# The Effect of Armed Conflict on Accumulation of Schooling:

## *Results from Tajikistan*[1]

Olga Shemyakina

Ph.D Student

University of Southern California

email: shemyaki@usc.edu

Draft: February 28th, 2006

## Abstract

Civil wars and armed conflicts are widespread in less-developed countries. However, there is little empirical research on household and individual response to such conflicts. From 1992 to 1998 Tajikistan was embroiled in one of the most devastating civil conflicts in the Former Soviet Union region. This paper examines the effect of this armed conflict on the accumulation of schooling by combining differences in exposure to the conflict across regions and cohorts using data from the 1999 and 2003 Tajik Living Standards Surveys. I find that homes of 6.8 percent of the households were damaged during the conflict and that 40% of 2000 households live in a community with such damage. The regression results suggest that exposure to the conflict had a significant negative effect on the enrollment of girls of age 14 -16, and, little or, no effect on enrollment of boys and younger children.

[1]I would like to thank Esther Dufflo, Richard Easterlin, Jeffrey Nugent, John Strauss, Anke Zimmermann, participants of the 1st Households' in Conflict Network Workshop 2006, and the 2005 BREAD summer school participants for excellent comments. All mistakes are mine.

# Contents

# 1 Introduction

Civil wars and armed conflicts are common in less developed countries, and their detrimental effects are widely recognized. Most research on civil wars has been focused on the onset, development and end of armed conflicts[2]. Also, existing research focuses primarily on African countries that experienced violent turmoils after their decolonization in the post World War II period (Collier et al. 2003). However, very few researchers have addressed the impact of civil wars on welfare of households and individuals. One possible reason is that large-scale, high quality household level data for developing countries affected by civil war are generally not available. Second, even when such data are available, it is difficult to identify whether the household coping behavior is induced by war or by poverty. This paper examines the effect of the armed conflict in Tajikistan, a transition economy, on individuals' school attainment and enrollment by combining differences across regions and cohorts in exposure to the conflict.

The 1992-98 Tajik civil war can be used to identify groups of individuals who were significantly exposed to the conflict and compare their educational attainment to the attainment by individuals who did not suffer as much[3]. In this paper, I use two empirical strategies and assume random placement of individuals in affected and non-affected regions while controlling for observable characteristics.

To analyze the impact of this conflict on schooling, I use the 1999 and 2003 Tajikistan Living Standards Surveys (TLSS)[4] data collected by the World Bank in collaboration with several local and international agencies. I utilize variables on damage to household's home during the civil war and household geographical location in a high or low conflict intensity zone to identify the impact of war on individual school enrollment and grade attainment. I assume that the damage to own dwelling or dwellings in a community reflect the degree of the household's exposure to economic and individual hardships as a result of war. I find that 6.8 percent of 2000 households in TLSS 1999

[2]Humphreys (2003) provides a recent review of the literature on this subject.

[3]The human costs of the conflict were substantial for the 6.4 million inhabitants of Tajikistan. Approximately 40 percent of population was affected directly during the conflict. The conflict displaced at least 600,000 people internally. In addition, about 60,000 found temporal refuge in the neighboring states and 500,000 left the country for good. The conflict claimed the lives of at least 50,000 men, orphaned 55,000 children and widowed 20,000 women (Falkingham 2000).

[4]TLSS 1999 data is available for download at www.worldbank.org/lsms. The 2003 TLSS data was kindly provided by Cem Mete of the World Bank.

data report a damage to household's dwelling during the war. This implies that almost 40 percent of households surveyed in 1999 lived in a community where one or more dwellings were damaged.

My first strategy involves an estimation of determinants of the school enrollment and attendance of children of the mandatory age group, ages 7 to 15 as of May 1999 and July 2003. In the first step, I compare primary and middle school enrollment rates for boys and girls including the war damage variables to measure the impact of the war. I use a rich set of observable characteristics to control for the potential selection effects. I find that enrollment rates for girls whose houses were damaged during the conflict were 17 % lower than those for girls from households who did not report damage to their dwellings (Table 1). I do not observe the similar pattern for boys. This observation may imply that affected households played "safe" and invested more in schooling of boys or that households kept girls at home protecting them from violence and instability caused by war. The enrollment rates among boys and girls of ages 7-11 approach universal (Figure 3). As children become older, the enrollments decrease as in many developing countries. This pattern suggests that during the conflict households attempted to protect the education of younger children by allowing them to complete at least primary school.

Further, I estimate a relative importance of individual, household and community characteristics. Among the household characteristics, the education level of a household head has the greatest impact on child enrollment, and, in particular, on the enrollment of children residing in regions affected by the civil war.

Since I use two cross-sectional datasets, such as the 1999 and 2003 TLSSs, I can not observe the same individuals in those years. The data does not allow me to study the dynamics of drop-outs and re-enrollments by the same individuals and their progress towards completion of mandatory education during and after the conflict. I investigate the impact of the conflict on the completion of mandatory schooling by focusing on the educational attainment by adults. This second strategy allows me to observe the short-term impact of the war and include in my dataset individuals of younger ages. Also according to the law of the Republic of Tajikistan, the first nine grades of schooling are free of charge and school enrollment is compulsory for ages 7 - 15. This law establishes an exogenous rule for the construction of my dataset.

In my second empirical strategy I use data for two groups of adults. The first group should

have completed their mandatory nine grades of schooling before the start of the conflict in 1992 and therefore their schooling should not have been affected by the civil war. The second group of adults should have completed their nine grades of mandatory schooling during or after the civil war. The latter was in the mandatory school age group, or ages 7 -15, during the war and therefore was exposed to the conflict.

Further, I linked an adult's education with the district (raion) level data on the exposure to the conflict. The exposure of the individual to the conflict is jointly determined by the year of birth and region of residence during schooling years.

The preliminary results using the 2003 TLSS data suggest that the exposure to conflict had a negative impact on schooling of women and little or no effect on the education of men.

The rest of the paper is organized as follows. Section 2 presents background on the civil conflict in Tajikistan and evidence from other countries. Section 3 describes trends in enrollment rates. Section 4 focuses on data and empirical strategy. Results are presented in Section 5 and discussion follows in Section 6.

# 2 Background

One can draw a parallel between the civil conflicts in 1990s in the Former Soviet Union (FSU) region and eruption of civil wars in many African countries in 1950-1960. Both, the collapse of the Soviet Union and decolonization in Africa, created many small low-income economies that had difficulty in sustaining themselves. In contrast to the African post-colonial countries, the transitional economies inherited a well-developed infrastructure and highly trained human capital. Those factors may have influenced the nature and length[5] of the post-independence conflicts in the FSU region.

In Tajikistan, old grievances and newly obtained independence led to a civil war in 1992 - 1993 that was followed by a prolonged armed conflict ending late in 1998[6]. Among the major sources of

[5]Although the independence reignited some of the low level conflicts in the transitional economies, often they did not last as long as conflicts in Africa. See Collier et. al (2003) for the length and intensity of civil wars in Africa and the FSU region. (Fig. 4.16, 4.17 and 4.18. pp. 113-114.)

[6]In June of 1997, the United Nations facilitated a peace accord between the Tajikistan's Moscow-backed government and the United Tajik Opposition (UTO). However, fighting in different parts of the country continued. The end of the conflict is documented as November 9, 1998 (University of Uppsala (http://www.pcr.uu.se/)

the conflict were an access to political and economic power and lack of a coherent national identity in Tajikistan[7].

The main parties to the conflict were the post-Communist Tajik government and several opposition groups, represented by the United Tajik Opposition (UTO). The conflict divided the country into geographical regions with opposing political interests because the political affiliations in Tajikistan are based on the regional sub-divisions and kinship groups, or clans[8]. Such allegiances are traditional in Central Asia, where the sense of national identity is often overshadowed by the regional or kinship affiliations (Roy, 2000; Collins, 2004).

The Tajik post-Communist party, comprised of members of Kulob and Khodjent clans, traditionally held power in the republic[9]. The party was supported by the clans and groupings from the southern districts of Kulob (Kuliab), the Uzbek-dominated Hissar region west of Dushanbe and Khodjent (former Leninabad) economic elite[10].

The opposition represented interests of regions that historically lacked access to power and intelligentsia that was not regionally based (Capisani 2000). The opposition was supported by the members of Gharmi (Garmi) and Pamiri clans and found a strong support in the southern (Khatlon) and eastern (GBAO) districts[11].

From 1992 to 1999, the government forces received strong political and military support from Russia and Uzbekistan. The opposition did not receive any express financial or political support from any country in the region but obtained an implicit support from Afghanistan and Iran[12].

[7]Central Asian countries' borders were carved by outside planners under Stalin in 1930s. Those planners did not always consider ethnic interests of local populations (Roy 2000).

[8]Alternatively, clans in Tajikistan were also defined as patron-client networks (Atkin, 1997) and elite groups (Fridman, 1994).

[9]From 1930s, members of those clans occupied many important government positions and managed state enterprises (Capisani, 2000).

[10]http://www.globalsecurity.org/military/world/war/tajikistan.htm. Accessed: May 10th, 2005; Capisani 2000: 168.

[11]Gharm and Pamiri oposition organized resistance in mountainous Gorno-Badakhson area of Tajikistan. The group received weapons from bases in Afghanistan (Panarin, Sergei A. "Political Dynamics of the "New" East (1985-1993)" in "Central Asia and Transcaucasia: Ethnicity and Conflict" edited by Vitaly V. Naumkin. Greenwood Press. 1994

[12]Afghanistan provided it's territory as a base for the opposition groups. Both, Afghanistan (Panarin, 1994) and Iran, supplied weapons.

## 2.1 Economic Situation

Tajikistan is the poorest[13] and the most remote of the FSU republics. It is a landlocked, mostly mountainous country in the Central Asia. It borders Uzbekistan to the west and north, Kyrgyzstan to the north, China to the east and Afghanistan to the south. The country has a total land area of 143,000 square kilometers and is populated by approximately 6.7 million people as of 2002[14].

The conflict took a significant toll on country's physical infrastructure[15] and destroyed human and social capital. It exacerbated problems Tajikistan experienced immediately after the dissolution of the FSU in 1991.

One of such post-transition difficulties was the deterioration of economic ties with business partners located in other FSU countries. The Soviet Union economic space was devised as a close-knit system, with some regions and republics specializing in particular products or industries. Tajikistan specialized in aluminum refinement and production of cotton. After the independence in 1991, Tajikistan's ties with its aluminum suppliers in Azerbaijan and Russia were severed. As a result, the Tajik aluminum smelter, the largest in the Central Asia, was working below its operating capacity due to a decrease in the supply of the major input.

Similarly, during the Soviet times about 90[16] percent of cotton production was shipped elsewhere for processing and the dissipation of industrial ties has left the cotton industry without a sufficient demand for its product. Alternatively, the sharp decline in production of this major cash-crop could be attributed to the shortage of laborers and war damage in cotton growing areas. During the first years of war, men were at war and many people fled many southern, cotton growing regions of Tajikistan[17] war-affected areas (Fridman, 1994; MacLean and Greene, 1998). Also over the course of the conflict, various military warlords and the government had fought over control of

[13]According to the World Food Programme, Tajikistan has the highest rate of poverty among all countries in the Commonwealth of the Independent States and (CIS) region. Almost 66 percent of the population live on less than USD2.15 a day. (http://www.wfp.org/ Accessed February 16, 2006).

[14]The World Factbook, CIA, 2005

[15]"According to A. Abdullojonev, Prime Minister of Tajikistan, by the end of December 1992 80 percent of the country's industry was destroyed and in the south of the republic 100 percent. In spite of the good yield, there were harvested only 100,000 tons of cotton instead of 700,000." Nezavisimaja Gazeta, December 23, 1992. As quoted in Fridman (1994) "Central Asia and Transcaucasia: Ethnicity and Conflict" edited by Vitaly V. Naumkin. Greenwood Press. 1994

[16]McLean and Greene (1998).

[17]MacLean and Greene (1998) report that the resettlement of such refugees was difficult as many returned to find their houses occupied by strangers and jobs already taken.

the important agricultural and industrial centers[18].

As a result of war and accompanying it economic crisis, many employment opportunities in Tajikistan disappeared. Also the economic ties with the FSU countries deteriorated. The situation was particularly grim for some groups of the population. For example, many members of Gharmi and Pamiri clans were facing employment discrimination after the war as the "winners" in the conflict, Kulobi and Khodjent clans, who had access to jobs, made them available mainly to their clan members (McLean and Greene, 1998).

Thus, it is not surprising that the enrollment rates at all levels of education decreased, starting in 1991 (see figure 2). This decrease could have been caused by the economic and political instability, declining employment opportunities within Tajikistan and potentially low returns to education for the "losers" in the civil war. I will discuss the trends in enrollment in more detail in Section 3.

## 2.2 Evidence from other countries

Armed conflict in Tajikistan may have affected accumulation of schooling through three channels. Those channels include both, material and psychological aspects and it would be difficult to differentiate between them. First, economic uncertainty, loss of income and the expectation of lower returns to schooling may have induced households to conserve resources and allocate them to their most productive uses. Second, the physical destruction of schools and educational institutions during the conflict may have reduced the availability and quality of schooling. Third, during the conflict parents may have kept children at home to ensure their safety (Falkingham, 2000). In this section I will review evidence from other countries.

While determinants of school enrollment have been widely researched[19], a few researchers have studied the effects of income shocks at the household and aggregate levels on school enrollment. One of the first such studies by Jacoby and Skoufias (1997) examined the effect of income shocks on schooling in agricultural India. If a household's income is erratic and expenditure on education is discretionary, then children from poor households may attend school sporadically. Thus, income uncertainty may adversely affect the quality and quantity of children's education. Jacoby and

[18]Some of those include the Kurgan Teppe region (part of Khatlon region) and city of Tursunzade in the Hissar locality (McLean and Greene, 1998)

[19]See surveys of literature by Strauss and Thomas (1995) and Glewwe (2002).

Skoufias find that agricultural households use both, child labor and seasonal non-attendance of school by children, as a form of self-insurance in the lean times. They find that the costs of such irregular school attendance are small in the short run. However, they argue that such strategy of self-insurance could be detrimental to child's human capital in the long-run.

The economic conditions in countries affected by internal wars may resemble those in countries affected by financial and economic crises. In such countries, high inflation rates and slowdown of the economy decrease living standards of country's population. Limited resources and uncertainty may lead households to focus on their most productive activities and investments. For example, households may reallocate resources between household members, by choosing who attends school and when. Thomas et al. (2004) find that many Indonesian households decreased their spending on education following the financial crisis in Indonesia in 1998. The decrease in spending was the largest for the poorest households with a higher proportion of young children. They conjecture that poor households favored education of teenagers who were close to graduation at the expense of younger children.

Those papers examined the impact of income shocks on household decisions using a framework in which households would like to invest in the education of their children but facing an unexpected income shock have to trade-off future consumption for present. Then the shock hits, households withdraw children from school and send them to work to maintain current consumption levels. Once the crisis is over, households may expect to return to their previous state and re-enroll children in school.

Households in the conflict zone may not consider these income shifting opportunities between the present and future consumption. If people are exposed to fighting and danger on the day-to-day basis, they may concentrate on the strategies that ensure their short term survival. One of such strategies could be keeping children at home for their protection and, possibly, for getting an extra income from children's employment. If all households follow such strategy then school enrollment rates should decrease during the conflict. However, a study of African countries affected by internal armed conflicts by Stewart et al. (2001) finds that primary school enrollments decreased only in three out of eighteen countries, but improved in five. On average, girls fared better than boys, which is consistent with an assumption that men usually do the fighting. Over the conflict years,

the primary and secondary enrollments of girls improved over the conflict years relative to boys in 14 out of 18 of war-affected countries. However, they argue that some of the results could be attributed to the "good" policies established in some of those before the start of the conflict. Miguel and Roland (2005) observe a similar result. They find that US bombing of Vietnam did not have a strong negative effect on the country's poverty rates, consumption or literacy.

In the post-conflict societies, "winners" in the conflict may limit access to education for the "losers". For example, they can restrict enrollment in particular levels of education or segregate of schools along the racial (South Africa), ethnic (Rwanda) or religious lines (Northern Ireland) (Bush and Saltarelli 2000). In the case of ethnic conflicts, the "winners" may impose education in a common language (Sudan, Senegal) and restrict or abolish education in a native language of a "losing" ethnic group(s) . Also, a government may focus on reconstruction efforts in regions populated by "winners" and limit rebuilding and staffing schools in the "losing" areas. Therefore, we may uncover hidden obstacles to education by analyzing how characteristics of households and communities affect the educational attainments of individuals.

Probability of future conflicts may decrease if the government improves access to education following increase in educational attainments by individuals. First, the government may signal its commitment to peace by prioritizing investment in education and health (Collier and Hoeffler 2002). This commitment may pacify population in the post-conflict period. By providing equal access to education for all, the government may decrease social tensions. As a result of those policies, rebels may find it difficult to recruit new militants (Keen 2001, Thyne 2005).

# 3 Trends in Enrollment Rates and Educational Attainment in Tajikistan

I begin with the description of the trends in the enrollment rates since the independence of Tajikistan in 1991 and proceed with discussing trends in school enrollments, attendance and grade attainment using the 1999 and 2003 TLSS data. I will focus on the distribution of enrollment rates across ages, gender and exposure to conflict for children of age 7 to 15.

## 3.1 General Trends in Enrollment

Tajikistan inherited a strong school system and a strong support for secondary education among the population. This is reflected in enrollment rates comparable to those in other Central Asian countries and Russia (Figure 1). In the post-transition period, enrollments at the primary and middle school levels declined by almost 10 percent The civil war of 1992-1998 in Tajikistan destroyed many schools and educational facilities. Many teachers fled the war-affected areas or emigrated. The dissolution of the FSU brought difficulties to the education sector as well.

Education in Tajikistan is nominally free of charge. Children in Tajikistan enter formal education at age 6 or 7, spend 4 years in primary school and usually complete their mandatory education of 9 grades by age 15. Upon completion of 9 grades of education, they decide between enrollment in high school (grades 9 - 11), technical or professional school or staying out of school altogether.

Despite officially free education many schools charge unofficial fees for school maintenance and supplies. Textbooks by law are to be provided for free. In fact, only 15 percent of all textbooks are provided free of charge and the rest should be bought or rented by a family. Some children miss first two months of school in the fall as they work in the fields, collecting cotton to pay their school fees (Miers 2003). There are many supply side constraints to school attendance and enrollment in poor countries. In Tajikistan, parents are concerned about lack of access to good quality of drinking water in schools, lack of heating facilities, poor physical condition of school facilities and overcrowding. Usually in Tajikistan, urban schools are better equipped and those in remote areas are in the worst condition. Improving schools, in particular, repairing school buildings, may indirectly improve student achievement through increased grade attainment (Glewwe and Jacoby 1994).

The strains on educational system, economic difficulties and the effect of civil war all led to the reduction in enrollments in school and other educational institutions. I attempt to disentangle the effect of war from other factors in my empirical analysis by controlling for community characteristics.

As we observe from Fig. 2, the onset of the civil war in 1991 coincides with the decrease in the basic education enrollment rates which fell from 94.8 % (1991) to 85.5% (1993). The situation stabilized in 1993 but the enrollment remained at 85-86 percent from 1993 to 1997 (Figure 2). The basic education enrollment rate increased to 89 percent by 2000 but did not recover to it's pre-war

levels. Similar trends are observed in the general secondary and in vocational and technical schools enrollments that correspond to age 15 - 18. The general secondary enrollment rates dropped by more than one-third from 40.4 percent in 1989 to 26.9 in 1993 and reached the low of 16.3 percent in 1998. Enrollment in all types of education started to recover after the achievement of peace in 1998 (Figure 2).

The overall decline in enrollments could be partially attributed to the economic and political instability in the region during the civil war of 1992-1998[20]. Many families lost breadwinners and assets. In such households, older children would have to leave school prematurely to support their families.

The trend in the enrollment rates, documented in Figure 2, is supported by the 1999 TLSS data. From Figure 3 that is based on a sample of 3,623 children of age 7 to 16 from the TLSS 1999 we can observe that in May 1999 (the time of the interviews) the mean school enrollment was 87%, with 83 and 91 percent enrollments for girls and boys respectively. Examining enrollment rates for specific age groups more closely, we find that enrollment rates for children of ages 7 to 11 reveal no statistically significant difference between boys and girls (Table 1). The enrollment rate for girls peaks at ages 9 to 10 at 93 percent and for boys at age 12 at 95%. Starting from age eight boys have higher enrollment rates than girls. This advantage is statistically significant for ages 12 to 16. Also, according to the World Bank (2005) boys have a higher chance of completing more grades of schooling while many girls tend to drop-out after grade 4. Early marriages may contribute to higher drop-out rates for girls in some regions.

However, as we can observe from Tables 2 and 3, once children are enrolled, there is a little difference in the attendance patterns by boys and girls as measured by "missed school for more than two weeks during last academic year" variable or by the "school hours missed last week". On average, 37% of all enrolled children missed more than two weeks of school during the 1998-1999 academic year. Once enrolled, boys miss more hours of school per week than girls, however this difference is not statistically significant.

[20]Fear of harassment has restricted girls' access to school. The number of female students from rural areas declined as parents are reluctant to send them away from a family. Many girls in Garm community/region finish school at grade 6 as parents fear that older girls will be harassed or abused by soldiers at checkpoints in the town. Fear of physical violence and of being beaten by other children is cited as the main reason why children of Pamiri and Gharmi origin skip school in Western Khatlon (Falkingham 2000).

The enrollment at the primary school level (ages 7 to 11) is nearly universal. Although boys still have some advantage over girls, this difference is not statistically significant.

## 3.2 Enrollment by the exposure to conflict

The differences in average enrollment rates are likely to understate the impact of the civil conflict as the data was collected in May of 1999, five months after the peace was reached in Tajikistan and more than six years after the peak of fighting in 1992-1993. To illustrate the magnitude of that disruption, in Tables 2 to 5, I present enrollment rates for children of ages 7 to 16 by age, gender and place of residence, defining place of residence as a high or low conflict intensity zone.

To investigate a possible differential impact of war on enrollments, I divided the sample of girls and boys into sub-groups based on the level of exposure to the conflict. I use two measures of conflict exposure: i) damage to household home during the conflict ("damage dwelling"); ii) household's residence in the area that was significantly affected by the conflict ("high" and "low" exposure sub-samples) (please see "Variables" section for more information). Table 1 summarizes the enrollment rates for those subgroups.

Comparing average enrollment rates of girls, we can observe that girls from "low" exposure areas are 8 and 17% more likely to be enrolled as compared to the girls from "high" exposure areas and girls whose home was damaged during the conflict, respectively.

### 3.2.1 Damage to dwelling

Let's look at the subgroups in more detail. I will refer to children from households who experienced damage to their dwelling during the conflict as "Damage" and "No damage" group, otherwise.

Examining enrollment rates for the "Damage" and "No damage" subgroups (Tables 4 and 5) we observe that girls of age 12 to 15 from "Damage" group were 20 to 30% less likely to be enrolled than girls from "No damage" subgroup and this difference is statistically significant.

Boys of age 14 and 15 from the "Damage" subgroup were 11 and 8 percent respectively less likely to be enrolled if the household dwelling was damaged during the conflict, although this difference is not statistically significant. Boys from "Damage" sub-group of ages 7-8, 11-13 and 16 are more likely to be enrolled while the enrolment rates are lower for boys of ages 9-10 and 14-15. There is

no conclusive result here, as the pattern of enrollment rates that we observed may be caused by the low number of cases.

In Tables 6 and 7 I compare enrollment rates for children who live in a community where at least one home was damaged during the conflict but who did not experience this damage themselves to children from a community where no homes were damaged during the conflict as based on the TLSS 1999 interviews. I find that girls aged 14-15 from the group with "damage in the community" were 14 to 15 percent less likely to be enrolled than girls from the "no damage group", and this difference is statistically significant. Comparing enrollment rates for boys from the same groups, we find that the difference in enrollment rates is much smaller at 2 to 6 percent, and it is not statistically significant.

The evidence from the 1999 TLSS data is consistent with the trends in Fig. 3 where we observed almost universal enrollment rates for younger children and less than so for older ones. The 1999 TLSS data added gender and regional dimensions to these trends. We observed that older girls have lower chances to be enrolled than boys of the same age. We also noticed that shocks in the form of damage to homes in a community or damage to families's homes led to a decrease in the enrollment rates for girls from the affected areas and households. We did not observe the same effect for boys.

Even during the Soviet times, Tajikistan was a rather patriarchal country. After the independence in 1991 the equality between men and women began to decline. In some areas girls are customarily taken out of school after grade 4 (age 11). Also women's wages are lower than mens. Since the return on the investment in girls' is lower than the return from the investment in education of boys, it is possible that education of girls is viewed as inferior to education of boys in some communities. In addition to that, income shock or uncertainty had a large and negative effect on schooling of girls. Also, older children are less likely to be enrolled if they have to work to support their family, help with younger siblings, or if they are considered sufficiently educated for the range of employment opportunities available to them.

These patterns indicate that this question deserves a further empirical investigation.

# 4 Empirical Strategy and Data

## 4.1 Data

The principal source of data for this study comes from the 1999 and 2003 Tajik Living Standards Surveys (TLSS). The 1999 TLSS was conducted in May 1999 jointly by the State Statistical Agency and the Center for Strategic Studies under the Office of the President in collaboration with the United Nations Development Programme (UNDP) and the World Bank (WB). The survey is the first large-scale household nationally representative living standards measurement survey conducted in Tajikistan after its independence in 1991[21]. The 2003 TLSS was conducted in June 2003.

Both, 1999 and 2003 TLSSs are large-scale socioeconomic surveys that include 3 modules: a household questionnaire, a community level questionnaire and a female questionnaire. The 1999 sample contains 14,142 individuals living in 2,000 households. The 2003 sample contains information on individuals from 4,160 households. The 1999 TLSS sample was designed to be nationally representative. The sample was stratified by oblast (region) and by urban and rural areas. The TLSS utilized a two-stage sampling method according to the standard Living Standards Measurement Survey practice (Deaton 1997). For the second stage of the sampling in urban areas, the survey team used the household listings prepared for the Census. In the rural areas the selection of households was done using the village registers that are maintained by the local administrations [22]. The 2003 survey oversampled households from Dushanbe and Gorno-Badakshon regions.

For the purposes of this paper, I rely primarily on detailed information on household and individual demographic characteristics, expenditure, school enrollment and community characteristics.

## 4.2 Identification and Empirical Specification

This study of sample of school-age children from a large cross-sectional household survey for Tajikistan extends previous research on determinants of school enrollment in the low-income countries

[21]The 1999 TLSS is publicly available from the World Bank web-site (www.worldbank.org/lsms/) and is a part of the Living Standards Measurement Survey Data Collection Project. The second living standards measurement survey for Tajikistan was conducted by the World Bank in 2003.

[22]Please see Basic Document for more detailed explanation of sample construction. "Basic Information: Living Standards Survey in the Republic of Tajikistan (TLSS)". June 2000

and contributes to the literature on the household behavior in the economies affected by internal armed conflicts.

The paper distinguishes that individuals were exposed to the conflict differentially because of their age or place of residence. Conflict data comes from the TLSS 1999 and other sources in the literature. In order to identify the effect of the armed conflict on the enrollment and completion of the mandatory 9 grades of schooling, this paper takes on two empirical approaches.

### 4.2.1 Strategy 1

The first strategy involves the estimation of determinants of the school enrollment and attendance of children in the age group 7 to 16 as of May 1999. My sample includes children who reached age 7 by the end of September 1991[23]. I exclude 256 children who reached age 7 after October 1991 because their inclusion in the sample size will erroneously increase the non-enrollment rate among 7 year olds as some of those children may be too young and non-eligible to be enrolled. My first analytical sample is a cross-sectional dataset constructed from the 1999 TLSS with information on 3,623 children of age 7 to 16 living in 1,486 households. The construction of this sample is presented in Figure 4. All variables used in this analysis are based on the information from the interview of the reporting adult in the household. Coding of variables and summary statistics for the sample are shown in Table 13.

A possible limitation of this strategy is the focus on enrollment and attendance at a point in time, in particular, May 1999. Unfortunately, we do not observe information at a household level on enrollments prior and during the war and we do not have a detailed list of villages and localities affected by war and corresponding exact number of casualties or degree of population displacement. This information would have allowed us to examine households' response to particular incidents of armed activity and determine the degree of adjustment to the conflict.

[23]September 1st is the official start of the school year in Tajikistan and other former Soviet Union countries. The school year starts in September and ends in May.

### 4.2.2 Strategy 2

I am extending my analysis further by investigating whether educational attainment differed between adults who completed their mandatory 9 grades of education before the start of the conflict and adults who were in the mandatory school age group (7 to 15) during the conflict, and between adults who lived in low and high conflict exposure zones. This extension includes the use of the 1999 and 2003 TLSS data for pre-war and post/during-war generations of adults.

The control group is comprised of individuals aged 17 to 25 in 1991. This cohort of individuals should have already completed their mandatory secondary education of 9 grades (usually completed by age 16) and consequently was not exposed to the conflict during their schooling years. Students of age 17 and above would have typically completed their secondary school education of 10 to 11 grades. Thus, this age group is considered as not exposed to the civil conflict of 1992 - 1998 during their mandatory school years and is defined as the control group. I also assume that this cohort, born between 1966 and 1973 should have been exposed to a similar grade school system as the cohort born after 1973.

The treatment group is defined as those individuals who faced decision to enroll or continue attending school after the start of the civil conflict in February of 1992. An individual aged 9 was entering either 3rd or 4th grade of primary school. An individual aged 14 was entering 8th or 9th grade or being two or one years away from the completion of his/her 9 years of mandatory schooling. Thus, individuals aged 9 to 14 years in 1991 would have spent between 2 and 6 years in school during the conflict that ended in November of 1998. Therefore, they were fully or substantially exposed to the conflict during their schooling (see Fig. 5).

After constructing the control and treatment groups from the 1999 and 2003 cross-sectional Tajik Living Standards Surveys, I estimate the differences in accumulation of schooling between the treatment and control age groups, and estimate if the war had a differential impact on schooling of the adults in the control group by examining differences in educational attainment by regional exposure to the conflict. The preliminary results using the TLSS 1999 and 2003 data suggest that the exposure to conflict had a transitory influence on educational attainment by women and had almost no effect on the education of men[24].

[24]Coding of variables and summary statistics for the sample are shown in Table 14.

### 4.2.3 Econometric Specification: Strategy 1

The first step in my analysis to show that the relative weights of factors affecting enrollment of school-age boys and girls differ.

I use the household production function developed by Becker (1975) to model the demand for education in form of child school enrollment.

In my analysis I assume that parents have a differential preference for their son's and daughter's education[25] as they respond to the actual or perceived differences in the labor market returns to schooling (Rosenzweig and Schultz 1982).

Equation 1 provides an econometric specification used to estimate values of parameters from the enrollment regressions.

$$E_i = c_1 + \beta_{1k} + (M_i D_i)\eta_1 + M_i\eta_2 + u_i \tag{1}$$

where $E_i$ is a binary variable indicating whether an individual $i$ is enrolled at the time of the survey; $D_i$ is a dummy indicating whether the individual's dwelling was damaged during the war; $\beta_{1k}$ - age fixed effects; $M_i$ is a vector of individual and household specific socio-economic characteristics (such as poverty rate; availability of employment; access to education).

### 4.2.4 Econometric Specification: Strategy 2

Equation 2, provides a fixed-effects specification for the empirical implementation of Strategy 2 that will use the data on the educational attainment of adults and characteristics of regions of residence. Following Duflo (2000), the equation 2 is specified as following:

$$S_{ijk} = c_1 + \alpha_{1j} + \beta_{1k} + (P_j T_i)\gamma_1 + (C_j T_i) + \epsilon_{ijk} \tag{2}$$

where $S_{ijk}$ is the education of individual $i$ born in region $j$ in year $k$; $T_i$ is a dummy indicating whether the individual belongs to a young "exposed" cohort in the sub-sample; $\alpha_{1j}$ - region of birth

[25] I test this assumption by estimating a regression equation with gender interaction terms for the pooled data for boys and girls. I reject the hypothesis that parameters for boys and girls are the same using an F-test (F(16, 124) = 3.66, p-value = 0.0000).

fixed effect; $\beta_{1k}$ - a cohort of birth fixed effect; $P_j$ is the intensity of the conflict in the region of birth; $C_j$ - a vector of region-specific variables (such as poverty rate; availability of employment; access to education).

## 4.3 Variables

### 4.3.1 Dependent Variable

In the equation (1) the dependent variable is whether a child is currently enrolled or attending school. The observations for this variable are obtained from Section 3 on education of the 1999 TLSS which contains information on the education of all household members who were 7 years or older at the time of the survey[26]. The respondents were asked:

- *Is [NAME] currently studying?*[27]

### 4.3.2 Determinants of Schooling

Schooling of an individual is typically determined by the combination of individual, household and community characteristics. Human capital theory states that education is a means to increase an individual's economic standing (Becker 1975). Therefore, the returns to education should determine the decision to invest in the first place. In Tajikistan, where being part of a particular clan may open or close avenues to employment, the investment in education may not be directly related to the subsequent returns from that education.

**Conflict Exposure Variables**

During the civil conflict of 1992-1998 some areas of Tajikistan were affected more than others. The war destroyed community and household assets, homes, water systems, roads, and livestock. Many villages in Khatlon were bombed and looted (Dudwick et al. 2003; McLean and Greene 1998). Damage to household assets caused by war was an external shock to household income and it may have affected perception of income security. Looting of villages, destruction of homes, violence

[26]Most households were surveyed in May of 1999. The school year runs from September to May.

[27]There is some ambiguity about the wording of this question as the answer to it may represent both: enrollment and attendance. I interpret answers as enrollment data as there are several other questions in the survey that address attendance specifically.

towards and discrimination against members of Pamiri and Gharmi clans and accompanying or following displacement represented a real danger and disruption to the day-to-day activities for the affected populations. Surrounding violence, political and income instability may have also affected populations that were not directly exposed.

Controlling for the effect of war in the estimation of the model will help to identify effects of the external shocks to household income and decision making.

I use three variables to control for the exposure to the civil war:

**WAR variables:**

1. *Damage to dwelling (dam dw)* - a categorical variable, that is equal to 1 if a household dwelling was damaged during the recent conflict, and, 0, otherwise. To construct this variable I use a question from Section 2 of the 1999 TLSS:

*Was the dwelling damaged during the recent civil unrest?*

2. *Damage in a community.* This measure is a dummy variable that is equal to one if any household in a primary sampling unit reported damage to it's dwelling. Some buildings in a community may remain intact even if other houses were destroyed. But if a resident's house was damaged - it may convey a sense of insecurity to other people in the community and increase stress level that may affect school enrollment or attendance patterns. Using this variable I would like to test the effect of exposure to conflict in a form of physical damage to property of other people in the community on the accumulation of schooling by members of this community.

3. *War (war c)* - a categorical variable equal to "1" if the community in which household resides was in the conflict zone, "0" otherwise[28].

*Other Determinants of Education*

It is common in empirical analysis of child education attainment to control for gender and age. The evidence from other studies on school enrollment and attendance in Tajikistan (Miers 2003, UNDP and UNESCO 2000) suggests that in poor families with several children younger children

[28]I construct a geographical mapping of the civil conflict based on the map of the United Nations Mission of Observers to Tajikistan (UNMOT) and references to fighting in the literature (listed in the Appendix A) to identify communities located in the war/fighting zone. Using a detailed map of the UNMOT deployment in Tajikistan in 1999 I identified names of villages and towns on the Tajik-Afghan border as according to Akiner (2002: 22) fighting was largely confined to this region and matched those names to the list of population points (PSU) surveyed in 1999 TLSS. The map and the list of communities with corresponding 1999 TLSS population points codes could be found in the *Appendix A*.

are more likely to attend school as they can use textbooks and clothes of their elder siblings. Also in some regions in Tajikistan, girls traditionally leave school after completing the basic education level. I expect that the predicted enrollment rates will decrease with age and will be lower for girls.

At the household level there are several factors that have shown empirically to affect investment in schooling of a child. Those factors include:

*Education and other human capital of the parents* - in the empirical literature it was shown that better educated parents can provide better care and schooling environment for their children. Because of those factors there will be a certain amount of inter-generational immobility, as children may follow educational and employment paths of their parents (Berryman 2000). In particular, in case of shocks, such as war, famine, or economic crisis, well educated individuals may be better prepared to deal with uncertainty and protect their children through more efficient use of the available resources (Strauss and Thomas 1995; Kiros and Hogan 2001). I use the education level achieved by family members such as head of the household and his/her spouse to control for the human capital (and possibly for innate ability of a child that is unobservable).

*Household income* - well-off households provide more educational opportunities for their children as they can afford the tuition and other school expenses, and, possibly, provide a better studying environment. Families with limited income may withdraw older children from schools to allow other children in the family to receive basic education. To control for household income I use a log of household expenditure per capita (log pce).

**Community level factors**:

There are other factors that can influence education of children apart from family and individual characteristics. I control for some regional characteristics that incorporate community values and beliefs towards schooling and schooling availability, such as 1) residence in Gorno-Badakshon (GB) region which is predominantly Ismali-Muslim[29], a community that has been strongly influenced by the teachings of Aga-Khan who favored education of children and in, particular, women. The Aga-Khan foundation established several educational facilities in the GB region. 2) Number of schools in the community.

[29]The rest of Tajikistan is Shiite Muslim (approximately 90% of the population), Ismali Muslims approximately 5% of population.

# 5 Empirical Evidence

## 5.1 Strategy 1

Table 8 presents an estimation of child enrollment rates using a linear probability model. In this model I control for child age, age and education of household head, place of residence (rural), log of household expenditure per capita *ln pce* and log of number of adults (ln adults) in a household.

In those regressions I estimate the effect of damage to household dwelling during the civil conflict on child enrollment. Separate models are reported for boys and girls.

As expected, the education level and age of the household head are positively related to enrollment. The enrollments are lower in urban areas. The model indicates that the reduction in *ln pce* leads to decreased enrollment.

In the pooled models for children from households with damage to dwelling and without, the F-tests[30] in the regressions for the samples of boys and girls require that the hypothesis that damage to household dwelling had no impact on children's enrollment rates be rejected. The values show that the effect is stronger for girls. In the interactive models the hypothesis that all interactive coefficients are equal to zero is also rejected. It implies that children from households that experienced a severe (income) shock during the civil war are less likely to be enrolled.

The effects of living in the GBAO region (not shown here) are strong and significant for girls. Residence in this region increases chances of enrollment by 22 - 30 % for girls and by 3- 8% for boys. Surprisingly, the number of secondary schools in the community does not have a strong effect on enrollment. This may indicate that mere availability of school buildings does not indicate that those schools are staffed and functioning in an appropriate manner.

The regression results and data on enrollment from Tables 4, 5, 6 and 7 suggest that the effect of exposure to war was greater for girls of age 12-15 I estimate separate models by sex for ages 7 - 11 and 12-15. The results are shown in Tables 9 and 10. We can observe that the effect of "damage dwelling" variable is negative and significant (p¡0.01) for the girls in the middle school age group, age 12 - 15. The size and sign of the coefficient for damage dwelling variable remain the same even when we control for regional and community characteristics (proportion of people

[30]F-value for boys: F( 14, 124)=2.18, p-value=0.0120; F-value for girls: F(14, 124)=3.20, p-value=0.0003

employed in different industries; proportion of enterprizes in a primary sampling unit closed).

Other important variables are log of household expenditure per capita, and education of parents. The educational achievement of parents has a two times greater effect on the probability of enrollment by girls of age 12-15 than on enrollment of boys and younger children. For each year of education received by a parent, the probability of enrollment in age group 12-15 increases by 2.5 percent. So children of parents with higher education received by both parents are 20 percent more likely to be enrolled as compared to children of parents with only high school diploma.

I also plan to include controls for the physical condition and availability of school resources in the extension of this paper.

## 5.2 Strategy 2

To estimate the effect of war on schooling of adults I empirically estimate equation (2) for the 1999 and 2003 two cross-sectional datasets that contain information on the accumulation of schooling by adults. In tables 11 and 12 I present the preliminary results of this estimation. The dependent variable in those equations is the number of grades, 0 to 9, completed by an adult. The number of grades completed is censored at 9 because schooling in Tajikistan is mandatory up to this grade.

In Figures 7 to 10 I plot the coefficients of the interactions of age in 1991 with the community's exposure to war (war b variable) and their 95% confidence intervals. From Fig. 10 that presents coefficients from the regressions using 2003 data for females we can observe that from age 23 to 15 the coefficients of interaction of age and conflict exposure variable hover around 0 and they are negative and increasing in absolute value for ages 5 to 14. We can interpret this as that exposure to conflict had a negative effect on the educational attainment by females from regions that were exposes to conflict more than others. Further, from Table 10, Column 1 we can observe that the interaction of the treatment group with the conflict exposure variable is negative and statistically significant. It suggests that on average children from the conflict affected areas obtained 0.11 less years of schooling than children from areas not affected by conflict. These results suggest that the identification strategy (Strategy 2) adopted for the cohorts of adults is plausible and merits further exploration.

In Figure 7 the interactive coefficients for females for 1999 do not reflect a strong effect of war

for both males and females. This could be due to a comparability issue of 1999 and 2003 data. The number of districts and identification codes for the primary sampling units differed across the 1999 and 2003 TLS surveys. As a result, I was not able to use about 13% of 2003 data and approximately 23.5% of observations on adults from 1999 dataset.

Using the third specification of the exposure to war (war c) from data sources other than the 1999 TLSS should allow us to use most of the data.

### 5.3 Extensions

In studying the enrollment of children, I plan to add controls for the value of productive assets owned by agricultural households, average male and female wages in the community and the proportion of population in a community with household expenditure below the regional mean. I also plan to control for economic conditions in the community and availability of jobs which I measure by using an estimate of a proportion of population laid off and/or on the unpaid leave due to state enterprize closure/or operation at reduced capacity. This variable represents a rough estimate of an exogenous income shock after the breakdown of the FSU. These controls will help me disentangle the effects of the economic situation in the community from the effects of damage brought by war. I will also add the data on enrollment of children from 2003 data.

I am also working on constructing a multilevel variable that would reflect the number of casualties and the intensity of conflict in the community. This would help me make a finer distinction on the extent of damage brought by the civil conflict to particular regions.

## 6 Discussion

In 1999 Tajikistan started its recovery from a seven year long civil conflict. Before the conflict Tajikistan was the poorest FSU country with the lowest GDP per capita. Culturally Tajikistan was divided into clans and ethnic groups with differential access to political and economic power and employment in government and state enterprizes. The civil war did not change this distribution of power significantly. The Communist party remained in office and established a repressive regime.

In this paper I have focused on the impact of conflict activity on investments in human capital

as measured by school enrollments and attendance. We observe from Fig. 3 that the initial drop in enrollment rates was associated with the onset of the conflict following which enrollments in all levels of education continued to decline further.

School enrollments in 1999 were lower for girls of ages 12 - 16 living in high conflict intensity zones. I interpret the evidence as indicating that households viewed older girls as more vulnerable to danger and/or harassment during the conflict or the return on investment in education of girls was lower in the war affected areas. It appears that the households in the condition of uncertainty were more inclined to invest in the education of boys. The detrimental impact of war on school enrollment is especially prominent for older girls whose house was damaged during the conflict.

Children of age 7 - 11 had relatively high enrollment rates, in both low and high conflict intensity areas while enrollment rates for older girls were lower. The war may have had a cumulative impact of war: older children reached school age right before the peak of fighting in 1992-1993 or soon after it started and their schooling overlapped with the most intense period of the war. In contrast, younger children reached school age when the conflict intensity was lower. Another likely explanation for almost universal enrollment rates among younger children is that families aimed to provide all children with at least primary education while education at the higher levels was perceived as optional and destined possibly for the educationally inclined children from well-endowed families.

Children in rural areas also were more likely to be enrolled. This may indicate that families in those areas had better access to financial and other resources for consumption smoothing. Also rural families could engage in subsistence agriculture and had a lesser reliance on outside income in comparison to urban families.

The results from linear probability regressions with interactive effects with the damage dwelling dummy variable suggest that school enrollment was lower for all age groups for children whose houses were damaged during the conflict and that income and education level of the head of the household increased enrollment for children from the affected areas.

To summarize the results: girls of age 11 - 15 from war-affected areas had lower probability of enrollment in school than their peers from low conflict intensity areas. Education of household heads had a strong and positive impact on enrollment of both, boys and girls. Children from rural areas were more likely to attend school. Using the data on adults we find that exposure to the

conflict did not have a significant effect on the education of boys. From the exploratory regression analysis of the 2003 and 1999 data on the educational attainment by adults we find that the cohort of female adults who lived in a high conflict intensity zone during their mandatory education has achieved 0.10 to 0.12 grades of school less than the rest of the sample.

After independence, the Tajik economy deteriorated and many state enterprizes were closed. Many employees were either made redundant or placed on unpaid leave. The civil war exacerbated this situation. The returns to education levels higher than primary may have reduced. The results suggest that households placed a priority on education of younger children and allowed them to complete at least primary school. Enrollment rates decreased with age, in particular for girls. Again, under uncertainty, households placed a priority on the short-term goals and shifted the distribution of resources towards a safer investment such as education of boys, and protection of minimum education for younger children.

# References


[1] Shirin Akiner. *Health care in central Asia*, chapter History and Politics in Central Asia: Change and Continuity. Open University Press, Buckingham, 2002. McKee, Martin and Judith Healy and Jane Falkingham and European Observatory on Health Care Systems.

[2] Muriel Atkin. "Tajikistan". In Glenn E Curtis, editor, *"Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan: country studies"*. Federal Research Division, Library of Congress, Washington, D.C., 1997.

[3] World Bank. Republic of Tajikistan. Poverty Assessment Update. Technical Report 30853-T, World Bank, 2005.

[4] Gary S. Becker and Yona Rubinstein. "Fear and the Response to Terrorism: An Economic Analysis". www.ilr.cornell.edu/international/events/upload/BeckerrubinsteinPaper.pdf, August 1st 2004.

[5] Gary Stanley Becker. *"Human capital : a theoretical and empirical analysis, with special reference to education"*. Human behavior and social institutions. National Bureau of Economic Research : distributed by Columbia University Press, Washington, D.C., 1975.

[6] Sue E. Berryman. *Hidden challenges to education systems in transition economies*. World free of poverty. World Bank, Washington, DC, 2000.

[7] Tilman Brueck. "The Welfare Effects of Farm Household Activity Choices in Post-War Mozambique". http://www.aeaweb.org/annualmtgpapers/2005papers.html, 2004.

[8] Kenneth D. Bush and Diana Saltarelli. "Two Faces of Education in the Ethnic Conflict": Towards a Peacebuilding Education for Children. Technical report, UNICEF. Innocenti Insight, 2000.

[9] CIA. "CIA Word Factbook", 2005.

[10] Paul Collier. *"Breaking the Conflict Trap: Civil War and Development Policy"*. A World Bank policy research report. World Bank; Oxford University Press, Washington, DC; New York, 2003.

[11] Paul Collier and Anke Hoeffler. "Aid, policy, and growth in post-conflict societies". Policy Research Working Paper no. 2902, World Bank, Washington, D.C., 2002.

[12] Angus Deaton. *The analysis of household surveys : a microeconometric approach to development policy*. Johns Hopkins University Press, Baltimore, MD, 1997.

[13] Ester Duflo. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment". Working Paper, March 2000.

[14] H.A. Ghobarah, P. Huth, and B. Russett. "Civil Wars Kill and Maim People - Long after Shooting Stops". *American Political Science Review*, 97, 2003.

[15] Paul Glewwe and Hannan Jacoby. "Student Achievement and Schooling Choice in Low-Income Countries: Evidence from Ghana. *Journal of Human Resources*, 29(3):843 – 864, 1994.

[16] Margaret E. Grosh and Paul Glewwe. "Using Nationally Representative Household Surveys for Food Policy Analysis". In Joachim von Braun and Detlev Puetz, editors, *Data Needs for Food Policy in Developing Countries: New Directions for Household Surveys*. International Food Policy Research Institute, 1993.

[17] A. Hoeffler and M. Reynal-Querol. "Measuring the Costs of Conflict". Oxford University, U.K. Oxford, 2003.

[18] Macartan Humphreys. "Economics and Violent Conflict". *http* : *//www.preventconflict.org/portal/economics/*, 2003.

[19] Hannan G. Jacoby and Emmanuel Skoufias. "Risk, Financial Markets, and Human Capital in a Developing Country. *The Review of Economic Studies*, 64(3):311 – 335, 1997.

[20] Jennifer McLean and Thomas Greene. "Turmoil in Tajikistan: Addressing the Crisis of Internal Displacement". In Joachim von Braun and Detlev Puetz, editors, *The Forsaken People*. Brookings Institution Press, Washington, D.C., 1998.

[21] Henrietta Miers. Findings from the social assessment on factors influencing the non-attendance of children. Technical report, Education Modernisation Project, Project Implementation Unit, Ministry of Education, 2003.

[22] Edward Miguel and David K. Evans. "Orphans and Scholing in Africa: A Longitudinal Analisys". BREAD Working Paper ♯56, March 2004.

[23] United Nations Development Programme. Human Development Report Office. Human development report. Technical report, Human Development Report Office United Nations Development Programme, New York, 2003.

[24] Olivier Roy. *The New Central Asia: The Creation of Nations*. New York University Press, Washington Square, New York, 2000.

[25] Mark Rozenzweig and T.P. Schultz. "Marked opportunities, genetic endowments and intrafamily resource distribution: Child survival in rural India". *Journal of Development Economics*, 72 (4):808 – 815, 1982.

[26] Frances Stewart, Cindy Huang, and Michael Wang. "Internal Wars in Developing Countries: An Empirical Overview of Economic and Social Consequences". In F. Stewart and V. Fitzgerald, editors, *War and Underdevelopment*, volume 1. Oxford University Press, 2001.

[27] John Strauss and Duncan Thomas. *Human resources: empirical modeling of household and family decisions*, volume III, chapter in the Handbook of Development Economics. Elsevier Science, 1995. J. Berman and T.N. Shinivasan.

[28] Duncan Thomas, Kathleen Beegle, Elizabeth Frankenberg, Bondan Sikoki, John Strauss, and Graciela Teruel. "Education in a Crisis". *Journal of Development Economics*, 74:53 – 85, 2004.

[29] Clayton L. Thyne. "ABC's, 123's and the Golden Rule: The Pacifying Effect of Education on Civil Conflict, 1980-1999". http://myweb.uiowa.edu/cthyne/research.htm, 2005.

# 7 Appendix

## 7.1 Appendix A

In this section I will discuss how I created "War" variable that denotes whether the household was located in the war-affected zone. I construct a geographic mapping of the civil conflict based on the map of the United Nations Mission of Observers to Tajikistan (UNMOT) (Figure 6) and references to fighting in the literature, (some are listed below) to identify communities located in the war/fighting zone. Using a detailed map of the UNMOT deployment in Tajikistan in 1999 I identified names of some of villages and towns on the Tajik-Afghan border[31], and in areas that had heightened military activity and matched those names to the list of population points (PSU) listed in the in 1999 TLSS. The map and the list of communities with corresponding 1999 TLSS population points codes are enclosed below. This list would be incomplete as only some of the communities were listed on the map. It was not possible to match names for some of the communities on the map and in the TLSS survey.

Below I enclose a list of communities located in the conflict zone and corresponding codes for primary sampling units from the 1999 TLSS documentation. In this list a name of the community is followed by its respective primary sampling unit number.

Shaartuz - 118; Kabodion; Nizhniy Panj - 30; Panj - 114; Kolkhozabad - 110, 111; Qurghonteppa (Kurgan-Tyube) - 28; Moskovsky - 131, 132, 33 (Kalininabad - included in Moskovsky); Shuroabad; Kulob- 32, 130; Dandara - 37, 38, 34, 35, 36, 121-128; Tursunzade - 48, 49, 50, 51, 13; Shakhrinau; Hisor(Gissar) - 57, 58, 59, 16; Leninki - 62, 63, 64, 65, 66; Kofarnikhan - 67, 68, 69, 70; Nurek; Faizabad - 53; Obigarm; Nalavbad; Sangimaliki; Darband (Komsomolabad) - 60; Kulob - 130; Labidar; Navalbad; Garm - 52; Tajikabad; Hoit; Tavildara- 54; Khovaling - 137; Khudjand - 93, 94, 95, 96, 97; and Dushanbe - 1-11.

Here is the account of some of the combat activities. I included only names of communities that I found in the literature which could be incomplete. The literature most likely will document events that happened in large, well-known towns, cities or villages and will omit more obscure places.

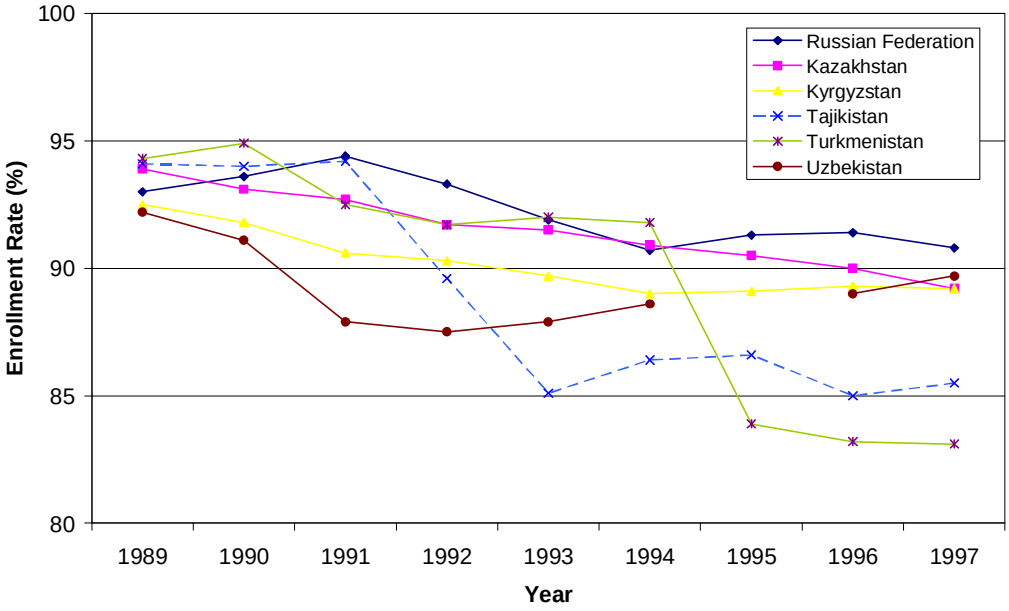
[31] According to Akiner (2002: 22) fighting was largely confined to Tajik-Afghan border.

- *Qurghonteppa region (Kurgan-Tyube)* - main fighting area in 1992: 50,000 casualties[32].
- *Dushanbe, country capital* - September 1992- December 1992 - changed hands, was captured by the opposition forces and then back by the government (Capisani 2000);
- *Eastern Garm Valley, 1996* - occupied by the opposition forces (Dudwick et al. 2003);
- *districts of Darwaz and Vanj - on the threshold of the Pamir Mountains in the East, 1996* - administered by opposition loyalists and heavily militarized (Dudwick et al. 2003);
- *Garm, 1996* - both opposition and national forces harassed businesses extorting bribes for the safe passage; fields were said to be uncultivated for the fear of land-mines (Dudwick et al. 2003);
- *Khudzhand, 1997 and 1998* - thousands of rebels took control of the city[33];
- *east of Dushanbe and Kofarnikhon area, Tajikabad, Pianj and Shaartuz, January - August 1998* - armed conflict between the government and the UTO. Disproportionate and indiscriminate force by government forces during the hostilities, and rape, torture, and the looting and torching of civilian homes. [34];
- *Karategin area, 1999* - acts of violence occurred by the third party and renegade armed groups[35];
- *Dushanbe, country capital, December 1998* - two opposition groups engaged in fighting, killing five and injuring six. [36].

## 7.2 Appendix B: Tables and Figures

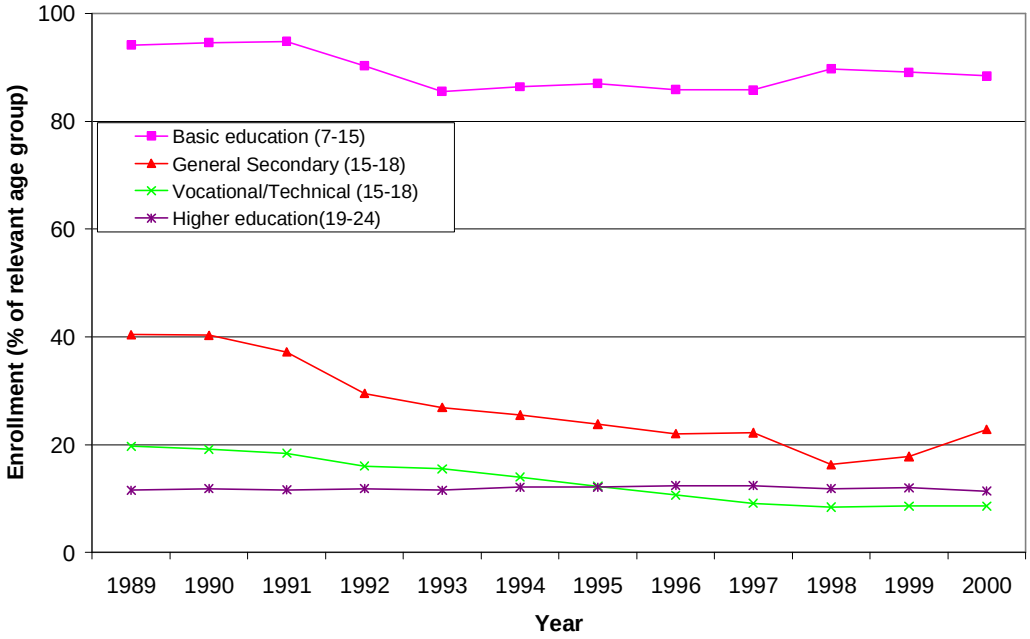
[32]Royal Institute of International Affairs(2000)
[33]http://www.ploughshares.ca/content/ACR/ACR00/ACR00-Tajikistan.html
[34]Tajikistan Country Report on Human Rights Practices for 1998, Bureau of Democracy, Human Rights, and Labor, US State Department, 1999
[35]http://www.globalsecurity.org/military/world/war/tajikistan.htm
[36]http://www.globalsecurity.org/military/world/war/tajikistan.htm

**Fig. 1 Basic Education Enrollment Rates (gross rates, percentage of 6/7 - 14/15 age group)**



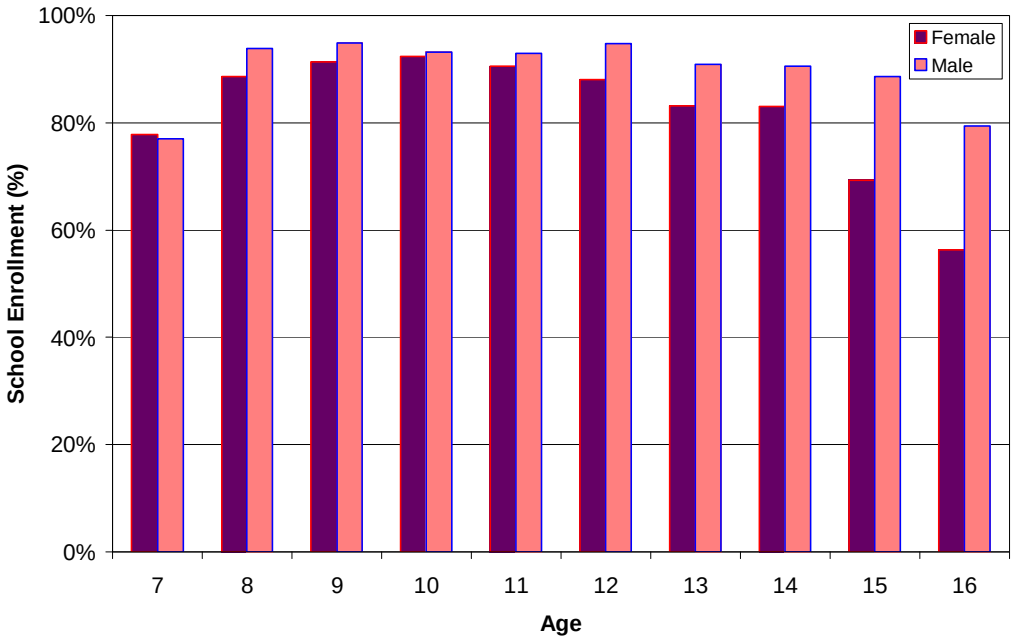

Source: Berryman (2000)

**Fig. 2 Tajikistan: 1989 - 2000 Enrollment Trends**




Source: UNDP (2002)

**Fig. 3 School Enrollment by Age and Gender (Age 7 - 16)**




Source: TLSS 1999, author's calculations

**Fig. 4 Sample Size Construction**
**(Enrollment Regressions, TLSS 1999)**

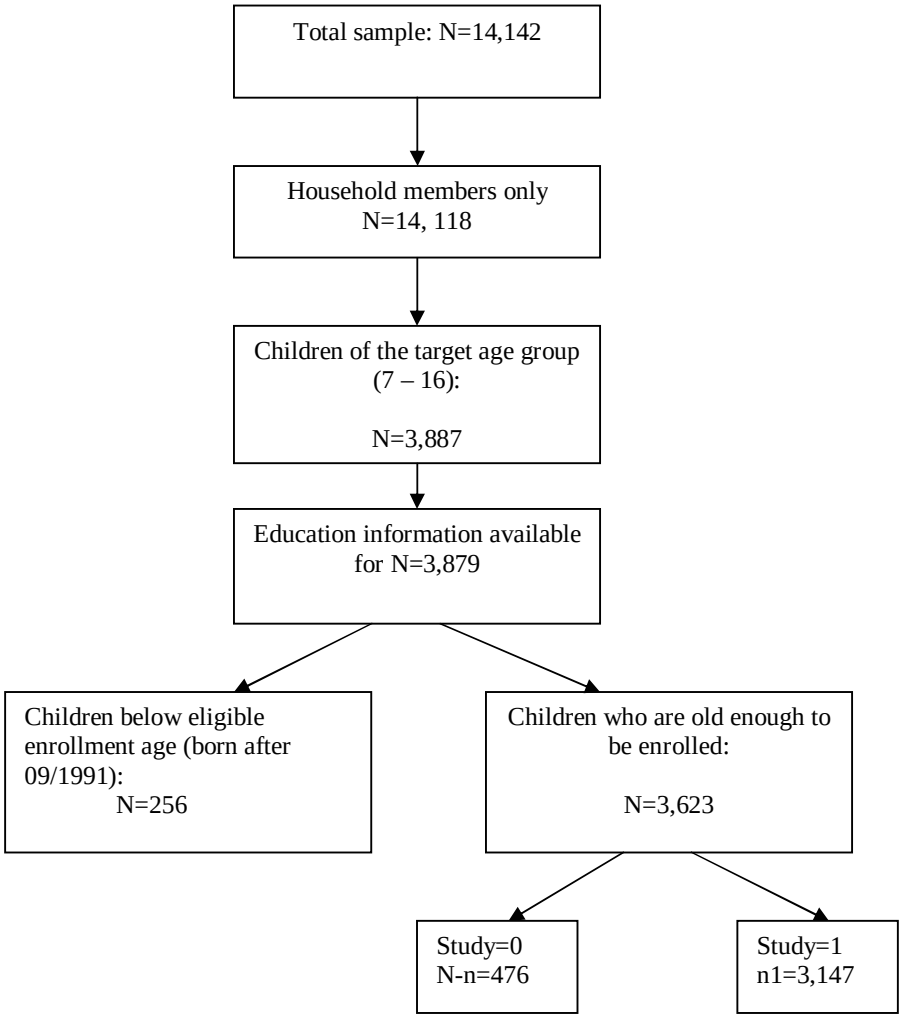


**Fig. 5 Definition of Treatment and Control Groups for Analysis in Strategy 2**

| **Political and other events** | Start of perestroika in 1985 | Beginning of school year/ Independence and start of the anti-government demonstrations – end of the civil conflict |
|---|---|---|
| **Dates** | | September 1991 – November 1998 |
| **Cohorts** | Control group | Treatment group |
| **Exposure** | No exposure during their mandatory education (aged 17 - 25 in 1991) | Significant or full exposure to the conflict during the schooling years (aged 9 to 15 in 1991) |
| **Year of birth** | 1966 – 1972 | 1976 - 1982 |
| **Age in 1999** | 27 - 33 | 17 - 23 |
| **Age in 2003** | 31 - 37 | 21 - 27 |

Note: The 1999 Tajik Living Standards Survey was carried out in May – September 1999, with most interviews conducted in May of 1999.

**Figure 6: Map of Tajikistan**

**[please see next page]**


Map No. 3765 Rev. 9 UNITED NATIONS
October 1997

Department of Public Information
Cartographic Section

**Fig. 7 Coefficients of the interactions age in 1991*Conflict Intensity in the region of birth, males (TLSS 1999)**

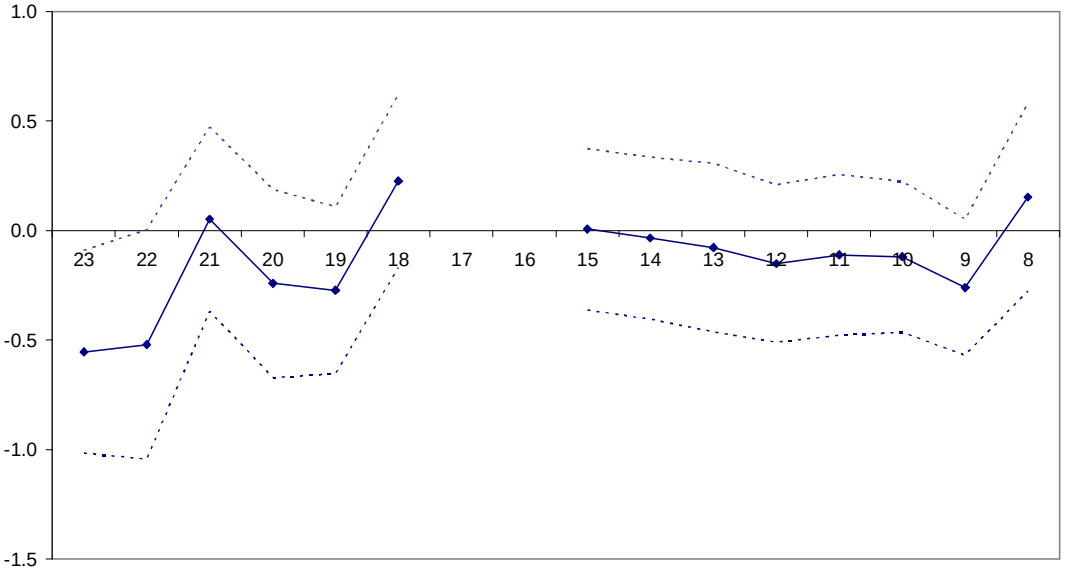



**Fig. 8 Coefficients of the interactions age in 1991*Conflict Intensity in the region of birth, females (TLSS 1999)**

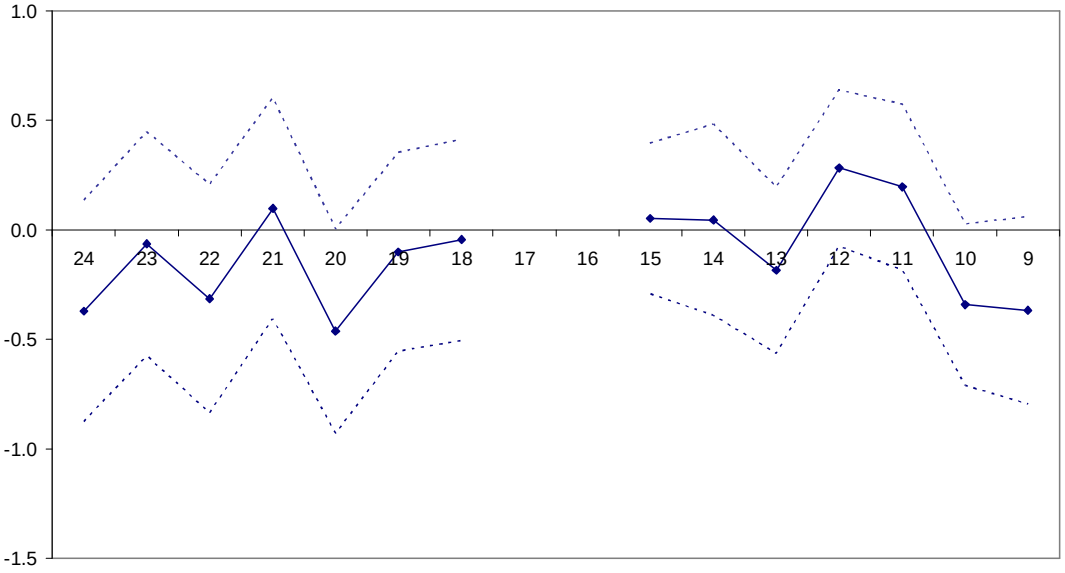


**Fig. 9 Coefficients of the interactions age in 1991*Conflict Intensity in the region of birth, males (TLSS 2003)**

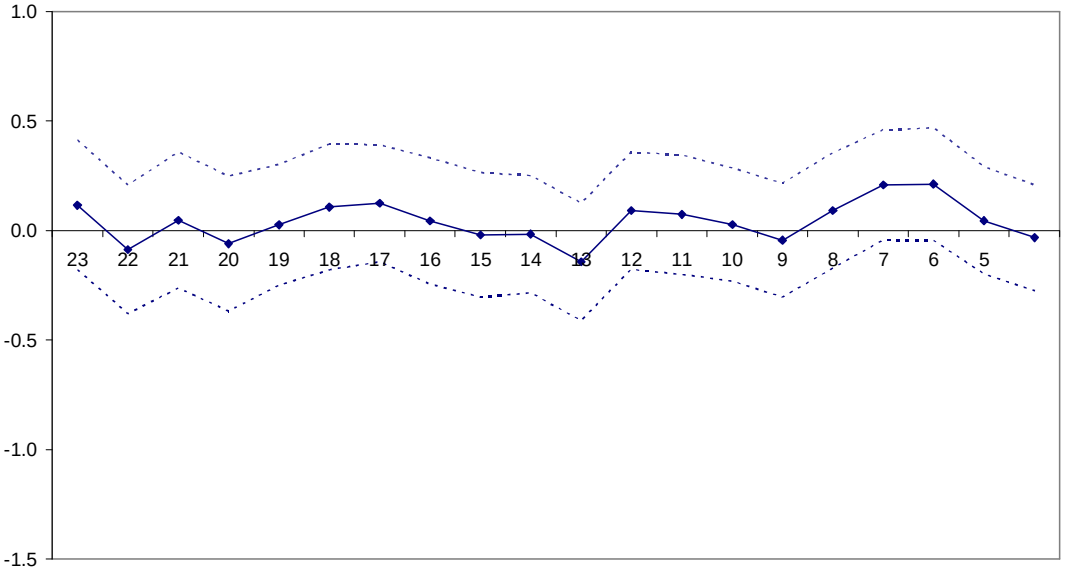



**Fig. 10 Coefficients of the interactions age in 1991*Conflict Intensity in the region of birth, females (TLSS 2003)**

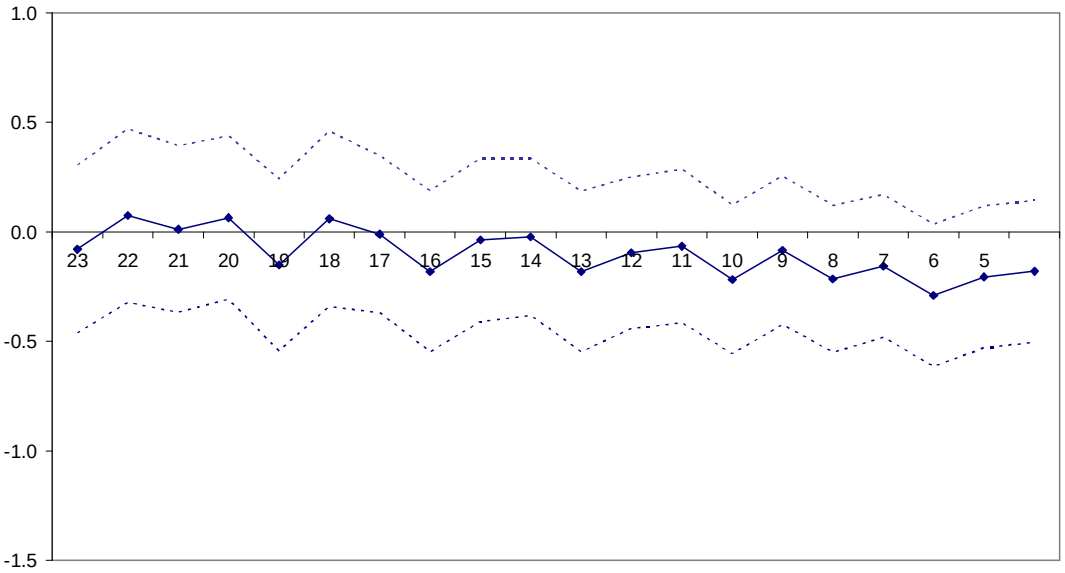


Table 1 - Enrollment by sex and conflict exposure, age 7 - 16 (TLSS 1999)

| ***Damage Dwelling*** | Boys | Girls | Total |
|---|---|---|---|
| Yes | 0.90 | 0.71 | 0.80 |
| s.e. | (0.03) | (0.04) | (0.02) |
| % of sample | 7 | 8 | 8 |
| No | 0.91 | 0.84 | 0.87 |
| s.e. | (0.01) | (0.01) | (0.01) |
| % of sample | 93 | 92 | 92 |
| ***Conflict Intensity*** | Boys | Girls | Total |
| High | 0.90 | 0.80 | 0.85 |
| s.e. | (0.01) | (0.01) | (0.01) |
| % of sample | 65 | 65 | 65 |
| Low | 0.92 | 0.88 | 0.90 |
| s.e. | (0.01) | (0.01) | (0.01) |
| % of sample | 35 | 35 | 35 |
| N observations | 1806 | 1817 | 3623 |

Table 2 - Proportion of enrolled children who missed school for 2 weeks or more during the 1998-99 academic year, by age and gender (TLSS 1999)

| Age | Male | Female | All |
|---|---|---|---|
| 7 | 0.49 | 0.33 | 0.42 |
| 8 | 0.28 | 0.34 | 0.31 |
| 9 | 0.36 | 0.35 | 0.36 |
| 10 | 0.35 | 0.38 | 0.36 |
| 11 | 0.40 | 0.35 | 0.37 |
| 12 | 0.40 | 0.36 | 0.38 |
| 13 | 0.40 | 0.38 | 0.39 |
| 14 | 0.41 | 0.37 | 0.39 |
| 15 | 0.42 | 0.44 | 0.43 |
| 16 | 0.35 | 0.34 | 0.34 |
| all | 0.38 | 0.37 | 0.37 |
| N(0) | 1020 | 956 | 1976 |
| N(1) | 618 | 553 | 1,171 |
| N | 1,638 | 1,509 | 3,147 |

Source: author's calculations from the 1999 TLSS.

Table 3: Average hours of school missed during last week, by age and gender

| | All enrolled students | | | All students who missed school | | |
|---|---|---|---|---|---|---|
| Age | Boys | Girls | All | Boys | Girls | All |
| 7 | 3.1 | 1.0 | 2.1 | 11.3 | 8.0 | 10.4 |
| 8 | 2.0 | 1.9 | 1.9 | 9.9 | 10.7 | 10.2 |
| 9 | 2.0 | 1.8 | 1.9 | 8.9 | 8.6 | 8.8 |
| 10 | 2.1 | 2.8 | 2.4 | 10.1 | 11.1 | 10.6 |
| 11 | 3.3 | 2.6 | 3.0 | 10.6 | 13.7 | 11.8 |
| 12 | 2.5 | 2.4 | 2.5 | 11.1 | 11.5 | 11.3 |
| 13 | 2.9 | 3.0 | 2.9 | 11.1 | 11.6 | 11.4 |
| 14 | 3.1 | 2.5 | 2.8 | 12.3 | 9.2 | 10.7 |
| 15 | 3.5 | 3.1 | 3.3 | 15.8 | 16.1 | 15.9 |
| 16 | 3.0 | 2.6 | 2.8 | 12.5 | 13.5 | 12.8 |
| all | 2.7 | 2.4 | 2.6 | 11.3 | 11.4 | 11.3 |
| N | 1636 | 1508 | 3144 | 388 | 324 | 712 |

Note: 3 observations with hours missed greater than 120 are not included.
Source: author's calculations from the 1999 TLSS.

Table 4 - Enrollment of Girls by Age and Damage to Dwelling

| age | Damage | No damage | t-stat | p-value |
|---|---|---|---|---|
| 7 | 0.80 | 0.78 | 0.12 | 0.90 |
| 8 | 0.79 | 0.90 | 1.41 | 0.16 |
| 9 | 0.77 | 0.92 | 1.91 | 0.06 |
| 10 | 0.94 | 0.92 | 0.28 | 0.78 |
| 11 | 0.82 | 0.91 | 1.20 | 0.23 |
| 12 | 0.70 | 0.90 | 2.65 | 0.01 |
| 13 | 0.62 | 0.85 | 2.17 | 0.03 |
| 14 | 0.60 | 0.85 | 2.43 | 0.02 |
| 15 | 0.42 | 0.72 | 2.73 | 0.01 |
| 16 | 0.73 | 0.55 | 1.13 | 0.26 |
| N | 149 | 1668 | | |

Table 5: Enrollment of Boys by Age and Damage to Dwelling

| age | Damage | No damage | t-stat | p-value |
|---|---|---|---|---|
| 7 | 0.80 | 0.77 | 0.16 | 0.87 |
| 8 | 1.00 | 0.93 | 0.99 | 0.32 |
| 9 | 0.90 | 0.95 | 0.71 | 0.48 |
| 10 | 0.89 | 0.94 | 0.76 | 0.45 |
| 11 | 1.00 | 0.93 | 0.84 | 0.40 |
| 12 | 1.00 | 0.94 | 0.98 | 0.33 |
| 13 | 0.93 | 0.91 | 0.26 | 0.79 |
| 14 | 0.80 | 0.91 | 1.16 | 0.25 |
| 15 | 0.81 | 0.89 | 0.97 | 0.33 |
| 16 | 0.84 | 0.79 | 0.54 | 0.59 |
| N | 131 | 1675 | | |

Table 6: Enrollment of Girls by Age and Conflict Exposure

| age | High | Low | t-stat | p-value |
|---|---|---|---|---|
| 7 | 0.79 | 0.77 | 0.18 | 0.83 |
| 8 | 0.88 | 0.91 | 0.56 | 0.57 |
| 9 | 0.96 | 0.90 | 1.51 | 0.13 |
| 10 | 0.96 | 0.90 | 0.61 | 0.54 |
| 11 | 0.90 | 0.92 | 0.33 | 0.74 |
| 12 | 0.84 | 0.93 | 2.17 | 0.03 |
| 13 | 0.82 | 0.86 | 0.81 | 0.42 |
| 14 | 0.77 | 0.91 | 2.63 | 0.01 |
| 15 | 0.62 | 0.77 | 2.11 | 0.04 |
| 16 | 0.46 | 0.60 | 1.66 | 0.10 |
| N | 629 | 1039 | | |

Table 7: Enrollment of Boys by Age and Conflict Exposure

| age | High | Low | t-stat | p-value |
|---|---|---|---|---|
| 7 | 0.63 | 0.88 | 2.25 | 0.03 |
| 8 | 0.93 | 0.94 | 0.19 | 0.85 |
| 9 | 0.93 | 0.96 | 0.89 | 0.38 |
| 10 | 0.92 | 0.95 | 0.90 | 0.37 |
| 11 | 0.92 | 0.93 | 0.25 | 0.80 |
| 12 | 0.97 | 0.93 | 1.35 | 0.18 |
| 13 | 0.88 | 0.92 | 0.91 | 0.37 |
| 14 | 0.90 | 0.92 | 0.53 | 0.60 |
| 15 | 0.87 | 0.90 | 0.64 | 0.52 |
| 16 | 0.75 | 0.81 | 0.93 | 0.36 |
| N | 639 | 1036 | | |

Table 8: LP estimates of enrollment by gender, age 7 - 16, Tajikistan, TLSS 1999 (Interactions with "Damage dwelling" variable)

| | **Boys** | | | | | | **Girls** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Interactive model | | | | | | Interactive Model | | | |
| | Linear Model | | Direct effect | | Intxn*dam_dw | | Linear Model | | Direct Effect | | Intxn*dam_dw | |
| | (1) | t-stat | (2) | t-stat | (3) | t-stat | (1) | t-stat | (2) | t-stat | (3) | t-stat |
| Constant | 0.135 | (0.84) | 0.167 | (0.99) | | | -0.284 | -(1.45) | -0.292 | -(1.48) | | |
| Damage Dweling | 0.010 | (0.29) | 0.012 | (0.03) | | | -0.112 | -(2.20) | 0.301 | (0.35) | | |
| ***Age in 1999:*** | | | | | | | | | | | | |
| 7 | -0.015 | -(0.24) | -0.012 | -(0.18) | -0.075 | -(0.37) | 0.209 | (3.15) | 0.218 | (3.08) | -0.170 | -(0.74) |
| 8 | 0.140 | (4.22) | 0.140 | (4.07) | 0.013 | (0.15) | 0.333 | (7.47) | 0.348 | (7.52) | -0.223 | -(1.74) |
| 9 | 0.154 | (4.65) | 0.163 | (4.74) | -0.133 | -(1.12) | 0.354 | (7.62) | 0.375 | (7.87) | -0.342 | -(2.35) |
| 10 | 0.136 | (4.14) | 0.145 | (4.22) | -0.143 | -(1.59) | 0.357 | (8.28) | 0.365 | (8.40) | -0.130 | -(0.94) |
| 11 | 0.134 | (3.98) | 0.136 | (3.70) | -0.020 | -(0.23) | 0.344 | (8.34) | 0.357 | (8.38) | -0.188 | -(1.37) |
| 12 | 0.156 | (4.98) | 0.159 | (4.74) | -0.040 | -(0.50) | 0.324 | (7.34) | 0.348 | (7.42) | -0.335 | -(3.10) |
| 13 | 0.118 | (3.45) | 0.123 | (3.37) | -0.013 | -(0.11) | 0.264 | (5.81) | 0.289 | (6.40) | -0.340 | -(2.03) |
| 14 | 0.113 | (3.12) | 0.124 | (3.36) | -0.151 | -(1.18) | 0.255 | (5.67) | 0.285 | (6.23) | -0.386 | -(2.78) |
| 15 | 0.091 | (2.53) | 0.104 | (2.72) | -0.122 | -(1.40) | 0.127 | (2.65) | 0.165 | (3.48) | -0.476 | -(3.28) |
| Rural | 0.030 | (1.13) | 0.023 | (0.86) | 0.070 | (0.67) | 0.065 | (2.16) | 0.055 | (1.89) | 0.070 | (0.40) |
| Log PCE | 0.057 | (3.30) | 0.059 | (3.23) | -0.090 | -(2.00) | 0.056 | (3.23) | 0.060 | (3.30) | -0.060 | -(0.69) |
| Log N Adults | -0.036 | -(1.85) | -0.028 | -(1.42) | -0.092 | -(1.18) | -0.037 | -(1.55) | -0.046 | -(1.95) | 0.127 | (0.92) |
| Age HHhead | 0.001 | (1.25) | 0.000 | (0.35) | 0.014 | (2.94) | 0.003 | (2.67) | 0.003 | (2.49) | 0.001 | (0.10) |
| Age HHspouse | 0.008 | (2.75) | 0.006 | (2.04) | 0.029 | (2.79) | 0.016 | (4.93) | 0.014 | (4.23) | 0.019 | (1.63) |
| N | 1806 | | 1806 | | | | 1817 | | 1817 | | | |
| R squared | 0.059 | | 0.074 | | | | 0.117 | | 0.134 | | | |

Note: Control group is "age 16". t-statistics in parenthesis are robust to heteroscedacticity at the community level.

Table 9: Determinants of primary school enrollment by gender, age 7-11 (TLSS 1999)

| Variables | Boys | | | Girls | | |
|---|---|---|---|---|---|---|
| Damage to dwelling | 0.024 | 0.029 | 0.029 | -0.045 | -0.044 | -0.038 |
| | (-0.356) | -(0.26) | -(0.34) | -(0.35) | -(0.36) | -(0.41) |
| Rural | 0.024 | 0.04 | 0.021 | 0.049 | 0.043 | 0.019 |
| | -(0.39) | -(0.27) | -(0.66) | -(0.14) | -(0.29) | -(0.70) |
| Ln expenditure per capita | 0.059 | 0.066 | 0.068 | 0.033 | 0.028 | 0.032 |
| | (0.003)** | (0.003)** | (0.002)** | -(0.11) | -(0.21) | -(0.12) |
| Ln household size | -0.022 | -0.003 | -0.004 | 0.007 | 0.006 | 0.004 |
| | -(0.49) | -(0.93) | -(0.91) | -(0.83) | -(0.85) | -(0.89) |
| Father's years of education | 0.008 | 0.007 | 0.008 | 0.019 | 0.019 | 0.019 |
| | -(0.12) | -(0.15) | -(0.13) | (0.003)** | (0.002)** | (0.002)** |
| Mothers years of education | 0.014 | 0.012 | 0.013 | 0.009 | 0.007 | 0.009 |
| | (0.010)* | (0.027)* | (0.021)* | -(0.23) | -(0.33) | -(0.23) |
| Missing info on parents controls | yes | yes | yes | yes | yes | yes |
| Regional controls | | yes | yes | | yes | yes |
| Community controls | | | yes | | | yes |
| Observations | 874 | 874 | 874 | 871 | 871 | 871 |
| R-squared | 0.059 | 0.067 | 0.078 | 0.046 | 0.05 | 0.081 |

Table 10: Determinants of middle school enrollment by gender, age 12-15 (TLSS 1999)

| Variables | Boys | | | Girls | | |
|---|---|---|---|---|---|---|
| Damage to dwelling | -0.011 | -0.01 | 0.004 | -0.173 | -0.16 | -0.161 |
| | -(0.78) | -(0.80) | -(0.92) | (0.005)** | (0.007)** | (0.012)* |
| Rural | 0.054 | 0.041 | 0.027 | 0.11 | 0.047 | 0.019 |
| | -(0.19) | -(0.38) | -(0.66) | (0.006)** | -(0.12) | -(0.73) |
| Ln expenditure per capita | 0.049 | 0.06 | 0.06 | 0.04 | 0.066 | 0.064 |
| | -(0.06) | (0.025)* | (0.022)* | -(0.10) | (0.011)* | (0.017)* |
| Ln household size | 0.032 | 0.032 | 0.034 | -0.111 | -0.08 | -0.072 |
| | -(0.26) | -(0.29) | -(0.24) | (0.023)* | -(0.11) | -(0.13) |
| Father's years of education | 0.013 | 0.012 | 0.011 | 0.023 | 0.022 | 0.022 |
| | (0.023)* | (0.035)* | (0.043)* | (0.000)** | (0.001)** | (0.001)** |
| Mothers years of education | 0.009 | 0.009 | 0.01 | 0.027 | 0.025 | 0.025 |
| | -(0.11) | -(0.11) | -(0.12) | (0.000)** | (0.000)** | (0.000)** |
| Missing info on parents controls | yes | yes | yes | yes | yes | yes |
| Regional controls | | yes | yes | | yes | yes |
| Community controls | | | yes | | | yes |
| Observations | 776 | 776 | 776 | 816 | 816 | 816 |
| R-squared | 0.044 | 0.055 | 0.067 | 0.118 | 0.143 | 0.155 |

Robust p values in parentheses

* significant at 5%; ** significant at 1%

p-values are robust to heteroscedasticity at the community level.

Table 11 - Effect of the Exposure to Conflict on Schooling: Coefficients of the Interactions Between Dummies Indicating Age in 1991 and the Exposure to Conflict in the Region of Birth (TLSS 1999)

| | Dependent variable: years of schooling (0 - 9) | | | | | |
|---|---|---|---|---|---|---|
| | Females | | | Males | | |
| ***Variables:*** | (1) | (2) | (3) | (1) | (2) | (3) |
| Residence in the High Conflict Zone (RHCZ) | -0.15 | | | -0.13 | | |
| | [0.08] | | | [0.07] | | |
| Interaction (age 5-15 in 1991)*RHCZ | 0.05 | | | 0.02 | | |
| | [0.10] | | | [0.09] | | |
| ***Age in 1991*** | | | | | | |
| 24 | | -0.37 | | | -0.55 | |
| | | [0.26] | | | [0.24] | |
| 23 | | -0.06 | | | -0.52 | |
| | | [0.26] | | | [0.27] | |
| 22 | | -0.32 | | | 0.05 | |
| | | [0.27] | | | [0.21] | |
| 21 | | 0.1 | | | -0.24 | |
| | | [0.26] | | | [0.22] | |
| 20 | | -0.46 | | | -0.27 | |
| | | [0.24] | | | [0.19] | |
| 19 | | -0.1 | | | 0.23 | |
| | | [0.23] | | | [0.20] | |
| 18 | | -0.04 | | | 0.01 | |
| | | [0.23] | | | [0.19] | |
| 15 | | 0.05 | 0.23 | | -0.03 | 0.02 |
| | | [0.18] | [0.21] | | [0.19] | [0.19] |
| 14 | | 0.05 | 0.11 | | -0.08 | -0.04 |
| | | [0.22] | [0.22] | | [0.20] | [0.19] |
| 13 | | -0.18 | -0.11 | | -0.15 | -0.11 |
| | | [0.19] | [0.19] | | [0.18] | [0.18] |
| 12 | | 0.28 | 0.34 | | -0.11 | -0.07 |
| | | [0.18] | [0.18] | | [0.19] | [0.19] |
| 11 | | 0.2 | 0.27 | | -0.12 | -0.07 |
| | | [0.19] | [0.19] | | [0.18] | [0.17] |
| 10 | | -0.34 | -0.27 | | -0.26 | -0.21 |
| | | [0.19] | [0.18] | | [0.16] | [0.16] |
| 9 | | -0.37 | -0.3 | | 0.15 | 0.2 |
| | | [0.22] | [0.21] | | [0.22] | [0.22] |
| ***Control Variables:*** | | | | | | |
| Region of birth | yes | no | no | yes | no | no |
| ***Fixed Effects by raion (n=54):*** | no | yes | yes | no | yes | yes |
| F statistic: year of birth*war exposure=0 | 0.27 | 1.31 | 1.77 | 0.04 | 1.21 | 0.48 |
| R-squared | 0.04 | 0.04 | 0.03 | 0.02 | 0.02 | 0.01 |
| Observations | 1352 | 1352 | 1352 | 1586 | 1586 | 1586 |

Notes: All specifications include year of birth dummies. Standard errors are in brackets.

F-statistics tests the hypothesis that the coefficients of the interaction between the year of birth dummies and the RHCZ are jointly zero. The control group is born in 1966 (Col. 2). The control group is year of birth 1966 - 1973 (Col. 3). The omitted region is Dushanbe.

Table 12 - Effect of the Exposure to Conflict on Schooling: Coefficients of the Interactions Between Dummies Indicating Age in 1991 and the Exposure to Conflict in the Region of Birth (TLSS 2003)

| | Dependent variable: years of schooling (0 - 9) | | | | | |
|---|---|---|---|---|---|---|
| | Females | | | Males | | |
| ***Variables*** | (1) | (2) | (3) | (1) | (2) | (3) |
| Residence in the High Conflict Zone (RHCZ) | 0.01 | | | -0.02 | | |
| | [0.05] | | | [0.03] | | |
| Interaction (age 5-15 in 1991)*RHCZ | -0.12 | | | 0.01 | | |
| | [0.05] | | | [0.04] | | |
| ***Age in 1991*** | | | | | | |
| 24 | | -0.08 | | | 0.12 | |
| | | [0.20] | | | [0.15] | |
| 23 | | 0.07 | | | -0.09 | |
| | | [0.20] | | | [0.15] | |
| 22 | | 0.01 | | | 0.05 | |
| | | [0.19] | | | [0.16] | |
| 21 | | 0.07 | | | -0.06 | |
| | | [0.19] | | | [0.16] | |
| 20 | | -0.15 | | | 0.03 | |
| | | [0.20] | | | [0.14] | |
| 19 | | 0.06 | | | 0.11 | |
| | | [0.20] | | | [0.15] | |
| 18 | | -0.01 | | | 0.12 | |
| | | [0.18] | | | [0.14] | |
| 17 | | -0.18 | | | 0.04 | |
| | | [0.19] | | | [0.15] | |
| 16 | | -0.04 | | | -0.02 | |
| | | [0.19] | | | [0.15] | |
| 15 | | -0.02 | 0 | | -0.02 | -0.05 |
| | | [0.18] | [0.13] | | [0.14] | [0.09] |
| 14 | | -0.18 | -0.15 | | -0.14 | -0.18 |
| | | [0.19] | [0.14] | | [0.14] | [0.09] |
| 13 | | -0.1 | -0.07 | | 0.09 | 0.06 |
| | | [0.18] | [0.12] | | [0.14] | [0.09] |
| 12 | | -0.07 | -0.04 | | 0.07 | 0.04 |
| | | [0.18] | [0.12] | | [0.14] | [0.10] |
| 11 | | -0.22 | -0.19 | | 0.03 | -0.01 |
| | | [0.17] | [0.12] | | [0.13] | [0.08] |
| 10 | | -0.08 | -0.06 | | -0.04 | -0.08 |
| | | [0.17] | [0.12] | | [0.13] | [0.08] |
| 9 | | -0.21 | -0.19 | | 0.09 | 0.06 |
| | | [0.17] | [0.11] | | [0.13] | [0.09] |
| 8 | | -0.16 | -0.13 | | 0.21 | 0.17 |
| | | [0.17] | [0.11] | | [0.13] | [0.08] |
| 7 | | -0.29 | -0.26 | | 0.21 | 0.18 |
| | | [0.17] | [0.11] | | [0.13] | [0.08] |
| 6 | | -0.21 | -0.18 | | 0.05 | 0.01 |
| | | [0.17] | [0.11] | | [0.13] | [0.07] |
| 5 | | -0.18 | -0.15 | | -0.03 | -0.07 |
| | | [0.17] | [0.11] | | [0.12] | [0.07] |
| ***Control Variables:*** | | | | | | |
| Region of birth | yes | no | no | yes | no | no |
| ***Fixed Effects by raion (n=54):*** | no | yes | yes | no | yes | yes |
| F statistic: year of birth*war exposure=0 | 4.72 | 0.76 | 1.05 | 0.05 | 1.19 | 1.75 |
| R-squared | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Number of Observations | 3663 | 3663 | 3663 | 3319 | 3319 | 3319 |

Notes: All specifications include year of birth dummies. Standard errors are in brackets.

F-statistics tests the hypothesis that the coefficients of the interaction between the year of birth dummies and the RHCZ are jointly zero. The control group is born in 1966 (Col. 2). The control group is year of birth 1966 - 1976 (Col. 3). The omitted region is Dushanbe.

Table 13 - Sample Characteristics (chidren age 7 - 16), TLSS 1999

| Variable | N | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ***Child Characteristics:*** | | | | | |
| Age | 3623 | 11.75 | 2.65 | 7 | 16 |
| Female | 3623 | 0.50 | | | |
| Grades Completed | 3623 | 4.78 | 2.81 | 0 | 11 |
| Enrolled | 3623 | 0.87 | | | |
| Tajik | 3623 | 0.75 | | | |
| Uzbek | 3623 | 0.23 | | | |
| Rural area (rural) | 3623 | 0.79 | | | |
| ***Region of Residence:*** | | | | | |
| Dushanbe | 3623 | 0.06 | | | |
| GB | 3623 | 0.04 | | | |
| RRS | 3623 | 0.24 | | | |
| Lenin | 3623 | 0.24 | | | |
| Khatlon | 3623 | 0.42 | | | |
| ***Household/Family characteristics:*** | | | | | |
| Damage dwelling (dam dw) | 3623 | 0.08 | | | |
| Household size (hhsize) | 3623 | 8.21 | 3.15 | 2 | 27 |
| Number of adults in a household (adults) | 3623 | 3.68 | 2.05 | 1 | 13 |
| Per capita household expenditure (Tajik roubles) | 3623 | 13726 | 8865 | 903 | 128398 |
| Age household head (agehh) | 3623 | 47.84 | 12.42 | 18 | 93 |
| Household Head Female | 3623 | 0.17 | | | |
| Grades completed by hhead | 3623 | 10.29 | 3.89 | 0 | 18 |
| Age of the spouse of hhead (agehs) | 3623 | 42.12 | 8.92 | 17 | 94 |
| Grades completed by hhead's spouse (edyhs) | 3623 | 9.28 | 2.66 | 0 | 15 |
| Age child's mother | 3623 | 38.11 | 4.84 | 17 | 54 |
| Grades completed by mother | 3623 | 9.95 | 1.99 | 0 | 15 |
| Grades completed by father | 3623 | 11.63 | 2.30 | 0 | 18 |
| Mother information missing | 3623 | 0.16 | | | |
| Father information missing | 3623 | 0.27 | | | |
| ***Community Characteristics:*** | | | | | |
| State enterprises fully closed in this community (yes/no) | 3390 | 0.34 | | | |
| Number of people had worked in those enterprises in this community | 1857 | 413.36 | 1054.90 | 0 | 6000 |
| State enterprises operating at a reduced capacity in this community (yes/no) | 3223 | 0.40 | | | |
| Number of people on leave from those enterprises | 1618 | 1034.67 | 2401.55 | 0 | 11000 |
| ***Proportion of people working in an industry in a community*** | | | | | |
| Agriculture | 3623 | 0.19 | | | |
| Industry | 3623 | 0.03 | | | |
| Infrastructure | 3623 | 0.03 | | | |
| Financial Services | 3623 | 0.00 | | | |
| Services | 3623 | 0.08 | | | |
| Construction | 3623 | 0.02 | | | |
| Government | 3623 | 0.03 | | | |
| Other | 3623 | 0.04 | | | |
| Region affected by war | 3623 | 0.43 | | | |

Table 14 - Means and Sample Size, Adults dataset (TLSS 1999 and 2003)

| | 1999 TLSS, adults, 2003 comparable | | 2003 TLSS, adults 1999 comparable | |
|---|---|---|---|---|
| Variable | N | Mean | N | Mean |
| Age | 2938 | 23.63 | 3840 | 23.82 |
| Female | 2938 | 0.46 | 3840 | 0.51 |
| Number of grades completed (0 - 9) | 2938 | 8.75 | 3840 | 8.72 |
| Moved since 01/1990 | 2899 | 0.00 | 3799 | 0.15 |
| Residence in high conflict area (war_b) | 2938 | 0.39 | 3840 | 0.42 |
| Rural area (rural) | 2938 | 0.83 | 3840 | 0.77 |
| ***Region of Residence:*** | | | | |
| Dushanbe | 2938 | 0.03 | 3840 | 0.05 |
| GB | 2938 | 0.05 | 3840 | 0.04 |
| RRS | 2938 | 0.23 | 3840 | 0.29 |
| Lenin | 2938 | 0.29 | 3840 | 0.27 |
| Khatlon | 2938 | 0.40 | 3840 | 0.35 |