Education vs Labour: Land Contracts and Gendered Parental Investments in Tajikistan*

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February 24, 2025

Abstract

This paper shows that gender differences in parental investments in patriarchal societies can be reinforced by the type of agricultural activity, while positive economic shocks may further exacerbate this bias, additionally crowding out higher possibilities to invest in female education. I exploit household data from the Tajikistan Living Standards Surveys, a triple difference identification strategy relying on exogenous spikes in cotton prices and spatial variation in suitability for cotton, and split sample analyses based on the exogenous allocation of state-owned versus small-size inheritable household-owned land rights. I find that girls experienced lower educational spending, which further dropped in cotton areas following the cotton price spike. These results are driven by households owning private land, where the costs of sending girls in the field are far less than the costs of investing in their education.

JEL classification: I0, D1, Q1

Keywords: cotton; education; gendered investment; gender bias

*I would like to thank Enrico Cantoni, Michela Carlana, Kyle Emerick, Margherita Fort, Pamela Jakiela, Sara Lazzaroni, Annalisa Loviglio, Paolo Masella, Eoin McGuirk, Chiara Monfardini, Owen Ozier, Vincenzo Scrutinio, Tommasso Sonno, Enrico Spolaore, and all the participants of EPP Summer Seminar at Tufts University, research seminars at the University of Bologna, Institute of Advanced Studies, Centro Studi Luca d'Agliano, Barcelona GSE Summer School for their useful comments and suggestions.

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1 Introduction

Gender equality is widely recognized as a key driver of economic growth and social progress. Empowering girls from a young age generates long-term advantages that benefit not only individuals but also their families and communities. These effects are far-reaching, enhancing national outcomes in areas such as education, labour markets, and overall societal well-being (Sen and Sengupta, 1983; Rose, 2000; Jayachandran and Kuziemko, 2011; Asfaw and Maggio, 2017). Despite these benefits, gender-based discrimination remains pervasive, particularly in developing countries, where the roots of inequality often manifest within the household and begin at an early age (Jayachandran, 2015; Evans et al., 2020). This entrenched inequality limits opportunities for women, perpetuating a cycle of disadvantage.

While many countries have made progress toward closing the gender gap in education, girls in some regions continue to face significant barriers. These include higher rates of being out of school, the prevalence of arranged or forced marriages, political disenfranchisement, and exposure to violence (Khanna et al., 2016). One of the most visible forms of gender discrimination is the unequal acquisition of human capital, particularly through education. Numerous studies document gender bias in household educational investments (Subramanian and Deaton, 1991; Alderman and King, 1998; Lancaster et al., 2008; Azam and Kingdon, 2013). These disparities are driven by a complex interplay of social norms, economic factors, and family expectations, which often prioritize sons over daughters.

In many patriarchal societies, including Tajikistan, these biases are exacerbated by cultural traditions. Sons are often viewed as the future heads of households and the primary caretakers of their parents, while daughters are expected to marry and leave their natal families. This patrilocal tradition reinforces the perception that investing in sons' education yields greater returns for the family, whereas investment in daughters may be seen as less beneficial. Such dynamics have a particularly strong influence in rural agricultural settings, where labour demands further shape educational decisions.

This paper focuses on the gendered impact of agricultural labour on intrahousehold educational investments, particularly in Tajikistan's cotton-growing regions. Cotton harvesting, which is labour-intensive and non-mechanized, heavily relies on female and child labour. The agricultural cycle coincides with the school year, often resulting in girls missing school to participate in the harvest. In contrast, boys' education is typically prioritized, given their expected future roles within the family. This paper argues that such gender-specific labour demands exacerbate pre-existing biases in educational investments, particularly during periods of economic shocks.

To explore these dynamics, we examine the effects of a significant cotton price spike in

2010/2011 on household educational spending in Tajikistan. Using data from the Tajikistan Living Standards Surveys (2007, 2009, 2011), this study employs a triple-difference identification strategy, exploiting exogenous price shocks and regional variation in cotton-growing suitability. We also examine how these effects differ by household land ownership structure, focusing on state-owned versus inheritable household farms. Our results indicate that in cotton-growing areas, educational spending on girls decreased by 35%, with a significant reduction in private tutoring expenditures. These results are particularly pronounced in households with private land, where the opportunity cost of girls' labour in the fields outweighs the perceived returns of investing in their education.

The findings provide causal evidence of how gendered labour demands in agriculture, particularly in the context of positive economic shocks, exacerbate gender bias in parental educational investments. This paper contributes to the broader literature on gender inequality in education by demonstrating how agricultural work and economic incentives intersect to reinforce discriminatory practices.

The paper is structured as follows: Sections 2 and 3 introduce the topic and provide background. Section 4 presents data, followed by the empirical strategy in Section 5. Results are discussed in Section 6. Paper concludes in Section 8.

2 Literature Review

2.1 Main Factors Driving Girls' Discrimination

This section explores the primary reasons behind gender bias in parental allocation of household resources and reviews the empirical strategies used in previous studies. One critical determinant of gender bias is patrilocality, which plays a significant role in shaping sex ratios in developing countries (Ebenstein, 2013). For example, the sex ratio in Korea improved following a pension expansion that reduced parents' dependency on their children for post-retirement support. Although boys are often subject to high expectations, studies have shown that eldest sons tend to bear the most responsibility for their parents and extended family and therefore receive preferential treatment in intrahousehold resource allocation (Das Gupta, 1987; Mullatti, 1995; Ebenstein, 2013). In some cultures, the eldest son also assumes religious responsibilities, such as performing the last rites for parents, which further solidifies his favored position (Arnold et al., 1998; Jayachandran and Pande, 2013).

Kinship norms and social expectations are central to understanding gender discrimination. In countries with skewed sex ratios, such as India, parents rely almost exclusively on their sons as they age because daughters typically marry and are expected to contribute to the welfare of their new families. Consequently, daughters are perceived to have lower returns on education since

they are unlikely to play a role in supporting their natal families after marriage. This pattern is prevalent in societies with conservative and patriarchal norms (Das Gupta, 1987; Foster and Rosenzweig, 2004). Moreover, the dowry system further intensifies discrimination against girls by framing them as financial liabilities. Parents thus invest more heavily in their sons to enhance their value in the marriage market (Das Gupta, 2005; Ashraf et al., 2020).

Inheritance practices are another crucial foundation of gender discrimination in many developing countries (Mullatti, 1995; Ebenstein, 2013; Bose and Das, 2017). Although legal rights to inheritance may have been equalized for men and women, cultural norms still dominate people's behavior. Sons, rather than daughters, are expected to inherit the family estate and to remain living with parents in a joint family setting (Bose and Das, 2017). These practices are closely linked to marriage customs, which further reinforce the gender disparities in resource allocation.

In general, the root causes of gender bias in children can be attributed to differences in perceived returns from daughters and sons. These differences arise from disparities in labour returns between men and women and from patriarchal family structures prevalent across many Asian countries, including Tajikistan (Rose, 2000; Akramov and Shreedhar, 2012). Since the returns on these investments are only realized long after the initial allocation, parental decisions are influenced by their ability to finance investments in children early on. Thus, access to credit markets is a critical factor for understanding rural households in developing countries. Poor households, particularly those lacking access to credit, are constrained in their ability to make equitable investments within the household (Rose, 2000). Therefore, a potential increase in income could help reduce gender bias in intrahousehold spending, but this depends largely on the household's financial status.

2.2 Discrimination in Educational Spending

This subsection discusses the literature on intrahousehold discrimination in educational spending against girls. For example, Masterson (2012) examined gender bias in education spending in Paraguay using MECOVI 2001 data and the Working and Leser specification of the Engel curve. He identified a pro-male bias in education spending, with variations depending on region and age category. He also noted that urban households typically had greater educational expenditures due to higher incomes and better opportunities. Using similar techniques, Zimmermann (2012) investigated gender discrimination among Indian children in the intrahousehold allocation of resources, specifically focusing on education spending. His results indicated discrimination against girls across all regions, particularly from the age of 10, with a sharp disadvantage for girls aged 15-19.

In a related study, Rose (2000) observed that women in rural areas of India tended to allocate

more time to raising boys than girls. She also analyzed the impact of credit market constraints on gender bias, finding that financial opportunities available to families significantly influenced the head of the household's decisions on investment in children. Additionally, Lancaster et al. (2008) documented substantial gender bias for children aged 10-16 in rural regions of Bihar and Maharashtra, with boys receiving greater educational investments than girls. This bias was not found in urban areas, likely because higher income levels in cities allowed for more equitable investments.

Interestingly, Himaz (2010) found contradictory evidence in Sri Lanka, showing that intra-household allocation of educational spending was biased in favor of girls in certain age categories. Specifically, her analysis showed a bias toward girls in the 5-9 and 17-19 age groups in 1990-1991, and in the 5-9 and 14-16 age groups in 1995-1996. She argued that this bias resulted from rational household decisions, as wage returns on education were greater for females than males during the observed period. Furthermore, she noted that Sri Lanka stands apart from other Asian countries in that women tend to enjoy higher social status and better labour market opportunities, which could explain the preference for girls in the early stages of education.

Kingdon (2009) studied gender bias in intrahousehold expenditures across Indian states, using both household and individual-level data. She emphasized the importance of individual-level data in identifying child gender bias, revealing considerable discrimination against girls aged 15-19. Similarly, Azam and Kingdon (2013) reported weak evidence of gender bias in school enrollment but significant pro-male bias in educational expenditures. They found that the presence of bias increased with the child's age, and regional discrepancies further influenced the degree of bias.

Emerson and Souza (2008) provided further insights into household spending patterns in Brazil, revealing that mothers tend to favor daughters, while fathers favor sons in decisions about child labour participation. However, both parents showed a pro-male bias in educational attainment. The study also controlled for household income, finding that while parental income did not significantly impact the educational attainment of sons and daughters, an increase in mothers' income reduced the likelihood of daughters being involved in child labour.

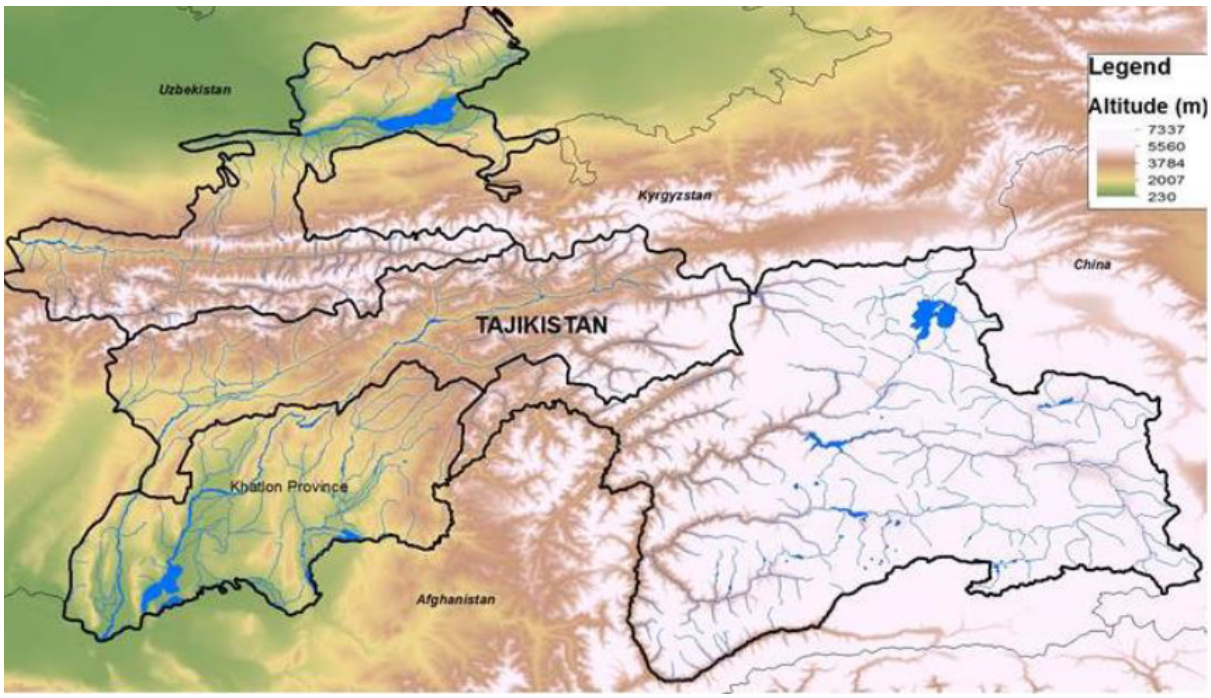
Overall, the reviewed studies consistently point to the presence of a pro-male bias in intra-household educational spending. However, the influence of mothers' income or increased female labour force participation on improving daughters' educational outcomes remains unclear. This study contributes to the existing literature by employing a less common triple difference identification strategy, which will be detailed in Section 5. While several studies have suggested that an increase in income could reduce gender bias (Oosterbeek et al., 2008; Skoufias and Parker, 2011; Saavedra and Garcia, 2012), this paper argues that positive income shocks may not always reduce bias, particularly under certain circumstances. Factors such as house-

hold income, family size, religion, and location can create heterogeneity in parental motivations for gender discrimination. This paper aims to evaluate how certain incentives, such as increased income and perceived labour market returns, can further exacerbate educational spending bias against girls.

3 Tajikistan and cotton

Tajikistan, one of the five Central Asian countries without access to the sea, had a population of approximately 9.475 million in 2021. According to the International Monetary Fund, Tajikistan ranks 172nd out of 188 countries in terms of GDP per capita. Despite agriculture being the lowest-paying sector, nearly 70% of the population is engaged in agricultural activities (Van Atta, 2009). Furthermore, Tajikistan is the largest source of migrants to Russia, with around $2.5 billion, or 33% of its GDP, coming from remittances. This dynamic results in a frequent absence of male labour, leaving women to take on a significant role in the economic activities of the country. This trend is especially prevalent in rural areas, where female participation in the labour force is particularly high (Hegland, 2010; Kan, 2018).

Figure 1: Geographical profile of Tajikistan: DIVA-GIS (2014)



The agricultural sector is vital to the Tajik economy, despite the fact that 93% of Tajikistan's land is mountainous, limiting the availability of arable land (Figure 1). Among agricultural crops, cotton plays a crucial role in the livelihoods of a significant proportion of the rural population. Cotton production is feasible in specific regions thanks to unique climatic and geographic

conditions that make the land suitable for this crop (Figure 2). Since the collapse of the Soviet Union, the cotton sector in Tajikistan has undergone significant liberalization, including the partial privatization of cotton farms. The distribution of cotton farms was based on a lottery system and through collective land tenure arrangements. In addition to the restructuring of cotton farmlands, other sectors such as ginning, financing, and marketing were privatized, and input prices were liberalized (Initiative, 2021).

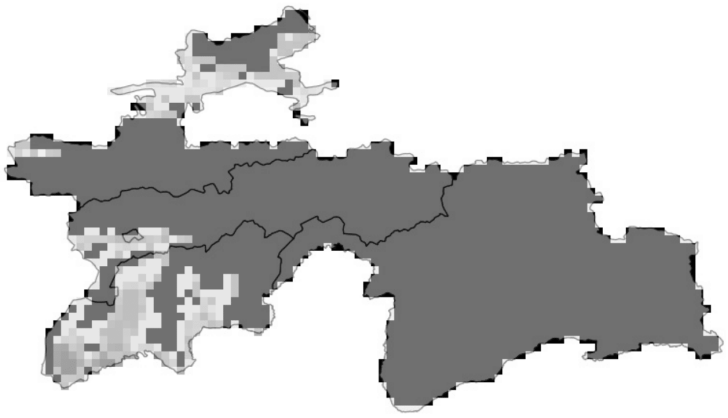


Figure 2: Cotton suitability in Tajikistan marked by light grey areas: based on data from FAO-GAEZ

Cotton, along with aluminum, accounts for over 75% of Tajikistan's exports. However, Tajikistan is a small player in the global cotton market, with its exports comprising only about 2% of the world's total cotton exports (Economics, 2021). The cotton price shock that occurred during the 2010/2011 season can be considered an exogenous event. The price surge was triggered by a severe drought in China, which, as the largest cotton producer and consumer, doubled its imports and drove global cotton prices to more than double (Outlook, 2020). According to Akramov and Shreedhar (2012), the surge in cotton prices during the 2010/2011 season led to an almost 40% increase in cotton production in Tajikistan, reversing a declining trend that had resulted from underinvestment in irrigation and infrastructure. Additionally, the harvested cotton area expanded by 30% in 2011.

In Soviet Tajikistan, cotton production was primarily managed by large state-owned farms, known as kolkhozes and sovkhozes. Seasonal workers were regularly recruited for the harvest period. After gaining independence, the privatization of state-owned farms began, with 77% of cultivated land becoming privately owned and 23% remaining under state control. Privatized land was distributed by lottery to small households and peasant (dekhkan) farms. Of this land, 22% went to household plots (typically about 0.3 hectares), and 55% went to dekhkan farms. Dekhkan farms could be family-owned or collectively owned; collective farms operated as large private cooperatives with more than 20 hectares of land (Food and (FAO), 2009).

Collective dekhkan farms resemble the state cooperatives of the Soviet era, where individual farmers and workers earn low daily wages for specific activities or can use a small portion of collective land for personal needs. The farm manager oversees all financial and production decisions, and shareholders have land rights for a period of 5 to 20 years, which are non-inheritable. On the other hand, private individual or family dekhkan farms are smaller (ranging from 2 to 20 hectares) and have well-defined inheritable rights for up to 99 years. Officially, all types of farms have the freedom to choose the crops they cultivate.

Student and child labour were commonly used to harvest cotton during the Soviet period. The same pattern persists today, given that cotton picking is still not mechanized. However, state farms are more rigorously monitored now to address the negative image associated with child labour, which has been a well-known issue in Tajikistan (Umarov, 2011).

During the harvest season, additional workers are required for cotton picking, and this labour force mainly comprises women and children. The absence of men due to labour migration, combined with the perception that women have greater agility, means that females are primarily recruited. Despite women's critical role, the wages in the cotton industry are among the lowest in the agricultural sector (SOAS, 2010).

Small family farms often hire from within the extended family before seeking workers on the local market, which is one of the main reasons that children become involved in the cotton-picking process. At the same time, these farms offer valuable employment opportunities for local women. However, due to conservative Islamic traditions in Tajikistan, women often face travel restrictions, which limits their ability to work outside their communities. Consequently, labour mobility among women is virtually nonexistent in rural Tajikistan (Akramov and Shreedhar, 2012).

4 Data

This paper utilizes data from the Tajikistan Living Standards Survey (TLSS), which was conducted by the World Bank and UNICEF in 2007 and 2009, with a follow-up in 2011 led by the Institute for East and Southeast European Studies. The data was collected during the cotton harvesting period, providing an accurate measure of labour market participation in cotton picking. TLSS 2007 is a representative sample comprising 4,860 households from 270 primary sampling units (PSUs). TLSS 2009 and 2011 consist of 1,503 households from 167 PSUs.

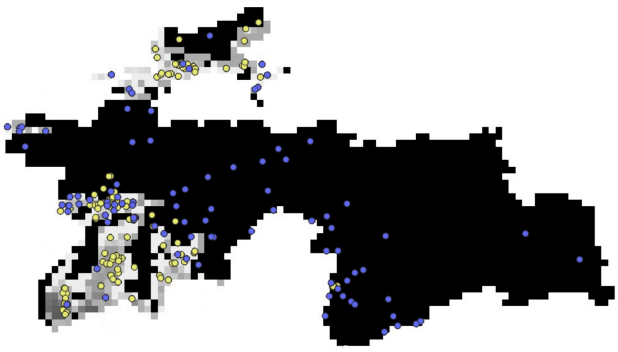
This analysis merges all three survey waves, focusing on 1,503 households from 167 PSUs to construct a panel dataset. The combined dataset includes 16,788 individuals, along with a series of socio-economic characteristics, such as gender, age, occupation, ethnicity, education, and income. The panel also covers 4,217 children. Farms are categorized into two types:

private/family farms and state/kolkhoz farms (for a more detailed description, please refer to Section 3).

Using the map of cotton suitability from FAO-GAEZ and the geolocation data of each PSU from TLSS, I generated Figure 3. Specifically, villages located in areas suitable for cotton cultivation (light grey areas) are classified as cotton villages, while the remaining villages are classified as non-cotton. In Figure 3, yellow dots represent cotton villages, whereas blue dots represent non-cotton villages. This classification enables the analysis of different agricultural areas and provides insight into their impact on economic activities.

Figure 3: Suitability of Cotton Cultivation: Data from FAO-GAEZ and TLSS

(a) Map of Cotton Suitability in Tajikistan

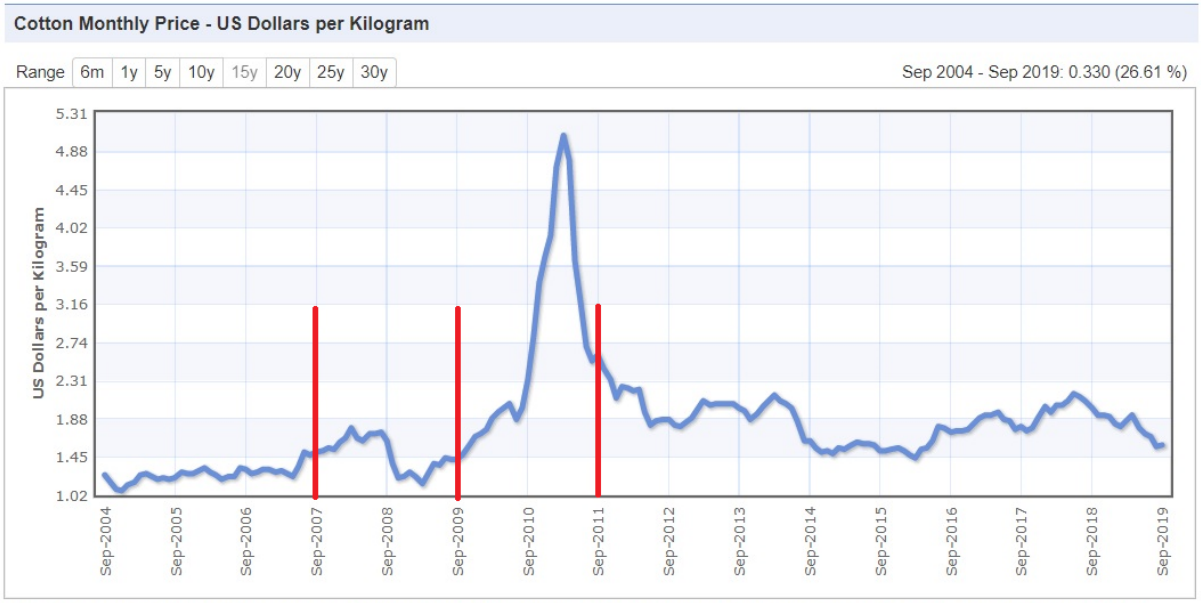


Notes: Light grey areas represent land where agro-environmental factors make it suitable for cotton cultivation; blue dots represent villages located in non-suitable areas; yellow dots represent villages located in suitable areas for growing cotton.

This exogenous variation in cotton suitability forms one of the cornerstones of the current identification strategy. Another key factor is the exogenous variation over time. Specifically, I utilize the spike in cotton prices that occurred between 2010 and 2011, based on data from IndexMundi.com, a reliable source for historical commodity price fluctuations (see Figure 4). The red lines indicate the timing of the data used in this paper, showing that cotton prices were relatively stable in September 2007 and 2009, while a significant increase is observed in September 2011, immediately following the price spike.

Figure 4: Cotton Prices Over Time: IndexMundi.com

(a) Historical Cotton Price Trends in Tajikistan



Notes: The figure illustrates the trajectory of cotton prices over time, as sourced from IndexMundi.com. The red lines indicate the timing of the TLSS surveys used in this analysis. Prices in September 2007 and 2009 were similar, while a significant increase was recorded in September 2011 following an exogenous price spike.

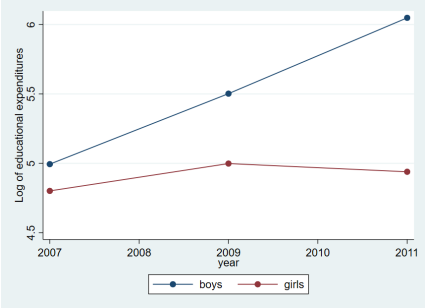
Tajikistan is a small exporter in the global cotton market, accounting for only 2% of world cotton exports. The spike in cotton prices was triggered by a severe drought in China, which serves as an exogenous shock to Tajikistan, given its limited influence on global supply and demand. In the subsequent analysis, I exploit both these variations—cotton suitability and the price shock—to develop the triple difference identification strategy discussed in the following section.

5 Empirical framework

To provide causal evidence of differential treatment in educational spending, this project employs an approach called difference-in-differences-in-differences (triple differences) [1] to demonstrate the impact of gender on the educational spending of children.

In order to investigate whether the cotton price shock affected girls and boys differently, I present Figure 5. It can be observed that there is a decline in educational spending for girls in 2011, whereas spending for boys continued to rise. The observation in 2011 follows immediately after the significant increase in cotton prices. This pattern suggests that evaluating the differential effect on boys and girls post-price shock may be fruitful. However, a simple difference-in-differences (DiD)[2] analysis can only be used if this price shock was not area-specific.

Figure 5: Gendered Educational Expenditures: Impact of 2011 Cotton Price Shock



Notes: Educational spending differences for boys and girls in cotton-growing areas. The significant decrease in 2011 indicates a potential effect of the cotton price shock on gendered spending.

Upon examining Figure 6 (a) and (b), it becomes evident that using the triple difference approach is a necessary step. This approach is essential because the assumption that the increase in cotton prices was a common shock does not hold. The figures show that the price shock was area-specific, rendering the simple difference-in-differences approach insufficient for recovering the treatment effect. Specifically, the price increase affected cotton-growing areas, but not non-cotton areas[3]. According to Gruber (1994), when there is a bias in two DiD estimators, applying the third difference will remove the bias, as it will be differenced out.

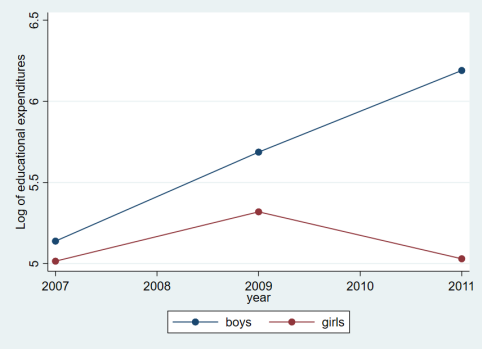
[1] Details can be found in Gruber (1994), Imbens and Wooldridge (2007), and Cunningham (2021).

[2] Difference-in-difference

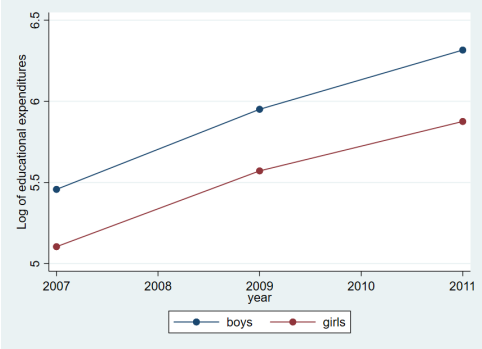
[3] The analysis focuses on the period immediately following the shock, which leaves agriculturalists no time to adapt to changing prices or to modify the crops they grow.

Figure 6: Gendered Educational Expenditures in Cotton and Non-Cotton Areas

(a) In Cotton Areas



(b) In Non-Cotton Areas



Notes: Educational spending patterns for boys and girls in cotton and non-cotton areas. In cotton areas (a), educational expenditures for girls declined in 2011, whereas boys' expenditures continued to increase. In non-cotton areas (b), the gender gap remains, but no significant changes are observed post-price shock.

To further investigate differences between cotton and non-cotton areas, I construct two graphs to test the parallel trends assumption for gender differences following the price shock. Figure 6a shows that over time, the gap in educational expenditures between boys and girls widened, but in 2011 the trend for girls reversed, leading to a reduction in expenditures. I argue that this shift resulted from the profitability of cotton farming and a preference for girls to work in the fields rather than pursue education. Despite the positive impact of the cotton price spike on female labour force participation and the associated income effect, it exacerbated the existing bias against girls.

From Figure 6b, it is interesting to see that the difference between girls and boys is larger in non-cotton areas. While the gap in educational spending persists, there are no observed changes after the positive price shock of 2011. Thus, the positive price shock was not a common shock, but rather area-specific. In this case, girls in non-cotton areas can be used as a control group, but the potential differences across areas beyond the changes in price could create biases in the results. Similarly, using the DiD approach only within cotton areas could be problematic due to other factors affecting educational spending unrelated to the price shock. Although there were no reforms or major changes in Tajikistan during the period that could affect educational spending, using the triple difference helps to control for potential confounding trends: (i) changes in educational spending for girls across areas and (ii) changes in spending for all children in cotton areas[4].

The main specification of the model is as follows:

[4]The triple differences (DDD) estimator starts by calculating time changes in averages for girls in cotton areas, and then nets out changes in means for girls in the control areas and changes in means for boys in cotton areas.

$$Ln(EducExp)_{i,h,t} = \alpha + \beta_1(\text{girl x post-year x cotton})_{i,h,t} + \beta_2(\text{girl x cotton})_{i,h} +$$
$$+ \beta_3(\text{post-year x cotton})_{h,t} + \beta_4(\text{girl x post-year})_{i,t} + \beta_5\text{girl}_i +$$
$$+ \beta_6\text{post-year}_t + \beta_7\text{cotton}_h + \gamma X_{i,t} + \sum_t \sigma_t Time_i + \sum_h \sigma_h Household_i + \varepsilon_{h,t}$$

where $Ln(EducExp)_{i,h,t}$ is a natural logarithm of intrahousehold expenditures on education of a child i in the household h over years t. $Girl_i$ is a dummy variable taking 1 if a child is girl below 18[5] and 0 otherwise. $Cotton_h$ is a dummy variable taking 1 if household is located in the village which is in the area that is suitable for cotton farming (refer to the Figure 3) and 0 otherwise. $Post-year_t$ is a dummy variable where 1 is year 2011 after the price shock and 0 is year 2007 and 2009 before the price shock.

The treatment effect is captured by β_1, which reports the effect of the cotton price shock on girl child in cotton villages compared to girls in non-cotton villages. In addition, I include individual characteristics $X_{i,t}$ such as gender, age, occupation, ethnicity, income, household size, hukumat, marital status, relation to the household's, head, living in urban area, education of parents, education of household's head, number of siblings, being first born, being the youngest son. Also I include household time fixed effects to control for unobserved time invariant heterogeneity. Standard errors are clustered at the household level[6]. I use cluster-adjusted standard errors in addition to the fixed effects to account for intra-cluster correlation which the fixed effects approach is not taking into account (Angrist & Pischke, 2009). Following the main specification, I split the sample between small family-owned farms and big state owned farms, while maintaining the triple difference approach and same set of controls. This is done in order to analyze the role of farm structure in gender bias in educational spending in cotton areas.

6 Results

In this section, I present the main findings of this chapter. Table 1 presents the results using the main triple difference specification described in the previous section. It can be seen that, on average, girls are discriminated against by 13% more in educational spending after controlling for time-invariant characteristics. The price shock itself had a sizeable positive effect on intrahousehold educational spending in general, and especially for girls. However, the situation is reversed in cotton areas, where expenditures on education are 18% lower on average. Moreover,

[5] 18 is the age of attaining legal adulthood. A legal adult is a person who has attained the age of majority and is therefore regarded as independent, self-sufficient, and responsible.

[6] Using standard errors which are robust and clustered at district level and psu level do not change the results. Since the sample was selected by randomly sampling households from within the hukumats; and I am focusing on the educational spending in the overall population, I choose to cluster standard errors by household, since there are households in the population of interest beyond those seen in the sample.

after the price shock, a girl in cotton areas receives 35% less spending on education compared to a boy of the same age. It is evident that the price shock had a negative impact on educational spending for girls in cotton areas. This is despite the established notion that a positive income shock typically leads to women's empowerment and has a positive effect on girls' human capital formation. In the following sections, I evaluate the potential mechanisms and factors that contribute to the observed discrimination.

Table 1: Baseline Results for Girls Using Triple Difference (DDD) Specification

	(1)	(2)	(3)
VARIABLES	Log of educational spending		
girl	-0.232***	-0.114***	-0.132***
	(0.0483)	(0.0385)	(0.0398)
post_year	0.796***	0.587***	0.940***
	(0.0595)	(0.0641)	(0.0876)
cotton	-0.168*	-0.185**	-0.185**
	(0.0920)	(0.0893)	(0.0889)
girl#post_year	0.0851	0.136*	0.142*
	(0.0843)	(0.0764)	(0.0787)
girl#cotton	0.202*	0.222**	0.284***
	(0.114)	(0.0921)	(0.0966)
post_year#cotton	-0.00335	0.196	0.187
	(0.125)	(0.124)	(0.135)
girl#post_year#cotton	-0.189	-0.347**	-0.354**
	(0.165)	(0.157)	(0.168)
Constant	5.423***	5.845***	6.088***
	(0.0410)	(0.211)	(0.267)
Controls	No	Yes	Yes
FE year and household	No	No	Yes
Observations	3,338	3,246	3,246
Number of households	996	996	996

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, household size, marital status of parents, relation to head of household, living in urban area, income, and number of children in the household.

Table 2: Detailed Results for Educational Expenses by Category

VARIABLES	(1) Log of expenses: fees	(2) uniforms	(3) books	(4) meals	(5) repair	(6) other	(7) private tutoring
girl	-0.403***	-0.123***	-0.0868**	-0.439**	-0.0123	-0.281**	-0.00403
	(0.125)	(0.0312)	(0.0370)	(0.180)	(0.0327)	(0.134)	(0.0100)
post_year	0.677**	0.906***	0.842***	-0.0273	0.501***	0.238	-0.0547***
	(0.311)	(0.0629)	(0.0743)	(0.496)	(0.0835)	(0.384)	(0.0158)
girl#post_year	0.306	0.0865	0.0922	0.338	0.0633	0.275	0.0530**
	(0.250)	(0.0663)	(0.0790)	(0.299)	(0.0800)	(0.194)	(0.0222)
girl#cotton	-0.184	-0.0225	-0.114	-0.107	-0.0798	-0.352	0.0385
	(0.454)	(0.0709)	(0.0862)	(0.275)	(0.0865)	(0.589)	(0.0242)
post_year#cotton	1.600**	0.510***	0.0525	-0.537	0.344**	0.421**	0.0972***
	(0.799)	(0.151)	(0.155)	(0.856)	(0.150)	(0.149)	(0.0292)
girl#post_year#cotton	-3.268***	0.0301	0.167	-0.853	-0.0549	-0.199	-0.115***
	(0.817)	(0.168)	(0.171)	(1.504)	(0.148)	(0.629)	(0.0394)
Constant	3.725***	4.595***	2.884***	4.118***	2.245***	3.086***	0.966***
	(0.140)	(0.0287)	(0.0368)	(0.257)	(0.0331)	(0.221)	(0.0522)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE year and household	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,081	2,805	2,663	689	2,300	562	3,489
Number of household	531	923	902	407	849	306	1,017

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, household size, marital status of parents, relation to head of household, living in urban area, income, and number of children in the household.

First, Table 2 breaks down educational expenses into specific categories to understand the main sources of household spending. Overall, girls are discriminated against in almost all categories, including school uniforms and meals. Girls receive 40% less money to cover school fees and 43% less for school meals. They also have 12% less spending on uniforms and 8% less on books. Regarding discrimination in cotton areas, the data shows that after the price shock, there was a significant decrease in school fees and private tutoring, as shown in columns 1 and 7 of Table 2. Both indicators support the hypothesis of lesser investment in girls in cotton areas after the spike in cotton prices.

Parents' unwillingness to spend more on private tutoring after controlling for income and living in urban areas suggests they may not prioritize girls' education, possibly because they perceive it as not paying off in the future. In cotton areas, parents tend to spend 11% less on private tutoring for girls, possibly because they prefer daughters to contribute to household tasks rather than invest in their education.

Another potential effect could result from the fertility pattern within the household. Girls are typically caregivers, and the more siblings a girl has, the more work she does inside the household. Parents may spend less on daughters' education because the time they spend taking care of their siblings is more valuable for the family. This hypothesis is evaluated in Table 3, which presents the results for different sibling compositions. Column 1 shows that having siblings makes the effect of discrimination stronger, as parents spent 14% less on education for girls in cotton areas when cotton prices increased. There may be a gendered differentiation in sibling composition, where parents want better care for their sons, or other daughters may need

Table 3: DDD Results for Educational Expenses by Sibling Composition

	(1)	(2)	(3)
VARIABLES	Number of siblings more than 1	Number of brothers more than 1	Number of sisters more than 1
girl	-0.111**	-0.0969	-0.0278
	(0.0508)	(0.160)	(0.128)
post_year	1.113***	1.457**	1.328***
	(0.131)	(0.664)	(0.420)
girl#post_year	0.0192	0.575	0.523
	(0.142)	(0.512)	(0.524)
girl#cotton	0.334***	0.287	0.119
	(0.119)	(0.184)	(0.205)
post_year#cotton	0.327*	0.329	0.288
	(0.195)	(0.479)	(0.338)
girl#post_year#cotton	-0.497**	-0.677	-0.608
	(0.229)	(0.525)	(0.583)
Constant	4.982***	4.694***	4.754***
	(0.0593)	(0.334)	(0.206)
Observations	1,492	367	571
Number of households	426	136	245

Notes. Standard errors are clustered at the household level. Individual controls include being first-born, ethnicity/religion, age, household size, marital status of parents, relation to head of household, living in an urban area, income, and number of children in the household.

less care. However, columns 2 and 3 show no significant difference based on sibling gender. This suggests that the gender of siblings does not play an important role; rather, the quantity of siblings is more critical. The more children there are in the family, the harder it becomes to allocate intrahousehold spending equally to everyone, and older girls may end up taking care of their younger siblings.

Table 4: Educational Expenses for the Firstborn Children

	(1)
VARIABLES	First born
girl	0.242
	(0.308)
post_year	0.601
	(0.486)
girl#post_year	0.712
	(0.603)
girl#cotton	-0.0446
	(0.386)
post_year#cotton	0.630
	(0.529)
girl#post_year#cotton	-1.464**
	(0.682)
Constant	5.066***
	(0.176)
Observations	753
Number of households	705
FE year and household	Yes

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, household size, marital status of parents, relation to head of household, living in urban area, income, and number of children in the household.

In Table 4, I examine whether birth order affects parents' decisions to invest in their daughters' education. Interestingly, the effect is not observed across all dimensions except in cotton areas after the price shock. The results imply that being the eldest daughter is associated with greater responsibilities within the household, working more, and marrying earlier. In particular, early marriage and the presence of younger siblings make the eldest daughter the least likely candidate for parental investment in conservative societies. Leaving the household after marriage and spending time caring for siblings further exacerbates the bias against spending on their education. Hence, parents are less likely to invest in the education of the eldest daughter after a positive income shock.

Table 5: Educational Expenses for Different Age Groups

	(1)	(2)
VARIABLES	Below 12	After 12
girl	-0.0913	-0.107**
	(0.176)	(0.0457)
post_year	1.936***	1.011***
	(0.407)	(0.104)
girl#post_year	-0.496*	-0.0182
	(0.278)	(0.0869)
girl#cotton	0.930***	0.152
	(0.318)	(0.105)
post_year#cotton	0.0501	0.216
	(0.427)	(0.158)
girl#post_year#cotton	-0.384	-0.304*
	(0.591)	(0.173)
Constant	6.165***	5.487***
	(1.020)	(0.338)
Controls	Yes	Yes
FE year and household	Yes	Yes
Observations	466	2,410
Number of households	354	873

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, household size, marital status of parents, relation to head of household, living in urban area, income, and number of children in the household.

It is crucial to further investigate age effects to check if the observed discrimination is mainly driven by older girls who can provide more substantial help in the household or field. In Table 5, I separate the effect between girls below and above 12 years of age. The age of 12 was chosen because (i) girls in this age group are old enough to work in the fields, and (ii) this is an unofficial age in Tajikistan when children may begin to engage in cotton harvesting (EJF, 2007). The results show no effect for younger age cohorts; however, the effect exists for older girls. This indicates that the price spike affected the distribution of intra-family expenditures differently according to the children's age. Interestingly, the positive impact on girls below 12 is not driven by cotton areas.

Another crucial factor affecting intrahousehold allocation of resources is the parental back-

ground. In Table 6 , I compare the extent to which the education of mothers and fathers affects educational expenditures. I account for better-educated parents, since it has been shown that higher parental education is associated with better human capital outcomes for their children (Brown, 2006; Ashraf et al., 2020). However, the results show that higher education still leads to discrimination, and maternal education has around 2% smaller impact on resource allocation compared to paternal education.

This finding is surprising since maternal education commonly signals better decision-making and greater involvement in children's upbringing. One possible explanation could be the cultural context of Tajik society, where traditions and social expectations are paramount, and mothers support the role of daughters as future wives to preserve familial honor (Qodir, 2012; Mahdavian, 2018). It is essential to highlight that discrimination in education against girls is significant even without accounting for the cotton price increase. Girls tend to receive 13-14% less spending than boys when parental education is high.

Table 6: Educational Expenses by Parental Education

	(1)	(2)
VARIABLES	Education of mother is higher or more	Education of father is higher or more
girl	-0.130***	-0.148***
	(0.0418)	(0.0452)
post_year	0.814***	0.815***
	(0.0790)	(0.0911)
girl#post_year	0.139*	0.146
	(0.0817)	(0.0907)
girl#cotton	0.308***	0.267**
	(0.108)	(0.117)
post_year#cotton	0.226	0.271
	(0.143)	(0.183)
girl#post_year#cotton	-0.334*	-0.353*
	(0.176)	(0.209)
Constant	5.777***	5.807***
	(0.251)	(0.279)
FE year and household	Yes	Yes
Observations	3,022	2,569
Number of households	953	843

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, household size, marital status of parents, relation to head of household, living in urban area, income, and number of children in the household.

The aforementioned results demonstrate that discrimination against girls in educational spending is widespread in Tajik society and does not depend significantly on parental background. It

is more severe in families with more children and affects older girls to a greater extent. The spike in cotton prices in 2011 had a positive effect on educational spending overall at the country level; however, paradoxically, the situation was reversed in cotton areas. Girls living in cotton areas were found to be the most discriminated against, with educational spending generally being lower in such areas.

Observing that the negative effect on girls' education comes predominantly from cotton areas, this analysis suggests that the peculiar culture of cotton production is the primary mechanism at play: cotton is easy to pick, and women, including young girls, are the primary workers during the harvest season. If households prefer to send daughters to work in the field rather than pay for their schooling, unequal educational spending should only be observed in private farms. State farms focus on meeting government goals for cotton harvest volume. They hire workers on a daily basis, without incentives to discriminate based on gender.

Given the conservative nature of Tajik society, young girls would not typically be allowed to work with unfamiliar individuals in the fields, many of whom are hired seasonally from other villages. Additionally, state farms are monitored by the government and NGOs, which are likely aware of the negative image that child labour could project for the country. In Table 7, I divide the sample between state-owned and privately-owned farms (refer to Section 3 for more details). The effect holds only for privately-owned farms, where girls experience discrimination in general and especially following the cotton price spike if they live in households that own the land. In contrast, girls living in households involved in state farms do not experience discrimination. This could stem from state farms being organized in various ways, such as cooperatives, collectives, and commercial farms. Unfortunately, the present data does not allow for further differentiation. Nonetheless, the results from Table 7 indicate that girls are more discriminated against when they are likely to engage in cotton picking within their households.

Table 7: Educational Expenses by Farm type

VARIABLES	(1) Private farm	(2) State farm
girl_child	-0.0785**	0.0869
	(0.0353)	(0.0860)
post_year	1.701***	1.717***
	(0.105)	(0.106)
girl_child*post_year	-0.969***	0.968
	(0.0668)	(0.703)
private_cotton	1.351*	
	(0.734)	
girl_child*private_cotton	-1.979**	
	(0.801)	
post_year*private_cotton	-1.159	
	(0.908)	
girl_child*post_year*private_cotton	-1.857*	
	(0.962)	
kolkhoz_cotton		-1.497
		(1.145)
girl_child*kolkhoz_cotton		1.075
		(1.162)
post_year*kolkhoz_cotton		1.328
		(1.096)
girl_child*post_year*kolkhoz_cotton		0.982
		(0.987)
Constant	5.190***	5.192***
	(0.229)	(0.235)
FE year and household	Yes	Yes
Number of households	463	2,636

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.

To further support this hypothesis, I analyzed survey questions from the Tajikistan Living Standards Survey (TLSS) regarding child labour, particularly whether children are hired in this population area. Table 8 shows that, in cotton villages with records of child labour, discrimination in education is around 45% for girls. In villages with no indication of children working, the effect vanishes. This finding supports our hypothesis that girls in cotton areas are more discriminated against because their labour is considered a better investment than their schooling.

Table 8: Main results for working children

	(1)	(2)
VARIABLES	If in this population point children earn nothing/are not hired	If in this population point children earns money if hired
girl	-0.0137	-0.0427
	(0.0883)	(0.0419)
post_year	1.032***	0.993***
	(0.192)	(0.0853)
girl#post_year	-0.243	0.0237
	(0.246)	(0.0915)
girl#cotton	-0.0210	0.344***
	(0.239)	(0.0894)
post_year#cotton	0.0571	0.306*
	(0.304)	(0.166)
girl#post_year#cotton	0.0207	-0.446**
	(0.325)	(0.178)
Constant	5.025***	5.053***
	(0.115)	(0.0372)
FE year and household	Yes	Yes
Number of households	100	788

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.

7 Additional Checks

In this section I address some concerns that arise in regards to this analysis. First, girls typically stay in their families before they get married. Also, they do not have much of decision making power before they reach 21. Given the results in Table A2, I would like to check if the bias could be driven by older girls. For this purpose, I do not focus solely on children, but I run the same analysis for all girls below and including 21 years old. Table 9 shows that the bias is 5% higher for this age cohort. It is mainly coming from elder girls who have more capability to work in the field and be productive. It is also important to notice that general discrimination is around 10%, which is lower than 13% among girls-children. It could be explained by age in two possible ways. First, older girls are more empowered to disagree with the household head. Second, they also most probably finished school and did not continue education, so there could be no educational expenditures associated with them.

Another potential concern is that families, which have participated in the study, are coming from the better developed regions of the country, thus, they may be richer. In this case, controlling for income may not be sufficient to account for selection bias. Therefore, I select only those households which have higher income level than the average country level and apply the same specification as in the main part of the analysis. The results are shown in Table A3, where no change is detected in the coefficient describing girls' discrimination in cotton areas after the positive price shock (it remains around 37 %). Girls are more discriminated (around 17%) on average, but after the price shock there was an increase in educational spending for girls,

however, this effect is reversed in cotton areas.

Informal insurance mechanisms developed between households could nullify the impact of the price shock or could be driving the results. I subset the sample into households who are engaged into the system of mutual assistance (data also taken from TLSS). This is a form of insurance mechanism for agricultural households during adverse shocks. It may take both financial and in-kind forms. Table A4 shows that girls tend to be even more discriminated in these households (nearly 48%). One of the potential explanation could be stronger ties and collaboration between the households that are engaged into mutual assistance, which makes possible network for marriage match making. Thus, girls may face even stronger discrimination in access to education, since this is not an important factor for future successful marriage, while taking care of the household and being productive in the field will be considered as a good signal for potential in-laws (CAA Network, 2017). Overall, higher coefficient in the variable of interest signals that not accounting for insurance mechanisms is most likely resulting in upward bias, which does not interfere with the general conclusion of this study.

Moreover, in order to check that the composition of siblings in further details, I re-evaluate the estimated effect only in the households with only two children of both gender. In this setting, I expect to get strong discrimination against daughter in line with the mechanism proposed above. Table A5 totally supports this claim as discrimination is raising dramatically to 150%. This result demonstrates that in the case of pure trade-off between son and daughter, parents tend to strongly discriminate girl in terms of educational spending in cotton areas even after the positive price shock. Since the effect on girls regardless of household activity seems to be absent, it supports the claim that cotton areas are mostly driving the results. Hence, it seems that the cultivation of cotton exacerbate an existing intrahousehold gender bias in the traditional Tajik society.

The crucial factor that could play a role in the girls' discrimination is decision making within the household. However, TLSS does not provide an opportunity to construct an adequate measure for this purpose. The only relevant question was inquiring about who decides to spend and save in the household. After selecting woman's answers, the dataset size shrank to 161 individuals only, with incomplete answers. This sample did not allow to control for the effect before and after the price shock. Instead I checked whether women decision making makes a change for girls in general and in cotton areas particularly. Table A6 shows that results are not significant, but the direction of the effect is positive for girls on average and in cotton areas in particular. However, limited sample does not allow me to draw any conclusions and further research is required.

8 Conclusion

Human capital investment is a cornerstone of economic development and poverty reduction (Becker, 1994). Nevertheless, one of the most important human capital dimension - education - is hardly accessible due to the costs it entails for families. Constraints exist not only in direct form (e.g. fees, materials, transportation, uniforms, textbooks), but also in indirect form in terms of income that is lost with children who could instead be working. Also, parents of girls face an additional trade off between providing them with an adequate schooling and saving these expenses, since girls will get married and leave the parental household. Moreover, credit-constrained families are not able to smooth their consumption over time and the costs of children's education go even higher (Rose, 2000, Kingdon, 2005, Maccini & Yang 2009, Barcellos et al, 2014). In this case, given the prevalence of son preference across developing world, girls are even further limited in their access to education (Jayachandran, 2015, Evans et al, 2020).

This chapter explored the case of Tajikistan in order to detect the existence of gender bias in cotton areas of the country. Despite the fact that cotton harvesting increases options for women employment, it has negative implications on girls' education. By looking into educational spending rather than school attendance, this study shows that positive income shock along with engagement into agricultural activity is further deepening the negative effect on girls' education. For this, it uses a triple difference identification strategy relying on exogenous spikes in cotton prices, spatial variation in suitability for cotton, and split sample analyses based on the exogenous allocation of household land contracts.

Results show that girls experience lower educational spending, which further dropped in cotton areas following the cotton price spikes. The bias is further characterized by showing that the eldest girl is the most discriminated, that the bias strength is proportional to the number of siblings, and that the education of the mother has no effect on it. Results are driven by small households holding their land privately, since they can rely on family members as a labour force. Hence, girls bring more profit to the household by working in the fields than by investing into their education. Furthermore, the household head is more interested in investing into sons who will inherit the land and take care of parents, further widening the gender gap in the long term. This study brings evidence that positive income shock may be a driver of gender discrimination if it is associated with increased labour force participation in the childhood. This is the case in patriarchal societies in developing countries where discrimination of girls is rooted in cultural norms and reinforced by the type of agricultural activity.

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Appendices for: Education vs Labour: Land Contracts and Gendered Parental Investments in Tajikistan?

Angelina Nazarova

A Appendix

A.1 Theoretical intuition

The intuition of the current analysis on parental preferences is based on the combined model of Chiappori (1992) and Pasqua (2005). In this section I will present a simplified version of it.

Consider the household with father-husband (m), mother-wife (f) and two children: boy (b) and girl (g), living in 3 periods: 0 - individuals are children and they live with their parents; 1 - people get married and have children, they decide their consumption, labour supply and investment in children's education; 2 - individuals are old and they do not work, they survive with their savings and with care/transfers from their children. Moreover, there are two types of goods: private and public. Parental preferences are represented by unique utility function: $U_{HH} = U_{HH}(c_1^m, c_1^f, c_2^m, c_2^f, x_1^b, x_1^g)$, where c_t^i - consumption of goods for parent i=m,f in period t=1,2; and x_t^j - investment in child j's education (j=b,g). Let's assume that labour supply is inelastic and equal to one. Therefore, parental income = sum of non-labour income I^i and labour income $\bar{w}^i(1+\eta^j\bar{x}_0^i)$ where $\bar{w}^i$ - wage of the non-educated worker, $\bar{x}_0^i$ - level of i's education, η^j - rate of return to education.
Given the nature of the model parents decide how much to invest in their children's education given. There is a minimum cost of education p_1^j, while returns to education which is equal to η^j [0,1] are different for boys and girls. This model also captures existing social norm according to which adults give a fraction λ^j [0,1] of their income to old parents, which again different for boys and girls. Thus, the household's maximization problem is:

$$\begin{aligned}\max_{c_1^m,c_1^f,c_2^m,c_2^f,x_1^b,x_1^g} U_{HH} = U_{HH}(c_1^m, c_1^f, c_2^m, c_2^f, x_1^b, x_1^g)\\ \text{s.t.} p_1^m c_1^m + p_1^f c_1^f + p_2^m(1+r)^{-1}c_2^m + p_1^b x_1^b + p_1^g x_1^g\\ = (1-\lambda^b)((\bar{w}^m(1+\eta^b\bar{x}_0^m)) + I^m) + (1-\lambda^g)((\bar{w}^f(1+\eta^g\bar{x}_0^f)) + I^f)\\ +(1+r)^{-1}(\lambda^b(\bar{w}^m(1+\eta^b x_1^b) + I^b) + \lambda^g(\bar{w}^f(1+\eta^g x_1^g) + I^g))\end{aligned}$$

Since this model is applied for the case of Tajikistan, the traditional values are dominant, as a result both parents prefer to invest into son. The solution becomes:

$$\frac{x_1^g}{x_1^b} = (\frac{p_1^b - \lambda^b\bar{w}^m\eta^b}{p_1^g - \lambda^g\bar{w}^f\eta^g})(\frac{\epsilon}{\delta})$$

It can be seen that the difference between level of education between boys and girls depends on the relationship between rate of return and the fraction of their income for old parents. Meaning that the lower is the rate of return and the higher the share of income dedicated to parents, which is typical case for the countries with strong patriarchal values, the bigger will be an educational gap between sons and daughters. Since Tajikistan is a country with prevailing traditional val-

ues, it can be expected from parents to invest more into sons than daughters when it comes to education.

A.2 Summary Statistics

Table A1: Descriptives at baseline

	Girl		Boy	
	Mean	SD	Mean	SD
Mother's education	2.75	1.90	3.02	1.86
Father's education	3.66	1.72	3.54	1.93
Firstborn	0.25	0.43	0.24	0.42
Age	9.03	4.88	8.89	4.92
Household size	6.53	2.60	6.53	2.67
Monthly income	94.76	411.02	91.99	321.57
Monthly spending	21.47	31.18	37.16	49.55
Living in a cotton area	0.20	0.40	0.19	0.40
			Educational expenditures	
Fees	26.46	103.07	45.48	280.82
Uniforms	141.33	346.92	145.41	288.18
Books	24.73	121.38	27.94	116.14
Meals	13.10	53.68	15.17	66.49
Repairs	17.26	92.59	16.82	87.24
Other expenses	3.77	20.11	5.92	30.51
Total spending on education	373.22	1978.06	408.13	2287.38
Private tutoring	1.97	0.18	1.97	0.18
Observations			3,246	

Notes: These characteristics are at baseline (before the sock). Parental education is a categorical variable, where 0 = none, 1 = primary (grades 1–4), 2 = basic (grades 1–8(9)), 3 = secondary general (grades 9–10(11)), 4 = secondary special, 5 = secondary technical, 6 = higher education, 7 = graduate school.

A.3 Additional results

Table A2: Educational expenditures by type of the household

	(1)	(2)	(3)
VARIABLES	Log of educational spending	—	Log of educational spending
girl	-0.0846*	-0.0654*	-0.0958**
	(0.0465)	(0.0396)	(0.0405)
post_year	0.870***	0.668***	1.029***
	(0.0653)	(0.0705)	(0.0974)
cotton	-0.126	-0.183**	-0.183**
	(0.0983)	(0.0926)	(0.0926)
girl#post_year	-0.0509	-0.0591	-0.0272
	(0.0800)	(0.0762)	(0.0791)
girl#cotton	0.0998	0.164*	0.234**
	(0.112)	(0.0901)	(0.0961)
post_year#cotton	-0.00831	0.253*	0.244
	(0.148)	(0.144)	(0.151)
girl#post_year#cotton	-0.0857	-0.346**	-0.408**
	(0.164)	(0.154)	(0.165)
Constant	5.328***	5.205***	5.403***
	(0.0395)	(0.225)	(0.300)
Controls	No	Yes	Yes
FE year and household	No	No	Yes
Observations	2,968	2,876	2,876
Number of households	930	930	930

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.

Table A3: Main results by average income

	(1)
VARIABLES	Households with higher than average monthly income
girl_child	-0.174***
	(0.0415)
girl_child#cotton	-0.278***
	(0.0978)
post_year	0.942***
	(0.0681)
girl_child#post_year	0.158*
	(0.0915)
post_year#cotton	0.207
	(0.134)
girl_child#post_year#cotton	-0.377**
	(0.165)
Constant	5.161***
	(0.0349)
Observations	3,322
FE year and household	Yes
Number of hhid	1,000

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.

Table A4: Additional checks: the system of mutual assistance

VARIABLES	(1) Households in the system of mutual assistance
girl_child	-0.512***
	(0.162)
girl_child#cotton	0.596***
	(0.189)
post_year	1.202***
	(0.198)
girl_child#post_year	0.301
	(0.207)
post_year#cotton	-0.0363
	(0.235)
girl_child#post_year#cotton	-0.483*
	(0.257)
Constant	5.009***
	(0.0918)
Observations	685
FE year and household	Yes
Number of hhid	187

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.

Table A5: Additional checks: two children of both gender

	(1)
VARIABLES	Households with two children: girl and boy
girl_child	0.00617
	(0.117)
girl_child#cotton	0.350
	(0.338)
post_year	0.302
	(0.236)
girl_child#post_year	0.266
	(0.457)
post_year#cotton	0.423
	(0.513)
girl_child#post_year#cotton	-1.573**
	(0.783)
Constant	5.342***
	(1.023)
Observations	211
FE year and household	Yes
Number of hhid	75

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.

Table A6: Household decision-making

	(1)
VARIABLES	Households where decisions to spend and save are made by women
girl_child	0.176
	(0.343)
cotton	0.409
	(0.324)
girl_child#cotton	0.0878
	(0.449)
Constant	7.707***
	(1.102)
Controls	Yes
FE household	Yes
Observations	161

Notes: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual controls include being firstborn, eldest son, youngest son, number of brothers and sisters, ethnicity/religion, age, hhsize, marital status of parents, relation to head of household, living in urban area, income, number of children in the household.