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The Marriage Market and Tajik Armed Conflict¹

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Abstract

The study seeks to provide an empirical illustration of the demographic impact of the 1992-1998 armed conflict in Tajikistan by exploring the link between violent conflict and the marriage market for women. I assess the potential roles of exposure to armed conflict and sex ratios on female age at first marriage. I use individual-level data from the 2003 Tajik Living Standards Measurement Survey (TLSS), Tajik census population data and data on raion-level exposure to armed conflict. The results from the Cox proportional hazards models suggest that regional exposure to conflict during a woman's most marriageable years lower her risk of entering her first marriage by fourteen percentage points. These findings support the hypothesis that an economic crisis associated with armed conflict increases female age at first marriage.

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1. Introduction

Crises and civil wars inflict large burdens on countries' populations. War-related mortality and morbidity patterns (Hoeffler and Reynal-Querol 2003; Ghobarah et al.2003) and the relationship between violent conflict, child mortality and female reproductive behavior (Lindstrom and Berhanu 1999; McGinn 2000; Agadjanian and Prata, 2002; Hill 2004; Hoeffler and Reynal-Querol; Verwimp and van Bavel 2005) were addressed in past literature. This study seeks to provide a further empirical illustration of the demographic impact of armed conflict by exploring the link between violent conflict and the marriage market for women in the post-conflict Tajikistan. This paper also contributes to the studies on nuptuality and fertility in Central Asia (Agadjanian and Makarova 2003; Agadjanian et al. 2008; Clifford et al. 2010).

This paper combines a dataset on the events during the 1992-1998 armed conflict in Tajikistan with individual-level data from the 2003 Tajik Living Standards Measurement Survey (TLSS) conducted by the World Bank. The conflict data were collected by the author from the centrally published Tajik daily and weekly newspapers, reports on the status of human rights in Tajikistan and studies of the post-independence period by academics and non-governmental organizations. The 1990 and 2000 Tajik Census data were used to construct a sex ratio.

Tajikistan makes an interesting setting for such an investigation, as it is possible to exploit the difference in the regional and temporal impact of the 1992-98 conflict as an identification strategy as some regions were affected to a greater extent than others. The conflict imposed substantial human costs on the population of 6.4 million. About ten per cent was internally displaced. The casualties attributed to the first years of the conflict vary from 20,000 to 100,000. About 55,000 children lost their parents and 20,000 women lost their husbands

(Falkingham 2000).

To investigate the impact of the civil war in Tajikistan on women's entry into their first marriages, I estimated a set of Cox proportional-hazards models. I also estimated several parametric survival models to evaluate whether time has an impact on the risk of being married. The main covariate of interest in these models is an interaction term between being of marriageable age during the conflict and living in one of the more conflict affected regions. The most marriageable age is defined as having reached age 17 between 1992 and 2000. The results show that these women had a lower risk of being married at a given time than women who reached age 17 before the conflict started or after 2001. This effect is particularly pronounced for young women who also lived in the communities greater affected by the conflict. The results are robust to inclusion of additional covariates and alternative specifications of the model. All models include birth cohort fixed effects and the raion level random effects. The results from parametric models indicate the risk of entering their first marriage declines at an increasing rate for women from the war-cohort who also lived in the more affected regions.

This study is also one of the first to evaluate the impact of sex ratios on age when women first marry in a Central Asian context. The sex ratio of men to women, a variable that was shown to have a significant impact on the marriage market for women in India, U.S.A., China, and Malaysia, does not appear to have a consistent and significant effect on the risk of women's entry into their first marriages in Tajikistan which could be explained by the following. Firstly, sex ratios based on Census data have the crude temporal and spatial resolution. Secondly, families in Tajikistan often adhere to traditional marriage customs and arrange marriages for their children. Thus the region-specific sex ratio may not accurately define the real marriage pool

(Bushkov and Mikulskii 1997).

The rest of the paper is organized as follows. Section 2 discusses lessons from other countries and generates a set of hypotheses to be tested. It also outlines the Tajik traditions on the union formation. Section 3 describes the data. Section 4 discusses the conflict in Tajikistan, identification and empirical estimation. Section 5 summarizes findings and Section 6 concludes.

2. Lessons from other countries and background

2.1 Prior research and hypotheses generation

This section explores several competing but not unrelated theories to generate a set of hypotheses on the likely impacts of civil wars on the entry into marriage by women.

Economic shocks and the marriage market: Armed conflicts inevitably lead to a decrease in the resources available to many households for consumption. The effect of decrease in household resources on entry into marriage is not clear-cut.

First, if economic crises occur periodically, households may devise ex-ante strategies that would help them to smooth consumption over time. Marriage creates benefits due to specialization in labor and household production (Becker 1973). These benefits may become particularly valuable if marriage allows households to smooth consumption when there is insufficient or non-existent access to credit (Kotlikoff and Spivak 1981; Rosenzweig and Stark 1989). For example, marriage may be used to secure access to networks of well-to-do relatives who can provide assistance in the hard times. In some developing countries, poor families use unmarried daughters as assets and “cash them in” during the crisis (Hoogeveen et al. 2004). In Uzbekistan during the uncertain times of perestroika, a spike in early marriages was observed by

Agadjanian and Makarova (2003). Clifford et al. (2010) also observed a spike in marriages in Tajikistan in 1992-93, the first two years of the civil war.

Second, if real wages or labor opportunities for women decrease to a larger extent than those for men, labor specialization in home and market production may become increasingly important. In Indonesia, where economic crisis led to a drastic decline in female wages relative to male wages, women increased their entry into marriage (Rukumnuaykit 2003), especially in communities that were more hit by the crisis (Nobles and Bутtenheim 2006). My first hypothesis (H1) therefore is that an economic shock may increase the risk of entry into marriage by women.

However, entry into marriage may also be delayed during the crisis. For example, due to fewer economic and labor market opportunities, many families may not be able to afford the costs of ceremonies and dowries. In South India during the drought of 1980-83 the number of marriages declined by approximately fifteen per cent (Caldwell et al. 1986). In Latin America in 1920-90, during and right after economic downswings, marriages were also postponed but once recovery was underway the marriage rate was on the rise (Palloni et al. 1996).

Physical security concerns and marriage: Marital behavior may also be affected by societal conflict and instability. During the civil war in Tajikistan, rape and kidnapping of young women (so called “bride abductions”) were widespread (Tadjbakhsh 1994; U.S. Department of State 1994, 1997; Harris 2006: p. 83). Falkingham (2000) suggests that the war created a general feeling of insecurity and that during an extended period of violence in Tajikistan there was a spike in early marriages. Thus, my second hypothesis (H2) is that exposure to armed conflict and, thus, potential or real threats of violence, may expedite marriage for women as parents attempt to transfer the responsibility for safety of young girls to their new families

Marriage market equilibrium and sex ratios: Armed conflicts take a heavy toll on the population of men (Newth 1964; Das Gupta and Shuzhuo 1999; Roberts et al. 2004). Several studies show that the deficit of desirable marriage partners for men or women in the relevant age, ethnicity and locality groups may motivate changes in the societal family practices and marriage institutions (Becker 1973; Caldwell et al. 1983; Rao 1993; Greene and Rao 1994; Angrist 2002; Chiappori, Fortin and Lacroix 2002).

Following a large scale armed conflict, the age of entry into marriage may be affected in either direction. Many women may not be able to get married as early as prior to the war as fewer men are available and women have to spend more time searching for a suitable candidate. A steady supply of young brides who keep entering the marriage market may crowd out marriage opportunities for slightly older women and leave a higher proportion of such women unmarried. My third hypothesis (H3) is that an increase in the sex ratio of men to women in the appropriate marriage age group should increase the risk of women being married by increasing the availability of marriage partners and thus decreasing time spent looking for a suitable candidate. On another hand, this leads to a fourth hypothesis (H4), that an increase in the number of potential marriage partners may delay entry into marriage as more time is now spent by selecting a suitable candidate.

2.2 Family and Marriage in Tajikistan

Marriage remains a central part of Tajik culture and the majority of the population marries by age 30. At the time of engagement and marriage, families exchange a large number of gifts. Traditionally, the groom's family transfers a larger amount of wealth, or *kalym* (bride price), to the bride's family. A low *kalym* or gifts of poor quality may be used as an excuse to

break the engagement. Tajik women tend to marry at a younger age than Tajik men who often wait until they accumulate enough money for the marriage expenses and new family (Olimova and Bosc 2003).

Traditionally, in Tajik families, the mother of a young man who has reached the marriageable age and who is ready to get married financially sets out to search for a *kelin* (daughter-in-law) to suit her needs and preferences. The Tajik families for a long time preferred to marry children to their cousins (Kuz'menko 1991, Harris 2004: 105). It is also common to marry someone from the patriarchal community of blood relatives who have a common ancestor and common interests - *avlod* - especially if an *avlod* has a high social standing in the society (Bushkov and Mikulskii 1997). However, a marriage proposal may be extended to a bride from a less important *avlod* if a groom suffers from chronic health problems or has other less desirable characteristics. Once the pool of eligible cousins and distant relatives is exhausted, the search for a suitable marriage partner is conducted among family friends and acquaintances. At least 58.3 per cent of marriages are arranged by the parents (Bushkov and Mikulskii 1997).

The marriage ceremony is usually conducted by a civil servant at the local civil office or registry office also called ZAGS that stands for "Zapis Aktov Grazhdanskogo Sostoyaniya", an office that registers births, deaths and marriages. Tajik family law defines the age of consent as 17 years old for both men and women. The court can reduce the age at marriage by maximum one year at the written request of persons entering marriage (Semein'i'i kodeks 1998).

Since Tajikistan's independence in 1991 and the following civil war, one can observe an emergence of new Islamic trends and weakening of women's social and economic positions. Informal and polygamous marriage unions are becoming more common in Tajikistan as women

experience a shortage of men due to civil war and labor migration of men to the more affluent countries in the former Soviet Union region (Olimova and Bosc 2003). The *nikoh* ceremony, is not official. It does not provide spouses with legal and property rights in a case of divorce, but is often chosen for religious, economic and social reasons. Underage and polygamous marriages that are more common in the rural areas can only be “officiated” by *nikoh*.

3. Data

This study employs the household and individual data from the 2003 Tajik Living Standards Survey (TLSS 2003), conducted by the World Bank and the State Statistical Committee of Tajikistan. The survey contains data on 4,160 households with a total of 26,141 individuals in three *oblasts* (regions): Khatlon; Sugd and Raions of Republican Subordination (RRS), which includes the capital city Dushanbe; and one autonomous region – the Gorno-Badakshon Autonomous Oblast (GBAO). A two-stage random sampling process was used to draw the sample surveyed in each *oblast*. The sample was stratified according to *oblast* and urban/rural settlements.

The data on age at first marriage come from the female questionnaire of the survey, which was completed by women ages 15-49 as of 2003. The data on education, age, and other socio-demographic characteristics of all married and unmarried women were obtained from the main 2003 TLSS questionnaire. The results from the questionnaire contain extensive information on all household members who are eating and living under the same roof and who were not absent for more than 12 months from the household (Table 1). The analysis of entry into marriage is focused on the transition from the never married into a married state.

[Place Table 1 here]

The study draws on survey data the age at first marriage reported by women ages 15-49 as of 2003. The survey data are preferred to the vital registration data, as an increasing proportion of marriages in Tajikistan is officiated by a religious ceremony and is not recorded in the vital registration data but should appear in the survey data. The 2003 survey data have some drawbacks. They include an absence of the precise date of marriage (that should be available from the vital registration data), and an incomplete marriage history with respondents being asked only “How old were you when you first married?”. Since this study uses data on the age when women were first married, the absence of the marriage history data does not present a problem to the analysis. Further, age at first marriage is unlikely to be reported with a substantial error. First marriage is an important event in a woman’s life and since the respondents are relatively young - ages 15-49, they are likely to accurately recall their age at first marriage.

The two main independent variables of interest in this study are specific to region of residence and birth cohort. The first variable measures an individual’s exposure to the Tajik armed conflict of 1992-98 and proxies for two types of shocks. The first shock is of an economic character. The conflict variable is used as a proxy for this shock because there is no information on income and assets of the household of origin available for married women who typically reside with their in-laws. The second shock is a negative effect of the conflict on the household and individual’s physical security. The conflict variable is assigned to an individual woman based on her residence in the conflict-affected region (as defined below) after age twelve. It is equal to one if a woman lived in a region significantly affected by war at age twelve, and is equal to zero otherwise. The second variable is a period- and region-specific sex-ratio that serves as a

proxy for marriage squeeze and the availability of marriage partners. Both variables are described in more detail below.

3.1 Residence in the conflict affected region (RCA)

The residence in the conflict affected regions (RCA) variable stands for raion-level exposure to the economic and security shocks during the 1992-98 Tajik armed conflict. It is a dummy variable, where “1” indicates that raion was significantly affected by the conflict (45 per cent of raions in Tajikistan) and “0” stands for the lesser-affected district. The RCA variable does not vary by time. The 2003 TLSS includes data on 63 out of 69 territorial units. The units include five cities: Khujand, Taboshar, Kurgon-Teppa, Kulob, and Khorog; two hukumats, Kayrakkum and Chkalovsk; and 56 raions. The survey did not include data on raions of Tavildara, Taboshar, Kuhistoni-Mastchov, Baljuvon, Norak, and Khovaling. In the remainder of this paper I use “raion” to denote a territorial unit such as raion, city or hukumat.

The construction of the RCA variable is based on the events of the 1992-98 Tajik armed conflict, their geographical location, and impact as reported in two central newspapers published in Dushanbe, Tajikistan between 1991 and 1999. More detail on the construction of this variable is provided in Shemyakina (2011). One of the shortcomings of the RCA measure is that it may not include some regional units that were affected by the conflict but not reported in the news. This shortcoming is likely to lead to underestimation of the effects of the conflict as regions that were affected by war may be compared to the regions that may include raions that were affected in some way and raions that were not affected at all. Further, for the larger raions where only a part of the community was touched by the war and another was not affected as much, the use of

the RCA measure will lead to underestimation of the actual impacts of the conflict on population. Thus, the measurement error in this variable is likely to lead to an underestimation of the actual effects of the conflict.

To control for possible migration during the war, I matched the raion-level data on the residence of individuals during the conflict to the data on the raion-level conflict exposure. The 2003 TLSS has information on the district of origin only for those individuals who moved between 1990 and 2003. For such individuals, the raion of residence at age twelve or later was established from the individual's migration data. For those who reported to moved earlier than 1990, or never moved - the raion of residence in 2003 was recorded as a raion of residence at age twelve.

3.2 Measuring the marriage squeeze

A ratio of males to females in the prime marriage age groups was used by Akers (1967), Keeley (1979), and Greene and Rao (1995) to measure a disproportion between sexes.

To calculate raion-level sex ratios for Tajikistan, I used the 1989 and 2000 Tajik Census population data reported by raion, sex and age. The population aged 10 to 84 is split into five-year age categories. This is permanent population that includes those who are temporarily absent (Goskomstat 2002) and thus the sex ratio based on these data may not adequately capture the actual availability of marriage partners.

The 2003 TLSS data and Goskomstat (1990) reports of marriage registrations suggest that prime marriage age groups in Tajikistan are women ages 17-22 and men ages 18-27. However, the above mentioned five-year age intervals in Census data restrict me to using either five- or ten-year age groups for the construction of the sex ratios. Thus, the sex ratios used in this

paper correspond to the ten-year age groups such as men ages 20-29 and women ages 15-24 in 1989 and 2003 to ensure better coverage of potential marriage partners. For each point in time when a woman was at risk of being married, starting at age sixteen, she was assigned the closest period-specific sex ratio, in her respective raion of residence at age twelve (Appendix Table 1).

4. Estimation

4.1 Identification

To identify an individual's exposure to the war, I explored two sources of variation in the exposure to the armed conflict of 1992-98. The first source of variation comes from the regional differences in the extent and intensity of war-related events, such as the destruction of infrastructure and industries, the degree of fighting and displacement during the conflict. Most of the population displacement and deaths due to the fighting occurred during the first two years of the war. The intensity of fighting became much lower after the post-Communist Tajik government managed to take back power in late 1993. The violent events of 1992-93 were concentrated in Khatlon region, RRS and the capital of Tajikistan, Dushanbe. Other areas of the country, such as the northern region of Sugd and most of the territory of Gorno-Badakhshan, remained relatively unaffected by the major fighting. The variable reports of conflict activity (RCA) defined in Section 3.1 above controls for the regional exposure to conflict.

The second source of variation in the conflict exposure was determined by the timing of the individual's exposure to the civil war. Women that attained the prime marriage age before the conflict were likely to be affected by the war differently than the cohort of women who reached the prime marriage age during the conflict.

[Place Table 2 here]

Table 2 presents data on the proportion of twelve three-year birth cohorts of women born between 1954 and 1988 who were married by the end of 1991. Among the younger cohorts, 79.67 percent of women born in 1969-71 and less than 26 per cent of those born in 1972-74 were married by 1992. Further, less than one per cent of women born in 1975-77 and 1978-80 were married at the start of 1992. Thus the majority of women who were aged 12-20 at the start of the war in 1992 were not married. These women were of prime marriage age by 1992 or reached it between 1992 and 1998. Therefore, their marriage decisions and prospects may have been affected by the armed conflict of 1992-98 and, associated with this conflict, economic and social changes.

4.2 Methods

To examine the association between age at first marriage and exposure to the 1992-98 Tajik armed conflict, I estimated a Cox proportional-hazards (CPH) regression model. In this model, the duration time between the date of exposure to marriage and age at first marriage is measured in years. I assumed that women become exposed to the risk of being married at age 16 which is consistent with a legal minimum marriage age of 17 years old. For each year between age 16 and the reported age at first marriage, women contribute one observation to the analysis. Ever-married women exit the analysis when they enter their first marriages. For women who were never married at the time of the 2003 survey, the data are censored at the time of their interview. I assumed such censoring to be exogenous. Since the analysis is focused on women born in 1966-86, women born in 1966 would be exposed to the risk of marriage at age 16 in 1982. Thus the analysis is measuring entry into marriage over 1982-2003.

In line with the hypotheses formulated in Section 2, there are two main variables of

interest. The first one is the residence in the conflict-affected area that is used as a proxy for an economic hardship and exposure to violent events. As discussed in Section 2, economic hardship has an ambiguous effect on entry into marriage. First, grooms may postpone getting married because of high costs, leading to delayed marriage for women as well. Second, to accelerate marriage of women, families of brides may be willing to accept lower bride prices and settle for modest weddings. If both factors are equally important, then the combined effect of the conflict on entry into marriage may be small. If residence in the conflict affected area is used a proxy for an exposure to physical harm with a greater risk for unmarried females, women in such regions may enter marriage at a faster rate than women from more stable locations.

The second variable of interest is the sex ratio of men to women. Again, in line with hypotheses presented in Section 2, an increase in the sex ratio can have either increase or decrease the risk of being married at a given time.

The difference-in-differences approach was used to compare the risk of being married for women who entered marriageable age during the period of the conflict with that of women who were either already married by 1992 or who reached marriageable age after the end of the conflict in 1998. This approach allowed me to control for the pre-war differences in characteristics that vary across regions affected by the conflict severely and regions that were affected to a lesser extent. Such characteristics might be related to the conflict and also to entrance into marriage. The benefit of the differences in differences approach is the opportunity to identify the group that was exposed to the conflict both at the place of their residence and at the age when they were most likely to get married. Equation 1 below presents a basic statistical framework for the empirical analysis.

$$\ln \lambda_{ijk}(t) = \ln \lambda_0(t) + \beta_{1k} + \eta P_j + (P_j \text{ war cohort}) \gamma + \delta X_i + \mu C_{jk} + \nu_j + \varepsilon_{ijk} \quad (1)$$

where λ_{ijk} is a hazard rate. Subscripts on the dependent variable denote individual i residing in the district j and who was born in year k . β_{1k} is a cohort of birth fixed effect. P_j is the region-specific conflict intensity that is equal to one for all women who lived in the conflict-affected region at or after age twelve. The conflict intensity measure is not time-varying. The estimated coefficient on P_j is the difference in the risk of being married between women who lived in the conflict-affected region at or after age twelve and women who lived in the lesser-affected regions. ‘*war cohort*’ is a dummy variable indicating whether individual i belongs to the cohort that was in the prime marriageable age category during the conflict (born in 1975-83). The interaction between P_j and “war cohort” captures women who were of most marriageable age during the war and also resided in the region that was more exposed to conflict. Thus, the estimated coefficient on this interaction term is the difference in the risk of being married for the cohort born in 1975-83 in the conflict affected region as compared to the same cohort who lived in the lesser affected region during the war. X_i is a set of individual characteristics, e.g. education level. C_{jk} is a set of regional characteristics that are specific to a birth cohort. ν_j is a district specific random effect. The raion-specific random effects do not correct for any possible correlation between the error term and the right-hand side variables. The random effects are assumed to follow a gamma distribution. The variance θ is estimated from the data and measures variability of the random effects among groups of observations (Cleves et al. 2004).

If the estimated coefficient γ is equal to zero, then exposure to conflict during one’s most marriageable age does not have a significant impact on the entry into marriage, then the hypotheses H1 and H2 defined in section 2.1 are not correct. If the estimated coefficient on the

sex ratio variable is not statistically different from zero, then the sex ratio has no impact on the age when women first marry in Tajikistan and both, H3 and H4 do not hold.

The correct estimation of Equation 1 is based on two assumptions. First, if in the absence of conflict, the marriage trends in all regions of Tajikistan would be similar to each other. Thus, if there were no civil war, the estimation assumes that the cohorts that were of marriageable age during the war (“war-cohort”) would have been on the same trend with respect to marriage as compared to the pre-war cohort. Second, I assume that there are no omitted time-varying and region specific effects correlated with the regional conflict measures. If there are some factors that are peculiar to particular regions for example, if the regions that suffered to a greater extent from the conflict were also more hit by the economic crisis due to independence achieved by Tajikistan in 1991, I might be mistakenly attributing the effect of economic crisis to the effect of armed conflict. Due to limited data, it is hard to disentangle the effects of the economic crisis and the war. Further, if the economic decline was more pronounced in the regions more affected by war and economic decline decreases (increases) risk of marriage, then estimated coefficient on the interaction term of interest will be higher (lower) in absolute value and thus, I will overestimate (overestimate) the impact of exposure to conflict on the risk of being married. Inclusion of raion-level controls should partially correct this problem.

To estimate parameters in equation (1), I use the sample of women, born between 1966 and 1986 (ages 17-37 in 2003). This sample is divided into two groups - the treatment and comparison groups.

The individuals who turned 17 years old in 1992-2000 and who lived in the conflict-affected areas comprise the treatment group (“war-cohort”). Based on their year of birth, those

women reached an age when they could officially marry during or immediately after the Tajik civil war. Thus those women were significantly exposed to the economic and demographic shocks associated with the conflict.

The comparison group consists of individuals whose marriage prospects should not have been significantly affected by the conflict either due to their age as they were supposed to be married by the start of the war or later or because they lived in the lesser-affected regions. Thus, the control group includes two subgroups. The first subgroup includes individuals who were born in 1966-74 and 1984-86. This older cohort was likely to be married before the start of the conflict in 1992 and their marriage prospects should not have been affected by the conflict. The second subgroup is matched by age to the treatment group. It contains individuals born in 1975-83 who lived in the regions lesser affected by conflict.

In the regression analysis that follows in Section 5, I also control for women's education and their cohort of birth. The education level is potentially endogenous to marriage as the marriage hazard increases significantly upon completion of education, especially for younger people (Winship 1986; Brien and Lillard 1994). To tackle this potential endogeneity of education to marriage, I use completion of mandatory nine grades of schooling as an indicator for the education level. Assuming an individual does not repeat grades and enters school at age seven, nine grades of education should be completed prior to an individual reaching the official marriage age of 17 years. However, attainment of nine grades of schooling was found to be negatively associated with the armed conflict in Tajikistan (Shemyakina 2011) and thus this variable is included only in some of the models.

While the marriage age data is available on women ages 15-49 in 2003, the analysis is

focused on women born in 1966-86, i.e. women who were aged 17 to 37 in 2003. Women ages 15 and 16 in 2003 are excluded from the analysis, as they were too young to be married at this time. Women born in 1954-65 in 2003 are also excluded, as they are less comparable to the cohorts of interest.

5. Results

5.1 Descriptive analysis of entry into first marriages

Table 3 presents the cumulative probability of being married by age 16, 17, 18, 20, and 23 by three-year birth cohort for women born in 1954-86. Note that younger women, born in 1981-86, would not have been exposed to the possibility of being married by age 23 in 2003 and some of those born in 1984-86 were not exposed to being married at age 20. Note that for the younger cohort, those born in 1975-83, we observe a 4.6 percentage point increase in the proportion of the cohort married by age 17. This cohort of women was also about two percentage points more likely to be married by age sixteen than the preceding cohorts.

[Place Table 3 here]

The proportion of women married by age 18 increased by six percentage points for the cohort born in 1975-77 as compared to women in the preceding and following birth cohorts. This cohort turned 18 during the first harsh years of the Tajik civil war. Thus, this increase in early marriages suggests that some families rushed to marry their daughters. Starting with the cohorts born in 1972-74, we observe a gradual decline in the proportion of women married by age 20 as compared to the older cohorts. The proportion of women not married by age 23, the age at which an unmarried girl is considered a spinster in Tajikistan, is notably higher among younger cohorts.

To test whether women from the more conflict-affected regions were more likely to get

married at an earlier age as compared to women from the lesser-affected regions, I estimated a set of linear probability models where the dependent variable is a dummy variable equal to one if a woman was married by age 17 or 18 and the independent variables are the same as in Equation 1 (Appendix Table 2). The regression results indicate that early marriages among these born in 1975-77, 1978-80 and 1981-83 were observed not only in the more conflict-affected regions (Appendix Table 2).

5.2 Marriage hazard analysis

I continue with the semi-parametric analysis and estimate Cox survival models to examine how the estimated association between exposure to conflict and age at first marriage is affected when other confounding factors are introduced to the analysis. The hazard analysis is suitable for the duration data, such as time to marriage, as it accounts for censoring of the observations and exit of individuals from the analysis upon marriage at different age. The hazard is the probability of an instantaneous risk of an event.

The results from Cox regressions are presented in Table 4. The estimated coefficients are presented in the exponential form (hazard ratios). Hazard ratios represent the effect a covariate has on an underlying hazard “as estimated by regression models which treat the logarithm of the hazard rate as a function of a baseline hazard, $h_0(t)$ ” (Duerden n.d.: p. 2). If an estimated hazard ratio for an independent variable x is greater (less) than one, it indicates that an increase in this variable increases (lowers) the risk of being married at a given time. If the estimated hazard ratio for a covariate is equal to one, then this variable has no effect on time to first marriage.

[Place Table 4 here]

The main variable(s) of interest is the interaction between being of the prime marriage

age (born in 1975-83) during the war and living in the conflict-affected region. All regressions in Columns 1-3 include birth cohort dummies and the interactive term. Column 2 adjusts for the completion of nine grades of education plus the Column 1 variables; Column 3 adjusts for the cohort and period specific measure of marriage squeeze in the region of residence. This design enabled me to examine how each covariate modifies the estimates of the effects of being exposed to the armed conflict during the marriageable years and thus allowed me to test the robustness of the estimates found in Column 1 when other relevant covariates are introduced in the analysis. In Columns 4-6, I expanded the set of interactive terms and the set of cohort terms by replacing a single interactive term with three interactive terms between exposure to conflict and a dummy term for belonging to one of the cohorts born in 1975-77, 1978-80 or 1981-83.

Interaction terms. Column 1 of Table 4 reports regression results that include an interaction term that is constructed by multiplying the dummy variable for being born in 1975-83 by the dummy indicating that an individual lived in the region affected by the more conflict affected region ((Born in 1975-83)* RCA). The estimated hazard ratio indicates that women who were of marriageable age and lived in the more conflict-affected region (interaction term) had about fifteen percentage points (significant at 5 per cent level) lower risk of entering marriage at a given time than women born in 1975-83, who lived in the regions lesser affected by the conflict. The coefficients on the interaction term remain statistically robust and stable once other individual and regional controls are added to the regressions. The regression results that include a set of interactive terms between the three cohorts constituting cohort born in 1975-83 and the regional exposure to conflict (Column 4) point in the same direction as results in Column 1, suggesting that individuals from these younger birth cohorts who lived in the more affected

regions have a lower risk of being married at a given time than the control group. The estimated coefficients on the interactive terms are statistically significant for cohorts born in 1975-78 and 1981-83.

Residence in the conflict affected area. Women's residence in the conflict-affected area (Table 4) increases her risk of being married at a given time. The estimated coefficient is not statistically significant in any of the regressions, indicating that residence in the conflict affected area by itself is not associated with a higher risk of being married at a given time.

Birth cohort effects. The estimated effect of the time trend on entry into marriage is significant assuming either linear (including a control for the birth year only, results not reported) or non-linear (one cohort dummy) effects (Column 1). Further, the estimated coefficients on birth cohort dummies are significantly different from each other for the cohorts born in 1975-86. As expected, the coefficients follow a downward pattern where the older birth cohorts are more likely to be married as compared to the younger birth cohorts in this analysis (results not reported).

Education. The estimated hazard rate for "completed nine grades of education" dummy variable indicates a positive effect of education on entry into marriage (significant at 10 per cent level) (Column 3). This unexpected result could be explained by the correlation between conflict exposure and being of school age during the war (born in 1976-86) and educational attainment established by Shemyakina (2011).

Sex Ratio. The estimated hazard rate associated with the Sex Ratio variable suggests that an increase in the sex ratio increases the risk of entering marriage at any given time (Column 3) (not statistically significant). In Column 6, however, the effect of sex ratio is reversed and is

statistically significant. I assume that this result is related to the way the sex ratio was assigned to each cohort/region and the inclusion of individual cohort terms in the regression as reported in Column 6. Further, the sex ratio variable is based on the 1989 and 2000 Tajik Census data. These data allow only for a crude temporal resolution where all born in 1966-74 are assigned the sex ratio based on the 1989 data and those born in 1975-86 are assigned the ratio based on the 2000 Census data. Since, no other reliable sources of raion-level data are available; this sex ratio provides us with the best possible approximation at the regional level, but not necessarily at the temporal level. The crude temporal approximation of the sex ratio should be taken into account, as the ratio may not adequately measure the relevant pool of marriageable partners for all individuals.

The Cox regression model assumes that time has no impact on the covariates or on the underlying hazard function. In the analysis that follows I explore the effect of time to failure on entry into first marriage by women. It is natural to assume that as women approach their most marriageable age the risk of being married first increases and then decreases. Thus, the risk of getting married would increase as women approach their prime marriageable age, which in Tajikistan would be age 19, and after that the risk of being married would be decreasing.

Robustness checks

In this subsection, I compare the regression results from three models: (i) the semi-parametric model (Cox regression) (as in Table 4, Column 1) and two parametric models: (ii) the Weibull parametric model and (iii) the accelerated time-failure model (ATF). The Weibull parameterization allows us to assume that the estimated baseline hazard increases at an increasing rate and time to failure follows a Weibull distribution. The ATF model assumes that

the effect of a covariate is to multiply the predicted event time by a constant which is equal to the estimated coefficient on the covariate. The ATF model employs log-time parameterization of time to failure using Weibull distribution (Cleves et al. 2004).

All regressions are estimated with raion-level random effects. The estimated coefficients on the main variable of interest, the interaction between the residence in the conflict-affected area and being from a young cohort and more affected cohort (born in 1975-83) in the parametric model (Table 5, Column 2), confirm the findings from the Cox regression. Individuals from the more conflict affected region and from the more affected cohort have 18 percentage points lower risk of being married at a certain time as compared to individuals from the same cohort who lived in the lesser-affected region.

[Place Table 5 here]

The results of the ATF model (Table 5, Column 3) show that one unit increase in the interaction term delays the predicted time to failure for a subject. E.g. for a subject predicted to fail at $t=1$, this one unit increase would delay the predicted time of failure to $\exp\{\ln(1)+0.1282592\} = 1.137$. For a subject predicted to fail at time $t=3$, the one unit increase in x would cause the time to failure be equal to $\exp\{\ln(3)+0.1282592\}=3.411$, or that the marginal effect of a one unit increase in the x variable (the interactive term) accelerated with the passage of time. This result is consistent with a hypothesis where men of marriageable age prefer to get married to younger women, as women in the affected regions grow older, their chances of getting married decrease at an increasing rate.

6. Concluding remarks

This paper explored the effect of the temporal and spatial exposure to the 1992-98 armed conflict

in Tajikistan and the cohort and region specific sex ratios on the age at first marriage for women.

The analysis indicates that women born in 1975-83, who also lived in the conflict-affected areas, were about 13 percentage points lower risk to enter their first marriage at a given time than women of the same age who were not exposed to the conflict. One of the explanations for the delay of marriages for younger cohorts in the conflict-affected regions is that households affected by civil war and economic crisis were conserving their scarce resources by postponing marriages and celebrations. Those results are robust to inclusion of birth cohort and individual controls. Also women from the younger war-affected cohort had lower risk of entering their first marriage at a given time than women from the older cohort. The delayed marriage for the younger cohort in Tajikistan may indicate an overall trend in an increasing age at first marriage. The sex ratio that was shown to have a significant effect on age when women first marry in other countries does appear to have a strong consistent effect on the risk of entering their first marriage for women in Tajikistan. The results from the parametric hazard models indicate that the risk of entering their first marriage declines at an increasing rate for the war-affected cohort in the more conflict-affected regions.

The analysis has several limitations. One limitation is the lack of data on the household of origin for women. If we had data on the pre-war wealth of the household of origin, we would be able to differentiate by income the marriage market behavior of women in response to the economic crisis. The second limitation is the limited temporal resolution of the sex ratio use in the study. The sex ratio is based on the Census data and, as discussed earlier, is limited in temporal coverage to 1989 and 2000. Thus, the results should be interpreted with caution. The third limitation is that it is difficult to disentangle the relative importance of the impact of

economic crisis in Tajikistan that occurred because of the breakdown of the Soviet Union and the economic crisis that could be attributed to the effect of the war. However, since almost 100 per cent of industry in the south was destroyed vs. 80 per cent destruction for the whole country, the estimates in this study point towards a greater detrimental impact of the armed conflict as compared to the impact of economic crisis alone (Nezavisimaja Gazeta, December 23, 1992 (as quoted in Fridman, 1994)).

Assuming that exposure to armed conflict measures the economic hardship of the families, the estimated effects of war on the marriage market for women in Tajikistan are similar to those in other countries affected by economic crises, for example, see Palloni et al. (1996).

In Tajikistan women have their first child very soon after marriage (Shemyakina 2007). Therefore, delaying marriage by a few years may lead to a decrease in infant mortality and total fertility rates – a positive outcome for Tajikistan, which has high rates of both. However, the observed decrease in the risk of marriage for women also points towards a longer period of time women now have to rely on resources of their natal families or on their own ability to provide for themselves. While the Tajik or any other government is limited in its ability to influence family practices, import men of marriageable age, or provide funds for establishment of new households and subsidize wedding expenses; the government can focus on policies that promote education of and employment for women. These strategies should help young women to reduce their dependence on the income of their parents, husbands or brothers and thus improve their status in society. Access to employment and education may deter young unmarried women from entering into less desirable polygamous and informal marriages under the pressure from their families and from dropping out of school at an early age.

References

- Agadjanian, Victor and Ndola Prata. "War, Peace, and Fertility in Angola." *Demography*, 2002, 39(2), pp. 215-31.
- Agadjanian, Victor and Ekaterina Makarova. "From Soviet Modernization to Post-Soviet Transformation: Understanding Marriage and Fertility Dynamics in Uzbekistan." *Development and Change*, 2003, 34(3), pp. 447-73.
- Agadjanian, Victor; Premchand Dommaraju and Jennifer E. Glick. "Reproduction in Upheaval: Ethnic-Specific Fertility Responses to Societal Turbulence in Kazakhstan." *Population Studies*, 2008, 62(2), pp. 211-33.
- Akers, Donald S. "On Measuring the Marriage Squeeze." *Demography*, 1967, 4, pp. 907-24.
- Angrist, Joshua. "How Do Sex Ratios Affect Marriage and Labor Markets? Evidence from America's Second Generation." *Quarterly Journal of Economics*, August 2002, pp. 997-1038.
- Becker, Gary. "A Theory of Marriage: Part I." *Journal of Political Economy*, 1973, Vol. 81 (4), pp. 813-846.
- Brien, Michael J.; Lee A. Lillard. "Education, Marriage and First Conception in Malaysia", *Journal of Human Resources*, Vol. 29, No. 4 (Autumn, 1994), pp. 1167-1204.
- Bushkov, V.I. and D.V. Mikulskii. *Anatomiia Grazhdanskoi Voiny V Tadzhikistane: Etno-Sotsial'nye Protsessy I Politicheskaia Bor'ba, 1992-1996*. [The Anatomy of the Civil War in Tajikistan: Ethnic and Social Processes and Political Struggle, 1992-1996]. Moscow: Institut etnologii i antropologii im. Miklukho-Maklaia RAN [Institute of ethnic studies and anthropology named after Mikluho-Maklai.] Russian Academy of Sciences. 1997.
- Caldwell, John C.; Reddy, Palli Hanumantha and Caldwell, Pat. "The Causes of Marriage

- Change in South India." *Population Studies*, 1983, 37(3): 343-361.
- Caldwell, John C.; P.H. Reddy; Pat Caldwell. "Periodic High Risk as a Cause of Fertility Decline in a Changing Rural Environment: Survival Strategies in the 1980-1983 South Indian Drought." *Economic Development and Cultural Change*, 1986, 34(4), pp. 677-701.
- Cleves, Mario, William Gould, and Roberto Gutierrez. *An Introduction to Survival Analysis Using Stata*. College Station, Texas: Stata Press, 2004.
- Clifford, David; Jane Falkingham and Andrew Hinde. "Through Civil War, Food Crisis and Drought: Trends in Fertility and Nuptuality in Post-Soviet Tajikistan." *The European Journal of Population*, 2010, 26, pp. 325-50.
- Das Gupta, Monica and Li Shuzhuo. Gender Bias in China, the Republic of Korea, and India 1920-90: Effects of War, Famine, and Fertility Decline. SSRN, 1999.
- Duerden, Martin. "What are hazard ratios?" (n.d.)
http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/What_are_haz_ratios.pdf
(Accessed: September 8, 2011)
- Falkingham, Jane. Women and gender relations in Tajikistan. [Manila]: Asian Development Bank Programs Dept. East and Office of Environment and Social Development. 2000.
- Fridman, Leonid A. "Economic crisis as a factor of building up socio-political and ethno-national tensions in the countries of Central Asia and Transcaucasia." In V.V. Naumkin (ed.). *Central Asia and Transcaucasia: ethnicity and conflict*, Westport, Conn.: Greenwood Press. 1994.
- Goskomstat Tajik SSR [State Statistical Committee of the Tajik Soviet Socialist Republic].
Naselenie Tajik SSR. [Population of the Tajik SSR.] Dushanbe. 1990.
- Greene, Margaret E.; Rao, Vijayendra. "The Marriage Squeeze and the Rise of Informal Marriage in Brazil." *Social Biology*, 1995, 42(1-2), pp. 65.

- Harris, Colette. *Control and Subversion: Gender Relations in Tajikistan*. London: Pluto Press, 2004.
- Harris, Colette. *Muslim Youth: Tensions and Transitions in Tajikistan*. Boulder: Westview Press, 2006.
- Hill, Kenneth. *War, Humanitarian Crises, Population Displacement, and Fertility: A Review of Evidence*. Roundtable on the Demography of Forced Migration, Program on Forced Migration and Health at the Mailman School of Public Health Columbia University, National Research Council, 2004.
- Hoeffler, Anke, and Martha Reynal-Querol. "Measuring the Cost of Conflict." Unpublished manuscript, Centre for the Study of African Economies, Oxford University, Oxford, U.K. 2003.
- Hoogeveen, J.G.M. (Hans), van der Klaauw, Bas and van Lomwel, A. Gijsbert C. "On the Timing of Marriage, Cattle and Weather Shocks," Tinbergen Institute Discussion Papers. June 2004.
- Kotlikoff, Laurence and A. Spivak. "The Family as an Incomplete Annuities Market." *Journal of Political Economy*, 1981, 89 (2): 372 – 391.
- Kuz'menko, T. "E net spaseniya dushe..."[There is no salvation for a soul...] *Narodnaya Gazeta*, Dushanbe: December 13, 1991, p.6.
- Lindstrom, D. P. and B. Berhanu. "The Impact of War, Famine, and Economic Decline on Marital Fertility in Ethiopia." *Demography*, 1999, 36: 247-261.
- McGinn, Therese. "Reproductive Health of War-Affected Populations: What do we know?" *International Family Planning Perspectives*, 2000, 26(4): 174-180.

- Newth, J.A. "The Soviet Population: Wartime Loses and the Postwar Recovery." *Soviet Studies*, 1964, 15(3), pp. 345-51.
- Nobles, Jenna and Alison Buttenheim. "Marriage in Periods of Crisis: Evidence from Indonesia," California Center for Population Research On-Line Working Paper Series. Los Angeles: University of California, Los Angeles, 2006.
- Olimova, Saodat and Igor Bosc. "Labour Migration from Tajikistan." International Organization for Migration in Cooperation with the Sharq Scientific Research Center. 2003.
- Palloni, A., Hill, K., and Aguirre, G. P.. "Economic Swings and Demographic Changes in the History of Latin America" *Population Studies*, 1996, 50: 105-32.
- Rao, Vijayendra. "The Rising Price of Husbands: A Hedonic Analysis of Dowry Increases in Rural India." *Journal of Political Economy*, 1993, 101(4).
- Roberts, Les; Riyadh Lafta; Richard Garfield; Jamal Khudhari; Gilbert Burnham. "Mortality before and after the 2003 Invasion of Iraq: Cluster Sample Survey." *Lancet*, 2004, 364: 1857-64.
- Rosenzweig, Mark R. and Oded Stark. "Consumption Smoothing, Migration and Marriage: Evidence from rural India." *Journal of Political Economy*, Vol. 97, No. 4 (Aug., 1989), pp. 905-926.
- Rukumnuaykit, Pungpond. "Economic Crisis and Demographic Outcomes: Evidence from Indonesia." Ph.D. Dissertation. Michigan State University. 2003.
- Schoen, Robert. "Measuring the Tightness of a Marriage Squeeze." *Demography*, 1983, 20, pp. 61-78.
- Semein'i i kodeks Respubliki Tajikistan. [Family Law of the Republic of Tajikistan]. Dushanbe,

November 13, 1998. # 683.

Shemyakina, Olga. "Armed Conflict, Education and the Marriage Market: Evidence from Tajikistan." Ph.D. Dissertation. University of Southern California. 2007.

Shemyakina, Olga. "The Effect of Armed Conflict on Accumulation of Schooling: Results from Tajikistan." *Journal of Development Economics*, 2011, 95(2), pp. 186-200.

State Statistical Committee of Republic of Tajikistan. "Vozrastnoi Sostav Naseleniya Respubliki Tajikistan: Po Dannum Vseobshei Perepisi Naseleniya 2000 Goda. [Age Structure of the Population of the Republic of Tajikistan: According to the 2000 Census Data.]" Edited by O. A. Djabbarov, Dushanbe: State Statistical Committee of Republic of Tajikistan, 2002.

Tadjbakhsh, Shahrbanou. "Women and War in Tajikistan", *The Central Asian Monitor*, No. 1, January 1994.

Verwimp, Philip and Jan van Bavel. "Child Survival and Fertility of Refugees in Rwanda." *European Journal of Population*, 2005, 21: 271-290

Walsh, Brendan M.. "Trends in Age at Marriage in Postwar Ireland." *Demography*, 1972, 9(2).

Winship, Christopher. "Heterogeneity and Interdependence: A Test Using Survival Models", *Sociological Methodology*, 1986, Vol. 16, pp. 250-282.

World Bank. Tajikistan Living Standards Measurement Survey 2003.

(www.worldbank.org/lsms). 2003.

----- Republic of Tajikistan: Poverty Assessment Update. Report No.30853.

Washington, D.C.: World Bank. 2005.

Table 1 - Descriptive statistics. Sample of all surveyed women, ages 15-49.

Variable	N	Mean	Std. Dev.	Min	Max
Personal characteristics					
Age	6196	28.55	9.63	15	49
Year of birth	6196	1974.45	9.63	1954	1988
Age at first marriage	4084	19.56	2.32	9	42
Classes completed	6181	10.06	2.32	0	21
Completed 9 grades or more	6087	0.85	0.36	0	1
Marital status (%)					
Married	6182	59.28			
In a polygamous union	6182	0.47			
Divorced	6182	2.39			
In informal union	6182	0.16			
Widowed	6182	4.41			
Single	6182	33.17			
Other		0.13			
Community characteristics (% residing in)					
Rural	6196	69.74			
Conflict-affected community (RCA)	6196	53.65			

Source: TLSS (2003).

Table 2 - Three year birth cohorts: selected demographic data.

3-year birth cohort	Age in 1992	Age in 1998	Age in 2003	% of the cohort married by 1991 (inclusive of 1991)	% of the cohort who had first child by 1991	N
1954-1956	36-38	42-44	47-49	97.20	94.76	191
1957-1959	33-35	39-41	44-46	96.78	92.69	342
1960-1962	30-32	36-38	41-43	97.12	93.73	415
1963-1965	27-29	33-35	38-40	93.99	85.08	449
1966-1968	24-26	30-32	35-37	92.52	80.18	439
1969-1971	21-23	27-29	32-34	79.67	52.81	481
1972-1974	18-20	24-26	29-31	25.78	8.61	511
1975-1977	15-17	21-23	26-28	0.18	1.10	545
1978-1980	12-14	18-20	23-25	0.00	0.15	656
1981-1983	9-11	15-17	20-22	0.00	0.00	774
Total:	9-38	15-44	20-49			4,803

Note: This table allows us to identify birth cohorts whose decisions about the first marriage and first birth may have been influenced by the exposure to the Tajik armed conflict of 1992-1998 during their prime marriageable years (ages 17-22). Source: as for Table 1.

Table 3 – Age at first marriage by 3-year birth cohort. Women born in 1954-1983.

3 year birth cohort	Median marriage age	Age first married (%)					Not married by 23	N obs
		16 and below	17 and below	18 and below	20 and below	23 and below		
1954-1956	19	1.6	6.3	36.5	76.6	91.2	8.8	192
1957-1959	19	0.9	4.4	32.5	71.4	91.2	8.8	342
1960-1962	19	1.2	5.5	29.8	75.0	91.8	8.2	416
1963-1965	19	1.1	4.7	27.8	70.6	87.3	12.7	449
1966-1968	19	0.5	3.9	28.8	73.7	90.0	10.0	441
1969-1971	19	1.0	5.6	27.0	71.8	87.6	12.5	482
1972-1974	19	0.8	5.1	29.7	68.6	83.0	17.0	512
1975-1977	19	2.8	9.7	35.8	64.8	80.4	19.6	545
1978-1980	19	3.0	9.9	29.5	55.2	68.4	31.6	658
1981-1983	19	2.2	8.5	21.9	42.2	-	-	775
1984-1986	18	1.1	3.5	9.1	11.9			850
Total								5,662

Source: as for Table 1.

Table 4 – Semi-parametric marriage hazard regressions (Cox proportional hazard model). Women born in 1966-1986 (ages 17-37 in 2003).

	(1)	(2)	(3)	(4)	(5)	(6)
Interaction of born in 1975-1983 and RCA	0.851** (0.067)	0.852** (0.068)	0.855** (0.068)			
Interaction of born in 1975-1977 and RCA				0.803** (0.088)	0.803** (0.088)	0.788** (0.087)
Interaction of born in 1978-1980 and RCA				1.023 (0.112)	1.021 (0.112)	1.001 (0.111)
Interaction of born in 1981-1983 and RCA				0.758** (0.094)	0.758** (0.094)	0.752** (0.093)
Born in						
1975-1983	0.798*** (0.046)	0.804*** (0.046)	0.799*** (0.047)			
1975-1977				1.135 (0.088)	1.140* (0.088)	1.192** (0.096)
1978-1980				0.748*** (0.059)	0.751*** (0.059)	0.785*** (0.065)
1981-1983				0.597*** (0.053)	0.602*** (0.053)	0.598*** (0.053)
RCA	1.083 (0.110)	1.100 (0.113)	1.106 (0.114)	1.081 (0.111)	1.097 (0.114)	1.074 (0.113)
Completed 9 grades or above		1.161** (0.074)	1.159** (0.074)		1.122* (0.072)	1.127* (0.072)
Rural		1.108* (0.066)	1.112* (0.067)		1.130** (0.067)	1.117* (0.067)
Sex Ratio			1.372 (0.821)			0.250** (0.171)
N	4159	4159	4159	4159	4159	4159
chi2	63.53	71.65	71.94	137.93	145.23	148.58
P	0.00	0.00	0.00	0.00	0.00	0.00
Chi square test of interactive terms = 0 (p-value)				0.036	0.037	0.030
Chi square test that all cohort terms = 0 (p-value)				0.000	0.000	0.000

Notes: "RCA" is a dummy variable that stands for residence in a community more affected by the conflict.

Columns represent hazard ratios. Standard errors are in parentheses. All regressions are specified with frailty terms at raion level. Subjects enter analysis at age 16.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Source: Individual data - TLSS (2003). Conflict data (RCA) are based on reports in the newspapers and by the non-governmental organizations (Shemyakina 2011). Sex ratio data - State Statistical Committee (2002).

Table 5 – Parametric models: entry into first marriage by Tajik women. Sample: women born in 1966-1986 (ages 17-37 in 2003).

	Panel A: parametric hazard model specified with Weibull distribution			Panel B: ATF model specified with Weibull distribution		
	(1)	(2)	(3)	(4)	(5)	(6)
Interaction of born in 1975-1983 and RCA	0.815** (0.065)	0.815** (0.065)	0.812*** (0.065)	1.137** (0.057)	1.136** (0.057)	1.138*** (0.057)
Born in 1975-1983	0.917 (0.052)	0.923 (0.053)	0.928 (0.054)	1.056 (0.038)	1.051 (0.037)	1.048 (0.038)
RCA	1.064 (0.136)	1.084 (0.141)	1.078 (0.140)	0.962 (0.077)	0.951 (0.077)	0.954 (0.077)
Completed 9 grades or above		1.235*** (0.080)	1.237*** (0.080)		0.877*** (0.035)	0.876*** (0.035)
Rural		1.234*** (0.077)	1.231*** (0.077)		0.877*** (0.034)	0.878*** (0.034)
Sex Ratio			0.755 (0.491)			1.191 (0.483)
Constant	0.073*** (0.007)	0.051*** (0.006)	0.065*** (0.037)	5.136*** (0.301)	6.376*** (0.483)	5.498*** (1.930)
ln_p Constant	1.596*** (0.022)	1.604*** (0.022)	1.604*** (0.022)	1.596*** (0.022)	1.604*** (0.023)	1.604*** (0.023)
ln_the Constant	0.196*** (0.039)	0.204*** (0.041)	0.204*** (0.041)	0.196*** (0.039)	0.204*** (0.041)	0.204*** (0.041)
N	4159	4159	4159	4159	4159	4159
chi2	29.96	52.22	52.40	29.96	52.22	52.40
P	0.00	0.00	0.00	0.00	0.00	0.00

Notes: “RCA” – dummy variable that stands for residence in a community more affected by the conflict. Columns 1-3 represent hazard ratios. Columns 4-6 report time-ratios. Standard errors are in parentheses. All regressions are specified with frailty terms at raion level. Subjects enter analysis at age 16.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Source: As for Table 5.

Appendix Table 1 – Assignment of sex ratios by birth cohort.

Birth cohort	Age in 1989	Age in 2000	Age in 2003	Sex Ratio=(men age 20-29)/ (women aged 15-24)
1966-1974	15-23	26-33	29-37	Based on the 1989 Census data
1975-1986	3-14	14-25	17-28	Based on the 2000 Census data

Appendix Table 2 - Linear Probability Regressions. Dependent variable: Married by age 17/ 18.
Sample: born in 1966-1986 (age 18 to 37 in 2003).

Dependent variable	Married by age 17			Married by age 18		
	(1)	(2)	(3)	(4)	(5)	(6)
Interaction of born in 1975-1977 and RCA	0.039 (0.030)	0.037 (0.029)	0.036 (0.029)	-0.014 (0.045)	-0.016 (0.046)	-0.015 (0.046)
Interaction of born in 1978-1980 and RCA	0.036 (0.027)	0.034 (0.027)	0.033 (0.026)	0.04 (0.046)	0.038 (0.046)	0.039 (0.046)
Interaction of born in 1981-1983 and RCA	-0.012 (0.023)	-0.016 (0.022)	-0.017 (0.022)	-0.047 (0.032)	-0.05 (0.032)	-0.05 (0.032)
1969-1971	0.028* (0.014)	0.028* (0.014)	0.028* (0.014)	-0.009 (0.031)	-0.009 (0.031)	-0.009 (0.031)
1972-1974	0.019 (0.014)	0.02 (0.014)	0.025 (0.015)	0.02 (0.027)	0.019 (0.027)	0.016 (0.029)
1975-1977	0.050** (0.023)	0.049** (0.023)	0.054** (0.024)	0.080** (0.035)	0.079** (0.035)	0.075* (0.038)
1978-1980	0.047** (0.023)	0.045** (0.022)	0.050** (0.024)	-0.008 (0.035)	-0.011 (0.034)	-0.014 (0.037)
1981-1983	0.059*** (0.020)	0.057*** (0.020)	0.059*** (0.020)	-0.051* (0.030)	-0.054* (0.030)	-0.056* (0.031)
1984-1986	0.004 (0.011)	0.001 (0.011)	0.002 (0.012)	-0.163*** (0.026)	-0.166*** (0.026)	-0.167*** (0.027)
Completed 9 grades or above		-0.043*** (0.015)	-0.043*** (0.015)		-0.03 (0.020)	-0.03 (0.020)
Rural		-0.012 (0.012)	-0.012 (0.012)		0.019 (0.026)	0.019 (0.026)
Sex Ratio			-0.114 (0.186)			0.087 (0.174)
Constant	0.032*** (0.011)	0.079*** (0.022)	0.173 (0.157)	0.285*** (0.022)	0.301*** (0.037)	0.228 (0.142)
N	4255	4255	4255	3961	3961	3961
R squared	0.01	0.02	0.02	0.03	0.03	0.03

Notes: Columns represent OLS coefficients. Robust standard errors (in brackets) are corrected for heteroscedasticity and are robust to clustered residuals across individuals who resided in the same raion at age 12 and above.

Reference category: born in 1966-1968.

*significant at 10%; ** significant at 5%; *** significant at 1%.

Source: as for Table 4.