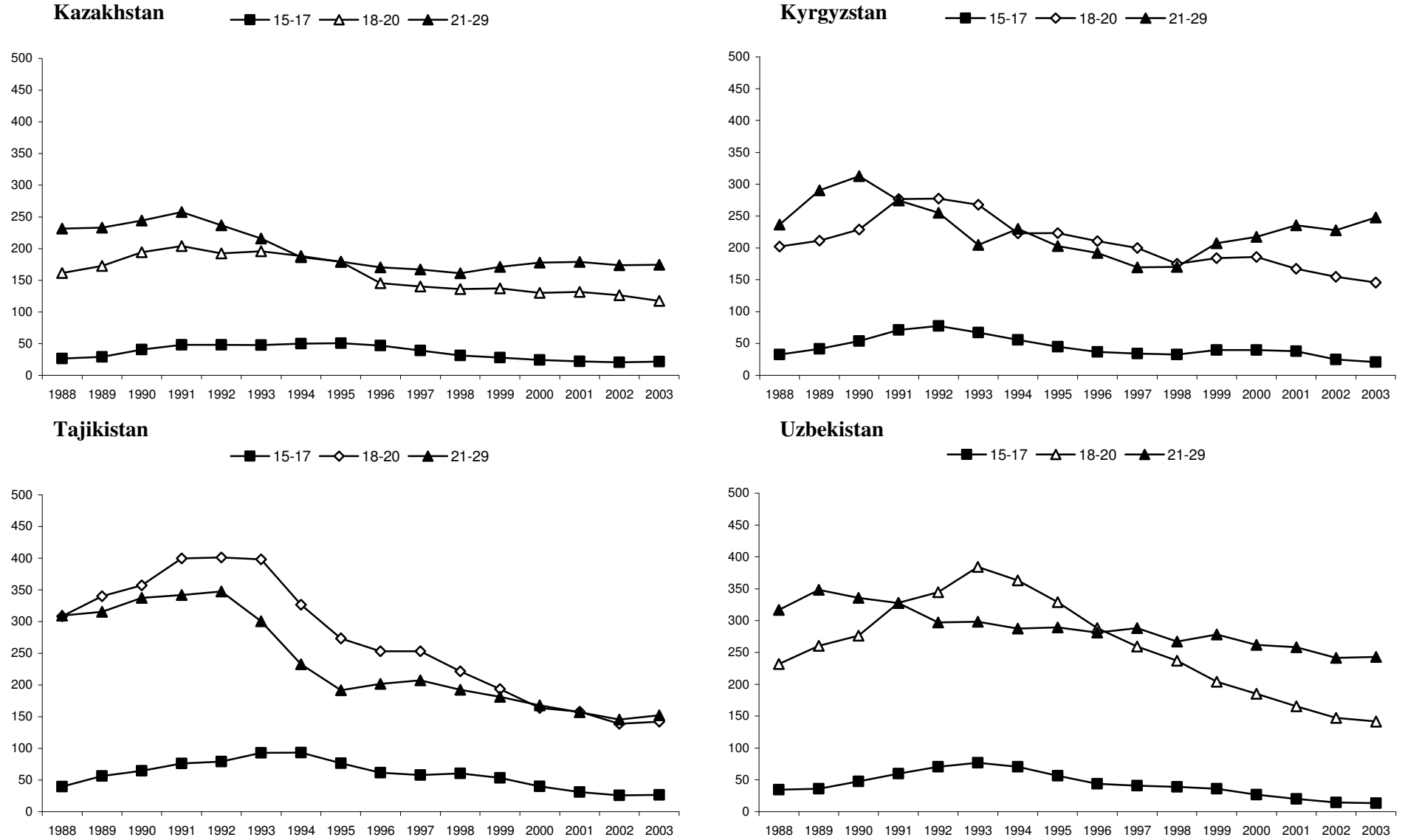
1 Rates per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
Source: author's analysis of MICS (2005).

Table 3.1 Relative risks[1] of union formation in Central Asia, compared to 1988 rate[2]

	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
1987		1.03	1.01	
1988	**(131) -**	**(132)** -	**(163)** -	**(150)** -
1989	1.04	1.13	1.13	1.09
1990	1.13	1.24	1.20	1.13
1991	1.18	1.33	1.29	1.25
1992	1.10	1.32	1.29	1.27
1993	1.06	1.16	1.28	1.35
1994	1.00	1.06	1.11	1.24
1995	0.96	0.97	0.92	1.10
1996	0.85	0.90	0.84	0.97
1997	0.81	0.84	0.83	0.92
1998	0.76	0.79	0.77	0.87
1999	0.77	0.91	0.70	0.82
2000	0.77	0.93	0.60	0.75
2001	0.77	0.90	0.56	0.70
2002	0.75	0.81	0.51	0.65
2003	0.73	0.82	0.54	0.66
2004	0.71			0.69
N_u	*6,473*	*3,429*	*4,506*	*6,691*
N_{wy}	*56,953*	*25,727*	*38,098*	*50,617*

1 Relative risks based on the 3-year moving average of the rate of first union formation.
2 1988 rate shown in brackets in bold; per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
N_u and N_{wy}: number of unions, and number of years of exposure, in total analysis period for sampled women.
Source: author's analysis of MICS (2005).

Figure 3.2 Rate of first union formation[1] for different age groups in Central Asia (three-year moving average)



1 Rate (y-axis) per 1,000 years of exposure for unmarried women in age group. Source: author's analysis of MICS (2005).

Table 3.2 Relative risks[1] of union formation for different age groups in Central Asia, compared to 1988 rate[2]

	Kazakhstan			Kyrgyzstan			Tajikistan			Uzbekistan		
	15-17	18-20	21-29	15-17	18-20	21-29	15-17	18-20	21-29	15-17	18-20	21-29
1987				1.10	1.00	1.06	0.98	1.06	0.97			
1988	**(26) -**	**(162) -**	**(232) -**	**(32) -**	**(202) -**	**(236) -**	**(40) -**	**(308) -**	**(309) -**	**(34) -**	**(232) -**	**(317) -**
1989	1.10	1.07	1.01	1.28	1.05	1.23	1.42	1.10	1.02	1.04	1.12	1.10
1990	1.54	1.20	1.05	1.66	1.13	1.32	1.63	1.16	1.09	1.37	1.19	1.06
1991	1.82	1.26	1.11	2.19	1.37	1.16	1.92	1.30	1.11	1.73	1.41	1.03
1992	1.82	1.19	1.02	2.39	1.37	1.08	2.00	1.30	1.12	2.04	1.49	0.94
1993	1.81	1.21	0.93	2.06	1.33	0.87	2.35	1.29	0.97	2.21	1.66	0.94
1994	1.90	1.16	0.80	1.72	1.10	0.97	2.36	1.06	0.75	2.03	1.57	0.91
1995	1.92	1.11	0.77	1.38	1.11	0.86	1.93	0.89	0.62	1.63	1.42	0.91
1996	1.77	0.90	0.74	1.13	1.04	0.81	1.55	0.82	0.65	1.26	1.24	0.89
1997	1.48	0.87	0.72	1.05	0.99	0.72	1.46	0.82	0.67	1.17	1.12	0.91
1998	1.19	0.84	0.70	1.01	0.87	0.72	1.52	0.72	0.62	1.13	1.02	0.84
1999	1.06	0.85	0.74	1.22	0.91	0.88	1.34	0.63	0.59	1.03	0.88	0.88
2000	0.92	0.81	0.77	1.22	0.92	0.92	1.01	0.53	0.54	0.77	0.80	0.83
2001	0.83	0.81	0.77	1.16	0.83	1.00	0.78	0.51	0.51	0.58	0.71	0.82
2002	0.78	0.78	0.75	0.77	0.76	0.96	0.65	0.45	0.47	0.42	0.64	0.76
2003	0.82	0.73	0.75	0.63	0.72	1.05	0.67	0.46	0.49	0.38	0.61	0.77
2004	0.78	0.69	0.76							0.33	0.55	0.75
N_u	*704*	*2,493*	*3,276*	*533*	*1,582*	*1,314*	*834*	*2,266*	*1,406*	*909*	*3,363*	*2,419*
N_{wy}	*22,961*	*16,981*	*17,012*	*12,519*	*7,755*	*5,453*	*19,052*	*11,325*	*7,720*	*25,381*	*15,910*	*9,326*

1 Relative risks based on the 3-year moving average of the rate of first union formation for a given age group.
2 1988 rate shown in brackets in bold; per 1,000 years of exposure for unmarried women in age group.
N_u and N_{wy}: number of unions, and number of years of exposure, in total analysis period in age group for sampled women.
Source: author's analysis of MICS (2005).

3.4 Discussion

3.4.1 Explaining the increase in union formation

There was a marked increase in the rate of first union formation in transitional Central Asia, particularly at younger ages. Since the results initially noted for Uzbekistan are part of a wider regional trend, it makes sense to place Agadjanian and Makarova's (2003) explanations within a wider Central Asian context.

The tendency for conspicuous consumption in the wedding celebrations is not particular to Uzbekistan. The qualitative research of Tett (1996), for example, conducted during 1990 and 1991, suggests that this tradition is also strong in Tajikistan. The village in Central Tajikistan where she carried out her research reflected 'a culture obsessed with marriage ceremonies. Weddings, past and present, were a constant topic of village discussion. They were the most elaborate and expensive set of ceremonies ever performed in village life…[and] a central focus for the village social calendar' (p.120). They provided 'one of the few vehicles for display of [wealth] that was thoroughly approved of by the villagers' (p.188). The tradition of gift exchanges was well established, with the most extensive gifts associated with the dowry and the *kalym* ('bride price'). How much families had given became widely known: as Tett (p.182) points out, 'skimping on the *kalym* or dowry was hard to hide, because the goods were displayed in the bride's room after the bridal journey, hung in groups showing which side had given what. Thus the women who attended… could rapidly assess the relative levels of expenditure'. Agadjanian and Makarova (2003) argue that in Uzbekistan during the *perestroika* period, when economic restructuring promoted the accumulation of private wealth, these customs were strengthened – reflected in increasingly lavish celebrations and gift exchanges – strengthening the role of marriage as a vehicle for displaying wealth to such an extent that marriage rates increased. In a similar way, Tett notes that the scale of gift exchanges in Tajikistan had reached unprecedented levels by the end of the Soviet period as the dowries and *kalym* increased and the ceremonies 'had become increasingly lavish and expensive' (p.187). She situates these inflationary pressures within the Soviet period more generally, and the associated rise in living standards coupled with the lack of opportunities to display wealth, rather than solely the

peculiarities of the *perestroika* period. Indeed, Agadjanian and Makarova (2003) acknowledge that the inflationary processes in Uzbekistan dated from the 1970s - but argue that they were accelerated during the *perestroika* years. Overall, the impetus provided by this widespread conspicuous consumption, and secondly the desire to avoid even higher dowry costs in future, may have played an important part in the increase in rates of first union formation across Central Asia during the late 1980s.

The third possible explanation relates an increase in anti-Soviet nationalism to a resurgence of the traditional preference for early female marriage. For example, in Tajikistan - as elsewhere in Central Asia - the policy of *glasnost* ('openness') gave a voice to nationalistic opinion. This was especially manifest in the push for an improvement in the status of the Tajik language. As Akbarzadeh (1996) outlines, following intense opposition pressure Tajik was made the national language in July 1989 - Tajikistan being the first of the Central Asian republics to take such a step. But overall nationalist sentiment remained rather weak in Tajikistan, and in Central Asia generally compared to other regions of the Soviet Union: unlike the Baltics, Moldova or the Ukraine, there were no mass-based nationalist or anti-Russian movements (Juska 1999). Indeed, Agadjanian and Makarova (2003) acknowledge that there is a danger of overstating the extent of nationalist resurgence during the period. It is unlikely that this was a significant factor behind the increase in first union formation in the transitional years.

The fourth explanation sees the increase in first union formation as, at least in part, a response to the anxieties and uncertainties of *perestroika* and the early independence years. Agadjanian and Makarova (2003) place particular emphasis on the uncertainty regarding cultural norms and the role of women in society. Koroteyeva and Makarova (1998:594) report that there were also implications for behaviour: while girls in Uzbek cities had previously tended to gather in public spaces like parks, it became 'inappropriate and inadvisable' to do so as they became more closely supervised to protect them from the 'dangers' of the city. However, the uncertainty in the transitional years was pervasive, not just concerning women but extending to other aspects of life and affected by the suite of concurrent changes. *Perestroika* represented a time of reform and political machinations within the Communist party.

The promise of improved life-styles contrasted sharply with day-to-day reality. Thus Buckley (1992:7), discussing the impact on Soviet women, notes that 'by 1989, to many women daily life seemed harder than ever before. *Glasnost* has exposed many problems in need of analysis… it had revealed, condemned and deplored, but not delivered'. There was also increased display of public dissatisfaction with living standards. In Tajikistan, for example, dissatisfaction eventually led to unrest and rioting, starting in early 1991. Overall, writing at the end of the *perestroika* period, Buckley (1992:8) concludes that 'change in the USSR is currently rapid, turbulent, chaotic and unpredictable'. In such a climate, a rational response might be to postpone long-term commitments like marriage – but Sobotka (2004) usefully points out that the effect of uncertainty on family formation is complex and dependent on context. In Central Asia, marriage represents an investment in a household's future: as Tett (1996) argues for Tajikistan, family ties, centred around the household unit, were seen as a crucial means for adapting to the shortcomings of the economic system throughout the Soviet era. During the uncertain years of *perestroika* and early independence, arranging a marriage would have been seen as a means of helping to secure a son's or daughter's future: as Koroteyeva and Makarova (1998:594) explain for Uzbekistan, 'parents prefer that a daughter has a husband to take care of her in times of uncertainty'.

3.4.2 Civil conflict in Tajikistan

Interestingly, there is no evidence that the rate of first union formation in Tajikistan was affected by the peak in fighting during the civil war in 1992. Figure 3.3 and Table 3.3 present annual (non-smoothed) estimates of first union formation in Tajikistan and neighbouring Uzbekistan, which unlike Tajikistan did not experience a civil war. Trends in first union formation in Tajikistan closely mirrored those in Uzbekistan during the early 1990s. While there is no evidence for the distinctiveness of Tajikistan's trends over the period at a national level, this may reflect the crude scale of analysis in comparison to the localised nature of the conflict within particular regions. Indeed, Agadjanian and Prata (2002) note the demographic impact of war in Angola was restricted to those regions most affected by the conflict, plus the capital Luanda. In Tajikistan, the most severe fighting was concentrated in Kurgan-Tyube and Kulyab, both in what is now the region of Khatlon (Brown 1998) - but given the

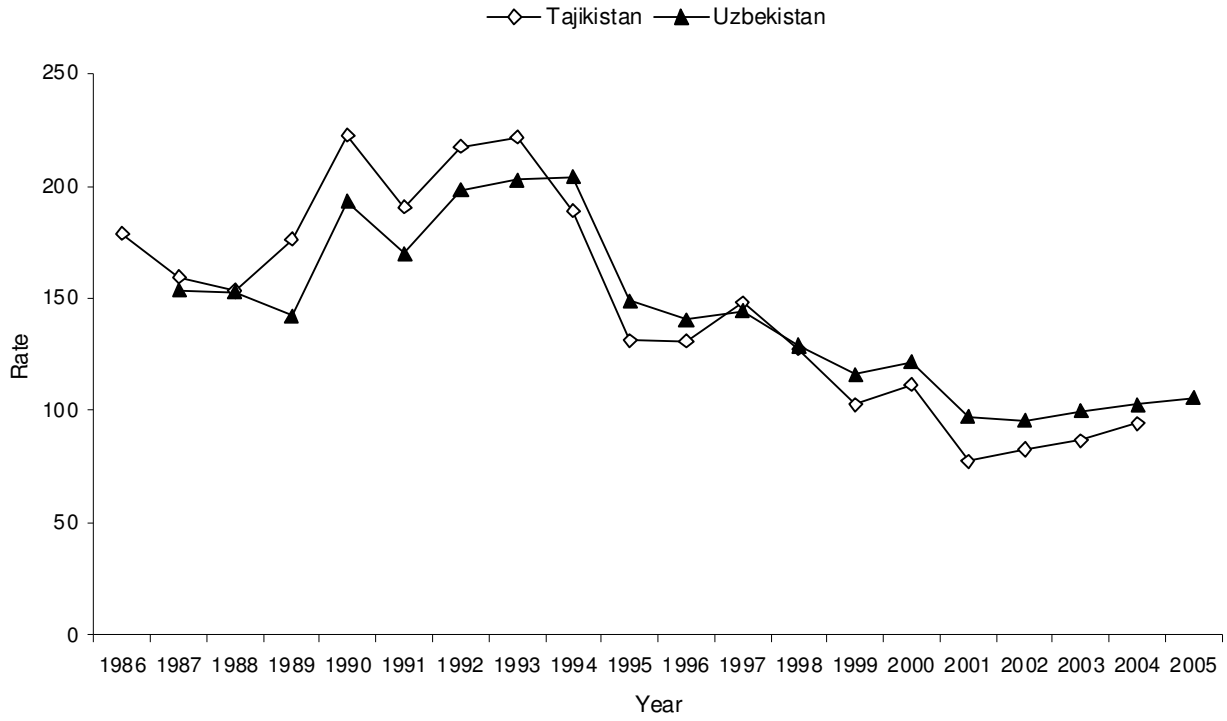
sample size involved there is a lack of statistical power to examine spatial differences in trends, even at the crude regional level.

3.4.3 Age-specific rates of union formation

The sharp increases in rates of first union formation for young women and particularly those aged 15-17, compared to the relative stability of trends at older ages, highlights the importance of considering age-specific marriage rates. The results strongly suggest that the changes in the *perestroika* and early post-independence period did not affect all women uniformly; on the contrary, the changes had a particularly strong effect for younger unmarried women. The explanation lies in the strong cultural expectation, even before *perestroika*, that women should be married at a relatively young age, albeit significantly later than in pre-Soviet times. While some women married in their mid-twenties, 'it was unusual for a girl to be any older and remain unmarried' (Tett 1996:109). Therefore, there has always been a strong pressure for women to be married by this age – or risk being labelled an 'old maid' (Tabyshalieva 1997; Harris 2004:86). What was new about the transition years was the impetus for even younger women, as well as those in their late teens and twenties, to be married. Whether the increased propensity for family formation is attributed to the strengthening of 'conspicuous consumption' or as a response to uncertainty, one or both of these acted to encourage a higher proportion of families to marry off their teenage daughters than in previous periods.

More generally, these results also provide evidence for Agadjanian's (1999:426) hypothesis that, in times of social and economic change and uncertainty, 'people do not change all components of their demographic behaviour equally and uniformly' and that changes in nuptiality may not necessarily mirror wider changes in reproductive behaviour. Indeed, mirroring wider Soviet trends, fertility rates in Central Asia peaked in 1987 and then started to decline (Becker and Hemley 1998; TransMONEE 2006; chapter 2). Therefore, the response of women to the changes of the transition years varied according to their stage of family building: at the same time as fertility was declining during the late 1980s and early 1990s, rates of first union formation were increasing.

Figure 3.3 Rate of first union formation[1] in Tajikistan and Uzbekistan (annual rates)



1 Rates per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
Source: author's analysis of MICS (2005).

Table 3.3 Relative risks[1] of union formation in Tajikistan and Uzbekistan, vs. 1988[2]

	Tajikistan	Uzbekistan
1986	1.17	
1987	1.04	1.01
1988	**(153)** -	**(153)** -
1989	1.15	0.93
1990	1.45	1.27
1991	1.24	1.11
1992	1.42	1.30
1993	1.45	1.33
1994	1.23	1.34
1995	0.85	0.97
1996	0.85	0.92
1997	0.97	0.95
1998	0.83	0.84
1999	0.67	0.76
2000	0.73	0.80
2001	0.50	0.64
2002	0.54	0.63
2003	0.57	0.65
2004	0.61	0.67
2005		0.69
N_u	*4,506*	*6,691*
N_{wy}	*38,098*	*50,617*

1 Relative risks based on the annual rate of first union formation (no smoothing).
2 1988 rate shown in brackets in bold; per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
N_u and N_{wy}: number of unions, and number of years of exposure, in total analysis period for sampled women.
Source: author's analysis of MICS (2005).

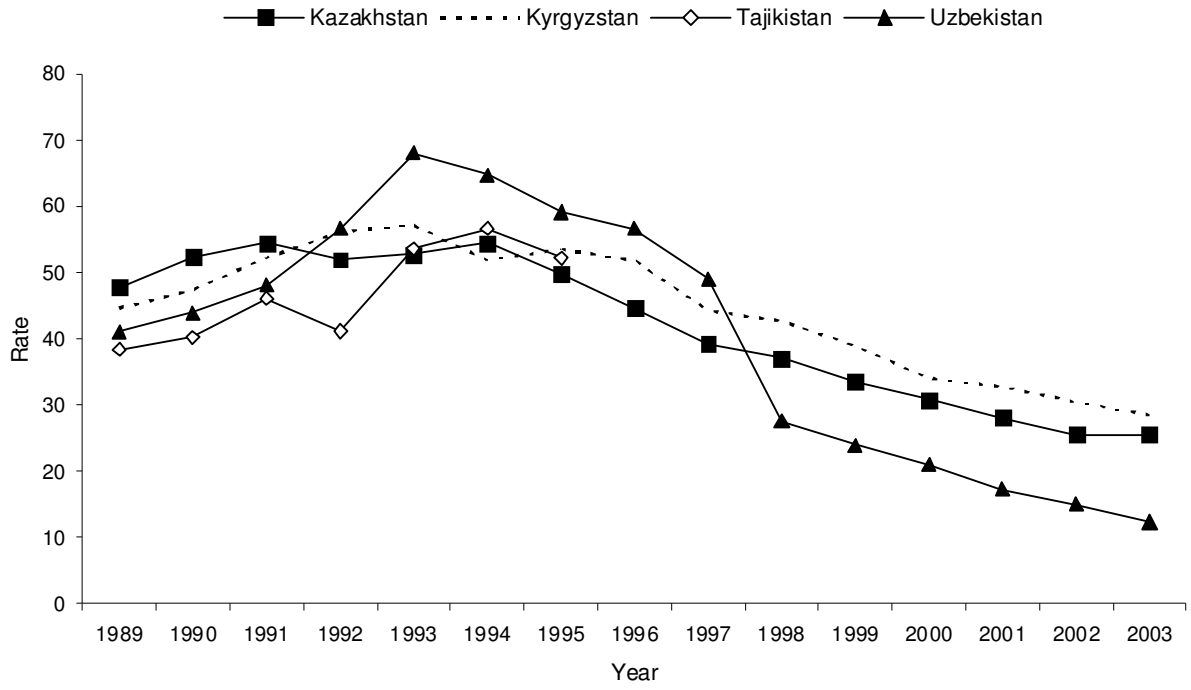
3.4.4 Relating Central Asia to Soviet Europe and the Caucasus

The demographic trends in transitional Central Asia show certain parallels with trends in late-Soviet Europe. Just as in Central Asia, the mean age of women at first marriage declined across late-Soviet Europe and the Caucasus in the late 1980s and early 1990s (TransMONEE 2006; Zakharov 2008:970). Just as in Central Asia (for example, chapter 2), the rate of first births within marriage remained very high, reflecting the continued swift progression from marriage to childbearing (for example, Perelli-Harris 2005). In Central Asia, consistent with an increase in early union formation and strong progression to childbearing within marriage, rates of childbearing for 15-19 year olds increased across the region (TransMONEE 2006; Figure 3.4)[21]. Indeed, those countries shown in this paper to have experienced the most significant increases in family formation - Kyrgyzstan, Tajikistan and Uzbekistan – are also those which have experienced the most significant increases in early childbearing. Just as in Central Asia, rates of childbearing for 15-19 year olds increased across (post-) Soviet Europe and the Caucasus in the late 1980s and early 1990s, albeit by varying degrees (TransMONEE 2006).

Therefore, while this paper has helped to place trends in individual Central Asian republics within the regional context, our understanding of the increase in first union formation during the transitional years would be developed by further extending the frame of reference to the whole (post-) Soviet context. Undoubtedly the Central Asia, Caucasus and Eastern Europe regions are culturally, historically and demographically very different. Nevertheless, there are indications that in all three regions there was an increase in family formation at young ages during the late 1980s and early 1990s. Further work examining the similarities between the trends in these regions would be most welcome.

[21] These are official data, prone to under-registration (Anderson and Silver 1989). Absolute levels of adolescent childbearing should be treated with caution, particularly given possibly different levels of under-registration in different republics. The important message of the figure is that early childbearing increased in the late 1980s and early 1990s, despite a probable increase in under-registration (for example, during the peak fighting in Tajikistan in 1992 (chapter 2)).

Figure 3.4 Adolescent birth rate[1] in Central Asia, 1989-2003



1 Live births per 1,000 women aged 15-19 years.
Source: TransMONEE (2006).

In particular, it would be interesting to consider the extent to which there was an intensification of conspicuous consumption in wedding ceremonies across the Soviet Union during *perestroika*, and the extent to which Central Asia, with its strong tradition of gift exchanges, was distinctive in this respect. Also, the Central Asian survey data analysed here has only very limited time-varying covariate information, such that it is difficult to evaluate the different explanations for the increase in union formation during the transitional period. Any research which is able to make use of richer temporal data would be most valuable. In particular, it would prove helpful in assessing the relative importance of the 'conspicuous consumption' and 'uncertainty' explanations. Friedman et al. (1994:383) predict that marriage and childbearing represent a strategy for reducing uncertainty about the future particularly for those women whose 'alternative pathways for reducing uncertainty [for example, through a stable career] are limited or blocked'[22]; conversely, the 'conspicuous consumption' explanation would gain further support if it was shown that women from relatively

[22] Kohler and Kohler's analysis (2002), showing that women in Russia who were most affected by labour market crisis often had a higher probability of having a child than those less affected by such crises, supports this idea. However, it was based on cross-sectional data.

wealthy households experienced the sharpest increase in the rate of first union formation during the *perestroika* years.

3.5 Conclusion

This paper adds to the sparse literature on the demography of transitional Central Asia, specifically focusing on the *perestroika* and early post-independence years. Using recently available survey data, it builds on the research of Dommaraju and Agadjanian (2008) and Agadjanian and Makarova (2003), corroborating the sharp increase in first union formation in Uzbekistan and Kyrgyzstan and the smaller increase in Kazakhstan. It extends the focus of analysis to four of the five Central Asian republics, showing that Tajikistan also saw sharp increases in the rate of first union formation in the late 1980s and early 1990s. It also finds clear evidence of an age-period interaction effect across the region: while there was an increase in the overall rate of first union formation in the Central Asian republics, this increase was most marked at younger ages, whilst rates at older ages were relatively stable.

These research themes could usefully be developed by examining trends in Turkmenistan, the other Central Asian republic, and by further extending the frame of reference to consider possible similarities in the nature of changes in first union formation across different regions of the former Soviet Union during the transitional period.

4.Tajikistan shows the biggest collapse of all: comparing declines in first union formation in post-Soviet Central Asia

Abstract

The republics of Central Asia experienced dramatic economic and social change after the end of the Soviet Union, but little is known about trends in union formation in the region. This paper, based on the analysis of recently available survey data, presents rates of first union formation from the late-1980s to mid-2000s for Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. It finds a significant decline in union formation across the region, but also clear differences between the republics in terms of the extent of the decline. Tajikistan and Uzbekistan, which experienced the most severe post-Soviet declines in food security, have also seen the sharpest declines in union formation. Indeed, Tajikistan – which experienced the most acute nutritional declines of all - had the highest rate of union formation in the late-Soviet period but the lowest rate by the turn of the millennium, reflecting a collapse in rates of union formation across age groups.

Keywords: post-Soviet, Central Asia, Tajikistan, union formation, food insecurity, drought

4.1 Introduction

The collapse of communism and the associated changes in the countries affected offer 'potentially rich material for an examination of the effects of dramatic sociopolitical and economic transformations on marital and fertility behaviour' (Agadjanian 1999:426). However, while the declines in union formation after communism in Central and Eastern Europe are well documented, there is not a comparable literature on nuptiality in post-Soviet Central Asia. While chapter 3 focuses on the transitional period immediately preceding and subsequent to independence, this paper focuses solely on the post-Soviet period[23].

4.1.1 Union formation in post-communist Central and Eastern Europe

In Central and Eastern Europe, marriage rates declined sharply after the fall of communism (Sobotka 2004). In most countries this was accompanied by an increase in the rate of non-marital union formation but, since this did not fully offset the decline in marriage, the proportion of adults living in union decreased (Sobotka and Toulemon 2008). Explanations for these changes in family formation have tended to stress the importance of post-communist economic crisis, or of ideational change, new opportunities and the 'Westernisation' of behaviour, or of both.

Frejka (2008:166) links these two explanations to one underlying root cause: 'the replacement of the state socialist regimes by market economies and by fledgling

[23] Note that the data and method used in this chapter are the same as in chapter 3. Some of the graphs and tables are also replicated. The decision to separate the chapters reflects a judgement that the increase in the marriage rate during the transitional period, and the subsequent decline in the post-Soviet years, are not 'two sides of the same coin' but should be related to the particular circumstances of each period, which requires referring to different substantive literature. As Agadjanian and Makarova (2003:461), commenting on the decline in marriage in Uzbekistan following the increase in the transitional years, argue: 'at first glance, it appears that the increased stability of life following independence reduced the sense of anxiety and uncertainty which was characteristic of the late 1980s. *However, marriage patterns did not simply revert back to the pre-crisis 'norm'*. Our fieldwork strongly suggests that the post-independence trend towards postponing marriage is due primarily to the *new* economic constraints caused by the introduction of a market economy [emphases added]'.

democratic institutions of governance'. This perspective is helpful in a number of respects. First, it allows for a creative tension between economic and cultural explanations which accommodates differences among different post-communist countries. Indeed, ideational change is considered more important in explaining demographic changes in Central Europe, which experienced a relatively successful transition, with the depth of social and economic crisis more important to changes in ex-Soviet European states (Macura 2000; Philipov and Dorbritz 2003; Sobotka 2004). Second, in a similar way, it allows for flexibility in assessing the relative importance of economic and cultural factors over time - and therefore for the possibility that, for example, cultural factors will come to dominate as the economic situation improves (Lesthaeghe and Surkyn 2002). Third, it also explicitly considers the importance of economic changes which do not fit neatly within 'crisis' explanations. In particular, the longer-term transition from socialism and central planning to market economy conditions – encompassing, for example, more expensive housing, increased private responsibility for child costs, reduced job security and an increased pressure to acquire more education – is seen as fundamental. As Frejka (2008) points out, these emerging market conditions represent important economic influences on union formation which persist after, and become no longer necessarily associated with, the initial post-communist crisis period of massive inflation and sharp increase in unemployment.

It is also important to recognise the diversity of the post-communist context. Culturally, in Central and Eastern Europe there is a distinction between countries that are more secular and liberal (e.g. the Czech Republic, Estonia, Slovenia and the former German Democratic Republic) and those which tend to be more socially conservative and where religion is more important (e.g. Poland, Romania, Slovakia) (Sobotka 2008). This is reflected in recent demographic behaviour: the diffusion of non-marital unions is relatively slow in Poland (Kotowska et al. 2008) and Romania (Muresan et al. 2008), for example, compared to the Czech Republic (Sobotka et al. 2008) and Slovenia (Stropnik and Šircelj 2008). Economically, too, there have been big differences in the economic performance of former Communist states. Sobotka (2003) notes that it is those countries that managed to maintain relative economic stability in the 1990s that also showed the most significant 'postponement' of family formation. Overall, in terms of both behavioural and attitudinal measures relating to

family formation, the differences amongst post-communist countries are now such that their diversity stands out in comparison with the other European regions - Nordic, German-speaking and Southern and Western European - which show more compact clusters of union formation behaviour and attitudes (Sobotka 2008).

4.1.2 Union formation in post-Soviet Central Asia

While there is an established literature on union formation in post-communist Central and Eastern Europe, there has been relatively little research on changes in post-Soviet Central Asia. Agadjanian (1999) provides insights into ethnic differences in marriage behaviour in Kazakhstan. Agadjanian and Makarova (2003), using retrospective survey data from 1996, show that women in Uzbekistan who reached marriageable age during the *perestroika* period before independence were more likely to have married by a given age than those from preceding cohorts - but, for those reaching marriageable age during the post-independence era, marriage dropped back to pre-*perestroika* levels. Most recently, Dommaraju and Agadjanian (2008) provide a valuable description of trends in marriage in Uzbekistan (up to 2001), Kazakhstan (up to 1998) and Kyrgyzstan (up to 1996). Again, their results point towards an increase in the marriage rate during *perestroika* – particularly in Uzbekistan and Kyrgyzstan – to a peak in the early post-independence years, followed by a subsequent decline. They suggest that, at least for Uzbekistan, this decline was not simply a short-term response to economic crisis but rather 'a long-term change in marriage patterns' (p.205). However, they acknowledge that 'a clearer assessment of recent marriage patterns in Central Asia will have to wait for new data' (p.210).

This paper hopes to build on Dommaraju and Agadjanian's (2008) research in three main ways. First, by using more recent survey data and extending the period of analysis to the mid-2000s, a clearer assessment can be made as to the nature of post-Soviet changes in nuptiality. Second, by including Tajikistan as well as Uzbekistan, Kazakhstan and Kyrgyzstan in the analysis, the potential for cross-country

comparison is extended to four of the five Central Asian Republics[24]. Tajikistan is an interesting case: it had the highest rate of population growth of all the Soviet republics at the time of independence (Anderson and Silver 1989). It was also the poorest Soviet republic, with average income in 1988 around 50% of that in Russia (Atkinson and Micklewright 1992:134), and experienced the most severe economic crisis post-independence - by 1996, Gross Domestic Product was just 39% of 1989 levels (TransMONEE 2006), the biggest decline in Central Asia. Unlike the other republics, it also experienced a civil war, with peak fighting in 1992 but lasting until 1997, in which an estimated 60,000 to 100,000 people died (International Crisis Group 2001). Third, the paper relates the trends in marriage rates to the nature of post-Soviet change in the republics – and, in particular, to changes in food security.

Given the declines in marriage rates and in the proportion of adults living in union in Eastern Europe (Sobotka and Toulemon 2008), declines in the rate of union formation in Central Asia are also expected. On the one hand, one might predict that these declines would be more marked in Kyrgyzstan and Kazakhstan, where sex roles have tended to be more egalitarian (Jones and Grupp 1987) and where enrolment in tertiary education has significantly increased in the post-Soviet period (TransMONEE 2006), than in Tajikistan and Uzbekistan, where female roles have traditionally been more conservative (Jones and Grupp 1987), Islam has a stronger tradition (Tazmini 2001), and rates of enrolment in higher education have declined (TransMONEE 2006). On the other hand, Uzbekistan and, in particular, Tajikistan were the countries most severely affected by declines in food security in the post-Soviet period and past research demonstrates that periods of acute food shortage can have a significant negative effect on marriage levels (Lee 1981; Galloway 1988; Palloni et al. 1996).

4.2 Context: Food insecurity in post-Soviet Central Asia

The post-communist economic crisis is well documented. In both Central and Eastern Europe and Central Asia, Gross Domestic Product declined, inflation soared, real

[24] While Multiple Indicator Cluster Survey (MICS) data for Uzbekistan, Kazakhstan, Kyrgyzstan and Tajikistan are available for academic research, data for Turkmenistan are restricted (http://www.childinfo.org/mics3_surveys.html).

wages sharply declined and unemployment increased (see TransMONEE 2006). However, just as there were differences in the extent of the crisis between different countries – with, for example, those in Central Europe on the whole faring better than the ex-Soviet European states – so there were differences in the nature of the crisis. In particular, the implications of the crisis for food security were different for the ex-Soviet states in Central Asia than for the ex-communist states in Europe.

During the Soviet period, even though most people in the region live in rural areas and agriculture is the largest economic sector, Central Asia was not self-sufficient in basic agricultural foodstuffs. This reflected the Soviet division of labour amongst its 15 republics, assigning cotton production to Central Asia (in particular, to Uzbekistan, Tajikistan and Turkmenistan) at the expense of food production (Peimani 2006). The region became heavily dependent on food imports from the rest of the Soviet Union. The end of the Soviet period meant the breakdown of these trading relationships; in addition, a severe shortage of foreign currency limited the Central Asian republics' ability to fund the necessary basic imports. Therefore, they became increasingly dependent on locally produced food for meeting their food security needs (Babu and Sengupta 2006). However, compared with other countries in transition, the Central Asian republics had the smallest share of arable land and the lowest amount of land per rural inhabitant (Peimani 2006) – limiting the extent to which local food production could meet the countries' needs. While food availability fell in post-communist Europe, it did not fall below the minimum requirements established by the Food and Agriculture Organisation of the United Nations[25]; in contrast, the food availability decline in Central Asia was such that these minimum energy levels were compromised (Rokx et al. 2002). The result was, with the partial exception of Kazakhstan, a region 'unable to feed its peoples' (Peimani 2006:66).

Accompanying the decline in food availability in Central Asia were changes in accessibility. Food and nutrition programs, that had ensured minimum food

[25] Of course, nutrition is a function not only of food availability but also of accessibility. Food availability remained above minimum energy requirements in post-communist Europe, but certain marginalised groups of the population in certain countries may still have had insufficient energy intakes (Rokx et al. 2002). Nevertheless, the sharper decline in post-Soviet Central Asia does serve to illustrate the particular problem with food availability in this region, compared to post-socialist Europe.

consumption levels during the Soviet period, were eliminated (Babu and Rhoe 2006). In addition, the liberalisation of previously subsidised food prices was particularly significant. January 1992 saw the liberalisation of prices across the then Commonwealth of Independent States (Kaser 1997), leading to dramatic rises in the cost of a number of foodstuffs (Rokx et al. 2002). With real wages declining, an increasing proportion of family income came to be spent on food. There was also a change in diet composition, with particularly sharp decreases in meat and milk consumption (Falkingham et al. 1997; Pomfret and Anderson 1997; Djalalov and Gemma 2006) while expenditures on bread and vegetable products were relatively stable (Babu and Reidhead 2000). This reflects a 'reductive' response to the crisis (Howell 1996) as the population became even more reliant on the traditional staple of bread as a cheap source of calories. Therefore the liberalisation of bread prices, in 1994 in Kazakhstan, Kyrgyzstan and Uzbekistan and in 1995 in Tajikistan (Economist Intelligence Unit 1995b; Kaser 1997), which had remained subsidised in the early post-independence years, had a further negative effect on nutrition levels, particularly in Tajikistan and Uzbekistan.

Indeed, while all the Central Asian republics suffered from food insecurity in the early post-independence years, the severity of the crisis varied. The Soviet legacy was different. In terms of grain, the base of the region's diet, Kazakhstan was a net exporter during the Soviet period and, indeed, remains the sixth largest producer in the world (Peimani 2006). At the other end of the extreme, of all the Soviet republics Tajikistan was most dependent on subsidies from Moscow during the Soviet era and had the highest inter-republic trade deficit (Foroughi 2002), relying on other republics for the vast majority of its grain supply. Uzbekistan, too, was a major importer of grain during the Soviet period, similarly relying on imports for around three-quarters of its supply (Economist Intelligence Unit 1997c). In contrast, while Kyrgyzstan was also dependent on grain imports, this only tended to make up a third of the country's total supply (Babu et al. 2006) since local production catered for most of the domestic need[26]. The republics also vary in terms of the proportion of their land which is

[26] In 1992, just after independence, cereal production in Kyrgyzstan was 679,000 tonnes, compared to 170,400 tonnes in Tajikistan, 964,000 tonnes in Uzbekistan and 18.3 million tonnes in Kazakhstan (FAO 2008b). Considering their respective populations (4.3m, 5.1m, 19.9m and 16.7 million at the

suitable for household subsistence arable use. People with access to land to grow their own food have been better able to cope during times of economic stress - but while such 'gardening' is especially common in the ex-Soviet Europe, and in Kazakhstan one-third of food is produced at home (Rokx et al. 2002), Tajikistan and Uzbekistan are severely limited in the amount of land suitable for household agricultural use: in Tajikistan, by the mountainous terrain; in Uzbekistan, by the availability of irrigated land (Duncan 2000; Spoor 2006). Further, while both Tajikistan and Uzbekistan have devoted an increased share of agricultural land to food production, they also face pressure to maintain a large share for cotton, a valuable source of external currency. Overall, the differences in trends in food insecurity between the Central Asian republics are illustrated by differences in the share of consumer expenditure devoted to food. In 1991, a similar share of expenditure was spent on food in all five republics (between 40 and 50%). By 1996, the share in Kazakhstan and Kyrgyzstan was around 55-60%, but in Tajikistan it had increased to approaching 90%; no data are provided for Uzbekistan after 1995, but in this year the share was 70%, well above that in Kazakhstan and Kyrgyzstan (Djalalov and Gemma 2006). Indeed, relating to food security, Rokx et al. (2002:59) report that 'certain areas are particularly vulnerable and should receive top priority', identifying Tajikistan and Uzbekistan as countries where nutritional status is 'very poor'.

The differences in food insecurity are also reflected in the estimated prevalence of undernourishment in the different countries[27] (FAO 2008a; Table 4.1). In Kazakhstan, levels have been relatively low throughout the period. Kyrgyzstan has actually made significant progress, after the shock of the initial few years of independence, in reducing undernourishment. But in Uzbekistan and Tajikistan, the

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time of the 1989 census), this translates to 0.16 tonnes of locally produced grain per head in Kyrgyzstan, and just 0.03 and 0.05 tonnes per head in Tajikistan and Uzbekistan. For Kazakhstan, a traditional exporter of grain, the figure was 1.09.

[27] These are the only years for which estimates are available. FAO's estimates of the prevalence of undernourishment are 'essentially a measure of food deprivation based on the calculation of three key parameters for each country: the average amount of food available for human consumption per person, the level of inequality in access to that food and the minimum number of calories required for an average person'. See http://mdgs.un.org/unsd/mdg/Metadata.aspx (Goal 1, Target 1.C) for further details.

prevalence of undernourishment significantly increased from 1993-95 to 2001-03. Indeed, as FAO (2006:) conclude, of the post-communist countries in Europe, the Caucasus and Central Asia, the most serious declines in food security have been in Tajikistan and Uzbekistan. As the data show, Tajikistan was worst affected of all.

Table 4.1 Prevalence of undernourishment[1] in the total population of four Central Asian republics (%)

	1993-1995	2001-03
Kazakhstan	3	8
Kyrgyzstan	21	4
Tajikistan	22	61
Uzbekistan	8	26

1 A measure of food deprivation based on three parameters: food availability, equality of access to food, and minimum required average human calorific intake. See footnote 28..
Source: FAO (2008a)

4.3 Data and Method[28]

Official data on first union formation in Central Asia are inadequate for a reliable assessment of temporal trends. In Tajikistan, for example, even before independence, the date of marriage registration with Soviet authorities was never a reliable indicator of the date of the religious ceremony *nikoh*, after which the couple would live together. Underage marriages were concealed from the authorities by delaying registration at the civil registry office (ZAGS), sometimes for several years. Even for 'legal' marriages, there might be a gap before registration, while some couples disregarded registration altogether. As Harris (2004:39) summarises, compared to the *nikoh*, 'civil registration was of little importance to Tajiks' and was viewed simply as a means of providing access to resources like family allowances. In the post-independence context, with the virtual collapse of the social security system (see Falkingham 2000), the motivation for registration has further reduced – particularly given the introduction of a registration fee. Qualitative accounts suggest that polygamy in Tajikistan has increased since independence (Tabyshalieva 1997), but since this is illegal these unions are also unrecorded. Overall, Dikaev (2005) reports

[28] The reader is invited to omit this section, which is identical to Section 3.2 in chapter 3 and has been replicated for convenience.

one estimate which suggests that only half of all marriages in Tajikistan are now officially registered. Under-registration is also a problem in other Central Asian states (Dommaraju and Agadjanian 2008).

Therefore, because of the inadequacy of official data, survey data are used to calculate rates of first union formation in late- and post-Soviet Central Asia. The latest round of Multiple Indicator Cluster Surveys (MICS3), carried out by UNICEF, represent the most recent data available. They are nationally representative sample surveys with a women's questionnaire, for those aged 15-49 at the time of the survey, which included questions on union formation. Specifically, women were asked the question 'In what month and year did you first marry or start living with a man as if married?' This is a more accurate reflection of the date of first union than the date of marriage registration and, given the significant under-registration issues, a more complete one. Surveys were carried out in Tajikistan (2005), Kyrgyzstan (2005/6), Kazakhstan (2006) and Uzbekistan (2006), with 10,626, 7,043, 14,719 and 14,205 women interviewed respectively. In a small number of cases where month or year of first union was missing, these data were imputed[29].

For each country, rates of first union, specific to those women who have never been in union (hereafter, 'unmarried' women), are calculated using a simple proportional hazards exponential model:

$$\lambda_i = \lambda \ \exp\{\mathbf{x}_i'\beta\} \tag{4.1}$$

In this model, λ_i is the hazard corresponding to individual *i*, λ is the baseline hazard when $\mathbf{x}_i$=0, and $\exp\{\mathbf{x}_i'\beta\}$ is the relative risk, a proportionate increase or decrease in the rate associated with the covariate characteristics $\mathbf{x}_i$. Taking logs, we obtain the additive log-linear model:

[29] Age at first union, which was also asked in the surveys, was used as the basis for imputation. The Tajikistan survey data contained the highest proportion of missing dates: of 6571 women ever to have been in a union, 282 months of union and 216 years of union were imputed, while 12 women missing both date of union and age at union information were excluded.

$$\log \lambda_i = \log \lambda + \mathbf{x}_i' \beta \tag{4.2}$$

where α is the log of the baseline hazard. Initially, since interest lies in describing overall trends in first union formation, dummy variables for calendar year are the only covariates and age intervals are not included. This is equivalent to assuming a constant baseline hazard across process time *t*, time since 15th birthday. However, since each survey collects information for women aged 15-49 at the time of the survey, data are truncated in periods before the survey (see Ní Bhrolcháin 1993). To ensure comparability across time, rates are calculated based on first unions, and exposure to first unions, for women aged 29 or under, for periods where the age distribution of women is complete up to age 30. Thus rates are reconstructed for a period of 20 years before each survey. Since first unions in Central Asia are concentrated at a relatively young age - traditionally an unmarried woman over the age of 20 is in danger of being considered an 'old maid' (Tabyshalieva 1997:52) - truncation is not a significant problem.

Interest also lies in examining trends in first union formation for different age groups. A piecewise exponential model can be specified where the process time *t*, time since 15th birthday, is split into age intervals *j*, assuming a constant hazard within these intervals:

$$\log \lambda_{ij} = \log \lambda_j + \mathbf{x}_i' \beta \tag{4.3}$$

where λ_j is the baseline hazard for age interval *j*. The age intervals chosen broadly reflect 'early' (15-17), 'peak' (18-20) and 'late' (21-29) ages at first union. Implicitly, under the proportional hazards assumption, the effect of the calendar year covariates is assumed to be the same for all age intervals *j*. However, the model is extended to allow for the relaxation of this assumption. Specifically, an interaction between the age intervals and calendar year is included in the model to allow for differences in trends in first union formation for different age groups of unmarried women:

$$\log \lambda_{ij} = \log \lambda_j + \mathbf{x}_i' \beta_j \tag{4.4}$$

where β_j represents the effect of calendar period for age interval *j*.

The survey also collected information on, for example, place (urban/rural) and region of residence, and the woman's educational background, but these were not used as covariates since all relate to the time of the survey only. Hoem and Kreyenfeld (2006a; 2006b) warn against an anticipatory approach which conditions on the future. In any case, the focus here is on national-level trends.

4.4 Results

4.4.1 Trends in overall rate of first union formation

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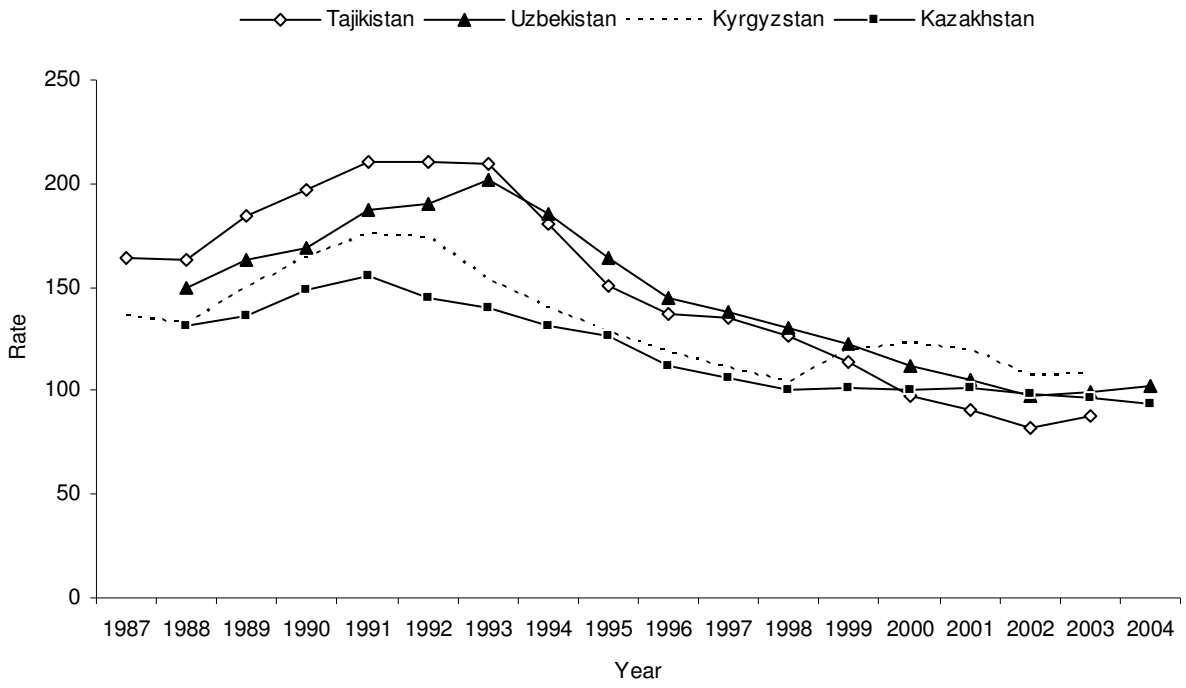
Figure 4.1 presents trends in first union formation for women in late- and post-Soviet Tajikistan, Uzbekistan, Kyrgyzstan and Kazakhstan. A number of specific results stand out. First, in the late Soviet period, marriage rates were higher in Tajikistan and Uzbekistan than in Kyrgyzstan and Kazakhstan. This is consistent with the results of Dommaraju and Agadjanian (2008), which showed that the predicted probability of first marriage for unmarried women had, in almost every year from the mid-1970s until the late-Soviet period, been higher in Uzbekistan than in Kazakhstan and Kyrgyzstan. These differences may in part reflect differences in economic development and levels of urbanisation. However, they also might reflect longer-standing cultural differences regarding gender and familial systems. In pre-Soviet times, as Jones and Grupp (1987) explain, sex roles tended to be more egalitarian among the semi-nomadic Kyrgyz and Kazakhs - with women playing a more active economic role and with more independence in everyday life - than in the oasis cultures of the Uzbeks and Tajiks, where female roles were more restrictive, women occupied a more subordinate role within the household system and daughters were married at an earlier age.

Second, in all four republics but particularly in Tajikistan, Uzbekistan and Kyrgyzstan, there is a marked increase in the rate of first union formation in the late-Soviet period, with the rate peaking in the early 1990s. Again, this is in line with Dommaraju and Agadjanian's (2008) results for Uzbekistan, Kyrgyzstan and Kazakhstan, which also illustrate the distinctiveness of this increase compared to the relative stability in first marriage rates from the mid-1970s to the late 1980s, and those of Agadjanian and Makarova's (2003) study focusing on Uzbekistan. This increase in marriage rates is the focus of the previous chapter and will not be further elaborated upon here.

Figure 4.1 Rate of first union formation[1] in Central Asia (three-year moving average)



1 Rates per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
Source: author's analysis of MICS (2005).

Table 4.2 Relative risks[1] of union formation in Central Asia, compared to 1988 rate[2]

	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
1987		1.03	1.01	
1988	**(131) -**	**(132)** -	**(163)** -	**(150)** -
1989	1.04	1.13	1.13	1.09
1990	1.13	1.24	1.20	1.13
1991	1.18	1.33	1.29	1.25
1992	1.10	1.32	1.29	1.27
1993	1.06	1.16	1.28	1.35
1994	1.00	1.06	1.11	1.24
1995	0.96	0.97	0.92	1.10
1996	0.85	0.90	0.84	0.97
1997	0.81	0.84	0.83	0.92
1998	0.76	0.79	0.77	0.87
1999	0.77	0.91	0.70	0.82
2000	0.77	0.93	0.60	0.75
2001	0.77	0.90	0.56	0.70
2002	0.75	0.81	0.51	0.65
2003	0.73	0.82	0.54	0.66
2004	0.71			0.69
N_u	*6,473*	*3,429*	*4,506*	*6,691*
N_{wy}	*56,953*	*25,727*	*38,098*	*50,617*

1 Relative risks based on the 3-year moving average of the rate of first union formation.
2 1988 rate shown in brackets in bold; per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
N_u and N_{wy}: number of unions, and number of years of exposure, in total analysis period for sampled women.
Source: author's analysis of MICS (2005).

Third, in all four republics, there has been a sharp decrease in the rate of first union formation since this peak in the early post-independence years. Dommaraju and Agadjanian (2008) also noted an incipient decline in marriage rates in post-Soviet Kyrgyzstan and Uzbekistan, but levels were still above or similar to those in the pre-*perestroika* period. The more recent results presented here show that, such has been the decline in first union formation, by the turn of the millennium rates in all four republics were significantly lower than in the late 1980s (see Table 4.2, which complements Figure 4.1 by providing relative risks of first union formation compared to the 1988 level). Thus the marriage decline does not simply represent a reversion to a pre-*perestroika* norm.

The results also show clear differences between the republics in terms of the nature of the decline. Most notably, Tajikistan, which had the highest rate of first union formation pre-independence, had the lowest rate by the early years of the new millennium. This represents a dramatic collapse in the rate of first union formation: the rate in 2003 represented a fall of 46% from the late 1980s (Table 4.2), and of 58% from the peak in the early post-independence years. Uzbekistan, too, experienced a particularly sharp decline: the risk of first union formation in 2003 was 34% lower than the late-1980s level, and more than 50% lower than the early post-independence peak. In contrast, while there were significant declines in Kazakhstan and Kyrgyzstan, these were smaller in comparison: for Kazakhstan (Kyrgyzstan) in 2003, the risk of first union formation was 27% (18%) lower than in the late 1980s, and around 38% (38%) lower than the peak. Overall, there is a distinction in terms of the timing and scale of the decline: in Tajikistan and Uzbekistan the decline started later and – especially in the case of Tajikistan - was particularly acute; in Kazakhstan and Kyrgyzstan the decline started earlier but was smaller in scale[30].

[30] These differences in the decline in the rate of union formation between the different republics are not simply a reflection of differences in ethnic composition. Indeed, when the hazard models presented in Section 4.3 were re-run examining rates of union formation for the titular ethnic group only in each country (i.e. considering models with an interaction between ethnicity and year), the differences between the republics remained: Tajiks in Tajikistan experienced the sharpest decline in first union formation; Kyrgyz in Kyrgyzstan experienced the smallest, though still substantial, decline.

4.4.2 Trends in rate of first union formation for different age groups

While there have been significant declines in marriage rates in post-communist Europe, a significant portion of the decline in period rates has been attributed to a 'postponement' of marriage, particularly in Central Europe, since the decline in the marriage rate has been mostly at younger ages – such that the mean age at marriage has been increasing (for example, Sobotka 2008; Sobotka and Toulemon 2008). Indeed, if a subsequent increase in the marriage rate at later ages compensates to some extent for earlier declines at younger ages, a period decrease in marriage rates need not translate into a comparable decrease in the cohort measure of the proportion of women ever married. To explore changes in the rate of first union formation for different ages in Central Asia, an interaction was included between calendar year and age group in the survival model of first union formation for each country (equation 4.4). In each case, adding these interaction terms significantly improved the fit of the model.

In all four republics, the increase in rates of first union formation in the early 1990s was most marked at younger ages. By the early-to-mid 1990s, rates for unmarried women aged 18-20 had exceeded the rates for those aged 21-29 (for Tajikistan, Uzbekistan and Kyrgyzstan) or had drawn level with them (for Kazakhstan) (Figure 4.2; Table 4.3). From the mid-1990s, in Kyrgyzstan and Kazakhstan decreases in the overall rates of first union formation were effected through decreases in the rate for the two youngest groups (15-17 and 18-20) while rates remained stable in the 21-29 group, and even started to increase in Kyrgyzstan. By the turn of the millennium, rates of first union formation were much higher for this older group than for those aged 18-20, indicative of an increase in the mean age of first union formation to accompany the decrease in the overall rate. In Uzbekistan and Tajikistan, rates also fall more sharply amongst the youngest age groups from the mid-1990s but, unlike Kyrgyzstan and Kazakhstan, the decline in the rate at the older ages continued. In particular, Tajikistan has seen sharp declines in this 21-29 age interval since independence, part of a general collapse in the rate of first union formation across age groups.

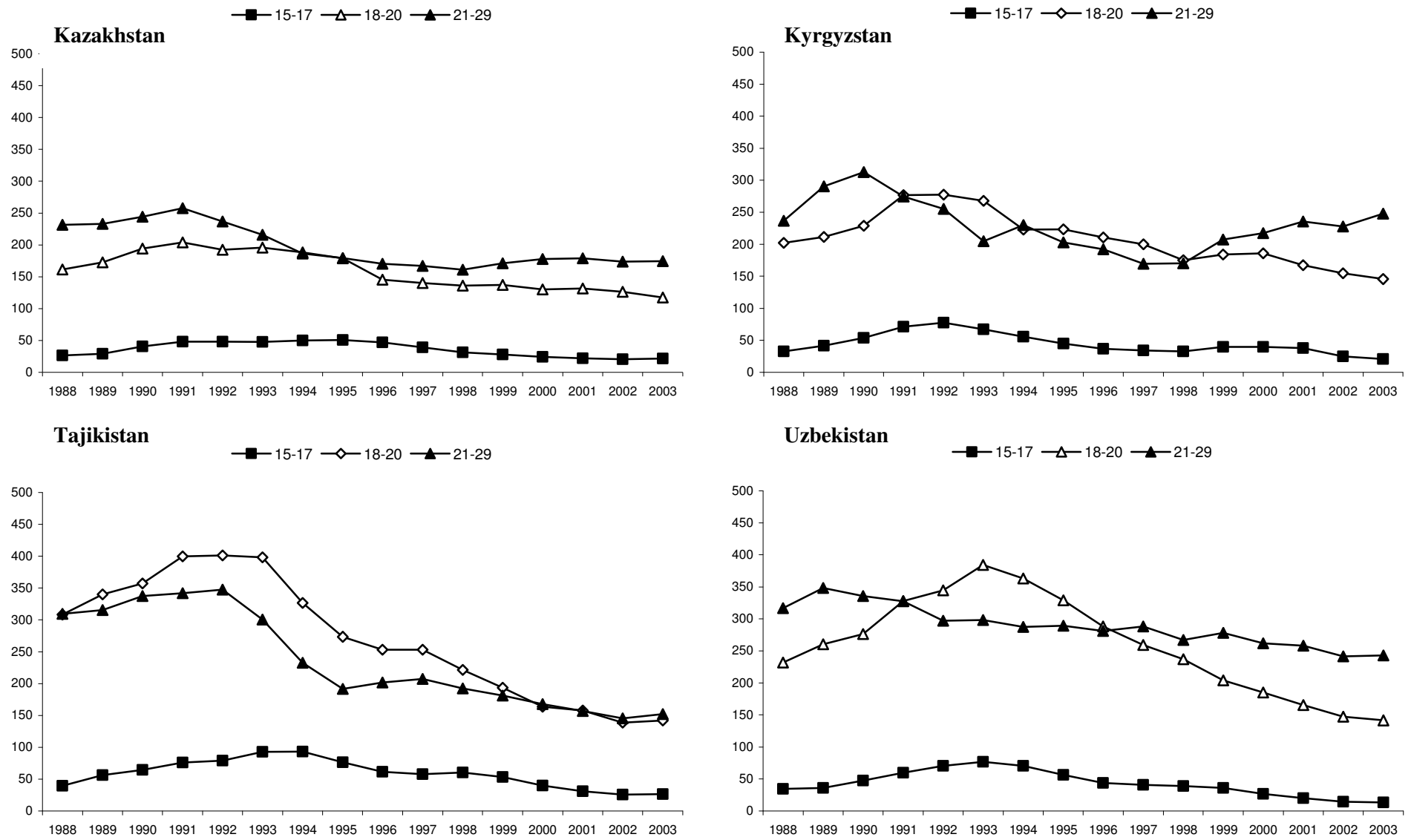
In Central Asia, as elsewhere, the extent to which - consistent with the 'postponement' scenario from the cohort perspective - any future increases in the rate of first union formation at older ages compensate for recent declines at younger ages is, essentially, an empirical question for future research. However, the length of time in which period rates of first union formation have been at a level significantly lower than that of the 1980s would seem to indicate a long-term change in union behaviour rather than simply a temporary 'timing' effect. This is most clear in the case of Tajikistan, where an acute decrease in rates of first union formation, together with the preservation of the age-at-first-union distribution, will inevitably translate into a sharp increase in the proportion of women who remain never-married – a marked departure from the Soviet era, where marriage remained nearly universal, and from historical norms.

4.5 Discussion

4.5.1 Response to food insecurity

Rates of first union formation have declined significantly across post-Soviet Central Asia. Interestingly, it is in Tajikistan and Uzbekistan, where female roles have traditionally been more conservative (Jones and Grupp 1987) and where Islam has perhaps the strongest tradition (Tazmini 2001), that have seen the greatest declines in rates of first union formation. Indeed, while Tajikistan is distinctive in terms of the scale of decline, the pattern of change in Uzbekistan shows certain parallels with the Tajik case - both in terms of the timing of decline and in outstripping the declines in Kazakhstan and Kyrgyzstan. In this context it is significant that, of the countries in transition, Tajikistan and Uzbekistan have seen the most serious declines in food security (FAO 2006). There is an established literature on the demographic implications of food scarcity – and a decrease in the rate of union formation is an established response to such a crisis. Galloway (1988), for example, examining the response to annual fluctuations in grain prices in nine pre-industrial countries, reports a clear decline in nuptiality during years of grain price shocks, while Lee (1981) notes comparable trends in historical data for England. In a similar way, the particularly sharp declines in first union formation in Tajikistan and Uzbekistan may in large part reflect a response to decreases in food security.

Figure 4.2 Rate of first union formation[1] for different age groups in Central Asia (three-year moving average)



1 Rate (y-axis) per 1,000 years of exposure for unmarried women in age group. Source: author's analysis of MICS (2005).

Table 4.3 Relative risks[1] of union formation for different age groups in Central Asia, compared to 1988 rate[2]

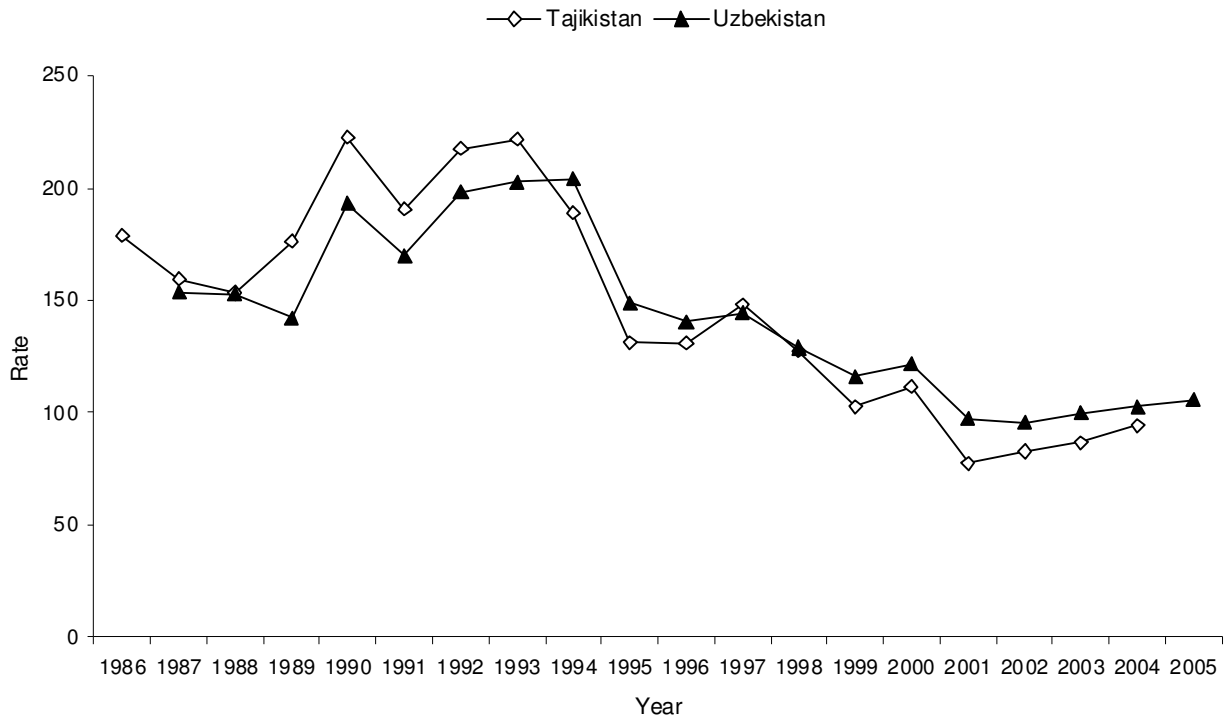
	Kazakhstan			Kyrgyzstan			Tajikistan			Uzbekistan		
	15-17	18-20	21-29	15-17	18-20	21-29	15-17	18-20	21-29	15-17	18-20	21-29
1987				1.10	1.00	1.06	0.98	1.06	0.97			
1988	**(26) -**	**(162) -**	**(232) -**	**(32) -**	**(202) -**	**(236) -**	**(40) -**	**(308) -**	**(309) -**	**(34) -**	**(232) -**	**(317) -**
1989	1.10	1.07	1.01	1.28	1.05	1.23	1.42	1.10	1.02	1.04	1.12	1.10
1990	1.54	1.20	1.05	1.66	1.13	1.32	1.63	1.16	1.09	1.37	1.19	1.06
1991	1.82	1.26	1.11	2.19	1.37	1.16	1.92	1.30	1.11	1.73	1.41	1.03
1992	1.82	1.19	1.02	2.39	1.37	1.08	2.00	1.30	1.12	2.04	1.49	0.94
1993	1.81	1.21	0.93	2.06	1.33	0.87	2.35	1.29	0.97	2.21	1.66	0.94
1994	1.90	1.16	0.80	1.72	1.10	0.97	2.36	1.06	0.75	2.03	1.57	0.91
1995	1.92	1.11	0.77	1.38	1.11	0.86	1.93	0.89	0.62	1.63	1.42	0.91
1996	1.77	0.90	0.74	1.13	1.04	0.81	1.55	0.82	0.65	1.26	1.24	0.89
1997	1.48	0.87	0.72	1.05	0.99	0.72	1.46	0.82	0.67	1.17	1.12	0.91
1998	1.19	0.84	0.70	1.01	0.87	0.72	1.52	0.72	0.62	1.13	1.02	0.84
1999	1.06	0.85	0.74	1.22	0.91	0.88	1.34	0.63	0.59	1.03	0.88	0.88
2000	0.92	0.81	0.77	1.22	0.92	0.92	1.01	0.53	0.54	0.77	0.80	0.83
2001	0.83	0.81	0.77	1.16	0.83	1.00	0.78	0.51	0.51	0.58	0.71	0.82
2002	0.78	0.78	0.75	0.77	0.76	0.96	0.65	0.45	0.47	0.42	0.64	0.76
2003	0.82	0.73	0.75	0.63	0.72	1.05	0.67	0.46	0.49	0.38	0.61	0.77
2004	0.78	0.69	0.76							0.33	0.55	0.75
N_u	*704*	*2,493*	*3,276*	*533*	*1,582*	*1,314*	*834*	*2,266*	*1,406*	*909*	*3,363*	*2,419*
N_{wy}	*22,961*	*16,981*	*17,012*	*12,519*	*7,755*	*5,453*	*19,052*	*11,325*	*7,720*	*25,381*	*15,910*	*9,326*

1 Relative risks based on the 3-year moving average of the rate of first union formation for a given age group.
2 1988 rate shown in brackets in bold; per 1,000 years of exposure for unmarried women in age group.
N_u and N_{wy}: number of unions, and number of years of exposure, in total analysis period in age group for sampled women.
Source: author's analysis of MICS (2005).

Annual (non-smoothed) fluctuations help to further illustrate the parallels between Tajikistan and Uzbekistan (Figure 4.3). In particular, 1995 seems to have been a watershed year in both countries. In just one year, the rate of first union formation decreased by 31% in Tajikistan (p=0.003)[31] and by 27% in Uzbekistan (p<0.001) (Table 4.4). The context of this decline for Tajikistan is described in chapter 2. Heavily dependent on imports of grain during the Soviet period, stocks of grain were drawn down rapidly in the early post-independence years. After the collapse of central planning, trading relationships took time to develop and the indebted government struggled to fund the necessary grain imports – particularly following a poor cotton harvest in 1994 and the associated reduction in valuable foreign revenues. Imports in 1994-95, even after being supplemented by aid, were just half of the 1994 level (World Food Programme 1996). The shortage of grain in the republic prompted dramatic increases in prices. The price of open market bread increased sixfold in the first six months of 1995 (Grand et al. 2001), while price controls on rationed state bread were lifted in August of the same year. Overall, the scarcity of flour and bread, and price increases, in 1995 had an acute impact on the welfare of the population, such that 'many people suffered significant hunger over a period of many months' (Harris 2004:29), and it was only aid from international agencies that prevented famine. Given past studies of the relationship between periods of food scarcity and nuptiality, it is not surprising that the rate of first union formation dropped dramatically at this time.

[31] This, and subsequent, p-values are results of Wald tests assessing the significance of a calendar year coefficient, compared with a reference comparison year. Standard errors were adjusted to take account of the surveys' sample design.

Figure 4.3 Rate of first union formation[1] in Tajikistan and Uzbekistan (annual rates)



1 Rates per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
Source: author's analysis of MICS (2005).

Table 4.4 Relative risks[1] of union formation in Tajikistan and Uzbekistan, vs. 1988[2]

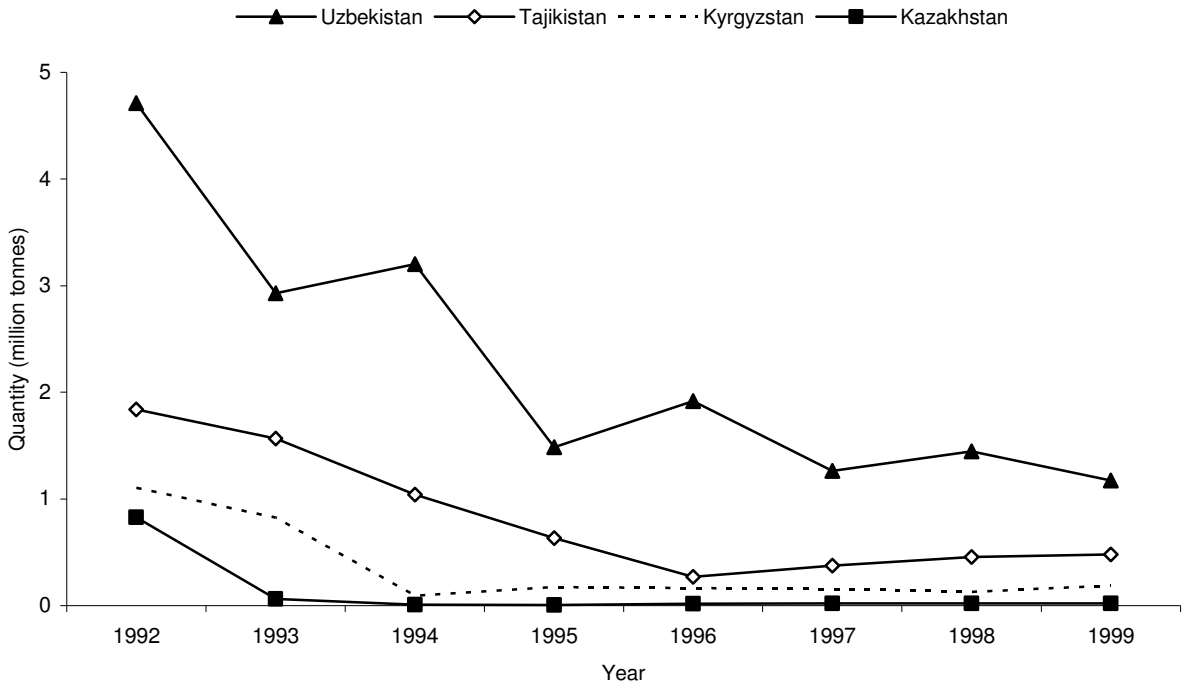
	Tajikistan	Uzbekistan
1986	1.17	
1987	1.04	1.01
1988	**(153)** -	**(153)** -
1989	1.15	0.93
1990	1.45	1.27
1991	1.24	1.11
1992	1.42	1.30
1993	1.45	1.33
1994	1.23	1.34
1995	0.85	0.97
1996	0.85	0.92
1997	0.97	0.95
1998	0.83	0.84
1999	0.67	0.76
2000	0.73	0.80
2001	0.50	0.64
2002	0.54	0.63
2003	0.57	0.65
2004	0.61	0.67
2005		0.69
N_u	*4,506*	*6,691*
N_{wy}	*38,098*	*50,617*

1 Relative risks based on the annual rate of first union formation (no smoothing).
2 1988 rate shown in brackets in bold; per 1,000 years of exposure for unmarried women aged 15-29 years inclusive.
N_u and N_{wy}: number of unions, and number of years of exposure, in total analysis period for sampled women.
Source: author's analysis of MICS (2005).

The similarity of the demographic response in Uzbekistan, meanwhile, reflects the similarity of the pressures that it experienced. Like Tajikistan, it had been dependent on imports for the majority of its grain during the Soviet period (Economist Intelligence Unit 1997c). Like Tajikistan, it was heavily reliant on cotton exports as a source of external revenue, and therefore vulnerable to changes in crop levels and in world prices. Indeed, while in the early years of independence, the cotton sector was helped by rising prices, by 1995 this trend in prices was reversing (Economist Intelligence Unit 1995c:61). Like Tajikistan, imports of grain to Uzbekistan declined sharply from 1994 to 1995 - in this case by more than half (FAO 2008c; Figure 4). This decline seems to stem not only from difficulty in funding the necessary imports, but also from over-optimism in estimates of domestic wheat production[32]. Like Tajikistan, bread prices were liberalised, although at the earlier date of November 1994, leading to immediate and significant price rises (Economist Intelligence Unit 1994b:70), which continued in 1995 (Economist Intelligence Unit 1995f:46). Like Tajikistan, there were reports of food shortages by early 1995 - to such an extent that rationing, which had been abolished at the end of 1994, was re-introduced (Economist Intelligence Unit 1995d:53; Pomfret and Anderson 1997). Overall, just as in Tajikistan, the population had become even more reliant on bread during the early years of independence – and just as in Tajikistan, in 1995 the population were faced with a 'perfect storm' of decreases in overall grain availability accompanied by the liberalisation of bread prices. The significant drop in nuptiality in this year should be understood within this context.

[32] The aim to become more self-sufficient had led to an increase in the amount of land sown to wheat. The initial estimate of the 1995 harvest was 3.3m tonnes (Economist Intelligence Unit 1996d:53), a significant chunk of domestic demand of 4m tonnes. At the end of the year it was officially recorded as 2.85 million tonnes, a doubling of 1994's 1.42m tonne crop (Economist Intelligence Unit 1995e:64). However, the figure for 1995 was subsequently revised downwards to 2m tonnes, the poor harvest reflecting the lowest yield in a decade (Economist Intelligence Unit 1996d:53). Faced with an unexpected shortfall in grain supplies in the winter of 1995-96, the government had no option but to order further grain from abroad, despite the fact that wheat prices at this point had reached a 16-year high (Economist Intelligence Unit 1996e:46).

Figure 4.4 Quantity of cereal imports in four Central Asian republics, 1992-1999



Note: The populations for the different republics, according to the 1989 Soviet census, were: Uzbekistan – 19.9m; Tajikistan – 5.1m; Kyrgyzstan – 4.3m; Kazakhstan – 16.7m.
Source: FAO (2008c).

In both Tajikistan and Uzbekistan, the marriage rate remained at a low level after 1995. Even though food shortages eased somewhat from mid-1996 in Tajikistan, after the end of subsidies bread was much more expensive than before. Further, the collapse of the collective and state farms, following the rapid inflation in 1995 after the introduction of a new currency, led to persistent under-and non-payment of wages in subsequent years (Grand et al. 2001). Similarly in Uzbekistan, while in the first half of the 1990s agriculture provided a buffer for growing unemployment in other sectors, from the mid-1990s unemployment and underemployment increased in rural areas as the sector became increasingly 'under strain' (Spoor 2006:198). The government retained the Soviet state order system for cotton and for grain, purchasing these products well below official market prices, which exacerbated hardship in rural areas (Economist Intelligence Unit 1996c:44). Large-scale state and co-operative farms, many of them insolvent, started to shed labour, while their remaining employees - on very low wages - became the 'working poor' (Spoor 2006:201). Thus in both Tajikistan and Uzbekistan, with bread much more expensive than pre-1995 and rural incomes declining, food insecurity remained a major issue. Given also that

in both countries wedding ceremonies are traditionally very expensive and a focus for conspicuous demonstrations of wealth (Tett 1996; Agadjanian and Makarova 2003), this undermined people's ability to finance the costs of a wedding and of family formation.

From the mid-1990s onwards, the countries became increasingly reliant on locally produced grain as imports remained well below Soviet levels. Both pursued a policy of increasing the share of agricultural land devoted to wheat production – although, while production levels started to increase, productivity was actually declining (Economist Intelligence Unit 2000). In both countries, household garden plots provided a safety net for many households, providing a valuable means of subsistence in the absence of sufficient income[33], although the small amount of suitable land available has restricted the size of the individual plots (Spoor 2006). Families therefore became increasingly dependent on, and therefore vulnerable to short-term disruptions in, the quality of the local food harvest.

In 2000 and 2001, both Tajikistan and Uzbekistan were affected by a severe drought, estimated to be the worst for 70 years, and part of a regional shortage of rainfall which also affected Iran, Afghanistan, Western Pakistan and Turkmenistan (IRI 2001), but not Kazakhstan and Kyrgyzstan. This led to an almost total failure of the rainfed wheat crop and significant drops in the irrigated wheat yield (FAO/WFP 2000). Indeed, water flows in the two main sources of irrigation, the Amu Darya and Syr Darya, were reported to be only 40% of the average (FAO 2001). Overall wheat production, which had increased since the mid-1990s, dramatically declined - in Tajikistan from 475,000 tonnes in 1999 to 255,000 tonnes in 2000 (Economist Intelligence Unit 2001c) and 300,000 tonnes in 2001 (World Food Programme 2003), and in Uzbekistan from 3.6 million tonnes in 1999 to 3.2 million in 2001 (FAO 2001). These declines had a serious effect on food security. In Tajikistan, for example, there was a 63.6% increase in the price of foodstuffs in 2000 (Economist Intelligence Unit 2001c). Especially vulnerable were those in rural areas whose household crop had

[33] For example, following the 1995 crisis, Harris (1998a:665-6) notes that villagers in Khatlon, Tajikistan decided to devote more of their private household plots for growing wheat rather than vegetables.

failed. The situation was particularly acute in the second year of drought in 2001, reflecting the cumulative effect of persistent water and food shortage, as people had exhausted whatever coping strategies remained.[34] As many as one million people in Tajikistan faced malnutrition and potential starvation (Economist Intelligence Unit 2001a) and were dependent on international aid. About 40% of Uzbekistan's population lived in the affected areas (WHO 2000). While there is no evidence for a change in the rate of first union formation during the first year of drought, the effect on nuptiality in the second year was significant. The rate of first union formation in 2001, during the second year of the drought, was just 75% (p=0.030) of pre-drought (1999) levels in Tajikistan, and 84% (p=0.047) of pre-drought levels in Uzbekistan (Figure 4.3; Table 4.4). Following the drought, rain during the 2001-2002 cropping season was in line with the long term average, and production in 2002 recovered to 1999 levels. Rates of first union formation have increased gradually since 2001, but in 2005 had yet to recover to pre-drought levels.

The annual pattern of trends in first union formation therefore highlights the importance of particular crisis periods in Tajikistan and Uzbekistan. However, the impact on nuptiality has also been long-lasting, with no immediate significant rebound following sharp declines. As Palloni et al. (1996:107) argue, 'when the economic effects of the crisis are long-lasting, a more permanent disequilibrium in the marriage markets sets in, and the making up of postponed marriages ceases to be a feasible option. The consequence is an increase in the proportion of members who never marry'. Indeed, underlying the specific crises in 1995 and 2000-2001 was the longer-term economic shift away from Soviet-style central planning, which co-ordinated trade between republics, to increased self-reliance in food supply – both at the national level (as imports declined) and at the household level (as families increasingly came to rely on household plots). At the same time, there was a shift from subsidised and stable food prices to market-driven pricing, prone to fluctuations.

[34] The UN's humanitarian aid co-ordinator in Dushanbe, Tajikistan, pointed out that 'families who survived last year by selling their cows and chickens now have no other means of coping. Some households have sold the glass out of their windows and the wooden beams from their roofs to raise money for food' (Reported in the *Guardian*, 'Drought hit states facing famine', October 30 2001).

Overall, these changes represented a shift from a situation in which minimum consumption levels were assured to a post-Soviet context in which this was no longer the case. Those countries most reliant on imports during the Soviet era – Uzbekistan and particularly Tajikistan - were least well placed to provide for their population. They saw the most severe declines in nutrition (Table 4.1) and the most significant declines in nuptiality. In contrast, Kazakhstan and Kyrgyzstan, which had been less reliant on imports during the Soviet era and which did not experience the 2000-2001 drought, were – after the shock of the first few years of independence – better able to provide for the population. From the mid-1990s, the level of undernourishment stayed low in Kazakhstan and decreased in Kyrgyzstan (Table 4.1), and the declines in first union formation in these two countries have been relatively small (Figure 4.1).

4.5.2 The rise of labour migration

The post-communist period has seen the emergence of new and significant patterns of international labour migration (see Rios 2006). These movements should be distinguished from the ethnic repatriation of the non-titular population (for example, of Russians from the Central Asian republics to Russia) in the years immediately preceding and subsequent to independence. In the Tajik case, economically-driven labour migration started to emerge in the mid-1990s (Umarov 2006) and for many it has 'offered the only alternative to going hungry' (Olimova and Bosc 2003:8). Much of the movement is undocumented and so not recorded in official figures. Olimova and Bosc (2003), using survey data, estimated that in 26% of Tajik households at least one household member had worked abroad at some point between 2000 and 2003. They identified several types of movement: traders who undertake short-term shuttle tours several times a year; seasonal workers, who return to Tajikistan each winter; and those who work abroad for several years at a time and visit their families infrequently.

Since the vast majority of migrants are men of working age who are working in Russia (Mughal 2007), the effect is to remove many eligible bachelors from the marriage market. Thus Harris (1998a:661) reports, of the Gharmi villages in Khatlon, Tajikistan that 'the absence of young men of marriageable age has made it extremely difficult to find spouses for the girls and there are increasing numbers of unmarried girls as old as 22 or 23 [which was previously unheard of]'. Indeed, the scale of

labour migration in Tajikistan is likely to be one of the key reasons for the persistence of low rates of first union formation since the mid-1990s. Given also the significant labour migration from the other Central Asian republics since the mid-1990s (see, for example, Ergeshbayev 2006; Maksakova 2006), it would be interesting for future research to examine the relationship between these movements and trends in first union formation in more detail – though this may be hampered by a lack of reliable data on migration levels over time.

4.5.3 The role of ideational change

This paper has highlighted the importance of economic change, and the implications for food security, to changes in the rate of first union formation in post-Soviet Central Asia. But there have also been changes in the ideational sphere. In the Tajik case, Harris (2006) observes changes, for example, in young people's attitudes to romantic friendships, and in women's clothing, since the Soviet era, particularly in the capital Dushanbe. She also notes the emergence of 'modernist' family styles, characterised by a higher degree of individualism and in which children have considerable say in the choice of their spouse. This contrasts to the 'traditionalist' model, strongly collectivist, in which marriages are arranged by family members. However, as she points out (p.152) the number of modernistic families in the republic is very small – at most representing 1% of families in the conservative rural areas of Khatlon, and 10% in the capital Dushanbe. Overall, traditionalist values remain dominant. Indeed, the post-Soviet period has seen a revival of Islamic practices (including, for example, increased observance of Ramadan) as religion becomes a more important feature of public and cultural life (Tazmini 2001) - although it is unclear that there is a serious religious resurgence (Harris 2006) and the impact on gender roles has yet to be evaluated (Falkingham 2000). In any case, the virginity of brides remains highly valued, and the movement of unmarried women outside the home tends to be restricted by their families (Harris 2004). Thus childbearing outside marriage remains rare, explaining why there has been as dramatic a drop in the rate of first births in Tajikistan as there has been in the rate of first union formation (chapter 2). Marriage

remains highly valued, and the ceremony remains the focus of conspicuous demonstrations of wealth[35].

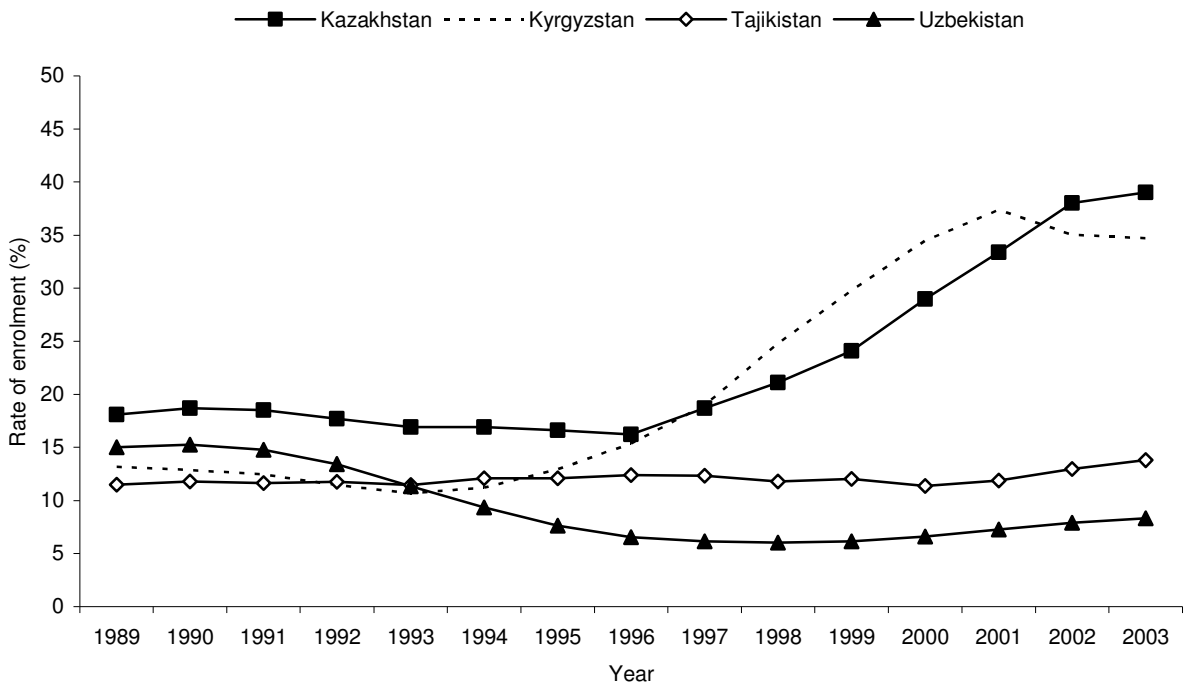
Meanwhile, there is no evidence that girls are staying in education for longer in the post-Soviet period in Tajikistan. In fact, there is evidence of a decrease in educational enrolment after age 12, mainly among girls (Baschieri and Falkingham 2008). Rates in the non-compulsory upper secondary ages are especially low, with an enrolment rate of 29% in 2003 (TransMONEE 2006), half that of the late Soviet period, with a particularly low rate for girls. While rates of enrolment in tertiary education have remained steady in the post-Soviet period, with around 12% of those aged 19-24 years enrolled (TransMONEE 2006), the sex gap increased – from 58 girls per 100 boys in 1990 to just 34 in 1998 (Falkingham 2000) and 35 in 2005 (UNESCO 2007). Increasingly in the post-Soviet period, in the absence of alternative accommodation, newly married women become *kelin*, 'incomers', in the home of their husband's family. As well as childbearing, heavy emphasis is placed on their domestic role in the household, to such an extent that uneducated girls, less likely to pursue a job, are often preferred by their prospective mothers-in-law (Harris 2006). Indeed, as Falkingham (2000) argues, there has been a significant gender dimension to the nature of post-independence changes in Tajikistan, with women concentrated in the lowest-paid sectors, including agriculture, education and health, where wages are insufficient to live on. Overall, given the decrease in educational and employment opportunities for women, the context in Tajikistan contrasts sharply with the situation in Central Europe, where postponement of family formation has been attributed partly to women's new employment opportunities and career prospects (Sobotka 2004).

Therefore, in post-Soviet Tajikistan – at least thus far – economic factors, rather than ideational changes and the spread of new opportunities for women, are the main reasons for the decline in the rate of first union formation. Similarly, the annual pattern of change in first union formation in Uzbekistan - with major declines in the rate of union formation coinciding with periods of particular food insecurity – also

[35] Indeed, in an attempt to limit the amount of money spent on weddings - which could bankrupt a household (Gomart 2003) - the president of Tajikistan recently issued a decree limiting the number of guests at wedding celebrations.

points towards the importance of economic factors. Rates of enrolment in higher education decreased from 14% in 1991 to 8% in 2003 (TransMONEE 2006), while, as in Tajikistan, fewer women pursue higher education than men (UNESCO 2007). In contrast, in both Kazakhstan and Kyrgyzstan, there has been a significant expansion of the tertiary sector, with enrolment rates more than doubling between 1996 and 2003 (TransMONEE 2006; Figure 4.5). Given that in both countries the sex gap in higher education is in the other direction – with an estimated 142 women enrolled for every 100 men in Kazakhstan, and 125 women per 100 men in Kyrgyzstan in 2005 (UNESCO 2007), this represents a considerable increase in female higher education. Thus ideational change, and the spread of new opportunities for women, is likely to have played a more significant role in influencing trends in union formation in Kazakhstan and Kyrgyzstan than in Tajikistan and in Uzbekistan, especially since the mid-1990s. Indeed, declines in first union formation in Kazakhstan and Kyrgyzstan over this period have been concentrated at the younger ages, consistent with the influence of increased female participation in higher education, while the rate at older ages has remained stable (Figure 4.2 and Table 4.3).

Figure 4.5 Higher education enrolment[1] in four Central Asian republics, 1989-2003



1 As percentage of population aged 19-24 years.
Source: TransMONEE (2006).

4.5.4 Relating Central Asia to post-communist Europe

The principles which are helpful in understanding changes in union formation in post-communist Europe are also helpful in Central Asia. Just as in post-communist Europe, there is considerable cultural diversity – with a particular cleavage between Tajikistan and Uzbekistan, where female roles have traditionally been more conservative, and Kazakhstan and Kyrgyzstan, where gender roles have traditionally been more egalitarian (Jones and Grupp 1987). As in post-communist Europe, there have also been big differences in the economic performance of the former Communist states: Uzbekistan and, in particular, Tajikistan have experienced greater problems with food insecurity than Kazakhstan and Kyrgyzstan. It is interesting that Tajikistan, which has experienced the most severe economic problems of all, has maintained a similar distribution of age at first union, with declines in the rate of first union formation in all age groups – in contrast with Kazakhstan and Kyrgyzstan, where declines since the mid-1990s have been specifically at the younger ages. This resonates with the pattern described by Sobotka (2004), in which those countries that had experienced a more successful transition showed the most significant increase in the mean age at first birth.

As in post-communist Europe (Frejka 2008), the underlying root cause of the changes in first union formation in Central Asia has been the shift from state socialist regimes to market economies. This perspective accommodates both the importance of economic change across the region and the possibility that the capitalist restructuring has started to foster ideational change and greater individual autonomy (Lesthaeghe and Surkyn 2002), reflected in the spread of female higher education, in Kyrgyzstan and Kazakhstan. It also provides a framework for considering economic influences on union formation which cannot be simply reduced to 'crisis' explanations. Thus in Tajikistan and Uzbekistan it has been the longer-term change from reliance on centrally-planned food imports to increased self-sufficiency, and from subsidised to free-market pricing, which has effected a one-off transition to a context in which minimum consumption levels are no longer guaranteed. This, as the paper has illustrated, has led to periods of acute food crisis. However, these crises are symptoms of a population which is now, unlike the past, vulnerable to short-term changes in food supply, either from reductions in import levels (as in 1995) or, as

reliance on local crops increased, on adverse local climatic conditions (as in 2000-2001). Even outside these crisis periods, basic foodstuffs now demand a significant share of the household budget – a feature of market conditions which can be expected to continue to have an important influence on union formation even as nutrition levels start to improve. Likewise, the increasing dependence on income from international labour migration[36] is a form of economic change which, given the absence of males for extended periods, may have a long-lasting influence on patterns of first union formation.

4.6 Conclusions and directions for future research

This paper extends previous research on first union formation in post-Soviet Central Asia (Dommaraju and Agadjanian 2008) by extending the period of analysis to the mid-2000s and, in including Tajikistan, extending the cross-country comparison to four of the five Central Asian republics. It finds that, while rates of first union formation peaked in the early 1990s, there was a sharp decrease in subsequent years – such that rates are considerably lower than in the 1980s. It also finds clear differences between the republics in terms of the extent of the decline. Tajikistan and Uzbekistan, which experienced the most severe declines in food security, have also seen the sharpest declines in first union formation. Indeed, Tajikistan, which had the highest rate in the late-Soviet period, had the lowest rate by the turn of the millennium, reflecting a collapse in rates of first union formation across age groups.

There are a number of interesting avenues for future research. First, while this paper has focused mainly on the importance of changes in food security for understanding changes in first union formation in Central Asia, the potential importance of ideational change and the spread of new opportunities for women could be explored in more detail, particularly for Kazakhstan and Kyrgyzstan. Second, as mentioned earlier, our understanding of trends in union formation would improve through research into the relationship with trends in international labour migration. Third,

[36] To illustrate, Mughal (2007:30) estimates that remittances sent by absent international migrants to families represented over a quarter of Tajikistan's Gross Domestic Product in 2004; globally, only in Tonga and Moldova do remittances make up a bigger share.

trends in first union formation for four of the five ex-Soviet Central Asian republics have been presented, but the picture would be completed by a study which examines recent changes in Turkmenistan. Fourth, the problem of food insecurity persists in Tajikistan, which has been identified by the United Nations as one of the 12 countries most severely affected by the recent increase in food prices (OCHA 2008). It will be interesting to see if this most recent period of food crisis has led to further declines in the rate of union formation.

5. Spousal separation, selectivity and contextual effects: exploring the relationship between international labour migration and fertility in post-Soviet Tajikistan

Abstract

This paper contributes to the sparse literature on the impact of temporary migration on fertility in origin areas. It examines the case of male labour migration from post-Soviet Tajikistan, a significant and relatively recent phenomenon. Fertility and migration models are solved simultaneously to account for cross-process correlation. There is clear evidence for a short-term disruptive effect of spousal separation, but it is too early to assess the implications for completed fertility. While there is no evidence for unobserved selectivity at the couple level, there is a significant positive correlation between the migration and fertility processes at the community level.

Keywords: labour migration, fertility, spousal separation, selectivity, multiprocess model, Tajikistan.

5.1 Introduction

This paper examines the relationship between men's temporary international labour migration from Tajikistan and their spouse's fertility. There is an established literature examining the links between spatial mobility and childbearing, including a number of papers in a recent special issue of *Demographic Research* (Volume 17). However, most of this research has tended to focus on the effects of long-term moves. As Lindstrom and Giorguli Saucedo (2002:1341) point out, 'the impact of temporary migration on fertility in origin areas has received little attention', despite the importance of this form of migration in many parts of the world. In Central Asia, as in parts of Eastern Europe, temporary international labour migration has become one of the defining features of the region's post-Soviet demography. In Tajikistan, this has been particularly significant: to illustrate, Mughal (2007:30) estimates that remittances sent by absent international migrants to families represented over a quarter of Tajikistan's Gross Domestic Product in 2004; globally, only in Tonga and Moldova do remittances make up a bigger share[37].

Most studies linking migration and childbearing have tended to treat one as an important 'parallel career' in shaping the other. Here, following Kulu and Milewski's (2007) advice, the approach is to examine the interdependencies between the two. Joint modelling of fertility and migration equations not only provides an estimate of the influence of spousal separation on fertility, but also some insight into the extent to which migrants are selected for unobserved characteristics associated with fertility.

5.2 Theory: temporary migration and childbearing

Four areas of the migration-fertility relationship are of particular relevance to the study of temporary migration and childbearing.

[37] According to a more recent estimate, remittances made up 46% of GDP in Tajikistan in 2008, a higher figure than for any other country (Ratha et al. 2008).

5.2.1 Disruption

The potentially disruptive influence of spousal separation on fertility is well recognised. Mathematical models have shown the potential for repeated seasonal migration to lower birth rates, analogous to reducing fecundability to a new lower constant level (Bongaarts and Potter 1979; Menken 1979). The 'efficiency' of spousal separation in reducing natural marital fertility is known to vary according to length of separation, length of postpartum amenorrhea and fecundability (Millman and Potter 1984). Meanwhile, we would expect the cumulative impact of spousal separation to be greatest in areas of relatively high fertility and low modern contraceptive prevalence. However, there have not been many empirical illustrations of the effect of separation on fertility in particular populations. At an aggregate level, van de Walle (1975) links the relatively low levels of marital fertility in nineteenth century Ticino, Switzerland to the regular seasonal pattern of male absence. Massey and Mullan (1984) use cross-sectional individual-level data from a rural town in Mexico to show that women with husbands absent through migration (leaving at some point between 1976 and 1978) were significantly less likely to have a child aged one or two (born in 1976 and 1977), while Chen et al. (1974) argue that monthly variation in the number of days males are absent partially explains the striking seasonal pattern in births found in Matlab, Bangladesh over the two-year observation period.

Empirical studies into the effect of separation are helpful in illustrating the impact on annual birth probabilities of a particular temporal pattern of male absence. They also provide insights into the possible longer-term implications of separation for fertility which purely mathematical studies, given the complexity of human behaviour, cannot. For example, as Millman and Potter (1984) acknowledge, their simulation does not allow for a potential increase in the frequency of intercourse after separation has ended, and therefore a higher post-reunion conception rate relative to a non-separation scenario, which might partially offset the effect of separation. It also does not allow for any dependency between the timing of separation and a woman's reproductive status. This may bias estimates of the impact of separation on fertility if, for example, in order to meet current income deficits the risk of migration increases following a birth. Overall, our understanding of the relationship between temporary migration and fertility would benefit from more empirical work to complement and inform

mathematical simulations – but such work has been limited, until recently, by a lack of individual-level data with information on both migration and fertility behaviour over time.

Lindstrom and Giorguli Saucedo's (2002; 2007) research into the interrelationships between Mexico-US migration and fertility is therefore particularly valuable. They use data from the Mexican Migration Project, containing retrospective migration and fertility histories for both Mexicans in the sending communities and those in the US areas in which they tend to settle. They show that, contrary to the independence assumption in Millman and Potter's (1984) simulations, the likelihood of husband's migration is greatest in the year during which a birth occurs, and in the years immediately following. They provide clear evidence of a disruptive effect on fertility: in the Mexico sample, spousal separation of 4-7 months lowers the odds of a birth in the subsequent year by 15%, while a separation of 8-12 months lowers the odds by 32%. Importantly, however, despite this short-term disruption, there is no evidence to suggest a significant effect of separation on cumulated fertility. Lindstrom and Giorguli Saucedo conclude that Mexican couples are able to make up for lost reproductive time following the periods of separation. The lack of impact on the total number of births also reflects the particular pattern of temporal absence: most separations are relatively short in duration and repeated long separations are unusual.

5.2.2 Adaptation/ assimilation

Much of the literature relating long-term migration to fertility behaviour evaluates the relative importance of socialisation and adaptation in a particular context. From the socialisation perspective, migrant fertility is heavily influenced by preferences and behaviour in the origin environment; in contrast, the adaptation/assimilation hypothesis argues that migrant fertility comes to resemble behaviour at the destination. Lindstrom and Giorguli Saucedo (2002) distinguish the importance of adaptation, rooted in economic theories of fertility stressing the role of income and the relative costs of and preferences for children in decisions regarding family size (Becker 1991), from that of assimilation, the gradual process in which migrants adopt the norms and cultural values of the population at destination. In the case of temporary migration, the former may influence behaviour during the temporary stay

within the different economic context at the destination, but the assimilation of values has the potential for a more long-lasting impact on fertility behaviour even after return to the origin environment. Indeed, they find evidence that, among couples in their Mexico sample and after controlling for the effects of separation, each additional year of women's cumulated US migration experience lowers the odds of a birth in a given year by 4%. Interestingly, any effect of men's cumulated migration experience on fertility is in the opposite direction. Therefore, to the extent to which the assimilation of cultural values serves to reduce the fertility of temporary migrants, it is specifically women's migration experience that seems to be significant.

5.2.3 Contextual influence of community migration patterns

According to the diffusion hypothesis, assimilated cultural values may not only influence individual couple's fertility, but also the behaviour of others in the area to which they return. This theory therefore highlights the 'contextual' influence of migration patterns within a community. The potential importance of diffusion increases with both migration prevalence and the length of history of the migration stream. Further, as Lindstrom and Giorguli Saucedo (2002) show, just as the gender composition is key to the assimilation process, so too it seems to play a key role in diffusion. They find that women living in Mexican communities with a high prevalence of female migration are significantly less likely to give birth in a given year, and have significantly fewer children, than those living in areas with a low female migration prevalence. On the other hand, those living in areas with a high prevalence of male migration are more likely to give birth in a given year after controlling for separation effects. Male migration, they argue, may actually serve to strengthen traditional family behaviour by providing extra income and hence both easing any economic pressures to forgo childbearing and reducing a woman's need to work outside the home. Similarly, Agadjanian et al (2008b) show that high community levels of male migration in rural Mozambique are associated with a higher probability of birth in a given year, and also speculate that migration's economic benefits might serve to strengthen the family system and the community's social fabric.

5.2.4 Selectivity

Importantly, migrants tend to be selected for certain characteristics associated with fertility. Even before long-term moves, migrant fertility behaviour often mimics the fertility behaviour of women in the migration destination (White et al. 1995; Chattopadhyay et al. 2006). A recent body of research illustrates how migration itself is often prompted by decisions connected with marriage and family building and that the tendency for women to have elevated first birth risks after internal migration should be understood within this context (Gabrielli et al. 2007; Milewski 2007; Nedoluzhko and Andersson 2007). While migrants may be selected for observed characteristics such as marital status, age and educational background, they may also differ in harder to measure characteristics including fertility preferences or openness to innovation (Lindstrom and Giorguli Saucedo 2002). Importantly, the potential direction of selectivity varies from place to place. On the one hand, migrants may possess motivational characteristics also associated with lower fertility, including a desire for social mobility; on the other, it might be the economically disadvantaged, with a propensity for high fertility, who are more predisposed to migrate (Singley and Landale 1997). Massey and Mullan's (1984) study of migration from Mexico provides an example of the former mode of selection. After controlling for the effects of separation, wives of legal migrants had significantly lower fertility compared to those married to illegal migrants. This they interpret as a reflection of differences of wealth and outlook between the two groups, with the wives of legal migrants having acquired a concept of upward mobility.

5.3 Context: fertility in, and labour migration from, Tajikistan

During Soviet times, Tajikistan had the highest fertility of all the Soviet republics, with census data showing the highest average annual rates of population growth in each of the periods 1959-1970, 1970-79 and 1979-1989 (Anderson and Silver 1989). Fertility peaked in the mid-1970s at 6.3 children per woman and subsequently started to decline, mirroring wider Soviet trends, reaching a figure of 5.04 by the time of independence in 1991 (TransMONEE 2006). Despite this decline, by the end of the Soviet era, Tajikistan was still regarded as 'pre-transitional' (Anichkin and Vishnevskii 1992:61). Central Asia had the highest fertility rates in the Soviet Union,

with Tajikistan showing the highest rates of all (Turner 1993) and the ideology of large families 'well established' among the local population (Harris 2002:219). In post-Soviet times, total fertility has continued to decline and was estimated at 3.96 for the 2000-02 period[38], but this remains the highest figure across the former Soviet Union. Modern contraceptive prevalence has increased but is still quite low, estimated at 30% of women in union in 1999 (Falkingham 2000), with use confined to women at higher ages and parities. Indeed, given both that the cumulative impact of spousal separation tends to be greatest in areas of relatively high fertility, and that labour migration from Tajikistan is significant, of the ex- socialist and Soviet states in Central Asia and Eastern Europe we might expect Tajikistan to show the most marked fertility response to temporary labour migration.

Recent labour migration should be distinguished from earlier migration movements. Tajikistan was affected by a huge wave of out-migration of the non-ethnically Tajik population in the years immediately preceding and subsequent to independence in 1991. The civil war in the early post-independence years led to the internal displacement of around 500,000-600,000 people, while an estimated 70,000-100,000 fled to Afghanistan (Foroughi 2002; Lynch 2002). Virtually all of these migrants had returned to their permanent place of residence by 1997 (Rowland 2005). But according to Olimova and Bosc (2003), it was not until the mid-1990s that economically-driven 'labour migration' started to emerge – and levels have probably been growing ever since. They estimate that in 26% of all households at least one household member had worked abroad at some point between 2000 and 2003. They identify several types of movement: traders who undertake short-term shuttle tours several times a year; seasonal workers, who return to Tajikistan each winter; and those who work abroad for several years at a time and visit their families infrequently. Both Olimova and Bosc (2003) and Mughal (2007) present data showing that the vast majority of migrants are men of working age who are working in Russia. Mughal argues that this represents a 'brawn' (rather than a 'brain') drain, given that only 7% of the migrants from his survey in the region of Khatlon had tertiary education, compared to around 20% of the working male population as a whole.

[38] This estimate is based on the author's calculations using the birth history component of the 2003 Tajikistan Living Standards Survey (TLSS).

The context of the labour migration process has implications for the nature of the migration-fertility relationship in Tajikistan. It is at this stage overwhelmingly sex selective, with very few women working abroad for significant periods and most men travelling alone[39]. The adaptation hypothesis, regarding a couple's fertility behaviour at destination, is therefore less relevant. Perhaps most importantly, and unlike some of the more established labour migration streams analysed in the literature, labour migration from Tajikistan is a relatively new, 'young', phenomenon. Methodologically, therefore, it would be difficult to investigate the effect of assimilation net of separation[40]. For these reasons, this paper focuses on examining the importance of the remaining areas – disruption, the contextual influence of community migration patterns, and selectivity – in the Tajik context. Disruption is expected to be an important short-term influence on fertility, particularly given the quite high levels of fertility and low modern contraceptive prevalence. Lindstrom and Giorguli Saucedo (2002; 2007) conclude that the effect of spousal separation on fertility in Mexico is temporary and couples are later able to make up for lost reproductive time; it will be interesting to see whether in Tajikistan, in the relatively short span of years analysed, the couples in which males have spent some time abroad have also been able to compensate for these periods of absence. In terms of contextual influences, since past studies have argued that its effects are strongest in places with a long history of migration and where there is a high prevalence of female migration, we would not expect to find strong evidence for diffusion in Tajikistan. Finally, given the tendency for labour migrants from Tajikistan to be relatively poorly educated, we might expect migrants to be selected for high fertility.

5.4 Data

[39] The TLSS survey data confirm that very few women migrate to work abroad. Of the 3,490 couples analysed, 546 men (15.7%) and 23 women (0.66%) had spent three months or more abroad between 1998 and 2003. Therefore, of those who had spent this amount of time abroad, just 4% were women.

[40] Lindstrom and Giorguli Saucedo (2002) use husband's total US experience, lagged by two years, as a measure of assimilation. This is in a context of a long history of Mexico-US migration; in the Tajik context, with limited potential for the accumulation of labour migration experience, any measure of assimilation is likely to be confounded with the potentially disruptive effect of separation and any 'catching up' in the conception rate following spousal reunion.

This study uses the 2003 Tajikistan Living Standards Survey (TLSS), part of the Living Standards Measurement Study (LSMS) household surveys project overseen by the World Bank. This was a nationally representative survey of 4,160 households across 208 primary sampling units ('communities'). The survey recorded complete birth histories for women aged 15-49 years, with exact dates of birth, together with the international migration history of each member of the household, providing a valuable chance to link fertility and migration behaviour. The migration history consists of the number of months an individual spent abroad in each of the years from 1998 to 2003 inclusive. A longer history would have been preferable, but given that labour migration is a very recent phenomenon – with movements only starting in the mid-1990s – the survey provides coverage of most of the years of labour migration up to the time of the survey. Pragmatically, too, since migration histories are likely to be recalled with less accuracy than birth histories, restricting retrospective questioning to the five years before the survey may minimise recall error. Importantly, migration histories were collected for each individual irrespective of whether they were currently residing in Tajikistan. If a particular member was currently abroad, another member of the household would provide the information on their behalf[41]. Since the focus here is the effect of labour migration on marital fertility, only married couples are included in the analysis. The spouse code in the survey roster was used to link the woman's fertility history with her spouse's migration history, creating a couple year dataset for the years 1998-2002 inclusive. The temporary international migration of the spouse was operationalised as a period of absence from the household, measured in months spent abroad in a given calendar year. Years before the couple were in union were excluded from analysis[42]. The analysed dataset contains 16,139 couple years to 3,490 couples across 208 communities.

[41] Migration histories were only collected for those listed as 'household members' on the household roster. The definition of a household member is not straightforward - and may well have been interpreted in different ways by different households. The potential omission of longer-term labour migrants, particularly if they have stopped sending remittances and failed to maintain contact with the household, is noted. Any such omissions would be expected to lead to an under-estimate of the influence of spousal separation on fertility.

[42] The woman's age x at the survey, and the woman's age at marriage y, are only measured in completed years. The woman's age at t years before the survey is calculated as x-t. Couple years were excluded from the analysis if $y>(x-t)$.

5.5 Method

Given the lack of empirical research on the impact of temporary migration on fertility in origin areas, this paper examines the relationship between men's international labour migration from Tajikistan and their spouse's fertility. The first step is to examine the potentially disruptive effect of male spousal absence on the odds of conception in a given year. Dates of birth are shifted back nine months to reflect the dates of conception leading to live births. The dependent variable in the fertility model is a binary variable y_{tjk} indicating whether couple j in community k conceived in year t. A multilevel discrete-time logistic regression model is fitted to allow for the hierarchical structure and to correct the estimated standard errors to allow for the clustering of observations at the couple and community level (Goldstein 2003). The model can be expressed as:

$$\log\left(\frac{p_{tjk}^{(y)}}{1-p_{tjk}^{(y)}}\right) = \beta_0^{(y)} + u_{jk}^{(y)} + v_k^{(y)} + \beta^{(y)} x_{tjk}^{(y)} + \gamma z_{tjk} \qquad (5.1)$$

where $p_{tjk}^{(y)}$ is the probability of a conception in a given year, z_{tjk} indicates spousal absence with coefficient γ, and $x_{tjk}^{(y)}$ represent a vector of controls with coefficients $\beta^{(y)}$. In this three-level framework, the intercept term is split into three components, reflecting the average intercept $\beta_0^{(y)}$, a couple-specific random effect $u_{jk}^{(y)}$ and a community-specific random effect $v_k^{(y)}$. The couple and community random effects are assumed to be normally distributed with mean 0 and variances $\sigma_{u(y)}^2$ and $\sigma_{v(y)}^2$. The baseline log-odds of conception is defined by the time since union (for conceptions leading to first births) or the time since the previous birth (for conceptions leading to higher order births). Apart from educational background, there are no controls for socio-economic status, which is likely to be correlated with both fertility and migration. The survey did collect a wealth of data on household income, consumption and expenditure, but these were not used as covariates since all relate to the period immediately preceding the survey only; Hoem and Kreyenfeld (2006a; 2006b) warn against an anticipatory approach which conditions on the future[43].

[43] Educational background is also only measured at the time of the survey but, since the vast majority of individuals in union have already completed their education, is included as a time-invariant control.

Given that migrants may be selected for certain unobserved characteristics associated with fertility, a multiprocess (or 'joint 'or 'simultaneous') model is also fitted to allow for the joint determination of fertility and migration processes. This approach has been recently used in the demographic literature to analyse correlated processes like childbearing and union dissolution (Steele et al. 2005; Leone and Hinde 2007), mobility and union dissolution (Boyle et al. 2008) and internal migration and fertility (Kulu 2008). To my knowledge, this is the first time it has been used to analyse the relationship between temporary international labour migration and fertility. An equation predicting spousal migration in a particular year, fitted simultaneously with equation (5.1), is given by:

$$\log\left(\frac{p_{tjk}^{(z)}}{1-p_{tjk}^{(z)}}\right) = \beta_0^{(z)} + u_{jk}^{(z)} + v_k^{(z)} + \beta^{(z)} x_{tjk}^{(z)} \qquad (5.2)$$

where $p_{tjk}^{(z)}$ is the probability of spousal absence in a given year and $x_{tjk}^{(z)}$ represent a vector of controls with coefficients $\beta^{(z)}$[44]. As with the equation for conceptions, the intercept term is split into three components - the average intercept $\beta_0^{(z)}$, a couple-specific random effect $u_{jk}^{(z)}$ and a community-specific random effect $v_k^{(z)}$. The model allows for selectivity at the couple and community levels by allowing for cross-process correlation between the random effects at these levels. Thus $(u_{jk}^{(y)}, u_{jk}^{(z)})$ and $(v_k^{(y)}, v_k^{(z)})$ are assumed to follow bivariate normal distributions:

$$\begin{bmatrix} u_{jk}^{(y)} \\ u_{jk}^{(z)} \end{bmatrix} \sim \mathrm{N}(0,\Omega_u) \;:\; \Omega_u = \begin{bmatrix} \sigma_{u(y)}^2 & \\ \sigma_{uyz} & \sigma_{u(z)}^2 \end{bmatrix}$$

$$\begin{bmatrix} v_k^{(y)} \\ v_k^{(z)} \end{bmatrix} \sim \mathrm{N}(0,\Omega_v) \;:\; \Omega_v = \begin{bmatrix} \sigma_{v(y)}^2 & \\ \sigma_{vyz} & \sigma_{v(z)}^2 \end{bmatrix}$$

[44] There are no controls for duration since previous migration because the 2003 TLSS data does not record information on migration before 1998. Since the migration information from 1998 - 2002 consists of the number of months of absence in each of the five years, rather than spells (start and end dates) of migration episodes, the data are organised by years within couples, rather than migration 'spells' within couples. Equation (5.2) therefore predicts the log odds of spousal absence through migration in a given year, rather than the log-odds of the hazard of migration at a given time since previous migration. Equation (5.1) similarly predicts the log-odds of conception in a given year, but a control for time since union/time since previous birth is included.

In this way, the extent to which male-migrant couples are selected for unobserved couple-level characteristics associated with fertility can be gauged by examining the direction and significance of the correlation (σ_{uyz}) between the u_{jk} terms in the two equations. Similarly, a significant covariance (σ_{vyz}) between the v_k terms may be interpreted as evidence for selectivity - this time at the community level. Alternatively, it may be indicative of the contextual influence of community migration patterns on fertility behaviour: a negative covariance, such that after controlling for covariates communities with a relatively high number of temporary migrants also have a relatively low number of conceptions, would be consistent with the diffusion hypothesis; a positive covariance would be consistent with the idea that migration's economic benefits can serve to strengthen the family system. Besides illustrating the importance of selectivity and possible contextual-level effects, the multiprocess model has the benefit of providing an estimate of the influence of spousal separation on fertility which is adjusted for selectivity bias at the couple and community levels.

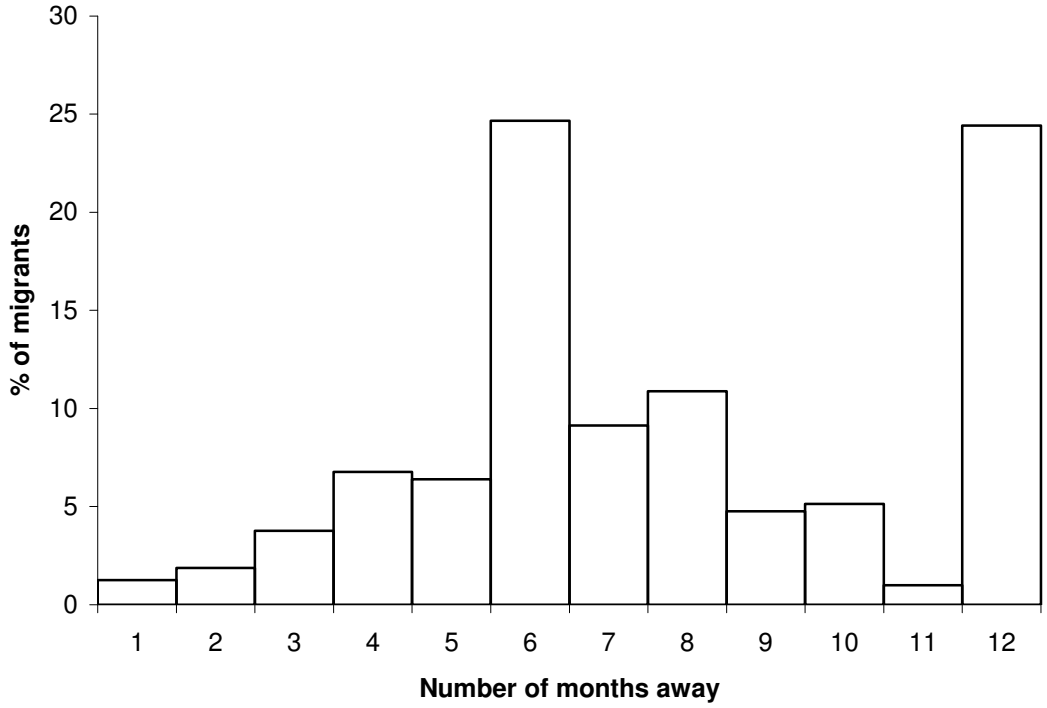
Identification of the multiprocess model is achieved through within-couple replication of conception and migration information across years. The model is therefore fitted under the assumption that all sources of correlation between the two processes are at the couple and community levels. Following Steele et al. (2004), it is fitted as a multilevel bivariate model by creating a dummy variable indicating the type of response to interact with the covariates of interest. In this case, therefore, for each couple year there are two responses (migration/conception). Estimation is through Markov Chain Monte Carlo (MCMC) methods, using MLwiN version 2.01 (Rasbash et al. 2004)[45]. Browne (2002) provides details of using MCMC methods in MLwiN.

[45] Initially, model parameters are estimated using quasi-likelihood methods. As Rasbash et al. (2004) explain, each binary response is transformed to a continuous linear model using a first order marginal quasi-likelihood (MQL) Taylor series approximation, and the model is then estimated using iterative generalised least squares. However, this method can produce estimates of the variance parameters for the random part of the model which are biased downwards. Therefore, Bayesian MCMC simulation-based methods are used, with the MQL estimates providing starting values. As Steele et al. (2005) explain, a chain of random draws is taken from the conditional distribution for each parameter, and a point estimate is obtained by taking the mean of the parameter values across all the chains. For the single process logistic models presented here, 80,000 chains are used, with the first 5,000 representing

5.6 Results

Of the 3490 couples studied, 394 (11.3%) male spouses lived abroad for at least one month during the period from 1998 to 2002. Of the 16,139 couple years analysed, in 788 (4.9%) of them the male spouse was abroad for at least one month in a given year. For these 4.9%, Figure 5.1 shows the distribution of months away. It is possible that there is some element of respondent digit preference ('rounding') for answers of six and 12 months. However, given the previous research of Olimova and Bosc (2003), the overall bimodal pattern probably reflects the real underlying distribution: a peak at six months reflecting seasonal workers, who return to Tajikistan each winter; and the peak at 12 months reflecting those who work abroad for several years at a time and visit their families relatively infrequently.

Figure 5.1 Number of months spent abroad by male spouse in years of labour migration



Source: author's analysis of Tajikistan Living Standards Survey (2003).

the 'burn-in' period in which draws are discarded before convergence is achieved; for the multiprocess model, 500,000 chains are used, with a burn-in of 20,000.

5.6.1 Disruption

Table 5.1 presents results from the single-process model examining the relationship between spousal absence and odds of conception in a given year. The categories chosen for the spousal absence variable reflect the nature of the distribution: months with sparse numbers are grouped together (one to five; seven to 11) while the peaks at six and 12 months have their own category. Since in Tajikistan the timing of first order conceptions is very strongly related to the timing of marriage, with a rapid progression from first marriage to first birth, separate models are fitted for first and higher order conceptions (Table 5.1). There is some evidence for a disruptive effect of spousal separation on fertility for childless women, with all durations of spousal absence showing a reduced odds of conception compared to the no-migration reference category. However, this effect is only significant for one of the categories (one to five months) and overall, given the relatively small number of cases in each category, there is a lack of statistical power to test for differences.

The model for higher order conceptions, benefiting from the pooling of cases across parities, provides a clearer picture. Interestingly, there is no evidence to suggest that periods of absence of up to six months in a given year, characteristic of seasonal migration movements, result in a reduced odds of conception - suggesting that in these instances couples are together long enough to make up for lost reproductive time. For absences of seven to 11 months, there is some evidence for a reduction in conceptions (p=0.11). For absences of 12 months in a given year, there is unambiguous evidence of a disruptive effect (p<0.01). Given that spousal absence was recorded in months only, that there are any conceptions at all in these latter instances may reflect the 'rounding-up' of responses of near-total annual absence when the spouse was in fact present for a period of some weeks. It may also reflect errors introduced by the assumption of a nine-month period of gestation when backdating the date of birth to the date of conception.

Table 5.1 Factors influencing odds of conception in a particular year: odds ratios from single process models for a) first conceptions b) higher order conceptions

N_a	N_b	**Variable**	**a. first conception**		**b. higher order conceptions**	
		Spousal absence in year (months)				
2072	*13280*	0	1		1	
16	*142*	1-5	0.31†	*0.690*	1.05	*0.213*
20	*175*	6	0.47	*0.715*	0.98	*0.246*
16	*226*	7-11	0.63	*0.715*	0.69	*0.226*
12	*180*	12	0.74	*0.737*	0.25**	*0.408*
		Controls (varying by year)				
		Female centred age[a]	0.86**	*0.034*	0.92**	*0.008*
		Female centred age squared[a]	0.99**	*0.002*	1.00**	*0.001*
		Parity[b]				
	2002	1	-		1	
	2800	2			0.72**	*0.075*
	2866	3			0.57**	*0.091*
	2535	4			0.51**	*0.109*
	1628	5			0.51**	*0.132*
	1106	6			0.47**	*0.166*
	1066	7+			0.71*	*0.171*
		Years since union[c]				
604		0	1		-	
481		1	0.99	*0.131*		
258		2	1.02	*0.165*		
137		3	0.55*	*0.233*		
98		4	0.47**	*0.283*		
555		5+	0.37**	*0.220*		
		Years since previous birth[d]				
	3001	<1	-		1	
	2661	1-2			1.13†	*0.068*
	3122	2-4			0.82**	*0.073*
	2406	4-7			0.62**	*0.096*
	2813	7+			0.46**	*0.132*
		Year				
450	*2519*	1998	1		1	
444	*2653*	1999	1.46*	*0.153*	1.16†	*0.077*
426	*2799*	2000	1.10	*0.161*	0.93	*0.081*
397	*2961*	2001	1.38*	*0.163*	1.04	*0.078*
419	*3071*	2002	0.78	*0.169*	0.69**	*0.085*
		Controls (time invariant)				
		Female highest educational level				
105	*442*	Missing/none/primary	1.06	*0.252*	1.02	*0.140*
410	*1520*	Secondary basic	1.05	*0.130*	1.01	*0.081*
1499	*11210*	Secondary complete	1		1	
122	*831*	Higher	0.55†	*0.316*	0.87	*0.132*

		Region				
563	*3789*	Khatlon	1		1	
227	*1710*	Dushanbe	1.66*	*0.258*	0.73**	*0.123*
383	*2646*	Regions of Republican Subordination	1.04	*0.160*	0.96	*0.079*
751	*4523*	Sogd	0.88	*0.137*	0.60**	*0.074*
212	*1335*	Gorno-Badakhshan	1.14	*0.213*	0.68**	*0.108*
		Type of Region				
1593	*9761*	Rural area	1		1	
543	*4242*	Urban area	1.06	*0.250*	0.80	*0.141*
		Proportion of households in community engaged in agriculture				
1588	*10075*	Most households	1		1	
235	*1287*	Only some	0.82	*0.250*	0.95	*0.148*
313	*2641*	None	0.71	*0.307*	1.11	*0.165*
		Constant (baseline)	-1.35**	*0.308*	-0.70**	*0.129*
		σ_u^2	0.007	*0.008*	0.002	*0.002*
		σ_v^2	0.008	*0.010*	0.019	*0.014*

†p<.10; * p<.05; **p<.01. Standard error in italics.
N gives the number of couple years in each category for categorical variables: N_a for the single process model; N_b for the multiprocess model.
a Mid-year age, in completed years.
b At beginning of the year.
c The difference between the woman's mid-year age and her age at first union (completed years only). Couple years before union are excluded from analysis.
d Time, at the beginning of the year, since the previous birth (includes fractions of a year).
Source: author's analysis of Tajikistan Living Standards Survey (2003).

A Poisson model was fitted to assess the cumulative impact of periods of spousal absence on the total number of conceptions over the period[46]. Table 5.2 presents the results. Over the five years considered, there is no evidence that women whose spouses were away for less than a year in total had fewer conceptions leading to live births than those whose spouses were present for the whole time. However, women whose spouses were away for a total period of between one and two years, or of more than two years, did have significantly fewer births. Of course, given the relatively short span of years analysed - and indeed the short history of labour migration from Tajikistan - it is too early to assess the implications for completed fertility. What is clear is the impact of spousal separation on cumulated fertility thus far; future research should examine whether these couples are able to compensate for these periods of absence in subsequent years.

[46]A negative binomial model was also fitted but the ancillary parameter α, an estimate of the degree of overdispersion, was not significant.

Table 5.2 Factors influencing total number of conceptions leading to live births, 1998-2002: parameter estimates from single process Poisson model

N	**Variable**		
	Cumulative number of months of spousal separation		
3096	0	(ref.)	
63	1-5	-0.04	*0.146*
142	6-11	0.09	*0.089*
100	12-23	-0.32*	*0.129*
89	24+	-0.21†	*0.132*
	Controls		
	Female centred age[a]	-0.08**	*0.006*
	Female centred age squared[a]	-0.01**	*0.001*
	Parity[b]		
971	0	(ref.)	
401	1	0.01	*0.064*
528	2	-0.12†	*0.070*
505	3	-0.22*	*0.084*
437	4	-0.27**	*0.102*
284	5	-0.20	*0.126*
189	6	-0.02	*0.152*
175	7+	0.39*	*0.166*
	Female highest educational level		
123	Missing/none/primary	0.04	*0.099*
443	Secondary basic	0.02	*0.058*
2723	Secondary complete		
201	Higher	-0.18†	*0.107*
	Region		
931	Khatlon	(ref.)	
410	Dushanbe	-0.14	*0.092*
661	Regions of Republican Subordination	-0.02	*0.056*
1156	Sogd	-0.34**	*0.051*
332	Gorno-Badakhshan	-0.29**	*0.079*
	Type of Region		
2469	Rural area	(ref.)	
1021	Urban area	-0.14	*0.102*
	Proportion of households in community engaged in agriculture		
2533	Most households	(ref.)	
331	Only some	-0.05	*0.105*
626	None	0.01	*0.119*
	Constant (baseline)	0.25**	*0.072*
	σ_v^2	<0.01	*0.058*

†p<.10; * p<.05; **p<.01. Standard error in italics.

N gives the number of couples in each category for categorical variables.

a Age at time of the survey (completed years).

b At beginning of 1998.

Source: author's analysis of Tajikistan Living Standards Survey (2003).

5.6.2 Selectivity and contextual influence of community migration patterns

Models presented thus far have been single-process; in other words, they fail to account for the possible selectivity of spousal migration status for unobserved characteristics associated with fertility. The results of the multiprocess model, which does account for unobserved heterogeneity by simultaneously fitting logistic equations for the migration and conception processes, are shown in Table 5.3[47]. Interestingly, there is no evidence for a selection effect at the couple level: σ_{uyz}, the correlation between the couple-dependent random effects in the conception and spousal separation equations is insignificant (p=0.36). In other words, after controlling for certain time-varying (including age, parity, years since previous conception and year) and time-constant (including educational background and region) variables, there is no evidence to suggest that there are unobserved factors that result in the selection of couples more or less likely to have children into spousal separation through male labour migration.

On the other hand, there is evidence for a significant positive correlation between the *community*-dependent random effects in the conception and spousal separation equations (σ_{vyz} = 0.16; p=0.076): after controlling for the observed covariates including the couple-level effect of separation, there is a tendency for communities with an above-average level of male migration to also have an above-average level of fertility.

[47] Here, given the small number of couple years at parity 0 in which spousal separation occurred, only the multiprocess model for higher order conceptions is considered. For simplicity, spousal separation is reduced to a binary variable (absent for 0-5 months/6-12 months), such that the spousal separation equation is a logistic model. Retaining the categories used in the single-process model in Table 1 would have required simultaneously fitting logistic (conception) and ordinal (spousal separation) equations, which cannot be accommodated in MLwiN.

Table 5.3 Factors influencing odds of conception in a particular year: odds ratios from single- and multiprocess model for higher-order conceptions

N	**Variable**	Single-process		Multiprocess[a]	
	Spousal absence in year (months)				
13421	0-5	1		1	
582	6-12	0.69*	*0.145*	0.62 **	*0.156*
	Controls (varying by year)				
	Female centred age[b]	0.92**	*0.008*	0.92**	*0.008*
	Female centred age squared[b]	1.00**	*0.001*	1.00**	*0.001*
	Parity[c]				
2002	1	1		1	
2800	2	0.72**	*0.075*	0.71**	*0.076*
2866	3	0.58**	*0.088*	0.57**	*0.090*
2535	4	0.51**	*0.106*	0.51**	*0.108*
1628	5	0.51**	*0.129*	0.51**	*0.132*
1106	6	0.47**	*0.162*	0.46**	*0.165*
1066	7+	0.71**	*0.168*	0.70**	*0.171*
	Years since previous birth[d]				
3001	<1	1		1	
2661	1-2	1.13†	*0.066*	1.13†	*0.067*
3122	2-4	0.82**	*0.072*	0.83**	*0.073*
2406	4-7	0.61**	*0.094*	0.62**	*0.095*
2813	7+	0.45**	*0.130*	0.46**	*0.131*
	Year				
2519	1998	1		1	
2653	1999	1.16†	*0.078*	1.16	*0.078*
2799	2000	0.93	*0.080*	0.93	*0.080*
2961	2001	1.04	*0.078*	1.04	*0.079*
3071	2002	0.69**	*0.084*	0.69**	*0.085*
	Controls (time invariant)				
	Female highest educational level				
442	Missing/none/primary	1.01	*0.139*	1.03	*0.142*
1520	Secondary basic	1.01	*0.081*	1.01	*0.083*
11210	Secondary complete	1		1	
831	Higher	0.87	*0.131*	0.87	*0.133*
	Region				
3789	Khatlon	1		1	
1710	Dushanbe	0.72**	*0.123*	0.72**	*0.128*
2646	Regions of Republican Subordination	0.97	*0.078*	0.98	*0.081*
4523	Sogd	0.61**	*0.073*	0.60**	*0.075*
1335	Gorno-Badakhshan	0.68**	*0.107*	0.67**	*0.110*
	Type of Region				
9761	Rural area	1		1	
4242	Urban area	0.81	*0.139*	0.81	*0.142*

	Proportion of households in community engaged in agriculture				
10075	Most households	1		1	
1287	Only some	0.94	*0.146*	0.94	*0.149*
2641	None	1.10	*0.160*	1.11	*0.165*
	Constant (baseline)	-0.706**	*0.124*	-0.714**	*0.126*
	$\sigma^2_{u(y)}$	0.004	*0.003*	0.046**	*0.010*
	$\sigma^2_{v(y)}$	0.019	*0.013*	0.022*	*0.011*
	$\sigma^2_{u(z)}$	14.88**	*2.576*	14.80**	*2.462*
	$\sigma^2_{v(z)}$	4.80**	*1.369*	4.376**	*1.239*
	σ_{uyz}			0.140	*0.154*
	σ_{vyz}			0.164†	*0.093*

†p<.10; * p<.05; **p<.01. Standard error in italics.
N gives the number of couple years in each category for categorical variables.
a The migration equation in the multiprocess model predicts the log-odds of the male spouse being absent for six months or more in a year. Controls are as for the fertility equation in the table above *except* male age and age squared, and male highest educational level, replace the female equivalents. Because the research focus is on fertility, the covariate coefficients for the migration equation are not presented.
b Mid-year age, in completed years.
c At beginning of the year.
d Time, at the beginning of the year, since the previous birth.
Source: author's analysis of Tajikistan Living Standards Survey (2003).

Therefore, there is certainly no evidence for the diffusion of assimilated cultural values relating to fertility – which would have predicted a negative community-level relationship between international migration and fertility. Instead, the results are consistent with those of Lindstrom and Giorguli Saucedo (2002) and Agadjanian et al (2008b). In both these studies a contextual community-level variable indicating the prevalence of male migration was significantly positively correlated with the odds of conception in a given year, after controlling for direct separation effects. Both studies suggest that the economic benefits of migration may serve to strengthen family systems within the community. However, the migration context in Tajikistan is very different to Mexico and Mozambique respectively. By the beginning of 2003, the end of the period analysed with the survey data, Tajik communities may have experienced international labour migration for a maximum of eight or nine years – compared to the communities in Mexico which have experienced labour migration for generations. It is unclear whether, over such a short period, the possible strengthening community-

level role of migration would have had time to take effect. In the Tajik case, therefore, the correlation between migration and fertility at the community level may be more likely to simply reflect selectivity, rather than the contextual influence of community migration patterns. It is possible, for example, that both migration and high fertility would be more prevalent in communities in the more remote mountainous areas; indeed, Olimova (2005) notes the connection between altitude and migration behaviour in Tajikistan.

Accounting for the positive correlation between community-level migration and fertility behaviour in a multiprocess model increases the size of the effect of spousal absence on the odds of conception in a given year: compared to an absence of 0-5 months, absence of 6-12 months is associated with a 38% decrease, rather than a 31% decrease, in the odds of conception (Table 5.3). Negative selection would have led to overestimation of the effect of spousal separation in the logistic and Poisson models presented in Tables 5.1 and 5.2. Instead, if anything these single-process models underestimate the disruptive influence of spousal separation on fertility.

5.7 Discussion and directions for future research

This paper adds to the very small number of studies examining the impact of temporary migration on fertility in origin areas using individual-level data. While past studies have tended to be based on data collected from a particular region within a country, this paper is able to make use of a nationally representative survey which had collected both birth and migration histories. Following Massey and Mullan (1984), Lindstrom and Giorguli Saucedo (2002; 2007) and Agadjanian (2008), it helps to illustrate the clear short-term disruptive influence of temporary migration and spousal separation on fertility. It finds no evidence for selectivity at the couple level after controlling for common covariates. However, it does find evidence for a positive correlation between the migration and fertility processes at the community level. Accounting for this correlation leads to an unbiased estimate of the effect of spousal separation on fertility, exemplifying the utility of a multiprocess approach.

The research does have its limitations. The multiprocess model allows for the possibility that unobserved time-invariant characteristics are correlated with both

migration and fertility but does not account for any changes in unobservables which affect both processes. Further, it does not accommodate possible reverse causation. A fully structural model, allowing for the effect of conception in a given year on spousal absence as well as vice versa, would require instruments related to one of the processes and not the other (Steele 2005). A further limitation is that the analysis is restricted to couples in union. Therefore, while the direct effect of male labour migration on marital fertility is considered, the possible impact on marriage itself is not. Harris (1998a) reports, of the Garmi villages in Khatlon, that 'the absence of young men of marriageable age has made it extremely difficult to find spouses for the girls and there are increasing numbers of unmarried girls aged 22 or 23 [which was previously unheard of]'. Future quantitative research on the gender imbalance-marriage link would provide further insights into how childbearing has been affected by male labour migration.

Since international labour migration from Tajikistan is a relatively recent phenomenon, its impact on completed fertility levels is not yet clear. Lindstrom and Giorguli Saucedo (2002; 2007) show that Mexican couples are able to make up for lost reproductive time following the periods of separation. In Tajikistan, we might expect the effect of separation on cumulated fertility evident in Table 5.2 to weaken as time progresses, allowing for periods of recuperation as spouses return after spells abroad. However, much depends on the future pattern of labour migration. In Mexico couples have been able to compensate for absence because the periods are relatively short in duration and repeated long separations are unusual. The long-term impact on fertility in Tajikistan may also be limited if seasonal migration comes to dominate international labour movements. However, Mughal (2007:84), examining statistics from the Russian border service, notes the increasing annual number of 'non-returnees' to Tajikistan, hinting at the consolidation of a trend towards longer-term stays and more permanent settlement in the last few years – which would be more likely to affect completed fertility levels. It will also be interesting to monitor the gender composition of labour migrants in future years. If women start to migrate in large numbers as well as men, the assimilation and diffusion of adopted cultural values relating to fertility behaviour may be expected to exert a downward influence on fertility to add to any longer-term impacts of disruption.

More generally, more research is needed on the relationship between migration and fertility in the post-socialist context. In both Central Asia and Eastern Europe, there have been striking changes in marital and fertility behaviour since the beginning of the 1990s, and new and significant international labour movements have emerged. Future work examining the links between these trends would be most welcome.

6. Conclusion

6.1 Understanding recent trends in marriage and fertility in Tajikistan

While there is an established literature on marriage and fertility change in post-socialist Central and Eastern Europe, there is comparatively little work on post-Soviet Central Asia. Least of all has been known about the nature of trends in post-Soviet Tajikistan – a republic potentially of particular interest since, of all the former ex-socialist and ex-Soviet states, it had the highest fertility at the time of independence and has experienced the most acute social and economic problems since then.

This thesis, in light of this research need, has aimed to describe and understand recent national-level trends in marriage and fertility in Tajikistan.

Chapter 2 established the nature of these trends. It showed that, in the early 1990s, total fertility decline was driven by a decline in higher-order fertility. From the mid-1990s, it was driven by declines in first-order fertility – in turn largely a reflection of a significant decline in the rate of first marriage. It also examined the nature of year-to-year fluctuations in marriage and fertility, noting the significant decreases associated with the periods of food crisis in 1995 and drought in 2000-01.

Given the particular importance of changes in marriage in Tajikistan, these were placed within a wider Central Asian context in Chapters 3 and 4. Chapter 3 documented the increase in the first marriage rate in Tajikistan during the transitional years immediately before and after the end of the Soviet Union in 1991. It showed that this increase, in common with other Central Asian republics, was most marked at younger ages. Chapter 4 examined the subsequent decrease in the rate of first marriage across the region. Chapter 2 had argued that changes in food security were key to understanding the decline in the marriage rate in Tajikistan. Chapter 4 extended this argument, noting that it was Tajikistan, which saw the most severe declines in food security, which also saw the biggest collapse in rates of first marriage.

Not only have the economic changes in the post-Soviet period had lasting implications for marriage behaviour, but also they have prompted new and significant international labour movements. In turn, as the couple-level analysis in chapter 5 shows, these movements have had a short-term disruptive effect on fertility – though it is too early to assess the implications for completed fertility levels. The chapter also illustrated a significant correlation between the fertility and migration processes, showing that communities with an above-average level of male migration also tend to have an above-average level of fertility after controlling for observed covariates.

6.2 Context and post-Soviet demographic change

This research serves to illustrate the importance of context to an understanding of post-Soviet demographic change. Each of the former Soviet Central Asian republics experienced a shrinkage of the national economy in the years after independence (TransMONEE 2006). But Tajikistan was particularly vulnerable to the changes associated with the end of the Soviet system: at the time of independence it was the most subsidised republic, receiving 47% of its total government revenues from Moscow, and it also had the highest inter-republic trade deficit (Foroughi 2002). The withdrawal of subsidies and disruption of trading relationships therefore contributed to acute post-independence economic decline in a republic which was already the poorest of the former Soviet states (Atkinson and Micklewright 1992:134). In particular, Tajikistan had been heavily reliant on imports for its grain supply, with the lowest local per capita grain production of any of the Central Asian republics. Therefore, while in each Central Asian republic the population experienced the removal of the three pillars of the former Soviet system - guaranteed employment, subsidised and stable pricing, and social benefits and services (Standing 1996:230) - it was in Tajikistan that the end to the assurance of minimum consumption levels was most acutely felt, reflected in a decrease in food security and an increase in undernourishment. The particularly sharp declines in rates of union formation in Tajikistan are consistent with the results of past studies documenting clear declines in nuptiality as a response to food insecurity (Lee 1981; Galloway 1988).

Meanwhile, the smaller declines in nuptiality in Kyrgyzstan and Kazakhstan, less reliant on subsidies and food imports at the time of independence, took place in a

context of relative food security. Increases in higher educational enrolment in these countries suggest that ideational changes may have played a more important role in post-Soviet changes in family formation than in Tajikistan. Overall, identifying a 'root cause' of demographic change in the region as the replacement of the Soviet regime by market economies in newly independent states (Frejka 2008) helpfully accommodates both ideational and economic explanations for recent demographic change - according to each republic's particular context. This perspective, while recognising the importance of particular periods of crisis to the pattern of demographic change in Tajikistan - as described in chapter 2 – also locates these particular periods within the longer-term transition from reliance on centrally-planned food imports to increased self-sufficiency and from subsidised to free-market pricing. This transition has seen the country as a whole, and individuals at the household level, become vulnerable to short-term periods of acute food shortage in the absence of guaranteed supplies provided by the Soviet state[48].

6.3 Implications for contraceptive policy in Tajikistan

Quantitative evidence provided in chapter 2 illustrates the robustness of higher order birth rates from the mid-1990s: despite annual fluctuations in the intervening period, the level of higher order childbearing in 2001 was similar to that in 1993 after controlling for compositional influences[49]. Importantly, this lack of decline in higher order fertility should be understood in the context of qualitative evidence for an unmet need for contraception (Harris 2002). Economic change has provided impetus for fertility decline. Women look back to the Soviet era with fondness, citing the security of people's lives, stable prices and higher material standard of living (Kanji 2002) - including a system of family benefits which had been among the most generous in the world, comprising payments for maternity leave, one-off birth payments, monthly

[48] A man interviewed in a report of the International Federation of Red Cross and Red Crescent Societies (2001) during the drought in 2001 pointed out the contrast with the Soviet era, when the 'state was able to help its people' during difficult times.

[49] The caveat noted in chapter 2 is repeated: since the analysis is restricted to women aged 34 and under, there could have been a significant reduction in fertility at higher ages which has remained undetected. Nevertheless, for the ages considered, it is clear that the decline in higher order conceptions to in the late 1980s and early 1990s has not been sustained.

child allowances and free pre-school and child care (World Bank 1993). Indeed, women in Khatlon, where Harris (1998a) carried out her research, use the Soviet period as a yardstick with which to compare their present difficulties. In particular, the post-independence period has brought 'a new awareness that couples simply cannot afford to have the same numbers of children as before. Previously, villagers did not think much about the number of children they wanted…or about controlling fertility.. today, however, increasing numbers of women realise they cannot manage to feed the children they have' (p.664-5). These women 'made it very clear that their major concern was control over their fertility' (Harris 1998b:200). Harris' (2002:221) judgement is that fertility would fall further if 'adequate' access to contraceptives could be supplied.

More widespread use of modern contraception has been hindered by three factors (Harris 1998a). First, affordability: although they have been supplied free of charge by the United Nations Population Fund, many clinics have charged for their provision. Second, medical staff's lack of encouragement for women to use them, partly a reflection of past Soviet-held opposition to their use, such that 'women are usually only offered contraceptives if they themselves find the clinic and then specifically ask for them' (Harris 1998a:665). Third, and related, is the relative lack of knowledge among the general population in the use of contraception (Harris 1998b). These factors help to explain why abortions have actually been on the increase among the Tajik population since independence, despite the costs involved (Harris 1998a:670).

This has important implications for Tajikistan's demographic policy. President Rakhmonov, concerned about the rate of population growth, has recognised the importance of reducing fertility (United Nations Office for the Coordination of Humanitarian Affairs 2003). Indeed, he has argued that rapid population growth had contributed to the impoverishment of the country (Davlatova 2002). In this respect the continued decline in total fertility from the mid-1990s is to be welcomed. But realisation that this has been largely driven by a reduction in first order fertility- in turn a function of declines in marriage rates - rather than by the decreases in higher birth rates seen in the early post-independence years, should provide further impetus to efforts to improve contraceptive education and availability. Legislation was passed in June 2002 aimed at encouraging the use of contraception. Subsequent surveys will

be needed to assess whether the increase in modern prevalence, from 27% in 2000 and 34% in 2005 according to the respective MICS surveys, has continued in the latter half of the decade.

6.4 Directions for future research

6.4.1 Extending existing themes

Individual chapters in the thesis have ended by describing how their particular research themes could be developed in the future. To summarise, research on trends in aggregate fertility and marriage rates would benefit from work further extending their spatial and temporal scope. An examination of recent demographic trends in Turkmenistan, the one Central Asian republic not considered here, would represent a valuable addition to the literature. Analysis of more recently collected survey data for Tajikistan would both help to corroborate the trends calculated in this thesis and to illustrate the nature of demographic change over the past few years. In particular, data from the 2007 Tajikistan Living Standards Survey will shortly become available. It will be interesting to note from these data whether higher order fertility has remained fairly robust to change or whether, consistent with the recent government drive to increase modern contraceptive prevalence, it has started to decline. Continuing to estimate trends in contraceptive prevalence using survey data is itself an important research need.

This thesis adopted a period perspective to the description and understanding of demographic trends – and provided evidence of a clear demographic response to period conditions. In contrast, a cohort series of marriage rates, arising as 'averages of (more fundamental) period movements' (Ní Bhrolcháin 1992:610), would have failed to identify the importance of the 1995 food crisis or the 2000-01 drought[50]. Future work, extending the spatial and temporal scope of the existing analysis, would benefit from retaining a period approach to measurement. It would also be helpful to

[50] The evidence for an age-period interaction effect, illustrating different impacts of particular periods on the rate of first marriage for different age groups of unmarried women, is also noted.

retain the focus on the study of the *macro-level* determinants of post-Soviet marriage and fertility change. As Ní Bhrolcháin (1992:607) has argued, macro-level determinants have been relatively neglected in the demographic literature.

6.4.2 Complementary qualitative insights

Given the lack of information on recent demographic change in Tajikistan, the thesis has focused on quantitative analysis to establish the nature of these trends. But further qualitative research would also add to our understanding. Harris (2002:224) advocates research into, for example, 'attitudes of different social groups towards ideal family size and the use of birth control' and 'who is responsible for decisions affecting the real numbers of children produced, and how these decisions are reached'. Given the particularly distinctive changes in the rate of first marriage in the late-Soviet and post-Soviet period, research which is able to probe in more detail how the decisions regarding union formation are made and how ceremonies are planned – and in particular how both of these aspects may be affected by periods of conspicuous consumption or of food scarcity - would be most valuable.

6.4.3 The social impact of demographic change

Illustration of the scale of post-Soviet demographic change in Tajikistan prompts interest in the social impacts of such changes. In particular, the marked decrease in the rate of union formation has potential implications for the welfare of women. Traditionally marriage in Tajikistan has been virtually universal, and this remained the case throughout the Soviet era. Following marriage, women become part of the husband's household. But the post-Soviet decrease in rates of first marriage will translate into a sharp increase in the proportion of women who remain never-married. Meanwhile women's chances of being financially independent are limited by the post-Soviet tendency for prioritising male education and an associated higher dropout of secondary education amongst girls (D'Hellencourt 2004) and by the concentration of women in poorly paid sectors including education and agriculture (Falkingham 2000; United Nations Development Programme 2000). Olimova and Bosc (2003:111) report that some women have resorted to becoming 'kept women' in order to survive: 'A young woman who is unable to marry and who has little chance of employment

becomes a burden to her family. If the family cannot afford to support her, paid cohabitation may be her only option'. Such arrangements, they point out, are often with young single male migrants who are at home in Tajikistan for a few months each year. There are also journalistic accounts of a strong increase in polygamy (Eshanova 2002; Greenberg 2006).

The extent of labour migration in Tajikistan, alluded to in chapter five, has social implications beyond contributing to gender imbalance in local marriage markets. Women have become increasingly relied upon for providing agricultural labour. Harris (2006:148) argues that the migration's sex-selective nature, leading to a sizeable pool of unmarried young women, plays a role in the growing instability of marriages such that 'if families do not like one *kelin* ['incomer'; term for the newly married wife in her husband's household] they can easily get another'. Meanwhile the composition of the family has changed, with a decrease in the number of nuclear families and an increase in female headship of households (Olimova and Bosc 2003), and there is concern about the impact of labour migration on family life, child discipline (Olimova and Bosc 2003) and children's educational enrolment and attendance (Clifford 2008).

Quantifying the extent of these social changes is not straightforward. None are recorded adequately in registration statistics: 'kept women' represent, by their very nature, unofficial and temporary partners; polygamy is illegal; and since the religious ceremony *nikoh* often remains unregistered as an official marriage, so the dissolutions of these unions are not recorded as 'divorces'. In addition, thus far survey birth and union history modules used in the country have not included questions to allow measurement of these phenomena. Specially designed survey questions may be required.

6.4.4 Demographic change in Central Asia

The collapse of socialism in Tajikistan has indeed provided 'rich material for an examination of the effects of dramatic sociopolitical and economic change on marital and fertility behaviour' (Agadjanian 1999:426). This research has illustrated significant change in marriage and fertility behaviour in Tajikistan – changes which

are distinctive in the context of the Soviet era, and in the context of post-Soviet changes in other Central Asian states. But, compared to the established literature on demographic change in post-socialist Europe, demographic change in Tajikistan specifically - and in Central Asia more widely - remains under-researched (Gentile 2007). Extending the spatial and temporal scope of this work, interweaving complementary qualitative insights and developing our understanding of the social implications of demographic change are challenging, yet potentially fruitful, avenues for future research.

Appendix: Tables

Table A1 Factors influencing odds of higher order conception in a particular month[1], Tajikistan 1989-2002

N	**Variable**	Odds ratio	
	Year		
18584	1989	1	
20542	1990	1.03	0.075
22405	1991	0.94	0.067
24049	1992	0.84*	0.060
25981	1993	0.71**	0.052
28002	1994	0.69**	0.052
30308	1995	0.76**	0.050
32379	1996	0.64**	0.046
33980	1997	0.69**	0.047
35812	1998	0.74**	0.047
37576	1999	0.69**	0.050
39648	2000	0.78**	0.057
41405	2001	0.65**	0.050
43029	2002	0.75**	0.054
	Parity		
83700	1	1	
99210	2	0.70**	*0.025*
88795	3	0.65**	*0.030*
75288	4	0.59**	*0.033*
46963	5	0.66**	*0.043*
29772	6	0.67**	*0.061*
26940	7+	0.94	*0.082*
	Years since previous live birth		
101683	<1	1	
97502	1-2	9.56**	*0.691*
109394	2-4	17.05**	*1.185*
72888	4-7	10.54**	*0.844*
69201	7+	5.44**	*0.559*
	age	1.23	*0.032*
	age_sq	1.00	*0.000*

1 For woman months at ages 15-34 inclusive. Woman months at parity 0 excluded.
†p<.10; * p<.05; **p<.01. Standard error in italics.
N gives the number of woman months in each category for categorical variables.
Source: author's analysis of TLSS (2003).

Table A2 Relative risks of first birth within union, Tajikistan 1986-2004[1]

Variable	Relative risk	
Year		
1986	1.08	*0.115*
1987	1.02	*0.129*
1988	1.07	*0.129*
1989	1	
1990	1.12	*0.121*
1991	1.00	*0.106*
1992	1.15	*0.115*
1993	0.97	*0.102*
1994	1.08	*0.111*
1995	1.14	*0.122*
1996	0.79*	*0.092*
1997	0.96	*0.106*
1998	1.15	*0.132*
1999	1.16	*0.131*
2000	1.16	*0.128*
2001	0.85	*0.100*
2002	1.11	*0.122*
2003	1.06	*0.109*
2004	1.06	*0.111*
Years since first union		
<1	1	
1-2	2.88**	*0.122*
2-3	1.72**	*0.121*
3-4	1.10	*0.111*
4-5	0.84	*0.114*
5+	0.26**	*0.034*
N_b	*4089*	
N_{wy}	*8687*	

1 For women aged 15-29 inclusive.

†p<.10; * p<.05; **p<.01. Standard error in italics.

N_b and N_{wy}: number of first births, and number of years of exposure, in total analysis period for sampled women.

Source: author's analysis of MICS (2005).

Table A3 Relative risks of first union, Tajikistan 1986-2004[1]

Variable	Relative risk	
Year		
1986	1.06	*0.136*
1987	0.95	*0.116*
1988	0.91	*0.095*
1989	1	
1990	1.30*	*0.148*
1991	1.14	*0.125*
1992	1.34*	*0.151*
1993	1.35**	*0.156*
1994	1.13	*0.120*
1995	0.79*	*0.086*
1996	0.79*	*0.090*
1997	0.90	*0.105*
1998	0.77*	*0.081*
1999	0.62**	*0.072*
2000	0.66**	*0.066*
2001	0.45**	*0.055*
2002	0.46**	*0.053*
2003	0.48**	*0.050*
2004	0.50**	*0.054*
Age group		
15-17	1	
18-20	4.97**	*0.264*
21-29	4.64**	*0.295*
N_u	*4506*	
N_{wy}	*38098*	

1 For women aged 15-29 inclusive.

†p<.10; * p<.05; **p<.01. Standard error in italics.

N_u and N_{wy}: number of first unions, and number of years of exposure, in total analysis period for sampled women.

Source: author's analysis of MICS (2005).

Table A4 Relative risks of first birth, Tajikistan 1986-2004[1]

Variable	Relative risk	
Year		
1986	1.18	*0.138*
1987	1.18	*0.161*
1988	1.09	*0.125*
1989	1	
1990	1.20†	*0.128*
1991	1.29*	*0.147*
1992	1.39**	*0.155*
1993	1.30*	*0.153*
1994	1.50**	*0.173*
1995	1.37**	*0.162*
1996	0.85	*0.110*
1997	0.95	*0.111*
1998	0.99	*0.120*
1999	0.95	*0.111*
2000	0.82†	*0.093*
2001	0.61**	*0.074*
2002	0.68**	*0.081*
2003	0.54**	*0.062*
2004	0.55**	*0.064*
Age group		
15-17	1	
18-20	12.45	*0.974*
21-29	18.55	*1.462*
N_b	*4412*	
N_{wy}	*45585*	

1 For women aged 15-29 inclusive.

†p<.10; * p<.05; **p<.01. Standard error in italics.

N_b and N_{wy}: number of first births, and number of years of exposure, in total analysis period for sampled women.

Source: author's analysis of MICS (2005).

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