

DISCUSSION PAPER SERIES

IZA DP No. 14775

**Civil War, Famine and the Persistence of
Human Capital: Evidence from Tajikistan**

Louise Grogan

OCTOBER 2021

DISCUSSION PAPER SERIES

IZA DP No. 14775

Civil War, Famine and the Persistence of Human Capital: Evidence from Tajikistan

Louise Grogan

University of Guelph, IZA and UCA

OCTOBER 2021

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Civil War, Famine and the Persistence of Human Capital: Evidence from Tajikistan*

The dissolution of the Soviet Union and 1992-96 Tajik civil war resulted in huge human and economic losses. Nevertheless, contemporary data suggest the persistence of investments in human capital in the region most affected by famine and least favoured since the cessation of hostilities, Gorno-Badakhshan Autonomous Oblast. Famine-affected women have greater stature and final educational attainment, later ages at marriage and lower fertility than do those in the neighbouring border province, Khatlon. Educational interactions between adults and children under age six are much more frequent. The continued emphasis on human capital after economic collapse is consistent with a locational imperative for households to earn incomes outside of agriculture, and with a higher relative status of women in non-agrarian societies.

JEL Classification: H4, J1

Keywords: food security, anthropometry, schooling, child mortality, early childhood education, civil war, Tajikistan

Corresponding author:

Louise Grogan
Department of Economics and Finance
Lang SBE
University of Guelph
MacKinnon Building
Rm. 706
Guelph
Canada
E-mail: lgrogan@uoguelph.ca

* Special thanks are due to two anonymous Referees and the Editor of this Journal for comments which substantially improved the quality of this manuscript. I would like to thank Kathryn Anderson, Tilman Brück, Damir Esenaliev, Bohdan Krawchenko, Murodbek Laldjebaev, Daniel Hamermesh, Roman Mogilevskii and participants at the Life In Kyrgyzstan 2019 Conference in Bishkek for very helpful comments on an earlier draft. Many thanks also to Marsha McGraw Olive and to participants of the Association of Comparative Economic Studies (ACES) sessions at the 2021 ASSA/AEA Meetings for helpful comments. All remaining errors are my own.

1 Introduction

This paper examines the legacy of a Soviet era human capital advantage amongst residents of the least-fertile and most-isolated corner of the former empire, Gorno-Badakhshan Autonomous Oblast (GBAO). GBAO is one of five regions of Tajikistan, the only Soviet republic to experience civil war immediately following the Soviet collapse. Data from the 1999 Living Standards Monitoring Study (LSMS), Tajikistan 2012 and 2017 Demographic and Health Surveys (DHS) and the 2005-6 Tajikistan Multiple Indicator Cluster Surveys (MICS) are employed. Difference-in-difference (DD) estimation is used to examine the relative impacts of the Soviet collapse on adult stature and educational attainment of women in GBAO and Khatlon, the other southern border region of the country. The Khatlon region is the ancestral home of the Kulyabi clans which eventually prevailed in the war against fighters from GBAO (Kilavuz (2009)). The results suggest that households in GBAO continue to invest strongly in early childhood human capital, even conditional on mother’s educational attainment and household wealth. These greater investments are consistent with the lack of agricultural employment opportunities in GBAO and the resulting need to obtain a broader range of skills.

An original Bolshevik aim had been to achieve similar levels of socioeconomic development throughout the Soviet Union (Antonenko (1983), Nourzhanov and Bleuer (2013)). The rapid industrialisation outlined in Stalin’s second five-year plan necessitated the provision of cheap food for the millions of people who were to leave the countryside for jobs in cities across the country. Food distribution and pricing policies were set to favour city-dwellers (Johnson (1985)). Strategically-important regions were also favoured with an extensive system of subsidies (see, for example, Bahry and Walsh (1987)). Enhanced food and consumer goods availability, known as “Moscow provisions” (*moskovskoe obespechenie*), were advertised as a means of attracting the high-skilled labour necessary to isolated regions. Those working in harsh and remote environments such as GBAO, the Far East and Far North were also given salary bonuses (*nadbavki*), holidays and lower official retirement ages. Access to scarce products could thus be greater in isolated cities such as Khorog, the capital of GBAO, than in the Russian cities where the goods had been manufactured (see, for example, Bliss (2006), Middleton (2016)). Despite these huge Soviet investments in infrastructure and human capital, GBAO remained overwhelmingly rural throughout the Soviet period.

The collapse of the Soviet Union and ensuing 1992-96 Tajik civil war instantaneously ended huge economic subsidies to Tajikistan (Scarborough (2018)). These subsidies have been estimated to have been the equivalent of half of the gross domestic product (GDP) of the Republic

(see, for example Stucker (2009), p.241 and Strayer (2016), p. 163). Large increases in food prices occurred. Fighting and food shortages were experienced in key cities across Tajikistan, including Dushanbe and Kurgan-Teppe, the capital of Khatlon, during during the war. In Khorog, Garm, Dushanbe and Khujand food shortages resulted in riots in which people were killed by security forces. The collapse of health services led to several outbreaks of typhoid (Mermin et al. (1999)).

The collapse of the Soviet Union left Tajikistan with a much larger population than could be supported by the land. Mountains cover 93% of the land, more than half of which lies at elevations above 3000 metres (Water for Sustainable Development (2018)). The Total Fertility Rate (TFR), the number of children a woman might expect to bear in her lifetime declined from about 7.0 to 5.0 in Tajikistan between 1970 and 1992, but remained the highest amongst Soviet republics (World Bank (2019c)). In GBAO, land is less suitable for growing crops or herding than in in other regions of Tajikistan. Under heavy Soviet subsidies, the population of GBAO had expanded from about 40 000 to 167 000 between 1937 and late 1990 (Buškov and Kalandarov (2003)). Eastern GBAO is home to a majority of the estimated 0.8% of Tajikistanis who are of ethnic Kyrgyz origin (Statistical Agency Tajikistan of Tajikistan (2010)). The high elevation of much of GBAO also precludes fruit and rice production and sheep herding. Yaks are kept for milk and meat in Murghab, but in quantities insufficient to provide food security (Epkenhans (2016)).

In the late Soviet period, only about 10-20% of food requirements in GBAO had been met locally (Bliss (2006)). From December 1992 to September 1993, almost no food or fuel reached GBAO, due to a blockade of the Pamir Highway (see, for example, Tadjbakhsh (1994), Jawad and Tadjbakhsh (1995), Babu Suresh and Tashmatov (2000) and Middleton (2019)). Famine conditions prevailed. Residents of the main city of GBAO, Khorog, and other large towns did not possess land and were not eligible for collective farm (*sovkhos*) rations. The lack of fuel meant that wheat combine machines could not be used. A sudden lack of sugar, salt and vinegar in the region had left no means of preserving food for winter. Almost no meat or powdered milk was available for seven months. Only food aid from the Aga Khan Foundation prevented mass starvation in 1993 (Bliss (2006)). A disastrous harvest in GBAO in 1995 further undermined food security. This absolute lack of food supply distinguishes the famine situation in GBAO from the Bengal famine of 1943, the Ethiopian famine in Wollo in 1973, and the Bangladesh famine in 1974, as described in (Sen (1981)).

The combination of Soviet development policies with the pre-existing highland realities had resulted in cultural and economic differences between GBAO residents and other Tajik peoples

by 1991. Both educational attainment and outmigration rates were higher from GBAO than from other areas of Tajikistan in the Soviet period (Nourzhanov and Bleuer (2013)). Today those born in GBAO may identify themselves foremost as Pamiri, even when resident outside of Tajikistan and carrying Tajik passports (Dagiev and Faucher (2018), Jonboboev (2018)). There are other potential several reasons for this, including memories of the civil war, the adherence of GBAO residents to the Ismaili faith and their knowledge that a large part of the local economy is now facilitated by the Aga Khan, but neglected by central government in Dushanbe (see, for example, Beeman (1999), Peyrouse (2012) and Kuhistoni (2014)).

The other southern border region, Khatlon, was a key producer of cotton (“white gold”) for the Soviet textile industry. Land is much more arable and fertile than in GBAO. In the late Soviet period, nearly the entire adult population of Khatlon had engaged in weeding, watering and manual harvesting of cotton on collective farms. Ownership of these farms changed with decollectivisation, but the importance of cotton monoculture has diminished only more slowly. After independence, medium-sized *Dehkan* farms were created and leased to former employees of collective farms. In addition to these allotments, farmers generally maintain small-scale household vegetable gardens and domesticated farm animals, as in Soviet times. Wheat, rice, vegetables and fruits are produced.

Because Tajik farmers are now free to choose what to farm, their ability to ensure food security may have improved. The Tajik government and local cotton ginners previously exerted substantial coercive power over planting, and controlled prices that farmers would receive (Eurasianet (2019)). Some farmers continue to choose cotton. As in Soviet times, school children, doctors, teachers and university students are sent to harvest cotton (*hashar*) every October. Remuneration is often partly in the form of cotton stalks, which can be burnt for heat in winter, or traded for foodstuffs produced locally (see, for example, Kassam (2011) and Boboyorov (2011), Swinkels (2014)).

Migrant remittances from seasonal work of men in Russia are now very important to family incomes across Tajikistan. Perhaps one third of the adult population of the country engages in seasonal labour migration (see, for example, Olimova and Olimov (2007)). In 2019, 29% of GDP was derived from this source (World Bank (2019b)). A majority of migrants are men working in the construction sector in cities across Russia. Russian language skills and education are not required for this type of work. Large numbers of farmers and their male children have migrated rather than engage in domestic cotton production with only subsistence returns. Anecdotal evidence suggests that villages in Khatlon and other cotton-growing regions are devoid of

working-age males because of the much greater potential salaries in Russia (Zarindast (2012), Luxmoore (2019)). Migration is also associated with a large increase in the number of divorces (Demytrie (2012)).

Privileged access to goods and services had previously attracted ethnic Russians to live in GBAO urban centres such as Khorog and Murghab, and to work in teaching or healthcare across the Tajik SSR. Many skilled jobs had been filled by Russian nationals. Tajik students who performed particularly well in highschool examinations had received funding to study in universities across the Soviet Union. As of 2012, the year of the first Tajikistan DHS, a majority of ethnic Russians had long left GBAO and Tajikistan. These skilled workers generally left for Russia in the early months of the Tajik civil war. Russian military airlifts were organized from Dushanbe. Many of those fleeing had filled high-skilled positions in administration, health and education in the late Soviet era. Although Russian workers had never constituted the majority of the Tajik or GBAO population, their departure substantially lowered population skill levels. Many skilled Tajik nationals also emigrated with their families to Russia permanently during and after the civil war. Permanent migrants from Badakhshan, as from Tajikistan as a whole, was relatively skilled. Those who remained were, on average, less skilled than those who emigrated.

The paper proceeds as follows. Section 2 comprises a comparison of human capital in GBAO and Khatlon, by birth cohort. The recent history of the southern border regions of Tajikistan is discussed in more detail in Appendix A. Section 4 presents difference-in-difference analysis of the impact of the Soviet collapse on relative adult stature and educational attainment of women in GBAO. Differences in contemporary early childhood educational investments across GBAO and Khatlon are then quantified. Section 5 concludes.

2 Data and summary statistics

There are several surveys which permit inference to be drawn about human capital in the late Soviet era and in the years following independence. The 1999 LSMS contains information on living standards very soon after the cessation of major hostilities. The 2005-6 MICS contains detailed information about early childhood interactions between adults and children of pre-school age in all regions of the country. The 2012 and 2017 DHS surveys contain child and adult anthropometry information, as well as standard socioeconomic variables including educational attainment. Adult height information can be employed as a summary measure of the nutrition and disease environment faced by individuals in childhood. DHS respondents are also posed

detailed subjective questions about women's status. Given the lack of household survey data and information about the magnitude of subsidies in the late Soviet era, these measures may be particularly important to a comparison of living standards.

The 1999 LSMS was the first nationally-representative household survey undertaken in Tajikistan. This survey comprises a household questionnaire, a population point component and an assessment of local prices for key foodstuffs. Nearly 2000 households were surveyed across all regions of the country. In rural areas, a module about agricultural production was administered to each household. A population point questionnaire was also completed.

Summary statistics from the 1999 LSMS of Tajikistan show the extent of poverty and displacement immediately after the war. Economic conditions of GBAO residents remained much worse than those in Khatlon three years after the cessation of major hostilities. Means of key living standards measures are presented for Khatlon and GBAO in Table 1.

Sample means are suggestive of the differences between GBAO and Khatlon in postwar economic situations facing households. There were fewer remaining infrastructure provisions in GBAO than in Khatlon: Far fewer responding households resided in population points in which agriculture was irrigated (16% versus 64%, column (1)). The population point questionnaire of the 1999 LSMS also indicates that Khatlon had many more refugees at the end of the civil war than did GBAO (column (2)). During the war, an estimated 10 to 20 percent of the population of Tajikistan was displaced at any one time (Lynch (2007)). In Khatlon, 67% of household heads reported the presence of refugees in the population, versus 19% in GBAO. This is consistent with descriptions of the 1990s contained in Bliss (2006). Almost no fighting occurred in GBAO. Khatlon experienced more fighting and internal population displacement, and also had more refugees from Afghanistan in the late 1990s.

Households had less access to utilities and public services, and were poorer in GBAO than in Khatlon in 1999. Women giving birth were much more likely to do so at home in GBAO (82%) than in Khatlon (55%) (column (3)). Soviet collective farms were much more likely to be present in the locations of GBAO residents than of those of Khatlon (column (4)). Far fewer households had access to centralized water provisions (49 versus 67%, column (5)) or to electricity (84% versus 100%, column (6)). Mean household expenditures in the month prior to the interview in GBAO were about 83% of those in Khatlon (column (7)). Household heads reported far lower subjective measures of their living standards in GBAO than in Khatlon (column (8)). Similar differences are apparent when comparing the living standards of households in GBAO to those of households in other regions of Tajikistan (bottom rows of Table 1).

2.1 Adult height and years of schooling

Anthropometry data may be particularly useful for establishing the historical record of living standards in the late Soviet era and the first years of independence. Before 1991, price setting, transfers from Moscow and public goods provisions may have created a large wedge between individual incomes and living standards. These policies were partly the result of geopolitical goals set in Moscow for more than seventy years (Pomfret (1995), Mastibekov (2014)). To date, Soviet archival records of the disease environment facing children and access to vaccines and surgical interventions during childhood are inaccessible. Adult stature measurements may provide a relatively noiseless summary measure of these features of Soviet childhoods. Food security, the disease environment, vaccination programmes, wages and school feeding policies may all have contributed to the stature of the last Soviet-born cohorts.

An experience of war during childhood has been shown to have considerable impacts on health in other contexts (see, for example, Akresh et al. (2012) and Minoiu and Shemyakina (2014)). Health in early childhood is highly persistent. Health at very young ages has been found to have effects on cognitive function and general health at older ages (see, for example, Attanasio, Meghir, and Nix (2019), Case and Paxson (2008)). Childhood stunting is associated with a range of worse adult outcomes (Cunha and Heckman (2007), Cunha, Heckman, and Schennach (2010), Currie and Vogl (2013), Galasso and Wagstaff (2019)).

Changes in adult stature are not always informative about long-run wealth or income changes in populations (see, for example Steckel (1995)), Komlos (1995)), Deaton (2007) and Deaton (2008)). Nevertheless, they are one readily-available summary measure of changes in relative living standards following the Soviet collapse.

A comparison of heights and educational attainment of adult women in GBAO and Khatlon suggests the impact of both the Soviet and civil war periods on human capital investments. Educational attainment of respondents is recorded in the DHS 2012 and 2017 rounds. Sample means for both outcomes are presented, by birth cohort, in Table 2. Samples are reweighted to reflect differences in size.

A GBAO height advantage of about 0.9-1.8 centimetres is evident amongst those born before 1978 (columns (1) and (2)). These women had reached age 15 before the advent of civil war. This is shown in column (1) of Panel A. This advantage appears smaller in subsequent cohorts, but had not been eliminated amongst those born during 1992-2002. Women born after 1992 are about 0.9 centimetres taller in GBAO than in Khatlon, on average (column (2) of Panel A).

Educational attainment was greater in GBAO than in Khatlon or other regions for cohorts

born during 1968-77 (Panel B, columns (1) and (2)). This remained true amongst the war- and famine-affected cohorts and those born later. The difference is greatest amongst those born during 1978-1991, nearly 3 1/2 years (Panel B, column (3)). The drop in educational attainment in Khatlon for this cohort reflects lengthy school closures due to heavy fighting and prolonged blockades of major towns. Amongst those born in 1992 or later, women in GBAO completed nearly two more years of schooling than did those in Khatlon. School attendance is mandatory between age 7 and 17, and there are eleven years taught in the public system. This remains similar to the Soviet era. The quality of this education may have also changed substantially in later cohorts. This is a known concern of local employers (see, for example, Ajwad et al. (2014) and World Bank (2019a)).

These findings are consistent with existing literature on schooling in the immediate post-Soviet period in Tajikistan. The decline in schooling in Khatlon amongst war-affected cohorts is consistent with that documented for regions most affected by fighting (Shemyakina (2011)). Kochkin (2012) finds that parents in GBAO have significantly higher educational expectations for their children than those elsewhere in Tajikistan. These findings are also consistent with Grogan (2007), who shows that multigenerational households invest less in the schooling of the youngest generation. Such households became more prevalent during the civil war.

The early childhood outcomes data from the MICS suggest that adults spend considerably more resources on pre-school children in GBAO than in Khatlon. In Table 3, means are presented. Respondents in the MICS are asked whether, in the past week, a household member has engaged with a child under sixty months in the following six activities: read to, sung, told stories, taken outside, played games with or named objects. With the possible exception of reading a book, these actions can be undertaken without any financial cost. The three categories of household member considered are: mother, father and other household members.

The means show that children in GBAO have much more educational inputs from adults even prior to attending school. For four of the six outcomes considered the fraction of GBAO children receiving such inputs was much greater than the fraction in Khatlon. About one third of children in GBAO had been read to in the previous week, versus about one sixth in Khatlon (column (1) of Table 3). About two-thirds of children in GBAO had been told stories by an adult, versus about 0.45 in Khatlon ((column (2)). GBAO children were about 0.06 more likely to have been sung to (column (3)), and about 0.10 more likely to have been played with by an adult (column (5)) than those in Khatlon in the week prior to the 2005-6 MICS survey. Differences in time spent naming objects were not, however, statistically significant across GBAO and Khatlon

(column (6)).

2.2 Early childhood health

All available child anthropometry data can also be employed to compare early childhood human capital in GBAO and Khatlon. Children under 60 months are also measured to create height-for-age, weight-for-age and weight-for height measures. Means of health outcomes including stunting, wasting, underweight and child death before sixty months are examined in columns (7)-(11) of Table 3.

Levels of stunting, wasting and underweight amongst children under sixty months in the combined MICS and DHS suggest that contemporary access to nutrition was slightly worse in GBAO than in Khatlon by the mid 2000s. For stunting (height-for-age score of -2 SD or less below the World Health Organisation growth chart) and underweight (weight-for-height score of -2 SD or less), levels are found to about be 0.02 higher in GBAO than in Khatlon, statistically significant at the 10% level (columns (7) and (9)). For wasting, (weight-for-age score of -2 SD or less), no significant differences are observed (column (8)).

The combined data mask an important divergence in trends in stunting across these two southern border regions. Stunting is generally considered the best measure of long-term deprivation in young children (see, for example, Dewey and Begum (2011)). In 2017, stunting differences measured for in the DHS were far above those seen in the combined surveys: In GBAO about 28% of children were stunted versus 15% in Khatlon (column (9)). The incidence of stunting in GBAO in 2017 was similar to that observed in 2005, but had fallen substantially in Khatlon. Wasting was slightly more prevalent in GBAO (column (10)), but no differences in underweight (weight-for-age score of -2 SD or less) were found in the combined 2005, 2012 and 2017 data (column (11)).

There is undoubtedly some selectivity into child survival that cannot easily be addressed in estimation using anthropometry scores. Conditional on survival, those who are sick are more likely to be stunted in childhood, and will be shorter adults. Illness is a major cause of childhood stunting (Currie and Vogl (2013)). Stunted women will, in turn, have more difficult births, and worse birth outcomes (Leroy and Frongillo (2019)). Differences in mortality before sixty months are not statistically significant between the two regions in the combined 2012 and 2017 DHS data. About 3-4% of children died before attaining this age in both regions (column (11) of Table 3).

2.3 Women's status in Khatlon and GBAO

The ability of women to direct household resources may be important to explaining differences in early childhood outcomes across regions. If mothers have different preferences about resource allocation from other household members, differences in say in household decision-making may be reflected in attention and nutrition for young children. The 2012 and 2017 DHS surveys contain standard proxies for a woman's relative status in her household, including age at marriage, age at first birth and the total number of children born to a woman. Less than 2% of respondents in this oldest cohort remained unmarried. As well, respondents were asked to answer five hypothetical questions about whether a spouse would be justified in beating his wife in the following circumstances: She goes out without asking permission, she neglects the children, she argues with her spouse, she refuses sex and she burns the food. Both respondents with and without spouses are posed these hypothetical questions.

The means of these variables can be compared across women in Khatlon and GBAO who were aged 15-24 in 1992. These respondents are the oldest present in the combined 2012 and 2017 DHS surveys. Many of these respondents would have had their education interrupted by civil war.

Women in GBAO have later ages at marriage, later first births and fewer total births than do those in Khatlon. This is shown in columns (1)-(3) of Table 4. The difference in mean age at marriage is nearly 2 years, (column (1)). Mean age at first birth is also about one and one half years different (column (3)). At the time of the DHS interview, women in this birth cohort had borne one child less, on average, if they resided in GBAO than in Khatlon (column (4)).

Women's views of gender relations between spouses also differ substantially, and suggest much greater autonomy within marriages in GBAO. Results for the five hypothetical outcomes are presented in columns (4)-(8) of Table 4, separately by region of residence. In GBAO less than one third of respondents agreed that a spouse was justified in beating his wife if she had gone out without permission, versus two-thirds of respondents in Khatlon (column (4)). Two thirds of women in Khatlon responded that a man was justified in beating his wife if she neglected the children, versus 0.41 in GBAO (column (5)). Similar large differences in responses to questions about arguing with a spouse, refusing sex and burning food were observed.

The higher relative status of women in GBAO than in Khatlon is consistent with the early childhood findings. Greater autonomy for women may lead to relatively greater investments in the next, smaller, generation.

The relatively high status of women in GBAO households suggests the persistence of cultural

changes associated with Soviet investments. There are also potential explanations related to the geography of GBAO. Investment in the next generation may be relatively important in non-agrarian societies (see, for example, Kochkin (2012)). Women may be relatively important in making early childhood human capital investments. Without agriculture, the physical strength of men might not lead to relatively greater contributions to household production, and to reduced female say in household decisions. Through these channels, the poorer quality land of GBAO may have interacted with Soviet investments to raise the status of both women and their children.

Other available measures of female autonomy concur with those observed in Table 4. The DHS data also show that women from GBAO are much more likely than those from Khatlon to migrate temporarily to supplement family incomes. The 2017 DHS posed the question “*Have you worked abroad for three or more months in the past three years?*” About 8% of respondents in GBAO had done so, versus 5% in Khatlon. In both the 2012 and 2017 DHS surveys, far more women from GBAO reported that they had been away for more than one month in the past twelve. In 2017, 61% of GBAO respondents had been away, versus 48% in Khatlon.

3 Estimation

The impact of the collapse of the Soviet Union on relative heights and educational attainment of women is assessed using DD estimation. Because these two outcomes are fixed by adulthood, the 2012 and 2017 DHS data permit a summary assessment of impacts. The standard DD assumption of parallel trends can also be examined amongst the 1968-71 and 1972-77 birth cohorts for both outcomes. To account for the Autumn 1991 collapse of the Soviet Union, and the nine month gestation period of children, 1992 births are omitted from the analyses.

The DD regression to be estimated takes the form:

$$\begin{aligned} OUTCOME_{ics} &= \beta_0 + \beta_1 * GBAO_s + \beta_2 * PSONIET_{ic} + \beta_3 * PSONIET * GBAO_{isc} \\ &+ \beta_4 * DISTPANJ_{cs} + \beta_5 * ELEV_{cs} + \beta_6 * RURAL_{cs} + \dots + \epsilon_{ics} \end{aligned}$$

Adult heights and years of education of women are explained as a function of a binary dummy, *GBAO*, a dummy indicating that the person was not yet aged fifteen by the collapse of the Soviet Union (*PSONIET*), and an interaction term between the two. The distance to the Afghan-Tajik border of community (district) *c* is included as a control in all specifications.

In the preferred specification, controls are also included for elevation above sea level (in metres) and rural location. Estimation compares first women in GBAO and Khatlon, and then women in GBAO to those in other regions of Tajikistan.

3.1 Heights

The DD specification assumes that heights would have followed a common trend in GBAO and elsewhere in the absence of the collapse of the Soviet Union. A test of this assumption is presented in Panel A of Table 5. Adult heights of birth cohorts 1968-71 are compared to those born during 1972-77, for GBAO and other regions.

There were no apparent differences in height trends between GBAO and Khatlon during this period. The interaction term between the dummy for post-1971 births and GBAO is never statistically significant at the 10 percent level (columns (1)-(3)). A similar result is found for all specifications in which GBAO heights for these oldest cohorts are compared to those in other regions of Tajikistan (columns (4)-(6)). The results of Panel A support the standard DD assumption of common pre-trends for the height outcome across treatment and control groups.

The persistence of the GBAO height advantage in famine-affected cohorts is remarkable. Results are presented in Panel B of Table 5. Women in GBAO remained more than one centimetre taller than those in Khatlon, and there was no significant trend in relative heights, *ceteris paribus*.

Differences in heights across residents of GBAO and other regions of Tajikistan can be similarly examined. Results are presented in columns (4)-(6) of Panel B of Table 5. The height advantage of GBAO women does not appear to have diminished in recent cohorts. After accounting for elevation and other factors, young GBAO women remain more than two centimetres taller than those in Sughd, the Regions of Republican Subordination or Dushanbe, far richer and more fertile regions.

3.2 Years of schooling

A similar analysis is undertaken for completed years of schooling. Here the sample is restricted to those aged 18 and over at the time of the DHS interview.

The standard DD assumption of common pre-trends in years of schooling appears to hold both when comparing GBAO women to those in Khatlon, and GBAO women to those in other regions of Tajikistan. These estimates are presented in Panel A of Table 6. The interaction term between the GBAO dummy and post-1971 births is never statistically significant. Women have more education in GBAO than other regions in these older cohorts, *ceteris paribus*.

The main DD analysis for education is presented in Panel B of Table 6. The results suggest that the GBAO schooling advantage for women declined in cohorts affected by the civil war and famine. In the comparison with Khatlon (columns (1)-(3)), and in that with other regions of Tajikistan (columns (4)-(6)) the interaction term between GBAO and post-Soviet is statistically significant at the 1% level in all specifications. Nevertheless, the schooling advantage in GBAO remains large, both in comparison with Khatlon and with other regions of the country. The coefficient on the DD interaction term is much smaller than that on the GBAO dummy in all cases.

3.3 Early childhood outcomes

First difference estimation by OLS can be used to quantify differences in contemporary early childhood investments across GBAO and Khatlon. The equation takes the form:

$$\begin{aligned} OUTCOME_{is} &= \beta_0 + \beta_1 * GBAO_s + \beta_2 * AGEMOS_{is} + \beta_3 * FEMALE_{is} \\ &+ \beta_4 * MOTHERED_{is} + \beta_5 * RURAL_{is} + \beta_6 * BRTHORD_{is} \\ &+ \beta_7 * HHSIZE_{is} + \beta_8 * HHWEALTH_{is} + \dots + \epsilon_{is} \end{aligned}$$

Outcomes comprise the six early childhood interactions, three anthropometric outcomes and mortality probabilities for those age sixty months or less. All equations control for birth order of individual i in oblast s . In the preferred specification, controls for mother's educational attainment, household wealth quantile, rural, birth order, household size, and an interaction between age in months and sex are included. Sample weights are included and standard errors are robust. The educational interaction data are from the 2005/06 MICS, while the anthropometry data also include observations from the 2012 and 2017 DHS.

The results show that young children in GBAO obtain more early childhood education opportunities but do not have better nutritional or mortality outcomes than those in Khatlon. This is true even after conditioning on mother's educational attainment and household wealth. Results are shown in columns (1)-(4) of Table 7, Panel A. Similar results obtain when comparing children in GBAO to those in other regions of Tajikistan (Panel A, columns (5)-(8)).

3.3.1 Early childhood education

Pre-school aged children in GBAO continue to obtain more early childhood education from adults than do those in Khatlon. The results are presented in Panel A. Children in GBAO are about 0.13-to 0.20 more likely to have been read to by their mother, father or another in the previous week than are those in Khatlon, *ceteris paribus*. Estimated coefficients differ little whether or not mother's education is controlled for ((columns (3) and (4)). The addition of controls for household wealth quintile does lower the coefficient estimate slightly for most outcomes. Still, the measured conditional association remains large and statistically significant at the 1% level for four of the six outcomes examined. Children in GBAO are more likely than those in Khatlon to have been read to, told a story, sung to, have been played with in the week prior to the MICS interview, even after accounting for all observable differences between parents and households.

Similar results prevail when early child interactions are compared between GBAO and respondents in other regions of Tajikistan (Panel B, columns (5)-(8)). These results are presented in Tables (5)-(8) of Panel A. In the preferred specifications of column (8), young children in GBAO are found to have been about 0.13 more likely to have been told stories in the week prior to the MICS interview, and about 0.17 more likely to have songs sung to them. They are also significantly more likely to have spent time outside and to have played with an adult.

3.3.2 Anthropometry and child mortality

Children in GBAO do appear to suffer more from stunting than do those in Khatlon in the combined MICS and DHS data. Stunting is generally considered the best measure of long-run childhood deprivation. Results are presented in Panel B of Table 7. The combined sample has been reweighted and a year dummy included in all specifications. The probability that a child is stunted (low height-for-age) is about 0.07 greater in GBAO, conditional on mother's educational attainment, household wealth and all other controls (columns (1)-(4)). The coefficient on the GBAO dummy is scarcely different in specifications which do not account for mother's education or household wealth. Differences in the incidence of underweight (low weight-for-height) and wasting (low weight-for-age) across Khatlon and GBAO are not apparent. When only the 2017 DHS is employed, the greater incidence of childhood stunting in GBAO is even more apparent.

When GBAO is compared to other regions of Tajikistan, anthropometrics outcomes of young children appear substantially worse. These results are presented in columns (5)-(8) of Panel C. The incidence of stunting is about 0.09 greater in GBAO, *ceteris paribus*.

Mortality before 60 months does not appear to be greater in GBAO than in Khatlon in the

DHS data, *ceteris paribus* (Panel C, columns (1)-(4)). This is also the case when comparing GBAO to other regions of Tajikistan (columns (5)-(8)). Wasting and underweight incidences are also higher in GBAO, by about 0.03 in the preferred specification. These findings suggest that children in the most recent cohorts in GBAO might not attain the height advantages observed amongst their mothers.

3.3.3 Women's status

The greater relative status of women in GBAO is evident amongst the youngest participants of the DHS surveys of 2012 and 2017. Responses to the same five hypothetical situations in which a woman considers beating justifiable are employed as dependent variables in simple OLS regressions. These results are shown in Table 8. Teenagers aged 15-19 are included in the analyses. The coefficient on a GBAO dummy in these limited dependent variable regressions is reported. In columns (1)-(3) comparisons are made between GBAO and Khatlon respondents and in (4)-(6) between GBAO and other regions of Tajikistan.

The comparison between GBAO and Khatlon respondents suggests large differences in the perceived acceptability of spousal beating. For all five outcomes, teenagers in GBAO are considerably less likely to view spousal beating as an acceptable response to perceived transgressions. For example, respondents in GBAO are about 0.17 less likely to than those in Khatlon respond that spousal beating is an acceptable response to arguing with one's spouse in the preferred specification (column (3)), which includes controls for education and rural-urban status.

By these measures, young women in GBAO also have a higher status in their households than women in other regions of Tajikistan (columns (4)-(6) of Table 8). For two outcomes, arguing with a spouse and refusing sex, women in GBAO are much less likely to agree that spousal beating is acceptable in Khatlon than in these regions. For other outcomes, no statistically significant differences are observed in the preferred specifications. These findings are particularly striking given the relative isolation of households in GBAO and the lack of reach of central government in this region.

4 Conclusions

This paper examines the legacy of the late Soviet era for human capital investments in Tajikistan. Information from household surveys comprising anthropometry scores, schooling attainment, mortality, attitudes to spousal violence and adult-child educational interactions is employed.

Difference-in-difference estimation is used to examine the differential impacts of the Soviet collapse on adult stature and years of schooling of women in GBAO and Khatlon. The results suggest the persistence of a relatively great incentive to invest in the human capital of children in the corner of the Soviet Union least conducive to agricultural production and arguably most impacted by dissolution. Part of the legacy of seventy years of Soviet subsidies to GBAO is apparent in cultural norms of a relatively high status of women in households and greater early childhood investments, measured as time spent with young children in several activities. The level of investment in early childhood human capital is particularly striking given levels of malnutrition, the rural location, isolation, harsh climate and agro-pastoral livelihoods practised by a majority of families in GBAO. The results suggest that GBAO parents may be incentivised by the poor quality of the surrounding land to invest in the human capital of future generations.

The economic collapse of Tajikistan is apparent from the available adult height data. The results of extreme deprivation during the civil war are now evident as a fall in adult stature. The measured decline in heights of more than half a centimetre is comparable with that which resulted from childhood food deprivations during the Biafran War in Nigeria (Akresh et al. (2012)). The end of Soviet subsidies and the subsequent blockade of GBAO during much of the Tajik civil war did not eliminate a Soviet adult height advantage of women in GBAO. Women in GBAO who were born after the Soviet collapse are still about one centimetre taller than those in neighbouring Khatlon.

Undernourishment remains a contemporary concern in Tajikistan, and particularly in GBAO. Consistent with continued food availability problems, GBAO children under age five experienced significantly greater stunting than those in any other region in 2017. High overall levels of stunting in GBAO suggest that nutritional supplements aimed at pre-school aged children might have a role to play.

The educational advantages of late Soviet cohorts in GBAO persist today. Years of schooling have declined somewhat amongst post-war cohorts in Tajikistan. This decline has perhaps been larger in GBAO than elsewhere. Nevertheless, the youngest adult cohorts in GBAO have at least one more year of schooling on average than do either those in Khatlon or other regions of Tajikistan. These results are particularly striking given that GBAO is much less wealthy than other regions of the country. Future research might exploit ethnic heterogeneity within GBAO to help ascertain the extent to which apparent cultural differences are a result of ecological conditions necessitating a migration- and remittance-dependent society.

References

- Ajwad, M., S. Hut, I. Abdulloev, R. Audy, J. de Laat, S. Kataoka, J. Larrison, Z. Nikoloski, and F. Torracchi (2014). The skills road: Skills for employability in tajikistan. *World Bank, Washington, DC*.
- Akresh, R., S. Bhalotra, M. Leone, and U. O. Osili (2012). War and stature: Growing up during the nigerian civil war. *American Economic Review: Papers and Proceedings* 101(3), 273–277.
- Antonenko, B. (1983). History of the tajik ssr. *Maorif Publishing House, Dushanbe*.
- Atkin, M. (1989). The subtlest battle: Islam in soviet tajikistan. philadelphia: Foreign policy research institute.
- Attanasio, O., C. Meghir, and E. Nix (2019). Human capital development and parental investment in india. (*Mimeo*).
- Babu Suresh, C. and A. Tashmatov (2000). Food policy reforms in central asia setting the research priorities. *Policy Brief*.
- Bahry, D. and A. Walsh (1987). Outside moscow: Power, politics, and budgetary policy in the soviet republics. *NY: Columbia University Press*.
- Beeman, W. (1999). The struggle for identity in pos-soviet tajikistan. *Middle East Review of International Affairs* 3(4), 100–105.
- Bliss, F. (2006). Social and economic change in the pamirs (gorno-badakhshan, tajikistan). *Routledge London. Translated from the German original by Nicola Pacult and Sonia Guss*.
- Boboyorov, H. (2011). Collective identities and patronage networks in southern tajikistan. *PhD Thesis, University of Bonn, Germany*.
- Buškov, V. and Kalandarov (2003). Le passé et le présent des populations du pamir occidental. institut francais d’etudes sur l’asie centrale: Les montagnards d’asie centrale. tachkent-aix-en-provence. 1(1), 103–118.
- Case, A. and C. Paxson (2008). Height, health and cognitive function at older ages. *American Economic Review* 92(2), 463–467.
- Cunha, F. and J. Heckman (2007). The technology of skill formation. *American Economic Review* 97(2), 31–47.
- Cunha, F., J. Heckman, and S. Schennach (2010). Estimating the technology of cognitive and non-cognitive skills formation. *Econometrica* 78(3), 883–931.

- Currie, J. and T. Vogl (2013). Early-life health and adult circumstance in developing countries. *Annual Review of Economics* 5, 1–36.
- Dagiev, D. and C. Faucher (2018). Introduction (ch. 1) identity, history and trans-nationality in central asia: The mountain communities of pamiir. *Imprint Routledge Ebook. First edition*.
- Deaton, A. (2007). Height, health, and development. *Proceedings of the National Academies of Science* 104(33), 13232–7.
- Deaton, A. (2008). Height, health, and inequality: The distribution of adult heights in india. *American Economic Review* 98(2), 468–474.
- Demytrie, R. (2012). Tajik women face divorce epidemic. october, www.bbc.com (last accessed february 2020).
- Dewey, K. G. and K. Begum (2011). Long-term consequences of stunting in early life. *Maternal and Child Nutrition* 7, 5–18.
- Epkenhans, T. (2016). The origins of the civil war in tajikistan: Nationalism, islamism, and violent conflict in post-soviet space. (*Contemporary Central Asia: Societies, Politics, and Cultures*) Lexington Press.
- Eurasianet (2019). Teachers toil in cotton fields as tajikistan tries to fix trade imbalance. *www.eurasianet.org November 14th*.
- Galasso, E. and A. Wagstaff (2019). The aggregate income losses from childhood stunting and the returns to a nutrition intervention aimed at reducing stunting. *Economics and Human Biology* (34), 225–238.
- Grogan, L. (2007). Patrilocality and human capital accumulation: Evidence from central asia. *Economics of Transition. Volume 15, Issue 4, Pages: 685-705*.
- Grousset, R. (1970). The empire of the steppes. a history of central asia new brunswick university press nj.
- Herzfeld, E. (1968). The persian empire: Studies in geography and ethnography of the ancient near east. In *F Steiner. p. 344*.
- Hopkirk, P. (1990). The great game: The struggle for empire in central asia. In *Kodansha International, New York*.
- Jawad, N. and S. Tadjbakhsh (1995). Tajikistan: A forgotten civil war. *Minority Rights Group*.

- Johnson, D. (1985). Agricultural productivity in the soviet union. *Current History* 84(504), 321–324.
- Jonboboiev, S. (2018). Geography, ethnicity and cultural heritage in interplay in the context in the tajik pamiri identity (ch. 2) in identity, history and trans-nationality in central asia: The mountain communities of pamir (dagikhudo dagiev and carole faucher, eds). *Imprint Routledge Ebook. First edition.*
- Kassam, S. N. (2011). One explanation for why farmers produce cotton collectively in post-soviet tajikistan. *PhD Thesis University of British Columbia (UBC), Department of Resource Management and Environmental Studies. open.library.ubc.ca (last accessed June 14th 2021).*
- Kilavuz, I. T. (2009). The role of networks in tajikistan’s civil war: Network activation and violence specialists. *Nationalities Papers. Cambridge University Press* 37(5), 693–717.
- Kochkin, E. (2012). Changes in the educational system in structural crisis: Educational trajectories of tajik children. *Lund University Student Papers. MA Thesis. Human Geography, lup.lub.lu.se (last accessed June 14th 2021) 1.*
- Komlos, J. (1995). The biological standard of living on three continents. *Boulder: Westview Press.*
- Kreutzmann, H. (2012). Pastoral practices in high asia. free university berlin *geo.fu-berlin.de* (last accessed june 14th 2021). *Pastoral Practices in Transition: Animal Husbandry in High Asian Contexts, Ch. 1.*
- Kreutzmann, H. (2015). Pamirian crossroads: Khirgiz and wakhi of high asia. *Wiesbaden: Harrassowitz Verlag.*
- Kuhistoni, K. (2014). Voices from central asia august no. 18. In *From Pamirs to the Outside World: Seeking Decent Jobs*. Elliot School of International Affairs Central Asia Program at The George Washington University.
- Kuzmina, E. (2008). The prehistory of the silk road. In *Edited by Victor H. Mair*. University of Pennsylvania Press, Philadelphia.
- Leriche, P. (1998). Bactria, pre-islamic period. In *Encyclopaedia Iranica.*
- Leroy, J. and E. Frongillo (2019). What does stunting really mean? a critical review of the evidence. *Advances in Nutrition* 10(2), 196–204.

- Luxmoore, M. (2019). *In A Tajik Village That Looks To Russia, Childrens Laughter Echoes In Fatherless Homes* www.rferl.org, November 16.
- Lynch, D. (2007). The tajik civil war and peace process. *Civil Wars* 4(4), 49–72.
- Mastibekov, O. (2014). Routledge. london and new york. *Leadership and Authority in Central Asia: The Ismaili Community in Tajikistan* 1.
- Mermin, J. H., R. Villar, J. Carpenter, L. Roberts, A. Samariddin, L. Gasanova, S. Lomakina, C. Bopp, L. Hutwagner, P. Mead, B. Ross, and E. D. Mintz (1999, 06). A Massive Epidemic of Multidrug-Resistant Typhoid Fever in Tajikistan Associated with Consumption of Municipal Water. *The Journal of Infectious Diseases* 179(6), 1416–1422.
- Middleton, R. (2016). History of the development of the pamir region of tajikistan (gorno-badakhshan). In: *Kreutzmann H., Watanabe T. (eds) Mapping Transition in the Pamirs. Advances in Asian Human-Environmental Research. Springer, Cham.*
- Middleton, R. (2019). Mapping transition in the pamirs. history of the development of the pamir region of tajikistan (gorno-badakhshan). *Modern Asian Studies. (Special Issue. Marginal Hubs: Conviviality Beyond the Urban Centre in Asia)* 53(3), 245–265.
- Minoiu, C. and O. Shemyakina (2014). Armed conflict, household victimization, and child health in côte d’ivoire. *Journal of Development Economics* 108, 237–255.
- Nourzhanov, K. and C. Bleuer (2013). State formation in the soviet era, 1917 to the 1960s ch. 3. *Tajikistan: A Political and Social History. Australian National University Canberra.*
- Olimova, S. and M. Olimov (2007). Labor migration from mountainous areas in the central asian region: Good or evil? *Mountain Societies Research and Development. no. 0904* 27(2), 104–108.
- Peyrouse, S. (2012). Economic trends as an identity marker? the pamiri trade niche with china and afghanistan. In *Problems of Post-Communism Volume 59. Issue 4.*
- Pomfret, R. (1995). The economies of central asia. *Princeton University Press.*
- Rawlinson, H. (2002). Bactria, the history of a forgotten empire. New Delhi: Asian Educational Services.
- Sabol, S. (1995). The creation of soviet central asia: The 1924 national delimitation. *Central Asian Survey* 14(2), 225–241.
- Saxer, M. (2016). A spectacle of maps: Cartographic hopes and anxieties in the pamirs. 21.

- Scarborough, I. (2018). The extremes it takes to survive: Tajikistan and the collapse of the soviet union, 1985-1992. *PhD thesis, The London School of Economics and Political Science (LSE)*.
- Sen, A. (1981). Ingredients of famine analysis: Availability and entitlements. *The Quarterly Journal of Economics* 96(3), 433–464.
- Sergeev, E. (2013). The great game 1856-1907: Russo-british relations in central and east asia. *Baltimore, MD: Woodrow Wilson Center and Johns Hopkins University Press*.
- Shaw, C. (2011). Friendship under lock and key: the soviet central asian border, 191834. *Central Asian Survey* 30(3), 331–348.
- Shemyakina, O. (2011). The effect of armed conflict on accumulation of schooling: Results from tajikistan. *Journal of Development Economics* 95(2), 186–200.
- Statistical Agency Tajikistan of Tajikistan (2010). Population census of tajikistan 2010. *www.stat.tj (last accessed September 29th 2021)*.
- Steckel, R. (1995). Stature and the standard of living. *Journal of Economic Literature* 33(1), 1903—1940.
- Strayer, R. W. (2016). Why did the soviet union collapse?: Understanding historical change. *London: Routledge*.
- Stucker, D. (2009). Environmental injustices, unsustainable livelihoods, and conflict: Natural capital inaccessibility and loss among rural households in tajikistan. *Environmental Justice and Sustainability in the Former Soviet Union In Julian Agyeman and Yelena Ogneva-Himmelberger eds. Cambridge, Mass. MIT Press, 2009 p.241, 237–274*.
- Swinkels, R. (2014). Assessment of household energy deprivation in tajikistan policy options for socially responsible reform in the energy sector. *World Bank*.
- Tadjbakhsh, S. (1994). Tajikistan: From freedom to war. *Current History Philadelphia* 93(582), 173–177.
- Water for Sustainable Development (2018). General information about tajikistan. *https://wsdconf2018.org/obshhaya – informatsiya/. High-Level International Conference on International Decade for Action (last accessed December 20, 2019)*.
- World Bank (2019a). Tajikistan early childhood education and care sector analysis: A focused review of preschool education in tajikistan. *World Bank, Washington, DC*.

World Bank (2019b). World bank development indicators. migrant remittances as a fraction of gross domestic production (gdp).

World Bank (2019c). World bank development indicators. total fertility rates in afghanistan and tajikistan.

Zarindast, K. (2012). Women constitute 95% of farmers in a tajik town of toos. *www.bbc.com* *May 29*.

Table 1: Living Standards of Households in GBAO, Khatlon and other oblasts in 1999

Fraction of households with ...		Population point measures				Household measures			
		Agricultural irrigation (1)	Any refugees (2)	Women give birth at home (3)	Presence of sovkhodz/kolkhoz (4)	Centralised water (5)	Electricity (6)	Hhld expenditures ^a (7)	Hhld head living standard ^b (8)
GBAO									
	0.159	0.186	0.818	0.972	0.488	0.837	0.951	2.916	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.05)	
N	704	688	704	576	688	688	704	704	
Khatlon									
	0.636	0.625	0.545	0.111	0.667	1.000	1.151	3.710	
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	.	(0.09)	(0.10)	
N	176	128	176	144	144	128	176	176	
Other oblasts in Tajikistan									
	0.145	0.471	0.298	0.774	0.586	0.812	1.029	3.099	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	
N	1120	1120	1120	992	1120	1120	1120	1119	
Difference (GBAO-Khatlon)									
	-0.477***	-0.439***	0.273***	0.861***	-0.178***	-0.163***	-0.200**	-0.794***	
	(0.04)	(0.05)	(0.04)	(0.03)	(0.04)	(0.01)	(0.09)	(0.11)	
N	880	816	880	720	832	816	880	880	
Difference (GBAO-Other oblasts in Tajikistan)									
	0.014	-0.285***	0.520***	0.198***	-0.097***	0.025	-0.078**	-0.183***	
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)	(0.06)	
N	1824	1808	1824	1568	1808	1808	1824	1823	

Notes: LSMS Tajikistan 1999. ^aTotal in 100 000s of Tajik roubles, in the month prior to the LSMS interview. ^b Subjective assessment of household representative, where '1' is lowest and '9' highest possible score. Household respondents reporting household-level outcomes were household heads, generally the oldest household male. Other oblasts comprise: Sughd, Regions of Republican Subordination (RRS) and Dushanbe.

Table 2: Heights and educational attainment of women GBAO, Khatlon and other regions by birth cohort

	<u>Year of birth</u>			
	<u>1968-1971</u>	<u>1972-1977</u>	<u>1978-1991</u>	<u>1992 and later</u>
	(1)	(2)	(3)	(4)
PANEL A: Adult height in centimetres				
<u>GBAO</u>				
	158.73	159.18	158.53	157.77
	(0.43)	(0.37)	(0.21)	(0.30)
<u>Khatlon</u>				
	157.81	157.85	157.83	156.85
	(0.31)	(0.24)	(0.13)	(0.15)
<u>Other oblasts in Tajikistan</u>				
	158.23	158.50	158.27	157.38
	(0.2)	(0.2)	(0.1)	(0.1)
Difference (GBAO-Khatlon)				
	0.92*	1.33***	0.70***	0.92***
	(0.5)	(0.4)	(0.2)	(0.3)
N	627	1008	3196	2490
Difference (GBAO-Other)				
	0.50	0.69*	0.26	0.39
	(0.5)	(0.4)	(0.2)	(0.3)
N	1179	1964	6154	4654
PANEL B: Years of schooling completed				
<u>GBAO</u>				
	11.63	11.63	12.64	11.89
	(0.17)	(0.12)	(0.10)	(0.13)
<u>Khatlon</u>				
	10.04	9.99	9.07	10.08
	(0.12)	(0.11)	(0.07)	(0.08)
<u>Other oblasts in Tajikistan</u>				
	10.74	10.62	10.09	10.52
	(0.07)	(0.06)	(0.04)	(0.05)
Difference (GBAO-Khatlon)				
	1.59***	1.64***	3.56***	1.81***
	(0.21)	(0.16)	(0.12)	(0.15)
N	625	1006	3149	1585
Difference (GBAO-Other)				
	0.89***	1.01***	2.55***	1.37***
	(0.18)	(0.14)	(0.10)	(0.14)
N	1185	1967	6131	2986

Notes: DHS 2012 and 2017 surveys for years of schooling and MICS for adult female heights. Other oblasts comprise: Sughd, Regions of Republican Subordination (RRS) and Dushanbe.. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 3: Means of early childhood outcomes for children in GBAO, Khatlon and other regions in Tajikistan

	Early childhood interactions					Anthropometry					
	Any books (1)	Any stories (2)	Any songs (3)	Any outside play (4)	Any play (5)	Any naming (6)	Stunting 2017 (7)	Stunting 2017 (8)	Wasting (9)	Under-weight (10)	Died <60 mos. (11)
Fractions of sample experiencing outcome:											
GBAO											
	0.364 (0.020)	0.658 (0.020)	0.847 (0.015)	0.863 (0.014)	0.893 (0.013)	0.559 (0.020)	0.233 (0.008)	0.277 (0.021)	0.107 (0.006)	0.144 (0.007)	0.033 (0.008)
Khatlon											
	0.166 (0.011)	0.453 (0.015)	0.785 (0.012)	0.843 (0.011)	0.797 (0.012)	0.553 (0.015)	0.213 (0.007)	0.151 (0.008)	0.103 (0.005)	0.127 (0.005)	0.035 (0.004)
Other oblasts in Tajikistan											
	0.301 (0.009)	0.507 (0.010)	0.657 (0.010)	0.813 (0.008)	0.783 (0.008)	0.605 (0.010)	0.183 (0.004)	0.126 (0.006)	0.097 (0.003)	0.104 (0.003)	0.024 (0.003)
Difference (GBAO-Khatlon)											
	0.198*** (0.023)	0.205*** (0.025)	0.063*** (0.019)	0.020 (0.018)	0.096*** (0.018)	0.007 (0.025)	0.020* (0.010)	0.126*** (0.023)	0.004 (0.008)	0.017** (0.009)	-0.003 (0.009)
N	1690	1690	1690	1690	1690	1690	6586	2390	6587	6586	2537
Difference (GBAO-Other oblasts in Tajikistan)											
	0.064*** (0.022)	0.151*** (0.022)	0.190*** (0.018)	0.049*** (0.016)	0.111*** (0.015)	-0.046** (0.023)	0.050*** (0.009)	0.152*** (0.022)	0.010 (0.007)	0.041*** (0.008)	0.009 (0.008)
N	2997	2997	2997	2997	2997	2997	10427	3882	10429	10427	4148

Notes: MICS 2005/06 and DHS 2012 and 2017 surveys for Tajikistan. Responses are at the level of the child, and reflect the fraction of children for whom each activity was provided in the reference week. Other oblasts comprise: Sughd, Regions of Republican Subordination (RRS) and Dushanbe. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 4: The status of women in GBAO, Khatlon and other oblasts in Tajikistan, women aged 15-24 in 1992

	Demographic outcomes			Respondent agrees that beating is justified if ...				
	Age at marriage (1)	Age first birth (2)	total ch born (3)	Goes w/out asking (4)	neglects children (5)	argues spouse (6)	refuses sex (7)	burns food (8)
<u>GBAO</u>								
	21.753 (0.218)	22.983 (0.191)	3.334 (0.079)	0.295 (0.020)	0.409 (0.022)	0.262 (0.019)	0.137 (0.015)	0.235 (0.019)
<u>Khatlon</u>								
	20.066 (0.128)	21.620 (0.124)	4.490 (0.067)	0.633 (0.016)	0.652 (0.016)	0.549 (0.016)	0.359 (0.016)	0.418 (0.016)
<u>Other oblasts in Tajikistan</u>								
	19.934 (0.070)	21.556 (0.072)	3.578 (0.034)	0.457 (0.011)	0.406 (0.011)	0.445 (0.011)	0.256 (0.009)	0.232 (0.009)
Difference (GBAO-Khatlon)								
GBAO	1.687*** (0.253)	1.363*** (0.227)	-1.156*** (0.103)	-0.337*** (0.026)	-0.243*** (0.027)	-0.287*** (0.025)	-0.222*** (0.022)	-0.183*** (0.025)
Difference (GBAO-Other oblasts in Tajikistan)								
GBAO	1.819*** (0.229)	1.426*** (0.204)	-0.244*** (0.086)	-0.162*** (0.023)	0.003 (0.024)	-0.183*** (0.022)	-0.119*** (0.018)	0.003 (0.021)

Notes: Respondents are aged 40-49 at the time of interview. DHS 2012 and 2017 surveys for Tajikistan. Responses are at the level of the child, and reflect the fraction of children for whom each activity was provided in the reference week. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 5: Difference-in-difference estimates of the effects of the collapse of the Soviet Union on relative heights of women in GBAO

	GBAO-Khatlon			GBAO-Other Oblasts of Tajikistan		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: PRE-TRENDS birth years 1968-77						
GBAO	1.1724** (0.566)	1.7648 (1.101)	2.0473* (1.102)	0.8821* (0.488)	2.2594*** (0.688)	2.5669*** (0.684)
post-1971 births	0.1076 (0.397)	0.1155 (0.397)	0.1166 (0.397)	0.2931 (0.266)	0.2675 (0.265)	0.2162 (0.265)
GBAO*(post-71 births)						
	0.3395 (0.690)	0.3529 (0.692)	0.3444 (0.694)	0.1514 (0.623)	0.2306 (0.626)	0.2637 (0.631)
constant	158.2254*** (0.560)	158.3443*** (0.597)	157.6806*** (0.548)	158.9894*** (0.324)	159.4934*** (0.363)	158.6479*** (0.349)
No.	1903	1903	1903	3080	3080	3080
obs.						
Panel B: 1972-2002 births (1992 births excluded)						
GBAO	1.4746*** (0.443)	1.1942* (0.716)	1.2274* (0.717)	0.9685** (0.401)	2.3311*** (0.469)	2.4135*** (0.472)
Post-1977 births	-0.3506 (0.257)	-0.3465 (0.258)	-0.8504** (0.419)	-0.5976*** (0.170)	-0.5690*** (0.170)	-0.9490*** (0.269)
GBAO*(post-77 births)						
	-0.5406 (0.482)	-0.5348 (0.482)	-0.5830 (0.488)	-0.2821 (0.442)	-0.3646 (0.446)	-0.4618 (0.452)
constant	158.3553*** (0.322)	158.2923*** (0.342)	158.7011*** (0.438)	159.0063*** (0.201)	159.4676*** (0.222)	159.7838*** (0.281)
No.	7400	7400	7400	11993	11993	11993
obs.						
Additional controls						
elev.	no	yes	yes	no	yes	yes
rural*post	no	no	yes	no	no	yes

Notes: Tajikistan DHS 2012 and 2017 surveys. Height is measured in centimetres. Distance to the Panj River border and rural-urban is controlled for in all specifications. Sample weights are included and standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 6: Difference-in-difference estimates of the effects of the collapse of the Soviet Union on relative years of schooling of women in GBAO

	GBAO-Khatlon			GBAO-Other Oblasts of Tajikistan		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: PRE-TRENDS birth years 1968-77						
GBAO	1.6723*** (0.153)	2.1692*** (0.389)	2.1692*** (0.389)	1.0954*** (0.132)	2.3366*** (0.184)	2.3366*** (0.184)
post-1971 births	0.1674 (0.144)	0.2729* (0.140)	0.2729* (0.140)	0.1305 (0.088)	0.0826 (0.087)	0.0826 (0.087)
GBAO*(post-71 births)	0.0537 (0.226)	-0.0197 (0.221)	-0.0197 (0.221)	0.0959 (0.194)	0.2509 (0.197)	0.2509 (0.197)
constant	11.2872*** (0.247)	11.3434*** (0.252)	10.5804*** (0.148)	12.4087*** (0.157)	12.9615*** (0.168)	11.9972*** (0.110)
No. obs.	1825	1778	1778	3525	3458	3458
Panel B: 1972-2002 births (1992 births excluded)						
GBAO	3.1151*** (0.099)	2.9438*** (0.276)	2.9461*** (0.276)	2.3028*** (0.084)	3.5765*** (0.129)	3.5908*** (0.129)
Post-1977 births	0.9414*** (0.106)	0.9769*** (0.105)	0.0100 (0.173)	0.3850*** (0.062)	0.3878*** (0.061)	0.1284 (0.108)
GBAO*(post-77 births)	-1.3725*** (0.198)	-1.4129*** (0.198)	-1.4673*** (0.199)	-0.8170*** (0.178)	-0.7788*** (0.184)	-0.8354*** (0.185)
constant	11.2603*** (0.177)	11.1970*** (0.189)	10.3469*** (0.124)	11.9965*** (0.110)	12.5083*** (0.114)	11.6659*** (0.077)
No. obs.	5461	5332	5332	10510	10359	10359
Additional controls						
elev.	no	yes	yes	no	yes	yes
rural*post	no	no	yes	no	no	yes

Notes: Tajikistan DHS 2012 and 2017 surveys. Height is measured in centimetres. Distance to the Panj River border and rural-urban is controlled for in all specifications. Sample weights are included and standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 7: Early childhood outcomes in southern border regions of Tajikistan

Coefficients of GBAO dummy in OLS regressions:								
	GBAO-Khatlon				GBAO-Other Oblasts			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A: Early childhood education								
Read books	0.198*** (0.023)	0.199*** (0.024)	0.167*** (0.025)	0.132*** (0.026)	0.081*** (0.022)	0.080*** (0.022)	0.047** (0.023)	0.031 (0.023)
Told stories	0.211*** (0.024)	0.206*** (0.025)	0.185*** (0.026)	0.140*** (0.026)	0.176*** (0.021)	0.175*** (0.021)	0.150*** (0.022)	0.131*** (0.022)
Sang songs	0.083*** (0.020)	0.083*** (0.020)	0.066*** (0.021)	0.042** (0.021)	0.217*** (0.018)	0.217*** (0.019)	0.184*** (0.019)	0.173*** (0.019)
Any outside	0.031* (0.017)	0.036** (0.018)	0.026 (0.019)	0.002 (0.020)	0.077*** (0.015)	0.079*** (0.016)	0.055*** (0.016)	0.050*** (0.016)
Play	0.090*** (0.016)	0.091*** (0.016)	0.094*** (0.018)	0.071*** (0.018)	0.133*** (0.014)	0.136*** (0.014)	0.120*** (0.015)	0.116*** (0.015)
Naming	0.020 (0.027)	0.022 (0.027)	0.015 (0.029)	-0.017 (0.030)	0.025 (0.024)	0.033 (0.024)	0.017 (0.025)	0.022 (0.025)
N	1646	1646	1646	1646	2925	2925	2925	2925
PANEL B: Anthropometric outcomes								
Stunting	0.062*** (0.017)	0.061*** (0.017)	0.067*** (0.018)	0.068*** (0.018)	0.089*** (0.015)	0.090*** (0.015)	0.101*** (0.016)	0.088*** (0.016)
Stunting 2017	0.142*** (0.023)	0.138*** (0.023)	0.150*** (0.025)	0.133*** (0.025)	0.155*** (0.022)	0.154*** (0.022)	0.166*** (0.022)	0.134*** (0.022)
Wasting	0.003 (0.013)	0.004 (0.013)	-0.002 (0.014)	-0.002 (0.013)	0.035*** (0.011)	0.035*** (0.011)	0.038*** (0.012)	0.032*** (0.012)
Underweight	-0.002 (0.012)	0.003 (0.012)	-0.002 (0.013)	-0.001 (0.013)	0.035*** (0.011)	0.034*** (0.011)	0.040*** (0.011)	0.033*** (0.011)
N	4036	4036	4036	4036	6807	6807	6807	6807
PANEL C: Mortality before 60 months								
	0.001 (0.010)	0.001 (0.010)	-0.002 (0.011)	-0.004 (0.011)	0.004 (0.008)	0.006 (0.008)	0.010 (0.009)	0.002 (0.009)
N	2537	2537	2537	2537	4148	4148	4148	4148
Other controls:								
Age months*sex	no	yes	yes	yes	no	yes	yes	yes
Mother's ed.	no	no	yes	yes	no	no	yes	yes
hhld. wealth quantile	no	no	no	yes	no	no	no	yes

Notes: Combined MICS 2005 survey and DHS 2012 and 2017 surveys for Tajikistan. Coefficients of the GBAO dummy from an OLS regression are reported. All estimates include controls for child age in months, sex, rural, birth order and household size. Outcomes variables in Panel A indicate whether or not any adult household member undertook a given activity with the child in the week prior to the interview. Stunting, wasting and underweight are indicators take the value 1 if a child is two standard deviations or less below the WHO growth chart norms for age and sex. Children under 60 months are included in estimation. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 8: Women's status responses, DHS respondents aged 15-19

Coefficients of GBAO dummy in OLS regressions						
Respondent agrees that beating is justified if ...						
	GBAO-Khatlon			GBAO-Other Oblasts		
	(1)	(2)	(3)	(4)	(5)	(6)
Goes out without permission						
GBAO	-0.156***	-0.138***	-0.132**	-0.048	-0.021	-0.037
	(0.051)	(0.053)	(0.054)	(0.047)	(0.048)	(0.049)
constant	0.486***	-0.382	-0.292	0.378***	-0.184	-0.343
	(0.025)	(0.895)	(0.896)	(0.017)	(0.605)	(0.609)
N	579	575	575	1104	1100	1100
Neglects the children						
GBAO	-0.109**	-0.088*	-0.087	0.019	0.042	0.023
	(0.052)	(0.053)	(0.054)	(0.048)	(0.049)	(0.049)
constant	0.469***	0.158	0.181	0.342***	-0.158	-0.354
	(0.025)	(0.893)	(0.895)	(0.016)	(0.590)	(0.595)
N	579	575	575	1104	1100	1100
Argues with him						
GBAO	-0.198***	-0.170***	-0.168***	-0.144***	-0.129***	-0.147***
	(0.046)	(0.048)	(0.049)	(0.043)	(0.043)	(0.044)
constant	0.417***	-0.117	-0.086	0.363***	-0.118	-0.308
	(0.025)	(0.877)	(0.880)	(0.017)	(0.609)	(0.611)
N	579	575	575	1104	1100	1100
Refuses sex						
GBAO	-0.105***	-0.091**	-0.094**	-0.065**	-0.049	-0.067**
	(0.036)	(0.037)	(0.038)	(0.032)	(0.033)	(0.034)
constant	0.213***	-1.062	-1.102	0.173***	-1.162**	-1.345***
	(0.020)	(0.726)	(0.731)	(0.013)	(0.456)	(0.463)
N	579	575	575	1104	1100	1100
Burns the food						
GBAO	-0.166***	-0.136***	-0.138***	-0.019	-0.004	-0.015
	(0.042)	(0.043)	(0.043)	(0.037)	(0.037)	(0.037)
constant	0.323***	0.398	0.374	0.176***	-0.043	-0.160
	(0.023)	(0.833)	(0.835)	(0.013)	(0.479)	(0.481)
N	579	575	575	1104	1100	1100
Other controls:						
age, years ed.	no	yes	yes	no	yes	yes
rural	no	no	yes	no	no	yes

Notes: DHS 2012 and 2017 surveys for Tajikistan. Coefficients of the GBAO dummy from an OLS regression are reported. Estimation is by OLS. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Appendix A

The British-Russian resolution of the Great Game through the 1895 border agreement divided Badakhshan between GBAO within the Tajik Soviet Socialist Republic (Tajik SSR) and the Afghan province of Badakhshan (Sergeev (2013)). Further west, this same agreement divided Tajik-speaking peoples who had been part of the historic Bactrian Empire (see, for example, Grousset (1970), Leriche (1998)). As in Badakhshan, the major trading cities and religious sites of the Bactrian plains had long been located to the south of the Panj. Over hundreds of years, the Kunduz and Balkh rivers had fed the development of a complex agricultural civilisation (Herzfeld (1968), Rawlinson (2002)).

After the Russian Revolution, the Tajik Soviet Socialist Republic became a laboratory for agricultural and industrialisation strategies. In the first years of Russian and Soviet rule, borders between Afghanistan, China and Tajikistan remained open (Antonenko (1983), Shaw (2011), p. 341). Throughout the 1920s, GBAO remained a part of historical trade routes between Xinjiang and other parts of Central Asia. As well as food, tea, opium, dyes, wool, silk, and manufactured products were commonly exchanged (Sabot (1995)). Similarly, residents of the Soviet province of Khatlon traded agricultural products with those in the neighbouring Afghan provinces of Balkh and Kunduz.

The collectivisation of agriculture, sedentarisation policies for nomadic peoples and campaigns against Islam began to interrupt trading patterns in 1929. There were strong protests by herders against collectivisation in Tajikistan, as elsewhere in the Soviet Union. In GBAO, the implementation of these policies resulted in starvation and imposition of the death penalty. Some emigration from GBAO to Afghan Badakhshan and Xinjiang resulted.

There was also some forced relocation of GBAO residents to the cotton fields in Khatlon under Stalin. Families of former communist party members also sometimes felt sufficiently betrayed by these new policies to exit the country (Kreutzmann (2015)). The Soviet response was to introduce military border guards along the bank of the Panj. By the mid-1930s the border between GBAO and Afghan Badakhshan had become impermeable (Shaw (2011)).

The historical capital of Badakhshan, Fayzabad, was a major trading centre on the Silk Road leading to the Mediterranean Sea (see, for example, Hopkirk (1990), Kuzmina (2008)). The town had hosted rice and flour mills and precious metals exchanges for hundreds of years before to British rule. Prior to the Russian annexation of Tajikistan, Fayzabad was also the only major town in Badakhshan. Despite the lack of wealth or height data from the pre-colonial period in

Badakhshan, the known stylised facts strongly suggest that the Afghan part of Badakhshan was more developed than the part which eventually became part of the Soviet Union.

The hardening of the Soviet border along the Panj River disrupted food security in GBAO. This was in part because southern Badakhshan comprises more arable land than does mountainous GBAO. Still, there was no illegal mass exodus from GBAO to neighbouring countries. On the Afghan side, land holdings were rapidly being consolidated by a few landowners. By the 1950s, these largeholders had both gained land titles and employees when former smallholder owners had been unable to pay off their debts (Grevemeyer (1982)).

Soviet policies compensated for the GBAO border closure with large transfers of food, fuel, cattle fodder and equipment. Modern infrastructure, such as roads, schools, medical clinics, apartment blocks and electric lighting were rapidly delivered. These huge transfers quickly raised living standards in GBAO above subsistence. The Soviet leadership was particularly keen to avoid protests in border regions, as these were more visibly embarrassing and might eventually undermine territorial claims. GBAO citizens could readily observe villages not fifty metres from theirs but in Afghanistan. This must have dissuaded some from attempting to cross the Panj (Bliss (2006)).

Soviet policies in Central Asia aimed to replace the power of religion and patrilocal household customs with the power of the state. The unveiling of women (*Hujum*), the criminalisation of polygamy and the breaking up of multigenerational households led to a protracted Basmachi Rebellion in the 1920s. These battles resulted in hundreds of deaths, particularly in Uzbekistan, and the fleeing of fighters into Afghanistan. However, by the 1930s, this resistance to the massive social change imposed by the Soviet state appears to have abated. General consent of locals for developments such as schooling and roads must have been achieved over the long period of Soviet rule. Otherwise, the maintenance and improvement of infrastructure, and the sending of children to school would have been just too costly to enforce (see, for example, Atkin (1989) and Saxer (2016)).

There remains a general dearth of local archival data for Tajikistan. The available data does suggest that about 10% of the GBAO population was imprisoned at the height of Stalin's terror, in 1937 (Mastibekov (2014)). Nevertheless, the historical record does not suggest mass starvation in Tajikistan during the 1930s (Bliss (2006)). Population growth in GBAO is known to have been much lower since the Soviet border closure than in Afghan Badakhshan.

Rural populations were concentrated in fertile valleys, and mainly engaged in growing cotton for Soviet textile production. Soviet irrigation infrastructure had been developed to cultivate

cotton. These residents could readily cultivate garden plots and keep animals. In GBAO, the ability to cultivate garden plots remained circumscribed by high elevation and lack of water (see, for example, Kreutzmann (2012)).