Long-term Consequences of Civil War in Tajikistan: The Gendered Impact on Education and Labor Market Outcomes

Satoshi Shimizutani & Eiji Yamada

Published online: 04 Nov 2022.

Submit your article to this journal ↗

Article views: 2212

View related articles ↗

View Crossmark data ↗

Citing articles: 3 View citing articles ↗

Routledge
Taylor & Francis Group

RESEARCH ARTICLE

OPEN ACCESS | Check for updates

Long-term Consequences of Civil War in Tajikistan: The Gendered Impact on Education and Labor Market Outcomes

Satoshi Shimizutani[a] and Eiji Yamada[b]

[a]Executive Senior Research Fellow, JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, Japan; [b]Research Fellow, JICA Ogata Sadako Research Institute for Peace and Development, Tokyo Japan

ABSTRACT

Tajikistan experienced a violent internal conflict between 1992 and 1997. This study examines the long-term consequences of civil war in Tajikistan on education and labor market outcomes twenty years after the end of the civil war. We compare individuals who should have completed their mandatory schooling before the war and individuals who were of school age during the war with a wide variety of geographical exposures to the war. We confirm a negative and significant effect on completing basic education for females exposed to the war during their school ages. Moreover, we see significant adverse effects on work status for receiving cash wages for females exposed to armed conflicts in their basic education ages.

Introduction

Tajikistan experienced a violent internal conflict known as the *Tajik Civil War* between 1992 and 1997, right after gaining its independence. The civil war dragged on for five years and ended in the complete devastation of many areas, with widespread human casualties and physical damage.

This study examines the long-term consequences of the civil war on education and labor market outcomes for those receiving basic education during the war. It utilizes variations in exposure to the armed conflict in Tajikistan by region and cohort. To do so, we use a rich nationally representative cross-sectional dataset collected in 2018 in Tajikistan, twenty years after the end of the civil war, which is merged with geographic information on the armed conflict. We identify the impact of the civil war on schooling and labor market outcomes by comparing individuals who should have completed their mandatory schooling before the war and individuals who were of school age during the war with a wide variety of exposure to the armed conflict.

A large volume of literature has empirically examined both short-run and long-term consequences of human-made catastrophes, including civil wars, on various outcomes. At the micro-level, this type of investigation is known as the 'microeconomics of violent conflict,' an area which has emerged particularly over the last decade as a sub-field of empirical development economics (Verwimp, Justino, and Brück 2019). Within this growing literature, a wide variety of studies have been undertaken by region and type of disaster. Since the long-term effects of human-made catastrophes are likely to be heterogeneous across individuals and families, more in-depth granular investigations are still required. In particular, further studies of the long-term effects on vulnerable people are indispensable to assess the implications for policy development, given that the number and scale of conflicts is growing worldwide.

We contribute to the literature by providing new evidence on the long-term consequences of the civil war in Tajikistan, a former member of the Soviet Union. To our knowledge, previous studies on the long-term effects of this conflict are scarce. Shemyakina (2011) examined the immediate educational outcomes of the civil war and showed that girls of school age during the conflict were more negatively affected in completing their mandatory schooling and school enrolment, while no effect was found for boys. However, there has been no analysis of the decade-long effects of the Tajik civil war beyond students' completion of mandatory schooling. In particular, given the immediate adverse impact on primary schooling for girls, it is worth investigating the later consequences on schooling and labor market outcomes, paying attention to gender differences.

We provide some new findings. We see a negative and significant effect on completing basic education for girls exposed to the war during their school ages. Moreover, we observe the long-term adverse effects on employment status for receiving cash wages for females when exposed to armed conflicts during the age they received their basic education.

This paper is comprised of the following sections. The next section provides a literature review. Section 3 briefly describes the civil war in Tajikistan in the 1990s. Section 4 explains the dataset used in this study. Section 5 examines the selection into violence and displacement as prerequisite for the empirical analyses. Section 6 presents and discusses the estimation results. The final section provides a summary of our main findings and briefly discusses some implications.

Literature Review

This section briefly reviews the literature on the consequences of human-made catastrophes. Recently, the literature on the 'microeconomics of violent conflict' has been growing rapidly to examine a variety of outcomes (Verwimp, Justino, and Brück 2019). Among these studies, we focus on the literature on education and labor market outcomes.

First, previous studies that investigated educational attainment observed the adverse effects of armed conflict on schooling through a variety of paths, including damage to school infrastructure and psychological distress to teachers and students (Buckland 2005; Brück, Maio, and Miaari 2019) as well as the impoverishment caused by conflict (Justino, Leone, and Salardi 2013). Negative effects have been found to result from World War Two in Austria and Germany (Ichino and Winter-Ebmer 2004), child soldering in Uganda by the Lord's Resistance Army (LRA) in the 1990s (Blattman and Annan 2010), the Rwandan genocide against the Tutsis in 1994 (Akresh and de Walque 2016), the Tajik Civil War in the 1990s (Shemyakina 2011), and civil conflict with the Shining Path during the 1980s to the mid-1990s in Peru (Leon 2012). Other studies reporting negative effects are related to the Cambodian genocide by the Khmer Rouge in the second half of the 1970s (Islam et al. 2017), landmine contamination from Cambodia's 30 years of war (1970 to 1998) (Merrouche 2011), the 1969-1973 US bombing of Cambodia (Saing and Kazianga 2020), the Boko Haram conflict in Nigeria in 2009-2016 (Bertoni et al. 2019), long-lasting civil conflicts in Myanmar (Yamada and Matsushima 2020), the Israeli–Palestinian conflict during the Second Intifada (Brück, Maio, and Miaari 2019) and violence in Timor Leste in 1999 (Justino, Leone, and Salardi 2013). To our knowledge, almost all of the studies found adverse effects on educational outcomes.

Second, the literature investigated labor market outcomes and the results are more mixed. Most of the literature found long-term loss of earnings. Negative effects were found 40 years later due to early life exposure to WWII in Austria and Germany (Ichino and Winter-Ebmer 2004). Effects were also found following the civil war in Peru (Galdo 2013) and political violence by terrorist groups in the same country (Leon 2012). Blattman and Annan (2010) also reported negative impacts from child soldiering in Uganda. In contrast, other studies found little effect on earnings from landmine contamination in Cambodia (Merrouche 2011), the US bombing of Cambodia (Saing and Kazianga 2020), and Hezbollah rocket attacks on Israel during the 2006 Lebanon War (Elster, Zussman, and Zussman 2017). In relation to labor market outcomes, the literature revealed a long-term negative effect on GDP 40 years after the end of WWII in Austria and Germany (Ichino and Winter-Ebmer

2004), ETA (Euskadi Ta Askatasuna) terrorist activities in the Basque Country between 1968 and 1997 (Abadie and Gardeazabal 2003), and 40 years after the US bombing of northern Laos during the Vietnam War (Yamada and Yamada 2021). Moreover, a recent paper revealed that former external migrants now living in Bosnia and Herzegovina have better educational and economic outcomes than those who did not migrate, but the advantages are smaller for external migrants who were forced to move (Efendic, Kovac, and Shapiro 2022).

Despite the large number of studies, to our knowledge, there has been little research on the association between the immediate gendered impact of schooling and the gendered impact on long-term labor market outcomes. Moreover, there has been a large variation in the volume of literature between the regions. While the literature has expanded to cover many countries that have experienced conflicts, evidence on conflicts in Central Asia remains scarce.

Civil War in Tajikistan

Tajikistan gained its independence from the former Soviet Union on 9 September 1991, thereby becoming the *Republic of Tajikistan*.[1] Prior to independence, the economy of the Tajik Soviet Socialist Republic was dominated by agriculture, particularly cotton. In addition, the economy had developed light industry (cotton ginning, silk, and carpet weaving), a food industry, and heavy industry in electricity, as well as mining and non-ferrous metal (aluminium and hydrometallurgical). However, the economy suffered from severe hardship in the 1980s and Tajikistan was the poorest among the former Soviet Union republics (Falkingham 2000).

After independence, for five years between 1992 and 1997, Tajikistan endured a violent internal war known as the *Tajik Civil War*. Fighting broke out on 5 May 1992 between the proponents of the new government and opposition forces. The new government supporters were led by President Rahmon Nabiyev, elected in 1991 with the support of Russian border guards. The country was dominated by two regional groupings. The Leninabad region was a historical power during Soviet times that had provided many of the ruling elites, and those from the Qurgantube and Kulob regions occupied high posts in the Ministry of Internal Affairs. In contrast, the opposition forces consisted of regional groups from the Garm and Gorno-Badakhshan (Pamiris) regions and were led by liberal democratic reformers and Islamists (Nourzhanov 2005).[2]

After many clashes, a compromise was made between the Leninabad and the opposing forces to form a new coalition government in the capital. However, fighting continued to occur outside of the capital, and the Leninabadi-Kulobi Popular Front Forces gained power with the support of the Russian military and Uzbekistan. Finally, the coalition government in the capital collapsed and the Supreme Soviet (parliament), dominated by the Leninabadi-Kulobi faction, elected a new government under Emomali Rahmonov in December 1992.[3] The Kulobi militias soundly defeated opposition forces. The campaign against Garmis and Pamiris was concentrated in areas south of the capital and many Garmis and Pamiris were killed or fled to Afghanistan, where the opposition was reorganized under an umbrella group called the United Tajik Opposition (UTO).[4]

While the armed conflict peaked between 1992 and 1993, the civil war dragged for a further five years, finally ending on 27 June 1997, when the 'Moscow Protocol' was signed by the warring parties. During the civil war, at least 50,000 men were killed, 20,000 women were widowed, and 55,000 children were orphaned (Falkingham 2000). While the majority of displaced people had settled back to their communities by 1995, at least 600,000 people remained internally displaced at the end of the war (Falkingham 2000).[5]

At the end of the civil war, Tajikistan was in a state of complete devastation, with huge human and structural damage – particularly in the southern part of the country where the main battlefields were located. In 1992, 80% of the country's industry was destroyed, including 100% of industry in the south (Shemyakina 2011). At the end of the war, most survivors lived at a subsistence level, and the resulting economic hardship motivated people to migrate abroad from the beginning of the 2000s.

Given this development of the conflict, we focus on the long-term consequences of the civil war in relation to aspects of human capital accumulation such as education and labor market outcomes.

Datasets

We use two datasets in this study, which are merged using geographical information, household-level data and conflict data.

(1) Household-level Data

We use a nationally representative household survey conducted in 2018 in Tajikistan which was implemented by the Japan International Cooperation Agency (JICA).[6] The original households in the sample are derived from those surveyed in the 2009 Tajikistan Living Standard Survey (TLSS), which was stratified based on oblasts (regions) and urban/rural areas in each oblast (nine in total). A hundred primary sampling units (PSU) were selected with a probability proportional to the number of households using the census of 2011, and 20 households in each of the PSUs were selected at the second stage. The most knowledgeable person responded to the questionnaire covering a wide variety of variables for all household members, along with their demographics and levels of educational attainment, information on work status, and household financial resources, including assets and housing.

The sample size of the 2018 survey is therefore 2,000 households with 14,940 individuals who are representative at the oblast and urban/rural level. Appendix Table A1 reports the representativeness of our survey by comparing the Tajikistan National Statistics ('Tajikistan in Figure 2017'). We judge that main demographic variables are comparable. Among these individuals, we use a sample comprising two groups for this study. The first is the 'Born 1976-86' cohort consisting of those aged 7 to 15 years during the civil war (we call this cohort the 'Born 1976-86' cohort or 'war exposed cohort'), while the other consists of individuals born between 1966 and 1975 who were supposed to complete their basic education by the beginning of the conflict. Note that there has been no institutional change in the nine years of basic education for all cohorts born since 1966.[7]

(2) Conflict Data

The conflict data in this study comes from the 'UCDP Georeferenced Event Dataset (UCDP GED),' which is made available by the Uppsala Conflict Data Program, Department of Peace and Conflict Research, Uppsala University (Sundberg and Melander 2013).[8] The dataset provides comprehensive data on organized violence in the post-1989 period at a geographically and temporally disaggregated level in a consistent way. The dataset focuses on the effect of armed violence on deaths across time and space. The basic unit of analysis for the dataset is the 'event,' which is defined as an individual incident (phenomenon) of lethal violence occurring at a given time (the most detailed unit is a day) and place (the most detailed unit is an individual village/town).[9] The dataset is fully geocoded, enabling us to merge it with the household data containing information on PSU.[10]

Our measure of 'exposure to conflicts' is based on the locations reported to have experienced casualties during the civil war. In this study, an individual was exposed to conflict if any casualties due to the civil war were reported within five kilometers from the centroid of a PSU where he or she resided in a year.[11] Figure 1 illustrates the geographical relationship between the location of the armed conflict and our survey sample. The pink dots show the centroids of the PSUs of the survey sampling, while the blue diamonds represent the whereabouts of the armed conflicts during the Tajik Civil War. Among the five regions in Tajikistan, most of the violent events took place in Dushanbe, Districts of Republican Subordination, and Khatlon Region. Another two regions, the Soghd Region and Gorno-Badakhshan Autonomous Region (GBAO), were less affected by the armed conflict. However, even within each region, the proximity to the location of armed conflict varies across the PSUs of the survey.
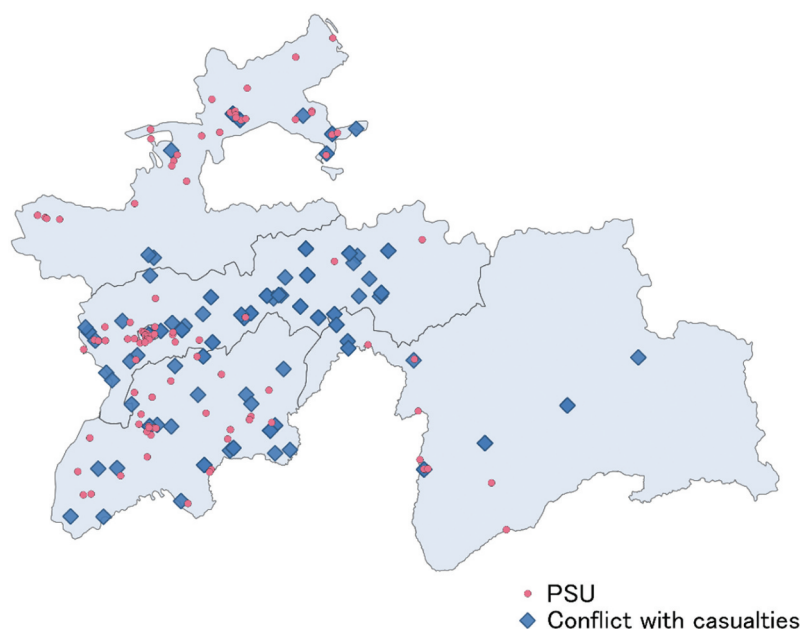
Figure 1. Map of Tajikistan and the conflict areas. Note: The base map is obtained from DIVA-GIS, an open-source GIS data distribution for administrative boundaries (URL: http://www.diva-gis.org/gdata). The pink dots show the centroids of the PSUs of the survey sampling, while the blue diamonds represent the whereabouts of the conflict-related violence during the Tajikistan Civil War.

Table 1 reports the summary statistics of the variables used in this study. As stated above, from the total sample that comprise 2,000 households with 13,430 individuals, we extract a subsample consisting of the individuals who were born between 1966 and 1986. Looking at the combined sample of males and females, the proportion of individuals exposed to conflicts within five kilometers is 17%, while for individuals in the 'Born 1976-86' cohort, the proportion is about 63%. Turning to the covariates in the regression, the share of Uzbek ethnicity is about 22%, while other ethnicities are negligible (the base in the estimation is the Tajik ethnicity which is dominant in the country). The average years of education of the head of household are 5.5. The proportion of heads of households who were born before 1966 exceeds half. Looking at the educational attainment of household members born before 1966, the average years of education of a male household member is 4.4 years and for a female household member is 4.7 years. The proportion of female senior members is close to a half and that for male senior member is 44%. The proportion of females is 51% and that of individuals living in rural areas comprises 81%. Thus, we do not see a large difference in those variables between males and females.

The remaining rows report the summary statistics of the outcome variables we investigate. The share of individuals who completed basic education is more than 90% for both sexes, with more than 75% of individuals completing secondary education. We define the completion of secondary education as those whose highest diploma is secondary general (grades 9 to 11), secondary special or secondary technical. The share of individuals who completed tertiary education is 12%. The completion of tertiary education is defined as obtaining a bachelor, master, or Ph.D. degree. In terms of employment status, the proportion of individuals without a job in the past twelve months is 5.5%. The proportion of those formally employed is 34% and the share of those receiving a cash wage is 32%. By sector, the share of the agricultural sector is about 10%, the construction sector exceeds 10% (dominant for males)

Table 1. Summary statistics.

VARIABLES	Male/Female born between 1966-1986 (N = 2,366)		Male born between 1966-1986 (N = 1,163)		Female born between 1966-1986 (N = 1,203)		All the sample (N = 13,430)	
	(1) mean	(2) sd	(3) mean	(4) sd	(5) mean	(6) Sd	(7) mean	(8) Sd
<War exposure>								
Conflict in 5 km	0.165	0.371	0.156	0.363	0.173	0.378	0.262	0.44
Born1976-86	0.630	0.483	0.630	0.483	0.629	0.483	0.131	0.338
<Covariates>								
Uzbek ethnicity	0.218	0.413	0.212	0.409	0.224	0.417	0.183	0.386
Other ethnicity	0.0254	0.157	0.0249	0.156	0.0258	0.159	0.0216	0.145
Head's years of education	5.549	5.669	5.447	5.659	5.648	5.680	6.906	5.67
Head was born before 1966	0.541	0.498	0.534	0.499	0.548	0.498	0.648	0.478
Average education years of male householders born before 1966	4.421	5.273	4.761	5.313	4.093	5.216	5.643	5.452
Average education years of female householders born before 1966	4.674	5.687	4.531	5.663	4.811	5.709	5.961	5.876
Number of female senior members (born before 1966)	0.488	0.536	0.530	0.539	0.447	0.530	0.595	0.534
Number of male senior members (born before 1966)	0.436	0.508	0.426	0.510	0.446	0.506	0.544	0.514
Female	0.508	0.500	0	0	1	0	0.493	0.5
Rural	0.811	0.392	0.809	0.393	0.812	0.391	0.706	0.456
<Outcome Variables>								
(1) Education level								
Complete basic education	0.940	0.237	0.957	0.203	0.924	0.265	0.685	0.464
Complete secondary education	0.780	0.414	0.854	0.353	0.708	0.455	0.419	0.493
Complete tertiary education	0.115	0.320	0.156	0.363	0.0765	0.266	0.0909	0.288
(2) Labor outcome variables								
Did not work in past 12 months	0.0545	0.227	0.0782	0.269	0.0316	0.175	0.029	0.168
Formally Employed	0.343	0.475	0.517	0.500	0.175	0.380	0.109	0.312
Receive cash wage	0.317	0.465	0.418	0.493	0.219	0.413	0.156	0.363
Work in agricultural sector	0.107	0.310	0.113	0.316	0.102	0.303	0.048	0.214
Work in construction sector	0.129	0.335	0.261	0.439	0.00166	0.0408	0.0624	0.242

Note: Authors' calculation. This table presents the mean and standard deviation. Columns (1) and (2) are for individuals born between 1966 and 1986, our estimation sample. Columns (3) to (6) show the results by gender and Columns (7) and (8) provide summary statistics on the whole sample, regardless of birth age.

Selection into Violence and Displacement

The major threat to our identification strategy is the omitted variables bias that simultaneously affects both exposure to the conflict and later educational and labor outcomes. More specifically, we need to examine whether the initial condition prior to the civil war was not correlated with the exposure to violent conflict during the civil war (Shemyakina 2011).[12] Thus, we examine whether pre-war household characteristics are associated with the 'exposure to conflict' by confirming whether those characteristics are comparable between war-exposed and non-exposed individuals. While our main analyses focus on individual level outcomes, the locational exposure to the war is measured by the residential choice, which depends on a household-level decision. Thus, the unit of observation is a household in this section. The summary statistics of the variables are presented in Appendix Table A2 by households with and without exposure to the conflict.

We regress an indicator to take one for households that were exposed to the conflict (they lived in a PSU where civil war casualties were reported within 5 km of the PSU centroid) and zero otherwise. Column (1) of Table 2 confirms that exposure to conflict is not significantly associated with predetermined variables prior to the civil war if we control for district fixed effect. We find that there is no statistical difference between individuals exposed to the civil war and those without. This result suggests that households in our dataset are likely to be exempt from selection into violence.

Another identification concern related to household choice on area of residence is that the location (PSU) of households' current residence is exactly recorded in our dataset and the household location during the time of civil war is unknown. Nevertheless, since the civil war caused widespread domestic displacement, estimating the impact of the armed conflict based on the current residence in the survey (2018) may bias the distribution of the households in the sample because more resilient households were more likely to remain in the affected area, which may cause underestimation bias. On the other hand, if wealthier households migrated away from the affected area, we may over-estimate the impact of the war. We confirm that 82.8% of households have no members who moved during or after the civil war and 17.7% of households have some members who have moved, either voluntarily or involuntarily, since the war started.[13] In order to detect whether the armed conflict affected displacement after the civil war, we regress an indicator to take 1 for domestically displaced households ('movers') and 0 otherwise on exposure to conflict conditional on variables used for selection into violence. Column (2) of Table 2 shows that displacement of households is not significantly associated with exposure to the conflict, suggesting that households in our data are exempt from selection into displacement. However, we see some coefficients on the pre-war covariates are statistically significant, such as Uzbek ethnicity and the educational attainment of household members.

In sum, the selection into violence in our sample may not be a large concern. This is also the case for domestic displacement, although some pre-war characteristics are statistically significant for displacement. Thus, we provide our results using those pre-war covariates in the estimation. We show the results of the full sample and the sub-sample of non-movers whose households have not relocated since the pre-war period. We acknowledge that this approach may fail to exclude the possibility of a biased estimate because the most vulnerable individuals/households may have perished directly or indirectly as a result of the conflict, and the sample selection can lead to underestimating the negative impacts of exposure to the war (Shemyakina 2011). Moreover, we

Table 2. Selection into violence and domestic displacement.

Variables	(1) Conflict within 5 km	(2) Domestic displacement
Conflict within 5 km		0.0604
		(0.0526)
Uzbek ethnicity	−0.0200	−0.118***
	(0.150)	(0.0271)
Other ethnicity	−0.0417	−0.191
	(0.0773)	(0.117)
Head's years of education	0.00665	−0.000526
	(0.00743)	(0.00601)
Average education years of male householders born before 1966	−0.00502	0.00229
	(0.00332)	(0.00351)
Average education years of female householders born before 1966	−0.00407	0.00565*
	(0.00377)	(0.00319)
Number of female senior members (born before 1966)	0.0398	−0.0425
	(0.0308)	(0.0348)
Number of male senior members (born before 1966)	0.00895	−0.0679*
	(0.0427)	(0.0366)
Rural	0.0699	0.0654*
	(0.127)	(0.0382)
Constant	0.433***	0.347***
	(0.0801)	(0.0752)
Observations	1,179	1,179
R-squared	0.641	0.146
District FE	YES	YES

Note: Standard Errors in the parentheses are clustered at the level of district. This table shows the results of OLS regressions to examine selection into violence and displacement. The unit of analysis is the household. Column (1) shows the results for selection into violence and Column (2) is for selection into displacement. The sample is limited to the households that have members born before 1966. *** p < 0.01, ** p < 0.05, * p < 0.1.

realize that our dataset does not has a rich set of variables representing the pre-war economic status of the household. However, we believe our approach addresses the issue since the education level of elder members in the household should be correlated with pre-war economic status.

Estimation Results and Discussion

We look first at the long-term consequences on educational attainment of the civil war. During the civil war, Tajikistan mandated nine required grades of schooling for children 7 to 15 years old as a basic nine-year education and provided schooling up to grade eleven free of charge. As discussed in the literature review, previous studies reached a consensus on the negative effects of civil wars on educational attainment through reduction of financial resources, need to attend a different school or interruptions to education, targets of attacks by terrorists, and death of parents.

We examine the effect of the armed conflict on completion of basic education by comparing individuals who should have completed their mandatory schooling before the war and individuals who were of school age during the war. We utilize the following specification using cross-sectional individual-level data from 2018.

$$y_i = \beta(Cohort_i * Site_i) + \delta Cohort_i + \zeta Site_i + \gamma X_i + \eta Female_i + \xi Rural_i + \mu_{j(i)} + \in_i \tag{1}$$

where, y_i is an indicator to take 1 if individual i has completed nine grades of basic education and 0 otherwise. $Cohort_i$ is an indicator to take 1 if individual i was in the cohort exposed to conflict in their school ages of basic education – in other words, they were 7-15 years old when the war started in 1992 and completion of their basic education was affected by the war.[14] $Site_i$ indicates whether any casualties by civil war were reported within 5 km of the centroid of the PSU where individual i located.[15] X_i is a vector of covariates predetermined prior to the conflict, as presented in Table 2. $Female_i$ takes 1 if individual i is female and 0 otherwise. $Rural_i$ indicates that the area where individual i lives is categorized as rural area. $\mu_{j(i)}$ is the district fixed effect for district j where the individual i lives. $\in_i$ is a well-behaved error term.

We assume that the individual i was affected by the civil war if individual i was born between 1976 and 1986 and lived in the PSU within 5 km of the location of the conflict. In other words, the impact of the conflict is captured by the cross-term $Cohort_i * Site_i$ in the equation (1). $Cohort_i$ is introduced to control the overall difference between the cohorts regardless of individual i's proximity to the location of conflict. We also assume that the individuals who were in primary and secondary schooling ages during the war (born between 1976-1986) belong to an age cohort more exposed to the war for human capital accumulation, and the individuals who were born between 1966 and 1975 are regarded as the less-exposed age cohort. Similarly, $Site_i$ is introduced to isolate the systematic characteristics of areas closer to the conflict location, which is correlated with the outcomes regardless of individual i's cohort. We assume that those who belong to the war-exposed cohort and lived in a war-exposed place are more seriously affected and likely to suffer from the long-term consequences of the conflict. The cross term is binary for each individual and takes 1 if the individual belongs to the 'Born 1976-1986' cohort and were exposed to the conflict and 0 otherwise.

The long-term impact of the civil war is likely to be heterogeneous across different groups. We focus on the gender difference to examine how the impact differs between males and females. We use the following specification to allow for the difference of the impact of the civil war by gender;

$$\begin{aligned} y_i = {} & \beta_1(Cohort_i * Site_i * Female_i) + \beta_2(Cohort_i * Site_i) + \beta_3(Cohort_i * Female_i) + \beta_4(Site_i * Female_i) \\ & + \delta Cohort_i + \zeta Site_i + \eta Female_i + \gamma X_i + \xi Rural_i + \mu_{j(i)} + \in_i \end{aligned}$$

$$\tag{2}$$

In this specification, a triple cross term, $Cohort_i * Site_i * Female_i$, is introduced to capture the differential impact of the war on females as the coefficient β_1, given the impact on males, β_2.

Table 3 reports the estimation results. Columns (1) to (4) report the results using all individuals in the sample, including both urban and rural residents. Column (1) shows the coefficient on the cross term between the 'Born 1976-86' cohort and exposure to conflict is not statistically significant and that the coefficient on the triple cross term is negative and significant for females, suggesting that girls who were living in affected areas during their school ages are less likely to complete the mandatory nine grades by 10.0%. Column (2) reports that the coefficient is also negative and significant if we conduct the same regression on the sub-sample by removing households who changed their residential location after the civil war.

Columns (3) and (4) report the results using the rural sample only. The coefficient on the triple cross term is negative and significant, showing the adverse effect of the civil war for females: girls who were living in rural and affected areas during their school ages are less likely to complete the mandatory nine grades by 12%, which is slightly larger for rural residents.

Table 3. Effect on completion of basic education.

	(1)	(2)	(3)	(4)
	All sample		Rural sample	
	All Sample	Sample excluding Movers	All Sample	Sample excluding Movers
Born1976-86 X Conflict in 5 km X Female	−0.101**	−0.114**	−0.116**	−0.0926
	(0.0393)	(0.0486)	(0.0469)	(0.0608)
Born1976-86 X Conflict in 5 km	0.0354	0.0568*	−0.00637	0.00940
	(0.0267)	(0.0312)	(0.0261)	(0.0277)
Uzbek ethnicity	0.0430	0.0591*	0.0613	0.0828*
	(0.0283)	(0.0339)	(0.0370)	(0.0440)
Other ethnicity	−0.0120	−0.0300	0.0670	0.0564
	(0.0786)	(0.103)	(0.0579)	(0.0713)
Head's years of education	0.0111***	0.00967**	0.0128***	0.0114**
	(0.00352)	(0.00373)	(0.00464)	(0.00517)
Head was born before 1966	−0.113***	−0.104**	−0.120**	−0.105*
	(0.0429)	(0.0455)	(0.0552)	(0.0586)
Average education years of male householders born before 1966	0.00354	0.00557	0.00552	0.00736
	(0.00410)	(0.00481)	(0.00511)	(0.00570)
Average education years of female householders born before 1966	0.00113	0.00413	−0.000371	0.00307
	(0.00497)	(0.00534)	(0.00594)	(0.00654)
Number of female senior members (born before 1966)	−0.0436	−0.0559	−0.0698	−0.0813
	(0.0416)	(0.0514)	(0.0539)	(0.0628)
Number of male senior members (born before 1966)	−0.0409	−0.0681	−0.0341	−0.0698
	(0.0576)	(0.0621)	(0.0671)	(0.0715)
Female	−0.00322	−0.0204	−0.00868	−0.0244
	(0.0182)	(0.0208)	(0.0213)	(0.0241)
Rural	−0.0228	−0.0197		
	(0.0193)	(0.0230)		
Constant	1.002***	0.999***	1.045***	1.039***
	(0.0202)	(0.0203)	(0.0220)	(0.0205)
Observations	2,366	1,918	1,918	1,612
R-squared	0.146	0.171	0.165	0.190
District FE	YES	YES	YES	YES
Cohort FE	YES	YES	YES	YES

Note: Standard Errors in the parentheses are clustered at the level of district. All regressions include District FE, Cohort FE, Conflict in 5 km FE, Female FE, and interaction terms of 'CohortFemale　Female FE' and 'Conflict in 5 km FE x Female FE'. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Now, we turn to examine the impact of exposure to the conflict on higher education, which has not been addressed. We employ the same specification (2) to examine the impact at higher education levels by taking the completion of secondary and tertiary education as y_i. Table 4 shows the results on the cross term between the 'Born 1976-86' cohort and exposure to casualties within five kilometers and the triple cross term among the 'Born 1976-86' cohort and exposure to casualties within five kilometers and female dummies. Column (1) reports that the coefficient on the cross term (the 'Born 1976-86' cohort and exposure to conflict) is negative but not statistically significant, suggesting that those who were exposed to the war in their basic education ages were not significantly disadvantaged in completing secondary education. The coefficient on the triple cross term in Column (1) is also negative but not significant, showing that females exposed to the conflict in their basic education ages were not significantly disadvantaged in completing secondary education in comparison to males.

Turning to tertiary education, Column (2) shows that the coefficient on the cross term is positive but not significant, indicating that those who were exposed to the war in their basic education ages were not significantly disadvantaged in completing tertiary education. The coefficient on the triple cross term in Column (2) is negative but not significant.

Now, we move to examine the labor market outcomes of the civil war. We use specification (2) by replacing the dependent variable with those related to labor market outcomes. To save space, Table 5 reports the coefficients on the cross term and the triple cross term of our interest. Column (1) reports the coefficient when we take the dependent variable as an indicator to take 1 if individual i did not work in the past 12 months. The coefficient on the cross term is negative and not significant for all samples, while it is positive and significant for the rural sample. Columns (2) and (3) report the coefficients when we replace the dependent variable with an indicator to take 1 when an individual i is formally employed or receives cash wages. The coefficient on the cross term is not significant, showing that those who were exposed to the civil war are less likely to be formally employed or receive cash wages, regardless of gender. At the same time, the coefficient on the triple cross term is negative and significant for receiving cash wages, suggesting that females exposed to the civil war are less likely to enjoy cash revenue compared to males.

Columns (4) and (5) show the coefficients when the dependent variable refers to the work sector. In those columns, most coefficients are not significant, indicating that there is no significant difference in work sector between the cohorts and gender.

Table 4. Effect on completion of higher education.

	(1)	(2)
Variables	Complete secondary education	Complete tertiary education
(1) All sample (N = 2.366)		
Born1976-86 X Conflict in 5 km X Female	−0.00708	−0.00965
	(0.0769)	(0.0839)
Born1976-86 X Conflict in 5 km	−0.000905	0.00196
	(0.0488)	(0.0782)
(2) Sample excluding movers (N = 1,918)		
Born1976-86 X Conflict in 5 km X Female	0.0227	0.00725
	(0.0836)	(0.0900)
Born1976-86 X Conflict in 5 km	0.00188	−0.00525
	(0.0588)	(0.0854)

Note: Standard Errors in the parentheses are clustered at the level of district. All regressions include District FE, Cohort FE, Conflict in 5 km FE, Female FE, and interaction terms of 'Cohort FE x Female FE' and 'Conflict in 5 km FE x Female FE'. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5. Effect on labor market outcomes.

VARIABLES	(1) Did not work in past 12 months	(2) Formally Employed	(3) Receive cash wage	(4) Work in agricultural sector	(5) Work in construction sector
(1) All sample (N = 2,366)					
Born1976-86 X Conflict in 5 km X Female	−0.0698	−0.0725	−0.185**	−0.0309	−0.0524
	(0.0492)	(0.0842)	(0.0816)	(0.0582)	(0.0886)
Born1976-86 X Conflict in 5 km	0.0622	−0.0239	0.0282	0.00214	0.0350
	(0.0399)	(0.0722)	(0.0647)	(0.0448)	(0.0898)
(2) Sample Excluding Movers (N = 1,918)					
Born1976-86 X Conflict in 5 km X Female	−0.0147	−0.0138	−0.188*	−0.0369	−0.130
	(0.0792)	(0.103)	(0.104)	(0.0815)	(0.0877)
Born1976-86 X Conflict in 5 km	0.0337	−0.0734	0.0536	−0.00732	0.108
	(0.0681)	(0.0723)	(0.0811)	(0.0571)	(0.0873)

Note: Standard errors in parentheses are clustered at the level of PSU. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All regressions include District FE, Cohort FE, Conflict in 5 km FE, Female FE, and interaction terms of 'Cohort FE x Female FE' and 'Conflict in 5 km FE x Female FE'.

Conclusion

This study utilizes variations in exposure to armed conflict by region and cohort to examine the long-term consequences on education and labor market outcomes twenty years after the end of the Tajikistan civil war. We provide several new findings. First, we confirm a negative and significant effect on completing basic education for females exposed to the war during their school ages. Second, we see significant adverse effects on receiving cash wages for females exposed to armed conflicts in their basic education ages.

This study reveals that, in several aspects, the impact of the armed conflict has lasted for twenty years after the end of the war. In particular, we show the adverse impact of the civil war on labor market outcomes in terms of cash wage payment for females. Together with the previous literature, we reveal a negative impact of a civil war on later outcomes, which is the case for females. Unfortunately, the limitation of the dataset does not allow us to further investigate why females exposed to the war are likely to be more disadvantageous. Future studies should address the transmission mechanism of the impact in a more nuanced way.

Notes

1. The Tajikistan Soviet Socialist Republic was renamed the Republic of Tajikistan on 31 August 1991 and was among the last republics of the Soviet Union to declare its independence.
2. Garm is located in the Rasht Valley area of central Tajikistan.
3. Rahmonov came from Kulob, not from the Leninabadi, and his power was military-based. He became the 3rd president of Tajikistan in November 1994.
4. The violence was particularly concentrated in Qurghonteppa, home to many Garmis.
5. 1.2 million people were refugees inside and outside the country (United Nations, 'Tajikistan: rising from the ashes of civil war').
6. The base of the survey is the 'Tajikistan Labour, Skills and Migration Survey,' which is the Tajikistan part of 'the Central Asia Longitudinal Inclusive Society Survey (CALISS)' conducted between June and April 2013.
7. There may be a systematic difference in higher educational attainment between cohorts born before 1973 who reached the age required to enter university before the collapse of the former Soviet Union. We examined this group to detect any differences in our analyses between cohorts born before and after 1973 but we did not find any significant difference.
8. We use GED 20.1, which covers the period between 1989 and 2019. The code book is available at https://ucdp.uu.se/downloads/ged/ged201.pdf. The sources of the UCDP GED data contain (1) global newswire reporting, (2)

global monitoring and translation of local news performed by the BBC and (3) secondary sources such as local media, NGO and IGO reports, field reports, books etc.

9. The strict definition of an event is an incident where armed force was used by an organized actor against another organized actor, or against civilians, resulting in at least 1 direct death at a specific location and a specific date.

10. Shemyakina (2011) used three sets of conflict data; (1) household reports of damage to their own dwellings available only in the 1999 survey, (2) regional level (PSU or ration) data in which any household reported damages to their dwelling and (3) raion-level data indicating high levels of conflict and insurgent activities, violence, and atrocities using a variety of sources. Since we cannot identify PSU in the 1999 survey, we cannot link the information to our household survey and therefore use the first and second conflict data. Conceptually, our measure is similar to the third one.

11. We defined an exposure to conflicts in different distances from the centroid of a PSU (e.g. 3 kilometers, 5 kilometers and 10 kilometers) and found that our results for basic education were the closest to the findings of Shemyakina (2011) if we define the exposure to conflicts within 5 kilometers from the centroid of a PSU. We also defined other measures of exposure such as the number of deaths and the number of conflicts. However, the information on the numbers is based on newspapers and reports including speculation, and thus may be incorrect or suffer from measurement errors.

12. Since post-war variables could be related to the consequences of exposure to the conflict, we focus on the variables that were determined before the conflict started as the potential omitted variables.

13. At the individual level, 94.3% of the total individuals in the 2018 survey were not displaced from their original places during or after the civil war.

14. Any individuals born before 1966 were not included since they were not required to complete nine grades of education.

15. Some papers that treat armed conflict as endogenous and address it by using instrumental variables. Galdo (2013) instruments a conflict with the incidence of conflict in nearby districts. Rohner, Thoenig, and Zilibotti (2013) instrument the violence in Ugandan county by the county's distance from Sudan.

Data availability statement

We are willing to provide the program files upon request. The dataset is available from the authors with the permission of JICA Ogata Research Institute upon reasonable request.

References

Abadie, A., and J. Gardeazabal. 2003. "The Economic Costs of Conflict: A Case Study of the Basque Country." *American Economic Review* 93 (1): 113–132. doi:10.1257/000282803321455188.

Akresh, R., and D. de Walque. 2016. "Armed Conflict and Schooling: Evidence from the 1994 Rwandan Genocide." *World Bank Policy Research Working Paper*, no. 4606.

Akresh, R., L. Lucchetti, and H. Thirumurthy. 2012. "Wars and Child Health: Evidence from the Eritrean–Ethiopian Conflict." *Journal of Development Economics* 99 (2): 330–340. doi:10.1016/j.jdeveco.2012.04.001.

Bertoni, E., M. Maio, V. Molini, and R. Nisticò. 2019. "Education Is Forbidden: The Effect of the Boko Haram Conflict on Education in North-East Nigeria." *Journal of Development Economics* 141: 102249. doi:10.1016/j.jdeveco.2018.06.007.

Blattman, C., and J. Annan. 2010. "The Consequences of Child Soldiering." *Review of Economics and Statistics* 92 (4): 882–898. doi:10.1162/REST_a_00036.

Brück, T., M. Maio, and S. Miaari. 2019. "Learning the Hard Way: The Effect of Violent Conflict on Student Academic Achievement." *Journal of the European Economic Association* 17 (5): 1502–1537. doi:10.1093/jeea/jvy051.

Buckland, P. 2005. *Reshaping the Future: Education and post-conflict Reconstruction*. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/14838.

Efendic, A., D. Kovac, and J. Shapiro. 2022. "Exposure to Conflict, Migrations and Long-run Education and Income Inequality: Evidence from Bosnia and Herzegovina." *Defence and Peace Economics* forthcoming 1–15. 10.1080/10242694.2022.2100572.

Elster, Y., A. Zussman, and N. Zussman. 2017. "Rockets: The Housing Market Effects of a Credible Terrorist Threat." *Journal of Urban Economics* 99 (99): 136–147. doi:10.1016/j.jue.2017.02.003.

Falkingham, J., 2000. *Women and Gender Relations in Tajikistan. Country Briefing Paper*. Manila.: Asian Development Bank Programs. https://www.adb.org/documents/women-tajikistan-country-briefing-paper

Galdo, J. 2013. "The long-run labor-market Consequences of Civil War: Evidence from the Shining Path in Peru." *Economic Development and Cultural Change* 61 (4): 789–823. doi:10.1086/670379.

Ichino, A., and R. Winter-Ebmer. 2004. "The long-run Educational Cost of World War II." *Journal of Labor Economics* 22 (1): 57–86. doi:10.1086/380403.

Islam, A., C. Ouch, R. Smyth, and L. Wang. 2017. "The Intergenerational Effect of Cambodia's Genocide on Children's Education and Health." *Population and Development Review* 43 (2): 331–353. doi:10.1111/padr.12047.

Justino, P., M. Leone, and P. Salardi. 2013. "Short- and long-term Impact of Violence on Education: The Case of Timor Leste." *The World Bank Economic Review* 28 (2): 320–353. doi:10.1093/wber/lht007.

Leon, G. 2012. "Civil Conflict and Human Capital Accumulation: The long-term Effects of Political Violence in Perú." *Journal of Human Resources* 47 (4): 991–1022. doi:10.1353/jhr.2012.0036.

Merrouche, O. 2011. "The Long Term Educational Cost of War: Evidence from Landmine Contamination in Cambodia." *Journal of Development Studies* 47 (3): 399–416. doi:10.1080/00220388.2010.485633.

Nourzhanov, K. 2005. "Saviours of the Nation or Robber Barons? Warlord Politics in Tajikistan." *Central Asian Survey* 24 (2): 109–130. doi:10.1080/02634930500154867.

Rohner, D., M. Thoenig, and F. Zilibotti. 2013. "Seeds of Distrust: Conflict in Uganda." *Journal of Economic Growth* 18 (3): 217–252. doi:10.1007/s10887-013-9093-1.

Saing, C., and H. Kazianga. 2020. "The long-term Impacts of Violent Conflicts on Human Capital: US Bombing And, Education, Earnings, Health, Fertility and Marriage in Cambodia." *Journal of Development Studies* 56 (5): 874–889. doi:10.1080/00220388.2019.1618449.

Shemyakina, O. 2011. "The Effect of Armed Conflict on Accumulation of Schooling: Results from Tajikistan." *Journal of Development Economics* 95 (2): 186–200. doi:10.1016/j.jdeveco.2010.05.002.

Sundberg, R., and E. Melander. 2013. "Introducing the UCDP Georeferenced Event Dataset." *Journal of Peace Research* 50 (4): 523–532. doi:10.1177/0022343313484347.

Verwimp, P., P. Justino, and T. Brück. 2019. "The Microeconomics of Violent Conflict." *Journal of Development Economics* 141: 102297. doi:10.1016/j.jdeveco.2018.10.005.

Yamada, H., and M. Matsushima. 2020. "Impacts of long-lasting Civil Conflicts on Education: Evidence from the 2014 Census of Myanmar." *Journal of Asian Economics* 71: 101250. doi:10.1016/j.asieco.2020.101250.

Yamada, T., and H. Yamada. 2021. "The long-term Causal Effect of U.S. Bombing Missions on Economic Development: Evidence from the Ho Chi Minh Trail and Xieng Khouang Province in Lao P.D.R." *Journal of Development Economics* 150: 102611. doi:10.1016/j.jdeveco.2020.102611.

Appendix

Table A1. Comparison between national statistics and the survey.

	National statistics	Our survey
Urban Population (%)	26.4	29.4
Rural Population (%)	73.6	70.6
Female (%)	50.7	50.7
Male (%)	49.3	49.3
Under Working Age (0-14, %)	34.4	32.4
Working Age (15-59, %)	60.3	60.4
Above Working Age (60-, %)	5.3	7.7

Note: The data from National statistics are available in *Tajikistan in Figures 2017*:
https://stat.ww.tj/e37b548394b7b88961c832850b383539_1508737633.pdf.

Table A2. Summary statistics of pre-war variables at household level.

	HH in war area (within 5 km from conflict)		HH in non-war area (further than 5 km from conflict)	
	(N = 350)		(N = 829)	
	(1)	(2)	(3)	(4)
VARIABLES	mean	sd	mean	sd
Uzbek ethnicity	0.143	0.350	0.199	0.400
Other ethnicity	0.0171	0.130	0.0241	0.154
Head's years of education	11.26	3.029	10.68	2.989
Average education years of male member born before 1966	8.532	5.104	7.880	4.887
Average education years of female member born before 1966	8.251	5.762	8.771	5.073
Number of female senior members (born before 1966)	0.834	0.462	0.815	0.441
Number of male senior members (born before 1966)	0.717	0.476	0.799	0.422
Rural	0.363	0.482	0.813	0.390
Domestic displacement after the war	0.254	0.436	0.148	0.356

Note: Authors' calculation. This table provides the summary statistics for the regression analyses presented in Table 2.