

Civil war, famine and the persistence of human capital: Evidence from Tajikistan

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Abstract

The persistence of health and early childhood education investments is examined for children under age six in the most isolated and least fertile region of the former Soviet Union. During the 1992-96 Tajik Civil War, famine engulfed the mountainous border province opposing the new central government, Gorno-Badakhshan Autonomous Oblast. This economic collapse is reflected in substantially lower adult heights of women who were children during this period. Nevertheless, contemporary data suggest the persistence of strong incentives to invest in human capital. Greater final educational attainment and later ages at marriage persist for famine-affected women than for those in the neighbouring border province, Khatlon. Early childhood educational interactions between adults and children are more frequent in Gorno-Badakhshan and child anthropometry scores are better. The persistent emphasis on human capital after war is consistent with a locational imperative to earn incomes outside of agriculture in Gorno-Badakhshan.

JEL codes: H4, J1

Keywords: food security, anthropometry, early childhood education, Civil War, Afghanistan, Tajikistan, adult height, Soviet Union, Great Game, Badakhshan, Bactria

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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). Data from the Tajikistan 2012 and 2017 Demographic and Health Surveys (DHS), the 2005/6 Tajikistan Multiple Indicator Cluster Surveys (MICS), the Afghanistan 2010-11 MICS and the 2013 Afghan National Nutrition Survey (NNS) are employed. The cumulative impact of economic development policies pursued in the late Soviet period and the 1992-96 Civil War is first assessed using data on adult stature of women and their educational attainment. Contemporary early childhood educational investments and anthropometric outcomes are then compared between GBAO and the neighbouring southern border region of Khatlon. The results suggest that households in GBAO continue to invest strongly in early childhood human capital, even conditional on their own educational attainment and wealth. These greater investments are consistent with the lack of agricultural employment opportunities in GBAO and the relatively great imperative to prepare children for eventual migration to Russia.

The division of Tajik peoples at the Panj River permits a preliminary assessment of the Soviet legacy in this border region. Prior to Western colonisation drives in the 1800s, the Tajik-speaking population located to the south of the Panj River had been much wealthier than that located to the north of this divide. In the 1200s, Marco Polo wrote of the Silk Road trading of Balas rubies from Shignan, in what eventually became Afghan Badakhshan (Marco Polo and Rustichello da Pisa (1300)). Lapis lazuli and other precious gemstones had been mined in on the as early as the fourth century. All capitals and historical trading centres of the province of Badakhshan had been located south of the Panj River. Here the land was more suitable for livestock and grain cultivation than on the northern bank of the Panj (Oriental and Colonial Record (1895)).

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 (Sabol (1995)). Similarly, residents of the Soviet province of Khatlon traded agricultural products with those in the neighbouring Afghan provinces of Balkh and Kunduz.

Outmigration rates from the Pamirs were higher than from other areas of Tajikistan in the Soviet period (Nourzhanov and Bleuer (2013)). The combination of Soviet development policies with the pre-existing highland realities appears to have resulted in cultural differences between Pamiris, Afghan Badakhshanis and other Tajik peoples which persist today. Residents of GBAO may identify themselves foremost as Pamiri, even when resident outside of Tajikistan and carrying Tajik passports (?)). 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, Peyrouse (2012) and Kuhistoni (2014)).

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 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 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 employ-

ees 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)).

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. Strategically-important regions were favoured with an extensive system of subsidies. 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. Despite these huge Soviet investments in infrastructure and human capital, GBAO remained overwhelmingly rural.

The collapse of the Soviet Union and ensuing 1992-96 Tajik Civil War instantaneously eliminated huge subsidies to GBAO. Large increases in food prices occurred. From December 1992 to September 1993, almost no food or fuel reached GBAO (see, for example, Tadjbakhsh (1994), Jawad and Tadjbakhsh (1995), Babu Suresh and Tashmatov (2000) and Epkenhans (2016), Middleton (2019)). Famine conditions prevailed. Only food aid from the Aga Khan Foundation prevented mass starvation. Immediately prior to this isolation, only about 10-20% of food requirements in GBAO had been met locally (Bliss (2006)). A disastrous harvest in GBAO in 1995 further undermined food security. Fighting and food shortages were also experienced in key cities across Tajikistan, including Dushanbe and Kurgan-Teppe, the capital of Khatlon, during during the war. However,

shortages were nowhere as extreme as in GBAO.

The paper proceeds as follows. Section 2 comprises background information on late Soviet era policies in Tajikistan and the Civil War, and a comparison of summary statistics. Section 4 presents multivariate analysis of the effects of economic collapse on adult stature and educational attainment in Afghan-Tajik border provinces. Differences in contemporary early childhood educational investments across GBAO and Khatlon are then quantified. Section 5 concludes.

2 Background and summary statistics

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)).

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 historically more developed than the part which eventually became part of the Soviet Union. For this reason, the estimated impacts of Soviet rule on observed heights may be thought of as lower bounds of true impacts.

Ill-conceived Soviet farming and food policies initially resulted in mass death from starvation in several parts of the Union. Collectivisation of agriculture led notably to the starvation of millions from hunger in Ukraine and Kazakhstan (see, for example Pi-

anciola (2004), Volkava (2012), and Graziosi (2005)). A majority of these deaths were in the countryside. Under central planning, hunger in cities could also coincide with the rotting of agricultural products on collective farms. 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)).

Privileged access to goods and services attracted ethnic Russians to live in places such as Khorog and Murghab, and to work in teaching or health care across Tajikistan. Many skilled jobs were filled by Russian nationals. Moscow provisions created a shadow economy in Tajikistan and elsewhere (see, for example, Eaton (2004)). Those with official access to food or consumer goods could convert these goods into other rationed goods and services. Such services might include access to schooling, lenience in treatment from state prosecutors, or extra help for children struggling in school. Tajik students who performed particularly well in highschool examinations received funding to study in universities across the Soviet Union. Tajik nationals with skills of value in Russia and internationally also emigrated at high rates to other parts of the country.

Across the Soviet Union, residents of city apartments also supplemented store-bought food with vegetables grown on intensively-cultivated private garden plots. Chickens and cows could also be kept. These plots were generally located within a couple of hours bus or electric train ride from homes, and were made widely available to urban residents through employers. Growers could also sell or barter this production in private markets (see, for example, Rowe (2009)). The output of these plots was preserved by canning for consumption during winter months. Canning provided a means of circumventing shortages of basic products in state stores. Rural populations were concentrated in fertile valleys, and mainly engaged in growing cotton ("white gold") 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, however, the ability to cultivate garden plots was circumscribed by high elevation and lack of water.

In the 1990s, both Afghanistan and Tajikistan experienced war. There were flows of refugees across the river borders in both directions. The Tajik cities of Konsomolabad, Garm and Tavildara endured continued heavy fighting. Fighting in Dushanbe was especially fierce in 1996. During the war, an estimated 10 to 20 percent of the population of Tajikistan was displaced at any one time (Pannier (2017)). Food shortages in Khorog,

Garm, Dushanbe and Khojand resulted in riots in which people were killed by security forces. The collapse of health services led to several outbreaks of typhoid. No surveys of population wellbeing were carried out during the Civil War.

Afghan refugees were generally not welcome in Tajikistan. In 2000 the Russian 201st regiment border and Tajik government border guards refused entry to about ten thousand Afghan nationals. As a result, families were stranded for months on a group of desolate islands in the Panj, while Taliban forces massed on Afghan side (USCR (2001)).

For much of the Soviet period, rural Khatlon, and the Ferghana and Gissar Valleys had employed nearly the entire adult population 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 *Dekhan* 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. Although farmers remain nominally free to choose what to farm, in practice the Tajik government and local cotton ginners continued to exert substantial coercive power over planting into the 2010s (Eurasianet (2019)). As of 2019, school children, doctors, teachers and university students were sent to harvest cotton (*hashar*) every October, for very low wages (Eurasianet (2019)).

Migrant remittances from seasonal work of men in Russia are very important to family incomes across Tajikistan (see, for example, Olimova and Olimov (2007)). In 2019, 29% of GDP was derived from this source (World Bank (2018)). Perhaps one third of the adult population of the country engages in seasonal labour migration. A majority of migrants are men working in the construction sector in cities across Russia. Language skills and education are not required for this type of work, large numbers of farmers and their 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)).

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 previously 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.

2.1 Summary statistics

Anthropometric measures may be of particular relevance to establishing the historical record of wellbeing in the late Soviet and the early independence periods in Tajikistan. Price setting, transfers from Moscow and public goods provisions may have created a large wedge between individual incomes and living standards. 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. These policies were partly the result of geopolitical goals set in Moscow for more than seventy years (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.

The relative poverty of Afghanistan during the late Soviet era is apparent in the available height data. Table 1 illustrates, using data from the 2013 NNS and 2010-11 MICS of Afghanistan, the 2012 and 2017 DHS surveys from Tajikistan and the 2012 DHS from Kyrgyzstan. These surveys collected height information for women and children. Amongst those born before 1992, Afghan women are about four centimetres shorter than Kyrgyz nationals and about three centimetres shorter than women of Tajikistan.

The experience of war during childhood is known to have considerable impacts on child anthropometry scores and other measures of child health (see, for example, Akresh, Bhalotra, Leone, and Osili (2012) and Minoiu and Shemyakina (2014)). This is consistent with adult stature trends in Central Asian countries since 1991. The first post-1991 cohorts have reached adult height in these data. Mean adult heights of women in Kyrgyzstan are similar in cohorts born before and after 1991. However, Tajik women born after 1991 are about 0.7 centimetres shorter and those in Afghanistan about two centimetres shorter than those born earlier. These means are suggestive of the disruption of food distribution systems and access to basic healthcare, including vaccinations, during wartime childhoods.

Three birth cohorts are distinguished in these Tables. These are pre-1977, 1977 to 1991

and post-1991 births. The sample is restricted to women born in or after 1968. The oldest women in the Afghanistan MICS 2010-11 sample were born in this year. Tajik women born prior to 1977 would have reached adult height before the Tajik declaration of independence from the Soviet Union in September 1991. Girls generally do not gain in stature after age fifteen. Tajik nationals born between 1977 and 1991 would have experienced some of their first fifteen years in the Soviet Union. Those born after 1991 in Tajikistan lived their early childhoods entirely after the collapse of the USSR and during the civil war spanning 1992-1997. These data are described in more detail in Data Appendix A.

Residents of Afghan border regions experienced relatively little of the Soviet occupation of the 1980s, civil war in the 1990s or post-2001 NATO campaigns. A Soviet military garrison was established in Fayzabad, Badakhshan, in 1980 and supplied from Khorog. Although women in Afghan Badakhshan born during 1977-91 experienced the Soviet presence during part of their childhoods, little fighting took place in Badakhshan after establishment. Afghan Badakhshan was only connected to Kabul by paved road in 2010 (UNAMA (2010)). Likewise, Kunduz and Balkh provinces were largely insulated from the series of wars which took place from the 1980s, and from the early years of Taliban rule.

The Soviet military intervention in Afghanistan was facilitated by a 1982 Afghan-Uzbek bridge at Termez, which transported a majority of soldiers and hardware into and out of the country. However, very little fighting occurred in Balkh and Kunduz during this period or during the subsequent Afghan civil war. Since 2010, there has been heavier fighting in these provinces, but the youngest cohort included in the MICS 2010-11 and NNS 2013 data had already attained adult height by that time.

The collapse of the Soviet Union left Tajikistan with a much larger population than could be supported by the land. Isolation precluded industrialisation. In GBAO, land is less suitable for growing crops or herding than in either Afghan Badakhshan or in other regions of Tajikistan. Under heavy Soviet subsidies, the population had expanded from about 40 000 to 167 000 between 1937 and late 1990 (Buškov and Kalandarov (2003)). 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. Population growth in GBAO had nevertheless been much lower since the Soviet border closure than in Afghan Badakhshan. The Total Fertility Rate (TFR), the number of children a woman might expect to bear in her lifetime, remained at about 7.5 in Afghanistan between 1970 and 1992, but declined from 7.0 to 5.0 in Tajikistan (World Bank (2018)).

Contemporary adult height data are suggestive both of Soviet policies in the region and of the blockade of GBAO during the Civil War. Amongst women who had reached age fifteen before 1991, those in GBAO are 5.5 centimetres taller, on average, than their Afghan counterparts. This is shown in Panel A of Table 2.

With the Soviet collapse and subsequent war, both rural and urban areas of GBAO were suddenly left with severe constraints on food availability. Residents of Khorog and other large towns did not possess land and were not eligible for collective farm (*sovkoz*) 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, until Aga Khan food aid began to arrive (Bliss (2006)). This lack of 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)).

Dramatic changes in adult height occurred across birth cohorts on both sides of the Panj river border in Badakhshan. Those born after 1977 in GBAO did not reach greater adult stature than their Afghan counterparts. These means suggest that children born in GBAO after independence did not make up for lost early childhood growth after the end of hostilities. Women in GBAO after 1991 are shorter than those born before 1977 by about 1.25 centimetres. Women born after 1991 in Afghan Badakhshan are about three centimetres taller than those born before 1977.

The reasons for absolute improvements on the Afghan side are less clear than those for height declines in GBAO. Harvests may also have been particularly good in the years in which the latter cohorts of Afghan women were children. Records of neither rainfall nor harvests for Badakhshan districts for the 1977-97 period appear to exist. Some food supplies from the Soviet Union may have been distributed to the population from the Soviet army base in Fayzabad, as part of strategies of the garrison to gain local acceptance.

These results contrast with those observed in other Tajik-Afghan border provinces. Heights of women in Khatlon are three to four centimetres greater than those in the northern Afghanistan provinces of Balkh and Kunduz. This height advantage has been maintained across all birth cohorts.

A comparison of heights and educational attainment of adult women in GBAO and Khatlon suggests both the impact of the Soviet period and civil war period. Mean heights for women, but not for men, are collected in the MICS survey. Years of education is collected in the DHS 2012 and 2017 rounds. Sample means for both outcomes are presented,

by birth cohort, in Table 4.

A GBAO height advantage of about one centimetre is evident amongst those who 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. Those born after 1992 are about 0.8 centimetres taller in GBAO than in Khatlon.

Educational attainment remained higher in GBAO both amongst the war- and famine-affected cohorts and those born later. Amongst those born in 1992 or later, women in GBAO completed nearly two more years of schooling than did those in Khatlon.

The early childhood outcomes data from the MICS suggest that adults spend considerably more resources on children in GBAO than in Khatlon. In Table 5, means are presented. Respondents in the MICS are asked whether, in the past week, a household member has engaged with a child under 60 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. Children under 60 months are also measured to create height-for-age, weight-for-age and weight-for height measures.

The means show that children in GBAO have much more educational inputs from adults even prior to attending school. For five of the six outcomes considered was the fraction of GBAO children receiving such inputs greater than the fraction in Khatlon.

Levels of stunting, wasting and underweight amongst children under 60 months in the MICS suggest that contemporary access to nutrition was not worse in GBAO than in Khatlon by the mid 2000s. For stunting (height-for-age score of -2 SD or less below the WHO growth chart) and wasting (weight-for-age score of -2 SD or less below the WHO growth chart), no differences in levels are found across these two southern border regions. Children in GBAO are about 0.05 less likely to be underweight (weight-for-height score of -2 SD or less below the WHO growth chart).

The 1999 Tajikistan Living Standards Monitoring Study (LSMS) offers corroborating information about living standards in border provinces of Tajikistan immediately following the cessation of hostilities in the Tajik Civil War. Two thousand households in all regions of the country were surveyed and a population point questionnaire was also completed.

Summary statistics are suggestive of the differences between GBAO and Khatlon in postwar economic situations facing households. Infrastructure provisions in GBAO were less than those in Khatlon: Far fewer responding households resided in population points

in which agriculture was irrigated (16% versus 64%). Far fewer households had access to centralized water provisions (49 versus 67%) or to electricity (84% versus 100%). Women giving birth were much more likely to do so at home in GBAO (82%) than in Khatlon (55%). Mean household expenditures in the month prior to the interview in GBAO were about 83% of those in Khatlon.

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. 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 period 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.

Across Tajikistan, the Soviet collapse, heavy fighting near Kurgan-Teppe, Khatlon, and the blockade of Dushanbe during 1996-97 all contributed to a dearth of food for purchase in urban areas. Urban residents had little means of cultivating fruits and vegetables because travel to locations of garden plots had become dangerous and public transport was scarce. In the countryside, the security situation was poor, but crops could be grown in the fertile soils and under the high summer temperatures prevailing in the river valleys. In the DHS data, the mean elevation above sea level of respondents from Khatlon is 773 metres, versus 2371 metres for respondents from GBAO.

Outside of GBAO, rural heights declined less across birth cohorts than did urban. This is shown in Panels A and B of Table 3. As a result, the difference in mean heights between rural and urban residents also declined across cohorts.

In GBAO too, heights declined across birth cohorts in both rural and urban areas. Amongst the pre-1977 cohort, women were on average 2-3 centimetres taller in urban than in rural areas. These women were also nearly two centimetres taller than their urban counterparts in other areas of Tajikistan. Heights declined in both rural and urban areas in subsequent GBAO cohorts. Amongst those born after 1991 in GBAO, heights of rural and urban residents were statistically equal, at the mean. The pre-1977 height difference between urban women in GBAO and those in other urban areas of Tajikistan had been completely eliminated. That the blockade of GBAO and subsequent famine most affected very young children is consistent with descriptions of this period reported in Bliss (2006). Many nursing mothers were anaemic due to a lack of meat, and milk powder for babies was unavailable. Women who experienced the first part of their childhoods under Soviet rule and the latter part during the civil war, do not appear to have lower adult heights

than those born prior to 1977.

3 Estimation

Prior to examining early childhood human capital investments, the impact of the late Soviet Union on adult stature is assessed using difference-in-difference (DD) estimation. Distance to the the Afghan-Tajik border (in kilometres) is controlled for in all specifications.

The DD regression to be estimated takes the form:

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

Adult heights of women are explained as a function of a binary dummy for the Tajik SSR ($TSSR$), 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. This DD specification assumes that heights would have followed a common trend on both sides of the Panj River in the absence of the collapse of the Soviet Union. Results are presented in Table 7. Equations are estimated separately for Badakhshan (Panel A) and for the former Bactrian Empire provinces of Khatlon, Balkh and Kunduz (Panel B).

There are two main reasons why the measured impacts might be considered lower bound impacts of the late Soviet period on adult stature. First, these results and the preceding summary statistics suggest that those who experienced some part of their childhoods in the USSR should be taller. These individuals are here grouped with those who were born after the collapse of the Soviet Union. Second, these former Soviet border provinces are known to have comprised the mountainous and less fertile hinterlands of major Silk Road cities. These areas were poorer prior to the 1895 accession to the territories of the Russian Empire.

In Badakhshan, the magnitude of stature changes over a short period is remarkable. The results of columns (1)-(4) of Panel A show that the late Soviet era height advantage

was nearly three centimetres. The interaction term (β_3) is, however, nearly as large and robustly negative. Those born in GBAO after the collapse of the Soviet Union are no longer taller than their contemporaries in Afghan Badakhshan. They are, on average, more than two centimetres shorter than those who had reached age 15 in GBAO by the collapse of the Soviet Union. The stature of adult males is estimated to have risen globally during the hundred year period from 1896 to 1996 from 162.5 centimetres to 171.3 (Our World in Data (2017)).

Differences in heights across residents of Khatlon and Afghan border provinces of Kunduz and Balkh can be similarly examined. There has historically been more development and contact with central authorities in these border provinces than in Afghan Badakhshan. Both the Soviets and the central government in Kabul developed some infrastructure in the north of the country, beginning in the 1930s. In 1964, the Salang Tunnel connected the northern provinces of Parwan and Baglan to Kabul. These modernisation efforts are another reason why measured impacts of the Soviet Union on adult heights can here be thought of as lower bounds of the true causal impacts. Results are presented in Panel B of Table 7.

Results differ substantially from those for Badakhshan. Those born prior to 1977 on the Soviet side of the Panj are about 3.5 centimetres taller than their contemporaries in the northern Afghanistan provinces of Balkh and Kunduz. However, the coefficient β_3 is not statistically significant at the 10% level in any specification. Khatlon residents who were less than fifteen years old at the Soviet collapse did not experience a decline in adult stature. In this area of fertile plains, where the first post-war president of Tajikistan was born, the height advantages previously conferred by the Soviet Union persisted. These data suggest that the extent of collapse of the GBAO economy during the Civil War was far greater than that which occurred in Khatlon.

3.1 Early childhood outcomes

The main estimation employs OLS regression to quantify differences in contemporary early childhood investments across the two southern border regions of Tajikistan, Khatlon and GBAO. The equation takes the form:

$$\begin{aligned}
OUTCOME_i = & \beta_0 + \beta_1 * GBAO_s + \beta_2 * AGEMOS_i + \beta_3 * FEMALE_i \\
& \beta_4 * MOTHERED_i + \beta_5 * HHWEALTH_i + \dots + \epsilon_{ics}
\end{aligned}$$

Outcomes comprise the six early childhood interactions and three anthropometric outcomes for those age sixty months or less. All equations control for birth order of individual i in state s . In the preferred specification, controls for mother’s educational attainment, household wealth quantile, household size, and an interaction between age in months and sex are included. Sample weights are included and standard errors are robust. The data are from the 2005/06 MICS.

3.1.1 Early childhood education

The results show that young children in GBAO obtain more early childhood education opportunities and do not have worse nutritional outcomes than those in Khatlon. This is true even after conditioning on mother’s educational attainment and household wealth. Results are shown in Table 8.

Pre-school aged children in GBAO continue to obtain more stimulation from adults than do those in Khatlon. The results are presented in Panel A. Children in GBAO are about 0.14-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. Estimated effects differ little whether or not mother’s education is controlled for (column (3) or not (column (2))). The addition of controls for household wealth quintile does lower the coefficient estimate somewhat, but the measured conditional association remains large and statistically significant at the 1% level. Children in GBAO are more likely than those in Khatlon to have been told a story or sung to, or to have played outside in the week prior to the MICS interview.

3.1.2 Anthropometry

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)).

Children in GBAO do not have worse anthropometric outcomes than do those in Khatlon. Results are presented in Panel B of Table 8. The probability that a child is underweight (low weight for height) is about 0.05 less, conditional on mother's educational attainment and household wealth. These results suggest that more of households' resources may be directed to children's nutrition in GBAO than in Khatlon.

There is undoubtedly some selectivity into child survival that cannot easily be addressed in estimation using anthropometry score. 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)).

Discussion

Data including information internal migration and region of birth (or ethnicity) would aid in understanding the role that land quality might play in early childhood investment decisions. Alternatively, knowledge of the location of migration of those Pamiris forcibly displaced from GBAO to Khatlon and Garm under Stalin would permit assessment of the extent to which their descendants exhibit similar behaviour to the descendants of those who remained in GBAO. A comparison of child outcomes between more and less fertile agricultural locations within these border regions would also aid in understanding the role of future agricultural employment prospects in determining decisions of parents.

Women in GBAO have later ages at marriage, later first births and fewer total births than those in Khatlon. Their views of gender relations between spouses also differ substantially, and suggest much greater autonomy within marriages. This is true both for women who were of marriage age before the advent of Civil War and those who became adults during the war. These differences are discussed in more detail in Data Appendix B.

4 Conclusions

This paper examines the legacy of the late Soviet period and Civil War years for contemporary early childhood human capital investments in the southernmost border regions of the former Empire, GBAO and Khatlon. Information from household surveys comprising anthropometric, schooling attainment, and adult-child educational interactions is employed. 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. One legacy of nearly eighty years of Soviet subsidies to GBAO appears to be a cultural and economic norm of health and education investments. The level of investment in early childhood human capital is particularly striking given the rural location, harsh climate and semi-nomadic herding livelihoods practised by a majority of Pamiri families.

The unsustainability of strategic Soviet investments in mountainous GBAO is apparent from the available adult height data. These data have been collected for women aged 15-49. The collapse of Soviet subsidies and the subsequent Tajik Civil War is shown to have resulted in rapid changes in adult heights of women. The blockade of Tajik GBAO during much of the war led to widespread food shortages. In 1993, the Aga Khan Foundation began the delivery of food aid, but population needs far outstripped supply. The results of this deprivation are now evident as a fall in adult heights. Women in GBAO who were under age 15 at when the Soviet Union collapsed are about three centimetres shorter than those born earlier. They are no longer taller than their contemporaries in Afghan Badakhshan. The measured decline is much greater than that resulting from childhood food deprivations during the Biafran War in Nigeria by Akresh, Bhalotra, Leone, and Osili (2012), and consistent with that documented in Blattman and Miguel (2010). In contrast, large Afghan-Tajik height differentials persist in recent birth cohorts in the more agriculturally-productive cotton-growing region of Khatlon. This region is also the ancestral home of the Kulyabi clans who eventually prevailed in the Civil War.

The available data show that children under sixty months experience considerably more early childhood education from adults in GBAO than in Khatlon, and that they may have slightly better nutritional status. Multivariate analysis shows that these differences remain salient after accounting for the greater educational attainment of mothers and for potential differences in household wealth across those in Khatlon and GBAO. These results may suggest that GBAO residents are incentivised by the poor quality of the surrounding land to invest in the human capital of future generations. As in Soviet times, migration of both men and women from GBAO to Russia remains more common than from other areas of Tajikistan.

New health data will allow further assessment of the legacy of the Soviet Union in Central Asia. This can best be done using large nationally-representative surveys with anthropometry information collected by trained experts, such as the MICS, DHS and NNS. There is now a large cohort of adults who were born after 1991, and who have reached adult height after the initial transitional shock. A wider range of health outcomes

might be examined. 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), Deaton (2008), Alderman (2019)). Data on early childhood cognitive outcomes, and household violence may shed new light on the persistence of Soviet policies for contemporary childhoods in the region.

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Table 1: Adult height in centimetres of women in centimetres by birth year in Central Asia

	Tajikistan	Kyrgyzstan	Afghanistan
born before 1992			
	158.147	159.775	155.403
	(0.06)	(0.11)	(0.07)
No.obs	11099	4482	12371
born in 1992 or later			
	157.486	159.806	153.603
	(0.07)	(0.11)	(0.11)
No.obs	9192	3618	5744
Difference			
	-0.661***	0.001	-1.733***
	(0.09)	(0.15)	(0.23)

Notes: DHS surveys (Tajikistan 2012 and 2017, Kyrgyzstan 2012) and MICS 2010-11 and NNS 2013 (Afghanistan).

Table 2: Heights of women by birth year in Afghanistan and Tajikistan

	Badakhshan			Khatlon, Kunduz and Balkh		
	Pre-1977	1977-1991	1992 and later	Pre-1977	1977-1991	1992 and later
Afghanistan						
	153.4763	157.3528	156.5350	154.0342	153.7767	152.8811
	(1.124)	(0.854)	(1.334)	(0.573)	(0.398)	(0.392)
Tajikistan						
	159.0184	158.6096	157.7396	157.8352	157.8033	156.9868
	(0.282)	(0.216)	(0.278)	(0.188)	(0.133)	(0.138)
Difference (Tajikistan-Afghanistan)						
	5.542***	1.257	1.205	3.801***	4.027***	4.106***
	(1.151)	(0.878)	(1.354)	(0.602)	(0.420)	(0.415)

Notes: DHS 2012 and 2017 surveys (Tajikistan) and MICS 2010-11 and Afghan National Nutrition Survey 2013 (Afghanistan). Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 3: Heights of women by birth cohort in Tajikistan

Year of birth		
Pre-1977	1977-1991	1992 and later
PANEL A: Tajikistan (non-GBAO)		
Urban		
159.217 (0.161)	158.981 (0.127)	158.047 (0.128)
Rural		
157.779 (0.132)	157.823 (0.090)	157.042 (0.097)
Difference (Urban-rural)		
-1.438*** (0.208)	-1.158*** (0.156)	-1.005*** (0.161)
PANEL B: Tajik GBAO		
Urban		
161.021 (0.698)	160.525 (0.523)	158.300 (1.142)
Rural		
158.669 (0.305)	158.276 (0.235)	157.667 (0.278)
Difference (Urban-rural)		
-2.352*** (0.760)	-2.249*** (0.573)	-0.633 (1.170)

Notes: DHS 2012 and 2017 surveys (Tajikistan). Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 4: Heights and educational attainment of women in southern border regions by birth cohort

	<u>Year of birth</u>		
	<u>Pre-1977</u>	<u>1977-1991</u>	<u>1992 and later</u>
PANEL A: Adult height in centimetres			
<u>GBAO</u>			
	159.018	158.610	157.740
	(0.282)	(0.216)	(0.278)
<u>Khatlon</u>			
	157.835	157.803	156.987
	(0.188)	(0.133)	(0.138)
Difference (GBAO-Khatlon)			
gbao	1.183***	0.806***	0.753**
	(0.339)	(0.254)	(0.310)
PANEL B: Years of schooling completed			
<u>GBAO</u>			
	11.603	12.544	11.891
	(0.090)	(0.093)	(0.131)
<u>Khatlon</u>			
	9.947	9.096	10.081
	(0.072)	(0.072)	(0.082)
Difference (GBAO-Khatlon)			
gbao	1.656***	3.448***	1.809***
	(0.115)	(0.118)	(0.154)

Notes: DHS 2012 and 2017 surveys for years of schooling and MICS for adult female heights. Women aged 18 and older are included. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 5: Means of early childhood outcomes for children in GBAO and Khatlon

	Any books	Any stories	Any songs	Any outside	Any play	Any naming	Stunting	Wasting	Underweight
<u>GBAO</u>									
	0.391 (0.021)	0.700 (0.020)	0.888 (0.014)	0.906 (0.012)	0.934 (0.011)	0.587 (0.021)	0.308 (0.020)	0.193 (0.017)	0.052 (0.009)
<u>Khatlon</u>									
	0.171 (0.012)	0.460 (0.016)	0.798 (0.013)	0.854 (0.011)	0.813 (0.012)	0.570 (0.016)	0.305 (0.015)	0.198 (0.012)	0.101 (0.009)
Difference (GBAO-Khatlon)									
gbao	0.220*** (0.024)	0.241*** (0.025)	0.091*** (0.019)	0.052*** (0.017)	0.121*** (0.016)	0.017 (0.026)	0.003 (0.025)	-0.005 (0.021)	-0.049*** (0.013)

Notes: MICS 2005/06 for Tajikistan. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Table 6: Living Standards of Households in GBAO and Khatlon in 1999

	GBAO	Khatlon
PANEL A: Population point measures		
Agricultural irrigation		
	0.1591	0.6364
	(0.014)	(0.036)
Any refugees		
	0.1860	0.6250
	(0.015)	(0.043)
Women give birth at home		
	0.8182	0.5455
	(0.015)	(0.038)
Presence of sovkhov/kolkhoz		
	0.9722	0.1111
	(0.007)	(0.026)
PANEL B: Household measures		
Centralised water		
	0.4884	0.6667
	(0.019)	(0.039)
Electricity		
	0.8372	1.0000
	(0.014)	.
Total hhld expenditures (100 000s of Tajik roubles)		
	0.9511	1.1506
	(0.022)	(0.086)
Hhld head living standard assessment 1 low, 9 high		
	2.9162	3.7102
	(0.045)	(0.095)

Notes: LSMS Tajikistan 1999. Household respondents in Panel B were generally household heads.

Table 7: Difference-in-difference estimates of the effects of the Soviet Union on adult heights of women in Afghan-Tajik border regions

Panel A: Badakhshan				
Tajikistan	2.5803*** (0.498)	2.9825*** (0.534)	2.9825*** (0.534)	2.9132*** (0.541)
Post-1977 births	1.4526* (0.830)	1.6483** (0.836)	1.6483** (0.836)	0.9173 (1.215)
(Post-1977 births)*(Tajikistan)	-2.1510** (0.891)	-2.3475*** (0.898)	-2.3475*** (0.898)	-2.2821** (0.900)
constant	155.4437*** (0.834)	154.7826*** (0.903)	154.7826*** (0.903)	155.3084*** (1.064)
No. obs.	2373	2356	2356	2356
Panel B: Khatlon, Kunduz and Balk				
Tajikistan	3.6562*** (0.684)	3.5153*** (0.687)	3.5153*** (0.687)	3.5278*** (0.685)
Post-1977 births	-0.6140 (0.640)	-0.6373 (0.638)	-0.6373 (0.638)	-0.7067 (0.699)
(Post-1977 births)*(Tajikistan)	0.2826 (0.672)	0.3225 (0.678)	0.3225 (0.678)	0.3056 (0.675)
constant	154.5900*** (0.598)	154.9483*** (0.639)	154.9483*** (0.639)	154.9999*** (0.667)
No. obs.	6120	6120	6120	6120
Additional controls				
ethnicity, elev.	no	yes	yes	yes
rural	no	no	yes	yes
rural*post-Soviet	no	no	no	yes

Notes: MICS 2010-11 and NNS 2013 (Afghanistan) and DHS 2012 and 2017 surveys (Tajikistan). Height is measured in centimetres. Distance to the Panj River 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 8: Early childhood outcomes in southern border regions of Tajikistan

PANEL A: Early childhood education				
Read books	0.206*** (0.025)	0.206*** (0.026)	0.165*** (0.028)	0.137*** (0.029)
Told stories	0.233*** (0.026)	0.227*** (0.027)	0.200*** (0.030)	0.154*** (0.030)
Sang songs	0.084*** (0.021)	0.088*** (0.022)	0.069*** (0.023)	0.045* (0.024)
Any outside	0.037** (0.018)	0.041** (0.020)	0.039* (0.022)	0.016 (0.022)
Play	0.082*** (0.017)	0.084*** (0.018)	0.092*** (0.020)	0.065*** (0.020)
Naming	0.016 (0.029)	0.014 (0.030)	0.009 (0.032)	-0.029 (0.032)
PANEL B: Anthropometric outcomes				
Stunting	0.005 (0.027)	0.004 (0.028)	0.014 (0.030)	0.026 (0.031)
Wasting	-0.018 (0.023)	-0.020 (0.023)	-0.028 (0.026)	-0.011 (0.025)
Underweight	-0.051*** (0.015)	-0.048*** (0.015)	-0.051*** (0.016)	-0.049*** (0.017)
Other controls:				
Age months*sex	no	yes	yes	yes
Mother's ed.	no	no	yes	yes
hhld. wealth quantile	no	no	no	yes

Notes: MICS 2005 survey (Tajikistan). Households in Khatlon and GBAO are included. Coefficients of the GBAO dummy are reported. All estimates include controls for child age in months, sex, rural, birth order and household size. Estimation is by OLS. 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.

Data Appendix A

The Demographic and Health Surveys comprise random samples of women aged 15-49, inclusive (Demographic and Health Surveys (2017)). Anthropometric information is collected from all respondents. The Tajikistan 2012 DHS comprises 9 656 and the 2017 DHS 10 718 respondents.

The two Afghanistan surveys differ slightly in sample frame from the DHS. The MICS 2010-11 survey for Afghanistan comprises a random sample of households (Multiple Indicator Cluster Survey, Afghanistan (2010)). In the MICS 2010-11 survey, there were 26 797 from whom height measures were taken. The Afghanistan NNS is also a household survey (Afghanistan National Nutrition Survey (2013)). Anthropometric information from all household respondents was collected. There were female 9 983 respondents aged 15-49 in the NNS.

Data Appendix B

The relative status of women appears to be much higher in GBAO than in Khatlon. This is show in Table 9. Separate means are presented for those who were aged 15-19 in 1992 and those who were aged 20-24 at that time. These means are consistent with the early childhood findings, if greater autonomy for women leads to relatively greater investments in the next, smaller, generation. The poorer quality land may raise the status of both women and their children. Investment in the next generation is more important, and women are relatively important in making this investment.

Table 9: The status of women in GBAO and Khatlon by age in 1992

<u>GBAO</u>		<u>Khatlon</u>	
15-19	20-24	15-19	20-24
PANEL A: Demographics			
Age at marriage			
22.099	21.345	19.829	20.298
(0.317)	(0.293)	(0.189)	(0.172)
Total children born			
3.129	3.581	4.200	4.777
(0.099)	(0.124)	(0.087)	(0.099)
PANEL B: Respondent agrees that beating is justified if ...			
Goes out without asking permission from spouse			
0.353	0.226	0.631	0.634
(0.029)	(0.027)	(0.022)	(0.022)
Neglects children			
0.459	0.348	0.660	0.644
(0.030)	(0.031)	(0.022)	(0.022)
Argues with spouse			
0.314	0.199	0.566	0.533
(0.028)	(0.026)	(0.023)	(0.023)
Refuses sex			
0.147	0.125	0.342	0.376
(0.021)	(0.022)	(0.022)	(0.023)
Burns food			
0.259	0.205	0.411	0.425
(0.026)	(0.026)	(0.023)	(0.023)

Notes: DHS 2012 and 2017 surveys for years of schooling and MICS for adult female heights. Sample weights included. Standard errors are robust. * significant at 10% level, ** significant at 5% level, and *** at 1% level.

Appendix B: Historical background

The river border between Afghanistan and Tajikistan presents an opportunity for some quantification of the impact of late Soviet policies on living standards. Peoples of this region were divided between the British and Russian Empires in 1895 as part of the resolution of the Great Game of territorial disputes. The poorer northern part of the historical provinces of Badakhshan and Bactria came under Russian, and eventually Soviet, control. These regions of the Tajik SSR were of enormous geopolitical importance to the Soviet Union for more than seventy years. Prior to this time, those residing south of the Panj had enjoyed higher living standards due to the greater arability of land, the presence of major Silk Road trading cities, and rich precious metals mines. Huge Soviet investments were made in agriculture and industry. Food was heavily subsidised. In Soviet Khatlon, a monoculture of cotton growing was developed in fertile river valleys.