# UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL, HUMAN AND MATHEMATICAL SCIENCES

Department of Economics


## Conflict and Education


by

**Abbas Ali Gillani**


Thesis for the degree of PhD. Economics

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# ABSTRACT

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The purpose of this research is to study the impact of conflict witnessed in Pakistan from 2007 onwards on educational outcomes, particularly pertaining to female education. It consists of three distinct chapters, each focusing on a unique aspect in which conflict affected educational outcomes. The first chapter deals with the first phase of conflict witnessed between 2007 and 2011, and analyses the impact of violence, and the ban on female schooling implemented with it, on enrolment rates. It suggests that although conflict resulted in a decline in overall enrolment rates at primary and middle level, militants were successful in using violence as a tool to deter female education, as enrolment rates for girls declined more compared to boys in areas that witnessed conflict. The second chapter studies the short-term and medium-term impact of conflict on enrolment rates after the end of the first phase of conflict. Results show that although the negative impact of conflict was larger in magnitude on girls than boys in the short-run, enrolment rates for girls recovered in the medium-run to match those of girls that did not witness conflict. However, enrolment rates for boys at middle level continued to suffer in the medium-run, possibly due to the permanent substitution of boys into the labour market. The third chapter examines the impact of conflict on degree choices of students applying to university. We find that students who live in districts affected by conflict are less likely to apply to degrees that require mathematics as a pre-requisite, compared to students who live in districts that do not witness conflict. However, a gender-wise breakup of results suggest that this is only the case for degree choices of boys, and not of girls.

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# Academic Thesis: Declaration Of Authorship

I, Abbas Ali Gillani, declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

Conflict and Education

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signed: Abbas Ali Gillani

Date: 20-07-2018

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This thesis is dedicated to my parents.

# Abbreviations

| | |
|---|---|
| ACF | Accounting and Finance |
| AFGHAN | Afghanistan |
| BBA | Business Administration |
| BBC | British Broadcasting Corporation |
| BUILD | Building |
| CS | Computer Science |
| DD | Difference-in-Difference |
| DDD | Difference-in-Difference-in-Difference |
| DGK | Dera Ghazi Khan |
| ECO | Economics |
| ELEC | Electricity |
| ENG | English |
| ENROL | Enrolment |
| F. E | Fixed Effects |
| GER | Gross Enrolment Rate |
| GTD | Global Terrorism Database |
| IBA | Institute of Business Administration |
| IV | Instrument Variable |
| MATH | Mathematics |
| MATHPREREQ | Mathematics-Prerequisite Degrees |
| MID | Middle |
| NATO | North Atlantic Treaty Organization |
| NER | Net Enrolment Rate |
| NONMATHPREREQ | Non-Mathematics-Prerequisite Degrees |
| PAK | Pakistan |
| POP | Population |
| PPS | Probability Proportional to Size |

| | |
|---|---|
| PRIM | Primary |
| PSLM | Pakistan Standard and Living Measurement |
| PSU | Primary Sampling Unit |
| PTSD | Post-traumatic Stress Disorder |
| RD | Round |
| SAT | Scholastic Aptitude Test |
| SATP | South Asia Terrorism Portal |
| SCH | School |
| SEC | Secondary |
| SS | Social Science |
| SSU | Secondary Sampling Unit |
| TOIL | Toilet |
| TQS | The Quetta Shura |
| TREAT | Treatment |
| TTP | Tehrik-i-Taliban Pakistan |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| US/U.S. | United States of America |

# Chapter 0: Introduction

The purpose of this research is to study the impact of conflict witnessed in Pakistan from 2007 onwards on educational outcomes, particularly pertaining to female education. It consists of three distinct chapters, each focusing on a unique aspect in which conflict affected educational outcomes. The first chapter deals with the first phase of conflict witnessed between 2007 and 2011, and analyses the impact of violence, and the ban on female schooling implemented with it, on enrolment rates. It suggests that although conflict resulted in a decline in overall enrolment rates at primary and middle level, militants were successful in using violence as a tool to deter female education, as enrolment rates for girls declined more compared to boys in areas that witnessed conflict. The second chapter studies the short-term and medium-term impact of conflict on enrolment rates after the end of the first phase of conflict. Results show that although the negative impact of conflict was larger in magnitude on girls than boys in the short-run, enrolment rates for girls recovered in the medium-run to match those of girls that did not witness conflict. However, enrolment rates for boys at middle level continued to suffer in the medium-run, possibly due to the permanent substitution of boys into the labour market. The third chapter examines the impact of conflict on degree choices of students applying to university. We find that students who live in districts affected by conflict are less likely to apply to degrees that require mathematics as a pre-requisite, compared to students who live in districts that do not witness conflict. However, a gender-wise breakup of results suggest that this is only the case for degree choices of boys, and not of girls. This chapter provides a background of the conflict witnessed in Pakistan from 2007 onwards, along with a description of how each phase of conflict was unique in terms of its occurrence and nature. It also includes an overview of the impact it had on schooling and other educational outcomes.

The 2011 Education for All Global Monitoring Report estimated that of the approximately 70 million out-of-school children globally, 28 million children, or 42 per cent of the total out-of-school children population, belong to conflict-affected areas (Global Education Monitoring Report, 2012). Children belonging to conflict affected countries are twice as likely to be killed before the start of primary schooling compared to other low income countries, whereas those displaced face

greater barriers to entry to education than their local counterparts. Conflict-affected countries have some of the lowest literacy rates in the world and some of the largest gender inequality. Of the total out-of-school children due to conflict, approximately 13 million live in sub-Saharan Africa, 5 million live in South and West Asia, while 4 million live within the Arab States (UNESCO, 2013). Conflict does not only adversely affect the demand of schooling, by decreasing the number of children going to school, or by displacing large proportion of total children population, it also has a negative impact on the supply of schooling. Conflict prevents regular institutional functioning of a school by increasing the number of closure days, causing damage and destruction to infrastructure, and increasing the number of deaths or displacement of teachers and staff involved. Moreover, conflict results in a greater welfare loss to the process of human capital accumulation through schooling, as it increases the likelihood of children substituting into the workforce, military, or marriage. At the same time, it often results in exacerbating the conditions of those already marginalized in society.

Human Rights Watch defines attacks on education as *'encompassing the full range of violations that place children at risk and deny them access to education. This includes attacks on school infrastructure and on students, teachers, and school administrators; the occupation of schools by the police and military; and harassment and threats against teachers, parents, and education professionals (Human Rights Watch, 2017).'* According to 'Global Coalition to Protect Education from Attack' report Afghanistan, Colombia, Pakistan, Somalia, Sudan and Syria were the worst affected countries in the world in terms of experiencing conflict against education between 2009 and 2012 (Guardian, 2015). Collectively, these countries experienced more than 1,000 attacks on schools, universities, staff and students, or had more than 1,000 educational facilities turned into military front points. Figure 1 below shows the geographical breakdown of attacks on education and military use of schools and universities between 2009 and 2012. Countries are divided into three categories based on the total number of attacks against educational institutions. Those marked as red are described as 'very heavily affected' due to more than 1,000 attacks on schools, universities, students, or staff, or conversion of schools for military purposes. Countries categorized as 'heavily affected' reported more than 500, but less than 1,000, such attacks or conversions, and are shaded as dark grey. Countries with less than 500 attacks are classified as

'other affected' and shaded in light grey whereas countries that witnessed no conflict against schooling are represented in white.

Figure 1: World-wide Attacks on Education and Military Use of Schools from 2009 till 2012


*Source: Guardian, 2015*

During conflict assaults are made on unoccupied school and university buildings with the intention to intimidate communities rather than kill or injure. Schools serve as an integral component of state governance and are attacked as an attempt to show aggression against the state. Schools can be deemed as 'soft' targets due to lack of security implemented around them, and thus easy to attack to cause public shock by targeting them. By damaging and destroying school buildings, attacking teachers and students, and terrorizing parents into keeping their children out of school, militants can exert great influence into pressurizing the state to achieve their objectives. Thus, attacks on schools serve as a viable tool for graining attention as well as creating terror in a community, resulting in psychological distress to all those involved, including children, parents, teachers, and the community as a whole. In other instances, militants as well state security forces also use educational institutions, including schools and universities, as temporary or permanent barracks or military bases. This does not only disrupt the school's

functioning, but also places the institution at an increased risk of attacks, frightening parents, teachers and children from staying away from school.

Amongst the countries that witnessed attacks on schools, Pakistan witnessed the highest number of terrorist attacks on educational institutions in terms of absolute targets, and in terms of attacks on educational institutions as a proportion of all terrorist attacks in the country. Figure 2 and 3 below show a comparison of the ten most affected countries by conflict in terms of total number of attacks on education, and also the number of attacks on education as a proportion of total attacks in the country. The total number of terrorist attacks on education stood at 724 in Pakistan between 2004 and 2013, followed by Thailand, Afghanistan and Iraq, where total number of attacks stood at 213, 205 and 184 respectively. The exceptionally high number of attacks on schools in Pakistan, in comparison to any other country, is primarily attributed to the unique policy of banning female education that was adopted by the militants[1], the Tehreek-e-Taliban Pakistan (TTP), which resulted in an intentional effort by the militants to target educational facilities and all personnel involved, including children. The TTP believed that western education contradicted and stood in contrast to their religiously motivated ideological beliefs and thus was deemed as 'harmful' for girls. Hence, any sort of schooling other than in religious seminaries was banned for all girls above the age of 8. TTP relied on physical harm to the extent of causing fatalities to instil fear, and used extreme violence to implement their policy of banning female education in order to extract maximum attention. When the TTP announced a deadline to ban all female education by end of January 2009, the violence that followed in Swat valley alone forced over 900 schools to close and stopped over 120,000 students and 8,000 female teachers from attending school (Guardian, 2014). One students who survived a militant attack by the TTP was Malala Yousafzai, the winner of the Nobel Peace Prize in 2014 who stated *'I was just 10 when more than 400 schools were destroyed. Women were flogged. People were killed. And our beautiful dreams turned into nightmares. Education went from being a right to being a crime. Girls were stopped from going to school.'* Six days after receiving the Peace Prize, TTP attacked an army run public school in Pakistan's city Peshawar, and

[1] Militancy in Pakistan was headed by the Pakistani faction of the Taliban network, called the Pakistan Tehreek-e-Taliban, an off-shoot militant organization committed to fighting against the state of Pakistan in response to Pakistan's allying with the western and NATO forces in pursuit of removing the Taliban regime from power in neighbouring Afghanistan.

systematically went through all classrooms, killing 141 people, almost all of them children (BBC, 2014). The attack remains amongst the deadliest attacks ever on a school in any country.

Figure 2: Attacks on Education

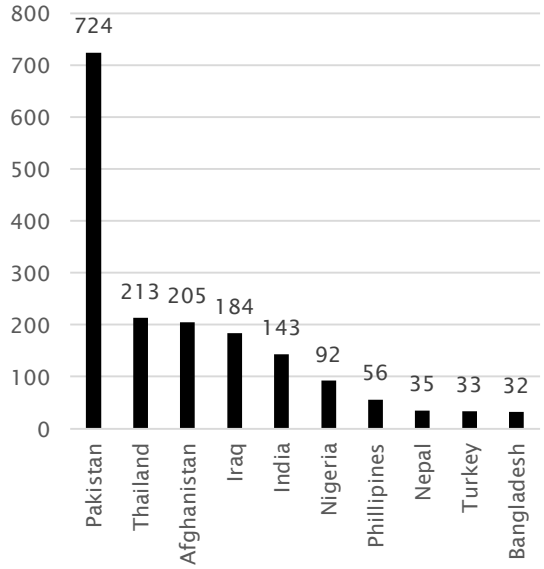
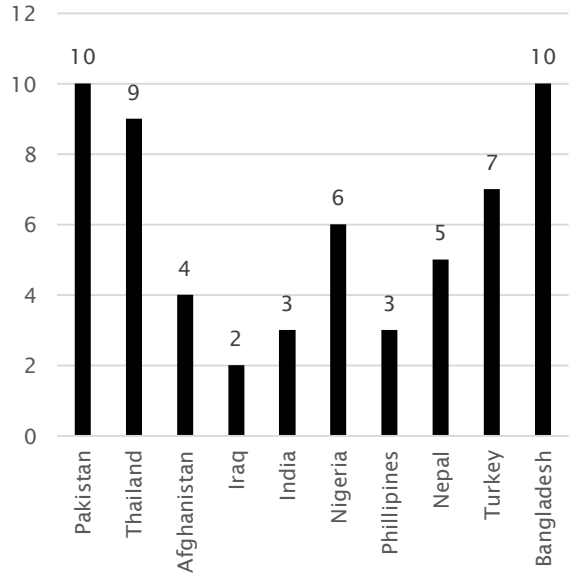



Figure 3: Attacks as a % of Total Attacks

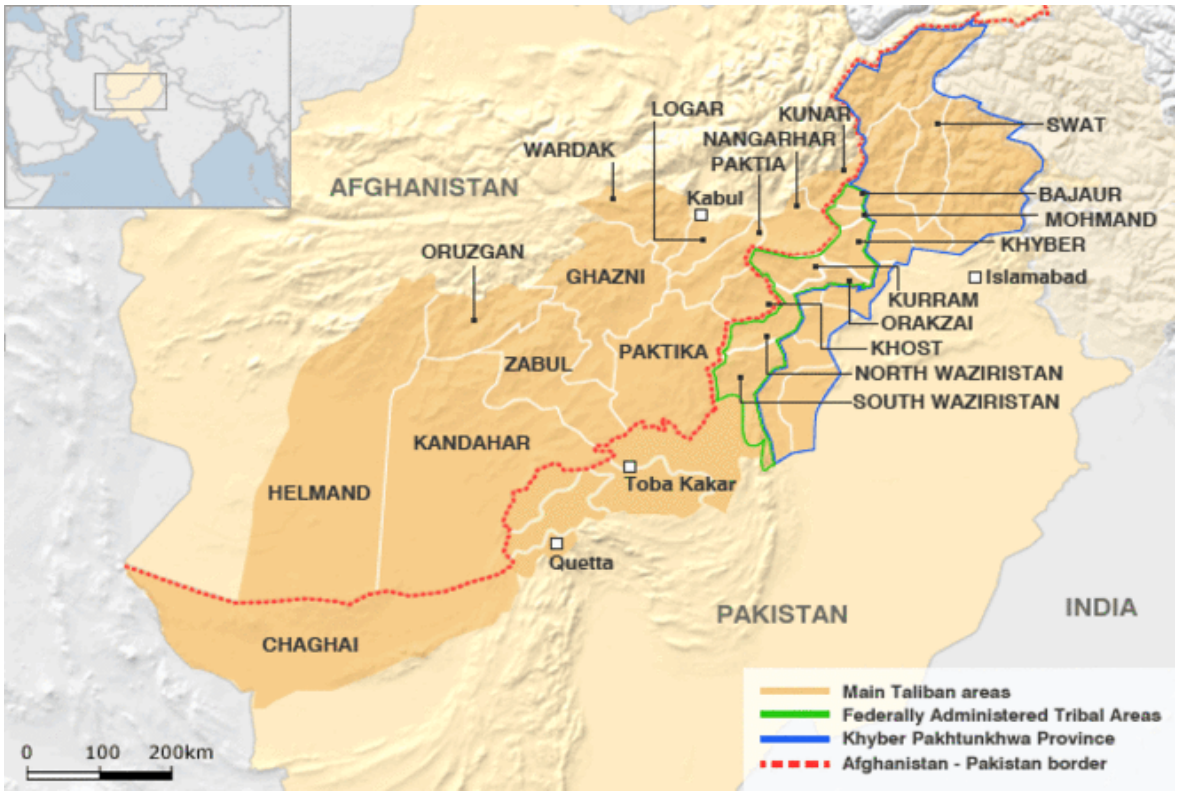



The attack on schools in Pakistan was part of a much larger conflict that initiated as a result of United States' (U.S.) invasion of Afghanistan in the aftermath of the militant attacks on U.S. soil in 2001[2]. Although Pakistan played a pivotal role in providing complete support to the U.S. and Afghanistan against the earlier Soviet invasion and occupancy of Afghanistan during the 1980's, it now faced a difficult task of balancing ties with its two former allies now fighting against each other in the new 'international war of terror' (Dawn, 2002). Pakistan, and its security forces, led by its army, agreed to support the international forces led by the U.S. to not provide any safe havens to Taliban in Pakistan, or Afghanistan, or to allow any free movement for the Taliban across the extremely porous Pakistan-Afghanistan (Pak-Afghan) border that had remained virtually unguarded since the independence of Pakistan. The decision by Pakistan in 2003 to introduce security forces in its tribal areas along the Pak-Afghan border for the first time since its independence faced

[2] The twin bombings of the World Trade Centre and the Pentagon on September 11, 2001 saw an immediate response from the U.S. and the world community, especially the N.A.T.O. forces, to invade Afghanistan. This was in response to the non-cooperation of the then Afghan government, the Taliban, to hand over their leader Osama bin Laden to the U.S. This was seen as an act of war by the N.A.T.O. forces led by U.S., and an act of aggression justified enough to invade Afghanistan.

an immediate resistance from the local population in the tribal areas, with fighting breaking out between Pakistan's armed forces and the Taliban. TTP had taken over a military identity in the tribal areas to represent all those foreign and local fighters who saw international interference in the tribal areas as unlawful and unjust (New York Times, 2006). Realizing that the decision to side with international forces against Taliban had been a deeply divisive one amongst its own population along cultural, religious and ethnic lines, Pakistan decided to apply a more cautious approach and turned towards diplomacy by signing peace agreements in 2004 with the TTP to ease the insurgency stemming in its tribal areas (Dawn, 2006). The peace agreement highlighted that Pakistan would help in compensating damages and reconstructing infrastructure in the tribal areas destroyed by Pakistan's security forces, and at the same time Pakistan would not aid in any international attacks carried out against TTP. In return, militants would not be allowed to use the tribal areas for any further military or political activities and would assist Pakistan in providing security and stability in the region. However, the peace agreements could not help reduce the tensions in the region as international forces led by U.S. continued to attack militants with the assistance provided by Pakistan, and the militants continued to gain popularity as an armed struggle against foreign invasion. In 2007, the escalation of conflict between Pakistan and Taliban turned into an outright war when militants sieged the capital of Pakistan, Islamabad. Figure 2 below shows a map of the presence of militants on both side of the Pak-Afghan border, and the geographical importance of the tribal areas. Although the presence of Taliban exceeded beyond the tribal areas of the entire region around the Pak-Afghan border, the militants used North and South Waziristan as their main military strongholds and continued to successfully launch attacks in Pakistan from these locations (BBC, 2011). South Waziristan was declared as the centre of all TTP led insurgencies in Pakistan and it's the capital, Wana, declared as capital of all territory held by TTP.

Figure 4: Pakistan-Afghanistan Border Region and Main Taliban Areas Along the Border




*Source: BBC, 2011*

The conflict that began in Pakistan in 2007 is still ongoing. However, it has changed its course during this time and can be classified into two broad categories. The first phase of conflict saw the breakdown of the peace agreement between the state of Pakistan and the TTP, resulting in an outright war between the two former allies in 2007. During the first phase of conflict, Pakistan's security forces launched offensive attacks against TTP in all tribal areas, while attacks on civilians and security personnel by the TTP resulted in loss of thousands of civilian lives (SATP). By 2009, the TTP had gained complete control over several districts in Pakistan, where a fundamentalist interpretation of Sharia (Islamic law) was imposed. The TTP imposed their authority through summary executions, including beheadings of state officials and political opponents, public flogging, and large-scale intimidation of the population. Women were not allowed to leave homes without male guardians, polio immunization programs were halted, while music and films were banned. TTP also began a violent campaign against education for girls, forcing thousands of schools to close and a displacement crisis as 2 million civilians fled the fighting (Human Rights Watch, 2017). The end of the first phase of conflict was a result of the security forces of Pakistan clearing all districts from the influence

and rule of TTP, and removal of all policies adopted by TTP. By 2011, Pakistan had cleared all of its tribal areas from TTP rule and declared the end of conflict between Pakistan and Taliban. Figure 3 and Figure 4 below shows the trend of the number of militants and security personnel killed respectively up until 2017.

Figure 5: Total Militants Killed

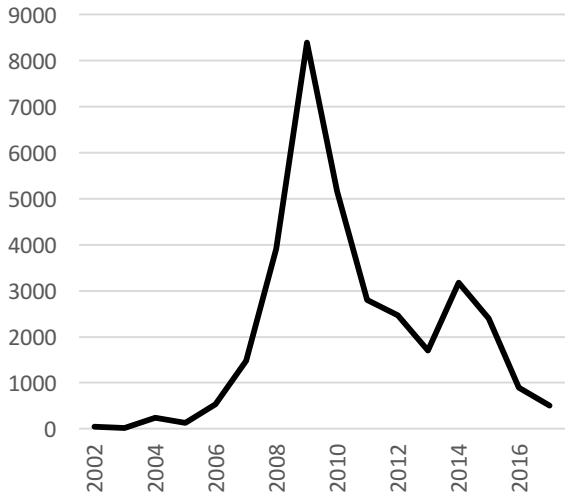
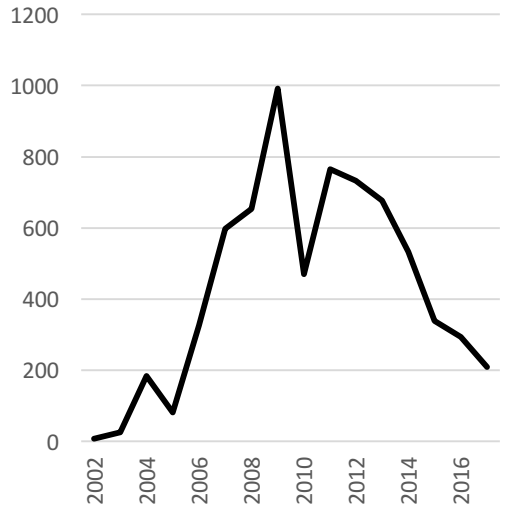


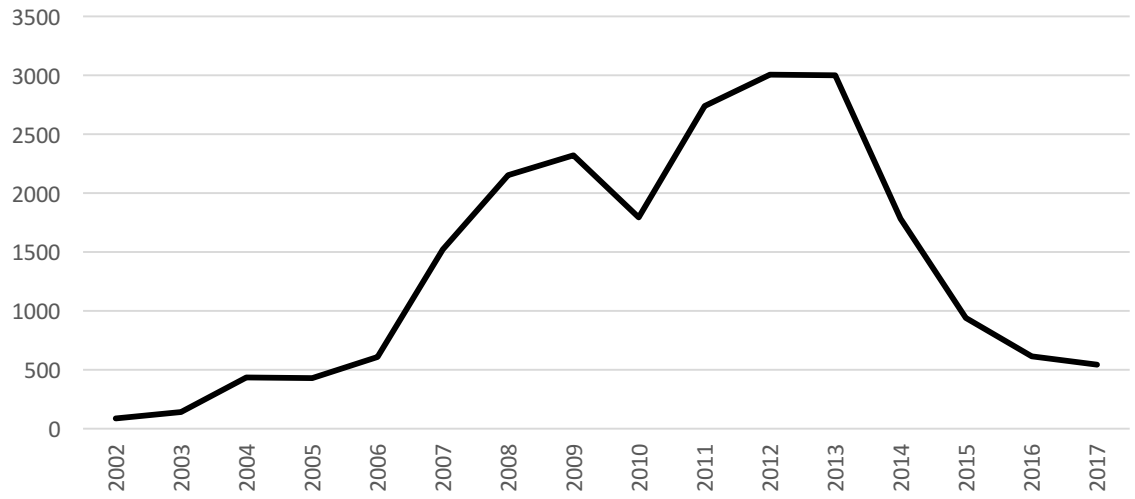

Figure 6: Total Security Personnel Killed




The second phase of conflict began soon after Pakistan's security forces and N.A.T.O. forces cleared the tribal areas of Pakistan from all TTP rule, and recaptured regions earlier used by TTP as headquarters and training grounds. However, the TTP leaders, along with their senior aides, from Afghanistan and the tribal areas of Pakistan infiltrated into Pakistan's southern Balochistan Province and quickly transformed Balochistan's capital Quetta into their safe haven. Quetta, is a frontier city that is approximately a three-hour drive from Kandahar, city in Afghanistan. Kandahar has long been considered the hub of Taliban activity and served as the capital of Taliban administration between 1994 till 2001. The militants regrouped to form a second militant organization in Quetta, called the The Quetta Shura (TQS), an affiliate of TTP and Al-Qaeda, considered to be the intellectual and ideological underpinning of the Taliban insurgency in Afghanistan, and declared themselves as the Taliban government-in-exile (Combatting Terrorism Center, 2012). Pakistan continued to regularly face harsh retaliation from the militants centred in Qutta, who conducted violent attacks across Pakistan and easily escaped through the porous Pak-Afghan border into pockets of tribal jurisdictions. Between 2007 till 2011, gains made by the militants in tribal areas of Pakistan, and the war against TTP in the tribal area kept the focus of the insurgency away from the growing militancy in Quetta. However, with the clearing of the tribal areas by 2011, the

focus shifted back to Balochistan where till today, Pakistan has conducted several military operations against militants. As a result, although the end of the first phase of conflict by 2011 saw a rapid decline in the number of clashes between Taliban and the security forces, resulting in a sharp decline in the number of fatalities, the militants continued to operate through Afghanistan, via Quetta, to cause damage to infrastructure and loss of civilian lives. As a result, as shown in Figure 6 below, civilian casualties continued to remain high through the two phases of conflict up until 2014 when renewed efforts were made to end the Taliban insurgency in both Afghanistan and Pakistan.

Figure 7: Total Civilians Killed




The aim of this research is to study the impact of conflict on educational outcomes in Pakistan, particularly pertaining to female education. Pakistan ranked 143 out of 144 countries in the gender inequality index in 2014, with only 47 per cent women in Pakistan being literate, while 53 per cent of girls not attending school at all ((World Economic Forum, 2016). Discriminatory cultural and social practices have impeded equal access to education for girls compared to boys, with parents finding it less economically productive to invest in girls' education. Violent conflicts have only tilted the misbalance of equal opportunities away from girls as parents remove girls from schools with a greater concern for security. This research is divided into three chapters, with each chapter focusing on a unique aspect of the conflict, shedding light on the impact it had on educational outcomes. The first chapter deals with the first phase of conflict witnessed between 2007 till 2011 and focuses on the impact of violence on gross enrolment rates (GER) for primary and middle school students. By using an instrument variable (IV) technique

we suggest that conflict caused a drop in overall GERs at primary and middle level for districts that witnessed violence. Moreover, since the militants adopted a policy of banning female education above the age of 8, we also show, using a difference-in-difference (DD) technique, that the militants were successful in using violence as a tool to ban female schooling, as GERs for girls declined more than boys in districts that did witness violence. By using a difference-in-difference-in-difference (DDD) technique we confirm our results that the ban was in fact detrimental for GER's of girls more than boys.

The second chapter looks at the short-run and the medium-run impact of conflict by assessing the enrolment rates after the end of the first phase of conflict. By using a pooled cross-sectional data, we compare districts that witnessed conflict with those did not witness conflict, and find that GERs for both boys and girls decline at primary and middle level in the short-run. However, after the conflict was over, in the medium-run, GERs for girls belonging to districts that experienced conflict recovered at primary and middle level to match those of girls belonging to districts that remained peaceful, but GERs for boys at middle level belonging to districts that experienced conflict remained lower than those of boys belonging to districts that remained peaceful. This could be attributed to the permanent substitution of boys into the labour market, once dropping out of school, and finding it harder to return to school once conflict is over.

The third chapter uses a unique dataset obtained from the admission process of a university based in Karachi, institute of Business Administration (IBA), and examines the impact of conflict on degree choices of students applying to university. By using an IV approach along with a linear probability model estimation, we show that students who lived in districts that witnessed conflict were less likely to apply to degrees that required mathematics as a pre-requisite compared to students who lived in districts that remained peaceful. The results are similar for two separate channels that individually identify exposure to conflict in either the first phase of conflict or the second phase. However, a gender-wise breakup of results suggests that the negative impact of conflict was only signficiant on degree choices of boys, and not girls. This heterogenous effect may be attributed to the change in labour market outcomes brought about due to conflict. Factors that influence a student's choice of degree based on the cost-benefit analysis can be categorized into three broad classifications: (i) student's preparation and achievement at pre-university levels of education; (ii) an

individual's preferences for various courses of study, which may be encouraged by parental and societal expectations; and (iii) the labour market prospects associated with a given set of skills.

However, there are certain data restrictions that need to be addressed in this thesis. The data used for conflict in this thesis is obtained from the South Asian Terrorism Portal (SATP) which collects data based on news resources and official government documents. This could lead to measurement errors in recording and reporting the exact civilian casualties in the country, especially from cities and districts severely affected by conflict, and from where accessibility of information may be difficult. We try to minimize any discrepancies in reporting and using data, if any, by two ways. Firstly, the data is compared with another set of data, the Global Terrorism Data (GTD) which also records information on terrorist events across the world based on variety of open media sources. Comparison of information on terrorist attacks and civilian casualties from these two datasets are much in line with each other. Secondly, the methodology used in each of the three chapters only requires a binary differentiation in whether districts were exposed to conflict or not. Therefore, even if there are differences in the number of terrorist attacks or civilian casualties reported by the databases, we are only interested in whether a district was exposed to conflict or not. This further minimizes the risk of any variation that may arise due to difference in reporting of information by these two datasets. However, despite attempts at minimizing the measurement error, the information from both data sources relies on the same media and news reporting which would not completely eliminate the measurement error. We provide a breakup of the total civilian casualties and the districts exposed to conflict reported by our two datasets in in Table 1 below. We do not observe a significant variation in the number of reported casualties from the two datasets, whereas the variation in the number of districts affected by conflict reported by the two datasets is also very small.

Table 1: Civilian Casualties and Districts Exposed to Conflict Reported by SATP and GTD

| | Civilian Casualties | | Districts Affected | |
|---|---|---|---|---|
| Year | SATP | GTD | SATP | GTD |
| 2005 | 186 | 175 | 9 | 11 |
| 2006 | 169 | 218 | 8 | 10 |
| 2007 | 308 | 376 | 20 | 21 |
| 2008 | 858 | 861 | 22 | 22 |
| 2009 | 1489 | 1422 | 34 | 36 |
| 2010 | 1264 | 1206 | 30 | 32 |
| 2011 | 1210 | 1248 | 38 | 41 |
| 2012 | 740 | 767 | 39 | 40 |
| 2013 | 1145 | 1175 | 35 | 39 |
| 2014 | 839 | 892 | 40 | 41 |

This research contributes to the existing literature in several ways. First, the nature of conflict in Pakistan and its impact on educational outcomes is a unique story. At a time when efforts are being made at a global level to achieve certain universal goals, including access to and attainment of basic education, militants in Pakistan adopted a ban restricting girls from attaining any sort of education beyond primary school. In order to achieve their desired goals, the use of violence was used to cause severe loss of life and damage to infrastructure to ensure a reduction in overall demand for schooling. Second, there has been very little research that has come out from the war on terror against Pakistan. This research helps in understanding the extent of destruction caused by the war and its direct and indirect impact on educational outcomes. Third, the identification strategy used to measure the impact of the policy ban on enorlment rates is unique in tackling the research question. Although existing literature either uses an IV approach to instrument for the endogeneity of occurrence of violence ( Monteiro et al., 2013; Gershenson et al., 2015; Haugan, 2016; Vanegas, 2014; Rodriguéz et al, 2009) or uses a difference-in-difference estimation to study the differential impact of conflict on the conflict-affected cohort (Chamarbagwala et al., 2010; Akresh et al., 2011; Swee, 2009), we combine the two approaches to find the impact of conflict on districts that were exposed to conflict, instrumenting for conflict originating from the militants' headquarters. Fourth, this research provides key insights on the dynamics of the pace of recovery for the growth theory that suggests that after a shock human capital accumulation returns to steady state (Chen et al., 2008; Cerra et al., 2008; Miguel et al, 2011; Davis et al., 2002; Brakman et al, 2004). This thesis suggests that the same nature of conflict has heterogeneous effects on the short-run and medium-run GERs of boys and

girls, along with a differing pace of recovery. Therefore, although on aggregate level, GERs may recover, certain subgroups within the aggregate level may not recover within the same time period, at the same pace. Moreover, although the ban on schooling was implemented towards girls, it had an impact on the short-run and medium-run GERs for boys too. This suggests that although violence could be used as a tool to target a certain group, it may have spill-over effects on other groups, leading to amplification of the negative impact. Fifth, factors that influence a student's choice of degree based on the cost-benefit analysis can be categorized into three broad classifications: (i) student's preparation and achievement at pre-university levels of education; (ii) an individual's preferences for various courses of study, which may be encouraged by parental and societal expectations; and (iii) the labour market prospects associated with a given set of skills. This research is amongst the first that adds exposure to conflict as a potential factor that may affect choice of degree at university level. Till now no literature exists that links how conflict through its impact on test scores could potentially affect the degree choices made at university level. We connect the existing literature on impact of violence on test scores, and the factors the effect choice of degree at university level, to try and estimate the impact of conflict witnessed at school level on degree choices at university level.

There are several methodological issues that may arise in the specifications due to the limitation of data on school-level, university-level and household-level information. There is not enough data that is released from Pakistan in terms of research on schooling and educational outcomes, hence this may lead to certain limitations in measuring our hypothesis, and potential channels, using the specified econometric models. In the first chapter, although we use an IV with a DD to measure the impact of conflict on enrolment rates, we do not have enough district-level and school-level controls to ensure that the instrument is not correlated with the error term. However, using various robustness checks and placebo test we can still test the validity of the used instrument and provide a plausible understanding of how conflict was dependent on the distance of each district from the militant headquarters, which in turn affected enrolment rates. Similarly, in the second chapter we observe that the change in the nature of conflict between 2007 and 2014 poses a limitation on our identification strategy. Violence in the first phase of conflict

from 2007 till 2011 was dependent on the geographical proximity of each district from the first militant headquarter in Wana, whereas violence in the second stage of conflict from 2011 onwards was dependent on the geographical proximity of each district to a second militant headquarter, Quetta. To measure the recovery rate of enrolment rates in 2013 and 2015, the control and treatment group must be dependent on both the first and the second phase of conflict. Our identification would require an instrument that would account for the continuing occurrence of conflict through this transition of varying phases of conflict. This raises difficulty in creating an instrument that would account for the complex treatment of our identification strategy. Lastly, in the third chapter, while we are interested in measuring the impact of conflict on degree choices, we do not have any information on student's educational and personal backgrounds or on district-level characteristics to test for any plausible mechanisms through which conflict may be affecting choice of degree chosen at university level. Although we try to control for type-of-schooling and district fixed effects, the lack of information on student-specific and district-specific characteristics might be biasing the magnitude of our effects. Moreover, our identification strategy compares districts that were affected by conflict in either phases of conflict with those that were not affected by conflict, to examine the distinct impact of each phase of conflict. However, this leads to a significant drop in the sample size of our data as there were many districts that were affected by both the phases of the conflict and were hence omitted from our estimation.

There are several policy debates that are highlighted in this thesis and need attention. Firstly, the significant differential in enrolment rates for boys and girls suggests that discriminatory cultural and social practices have impeded equal access to education for girls compared to boys, with parents finding it less economically productive to invest in girls' education. While greater effort must be made to ensure that access to basic education is made for both boys and girls, extra incentives must be provided to ensure that girls are given an equal opportunity to go to school. Secondly, although conflicts around the world are becoming increasingly localized in nature, their impact could be as catastrophic as full-scale wars. Policies such as banning female education and the use of violence to implement them, as suggested by this thesis, could have lasting negative consequences and could have considerable spill-over effects

in the long run. Thirdly, as suggested in the second and third chapter, much of the decisions around schooling and choice of degree at the university level may revolve around the dynamics and expectations of the labour market. Despite increases in recent years, female labour force participation in Pakistan, at 25%, is well below rates for countries with similar income levels (ADB, 2016). Even among women with high levels of education, labour force participation lags: only around 25% of women with a university degree in Pakistan are working. Policymakers must pay immediate attention to the low rate of female participation in the labour market which might be leading to a substantial loss in human capital accumulation for girls. Lastly, lessons must be learnt from studying the impact of conflict in Pakistan on educational outcomes to understand how to tackle the negative effects of violence. Violence effects educational outcomes directly, and indirectly, through multiple channels that could be effecting the demand or supply of schooling. Therefore, it is important to pay close attention to every conflict, in order to understand the mechanism through which it affects schooling, and the repercussions it has in the long run, specifically in terms of choice of degree at university level and labour market outcomes.

# Chapter 1: Ban on Female Education

## 1 Introduction

Recent years have seen a change in nature of armed conflicts from large scale military aggressions and civil wars to more localized insurgencies. A growing number of armed conflicts today are no longer between sovereign states or for territorial gains, but rather an ideological struggle between state and insurgents, or between localized populations belonging to differing groups. During conflict, assaults are made on unoccupied school and university buildings with the intention to intimidate communities even if not necessarily to kill or injure. Schools serve as an integral component of state governance and are thus attacked as an attempt to show aggression against the state. Schools can be deemed as 'soft' targets due to lack of security implemented around them, and thus easy to attack or cause public shock by targeting them. By damaging and destroying school buildings, attacking teachers and students, and terrorizing parents into keeping their children out of school, militants can exert great influence into pressurizing the state to achieve their objectives. Thus, attacks on schools serve as a viable tool for gaining attention and creating terror in a society, resulting in psychological distress to all those involved, including children, parents, teachers, and the community as a whole. In other instances, militants as well state security forces have used educational institutions, including schools and universities, as temporary or permanent barracks or military bases. This not only disrupts the school's functioning, but also places the institution at an increased risk of attack, frightening parents, teachers and children from staying away from school. Simple economic logic would suggest that conflict results in a greater welfare loss to the process of human capital accumulation achieved through schooling, as it increases the likelihood of children substituting into informal or child-labour workforce, military, or marriage. At the same time, it often results in exacerbating the conditions of those already marginalized in society.

The existing literature shows that violent conflicts result in reduction in educational access and attainment of education (Akresh et al., 2011; Alderman et. Al., 2006). Students exposed to violence, especially in schools, tend to lose motivation and concentration due to prolonged fear, disruption in home and school environments, and adverse psychological impact on health and mental wellbeing, forcing them to

no longer attend school (Gershenson et al., 2015). The effects on educational outcomes can also be heterogeneous across gender; in certain cases, exposure to violence has had a larger negative effect on enrolment for girls (Shemyakina, 2010), whereas in other instances conflict resulted in long-term effect on educational outcomes for boys only (Justino et al., 2013). While much research has focused on the effects of conflict in reducing supply of schooling through closure of schools (Maio et al., 2013), destruction of school infrastructure (Chamarbagwala et al., 2010), and reduction in teacher availability (Gershenson et al., 2015), there is little research on how negative policies such as violent ban on schooling can reduce demand for schooling, in particular affect enrolment rates and drop-out rates.

This research examines conflict witnessed in the first phase of conflict in Pakistan between 2007 till 2011 on gross enrolment rates (GERs), and the ban on female education brought along with it by militants as an instrument to crowd out female education. The total number of terrorist attacks on education stood at 724 in Pakistan between 2004 and 2013, the highest by any country during that time period, followed by Thailand, Afghanistan and Iraq, where total number of attacks stood at 213, 205 and 184 respectively (Guardian, 2015). The exceptionally high number of attacks on schools in Pakistan compared to any other country is primarily attributed to the unique policy of banning female education that was adopted by the militants, the Tehreek-e-Taliban Pakistan (TTP), which resulted in an intentional effort by the militants to target educational facilities and all personnel involved, including children. The Taliban's believed that western education contradicted and stood in contrast to their religiously motivated ideological beliefs and thus was deemed as 'harmful' for girls. Hence, any sort of schooling not provided in religious seminaries was banned for all girls above the age of 8. The Taliban relied on physical harm to the extent of causing fatalities to instil fear, and used extreme violence to implement their policy of banning female education in order to extract maximum attention. When the TTP announced a deadline at the start of 2009 to ban schools from teaching girls above the age of 8 in Swat valley, the violence that followed forced over 900 schools to close and over 120,000 students and 8,000 female teachers stopped attending school (Guardian, 2014). To put the analysis into context, conflict in Pakistan stemmed from the insurgency that brewed in its tribal areas neighbouring Afghanistan. With the invasion of Afghanistan by NATO allies in 2002 and the state of Pakistan joining the allies, insurgency in bordering tribal areas of Pakistan started as early as 2005. Since the militants' base of

operation and training camps were situated in tribal Wana, South Waziristan, conflict witnessed in Pakistan was viewed as being controlled by militants in Wana.

By using dataset on district level GERs from 2005 till 2011 on approximately[3] 101 districts, and combining it with data on conflict, we use an instrument variable (IV) technique with a difference-in-difference (DD) estimation, and a difference-in-difference-in-difference (DDD) estimation, to show that the ban on female education was effective in reducing GERs for districts that experienced violence, with the ban being more effective on girls than boys. Since the ban was above the age of 8, it was primarily targeted towards girls at middle school and above, as middle school in Pakistan starts at the age of 9[4]. The results from our DD specification suggests that districts that were closer to militant headquarters were more likely to witness violence, and that overall GERs declined at both primary and middle level for districts that witnessed violence. The results are significant for both primary and middle level overall GERs, with the magnitude higher for primary schools. Districts that witnessed conflict experienced a decline in overall GERs of 13.8 per cent at primary level compared to districts that remained peaceful, whereas districts that witnessed conflict at middle level witnessed a decline in overall GERs of 8.9 per cent compared to those that remained peaceful. A gender-wise breakup of results suggest that the impact of conflict was larger on boys than on girls at primary level but larger on girls than boys at middle level.

Our second specification using a DDD estimation suggests that the policy of banning female schooling adopted by militants was successful in curbing education for girls more than for boys. Results suggest that as the ban was above the age of 8, and hence targeted towards girls belonging to middle school and above, we see the negative magnitude of impact higher in middle school compared to primary school, as well as the results being significant. Girls in middle school belonging to conflict districts witnessed a larger decline in GERs by 9.9 per cent compared to boys in districts that witnessed violence compared to districts that did not witness conflict, the results being significant at the 1 per cent level.

[3] Between 2007 till 2011 a few districts were broken down into smaller districts due to which total number of districts vary slightly between years.
[4] Primary schools in Pakistan are typically from age 5 till 9 whereas middle school are from 10 till 12.

There are several motivational aspects for this research. First, with conflict becoming increasingly more localized in nature, this research looks at the effects of militancy having the potential to lead to outcomes as destructive as large scale wars themselves. Second, although the ban on female education is unique for its current time, it is also unique in being implemented by a group of militants, and not state-sponsored, and yet it succeeding in creating prolonged fear across a whole population. While access to and attainment of education is a basic human right, using violence to intentionally deter education is unique in its own case. Third, despite the ban stemming from a group of ideologically driven militants, it created space for insurgencies across the globe to adopt irrational violent policies to create anxiety amongst populations and deter access to basic rights. The destructive potential of such bans need to be addressed as they continue to create fear and result in highly negative impacts for populations across the world.

The remainder of the paper is structured as follows: Section 2 provides a review of the relevant literature that exists on the impact of conflict on education, particularly the gender-specific varying impact of conflict. Section 3 describes the datasets used for this research and Section 4 discusses the identification strategies applied for our estimations. Results and robustness checks are presented in Section 5 and Section 6 while Section 7 concludes the paper.

## 2 Literature review

Past literature has examined the effect of conflict on educational outcomes using various specifications including difference-in-difference estimation, panel data with fixed effects and using distance from source of conflict as an IV. It has also examined impact of conflict on various educational outcomes including enrolment rates, attendance, completion rate, dropout rates and test scores, with analysis provided on gender-specific outcomes.

Monteiro et al. (2013) study the negative spill over effects of conflict by analysing how drug battles in Rio de Janeiro affected educational outcomes of children attending schools located in and around conflict areas. They find that the impact of violence decreases with an increase in the distance between the school and conflict location. By exploring variation in violence that occurred across time and space when gangs battled over territories, within-school estimates of their causal effect indicate that students scored less in exams in years they were exposed to violence. They also suggest that armed conflicts are associated with higher teacher

absenteeism, lower principal turnover and temporary school closings, leading to lower enrolment rates. Gershenson et al. (2015) also provide further evidence that in the wake of an attack, the proficiency rates of schools depended on the geographical proximity of the school to the source of attack. By using a difference-in-difference strategy that exploited geographic variation in school's proximity to attacks, they find that Virginia school shooting significantly reduced school level proficiency rates in schools that were closer to the attack. This is because terrorist attacks have the potential to disrupt learning at school, by reducing instructional time due to higher teacher and student absences, school closures and disruption in class and home environments. Additionally, Haugan (2016) examines the impact of urban violence on standardized test scores of public schools in Colombia and find each additional homicide per year occurring within five hundred meters of a school reduced student achievement on a variety of tested academic subjects. Estimates from differential effects are more consistent with supply side channels leading to a decline in student achievement and not driven by bias arising from student migration.

While all these studies point towards supply-side channels of the impact of conflict on educational outcomes, Rodriguéz et al. (2012) and Vanegas (2014) also try to estimate the impact of conflict in Colombia on educational outcomes by providing explanation through demand-side mechanisms. By using rainfall as an instrument, Vanegas provides evidence for the effect of prenatal exposure to violence on the probability of school dropout years later, revealing that the instrumented effect of municipality-level violence during a mother's pregnancy has an impact on an individual's cognitive development via stress hormones released by the mother. On the other hand, Rodriguéz et al. (2009) use three separate instruments including natural disasters, estimated local cocaine revenues, and lagged homicide capture rates, to show that the intensity of armed conflict in Colombian municipalities reduced school enrolment and decreased test scores. By using all three instruments, they find that negatively affected family budget constraints, the returns to education via reduced life expectancy, and reduces the quality of education. However, they do not find any evidence of supply-side channels, including teacher-student ratio and qualifications of teachers, through which violence may have affected test scores.

While other studies have provided similar results on the impact of conflict on educational outcomes, using similar identification strategies, they have fallen short

in identifying the causal channels of the effect. Chamarbagwala et al. (2010) and Akresh et al. (2011) use cross-sectional data and a differences-in-differences strategy to compare the educational outcomes of individuals exposed to varying intensities of conflict in Guetamala and Rwanada respectively. Depending on the year and place of birth of each individual, they both find that individuals who were exposed to violence completed less years of schooling compared to individuals who were not exposed to violence. Similarly, without finding any statistical evidence on the supply-side channels of the impact, and using a similar difference-in-difference empirical strategy as Chamarbagwala et al. and Akresh et al. Swee (2009) found that an increase in the war casualty rate in Bosnia and Herzegovina reduced the probability of completing secondary, with stronger effects for males.

Depending on the nature of the conflict, the impact of violence on educational outcomes can also vary across genders. Shemyakina (2011) studied the impact of armed conflict in Tajikistan on schooling outcomes and found that girls, who were of school age during conflict and lived in conflict affected regions, were less likely to complete their mandatory schooling than girls of the same age who lived in the regions relatively unaffected by the conflict. By using differences in regional and temporal exposures, her results indicate that although exposure to violent conflict had a large and statistically significant negative effect on the enrolment of girls, there was no effect of regional and household conflict exposure on enrolment of boys. Her estimation provides similar robust results when community and household fixed effects are applied, and selection into violence and migration are accounted for. Similarly, using a panel dataset with school fixed effects on schools from the Indian state of Assam, Roy et al. (2016) study the impact of violent conflict on female students' enrolment rates. They find that increasing the average yearly killings in a district lead to a significant decline in girls' enrolment rate. Additionally, gender differential responses are more negative for lower grades, rural schools and poorer districts, while results remain similar when an alternative definition of conflict from a different dataset is used. The reason why Roy et al. found significant impact of conflict on enrolment rate of girls only was due to the high gender inequality and extremely poor status of women in Assam. As a result, since schooling is considered a as a luxury good for girls, and since girls are perceived to be more vulnerable to attacks, once conflict broke out enrolment rates of girls were the first to suffer. Lastly, Justino et al. (2013) study the impact of conflict in Timore Leste on educational outcomes by comparing the educational

impact of different phases of violence on school attendance. They find that although the short-term effects of the conflict were mixed, there was a loss in human capital accumulation for boys in the long-run due to household trade-off between education and economic welfare. Mirroring the findings of Bellows et al. (2006), they find evidence for a rapid recovery in educational outcomes among girls but the negative effects on primary school attendance and completion persisted for the boys.

This research contributes to the existing literature in several ways. First, the nature of conflict and its impact on educational outcomes is a unique story. In a time when strong efforts are being made to achieve certain universal goals, including access to and attainment of basic education, militants in Pakistan adopted a ban on all female education above the age of 8. Although a group of militants and not the state announced the ban, the violence used was enough to create sufficient fear and terror to cause significant damage in reducing overall demand for schooling. Second, there has been very little research that has come out from the war on terror against Afghanistan and Pakistan. This research helps in understanding the extent of destruction caused by the war and its direct and indirect impact on educational outcomes. Third, the identification strategy used in this research is unique in tackling the research question. Although existing literature either uses an IV approach to instrument for the endogeneity of occurrence of violence or uses a difference-in-difference estimation to study the differential impact of conflict on the conflict-affected cohort, we combine the two approaches to find the impact of conflict on districts that were exposed to conflict, instrumenting for conflict originating from the militants' headquarters

## 3 Data

We analyse the impact of conflict and the ban on female education brought along with it by militants on primary and middle level GERs by merging various district level datasets in Pakistan.

### 3.1 The GER datasets

The gross enrolment rate (GER) is defined as the number of individuals enrolled at a school level as a percentage of the number of children corresponding to the enrolment level age (UNESCO, 2017). GERs for year 2005 till 2011 are obtained from the publication of the Pakistan Social and Living Standards Measurement

(PSLM) which provides information on district level social and economic indicators in Pakistan every alternate year. Data on enrolment rates is provided biennially by the PSLM. The sample size of the PSLM surveys on a district level is approximately 70,000 households. The survey consists of all urban (cities) and rural areas (villages) of the four provinces of Pakistan. Each city is divided into enumeration blocks consisting 200-250, with each enumeration block classified into three income groups i.e. low, middle and high. List of villages published in the Population Census 1998 have been taken as the rural framework. Table 1 below denotes the enumeration blocks and villages as per sampling frame:

Table 2: Sampling Frame for Enumeration Blocks and Villages

| Province | Enumeration Blocks | Villages |
|---|---|---|
| Punjab | 14,549 | 25,857 |
| Sindh | 9,025 | 5,871 |
| Khyber Pakhtunkhwa | 1,913 | 7,337 |
| Balochistan | 613 | 6,557 |
| **Total** | **25,487** | **45,622** |

A two stage stratified sample design is adopted for the PSLM survey. Villages and enumeration blocks in rural and urban areas, respectively, are taken as Primary Sampling Units (PSUs). Sample PSUs are selected from the total strata with Probability Proportional to Size (PPS) method of sampling technique. Households within sample PSUs are then taken as Secondary Sampling Units (SSUs). A specified number of households i.e. 16 and 12 from each sample PSU of rural and urban areas is selected, using systematic sampling technique with a random start.

However, there are two concerns regarding the PSLM data. First, Pakistan is divided into four main provinces and three autonomous regions. Due to partial sovereignty of the autonomous regions, the PSLM data provides information only for the districts within the four main provinces of Pakistan and excludes any information on enrolment rates for districts located in the autonomous regions. Therefore, the impact of conflict and the ban on female education is only for the four main provinces of Pakistan. As a consequence, the results of this research may be under represented as GERs belonging to districts in tribal areas where intense conflict took place is ignored. Secondly, conflict causes populations to often be displaced and leads to migrations. As a result, students either temporarily drop out of schools or miss school years due to migration. To address this concern, we use GERs rather than net enrolment rate (NER) to account for the bias created by

displaced students. Since, there is no data available on migration at a district level in Pakistan, we work with GERs rather than net enrolment rates (NERs) to account for some of the bias created in our estimation due to migration. The tables below show the trend in enrolment rates from 2005 till 2011 at primary and middle level:

Table 3: Overall GERs for Primary Schools

| | 2005 | 2007 | 2009 | 2011 |
|---|---|---|---|---|
| **Number of Districts** | **99** | **101** | **110** | **114** |
| % of Districts with GER < 25% | 0 | 0 | 0 | 2 |
| % of Districts with GER Between 25%-50% | 6 | 5 | 3 | 4 |
| % of Districts with GER Between 50%-75% | 40 | 26 | 27 | 20 |
| % of Districts with GER Between 75%-100% | 34 | 40 | 44 | 41 |
| % of Districts with GER > 100% | 20 | 29 | 26 | 33 |

Table 4: GERs of Boys for Primary Schools

| | 2005 | 2007 | 2009 | 2011 |
|---|---|---|---|---|
| **Number of Districts** | **99** | **101** | **110** | **114** |
| % of Districts with GER < 25% | 0 | 0 | 0 | 0 |
| % of Districts with GER Between 25%-50% | 3 | 1 | 1 | 3 |
| % of Districts with GER Between 50%-75% | 12 | 9 | 9 | 6 |
| % of Districts with GER Between 75%-100% | 53 | 47 | 43 | 40 |
| % of Districts with GER > 100% | 32 | 43 | 47 | 51 |

Table 5: GERs of Girls for Primary Schools

| | 2005 | 2007 | 2009 | 2011 |
|---|---|---|---|---|
| **Number of Districts** | **99** | **101** | **110** | **114** |
| % of Districts with GER < 25% | 5 | 4 | 4 | 5 |
| % of Districts with GER Between 25%-50% | 21 | 15 | 15 | 17 |
| % of Districts with GER Between 50%-75% | 38 | 37 | 34 | 28 |
| % of Districts with GER Between 75%-100% | 19 | 24 | 25 | 30 |
| % of Districts with GER > 100% | 17 | 20 | 22 | 20 |

Table 6: Overall GERs for Middle Schools

| | 2005 | 2007 | 2009 | 2011 |
|---|---|---|---|---|
| **Number of Districts** | **93** | **101** | **110** | **114** |
| % of Districts with GER < 25% | 14 | 12 | 8 | 10 |
| % of Districts with GER Between 25%-50% | 59 | 51 | 45 | 46 |
| % of Districts with GER Between 50%-75% | 22 | 29 | 38 | 32 |
| % of Districts with GER Between 75%-100% | 5 | 8 | 6 | 12 |
| % of Districts with GER > 100% | 0 | 0 | 3 | 0 |

Table 7: GERs of Boys for Middle Schools

| | 2005 | 2007 | 2009 | 2011 |
|---|---|---|---|---|
| **Number of Districts** | **93** | **101** | **110** | **114** |
| % of Districts with GER < 25% | 10 | 4 | 5 | 4 |
| % of Districts with GER Between 25%-50% | 42 | 40 | 25 | 31 |
| % of Districts with GER Between 50%-75% | 34 | 39 | 54 | 41 |
| % of Districts with GER Between 75%-100% | 14 | 14 | 15 | 23 |
| % of Districts with GER > 100% | 0 | 3 | 1 | 1 |

Table 8: GERs of Girls for Middle Schools

| | 2005 | 2007 | 2009 | 2011 |
|---|---|---|---|---|
| **Number of Districts** | **93** | **101** | **110** | **114** |
| % of Districts with GER < 25% | 34 | 41 | 33 | 39 |
| % of Districts with GER Between 25%-50% | 49 | 35 | 42 | 34 |
| % of Districts with GER Between 50%-75% | 11 | 19 | 17 | 16 |
| % of Districts with GER Between 75%-100% | 5 | 5 | 6 | 12 |
| % of Districts with GER > 100% | 1 | 0 | 2 | 0 |

## 3.2 Dataset on civilian casualties

GERs obtained from PSLM are linked to a second dataset on conflict gathered and published by the South Asia Terrorism Portal (SATP). Data on Pakistan is collected by the SATP based on news resources and official government documents. The data acquired from this publicly available portal includes 'total civilian casualties due to terrorist activities in Pakistan' from 2003 till 2015. The individual major incidents of terrorism related violence are collated at a district level to match GERs measured on a district level. To match the timeline of enrolment, casualties are converted from annual timeline, January-December figures, to academic timeline, August-July figures. Therefore, casualties witnessed in a particular year represent civilians killed between August of the preceding year and July of the stated year. For example, casualties witnessed in 2009 represent civilians killed between August 2008 and July 2009. Figure 8 below shows the number of civilian casualties through terrorist activities before the start of the conflict till the end of the first phase of conflict, between 2005 and 2012. As illustrated, the immediate surge in civilian casualties in 2007 marks the start of the first year of conflict. Therefore, enrolment rates in 2007 are taken as the last year of enrolment rates before the conflict whereas enrolment rates in 2009 is taken as the first year of enrolment rates after the conflict.

Figure 8: Yearly Number of Total Civilian Casualties

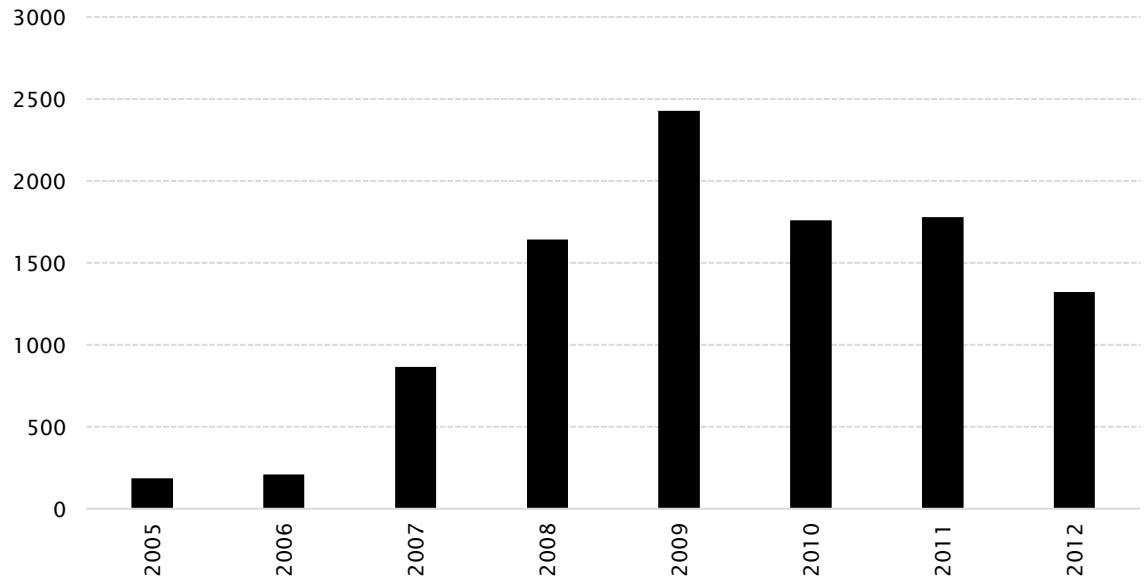



Figure 9: Yearly Number of Casualties through Attacks on Schools Only


## 3.3 Dataset on school characteristics

We merge our previous two datasets with our control variables by adding district level school characteristics obtained from 'Pakistan District Education Profile' (Pakistan Data Portal). This dataset is gathered by The Academy of Educational Planning & Management of Pakistan which serves under the Ministry of Federal Education & Professional Training of Government of Pakistan. The District Education Profile provides district level school characteristics for years 2007, 2009

and 2011 but not for 2005. These characteristics include the number of schools in each district that have satisfactory building conditions and utilities such as electricity and water. The tables below show the trend in these control variables from 2007 till 2011 at primary and middle level:

Table 9: Yearly Number of Casualties through Attacks on Schools Only

| Average Across the Districts | 2007 | 2009 | 2011 |
|---|---|---|---|
| Ratio of Schools with Electricity (Elec.) | 0.31 | 0.35 | 0.40 |
| Ratio of Schools with Water | 0.65 | 0.70 | 0.73 |
| Ratio of Schools with No Building (No Build.) | 0.08 | 0.08 | 0.08 |
| Ratio of Mosque Schools (Mosque) | 0.07 | 0.06 | - |
| Ratio of Schools with Toilet (Toil.) | 0.54 | 0.62 | 0.61 |
| Ratio of Enrolment to School (Enrol/Sch) | 92.29 | 94.05 | 88.78 |

Table 10: Control Variables for Middle Schools

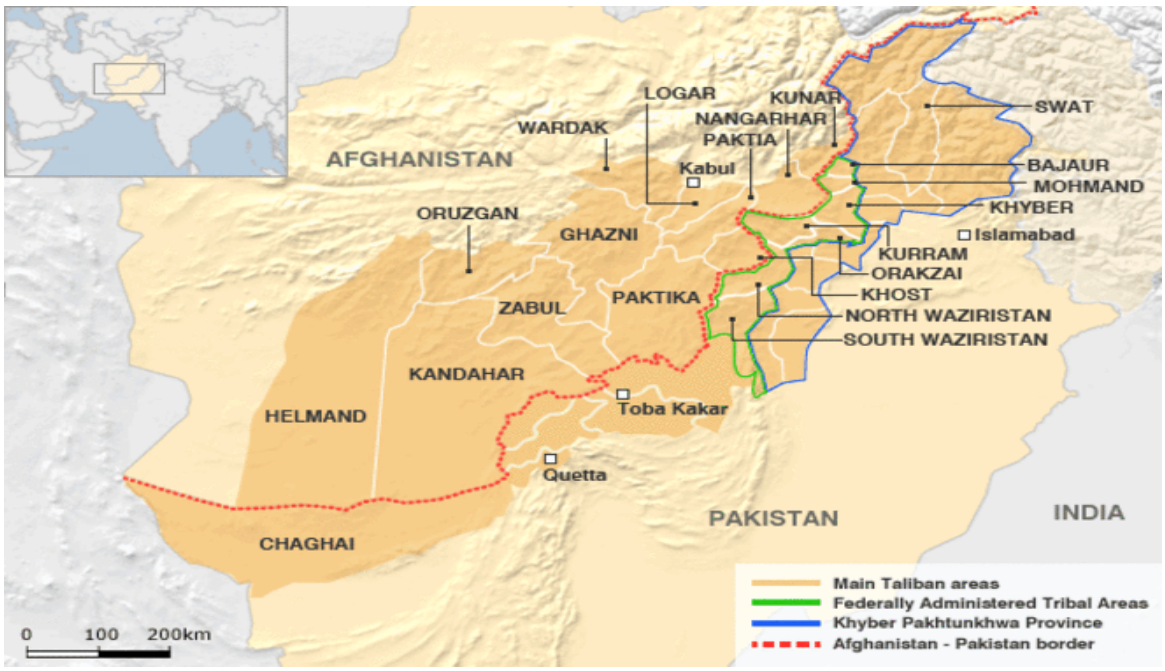
| Average Across the Districts | 2007 | 2009 | 2011 |
|---|---|---|---|
| Ratio of Schools with Electricity (Elec.) | 0.56 | 0.57 | 0.61 |
| Ratio of Schools with Water | 0.73 | 0.76 | 0.78 |
| Ratio of Schools with No Building (No Build.) | 0.04 | 0.05 | 0.03 |
| Ratio of Mosque Schools (Mosque)[5] | 0.07 | 0.06 | - |
| Ratio of Schools with Toilet (Toil.) | 0.71 | 0.77 | 0.79 |
| Ratio of Enrolment to School (Enrol/Sch) | 221.5 | 218.2 | 233.8 |

## 3.4 Distance of districts from militant headquarters

Using Google Maps, we also calculate travelling distances of each district from its capital to the militants' headquarters in Wana, South Waziristan. Since militancy in Pakistan spurred from the porous Pakistan-Afghanistan border, conflict witnessed in each district is expected to be associated with the mobility of militants from their headquarters and training facilities in Wana to each district. The map below shows the strongholds of militants and the location of their headquarters in the tribal areas of Pakistan:

[5] Since mosque schools/religious seminaries in each district are a separate system of schooling from conventional schooling, the ratios for each district for either primary or middle school remain is the same.

Figure 10: Pakistan-Afghanistan Border Region and Main Taliban Areas Along the Border




*Source: British Broadcasting Corporation (BBC), 2011*

# 4 Empirical methodology

## 4.1 Using IV for endogeneity of conflict in our DD estimation

The conflict that began in Pakistan in 2007 is still ongoing. However, it has changed its course during this time period and can be classified into two broad categories. The first phase of conflict saw the breakdown of the peace agreement between the militants and Pakistan resulting in an outright war from 2007 onwards. The first phase of the conflict saw security forces of Pakistan constantly clearing the tribal areas, and all adjoining areas, from the influence and rule of Taliban, and bringing the entire region under the rule of law governed by Pakistan. By 2011, Pakistan had cleared all of its tribal areas from militant rule and had declared the end of conflict between Pakistan and Taliban. Since the first phase of conflict in Pakistan was triggered by militancy in the tribal areas, we assume that the incidence of individual events of violence witnessed in any district in Pakistan was dependent on the geographic positioning of the district to the militants' headquarters in the tribal areas of Wana, South Waziristan. Militants used Wana as their headquarters for operation, as a military training facility and a base to launch terrorist attacks across Pakistan. Militants travelled by foot or other modes of transportation to their targets from their safe havens in the tribal areas, particularly from their headquarters and training grounds in Wana, South Waziristan, and hence found it

easier to target areas that were closer in terms of distance, and hence more accessible to them. Therefore, with conflict being endogenous to the physical proximity of each district to the militants' headquarters, we use travelling distance from each district to the militants' headquarters as an instrument variable (IV) to measure the probability of a district witnessing conflict and hence being part of the treatment group.

Using distance of each district to the militant headquarters in Wana is in line with the existing literature that suggests that suggests that the probability of occurrence of conflict, or intensity of violence witnessed, can be negatively correlated to the distance from source of conflict. Monteiro et al. (2013) study the negative spill over effects of conflict by analysing how drug battles in Rio de Janeiro affected educational outcomes of children attending schools located in and around conflict areas. They find that the impact of violence decreases with an increase in the distance between the school and conflict location. Similarly, Gershenson et al. (2015) also provide further evidence that in the wake of an attack, the proficiency rates of schools depended on the geographical proximity of the school to the source of attack. Moreover, Additionally, Haugan (2016) examines the impact of urban violence on standardized test scores of public schools in Colombia and find each additional homicide per year occurring within five hundred meters of a school reduced student achievement on a variety of tested academic subjects.

We carry out a simple OLS regression that would serve as the first stage of our estimation strategy to test the correlation between the geographical proximity of each district from three distinct points and the probability of each district witnessing conflict. First, distance from each district is calculated from the militant headquarters in Wana. Second, as a placebo test, distance of each district is calculated from Dera Ghazi Khan (DGK), a centre most district in Pakistan. Thirdly, we calculate district of each distance from Quetta, a district that served as the militant headquarters in the second phase of the conflict but not first, and remains a major transportation route between Pakistan and Afghanistan. The results for our correlation between distances and probability of a district witnessing conflict are presented below:

Table 11: Relationship between Distance and Probability of Witnessing Conflict

| OUTCOME: *PROBABILITY OF CONFLICT* | DISTANCE FROM WANA (1) | DISTANCE FROM DGK (2) | DISTANCE FROM QUETTA (3) |
|---|---|---|---|
| **DISTANCE** | **-0.0005*** ** | **0.0001** | **-0.0004** |
| | **(0.0001)** | **(0.0001)** | **(0.0001)** |
| F-test | 59.85 | 1.53 | 0.68 |
| R-Squared | 0.07 | 0.002 | 0.001 |
| Observations | 786 | 786 | 786 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Our results suggest that a direct negative correlation exists between the distance of each district from the militant headquarters in Wana and the probability of a district witnessing conflict, and hence being part of the treatment group. The results are significant at the 1 per cent level. However, our results also suggest that the distance of each district from a centre most point of Pakistan does not have any correlation with a district witnessing conflict. Similarly, there exists no relationship between the distance of each district to Quetta and the probability of a district witnessing conflict. Hence, we can conclude that the probability of each district witnessing conflict was only dependent on the geographical proximity of each district with militant headquarters in Wana.

Once we have established the relationship between the distance of each district from the militant headquarters and the probability of a district witnessing conflict, we measure the impact of conflict on GERs by treating the start of the first phase of conflict in 2007 as a stimulus, and using a difference-in-difference (DD) estimation to test the effect of the stimulus on our treatment group (all those districts that remained peaceful before the conflict and experienced violence after the onset of conflict in 2007). Enrolment rates in 2005 and 2007 are taken as pre-conflict enrolment rates, whereas enrolment rates for 2009 and 2011 are taken as post-conflict enrolment rates. We construct our treatment group to include districts that did not experience civilian casualties before the onset of the conflict in 2007, and witnessed casualties in any year after the onset of the conflict up until the end of the first phase of conflict in 2011. Our control group includes districts that did not experience any casualties before the conflict up till the end of the first phase of conflict. This results in 14 districts being included in the treatment group

while 49 districts are included in the control group and 51 districts are omitted from the estimation. We estimate:

First Stage: $TREAT_d = \alpha + \beta_1 DISTANCE_d + X' + \varepsilon_d$

Second Stage: $GER_{d,t} = \alpha + \beta_1 TREAT_d + \beta_2 POST_t + \delta_1 (TREAT_d * POST_t) + X' + \varepsilon_{d,t}$

where $GER_{d,t}$ is the outcome GER in district d, in year t, where t equals year 2005 and 2007 for GERs in pre-conflict years and equals year 2009 and 2011 for enrolment rate in post-conflict years. $TREAT_d$ is a binary variable that equals 1 if a district belongs to the treatment group and equals 0 if a district belongs to the control group. However, the probability of a district witnessing conflict and thus belonging to the treatment group is associated with the distance of the district from the militants' headquarters in Wana. Therefore, $DISTANCE_d$ represents the distance of a district, measured from its capital, to the militants' headquarters in Wana. $POST_t$ is a year dummy that equals 1 when the year is 2009 and 2011, and equals 0 when the year is 2005 and 2007.

The coefficient of the interaction term ($TREAT_d * POST_t$), $\delta_1$, measures the differential impact of the onset of the conflict as a stimulus on GERs of the treated group compared to the enrolment rates of the controlled group. An analysis of the differential in magnitude of this interaction term for estimation of boys and girls separately would also suggest whether the militants were successful using violence as a tool in banning female education, as the coefficient of the interaction term for girls should be larger in negative magnitude compared to that of boys. $X'_{d,t}$ are a set of district level control variables while $\varepsilon_{d,t}$ is the error term.

For our estimation, although we measure the impact of conflict on enrolment rates at a district level, we also cluster standard errors at the district level. This is because clustering at a district level would account for any within-district correlations in the incidence of experiencing conflict, and deal with any bias in standard errors arising from such correlations. Since conflict witnessed in each district in Pakistan between 2007 till 2011 is thought of to be dependent on the geographical proximity of each district to the militant headquarters, it is probable that districts that witnessed conflict in one year are more prone to continue witnessing conflict in the following years. This would lead to within-district correlation in the probability of witnessing conflict which could bias the standard

errors and be accounted for by clustering at a district level. Our robustness checks without clustering standard errors suggests no change in the significance of our estimates.

## 4.2 Using difference-in-difference-difference (DDD) to measure impact of ban on female education

We try to measure the impact of the ban on female education adopted by the militants to curb female education by using a difference-in-difference-in-difference (DDD) estimation. We test the differential impact of the ban on the GERs of girls relative to boys in the treatment group, compared to the enrolment rates of girls relative to boys in the control group. We maintain our treatment group to include districts that did not experience civilian casualties before the onset of the conflict in 2007 and then witnessed casualties in any of the year after the conflict started up until the end of the first phase of conflict. Our control group includes districts that remained peaceful throughout the time period. We estimate:

$$GER_{d,i,t} = \alpha + \beta_1 TREAT_d + \beta_2 POST_t + \beta_3 FEMALE_i + \beta_4 ( TREAT_d*POST_t ) + \beta_5 ( TREAT_d*FEMALE_i ) + \beta_6 ( POST_t*FEMALE_i ) + \delta_1 ( TREAT_d*POST_t*FEMALE_i ) + X' + \varepsilon_{d,i,t}$$

where $GER_{d,t}$ is the outcome GER in district d, in year t, where t equals year 2005 and 2007 for GERs in pre-conflict years and equals year 2009 and 2011 for enrolment rate in post-conflict years. $TREAT_d$ is a binary variable that equals 1 if a district belongs to the treatment group and equals 0 if a district belongs to the control group. $POST_t$ is a year dummy that equals 1 when the year is 2009 and 2011, and equals 0 when the year is 2005 and 2007. $FEMALE_i$ is a gender dummy that equals 1 when GERs correspond to those of girls and equals 0 when GERs correspond to those of boys. The coefficient of the interaction term ( $TREAT_d*POST_t*GENDER_i$ ), $\delta_1$, measures the differential impact of the ban on the GERs of girls relative to boys in the treatment group, compared to the GERs of girls relative to boys in the control group. It measures the effectiveness of the ban by estimating whether GERs of girls in conflict-affected districts were lower than that of boys belonging to the same districts. $X'_{d,t}$ are a set of district level control variables while $\varepsilon_{d,t}$ is the error term.

# 5 Results

## 5.1 Using IV for endogeneity of conflict in our DD estimation

We provide results for our third specification, which combines our first two estimations, by instrumenting for conflict witnessed in each district to be dependent on the distance of each district to the militants' headquarters, and therefore determining whether a district would be included in our treatment group or the control group for our DD estimation. The results are presented below:

Table 12: Using 2SLS with DD to Measure the Impact of Conflict on Overall GERs

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0003)** | **(0.0006)** | **(0.0003)** | **(0.0006)** |
| *SECOND STAGE* | | | | |
| TREAT | 29.00** | -14.41 | 33.18*** | 19.17** |
| | (13.90) | (14.42) | (10.64) | (7.68) |
| POST | 9.07** | 6.62* | 4.72 | 6.45** |
| | (4.56) | (3.76) | (3.13) | (2.59) |
| **TREAT*POST** | **-14.08** | **-13.81*** | **-0.50** | **-8.88*** |
| | **(9.08)** | **(7.72)** | **(6.73)** | **(5.03)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 2.55 | 12.01 | 10.57 | 20.20 |
| R-Squared | 0.02 | 0.21 | 0.04 | 0.32 |
| Observations | 848 | 554 | 836 | 554 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from our DD and IV estimation combined suggests that conflict acted as a negative stimulus on overall GERs, whereby districts that witnessed conflict were those that were closer to the militant's headquarters and saw a reduction in overall

GERs compared to districts that remained peaceful. Column (2) and column (4) from Table 12 above suggests that when standard errors are clustered at district level, districts that experienced conflict witnessed a decline in overall GERs by 13.8 per cent at primary level and 8.9 per cent at middle level, the results being significant for both primary and middle schools at 10 per cent. Moreover, when standard errors are not clustered at district level but calculated as robust, as shown in Table 16 of section 6.1, the coefficients become insignificant. However, changing the definition of conflict from 'civilian casualties' to 'attacks specifically on education', as shown in Table 20 of section 6.2, results in the negative impact of conflict being significant at both primary and middle level. Districts that experienced conflict witnessed a decline in overall GERs by 30.3 per cent at primary level and 25.6 per cent at middle level, the results being significant at 5 per cent. Since the policy of banning education was for girls only, we expect the gender wise breakup of our DD estimation to provide estimations for the impact and success of the ban. We provide gender specific result of our estimation since, the results for impact of conflict on GERs of boys as below:

Table 13: Using 2SLS with DD to Measure the Impact of Conflict on GERs of Boys

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0004)** | **(0.0008)** | **(0.0004)** | **(0.0008)** |
| *SECOND STAGE* | | | | |
| TREAT | 37.63** | 8.12 | 45.98*** | 40.25*** |
| | (11.87) | (11.47) | (11.17) | (8.80) |
| POST | 12.03*** | 10.62*** | 7.87** | 4.86 |
| | (4.61) | (3.66) | (3.58) | (3.09) |
| **TREAT*POST** | **-21.17**** | **-19.89**** | **-5.62** | **-6.63** |
| | **(9.73)** | **(9.14)** | **(7.91)** | **(6.78)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 4.05 | 7.94 | 13.25 | 14.81 |
| R-Squared | 0.05 | 0.19 | 0.10 | 0.39 |
| Observations | 424 | 277 | 418 | 277 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from Table 13 above suggests that the onset of the conflict and the ban on banning female education only had a significant impact on GERs of boys at primary level. When standard errors are clustered on district level, GERs of boys belonging to districts that witnessed violence declined by 19.9 per cent at primary level and 6.6 per cent at middle level compared to GERs of boys belonging to districts that did not witness violence, the results being significant only at primary level, at 5 per cent. Moreover, when standard errors are not clustered at district level but calculated as robust, as shown in Table 17 of section 6.1, the coefficients still remain significant at 5 per cent for primary level and insignificant for middle level. Lastly, changing the definition of conflict from 'civilian casualties' to 'attacks specifically on education', as shown in Table 21 of section 6.2, yields significant results at primary and middle level. GERs of boys belonging to districts that

witnessed violence declined by 28.5 per cent at primary level and 25.7 per cent at middle level compared to GERs of boys belonging to districts that did not witness violence, the results being significant at both levels at 5 per cent. The results for impact of conflict on GERs of girls is provided below:

Table 14: Using 2SLS with DD to Measure the Impact of Conflict on GERs of Girls

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0004)** | **(0.0008)** | **(0.0004)** | **(0.0008)** |
| *SECOND STAGE* | | | | |
| TREAT | 20.34 | -36.99* | 20.38* | -1.91 |
| | (17.40) | (19.67) | (12.11) | (9.00) |
| POST | 6.12 | 2.62 | 1.58 | 8.04*** |
| | (5.01) | (4.67) | (3.82) | (2.89) |
| **TREAT*POST** | **-7.00** | **-7.72** | **-4.62** | **-11.12** ** |
| | **(9.86)** | **(7.97)** | **(8.04)** | **(5.13)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 2.08 | 14.10 | 5.09 | 17.45 |
| R-Squared | 0.01 | 0.39 | 0.02 | 0.46 |
| Observations | 424 | 277 | 418 | 277 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from Table 14 above suggests that the onset of the conflict and the ban on banning female education only had a significant impact on GERs of girls at middle level. When standard errors are clustered on district level, GERs of girls belonging to districts that witnessed violence declined by 7.7 per cent at primary level and 11.1 per cent at middle level compared to GERs of girls belonging to districts that did not witness violence, the results being significant only at middle level, at 5 per cent. Moreover, when standard errors are not clustered at district level but

calculated as robust, as shown in Table 18 of section 6.1, the coefficients still remain significant at 5 per cent at middle level and insignificant at primary level. Lastly, changing the definition of conflict from 'civilian casualties' to 'attacks specifically on education', as shown in Table 22 of section 6.2, yields significant results at primary and middle level. GERs of girls belonging to districts that witnessed violence declined by 32.0 per cent at primary level and 25.5 per cent at middle level compared to GERs of boys belonging to districts that did not witness violence, the results being significant at both levels at 5 per cent. The gender-wise breakup of results for our combined estimation provides mix results when the first definition of conflict, 'total civilian casualties' is used. Comparison of decline of GERs for boys and girls suggests that at primary level the negative impact of conflict was greater on GERs of boys compared to GERs for girls. GERs of boys declined by 19.9 per cent for boys but by 7.7 per cent for girls. However, at middle level, the negative impact was greater on GERs of girls as compared to boys as GERs of boys declined by 6.6 per cent and GERs of girls declined by 11.1 per cent.

However, changing the definition of conflict specifically towards attacks on schools provides a more straightforward picture of the ban on female schooling working negatively against girls as compared to boys. GERs of boys declined by 28.5 per cent for boys but by 32.0 per cent for girls whereas at middle level GERs of boys declined by 25.7 per cent and GERs of girls also declined by 25.5 per cent. Since violence was used as a tool to deter female schooling, using a definition of conflict specifically targeted towards attacks on schools shows that the use of violence to implement the ban was indeed successful as GERs of girls belonging to conflict districts declined more in comparison to GERs of boys belonging to conflict districts. However, to make any conclusive statements on whether the ban was effective in curbing female schooling in comparison to schooling of boys, we provide a DDD estimation as our last specification.

## 5.2 Using difference-in-difference-difference (DDD) to measure impact of ban on female education

Lastly, we test the differential impact of the ban on the GERs of girls relative to boys in the treatment group, compared to the enrolment rates of girls relative to boys in the control group. We maintain our treatment group to include districts that did not experience civilian casualties before the onset of the conflict in 2007

and then witnessed casualties in any of the year after the conflict started up until the end of the first phase of conflict. The results are presented below:

Table 15: Impact of Ban on GERs using DDD

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| TREAT | 1.49 | 0.36 | 5.39 | 3.32 |
| | (3.69) | (4.17) | (3.72) | (3.84) |
| POST | 2.25 | -0.74 | 4.85*** | 0.88 |
| | (2.09) | (3.41) | (1.59) | (2.03) |
| GENDER | -23.37*** | -22.67*** | -18.43*** | -20.48*** |
| | (2.52) | (2.78) | (1.51) | (1.91) |
| TREAT*POST | 1.06 | -1.20 | 1.51 | 3.94 |
| | (2.97) | (3.49) | (2.14) | (2.72) |
| GENDER*POST | 1.71 | 2.08 | -0.30 | 4.11 |
| | (1.83) | (2.40) | (1.68) | (2.20) |
| TREAT*GENDER | -0.52 | -0.84 | -0.43 | 0.80 |
| | (4.08) | (4.52) | (3.19) | (3.66) |
| **TREAT*POST** | **-5.66** | **-2.89** | **-6.10**** | **-9.91**** |
| ***GENDER** | **(3.73)** | **(4.04)** | **(2.87)** | **(2.91)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 40.5 | 24.4 | 45.4 | 45.7 |
| R-Squared | 0.21 | 0.39 | 0.21 | 0.48 |
| Observations | 775 | 501 | 763 | 501 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from column (2) and column (4) in Table 15 above suggests that the militants were successful in using violence as a tool to ban female schooling as GERs of girls declined more than GERs of boys in districts that witnessed conflict compared to districts that did not witness conflict. As the ban was above the age of 8, and hence targeted towards students belonging to middle school and above, we see the negative magnitude of impact higher in middle school, as well as the

results being significant. At middle level, when standard errors are clustered at district level, GERs of girls at primary level declined by 2.9 per cent more than GERs of boys in districts that witnessed conflict compared to districts that did not witness conflict, however the results are not significant. However, GERs of girls at middle level declined by 9.9 per cent more than GERs of boys in districts that witnessed conflict compared to districts that did not witness conflict, the results being significant at 1 per cent. Even when standard errors are not clustered at district level but calculated as robust, as shown in Table 19 of section 6.1, the coefficients are still significant at 10 per cent for middle schools but not significant at primary level. Lastly, changing the definition of conflict from 'civilian casualties' to 'attacks specifically on education', as shown in Table 23 of section 6.2, yields significant results at primary and middle level. GERs of girls belonging to districts that witnessed violence declined by 5.7 per cent at primary level and 4.9 per cent at middle level compared to GERs of boys belonging to districts that witnessed conflict, relative to GERs of girls in comparison to GERs of boys belonging to districts that did not witness conflict. The results are significant at 5 per cent.

### Differential impact on boys and girls

Results from our DDD specification suggests that the policy of banning female schooling adopted by militants was successful in curbing education for girls more than for boys. As the ban was above the age of 8, and hence targeted towards girls belonging to middle school and above, we observe that enrolment rates for girls suffered more than boys in districts that witnessed conflict, compared to districts that remained peaceful. No significant differential in impact of conflict between boys and girls was observed at primary school as the policy ban was for girls above the age of 8.

## 6 Robustness check

### 6.1 Using non-clustered standard errors

For our main estimation, although we measure the impact of conflict on enrolment rates at a district level, we also cluster standard errors at the district level. This is because clustering at a district level would account for any within-district correlations in the incidence of experiencing conflict, and deal with any bias in standard errors arising from such correlations. Since conflict witnessed in each district in Pakistan between 2007 till 2011 is thought of to be dependent on the

geographical proximity of each district to the militant headquarters, it is probable that districts that witnessed conflict in one year are more prone to continue witnessing conflict in the following years. This would lead to within-district correlation in the probability of witnessing conflict which could bias the standard errors and be accounted for by clustering at a district level. For our robustness check we use robust standard errors instead of clustering standard errors for each of our specifications, assuming there is no within-district correlation in the incidence of experiencing conflict. We provide results for both our specifications below:

## Using IV for endogeneity of conflict in our DD estimation

Results for overall specification are presented below:

Table 16: Using 2SLS with DD to Measure the Impact of Conflict on Overall GERs

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0003)** | **(0.0006)** | **(0.0003)** | **(0.0006)** |
| *SECOND STAGE* | | | | |
| TREAT | 29.00** | -14.41 | 33.18*** | 19.17*** |
| | (9.65) | (11.74) | (7.51) | (7.18) |
| POST | 9.07 | 6.62 | 4.72 | 6.45** |
| | (5.74) | (4.41) | (4.57) | (3.49) |
| **TREAT*POST** | **-14.08** | **-13.81** | **-0.50** | **-8.88** |
| | **(13.02)** | **(9.80)** | **(10.46)** | **(7.39)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| F-test | 4.66 | 20.99 | 15.47 | 29.75 |
| R-Squared | 0.02 | 0.21 | 0.04 | 0.32 |
| Observations | 848 | 554 | 836 | 554 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of boys is presented below:

Table 17: Using 2SLS with DD to Measure the Impact of Conflict on GERs of Boys

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0004)** | **(0.0008)** | **(0.0004)** | **(0.0008)** |
| *SECOND STAGE* | | | | |
| TREAT | 37.63*** | 8.12 | 45.98*** | 40.25*** |
| | (9.51) | (10.29) | (8.81) | (7.81) |
| POST | 12.03** | 10.62** | 7.87 | 4.86 |
| | (5.74) | (4.35) | (5.04) | (3.85) |
| **TREAT*POST** | **-21.17*** | **-19.89** ** | **-5.62** | **-6.63** |
| | **(12.68)** | **(9.65)** | **(11.43)** | **(7.34)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| F-test | 6.82 | 11.39 | 21.54 | 19.31 |
| R-Squared | 0.05 | 0.19 | 0.10 | 0.39 |
| Observations | 424 | 277 | 418 | 277 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of girls is presented below:

Table 18: Using 2SLS with DD to Measure the Impact of Conflict on GERs of Girls

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0004)** | **(0.0008)** | **(0.0004)** | **(0.0008)** |
| *SECOND STAGE* | | | | |
| TREAT | 20.34 | -36.99** | 20.38** | -1.91 |
| | (13.00) | (15.88) | (9.01) | (7.03) |
| POST | 6.12 | 2.62 | 1.58 | 8.04** |
| | (7.74) | (5.64) | (5.87) | (3.93) |
| **TREAT*POST** | **-7.00** | **-7.72** | **-4.62** | **-11.12*** |
| | **(17.70)** | **(11.69)** | **(13.10)** | **(6.54)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| F-test | 1.54 | 23.39 | 4.63 | 33.84 |
| R-Squared | 0.01 | 0.39 | 0.02 | 0.46 |
| Observations | 424 | 277 | 418 | 277 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## Using difference-in-difference-difference (DDD) to measure impact of ban on female education

Results for overall specification are presented below:

Table 19: Impact of Ban on GERs using DDD

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| TREAT | 1.49 | 0.36 | 5.39* | 3.32 |
| | (2.81) | (4.90) | (2.78) | (3.60) |
| POST | 2.25 | -0.74 | 4.85** | 0.88 |
| | (2.47) | (3.48) | (2.32) | (3.02) |
| GENDER | -23.37*** | -22.67*** | -18.43*** | -20.48*** |
| | (3.36) | (4.18) | (2.61) | (3.24) |
| TREAT*POST | 1.06 | -1.20 | 1.51 | 3.94 |
| | (3.57) | (3.59) | (3.51) | (4.17) |
| GENDER*POST | 1.71 | 2.08 | -0.30 | 4.11 |
| | (4.09) | (4.90) | (3.41) | (3.93) |
| TREAT*GENDER | -0.52 | -0.84 | -0.43 | 0.80 |
| | (4.95) | (6.15) | (4.13) | (4.94) |
| **TREAT*POST** | **-5.66** | **-2.89** | **-6.10** | **-9.91*** |
| ***GENDER** | **(5.82)** | **(7.19)** | **(4.95)** | **(6.00)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| F-test | 30.6 | 26.5 | 29.5 | 45.7 |
| R-Squared | 0.21 | 0.39 | 0.21 | 0.48 |
| Observations | 775 | 501 | 763 | 501 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## 6.2 Using casualties linked to just attacks on education

Changing the definition of conflict to just attacks on schools provides a more straightforward picture of the impact of violence used against schooling and the effects of ban on female schooling. Since violence was used as a tool to deter female schooling, using a definition of conflict specifically targeted towards schools, and students, shows specifically how successful violence was in reducing enrolment rates, and the precise success of the ban on female education.

## Using IV for endogeneity of conflict in our DD estimation

Results for overall specification are presented below:

Table 20: Using 2SLS with DD to Measure the Impact of Conflict on Overall GERs

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0004)** | **(0.0007)** | **(0.0004)** | **(0.0007)** |
| *SECOND STAGE* | | | | |
| TREAT | 52.36 | -46.81** | 66.24*** | 41.26*** |
| | (32.78) | (21.80) | (24.30) | (13.76) |
| POST | 7.59** | 6.14* | 4.70* | 6.52*** |
| | (3.71) | (3.14) | (2.51) | (2.04) |
| **TREAT*POST** | **-30.87** | **-30.28**** | **-1.60** | **-25.62**** |
| | **(19.76)** | **(13.42)** | **(14.81)** | **(10.04)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 2.11 | 14.40 | 9.70 | 23.39 |
| R-Squared | 0.01 | 0.23 | 0.04 | 0.32 |
| Observations | 848 | 554 | 836 | 554 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of boys is presented below:

Table 21: Using 2SLS with DD to Measure the Impact of Conflict on GERs of Boys

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.002*** ** | **-0.002* ** |
| | **(0.0006)** | **(0.0010)** | **(0.0006)** | **(0.0010)** |
| *SECOND STAGE* | | | | |
| TREAT | 77.73*** | -11.62 | 98.71*** | 75.61*** |
| | (27.78) | (19.10) | (25.66) | (14.82) |
| POST | 10.08*** | 6.81** | 7.23** | 6.16*** |
| | (3.80) | (2.73) | (2.85) | (2.29) |
| **TREAT*POST** | **-47.89** ** | **-28.52** ** | **-12.06** | **-25.70** ** |
| | **(21.99)** | **(14.31)** | **(17.32)** | **(12.66)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 3.49 | 7.95 | 12.23 | 18.23 |
| R-Squared | 0.04 | 0.19 | 0.10 | 0.39 |
| Observations | 424 | 277 | 418 | 277 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of girls is presented below:

Table 22: Using 2SLS with DD to Measure the Impact of Conflict on GERs of Girls

| | PRIM. SCHOOL NO CONTROLS | PRIM. SCHOOL CONTROLS | MID. SCHOOL NO CONTROLS | MID. SCHOOL CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **DIISTANCE** | **-0.002*** ** | **-0.002** ** | **-0.002*** ** | **-0.002* ** |
| | **(0.0006)** | **(0.0010)** | **(0.0006)** | **(0.0010)** |
| *SECOND STAGE* | | | | |
| TREAT | 26.98 | -82.00*** | 33.78 | 6.91 |
| | (41.13) | (27.68) | (27.19) | (16.34) |
| POST | 5.10 | 5.47 | 2.16 | 6.87*** |
| | (4.05) | (4.34) | (3.09) | (2.29) |
| **TREAT*POST** | **-13.85** | **-32.04** ** | **-8.86** | **-25.54** ** |
| | **(21.09)** | **(15.29)** | **(17.81)** | **(10.29)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 1.87 | 17.69 | 4.57 | 18.99 |
| R-Squared | 0.01 | 0.42 | 0.02 | 0.46 |
| Observations | 424 | 277 | 418 | 277 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## Using difference-in-difference-difference (DDD) to measure impact of ban on female education

Results for overall specification are presented below:

Table 23: Impact of Ban on GERs using DDD

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| TREAT | 10.60*** | 6.19 | 8.56* | 7.08 |
| | (3.85) | (4.75) | (4.96) | (4.33) |
| POST | 2.48 | 0.34 | 4.76*** | 1.09 |
| | (1.56) | (1.93) | (1.25) | (1.59) |
| GENDER | -24.04*** | -20.67*** | -18.79*** | -20.62*** |
| | (1.76) | (1.65) | (1.50) | (1.65) |
| TREAT*POST | 3.19 | 5.14 | 2.98 | 5.54 |
| | (3.37) | (3.84) | (2.71) | (3.47) |
| GENDER*POST | 0.52 | 2.34 | -1.50 | 2.25 |
| | (1.29) | (1.54) | (1.44) | (1.54) |
| TREAT*GENDER | -4.72 | -3.95 | -3.64 | -4.43 |
| | (5.91) | (4.12) | (4.59) | (4.07) |
| **TREAT*POST** | **-2.28** | **-5.69**** | **-1.28** | **-4.90**** |
| ***GENDER** | **(6.02)** | **(2.47)** | **(4.11)** | **(2.32)** |
| POP. DENSITY | | YES | | YES |
| MOSQUE | | YES | | YES |
| ELEC. | | YES | | YES |
| TOIL. | | YES | | YES |
| NO BUILD. | | YES | | YES |
| ENROL/SCH | | YES | | YES |
| WATER | | YES | | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 46.5 | 46.6 | 43.6 | 49.9 |
| R-Squared | 0.23 | 0.47 | 0.21 | 0.51 |
| Observations | 844 | 554 | 832 | 554 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## 7 Conclusion

The existing literature shows that violent conflicts result in reduction in educational access and attainment of education (Akresh et al., 2011; Alderman et al., 2006). Students exposed to violence, especially in schools, tend to lose motivation and concentration due to prolonged fear, disruption in home and school environments, and adverse psychological impact on health and mental wellbeing, forcing them to no longer attend school (Gershenson et al., 2015). The effects on educational outcomes can also be heterogeneous across gender; in certain cases, exposure to violence has had a larger negative effect on enrolment for girls (Shemyakina, 2010), whereas in other instances conflict resulted in long-term effect on educational outcomes for boys only (Justino et al., 2013). While much research has focused on the effects of conflict in reducing supply of schooling through closure of schools (Maio et al., 2013), destruction of school infrastructure (Chamarbagwala et al., 2010), and reduction in teacher availability (Gershenson et al., 2015), there is little research on how negative policies such as violent ban on schooling can reduce demand for schooling, in particular affect enrolment rates and drop-out rates.

This research examines conflict witnessed in Pakistan between 2007 till 2011 on gross enrolment rates (GERs), and the ban on female education brought along with it by militants as an instrument to crowd out female education. By using dataset on district level GERs from 2005 till 2011 on approximately[6] 101 districts, and combining it with data on conflict, we use an instrument variable (IV) technique with a difference-in-difference (DD) estimation, and a difference-in-difference-in-difference (DDD) estimation, to show that the ban on female education was effective in reducing GERs for districts that experienced violence, with the ban being more effective on girls than boys. Since the ban was above the age of 8, it was primarily targeted towards girls at middle school and above, as middle school in Pakistan starts at the age of 9[7]. The results from our DD specification suggests that districts that were closer to militant headquarters were more likely to witness violence, and that overall GERs declined at both primary and middle level for districts that witnessed violence. The results are significant for both primary and middle level

[6] Between 2007 till 2011 a few districts were broken down into smaller districts due to which total number of districts vary slightly between years.
[7] Primary schools in Pakistan are typically from age 5 till 9 whereas middle school are from 10 till 12.

overall GERs, with the magnitude higher for primary schools. Districts that witnessed conflict experienced a decline in overall GERs of 13.8 per cent at primary level compared to districts that remained peaceful, whereas districts that witnessed conflict at middle level witnessed a decline in overall GERs of 8.9 per cent compared to those that remained peaceful. A gender-wise breakup of results suggest that the impact of conflict was larger on boys than on girls at primary level but larger on girls than boys at middle level.

Our second specification using a DDD estimation suggests that the policy of banning female schooling adopted by militants was successful in curbing education for girls more than for boys. Results suggest that as the ban was above the age of 8, and hence targeted towards girls belonging to middle school and above, we see the negative magnitude of impact higher in middle school compared to primary school, as well as the results being significant. Girls in middle school belonging to conflict districts witnessed a larger decline in GERs by 9.9 per cent compared to boys in districts that witnessed violence compared to districts that did not witness conflict, the results being significant at the 1 per cent level.

This research contributes to the existing literature in several ways. First, the nature of conflict and its impact on educational outcomes is a unique story. In a time when strong efforts are being made to achieve certain universal goals, including access to and attainment of basic education, militants in Pakistan adopted a ban on all female education above the age of 8. Although a group of militants and not the state announced the ban, the violence used was enough to create sufficient fear and terror to cause significant damage in reducing overall demand for schooling. Second, there has been very little research that has come out from the war on terror against Afghanistan and Pakistan. This research helps in understanding the extent of destruction caused by the war and its direct and indirect impact on educational outcomes. Third, the identification strategy used in this research is unique in tackling the research question. Although existing literature either uses an IV approach to instrument for the endogeneity of occurrence of violence or uses a difference-in-difference estimation to study the differential impact of conflict on the conflict-affected cohort, we combine the two approaches to find the impact of conflict on districts that were exposed to conflict, instrumenting for conflict originating from the militants headquarters.

# Chapter 2: Recovery Rates

## 1 Introduction

Civil conflicts have been widespread throughout the world in the past few decades, and economists have been trying to analyse the consequences of these conflicts, with particular attention to their effects on human capital accumulation. The short run impacts of civil conflicts are clearly catastrophic (Akresh et al. 2011; Alderman et al., 2006; Gershenson et al., 2015). However, recent analyses provide mix evidence on the persistence of the effects of conflict on human capital accumulation. Empirical literature dealing with the effects of conflict at the *macro-level* shows robust evidence that educational outcomes of countries exposed to violence are able to catch up after a certain period of time, recovering to their pre-conflict levels in most development indicators (Silwal, 2014; Shemyakina, 2011). Economic growth theory suggests that, after a shock, the economy returns to its steady state level, as does human capital, but these models offer very little insight on the pace of recovery. Empirical cross-country and cross-regional studies suggest that countries see a steep decline on a variety of welfare indicators as a consequence of war, but they also show that there is significant recovery in most of these dimensions, but that this process varies in its duration. Chen et al. (2008) look at 41 countries that suffered civil conflicts between 1960 and 2003, and find that after the war ends, there is significant recovery in terms of economic performance, health, education and political development. Moreover, Cerra et al. (2008) find that most of the output losses due to conflict are recovered in a very short period of time. Miguel et al. (2011) look at the long-term consequences of the massive US bombings in Vietnam, finding that 27 years after the end of the war there was no detectable impact on poverty rates, consumption levels, literacy levels, infrastructure, or population density. Finally, Davis et al. (2002), and Brakman et al. (2004) arrive at similar conclusions based on evidence from the Allied bombing in Japan and West Germany, respectively. In general, this literature concludes that the effects of severe periods of violence on economic outcomes and human welfare tend to vanish over time.

However, estimates on *micro-level* effects of violent conflict on educational outcomes show that conflict not only results in short run reduction of educational

access and attainment (Akresh et al., 2011; Alderman et al., 2006; Chamarbagwala et al., 2010), but also has a negative impact on individual's decades after the conflict is over (Leon, 2012; Justino et al., 2013). This is because shocks to educational access during childhood can lead to significant and long-lasting detrimental effects on individual human capital accumulation (Akbulut, 2009; Ichino et al., 2004; Leon, 2012). Although the growth models predict that the temporary destruction of capital due to conflict can be overcome in the long run by higher investments in affected areas, the long-term destructive effects of violent conflict may remain entrenched in certain regions and among some population groups even if economic growth converges at the aggregate level. Hence, negative impact of conflict on educational outcomes and labour market participation, of individuals and households may be observed decades after the conflict. Students exposed to violence, especially in schools, tend to lose motivation and concentration due to prolonged anxiety and fear created by exposure to conflict, disruption in home and school environment, and adverse psychological impact on health and mental wellbeing (Gershenson et al., 2015), resulting in impacts that might linger on beyond the short run.

This paper provides analysis on a *macro*-level, by estimating the impact of conflict on human capital accumulation, specifically gross enrolment rates (GERs), on an aggregate district-level. We investigate how enrolment rates in Pakistan recovered after the end of conflict, by estimating the short run and medium run impact. Although the existing literature points towards evidence that indicators on an aggregate level eventually recover to their pre-conflict levels after conflict is over, the duration of recovery for differing subgroups can vary. The disproportional representation of males in the labour market in Pakistan along with the unique policy of banning female education provides for interesting reasons to study the pace of recovery of enrolment rates after the conflict was over. Since the first phase of conflict ended by end 2011 and GERs on district level are only reported biennially in Pakistan, resulting in the first set of available GERs after the end of the first phase of conflict being in 2013, we study the impact of conflict witnessed between 2007 and 2012 on district level GERs in 2013 and 2015. By using a pooled cross-sectional data on district level GERs, we estimate the short-term impact of conflict on district level GERs in 2013, and then estimate how district-level GERs recovered in the medium-term in 2015. By measuring the short-term and medium-term impact of conflict on GERs for boys and girls separately, we analyse how the

recovery rate of GERs differed for boys and girls and whether the impact was persistent for either gender. Hence our research question is 'How did enrolment rates recover after the end of the conflict?'

In order to estimate how GERs recovered after the end of conflict, we compare districts that entered and exited conflict by 2012 and then remained peaceful for subsequent years (conflict-affected districts) with districts that remained peaceful throughout the time period (conflict-free districts). Thus, our conflict-affected group includes districts that did not experience violence prior to the onset of conflict in 2007, experienced violence in 2012 irrespective of experiencing violence between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. Our control group includes districts that remained peaceful and did not experience violence from 2006 till 2014. We find that conflict had a negative short-run impact on overall GERs at primary and middle level for outcome enrolment period 2013. The results are significant at 1% level for both primary and middle schools respectively. At primary level, in the short-run, conflict resulted in GERs of districts to decline by 12.1 per cent in 2013 compared to districts that did not experience conflict. However, GERs for districts affected by conflict recovered in the medium-run by 2015, and were 3.5 per cent lower compared to districts that remained peaceful. On the other hand, at middle level, in the short-run, conflict resulted in GERs of districts to decline by 13.8 per cent in 2013 compared to districts that remained peaceful. But enrolment rates did not recover as quickly at middle level as at primary level, with GERs for districts affected by conflict in the medium-run in 2015 being lower by 8.3 per cent lower compared to districts that remained peaceful. This suggests that along with the impact of conflict being heterogeneous on different levels of schooling in the short-run, the rate of recovery of GERs at different levels of schooling also varied, with GERs of middle schools taking longer to recover after end of conflict.

A gender-wise breakup of results suggest that conflict not only had a heterogeneous negative impact on GERs of boys at primary and middle level in the short-run, but the pace of recovery of enrolment rates at primary and middle level also differed. The results are significant at 1% level for both primary and middle schools respectively. At primary level, in the short-run, conflict resulted in GERs of districts to decline by 13.1 per cent in 2013 compared to districts that did not experience conflict. However, GERs for districts affected by conflict recovered only

slightly in the medium-run by 2015, and were 9.9 per cent lower compared to districts that remained peaceful. On the other hand, at middle level, in the short-run, conflict resulted in GERs of districts to decline by 11.7 per cent in 2013 compared to districts that remained peaceful. But enrolment rates did recover faster at middle level compared to primary level, with GERs for districts affected by conflict in the medium-run in 2015 being lower by 5.5 per cent lower compared to districts that remained peaceful. This suggests that conflict not only had a negative impact on GERs of boys in the short-run, but also affected enrolment rates for boys even after conflict was over. A common explanation provided for the persistent effect of conflict on GERs of boys, and the non-recovery of enrolment rates to match those of conflict-free districts is the household trade-off between education and economic survival during conflict period that leads to the removal of boys from schools permanently (Justino, 2013). Boys generally tend to benefit less from post-conflict recovery as they substitute into the labour market due to loss in household income in period of conflict, and hence find it more difficult to return to school even after conflict is over. This therefore slows down the pace of recovery of enrolment rates of boys, resulting in the impact of conflict being relatively persistent.

For girls, although conflict had a negative short-run impact on GERs at primary and middle level for outcome enrolment period 2013, enrolment rates recovered in the medium-run to match those of districts that remained peaceful. At primary level, in the short-run, conflict resulted in GERs of districts to decline by 11.1 per cent in 2013 compared to districts that did not experience conflict. However, GERs for districts affected by conflict recovered completely to match those of conflict-free districts as no significant difference was found between the enrolment rates for conflict-affected and conflict-free districts in the medium-run in 2015. This suggests that in the absence of any permanent substitution of girls into the labour market, once the conflict was over, girls returned to school at the primary level. On the other hand, at middle level, in the short-run, conflict resulted in GERs of districts to decline by 12.0 per cent in 2013 compared to districts that remained peaceful. But enrolment rates for girls at middle level did not recover fully as they did for girls at primary level, with GERs for districts affected by conflict in the medium-run in 2015 being lower by 7.3 per cent lower compared to districts that remained peaceful. This suggest that enrolment rates for girls recovered at primary level but not as middle level. This is probably due to the success of the ban on female education that was adopted for all girls above the age of 8. Since the

purpose of this ban was to primarily target girls of middle school and above, although the ban affected GERs of girls at primary and middle level in the short-run, it led to a permanent loss in human capital accumulation for girls at the medium-level only.

The paper is structured as follows: Section 2 provides a review of the relevant literature that exists on the impact of conflict on human capital accumulation. Section 3 describes the datasets used for this research and Section 4 discusses the main identification strategy applied for our estimations. Results and robustness checks are presented in Section 5 and Section 6 respectively, and Section 7 concludes the paper.

## 2 Literature review

Past literature has examined the short-run impacts of civil conflicts, as well as the persistent effects of conflict on human capital accumulation. While the short-term impact of conflict is clearly catastrophic, recent analysis provide mixed evidence on the effects of conflict on human capital accumulation. By exploiting variation in conflict location and birth cohorts, Leon (2012) identify the short term and long term effects of civil war in Peru on educational attainment. They find that exposure to violence during early childhood lead to permanent losses, with negative effects prevailing in the short run and the long run. However, conditional on being exposed to violence, individuals who experienced shock after starting school did accumulate less years of education but the effects are stronger in the short run than in the long run. These individuals fully caught up to their peers who were not exposed to violence. As a result, the short term effects show that the persistence of the shock depends on the moment in life when the child was exposed to violence. Similarly, Akbulut (2009) provides causal evidence on the long-run consequences of large-scale physical destruction on the educational attainment, health status and labour market outcomes of German children. The identification strategy exploits the plausibly exogenous city-by-cohort variation in the intensity of destruction as a unique quasi-experiment. Their findings suggest significant long-lasting detrimental effects on the human capital formation and labour market outcomes of Germans who were school-age during the conflict. These children led to fewer years of schooling on average, poorer health status and lower labour market earnings. The results suggest that although severely high regions rapidly

return to their pre-war patters in terms of local populations and macroeconomic outcomes, consequences of wars along human dimension are more substantial and persistent, underlining the importance of policies primarily targeting school-age children. Lastly, Justino et al. (2013) analysed the effects of conflict in Timor Leste on educational outcomes among boys and girls exposed to violence and found substantial loss of human capital in the long run for boys only. This may be a result of household trade-offs between education and economic welfare. The impact of conflict on girl's education, although negative in the short-run in terms of school attendance, did not hinder their school attainment in the long run since they were able to benefit from the rapid reconstruction of the education system in violence affected areas. However, the impact of the conflict on boys did not only prevail in the short run but persisted over generations as it lead to the permanent disenrollment of boys from schools in order to participate in economic activities such as child labour.

However, not all evidence points towards conflict leading to a permanent loss in human capital accumulation in the long-run. Chen et al. (2007) analyse the aftermath of civil war in a cross-section of countries. They focus on those experiences where the end of conflict marks the beginning of a relatively lasting peace. Their estimates consider 41 countries involved in internal wars in the period 1960-2003. In order to provide a comprehensive evaluation of the aftermath of war, their paper considers a host of social areas represented by basic indicators of economic performance, health and education, political development, demographic trends, and conflict and security issues. For each of these indicators, they first compare the post- and pre-war situations and then examines their dynamic trends during the post-conflict period. They conclude that, even though war has devastating effects and its aftermath can be immensely difficult, when the end of war marks the beginning of lasting peace, recovery and improvement are indeed achieved. Similarly, evidence from Nepal suggests that the effect of conflict on secondary education was short lived and did not persist (Silwal, 2014). Three to five years after the conflict ended, the difference in educational attainment in districts with high violence and districts with low violence was similar to their pre conflict levels. As such, the high violence districts did not seem to permanently lag behind. However, although the decline in secondary education attainment mostly rebounded, there was a widening gap in academic performance between the groups of districts that were differently affected by the conflict. In comparison to low-violence areas, girls from high-violence areas continued to drop out at higher

rates in post-conflict period, whereas boys from high-violence areas did not drop out at a higher rate than boys from a lower-violence area in the post-conflict period. As a result, although the patterns of post-conflict recovery suggested an overall convergence in educational attainment for areas that were adversely affected by conflict, the effects on academic performance seemed to continue.

Adding to the literature, this paper provides two key insights on the dynamics of the pace of recovery for the growth theory that suggests that after a shock human capital accumulation returns to steady state. First, the results suggest that the same nature of conflict has heterogeneous effects on the short-run and medium-run GERs of boys and girls, along with a differing pace of recovery. This suggests that although on aggregate level, GERs may recover, certain subgroups within the aggregate level may not recover within the same time period. Secondly, although the ban on schooling was implemented towards girls, it had an impact on the short-run and medium-run GERs for boys too. This suggests that although violence could be used as a tool to target a certain group, it may have catastrophic spill-over effects on other groups, leading to amplification of the negative impact. Hence, policies that might be focused intentionally towards targeting one group of individuals can lead to an unintentional impact on another group resulting in a much worse crisis than expected.

## 3 Data

We estimate the short-run and medium-run impact of conflict on primary and middle level GERs by merging district level datasets.

### 3.1 The GER datasets

Gross enrolment rate, GER, is defined as the number of individuals enrolled in a school level as a percentage of the number of children corresponding to the enrolment level age. GERs for year 2007, 2009, 2011, 2013 and 2015 are obtained from the publication of the Pakistan Social and Living Standards Measurement (PSLM).

PSLM provides indicators every alternate year on a district level. The sample size of the PSLM surveys on a district level is approximately 70,000 households. The survey consists of all urban (cities) and rural areas (villages) of the four provinces of Pakistan. Each city is divided into enumeration blocks consisting 200-250, with

each enumeration block classified into three categories of income groups i.e. low, middle and high. List of villages published in the Population Census 1998 have been taken as the rural framework. Table 1 below provides the number of enumeration blocks and villages as per sampling frame:

Table 24: Sampling Frame for Enumeration Blocks and Villages

| Province | Enumeration Blocks | Villages |
|---|---|---|
| Punjab | 14,549 | 25,857 |
| Sindh | 9,025 | 5,871 |
| Khyber Pakhtunkhwa (KP) | 1,913 | 7,337 |
| Balochistan | 613 | 6,557 |
| **Total** | **25,487** | **45,622** |

A two stage stratified sample design is adopted for the PSLM survey. Villages and enumeration blocks in rural and urban areas, respectively, are taken as Primary Sampling Units (PSUs). Sample PSUs are selected from the total strata with Probability Proportional to Size (PPS) method of sampling technique. Households within sample PSUs are then taken as Secondary Sampling Units (SSUs). A specified number of households i.e. 16 and 12 from each sample PSU of rural and urban areas is selected, using systematic sampling technique with a random start. The tables below show the trend in GERs for 2007, 2009, 2011, 2013 and 2015 at primary and middle level:

Table 25: Overall GERs for Primary Schools

| | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| **Number of Districts** | **101** | **110** | **114** | **114** | **114** |
| % of Districts with GER < 25% | 0 | 0 | 2 | 1 | 0 |
| % of Districts with GER Between 25%-50% | 5 | 3 | 4 | 3 | 4 |
| % of Districts with GER Between 50%-75% | 26 | 27 | 20 | 29 | 33 |
| % of Districts with GER Between 75%-100% | 40 | 44 | 41 | 38 | 39 |
| % of Districts with GER > 100% | 29 | 26 | 33 | 29 | 24 |

Table 26: GERs of Boys for Primary Schools

| | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| **Number of Districts** | **101** | **110** | **114** | **114** | **114** |
| % of Districts with GER < 25% | 0 | 0 | 0 | 0 | 0 |
| % of Districts with GER Between 25%-50% | 1 | 1 | 3 | 1 | 1 |
| % of Districts with GER Between 50%-75% | 9 | 9 | 6 | 10 | 10 |
| % of Districts with GER Between 75%-100% | 47 | 43 | 40 | 39 | 44 |
| % of Districts with GER > 100% | 43 | 47 | 51 | 50 | 46 |

Table 27: GERs of Girls for Primary Schools

| | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| **Number of Districts** | **101** | **110** | **114** | **114** | **114** |
| % of Districts with GER < 25% | 4 | 4 | 5 | 4 | 4 |
| % of Districts with GER Between 25%-50% | 15 | 15 | 17 | 15 | 18 |
| % of Districts with GER Between 50%-75% | 37 | 34 | 28 | 34 | 31 |
| % of Districts with GER Between 75%-100% | 24 | 25 | 30 | 26 | 30 |
| % of Districts with GER > 100% | 20 | 22 | 20 | 21 | 17 |

Table 28: Overall GERs for Middle Schools

| | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| **Number of Districts** | **101** | **110** | **114** | **114** | **114** |
| % of Districts with GER < 25% | 12 | 8 | 10 | 9 | 11 |
| % of Districts with GER Between 25%-50% | 51 | 45 | 46 | 44 | 40 |
| % of Districts with GER Between 50%-75% | 29 | 38 | 32 | 37 | 38 |
| % of Districts with GER Between 75%-100% | 8 | 6 | 12 | 9 | 9 |
| % of Districts with GER > 100% | 0 | 3 | 0 | 1 | 2 |

Table 29: GER of Boys for Middle Schools

| | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| **Number of Districts** | **101** | **110** | **114** | **114** | **114** |
| % of Districts with GER < 25% | 4 | 5 | 4 | 4 | 3 |
| % of Districts with GER Between 25%-50% | 40 | 25 | 31 | 29 | 38 |
| % of Districts with GER Between 50%-75% | 39 | 54 | 41 | 50 | 39 |
| % of Districts with GER Between 75%-100% | 14 | 15 | 23 | 16 | 17 |
| % of Districts with GER > 100% | 3 | 1 | 1 | 1 | 3 |

Table 30: GERs of Girls for Middle Schools

| | 2007 | 2009 | 2011 | 2013 | 2015 |
|---|---|---|---|---|---|
| **Number of Districts** | **101** | **110** | **114** | **114** | **114** |
| % of Districts with GER < 25% | 41 | 33 | 39 | 32 | 32 |
| % of Districts with GER Between 25%-50% | 35 | 42 | 34 | 39 | 37 |
| % of Districts with GER Between 50%-75% | 19 | 17 | 16 | 21 | 22 |
| % of Districts with GER Between 75%-100% | 5 | 6 | 12 | 8 | 8 |
| % of Districts with GER > 100% | 0 | 2 | 0 | 1 | 1 |

## 3.2 Dataset on civilian casualties

GERs obtained from PSLM are linked to the second set of data, on conflict, gathered and published by the South Asia Terrorism Portal (SATP). Data on Pakistan is collected by the SATP based on news resources and official government documents. The data acquired from this portal includes 'total civilian casualties due to terrorist activities in Pakistan' from 2005 till 2015. The individual major incidents of terrorism related violence are collated at a district-level to match GERs measured on a district-level. To match the timeline of enrolment, casualties are converted from annual timeline, January-December figures, to academic timeline, August-July figures. Therefore, casualties witnessed in a particular year represent civilians killed between August of the preceding year and July of the stated year. For example, casualties witnessed in 2009 represent civilians killed between August 2008 and July 2009. Figure 1 and Figure 2 below show the yearly number of civilian casualties and the yearly number of districts that witnessed with civilian casualties between 2005 and 2014:

Figure 11: Total Number of Casualties

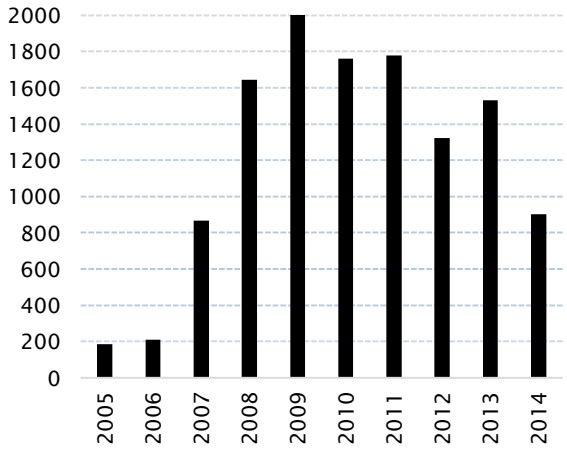
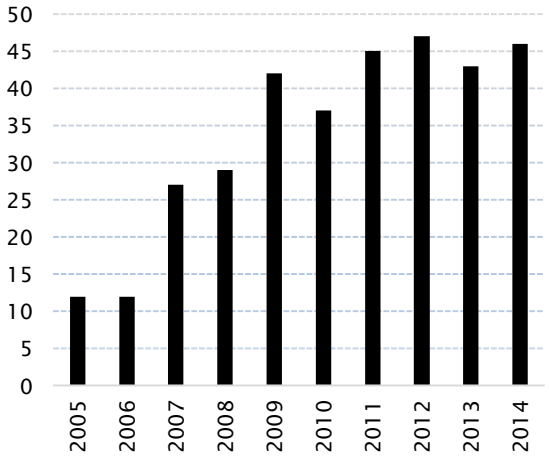



Figure 12: Districts with Casualties




## 4 Empirical methodology

We measure the persistent effects of conflict on human capital accumulation by estimating the short-run and medium-run impact of conflict on GERs by comparing districts that entered and exited conflict and then remained peaceful for subsequent years, 'conflict-affected districts', with districts that remained peaceful throughout the time period, 'conflict-free districts'. Thus, our conflict-affected group includes districts that did not experience violence prior to the onset of conflict in 2007, experienced violence in 2012 irrespective of experiencing violence

between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. Our control group includes districts that remained peaceful and did not experience conflict from 2006 till 2014. We measure the persistent effects of conflict by estimating the impact of conflict GERs in 2013, immediately after the end of conflict in 2012, short-run effect of conflict, and the effect on GERs in 2015, three years after the end of conflict, medium-run effect of conflict. Since the first phase of conflict ended by 2011 and GERs on district level are only reported biennially in Pakistan, the first set of available GERs after the end of the first phase of conflict are estimated in 2013, followed by estimates of GERs in 2015. Table 47 below sows the breakup of districts for our estimation:

Table 31: Districts in Treatment Group, Control Group and Omitted

| Category | Districts |
|---|---|
| Conflict-affected Districts | 8 |
| Conflict-free Districts | 37 |
| Omitted | 71 |
| **Total** | 116 |

Our identification strategy creates a limitation for the sample of the dataset. As shown in Table 31, 71 of the 116 districts in our estimation are omitted from the analysis, while only 8 districts re included in the treatment group. The large number of districts omitted from the sample size is specifically due to the definition of our treatment group which requires only those districts to be included in the treatment group that experienced conflict in 2012 (irrespective of experiencing conflict between 2007 till 2011 or not), and then remained peaceful afterwards. A lot of the districts omitted from the estimation are those which either did not exit conflict in 2012 (hence continued to remain in conflict), or those that did not experience conflict particularly in 2012. The specific requirement of district to satisfy both of these requirements in order to be part of the treatment group imposes a restrictive condition on the sample size, leading to a large proportion of the districts to be excluded from the identification strategy. However, the omission of these districts could likely lead to the issue of selection bias. This is because the omission of districts that did not fall into the treatment group could introduce a bias in such a way that randomization is not achieved, thereby ensuring that the sample obtained is not a representative of the total sample intended to be analysed. We conduct a paired sample t-test to find out if a selection bias is present, by estimating whether there is a significant difference in the values of the treatment

and control group (inclusive group), and the omitted group for all our variables. We find that the outcome enrolment period at the primary level has no significant difference in value for the omitted observations and inclusive observations. However, a significant difference does exist in the value at middle level, indicating that a selection bias may be likely present for middle level enrolment rates. This means that our estimates for the impact of conflict on enrolment rates at middle level may be overestimated. A gender-wise breakup suggests that the significant difference is present in the enrolment rates for boys but not for girls. Similarly, we find no evidence of a significant difference in values for the inclusive group and the omitted group for our other explanatory variables including population density and pre-conflict level enrolment rates.

Following are the graphs of the districts that belonged to the conflict-affected group and conflict-free group of districts:

Figure 13: Overall GERs at Primary Level

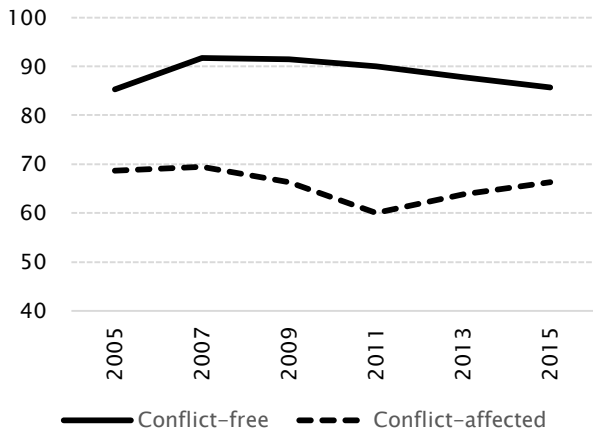



Figure 14: Overall GERs at Middle Level

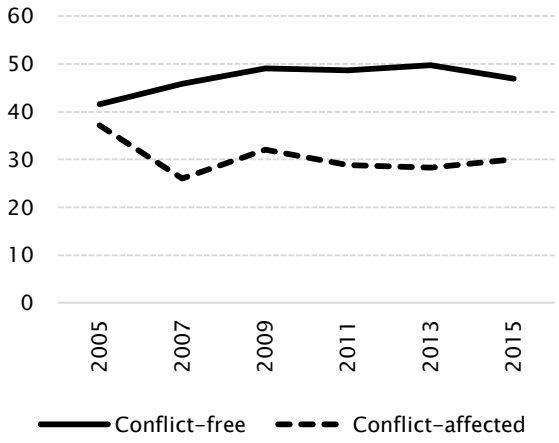



Figure 15: GERs of Boys at Primary Level

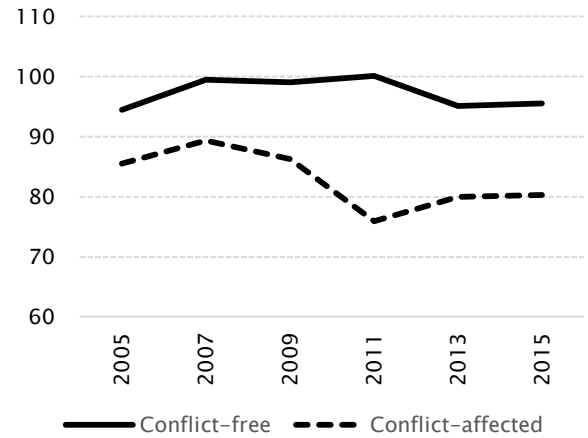



Figure 16: GERs of Boys at Middle Level

Figure 17: GERs of Girls at Primary Level

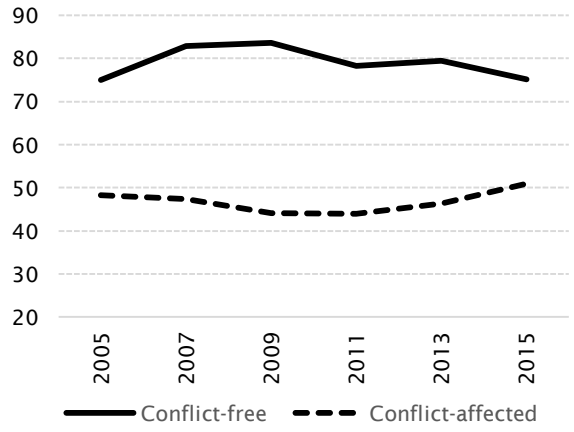
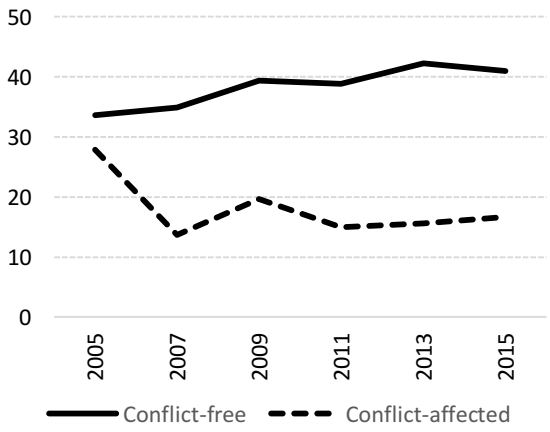



Figure 18: GERs of Girls at Middle Level




Using a pooled cross sectional data, we estimate the impact of conflict on GERs at primary and middle level. We estimate:

$$GER_{d,t} = \alpha + \beta_1 GER_{d,2007} + \beta_2 CONFLICT_d + \beta_3 MT2015_t + \beta_4 ( CONFLICT_d * MT2015_t ) + \beta_5 POPGROWTH_d + \varepsilon_{d,t}$$

where $GER_{d,t}$ is the outcome GER in district d at time t, where t represents year 2013 and 2015. $GER_{d,2007}$ controls for enrolment rates right before the start of conflict in 2007. $MT2015_t$ is a year dummy that equals 1 when year equals 2015, otherwise it equals 0 when year equals 2013. $CONFLICT_d$ is a dummy that equals 1 if a district belonged to the conflict-affected group, otherwise it equals 0 if the district belonged to conflict-free group. Districts in the conflict-affected group did not experience violence prior to the onset of conflict in 2007, experienced violence in 2012 irrespective of experiencing violence between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. Districts in the conflict-free group remained peaceful from 2006 till 2014. The coefficient of the term $CONFLICT_d$, $\beta_2$, estimates the short-run impact of conflict, whereas the summation of coefficient $\beta_2$ and the coefficient of the interaction term ( $CONFLICT_d * MT2015_t$ ), $\beta_4$, estimates the medium-run impact of conflict. $POPGROWTH_d$ is the population growth of district d while $\varepsilon_{d,t}$ is the error term.

For our estimation, although we measure the impact of conflict on enrolment rates at a district level, we also cluster standard errors at the district level. This is because clustering at a district level would account for any within-district

correlations in the incidence of experiencing conflict, and deal with any bias in standard errors arising from such correlations. Since conflict witnessed in each district in Pakistan from 2007 onwards is thought of to be dependent on the geographical proximity of each district to the militant headquarters, it is probable that districts that witnessed conflict in one year are more prone to continue witnessing conflict in the following years. This would lead to within-district correlation in the probability of witnessing conflict which could bias the standard errors and be accounted for by clustering at a district level. Our robustness checks without clustering standard errors suggests no change in the significance of our estimates.

Due to the change in the nature of conflict between 2007 and 2014, our identification strategy suffers from a limitation. Since the militants' base of operation and training camps were situated in Wana, conflict witnessed in Pakistan between 2007 till 2011 was viewed as being controlled by militants in Wana. However, after the tribal areas were cleared of all militancy by 2011, bringing an end to the first phase of conflict, violence was no longer dependent on the geographical proximity of each district to Wana. As a result, the nature of conflict, and the pattern of violence changed in the middle of our estimated time period, from the onset of conflict in 2007 till the observations of the first set of GERs in 2013. Conflict from 2007 till 2011 was dependent on the geographical proximity of each district from Wana whereas after 2011 that was not the case. While we may consider the travelling distance between each distance to Wana as a plausible instrument to measure the occurrence of conflict between 2007 till 2011, and a separate instrument to measure the occurrence of conflict after 2011, they are different variables. Our identification would require an instrument that would simultaneously account for conflict between 2007 till 2011 and later peace, and one for peace between 2007 till 2011 and later conflict. We would need this instrument to also account for the continuing occurrence of conflict throughout this time period. This raises difficulty in creating an instrument that would account for the complex treatment of our identification strategy. However, we provide an alternate identification strategy using an instrument for the probability of a district exiting conflict being dependent on the location of that district to the two separate militant headquarters, and the effect of conflict on enrolment rates, in section 8. Using distance as an IV to account for the changing nature of conflict we measure the immediate impact of exiting first phase of conflict. Moreover, we also compare the impact of exiting the first phase of conflict with the impact of witnessing

violence in both phases of conflict. Lastly, we also estimate effects of exiting first phase of conflict on enrolment rates after a few years of exiting conflict to measure the medium-term impact of exiting first phase of conflict.

## 5 Results

We provide results for the short-run and medium-run impact of conflict on GERs by estimating the GERs in 2013, immediately after districts in the conflict-affected group exit conflict in 2012, and estimating GERs in 2015, three years after districts in the conflict-affected group exited conflict. The results are presented below:

Table 32: Short-Run and Medium-Run Impact of Conflict on Overall GERs in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -1.43 | -0.50 | -1.26 | -0.93 |
| | (0.95) | (0.95) | (1.28) | (0.88) |
| **CONFLICT** | **-23.53*** ** | **-12.12*** ** | **-21.36*** ** | **-13.79*** ** |
| | **(5.40)** | **(3.58)** | **(4.75)** | **(3.61)** |
| **CONFLICT*** | **3.82** | **8.65*** ** | **3.18** | **4.96** ** |
| **MT** | **(3.88)** | **(2.75)** | **(3.08)** | **(2.06)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 7.51 | 51.88 | 8.42 | 29.67 |
| R-Squared | 0.11 | 0.70 | 0.14 | 0.62 |
| Observations | 176 | 138 | 175 | 138 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from column (2) and (4) from Table 32 above suggest that conflict had a negative short-run impact on overall GERs at primary and middle level for outcome enrolment period 2013. The results are significant at 1% level for both primary and middle schools respectively. At primary level, districts that entered conflict and exited in 2012 witnessed a decline in overall GERs in 2013 by 12.1 per cent compared to districts that did not experience conflict. At middle level, districts that entered conflict and exited in 2012 witnessed a decline in overall GERs in 2013 by13.8 per cent compared to districts that remained peaceful. The results suggest

that conflict negatively impacted overall GERs in the short-run. However, conflict also had a negative impact on overall GERs in the medium-run too. Adding the coefficients of conflict and the interaction term, we find that conflict continued to negatively impact GERs in 2015, even after three years conflict was over. At primary level, districts that experienced conflict witnessed a decline in overall GERs in the medium-run in 2015 by 3.5 compared to districts that remained peaceful, whereas at middle level districts that experienced conflict witnessed a decline in overall GERs in the medium-run in 2015 by 8.3 per cent compared to districts that remained peaceful. This suggests that along with the impact of conflict being heterogeneous on different levels of schooling, the rate of recovery of GERs at different levels of schooling also varied, with GERs of middle schools suffering more compared to primary schools even three years after end of conflict.

The results provided above are estimated when standard errors are clustered on a district level. Table 36 of robustness checks 6.1 provides results for estimates when standard errors are not clustered but calculated as robust. It suggests similar results to our main specification that conflict had a significant negative short-run impact on overall GERs at primary and middle level for outcome enrolment period 2013, with the results still being significant at 1% level for both primary and middle schools respectively. However, since the interaction term loses its significant, there is weak evidence of conflict impacting overall GERs in the medium-run.

Similarly, we also provide robustness checks in 6.2 allowing for a change in definition of our conflict-affected group, in order to increase the number of districts applicable to the category. We do not change the definition of conflict itself from 'civilian casualties' to 'attacks on education' as that would result in no district being included in the conflict-affected group. This is because there was no district that did not witness an attack on education prior to the onset of conflict in 2007, experienced attack on education in 2012 irrespective of experiencing violence between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. Hence, changing the definition of conflict from 'civilian casualties' to 'attacks on education' would make the conflict-affected group void of any observations. Thus, keeping the definition of conflict as same as indicating total civilian casualties, earlier we defined conflict-affected group to include districts that did not experience violence prior to the onset of conflict in 2007, experienced violence in 2012 irrespective of experiencing violence between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. This allowed for only

8 districts to be included in the group. Now we define conflict-affected group to include districts that did not experience violence prior to the onset of conflict in 2007, experienced violence in either 2011 or 2012 irrespective of experiencing violence between 2007 and 2010, exited conflict in 2012, and then remained peaceful till 2014. Although this leads to an increase in the number of districts applicable to 19, the model loses its explanatory power as it allows those districts to be included in the treatment that might have exited conflict in 2011, thus remaining peaceful during year 2012 allowing for recovery of GERs before they are estimated in 2013. Hence, the short-term impact on GERs in 2013 may be underestimated, therefore leading to a biased medium-term impact too. Results from Table 39 in section 6.2 of robustness checks suggests that conflict had a negative short-run and medium-run impact on overall GERs at primary and middle level for outcome enrolment period 2013, but the impact is much smaller in magnitude compared to our main specification, as expected, and the results are not significant. Since conflict in Pakistan included the use of violence as a tool to ban female schooling, we try to analyse the gender-wise impact of conflict, and the ban adopted along with it, on GERs of boys and girls separately. The gender-specific results for short- and medium-run impact of conflict on GERs of boys below:

Table 33: Short-Run and Medium-Run Impact of Conflict on GERs of Boys in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -0.07 | 0.46 | -2.47* | -1.25 |
| | (1.10) | (1.27) | (1.29) | (1.28) |
| **CONFLICT** | **-15.58*** ** | **-13.09*** ** | **-16.88*** ** | **-11.72*** ** |
| | **(5.11)** | **(4.36)** | **(4.89)** | **(3.51)** |
| **CONFLICT*** | **0.36** | **3.24*** | **5.09** | **6.22*** ** |
| **MT** | **(3.31)** | **(1.71)** | **(4.12)** | **(2.30)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 3.60 | 11.29 | 6.42 | 22.76 |
| R-Squared | 0.13 | 0.50 | 0.13 | 0.60 |
| Observations | 88 | 69 | 88 | 69 |

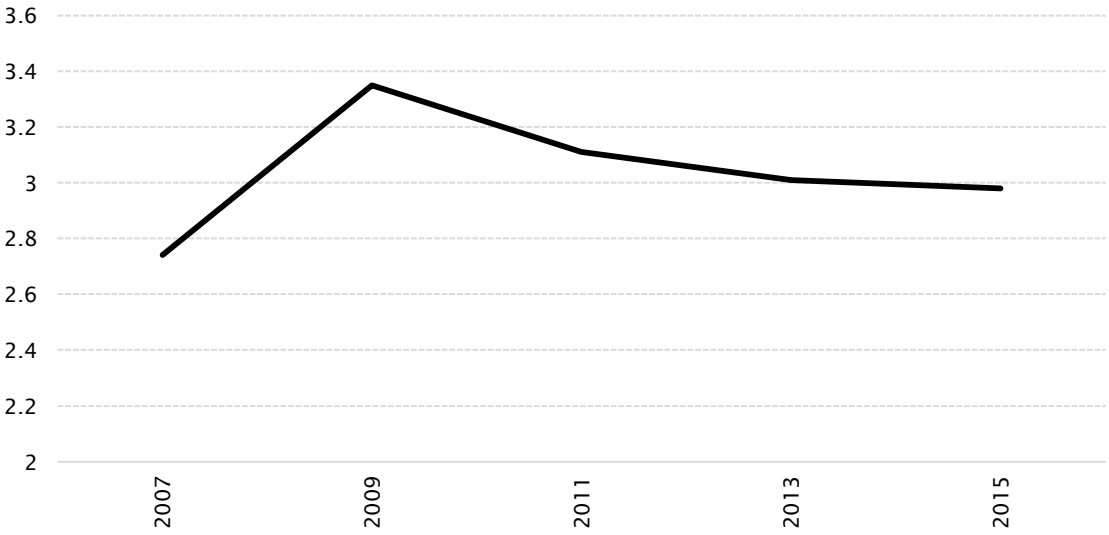
Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from column (2) and (4) from Table 33 above suggest that conflict had a negative short-run impact on GERs of boys at primary and middle level for outcome enrolment period 2013. The results are significant at 1% level for both primary and middle schools respectively. At primary level, GERS of boys belonging to districts that entered conflict and exited in 2012 witnessed a decline by 13.1 per cent compared to districts that did not experience conflict. At middle level, GERs of boys belonging to districts that entered conflict and exited in 2012 witnessed a decline by11.7 per cent compared to districts that remained peaceful. The results suggest that conflict negatively impacted GERs of boys in the short-run. However, conflict also had a negative impact on GERs of boys in the medium-run too. Adding the coefficients of conflict and the interaction term, we find that conflict continued to negatively impact GERs of boys in 2015, even after three years conflict was over. At primary level, districts that experienced conflict witnessed a decline in GERs of boys in the medium-run in 2015 by 9.9 compared to districts that remained peaceful, whereas at middle level districts that experienced conflict witnessed a decline in GERs of boys in the medium-run in 2015 by 5.5 per cent compared to districts that remained peaceful. This suggests that conflict not only had a negative impact on GERs of boys in the short-run, but also affected enrolment rates for boys even after conflict was over.

A common explanation provided for the persistent effect of conflict on boys is the household trade-off between education and economic survival during conflict period that leads to the removal of boys from schools permanently (Justino, 2013). Boys generally tend to benefit less from post-conflict recovery as they substitute into the labour market due to loss in household income in period of conflict, and hence find it more difficult to return to school even after conflict is over. Although we do not have district-level data on labour market indicators to provide estimates for this explanation, we do have yearly data on national level to examine the trend of labour force participation of boys from age 10 till 14 during and after the conflict period. The graph for labour force participation of boys is presented below:

Figure 19: Labour Force Participation of Boys Aged 10-14 in Pakistan from 2007 till 2015




The graph above provides evidence supporting the explanation that conflict does not only result in substitution of boys into the labour market due to falling household income, but also that such a substitution is permanent even after conflict is over. Labour force participation for boys in Pakistan increased significantly after the start of the conflict in 2007 and although it declined after 2011, it remained above pre-conflict level. This suggests that although some boys possibly returned to the schools after leaving the labour market after the end of the conflict, the recovery was not at pre-conflict levels, with boys continuing to stay permanently in the labour market.

Although there is no employment related data available on a district-level in Pakistan, we provide a rough estimate for the correlation between gross enrolment rates and labour force participation using provincial data. Data on provincial level is available for all four provinces of Pakistan between the years 2007 till 2015. The table below provides results for the correlation between GERs at middle and secondary level on labour force participation of boys and girls aged 10 till 14:

Table 34: Correlation between Enrolment Rates and Labour Force Participation

| | BOYS NO CONTROLS | BOYS CONTROLS | GIRLS NO CONTROLS | GIRLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (1) | (2) |
| **GER** | **-0.07**** | **-0.05**** | **-0.01** | **-0.03** |
| | **(0.01)** | **(0.01)** | **(0.02)** | **(0.05)** |
| YEAR F.E. | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | PROVINCE | PROVINCE | PROVINCE | PROVINCE |
| R-Squared | 0.45 | 0.82 | 0.06 | 0.40 |
| Observations | 20 | 20 | 20 | 20 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results above suggest a significant negative correlation between gross enrolment rates for boys and their labour force participation, but not for girls. This provides evidence for our hypothesis that boys who tend to leave school usually substitute into the labour market due to a trade-off between education and household income. This makes it harder for boys to return to school once conflict is over leading to permanent loss in human capital accumulation. However, for girls, since there exists no correlation between education and labour market participation, girls find it easier to return to school once conflict is over. Our results suggest, that at middle level, each additional per cent increase in gross enrolment rate for boys resulted in the labour force participation declining by 0.05 per cent. The results are significant at the 5 per cent level.

The results provided for our main estimation in Table 33 are estimated when standard errors are clustered on a district level. Table 37 of robustness checks 6.1 provides results for estimates when standard errors are not clustered but calculated as robust. It suggests similar results to our main specification that conflict had a significant negative short-run impact on GERs of boys at primary and middle level for outcome enrolment period 2013, with the results still being significant at 1% level for both primary and middle schools respectively. However, since the interaction term loses its significant, there is weak evidence of conflict impacting GERs of boys in the medium-run. Similarly, we also provide robustness checks in 6.2 allowing for a change in definition of our conflict-affected group, in order to increase the number of districts applicable to the category. Results from Table 40

in section 6.2 of robustness checks suggests that conflict had a negative short-run and medium-run impact on GERs of boys at primary and middle level for outcome enrolment period 2013, but the impact is much smaller in magnitude compared to our main specification. We now provide gender-specific results for the short-run and medium-run impact of conflict on GERs of girls below:

Table 35: Short-Run and Medium-Run Impact of Conflict on GERs of Girls in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -2.81** | -1.46 | -0.22 | -0.61 |
| | (1.41) | (1.07) | (1.65) | (1.25) |
| **CONFLICT** | **-31.49*** ** | **-11.09** ** | **-25.86*** ** | **-11.94** ** |
| | **(7.44)** | **(4.61)** | **(5.30)** | **(4.94)** |
| **CONFLICT*** | **7.29** | **13.06*** ** | **1.44** | **4.68*** |
| **MT** | **(5.09)** | **(4.80)** | **(3.10)** | **(2.62)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 8.54 | 46.46 | 8.14 | 16.93 |
| R-Squared | 0.16 | 0.72 | 0.20 | 0.68 |
| Observations | 88 | 69 | 87 | 69 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results from column (2) and (4) from Table 35 above also suggest that conflict had a negative short-run impact on GERs of girls at primary and middle level for outcome enrolment period 2013. The results are significant at 5% level for both primary and middle schools respectively. At primary level, GERS of girls belonging to districts that entered conflict and exited in 2012 witnessed a decline by 11.1 per cent compared to districts that did not experience conflict. At middle level, GERs of girls belonging to districts that entered conflict and exited in 2012 witnessed a decline by 11.9 per cent compared to districts that remained peaceful. The results suggest that conflict negatively impacted GERs of girls in the short-run. However, once the conflict was over, it only had a negative impact on overall GERs in the medium-run at the middle level. This is probably due to the success of the ban on female education that was adopted for all girls above the age of 8. Since the

purpose of this ban was to target girls of middle school and above, although the ban affected GERs of girls at primary and middle level in the short-run, it led to a permanent loss in human capital accumulation for girls at the medium-level only. Girls at primary level who had substituted out of schools due to conflict returned once conflict was over. Adding the coefficients of conflict and the interaction term, we find that conflict continued to negatively impact GERs of girls in 2015 at middle level only, even after three years' conflict was over. At primary level, GERs of girls in 2015 belonging to districts that experienced conflict rebounded to match those of districts that remained peaceful, whereas at middle level districts that experienced conflict witnessed a decline in GERs of girls in the medium-run in 2015 by 7.3 per cent compared to districts that remained peaceful. This suggests that conflict although conflict had a negative impact on GERs of boys in the short-run at primary and middle level, the effects were only persistent in the medium-run on GERs of girls at middle level.

The results provided above are estimated when standard errors are clustered on a district level. Table 38 of robustness checks 6.1 provides results for estimates when standard errors are not clustered but calculated as robust. It suggests similar results to our main specification that conflict had a significant negative short-run impact on GERs of girls at primary and middle level for outcome enrolment period 2013, with the results still being significant at 1% level for both primary and middle schools respectively. However, since the interaction term loses its significant, there is weak evidence of conflict impacting GERs of girls in the medium-run. Similarly, we also provide robustness checks in 6.2 allowing for a change in definition of our conflict-affected group, in order to increase the number of districts applicable to the category. Results from Table 41 in section 6.2 of robustness checks suggests that conflict had a negative short-run and medium-run impact on GERs of girls at primary and middle level for outcome enrolment period 2013, but the impact is much smaller in magnitude compared to our main specification, as expected, and the results are not significant.

## Differential impact on boys and girls

In summary, our results indicate that conflict had a negative short-run and medium-run impact on overall GERs at primary and middle level. A gender-wise breakup of results suggests that conflict impacted GERs of boys at both primary and middle level in the short run and in the medium-run. GERs of boys suffered in the medium-run due to their substitution into the labour market, and hence finding it harder to

return to school once conflict was over. On the other hand, although GERs of girls were negatively impacted by conflict in the short run at both primary and middle level, GERs rebounded at the primary level once conflict was over. A common explanation provided for the persistent effect of conflict on boys is the household trade-off between education and economic survival during conflict period that leads to the removal of boys from schools permanently. Boys generally tend to benefit less from post-conflict recovery as they substitute into the labour market due to loss in household income in period of conflict, and hence find it more difficult to return to school even after conflict is over. This is because girls do not tend to substitute permanently into the labour market, as a result of falling household incomes, and therefore return to schools once conflict is over. However, in Pakistan, at middle level, GERs of girls also continued to suffer in the medium-run too, possibly owing to the permanent loss in human capital accumulation due to the ban on female schooling during the time of conflict by militants.

## 6 Robustness check

### 6.1 Using non-clustered standard errors

For our main estimation, although we measure the impact of conflict on enrolment rates at a district level, we also cluster standard errors at the district level. This is because clustering at a district level would account for any within-district correlations in the incidence of experiencing conflict, and deal with any bias in standard errors arising from such correlations. Since conflict witnessed in each district in Pakistan from 2007 onwards is thought of to be dependent on the geographical proximity of each district to the militant headquarters, it is probable that districts that witnessed conflict in one year are more prone to continue witnessing conflict in the following years. This would lead to within-district correlation in the probability of witnessing conflict which could bias the standard errors and be accounted for by clustering at a district level. For our robustness check we use robust standard errors instead of clustering standard errors for each of our specifications, assuming there is no within-district correlation in the incidence of experiencing conflict. Results for overall specification are presented below:

Table 36: Short-Run and Medium-Run Impact of Conflict on Overall GERs in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -1.43 | -0.50 | -1.26 | -0.93 |
| | (3.91) | (2.62) | (3.20) | (2.62) |
| **CONFLICT** | **-23.53*** ** | **-12.12*** ** | **-21.36*** ** | **-13.79*** ** |
| | **(6.23)** | **(3.00)** | **(4.65)** | **(2.98)** |
| **CONFLICT*** | **3.82** | **8.65*** | **3.18** | **4.96** |
| **MT** | **(8.69)** | **(4.44)** | **(6.67)** | **(4.20)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| F-test | 8.34 | 87.72 | 11.87 | 60.26 |
| R-Squared | 0.11 | 0.70 | 0.14 | 0.62 |
| Observations | 176 | 138 | 175 | 138 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of boys is presented below:

Table 37: Short-Run and Medium-Run Impact of Conflict on GERs of Boys in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -0.07 | 0.46 | -2.47 | -1.25 |
| | (3.69) | (3.21) | (3.67) | (3.11) |
| **CONFLICT** | **-15.58*** ** | **-13.09*** ** | **-16.88*** ** | **-11.72*** ** |
| | **(5.08)** | **(3.95)** | **(4.86)** | **(3.17)** |
| **CONFLICT*** | **0.36** | **3.24** | **5.09** | **6.22** |
| **MT** | **(7.01)** | **(4.71)** | **(6.44)** | **(4.17)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| F-test | 6.46 | 20.50 | 7.06 | 37.26 |
| R-Squared | 0.13 | 0.50 | 0.13 | 0.60 |
| Observations | 88 | 69 | 88 | 69 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of girls is presented below:

Table 38: Short-Run and Medium-Run Impact of Conflict on GERs of Girls in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -2.81** | -1.46 | -0.22 | -0.61 |
| | (6.19) | (3.98) | (4.90) | (3.73) |
| **CONFLICT** | **-31.49*** ** | **-11.09** ** | **-25.86*** ** | **-11.94** ** |
| | **(7.40)** | **(4.29)** | **(5.27)** | **(4.66)** |
| **CONFLICT*** | **7.29** | **13.06*** | **1.44** | **4.68** |
| **MT** | **(10.53)** | **(7.34)** | **(7.60)** | **(6.13)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| F-test | 9.53 | 70.76 | 14.71 | 32.09 |
| R-Squared | 0.16 | 0.72 | 0.20 | 0.68 |
| Observations | 88 | 69 | 87 | 69 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## 6.2 Changing the definition of the conflict-affected group

We also provide robustness checks by allowing for a change in definition of our conflict-affected group, in order to increase the number of districts applicable to the category. We do not change the definition of conflict itself from 'civilian casualties' to 'attacks on education' as that would result in no district being included in the conflict-affected group. This is because there was no district that had attacks on education in such a way that it fit our treatment group i.e. did not witness an attack on education prior to the onset of conflict in 2007, experienced attack on education in 2012 irrespective of experiencing violence between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. Thus, we keep the definition of conflict as same as indicating 'total civilian casualties', however we relax the definition of the treatment group to include districts that did not experience violence prior to the onset of conflict in 2007, experienced violence in either 2011 or 2012 irrespective of experiencing violence between 2007 and 2010, exited conflict in 2012, and then remained peaceful till 2014. Although this leads to an increase in the number of districts applicable to 19, the model loses its

explanatory power as it allows those districts to be included in the treatment that might have exited conflict in 2011, thus remaining peaceful during year 2012 allowing for recovery of GERs before they are estimated in 2013. Hence, the short-term impact on GERs in 2013 may be underestimated, therefore leading to a biased medium-term impact too. Results for overall specification are presented below:

Table 39: Short-Run and Medium-Run Impact of Conflict on Overall GERs in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -1.44 | -0.50 | -1.26 | -0.93 |
| | (0.95) | (0.94) | (1.27) | (0.88) |
| **CONFLICT** | **-7.91** | **-4.05** | **-5.41** | **-1.61** |
| | **(5.28)** | **(3.30)** | **(5.75)** | **(3.78)** |
| **CONFLICT*** | **1.23** | **2.59** | **1.48** | **1.22** |
| **MT** | **(2.14)** | **(2.22)** | **(1.75)** | **(1.78)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 1.59 | 46.49 | 0.61 | 25.34 |
| R-Squared | 0.02 | 0.79 | 0.01 | 0.61 |
| Observations | 220 | 178 | 219 | 178 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of boys is presented below:

Table 40: Short-Run and Medium-Run Impact of Conflict on GERs of Boys in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -0.07 | 0.46 | -2.47* | -1.25 |
| | (1.09) | (1.26) | (1.28) | (1.26) |
| **CONFLICT** | **-2.69** | **-4.64** | **-0.93** | **-2.89** |
| | **(4.39)** | **(4.19)** | **(5.57)** | **(4.73)** |
| **CONFLICT*** | **0.73** | **2.15** | **2.21** | **1.41** |
| **MT** | **(2.59)** | **(2.54)** | **(2.30)** | **(2.53)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 0.13 | 8.45 | 1.26 | 9.21 |
| R-Squared | 0.01 | 0.40 | 0.01 | 0.52 |
| Observations | 110 | 89 | 110 | 89 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for GERs of girls is presented below:

Table 41: Short-Run and Medium-Run Impact of Conflict on GERs of Girls in 2013 and 2015

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| MT | -2.81** | -1.46 | -0.22 | -0.61 |
| | (1.13) | (1.05) | (1.64) | (1.23) |
| **CONFLICT** | **-13.12*** | **-2.02** | **-9.89** | **-5.55** |
| | **(7.00)** | **(3.37)** | **(6.55)** | **(3.82)** |
| **CONFLICT*** | **1.74** | **2.71** | **0.92** | **1.28** |
| **MT** | **(2.75)** | **(3.11)** | **(1.97)** | **(1.86)** |
| ENROL2007 | | YES | | YES |
| POP. GROWTH | | YES | | YES |
| Cluster | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| F-test | 3.59 | 41.52 | 0.96 | 19.14 |
| R-Squared | 0.05 | 0.72 | 0.04 | 0.71 |
| Observations | 110 | 89 | 109 | 69 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## 7 Conclusion

Civil conflicts have been widespread throughout the world in the past few decades, and economists have been trying to analyse the consequences of these conflicts, with particular attention to their effects on human capital accumulation. Empirical literature dealing with the effects of conflict at the *macro-level* shows robust evidence that educational outcomes of countries exposed to violence are able to catch up after a certain period of time, recovering to their pre-conflict levels in most development indicators. Economic growth theory suggests that, after a shock, the economy returns to its steady state level, as does human capital, but these models offer very little insight on the pace of recovery. Empirical cross-country and cross-regional studies suggest that countries see a steep decline on a variety of welfare indicators as a consequence of war, but they also show that there is significant recovery in most of these dimensions, but that this process varies in its duration.

However, estimates on *micro-level* effects of violent conflict on educational outcomes show that conflict not only results in short run reduction of educational access and attainment, but also has a negative impact on individual's decades after the conflict is over. This is because shocks to educational access during childhood can lead to significant and long-lasting detrimental effects on individual human capital accumulation. Although the growth models predict that the temporary destruction of capital due to conflict can be overcome in the long run by higher investments in affected areas, the long-term destructive effects of violent conflict may remain entrenched in certain regions and among some population groups even if economic growth converges at the aggregate level. Hence, negative impact of conflict on educational outcomes and labour market participation, of individuals and households may be observed decades after the conflict.

This paper provides analysis on a *macro*-level, by estimating the impact of conflict on human capital accumulation, specifically gross enrolment rates (GERs), on an aggregate district-level. We investigate how enrolment rates in Pakistan recovered after the end of conflict, by estimating the short run and medium run impact. Although the existing literature points towards evidence that indicators on an aggregate level eventually recover to their pre-conflict levels after conflict is over, the duration of recovery for differing subgroups can vary. The disproportional representation of males in the labour market in Pakistan along with the unique policy of banning female education provides for interesting reasons to study the

pace of recovery of enrolment rates after the conflict was over. Since the first phase of conflict ended by end 2011 and GERs on district level are only reported biennially in Pakistan, resulting in the first set of available GERs after the end of the first phase of conflict being in 2013, we study the impact of conflict witnessed between 2007 and 2012 on district level GERs in 2013 and 2015. By using a pooled cross-sectional data on district level GERs, we estimate the short-term impact of conflict on district level GERs in 2013, and then estimate how district-level GERs recovered in the medium-term in 2015. By measuring the short-term and medium-term impact of conflict on GERs for boys and girls separately, we analyse how the recovery rate of GERs differed for boys and girls and whether the impact was persistent for either gender. Hence our research question is 'How did enrolment rates recover after the end of the conflict?'

In order to estimate how GERs recovered after the end of conflict, we compare districts that entered and exited conflict by 2012 and then remained peaceful for subsequent years (conflict-affected districts) with districts that remained peaceful throughout the time period (conflict-free districts). Thus, our conflict-affected group includes districts that did not experience violence prior to the onset of conflict in 2007, experienced violence in 2012 irrespective of experiencing violence between 2007 and 2011, exited conflict in 2012, and then remained peaceful till 2014. Our control group includes districts that remained peaceful and did not experience violence from 2006 till 2014. We find that conflict had a negative short-run impact on overall GERs at primary and middle level for outcome enrolment period 2013. The results are significant at 1% level for both primary and middle schools respectively. At primary level, in the short-run, conflict resulted in GERs of districts to decline by 12.1 per cent in 2013 compared to districts that did not experience conflict. However, GERs for districts affected by conflict recovered in the medium-run by 2015, and were 3.5 per cent lower compared to districts that remained peaceful. On the other hand, at middle level, in the short-run, conflict resulted in GERs of districts to decline by 13.8 per cent in 2013 compared to districts that remained peaceful. But enrolment rates did not recover as quickly at middle level as at primary level, with GERs for districts affected by conflict in the medium-run in 2015 being lower by 8.3 per cent lower compared to districts that remained peaceful. This suggests that along with the impact of conflict being heterogeneous on different levels of schooling in the short-run, the rate of recovery

of GERs at different levels of schooling also varied, with GERs of middle schools taking longer to recover after end of conflict.

A gender-wise breakup of results suggest that conflict not only had a heterogeneous negative impact on GERs of boys at primary and middle level in the short-run, but the pace of recovery of enrolment rates at primary and middle level also differed. The results are significant at 1% level for both primary and middle schools respectively. At primary level, in the short-run, conflict resulted in GERs of districts to decline by 13.1 per cent in 2013 compared to districts that did not experience conflict. However, GERs for districts affected by conflict recovered only slightly in the medium-run by 2015, and were 9.9 per cent lower compared to districts that remained peaceful. On the other hand, at middle level, in the short-run, conflict resulted in GERs of districts to decline by 11.7 per cent in 2013 compared to districts that remained peaceful. But enrolment rates did recover faster at middle level compared to primary level, with GERs for districts affected by conflict in the medium-run in 2015 being lower by 5.5 per cent lower compared to districts that remained peaceful. This suggests that conflict not only had a negative impact on GERs of boys in the short-run, but also affected enrolment rates for boys even after conflict was over. A common explanation provided for the persistent effect of conflict on GERs of boys, and the non-recovery of enrolment rates to match those of conflict-free districts is the household trade-off between education and economic survival during conflict period that leads to the removal of boys from schools permanently (Justino, 2013). Boys generally tend to benefit less from post-conflict recovery as they substitute into the labour market due to loss in household income in period of conflict, and hence find it more difficult to return to school even after conflict is over. This therefore slows down the pace of recovery of enrolment rates of boys, resulting in the impact of conflict being relatively persistent.

For girls, although conflict had a negative short-run impact on GERs at primary and middle level for outcome enrolment period 2013, enrolment rates recovered in the medium-run to match those of districts that remained peaceful. At primary level, in the short-run, conflict resulted in GERs of districts to decline by 11.1 per cent in 2013 compared to districts that did not experience conflict. However, GERs for districts affected by conflict recovered completely to match those of conflict-free districts as no significant difference was found between the enrolment rates for conflict-affected and conflict-free districts in the medium-run in 2015. This

suggests that in the absence of any permanent substitution of girls into the labour market, once the conflict was over, girls returned to school at the primary level. On the other hand, at middle level, in the short-run, conflict resulted in GERs of districts to decline by 12.0 per cent in 2013 compared to districts that remained peaceful. But enrolment rates for girls at middle level did not recover fully as they did for girls at primary level, with GERs for districts affected by conflict in the medium-run in 2015 being lower by 7.3 per cent lower compared to districts that remained peaceful. This suggest that enrolment rates for girls recovered at primary level but not as middle level. This is probably due to the success of the ban on female education that was adopted for all girls above the age of 8. Since the purpose of this ban was to primarily target girls of middle school and above, although the ban affected GERs of girls at primary and middle level in the short-run, it led to a permanent loss in human capital accumulation for girls at the medium-level only.

## 8 Alternative estimation strategy: IV approach

We measure the impact of conflict on enrolment rates, and their recovery rate, by comparing districts that experienced violence, 'conflict-affected groups', with districts that remained peaceful, 'conflict-free groups'. However, due to the changing nature of conflict, our definition for the conflict-affected group varies and hence poses an identification challenge for our estimation. Conflict witnessed in Pakistan between 2007 till 2011 originated from militants' headquarters in Wana and therefore any violence witnessed in a district during this time period of conflict was predicted to be dependent on the distance of each district from Wana. Hence, the first phase of conflict, from 2007 till 2011 is seen to be dependent on the geographical proximity of the district from Wana. Conflict witnessed in Pakistan after 2011 originated from the militants' headquarters in Quetta and therefore any violence witnessed in a district during this time period was predicted to be dependent on the distance of each district from Quetta. Hence, the second phase of conflict, from 2011 onwards is seen to be dependent on the geographical proximity of the district from Quetta. For our estimation, our control group, conflict-free group, includes districts that remained peaceful and did not experience conflict from 2006 till 2014. However, on the other hand, the varying nature of conflict means that our conflict-affected group could include districts that experienced conflict (i) in both the first phase and the second phase of conflict, (ii) in the first phase but not the second phase of conflict, (iii) in the first phase of conflict only, (iv) in the second phase of conflict only or (v) not in the first phase but only in the second phase of conflict. Since conflict in each phase was uniquely dependent on the distance of each district to the militant headquarters in each phase, we are interested in finding the number of districts that were affected by conflict in each phase. Table 42 below shows the breakup of districts affected by each phase of conflict:

Table 42: Districts in Treatment Group, Control Group and Omitted for Each Phase

| Category | 1st Phase Total | 2nd Phase Total | Both 1st & 2nd Phase | Only 1st Not 2nd Phase | Only 2nd Not 1st Phase |
|---|---|---|---|---|---|
| Conflict-affected Districts | 61 | 59 | 42 | 19 | 17 |
| Conflict-free Districts | 55 | 47 | 43 | 38 | 38 |

The variation in the total number of districts falling under each category of the nature of conflict in Table 1 above suggests that there were districts that were affected by both the phases of conflict, and at the same time there were districts that were only affected by each phase of conflict. Hence, for our estimation strategy, although we instrument for the probability of a district witnessing conflict in each district to be dependent on the travelling distance of each district to the militant headquarters in each phase, we use the different grouping of districts, based on exposure to conflict as shown in Table 1, to measure the effect of each phase of conflict, along with the impact of entering and exiting conflict in different phases. By comparing enrolment rates in 2013 and 2015, we also compare the immediate impact against the medium term impact of conflict for each stage of conflict. We estimate:

First Stage: $$FP_d = \alpha + \beta 1\ WANA_d + \beta 2\ POPDENSE_d + \varepsilon_{d,t}$$

$$SP_d = \alpha + \beta 1\ QUETTA_d + \beta 2\ POPDENSE_d + \varepsilon_{d,t}$$

Second Stage: $$GER_{d,t} = \alpha + \beta 1 \{ FP_d * (1\text{-}SP)_d \} + \beta 2 ( FP_d * SP_d ) + \beta 3 \{ SP_d * (1\text{-}FP)_d \} + \beta 4\ MT_t + \beta 5 \{ FP_d * (1\text{-}SP)_d * MT_t \} + \beta 6 \{ FP_d * SP_d * MT_t \} + \beta 7 \{ SP_d * (1\text{-}FP)_d * MT_t \} + \beta 8\ GER_{d,2007} + \beta 9\ POPDENSE_d + \varepsilon_{d,t}$$

where FP is a dummy that equals 1 if district d witnessed violence in the first phase of conflict, between 2007 till 2011, irrespective of whether it witnessed violence after that, otherwise it equals 0. WANA is the travelling distance of each district d to the militant headquarters in the first phase of conflict, Wana. SP is a dummy that equals 1 if district d witnessed violence in the second phase of conflict, from 2012 and onwards, irrespective of whether it witnessed violence before that. QUETTA is the travelling distance of each district d to the militant headquarters in the second phase of conflict, QUETTA. MT is a time dummy that equals 1 when enrolment rates correspond to year 2015, otherwise it equals 0 when enrolment rates correspond to year 2013. (1-FP) is a dummy that equals 1 when district d did not witness any violence in the first phase of the conflict, meaning it either only experienced violence during the second phase of conflict or did not experience violence at all. Similarly, (1-SP) is a dummy that equals 1 when district d did not witness any violence in the second phase of the conflict, meaning it either only

experienced violence during the first phase of conflict or did not experience violence at all. Hence, $\beta 1$ provides us with the immediate impact of exiting first phase of conflict on enrolment rates in 2013. $\beta 2$ gives us the impact of both phases of conflict on enrolment rates in 2013. $\beta 3$ estimates the immediate impact of entering the second phase of conflict on enrolment rates in 2013. $\beta 5$ measures the impact of exiting the first phase of conflict after three years on enrolment rates in 2015. $\beta 6$ estimates the impact of both stages of conflict on enrolment rates in 2015. And finally, $\beta 7$ provides us with the impact of entering the second phase of conflict on enrolment rates in 2015. $GER_{d,t}$ is the outcome enrolment rate in district d at time t, where t represents year 2013 and 2015. $GER_{d,2007}$ controls for enrolment rate of district d at the start of conflict in 2007. $POPDENSE_d$ is the population density of each district d, last measured in 2008, while $\varepsilon_{d,t}$ is the error term.

However, there are limitations to our estimation strategy. Firstly, the outcome enrolment period is for two years only, 2013 and 2015. Hence, there is no way to find the effect of the first phase of the conflict as it gets absorbed by the group effect since we do not have information prior to the start of the first phase of conflict. Therefore, our estimation strategy can only observe the change in the effects of conflict over time when compared with districts that remained peaceful, and with the changing nature of conflict. Secondly, we cannot interpret the size of the coefficients in the absolute terms as we do not have any estimates for entering the first phase of conflict. As a result, we can only compare coefficients to interpret the impact of the changing nature of conflict.

**Results**

We first provide results for overall GERs:

Table 43: Impact of Conflict on Overall GERs

| | PRIM. SCHOOLS NO CONTROLS | PRIM. SCHOOLS CONTROLS | MID. SCHOOLS NO CONTROLS | MID. SCHOOLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **FP** | | | | |
| WANA | -0.0004*** | -0.0004*** | -0.0004*** | -0.0004*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| F-test | 27.78 | 13.99 | 27.78 | 13.99 |
| **SP** | | | | |
| Quetta | -0.0002*** | -0.0004*** | -0.0002*** | -0.0004*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| F-test | 9.60 | 18.25 | 9.60 | 18.25 |
| *SECOND STAGE* | | | | |
| FP | 47.83 | 55.75 | 179.12 | 104.28*** |
| *(1-SP) | (133.81) | (42.45) | (124.82) | (41.24) |
| FP*SP | -93.26 | -0.06 | -74.81*** | -1.59 |
| | (27.98) | (19.50) | (27.19) | (17.41) |
| SP | -152.62 | 12.99 | -6.01 | 56.37 |
| *(1-FP) | (149.02) | (45.65) | (133.38) | (46.61) |
| FP*(1-SP) | 152.46 | -15.77 | 19.60 | 2.45 |
| *MT | (188.46) | (47.12) | (179.85) | (53.96) |
| FP*SP | -12.64 | -22.47 | 0.08 | -5.41 |
| *MT | (39.93) | (24.76) | (38.48) | (25.64) |
| SP*(1-FP) | 148.94 | -17.05 | -3.15 | -16.91 |
| *MT | (207.20) | (50.77) | (191.27) | (59.12) |
| MT | -73.08 | 14.29 | -4.44 | 4.98 |
| | (101.61) | (30.53) | (96.65) | (33.89) |
| POP. DENSE | NO | YES | NO | YES |
| ENROL2007 | NO | YES | NO | YES |
| 2nd Stage F-test | 17.52 | 115.44 | 20.66 | 76.89 |
| R-Squared | 0.24 | 0.73 | 0.27 | 0.62 |
| Observations | 458 | 400 | 457 | 400 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

There are several coefficients that we examine and compare to evaluate the impact of conflict on enrolment rates. First, we analyse the coefficient of exiting first phase of conflict for outcome enrolment period 2013, FP*(1-SP), to measure the immediate impact of exiting first phase of conflict. We find that overall enrolment rates in 2013 are higher at primary and middle level for districts that exited first phase of conflict relative to districts that remained peaceful. However, the coefficient is only statistically significant at the middle level suggesting that enrolment rates recovered at middle level once conflict was over. Second, we compare the coefficient of exiting first phase of conflict for outcome enrolment period 2015, FP*(1-SP)*MT, with the coefficient of witnessing violence in both phases of conflict, FP*SP*MT. We find that overall enrolment rates are higher at primary and middle level for districts that exited first phase of conflict relative to districts that remained peaceful when compared to districts that experienced violence in both stages of conflict relative to districts that remained peaceful. A two-paired t-test suggests that the two coefficients are statistically different. This again suggests that enrolment rates did recover once conflict was over. Third, we analyse the coefficient of exiting first phase of conflict for outcome enrolment period 2015, FP*(1-SP)*MT, to measure the medium-term impact of exiting first phase of conflict. We find that overall enrolment rates in 2015 are lower at primary but higher at middle level for districts that exited first phase of conflict relative to districts that remained peaceful. However, the coefficients are statistically insignificant at both levels leading to inconclusive results. We provide results for the two paired t-test to compare coefficients, and examine whether these coefficients are statistically significant:

Table 44: Using Paired T-test to Compare Coefficients

| Coefficients for Comparison | T-test Value | Significance |
|---|---|---|
| $\beta_1$ and $\beta_3$ | 7.99 | Statistically Significant |
| $\beta_1$ and $\beta_5$ | 16.57 | Statistically Significant |
| $\beta_1$ and $\beta_6$ | 11.13 | Statistically Significant |
| $\beta_1$ and $\beta_7$ | 21.44 | Statistically Significant |
| $\beta_3$ and $\beta_5$ | 11.92 | Statistically Significant |
| $\beta_3$ and $\beta_6$ | 7.09 | Statistically Significant |
| $\beta_3$ and $\beta_7$ | 16.40 | Statistically Significant |
| $\beta_5$ and $\beta_6$ | -2.38 | Statistically Significant |
| $\beta_5$ and $\beta_7$ | 2.12 | Statistically Significant |
| $\beta_6$ and $\beta_7$ | -4.38 | Statistically Significant |

We now provide gender-wise results for GERs at primary level:

Table 45: Impact of Conflict on Gender-wise GERs at Primary Level

| | BOYS NO CONTROLS | GIRLS NO CONTROLS | BOYS CONTROLS | GIRLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **FP** | | | | |
| WANA | -0.0004*** | -0.0004*** | -0.0004*** | -0.0004*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| F-test | 13.83 | 13.83 | 6.95 | 6.95 |
| **SP** | | | | |
| Quetta | -0.0002** | -0.0002** | -0.0004*** | -0.0004*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| F-test | 4.78 | 4.78 | 9.06 | 9.06 |
| *SECOND STAGE* | | | | |
| FP | 82.86 | 178.52 | 45.39 | 87.51 |
| *(1-SP) | (129.14) | (171.07) | (55.63) | (65.83) |
| FP*SP | -46.34* | -140.17*** | 5.62 | -6.85 |
| | (25.66) | (39.20) | (26.06) | (28.86) |
| SP | -240.22 | -65.03 | -13.61 | 29.83 |
| *(1-FP) | (148.28) | (190.32) | (59.80) | (70.06) |
| FP*(1-SP) | 124.03 | 180.89 | -22.31 | -4.52 |
| *MT | (169.04) | (259.91) | (56.53) | (79.05) |
| FP*SP | -16.04 | -9.24 | -26.92 | -15.29 |
| *MT | (34.08) | (58.57) | (29.82) | (40.11) |
| SP*(1-FP) | 120.63 | 177.24 | -19.31 | -11.30 |
| *MT | (189.86) | (284.62) | (62.02) | (83.05) |
| MT | -57.80 | -88.35 | 18.05 | 7.55 |
| | (91.80) | (142.45) | (36.60) | (50.91) |
| POP. DENSE | NO | NO | YES | YES |
| ENROL2007 | NO | NO | YES | YES |
| 2nd Stage F-test | 13.10 | 13.88 | 21.51 | 93.12 |
| R-Squared | 0.29 | 0.35 | 0.47 | 0.79 |
| Observations | 229 | 229 | 200 | 200 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

First, we analyse the coefficient of exiting first phase of conflict for outcome enrolment period 2013, FP*(1-SP), to measure the immediate impact of exiting first phase of conflict. We find that enrolment rates for boys in 2013 at primary level are higher for districts that exited first phase of conflict relative to districts that remained peaceful. Similarly, for girls too, enrolment rates at primary level are higher for districts that exited first phase of conflict relative to districts that remained peaceful. However, the coefficients are not statistically significant at the primary level for either boys or girls leading to inconclusive results. Second, we compare the coefficient of exiting first phase of conflict for outcome enrolment period 2015, FP*(1-SP)*MT, with the coefficient of witnessing violence in both phases of conflict, FP*SP*MT. We find that enrolment rates in 2015 for boys are higher at primary level for districts that exited first phase of conflict relative to districts that remained peaceful when compared to districts that experienced violence in both stages of conflict relative to districts that remained peaceful. A two-paired t-test suggests that the two coefficients are statistically different. Even for girls, we find that enrolment rates in 2015 are higher at primary level for districts that exited first phase of conflict relative to districts that remained peaceful when compared to districts that experienced violence in both stages of conflict relative to districts that remained peaceful. A two-paired t-test suggests that the two coefficients are statistically different. However, the differential is much higher for girls when compared to boys, suggesting that enrolment rates for girls recovered more than boys at primary level. Third, we analyse the coefficient of exiting first phase of conflict for outcome enrolment period 2015, FP*(1-SP)*MT, to measure the medium-term impact of exiting first phase of conflict. The coefficients are not statistically significant at the primary level for either boys or girls leading to inconclusive results.

We now provide gender-wise results for GERs at middle level:

Table 46: Impact of Conflict on Gender-wise GERs at Middle Level

| | BOYS NO CONTROLS | GIRLS NO CONTROLS | BOYS CONTROLS | GIRLS CONTROLS |
|---|---|---|---|---|
| *VARIABLES* | (1) | (2) | (3) | (4) |
| *FIRST STAGE* | | | | |
| **FP** | | | | |
| WANA | -0.0004*** | -0.0004*** | -0.0004*** | -0.0004*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| F-test | 13.83 | 13.83 | 6.95 | 6.95 |
| **SP** | | | | |
| Quetta | -0.0002** | -0.0002** | -0.0004*** | -0.0004*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| F-test | 4.78 | 4.78 | 9.06 | 9.06 |
| *SECOND STAGE* | | | | |
| FP | 49.32 | 308.91*** | 75.80 | 127.79*** |
| *(1-SP) | (142.58) | (117.67) | (61.02) | (36.73) |
| FP*SP | -49.39 | -100.21*** | 19.18 | -28.91 |
| | (30.54) | (34.46) | (28.22) | (18.07) |
| SP | -118.54 | -106.52 | 1.21 | 109.96** |
| *(1-FP) | (154.36) | (123.03) | (67.66) | (44.46) |
| FP*(1-SP) | 16.35 | 25.80 | -2.81 | 8.06 |
| *MT | (212.02) | (175.08) | (81.54) | (46.79) |
| FP*SP | -8.91 | -7.85 | -9.39 | -1.28 |
| *MT | (44.04) | (48.87) | (41.61) | (27.81) |
| SP*(1-FP) | -25.09 | 21.17 | -38.19 | 4.90 |
| *MT | (227.46) | (182.64) | (88.60) | (51.17) |
| MT | 3.48 | -13.47 | 12.04 | -2.32 |
| | (115.80) | (90.98) | (53.28) | (30.07) |
| POP. DENSE | NO | NO | YES | YES |
| ENROL2007 | NO | NO | YES | YES |
| 2nd Stage F-test | 17.40 | 11.79 | 24.47 | 58.55 |
| R-Squared | 0.34 | 0.32 | 0.50 | 0.68 |
| Observations | 229 | 228 | 200 | 200 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

First, we analyse the coefficient of exiting first phase of conflict for outcome enrolment period 2013, FP*(1-SP), to measure the immediate impact of exiting first phase of conflict. We find that enrolment rates for boys in 2013 at middle level are higher for districts that exited first phase of conflict relative to districts that remained peaceful. However, the results are not significant. For girls, enrolment rates at middle level are higher for districts that exited first phase of conflict relative to districts that remained peaceful. The coefficient is statistically significant at the middle level suggesting that enrolment rates recovered for girls but not for boys. Second, we compare the coefficient of exiting first phase of conflict for outcome enrolment period 2015, FP*(1-SP)*MT, with the coefficient of witnessing violence in both phases of conflict, FP*SP*MT. We find that enrolment rates in 2015 for boys are higher at middle level for districts that exited first phase of conflict relative to districts that remained peaceful when compared to districts that experienced violence in both stages of conflict relative to districts that remained peaceful. A two-paired t-test suggests that the two coefficients are statistically different. Even for girls, we find that enrolment rates in 2015 are higher at middle level for districts that exited first phase of conflict relative to districts that remained peaceful when compared to districts that experienced violence in both stages of conflict relative to districts that remained peaceful. A two-paired t-test suggests that the two coefficients are statistically different. However, the differential is much higher for girls when compared to boys, suggesting that enrolment rates for girls recovered more than boys at middle level. Third, we analyse the coefficient of exiting first phase of conflict for outcome enrolment period 2015, FP*(1-SP)*MT, to measure the medium-term impact of exiting first phase of conflict. The coefficients are not statistically significant at the middle level for either boys or girls leading to inconclusive results.

# Chapter 3: Degree Choices

## 1 Introduction

One of the highest stake decision an individual makes during schooling is to decide on what career to choose. Hence the choice of going to university and which degree to apply for plays a critical role in determining the career choice and the future earnings of any individual. Many factors impact the choice of degree chosen at university level, chief amongst them being the standard economic model of schooling decision that compares the returns to different majors with the costs associated with completing them (Arcidiacono, 2010). Individuals tend to typically focus on their expected returns from choosing a degree and compare them to alternative careers or occupations. However, when comparing costs of schooling, the focus shifts towards a students' ability to complete years of schooling in the most efficient and effective manner. In this regard, access to schooling and the environment in which schooling is provided plays a critical role in determining which degree choice would be most productive for a student. One such factor that can impact the environment in which a student makes choices regarding degrees at university level, and hence therefore impacts future career and earning prospects, is exposure to violence.

It is acknowledged that exposure to a violent act causes risk for disturbances in children's lives, the most commonly studied consequence of exposure being Post Traumatic Stress Disorder (PTSD), (Yehuda, 1988). Research reveals that students exposed to school shootings often exhibit tendencies of PTSD symptoms after exposure to violence and that these symptoms may be persistent (Haravuori et al., 2012; Hughes et al., 2011; Littleton et al., 2009; Nader, Pynoss, Fairbanks et al., 1990; Pynoos et al., 1987; Suomalainen et al., 2011). After a sniper attack on an elementary school playground in the United States in 1984, 60 per cent of the exposed children had moderate or higher PTSD symptoms one month after the incident while 38 per cent of them still had PTSD one year after the attack (Nader et al, 1990). Accordingly, 30 per cent of the female students at Virginia Tech had PTSD symptoms three months after the shooting incident, and 24 per cent still suffered from these symptoms one year afterwards (Littleton et al., 2009). A two-year follow-up study of the two school shootings in Finland revealed that 43 per cent of the students in both violence affected schools had PTSD four months after

the incidents (Horowitz et al., 1979) and that 19 per cent of the students had PTSD during the follow-up a year later. Furthermore, research also suggests that conflict in the neighbourhood, and not only in schools, also puts the caregivers of students, along with students, in conflict exposed areas at a risk of traumatization (Scrimin et al., 2006). Three months after being taken hostage in the Russian school in Beslan in 2004, both children and their parents had high levels of PTSD. It is noteworthy that even among the caregivers who were not inside the school during the incident, the level of PTSD was as high as their children's, indicating that the impact of violence affected the entire family (Scrimin et al., 2006). Moreover, conflict in general, and school shootings in particular, may shatter the sense of safety in other schools and the wider communities as well. A National Youth Risk Behavior Survey conducted in the US in 1999 at the same time as a school shooting occurred in Columbine High School suggested that students missing school because of safety concerns was 2.6 times higher after the Columbine incident than before (Brener et al., 2002). Thus, they emphasized that the aftermath of an extremely violent act impacts not only those in the immediate proximity of the attack but also those in the community, thus increasing the number of individuals potentially in need of support.

There is also ample evidence that suggests exposure to violence impacts student learning in general, and educational outcomes such as test scores in particular. The existing literature shows that students exposed to violence, especially in schools, tend to lose motivation and concentration due to prolonged fear, disruption in home and school environments, and adverse psychological impact on health and mental wellbeing (Gershenson et al., 2015). Although violent conflicts result in reduction in educational access and attainment of education (Akresh et al., 2011; Alderman et. al, 2006), the effects on educational outcomes can also be heterogeneous across gender; in certain cases, exposure to violence has had a larger negative effect on enrolment for girls (Shemyakina, 2010), whereas in other instances conflict resulted in long-term effect on educational outcomes for boys only (Justino et al., 2013). Violence disrupts school routines, increases teacher and student absenteeism, and causes major psychological distress, which in return may impact the performance of a student. As a consequence, once violence is triggered, one can expect safety concerns and threats to individuals' lives to dramatically increase, leading to potential adverse effects of violence on key educational outcomes, such as test scores. The potential effects of violence

on student learning can operate through both direct and indirect channels. The direct channels can include school absenteeism and poor academic performance at school due to a lack of focus associated with anxiety and fear, while indirect channels can include disruptions to processes of learning from parents and teachers who may experience problems themselves. Therefore, it is imperative to study whether exposure to violence, which negatively impacts educational outcomes and attainment through demand and supply side factors, also plays a critical role in determining degree choices at university level, and hence shapes career prospects and future earnings of an individual.

Therefore, the research question presented in this paper is, does conflict impact choice of degree at university level? By using admission data from 2014 till 2016 from one of the largest universities of Pakistan, Institute of Business Administration (IBA), we estimate whether students who were exposed to conflict applied to university degrees differently compared to students who were not exposed to conflict. Since the degree choices at IBA are clearly categorized as those that require mathematics as a pre-requisite (MATHPREREQ) and those that do not require mathematics as a pre-requisite (NONMATHPREREQ), we divide our sample along those admission criteria to study the impact of conflict on degree choices. In summary, we estimate whether students living in conflict-affected districts were less likely to apply to MATHPREREQ degrees compared to NONMATHPREREQ degrees, relative to students who lived in non-conflict-affected districts. Supporting this comparison between degree choices that require mathematics as a pre-requisite and those that do not is the existing literature on the efficacy of school inputs routinely showing that mathematics achievement scores are more sensitive than language scores to shocks to school environments (e.g., Hanushek et al., 2010). Currie et al. (2001) speculate that this may be because children are more apt to learn reading skills at home, which suggests that, to the extent that violence caused absences, school closures, and displaced instructional time during school days, it makes sense to see larger effects on mathematics achievement. Another possible explanation through which violence effects test scores, especially mathematics and science more than languages, include violence induced decline in instructional time and decrease in school human resources by increasing temporary school closing and teacher absenteeism. Monteiro et al. (2013) provide evidence that students from schools which are exposed to violence perform worse on standardized mathematics exams in the short run compared to students who are

not exposed to violence. Hence, there exists a direct link that would suggest that exposure to conflict could impact mathematics performance at school level which in turn could impact the distribution of students applying to MATHPREREQ degrees relative to NONMATHPREREQ degrees at university level.

We use two distinct treatments to define a district's exposure to conflict, each treatment being unique in terms of the time in student's life the violence occurred, which in turn played a critical role in determining the choice of degree at university level. Our first treatment defines exposure to conflict as violence witnessed by a student only during advance years of schooling i.e. during higher secondary level[8]. As higher secondary schooling in Pakistan is for two years, our definition for conflict-affected districts for the first treatment includes only those districts that witness violence up till two academic years before the university entrance exam date, and not before that, meaning only during the years a student was in higher secondary schooling. Since our admission data is for 2014 till 2016, this would indicate that students only witnessed violence between 2012 till 2014 respectively and not before that. By using a linear probability model, and a probit model as a robustness check, we instrument the probability of each district witnessing conflict, and hence being part of the first treatment, to the travelling distance of each district to the militant headquarter in Quetta[9], and estimate whether students who lived in conflict-affected districts applied for degrees differently than students who lived in non-conflict-affected districts. We find that violence witnessed during higher secondary years of schooling led to a decline in the likelihood that a student applied to a MATHPREREQ degree compared to a NONMATHPREREQ degree. Students who lived in conflict-affected districts were 10 per cent less likely to apply to a MATHPREREQ degree relative to NONMATHPREREQ degree, compared to students who lived in non-conflict districts. A gender wise breakup shows that boys who lived in conflict-affected districts were 12 per cent less likely to apply to a

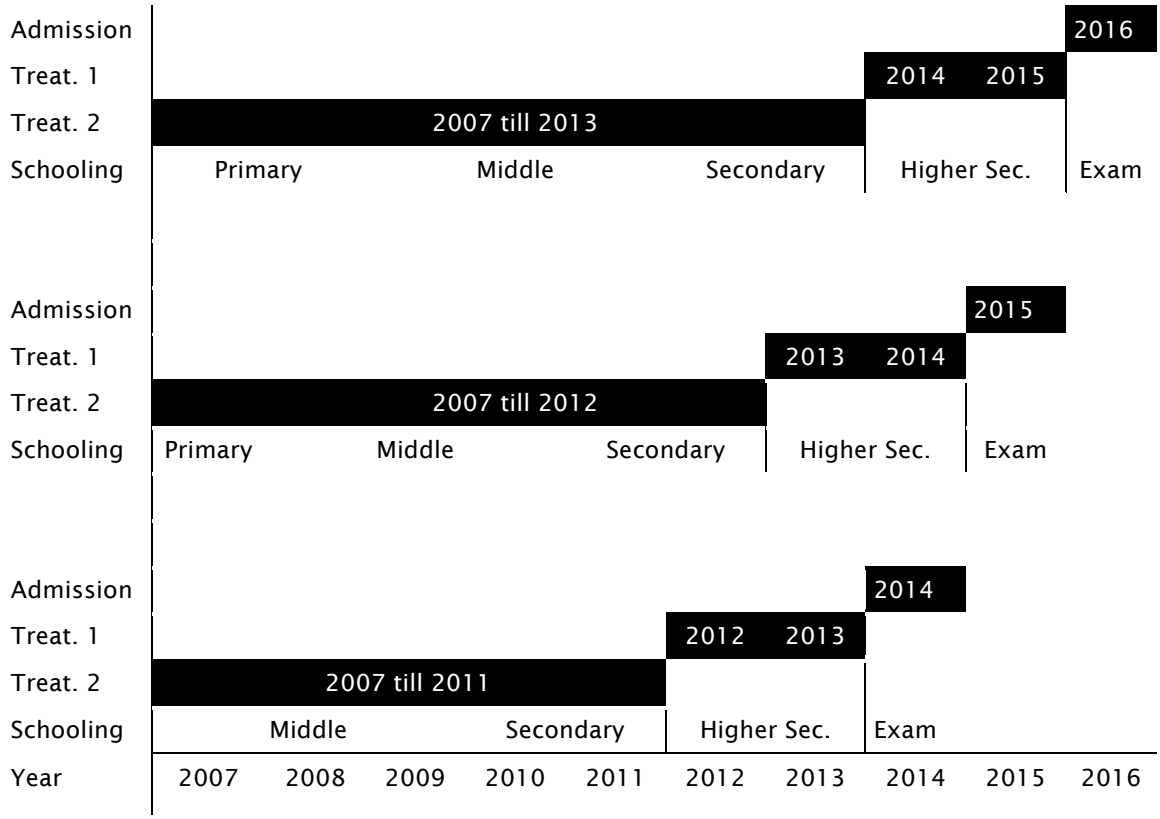
[8] Primary schooling in Pakistan is typically categorized from grade 1 till 5, middle schooling from grade 6 till 8, secondary schooling from grade 9 till 10, and finally higher secondary schooling from grade 11 till 12.

[9] Conflict in Pakistan during the first phase between 2007 till 2011 stemmed from the militant's headquarters in Wana. However, after the conflict was over and all tribal areas, including Wana, were cleared of militants, the Taliban regrouped in Quetta to form a second base of operation and conducted violent attacks from there. Hence, militancy in Pakistan after 2011 stemmed from Quetta which served as a military stronghold and a training ground for the Taliban.

MATHPREREQ degree relative to boys who lived in non-conflict districts, whereas no significant impact was found on degree choices of girls.

We then define our second treatment for exposure to conflict as violence witnessed by a student only during the first stage of conflict in Pakistan between 2007 till 2011, at a time when all applicants for the university entrance exam would have been in their primary, middle or secondary year of schooling. This means that a student would have witnessed violence, if any, before starting higher secondary year of schooling. Hence, our conflict-affected districts for the second treatment include all those districts that witnessed violence during the conflict between 2007 till 2011, and then remained peaceful from 2011 onwards till the date of the entrance exam between 2014 till 2016. By again using linear probability model, and a probit model as a robustness check, we instrument the probability of each district witnessing conflict during the first phase of conflict, and hence being part of the second treatment, to the travelling distance of each district to the militant headquarter in Wana, and estimate whether students who lived in conflict-affected districts applied for degrees differently than students who lived in non-conflict-affected districts. We find that violence witnessed during the first phase of conflict during primary, middle or secondary year of schooling led to a decline in the likelihood that a student applied to a MATHPREREQ degree compared to a NONMATHPREREQ degree. Students who lived in conflict-affected districts were 36 per cent less likely to apply to a MATHPREREQ degree relative to NONMATHPREREQ degree, compared to students who lived in non-conflict districts. A gender wise breakup shows that boys who lived in conflict-affected districts were 38 per cent less likely to apply to a MATHPREREQ degree relative to boys who lived in non-conflict districts, whereas no significant effect was found on girls. Figure 18 below shows the timeline of each treatment corresponding to the time period of exposure to violence, and the level of schooling at which exposure occurred.

Figure 20: Timeline of Each Treatment Corresponding to Level of Schooling and Admission




In summary, results for both are treatment suggest that students who witnessed violence had a lower likelihood of applying to a MATHPREREQ degree compared to a NONMATHPREREQ degree, relative to students who did not witness violence. However, a gender-wise breakup of results suggests that the negative impact of violence on the likelihood of applying to a MATHPREREQ degree is only observed on boys, and not on girls. This disproportional impact of conflict on degree choices of boys but not girls could be attributed to the change in labour market prospects associated with each gender due to a violence-prone environment unfavourable for employment opportunities. Although we do not have data on labour market outcomes to test this explanation, the theory is in line with the existing literature that suggests conflict often results in lower unemployment rates for men but not for women (Kondylis, 2007). In Pakistan, women work primarily in the home or on the farm, or stay at home after getting married at early ages. Their participation in work outside these areas, particularly in formal employment, is extremely low. Despite increases in recent years, female labour force participation in Pakistan, at 25 per cent is well below rates for countries with similar income levels and only around 25 per cent of women with a university degree seek employment in the formal sector (ADB, 2016). This suggests that girls seeking university education

are not driven by labour market returns, or earnings. In such instances, conflict would not result in a change in future labour market prospects for girls and perhaps not alter the preference of degree choice at university level. However, the choice of degree chosen for boys could be correlated with the expectations of the labour market, and hence any violence deemed as a negative stimulus to lucrative employment opportunities could alter the choice of degree chosen at university level for boys.

The paper is structured as follows: Section 2 provides a review of the relevant literature that exists on the impact of violence on test scores at school level and the factors that impact choice of degree at university level. Section 3 describes the datasets used for this research and Section 4 discusses the main identification strategy applied for our estimations. Results and robustness checks are presented in Section 5 and Section 6, while Section 7 concludes the paper.

## 2 Literature review

This section deals with two separate strands of literature that (i) deals with the impact of conflict on educational outcomes, particularly test scores and (ii) deals with the decision-making involved in choosing degree at university level. Concerning the first set of literature, Monteiro et al. (2013) provide evidence that students from schools exposed to violence in Rio de Janeiro perform worse on standardized mathematics exams compared to students not exposed to violence. By including year fixed effects, and cross-section controls, the results indicate that heterogeneity in student, classroom and school characteristics played a limited role in generating the observed correlation between violence and achievement in mathematics. At the same time, no significant correlation is found between conflict and language scores, which is not surprising given the common view that performance in language is expected to be strongly associated with household background and not school related characteristics. They also find evidence, that for mathematics only, negative effect of violence increases with conflict intensity and duration, and is most strong when conflict occurs in the months just before the exam. The mechanism explained though which violence effected mathematics scores included decline in instructional time, which affected learning in mathematics more than languages, and decrease in school human resources by increasing temporary school closing and teacher absenteeism. Additionally, using time and school fixed effects that control for the endogeneity of violence, Haugan

(2016) shows that each additional homicide occurring within 500 meters of a school in Medellin, Colombia reduces student performance for a number of academic subjects on a standardized exam. While it is impossible to rule out the possibility that homicide exposure affects academic achievement via psychological impacts on students, he concludes that overall the results are more consistent with supply-side channels. Students and teachers may have been extorted on their daily commute, teachers targeted for their roles as community leaders, and schools often closed due to violence. Haugan estimates that each additional homicide per year decreases results on various areas of the ICFES[10] standardized exam. The common subjects that saw a decline in performance included mathematics, science and critical reading. The results also indicate that since the effect of homicides on exam scores shifts the entire distribution of scores downwards, student migration did not drive the estimated negative effect of homicides on exam scores. Moreover, Gershenson et al. (2015) provides evidence that exposure to violent traumatic events, such as terrorism, random school shootings, and community level violence in general have deleterious impacts on the psychological development of children. This is reflected by depression, aggressive behaviour, anxiety and stress, social and emotional problems, and impaired cognitive development and academic achievement. Robust evidence is provided in support of a causal relationship between community level shooting in a school located in Virginia and third and fifth grade mathematics and reading proficiency. The estimated effects on mathematics proficiency are the most robust to conditioning on district trends. This is consistent with the previous literature on the efficacy of school inputs that routinely shows that mathematics achievement scores are more sensitive than language scores to shocks to school environments (e.g., Hanushek et al., 2010).

Moving on to the second set of literature, Arcidiacono (2010) suggests that amongst the many factors that impact the choice of degree chosen at university level, chief amongst them is the standard economic model of schooling decision that compares the returns to different majors with the costs associated with

[10] The ICFES exam is administered prior to graduation in Colombian high school final year, 11th or 12th. The exam evaluates five subjects; Critical Reading, Math, Social Studies, Science and English. The ICFES test is nationally recognized as the most important test since it can affect the possibilities that a student might have to be accepted in Public and Private Colleges.

completing them. Individuals tend to typically focus on their expected returns from choosing a degree and compare them to alternative careers or occupations. However, when comparing costs of schooling, the focus shifts towards a students' ability to complete years of schooling in the most efficient and effective manner. However, a standard cost-benefit analysis may not be the only factor behind choice of degree at university level, with preference for degrees and prospects of labour market return also playing a role in determining choice of degree. Turner et al. (1999) find that within the arts, sciences, and engineering fields, differences between boys and girls in choice of university major in the US have not lessened in the past two decades. Using detailed data on choice of major and individual scores on the Scholastic Aptitude Test (SAT), they examine the extent to which observed differences between boys and girls reflect the effects of pre-college preparation (as reflected in SAT scores), as contrasted with a show of other forces. One conclusion they derive is that there is a widening divide between the life sciences and mathematics/physical science fields in their relative attractiveness to boys and girls. Differences in SAT scores account for only part of the observed gap, and an array of residual forces-including differences in preferences, labour market expectations, and gender-specific effects of the college experience account for the main part of today's gender gaps in choice of academic major. Similarly, Tonin et al. (2014) suggest that in many countries there is a considerable gender gap in enrolment for bachelor degree in economics and investigate the sources of this gap by looking in detail at the university admission process in the UK. By using administrative data covering half of all university applications in UK they find no evidence of universities discriminating against female applicants. However, they do find that girls are less likely to apply for a bachelor's degree in economics to start with, even if once they apply their likelihood of enrolling is the same as for boys. Girls are less likely to study mathematics in higher secondary schooling and this may deter them from applying to study economics at the university level. However, even among those who have studied mathematics, females are less likely to apply than males, suggesting that differences in the choice of subjects at higher secondary schooling cannot explain the whole gap. Moreover, studies have also documented large differences in earnings across different university degrees. For example, Grogger et al. (1995) find that one-quarter of the change in the university wage premium for men was driven by a shift from low-paying degrees to high-paying degrees. And, James et al. (1989) argue that "while sending your child to Harvard appears to be a good investment, sending him to your local state university

to do a degree in engineering, to take lots of mathematics, and preferably to attain a high GPA, is an even better private investment." Given these large earnings differences across degrees, economists have tried to analyse the extent to which students sort into degrees as a function of such differences.

Factors that influence a student's choice of degree based on the cost-benefit analysis can be categorized into three broad classifications: (i) student's preparation and achievement at pre-university levels of education; (ii) an individual's preferences for various courses of study, which may be encouraged by parental and societal expectations; and (iii) the labour market prospects associated with a given set of skills. This research is amongst the first that adds exposure to conflict as a potential factor that may affect choice of degree at university level. Till now no literature exists that links how conflict through its impact on test scores could potentially affect the degree choices made at university level. We connect the existing literature on impact of violence on test scores, and the factors the effect choice of degree at university level, to try and estimate the impact of conflict witnessed at school level on degree choices at university level. Secondly, although it may seem comforting to find evidence that points towards the direct impact of violence on test scores to be short-lived, this research shows that conflict can have an indirect lasting impact on human capital accumulation and on future earnings. This is because violence before crucial exam periods could impact test scores and be an important determinant of university admissions, the choice of degree chosen and the quality of university to which students have access to. Hence, it is reasonable to assume that by impacting test scores, violence may have an indirect long-term consequence for the education and labour market outcomes of affected students.

## 3.1 Data

## 3.1 IBA admission tests

Data on individual-level scores for university entrance exams are obtained from one of the largest (in terms of student body) and highest ranking universities in Pakistan, Institute of Business Administration (IBA). Situated in the metropolitan hub of the country, Karachi, and having a student body of over 6,000 individuals, IBA is one of the only two business schools in Pakistan to be awarded the certification of South Asian Quality System. The institute was established in 1955 as a purely business school, but gradually expanded to an interdisciplinary

university with undergraduate, graduate and post- graduate programs covering social sciences, management, mathematical sciences, law, computer sciences, and economics. It achieved a degree awarding status in 1994. Table 46 below shows a breakup of individuals who applied for IBA's undergraduate entrance exams only, in 8 different admission rounds (Rd.) between 2014 till 2016:

Table 47: Descriptive Analysis for Applicants Appearing for Entrance Exam

| | RD. 1 | RD. 2 | RD. 3 | RD. 4 | RD. 5 | RD. 6 | RD. 7 | RD. 8 |
|---|---|---|---|---|---|---|---|---|
| Admission Year | 2014 | | | | 2015 | | | 2016 |
| Test Month | NOV | MAR | JUN | JUL | MAR | JUN | JUL | FEB |
| Total Applicants | 157 | 2034 | 2749 | 806 | 2044 | 2899 | 914 | 2244 |
| Average Age | 21.8 | 20.9 | 20.7 | 20.7 | 19.9 | 19.7 | 19.7 | 19.0 |
| Male (%) | 43.3 | 62.6 | 61.6 | 70.6 | 62.0 | 62.1 | 69.3 | 60.7 |
| Districts Applied | 11 | 44 | 56 | 33 | 43 | 62 | 35 | 56 |
| Non Con. Districts | 7 | 29 | 39 | 24 | 28 | 43 | 25 | 40 |
| Conflict Districts | 4 | 15 | 17 | 9 | 15 | 19 | 10 | 16 |
| Govt. School (%) | 46.5 | 38.8 | 49.6 | 50.3 | 39.6 | 49.6 | 58.1 | 40.1 |
| Degrees[11] | SS | BA, ACF,SS | BA, ACF,SS | ECO, CS | BA, ACF,SS | BA, ACF,SS | ECO, CS | BA, ACF,SS |

The above data requires attention on a few admission processes. Firstly, data for Round 1 indicates far fewer observations then the rest of the cycles. This is because the university initiated its social sciences (SS) program for the first time in 2013 and conducted its first admission test for only SS degree in Round 1. In subsequent admission rounds, the entrance exam for all undergraduate degrees, including business administration (BBA), accounting & finance (ACF), economics & mathematics (ECO), SS, and computer sciences (CS) were conducted at the same time of the year. Secondly, although Table 1 suggests that individual's applied for the entrance exams from as many as 62 districts (out of 110) in Pakistan, majority

[11] SS = Social Science, BA = Business Administration, ACF = Accounting and Finance, CS = Computer Science, ECO = Economics & Mathematics

of applications received were from Karachi. Out of 13,847 applicants, 10,936 were from Karachi. Thirdly, for our analysis we combine the admission cycles into academic periods for which the students applied for the entrance exam. Therefore, all admission tests between Aug-13 and July-14 were part of the academic year 2014 as students who graduated from higher secondary schooling by Aug-13 would have applied for that entrance exam. Similarly, all admission tests between Aug-14 and July-15 were part of the academic year 2015 as students who graduated from higher secondary schooling by Aug-14 would have applied for that entrance exam. We assume that students apply in the academic test right after their graduation from higher secondary schooling without any delay in academic year.

## 3.2 IBA entrance requirements

IBA has the following admission requirements for its degree choices:

Admissions to the business program, BBA, requires a Higher Secondary School Certificate with a minimum of 65 per cent marks; or A' Levels with a minimum of 2 'B's and 1 'C' in three principal subjects such that there should be no grade less than a 'C' across the three principal subjects; or American/Canadian High School Diploma with a minimum of 80 per cent; or an International Baccalaureate with at least 25 points out of 45. None of these requirements require mathematics as a pre-requisite to apply to the university.

Admissions to the social science, SS, and accounting & finance, ACF, program requires a Higher Secondary School Certificate with a minimum of 60 per cent marks; or A' Levels with a minimum of 1 'B' and 2 'C's in three principal subjects such that there should be no grade less than a 'C' across the three principal subjects; or American/Canadian High School Diploma with a minimum of 80 per cent; or an International Baccalaureate with at least 24 points out of 45. None of these requirements require mathematics as a pre-requisite to apply to the university.

However, admissions to the economics & mathematics, ECO, and computer science, CS, program requires a Higher Secondary School Certificate (with mathematics) with a minimum of 60 per cent marks; or A' Levels with a minimum of 1 'B' and 2 'C's in three principal subjects (including mathematics) such that there should be no grade less than a 'C' across the three principal subjects; or American/Canadian High School Diploma with a minimum of 80 per cent; or an International

Baccalaureate with at least 24 points out of 45. Hence, these two degrees require mathematics as a pre-requisite to apply to the university.

In summary, degrees of SS, ACF and BB did not require mathematics as a pre-requisite (NONMATHPREREQ) whereas degrees of ECO and CS required mathematics as a pre-requisite (MATHPREREQ).

## 3.3 Restriction on age limit

For both our mechanisms to have an impact on conflict, we assume that students applying to university exams have recently finished higher secondary schooling. In Pakistan, primary school is completed at an average age of 11, followed by middle school completion at the average age of 14, high school completion at an average age of 16, and thus advance high school completion at an average of 19. A snap shot of our data suggests that the average age of students applying to IBA is 20, with 88 per cent of our sample size belonging to the age up till 22. To account for late years of admissions and repetition of classes by students, we restrict our sample till age 22.

It is important here to highlight the timeline of exposure to conflict of students who applied to IBA between 2014 till 2016. For our first treatment of conflict-affected districts, since we are only interested in the impact of conflict witnessed during higher secondary schooling, which is schooling up till two years before the university entrance exam, we only observe violence witnessed between 2011 till 2013 for higher secondary schooling between 2013 till 2015 respectively. This would suggest students who applied for the entrance exam in 2016 would have only experienced violence, if any, during their higher secondary year of schooling, from 2013 till 2015 and not before that. Similarly, all those students who applied for the entrance exam in 2015 would have only experienced violence, if any, during their higher secondary year of schooling, from 2012 till 2014 and not before that. Finally, students who applied for the entrance exam in 2014 would have only experienced violence, if any, during their higher secondary year of schooling, from 2011 till 2013 and not before that. None of these students would have experienced any violence prior to their two years of higher secondary schooling, including the time period of the first phase of conflict from 2007 till 2011.

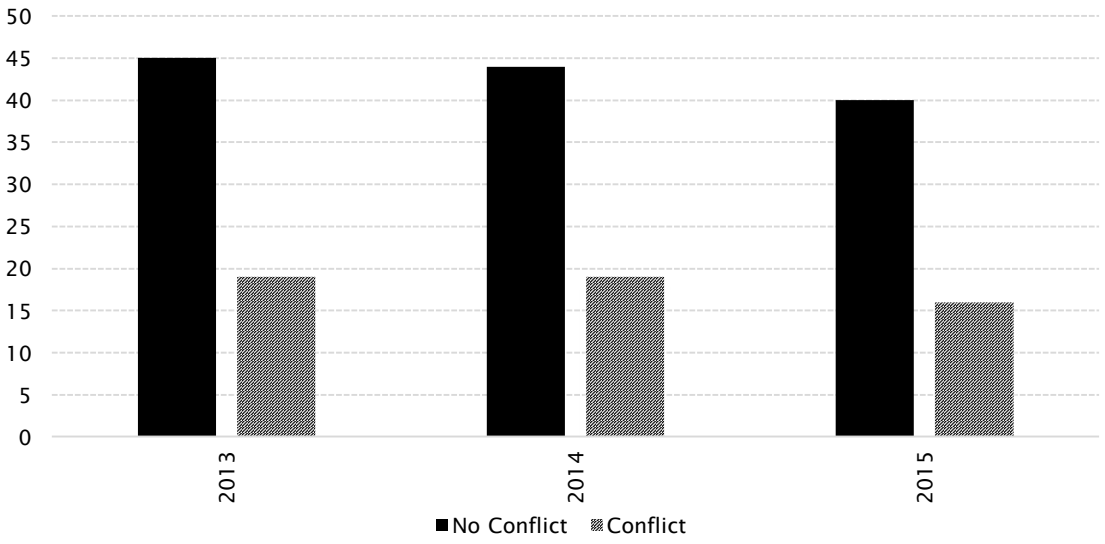
For our second treatment of conflict-affected districts, we hypothesize that students witnessed violence, if any, during the first phase of conflict between 2007

till 2011, which in return coincides with students being exposed to violence before the start of their higher secondary schooling i.e. during primary, middle or secondary schooling. All those students who applied for admissions in 2016 would have typically started their higher secondary schooling from 2013, all those students who applied to university in 2015 would have typically started their higher secondary schooling from 2012, and all those students who applied to university in 2014 would have started their higher secondary schooling from 2011. Hence, our entire sample for the first treatment would have witnessed violence during the first phase of conflict, if any, corresponding to exposure to violence during primary, middle or secondary schooling.

## 3.4 Conflict

Exam scores obtained from IBA are linked to the second set of data, on conflict, gathered and published by the South Asia Terrorism Portal (SATP). Data on Pakistan is collected by the SATP based on news resources and official government documents. The data acquired from this portal includes 'total civilian casualties in Pakistan' from 2013, one year prior to our first academic cycle data 2014, till 2015, one year prior to our last academic cycle data, 2016. Since existing literature suggests that the impact of violence on students test scores is only in the short run, we expect conflict only up to one academic year prior to the test date to impact test scores in that year. Therefore, we expect students who applied to university in the academic time period 2014 would have only been affected by conflict that took place in academic time period 2013. Similarly, students who applied to university in the academic period 2014 would have only been affected by conflict that took place in academic period 2014. Figure 1 below shows the total number of districts from which students applied for, for the entrance exam at IBA, which were affected and not affected by conflict between academic years 2013 and 2015, which in return impacted student degree choices in academic years from 2014 till 2016:

Figure 21: Breakdown of Number of Districts from which Students Applied from




## 3.4 Distances from militant headquarters in Wana and Quetta

Conflict in Pakistan stemmed from the insurgency that brewed in its tribal areas neighbouring Afghanistan. With the invasion of Afghanistan by NATO allies in 2002 and the state of Pakistan joining the allies, insurgency in bordering tribal areas of Pakistan started as early as 2005. The extremely porous Pakistan-Afghanistan border allowed for free movement of militants across the two countries. Armed conflict between the militants and the state of Pakistan officially broke out with the collapse of the third and last peace accord between Taliban and the Pakistani security forces, the Waziristan Accord, in July 2007 following a siege by the militants of a militant-stronghold mosque in Pakistan's capital, Islamabad. This resulted in the establishment of Tehreek-e-Taliban Pakistan (TTP), a branch of Taliban focused on militancy and resistance in Pakistan, with headquarters situated in the tribal area, Wana, located in South Waziristan, Pakistan. Since the militants' base of operation and training camps were situated in tribal Wana, South Waziristan, conflict witnessed in Pakistan between 2007 till 2011 was viewed as being controlled by militants in Wana. Therefore, we calculate the distance of each district, from its capital, to the militant's headquarters in Wana and measure the probability of a district witnessing conflict between 2007 till 2011 in Pakistan being associated with the geographical proximity of the district from Wana. Using Google Maps, we calculate travelling distances of each district from its capital to the militants' headquarters in Wana, South Waziristan.

Soon after Pakistan army and NATO forces cleared all tribal areas of Pakistan from Taliban rule, and recaptured districts earlier captured by militants and used as headquarters and training grounds, the militant leaders from Afghanistan and the tribal areas of Pakistan infiltrated into Pakistan's southern Balochistan Province. The leaders along with their senior aides quickly transformed Balochistan's capital of Quetta as their safe haven due to the geographical proximity with Afghanistan and also the cultural similarities it shared with the neighbouring region. Quetta, is a frontier city that is approximately a three-hour drive from Kandahar city in Afghanistan. Kandahar has long been considered the hub of Taliban activity and served as the capital of Taliban administration between 1994 till 2001. The militants regrouped to form a second militant organization in 2012 in Quetta, called the The Quetta Shura (TQS), an affiliate of Al-Qaeda, considered to be the intellectual and ideological underpinning of the Taliban insurgency in Afghanistan and identified as the Taliban government-in-exile. TQS was a 10-member council of senior Taliban leadership, who devise military, political, religious and intelligence strategies that are then executed by Taliban fighters mostly in southern Afghanistan and Pakistan. Several Al-Qaeda and Taliban leaders who were part of TQS have been tracked or arrested in and around Quetta. Pakistan continued to regularly face harsh retaliation from the militants who conducted violent attacks operated from Quetta and easily escaped through the porous Pakistan-Afghanistan border into pockets of tribal jurisdictions. Between 2007 till 2011, gains made by the militants in north-west Pakistan, and the war against militants in that area kept the focus of the insurgency away from the growing militancy in Quetta. However, with the clearing of the north-west areas in 2011, the focus shifted back to Balochistan where till today, Pakistan has conducted several military operations against militants.

Quetta serves as a hub of providing a ready supply of young men prepared to fight in Afghanistan and Pakistan. Most of these men are recruited at the refugee camps around Quetta, trained in militant turned safe-houses in the city or near the border, and then shifted to Afghanistan for fighting against U.S. and NATO forces. Taliban leaders find easily accessible shelter in these camps, including the famous Jangal Pir Alizai and Surkhab camps, which have been the centre of terrorist havens and training grounds for the militants. The areas in and near Quetta that stretch toward the border with Afghanistan have sprawling religious seminaries, some of which are used for inciting violence against civilians in Afghanistan and Pakistan. In

Balochistan, there are around 1,300 madrasas among which 'Madrasa Arabia' and 'Matlu'ul Uloomul Arabia Nizamia' in Quetta have been popular for recruiting fighters for militancy.

Since the TQS base of operation and training camps were situated in Quetta after 2011, militancy and violence witnessed in Pakistan from 2011 onwards was viewed as being controlled by militants in Quetta. Therefore, using Google Maps, we calculate the distance of each district, from its capital, to the Al-Qaeda headquarters in Quetta and measure the probability of a district witnessing conflict from 2011 onwards in Pakistan being associated with the geographical proximity of the district from Quetta.

# 4 Econometric model

## 4.1 Two distinct treatments for exposure to conflict

We try to estimate the impact of conflict on university level degree choices by comparing degree preferences of students who lived in conflict-affected districts with those who lived in non-conflict-affected districts. By instrumenting the occurrence of conflict on the distance of each district from the militants' headquarters, and using a linear probability model, we estimate whether students belonging to conflict-affected districts compared to non-conflict-affected districts were less likely to apply to MATHPREREQ degrees relative to NONMATHPREREQ degrees. We club all those degrees that required mathematics as a pre-requisite at IBA, namely ECO and CS, into MATHPREREQ, and all those degrees that did not require mathematics as a pre-requisite, namely BBA, ACF and SS as NONMATHPREREQ. We estimate:

$$CONFLICT_d = \alpha + \gamma_1 DISTANCE_d + YEAR\ F.E. + EDUTYPE\ F.E. + X' + \varepsilon_{i,d,t}$$

$$DEGREE_{i,d,t} = \alpha + \delta_1 CONFLICT_d + YEAR\ F.E. + EDUTYPE\ F.E. + X' + \varepsilon_{i,d,t}$$

We identify two distinct conflict-affected treatments, $CONFLICT_d$, instrumented to their own unique travelling distance from the militant headquarters measured by $DISTANCE_d$. Our first treatment $CONFLICT_d$ defines exposure to conflict as violence witnessed by a district d only during higher secondary schooling of a student. Since our sample is from admission process between 2014 till 2016, this means that the treatment includes only those districts that witnessed violence during academic years 2011 till 2013 respectively when students were in higher secondary

schooling, but remained peaceful before that. Students who would have applied for university in academic year 2014 would have finished their higher secondary schooling by academic year 2013 which means they would have started higher secondary schooling by 2011. Students who would have applied for university in academic year 2015 would have finished their higher secondary schooling by academic year 2014 which means they would have started higher secondary schooling by 2012. Finally, students who would have applied for university in academic year 2016 would have finished their higher secondary schooling by academic year 2015 which means they would have started higher secondary schooling by 2013. Therefore, $CONFLICT_d$ is a binary variable that takes a value equals to 1 if a student belonged to a district d that witnessed violence only during higher secondary schooling and not before that. The binary variable takes a value equals to 0 if the student belonged to a district d that remained peaceful up until the date of the entrance exam. Since the militants' base of operation and training camps after the first phase of conflict were situated in Quetta, conflict witnessed in Pakistan after 2011 was viewed as being controlled by militants in Quetta. Hence, we instrument the occurrence of conflict between 2011 till 2013 in each district d for the first treatment to be dependent on the geographical proximity of that distance from Quetta, measured by $DISTANCE_d$.

Our second treatment $CONFLICT_d$ defines exposure to conflict as violence witnessed by a district only during the first stage of conflict in Pakistan between 2007 till 2011 and remaining peaceful from 2011 onwards till the date of the entrance exam between 2014 till 2016. All those students who applied for university between 2014 till 2016 would have been in primary, middle or secondary school during the first phase of conflict. This means that a student belonging to this treatment would have witnessed violence, if any, before starting higher secondary year of schooling. Therefore, $CONFLICT_d$ is a binary variable that takes a value equals to 1 if a student belonged to a district d that witnessed violence only during the first phase of conflict and not after that. The binary variable takes a value equals to 0 if the student belonged to a district d that remained peaceful throughout the first phase of conflict and up till the date of the entrance exam. Since the militants' base of operation and training camps during the first phase of conflict were situated in tribal Wana, South Waziristan, conflict witnessed in Pakistan between 2007 till 2011 was viewed as being controlled by militants in Wana. Hence, we instrument the occurrence of conflict in each district d for the

first treatment to be dependent on the geographical proximity of that distance from Wana, measured by $DISTANCE_d$.

$DEGREE_{i,d,t}$ is the response measure of the outcome variable, representing the choice of degree of student i belonging to district d at time t, where t is between academic year 2014 till 2016. This variable is equals to 1 if a student applied to MATHPREREQ degree and equals 0 if a student applied to NONMATHPREREQ degree. We also include time variant fixed effects, YEAR F.E., and fixed effects of whether a student attended private or public school, EDUTYPE F.E. Due to the limitation of the data we do not have any district-level school characteristics as controls but using EDUTYPE fixed effects could exploit within-school variation over time and potentially remove omitted variable bias. X' are a set of controls including age, national-level normalized overall test scores and population density growth of each district d. $\varepsilon_{i,d,t}$ is the error term. Table 47 below shows the breakdown of districts which belonged to either treatment for each admission year.

Table 48: Districts in Treatment Group, Control Group and Omitted

| Admission Cycle | 2014 | | 2015 | | 2016 | |
|---|---|---|---|---|---|---|
| Definition of Conflict | Treat. 1 | Treat. 2 | Treat. 1 | Treat. 2 | Treat. 1 | Treat. 2 |
| Number of Districts | 98 | 98 | 100 | 100 | 104 | 104 |
| Conflict-Affected Districts | 14 | 14 | 14 | 8 | 14 | 6 |
| Conflict-Free Districts | 19 | 19 | 17 | 17 | 14 | 14 |
| Omitted Districts | 65 | 65 | 69 | 75 | 76 | 84 |

Our estimation strategy poses an identification challenge for each one of our treatments. Since each treatment is unique in identifying the time period during which a district was exposed to conflict, a separate instrument is to measure the probability of a district witnessing conflict. Each instrument is clearly able to capture the changing nature of the conflict, allowing for the two treatments to be independent of each other. Our first treatment defines exposure to conflict as violence witnessed by a district only during higher secondary schooling from 2011 till 2013. This time period coincides with violence witnessed during the second phase of conflict which started after 2011. Since the militants' base of operation and training camps during the second phase of conflict were situated in Quetta, conflict witnessed in Pakistan from 2011 onwards was viewed as being controlled by militants in Quetta. Hence, for the first treatment, we instrument the occurrence of conflict in each district during higher secondary schooling between 2011 and 2013 to be dependent on the geographical proximity of that distance from Quetta.

This means that our first treatment only includes districts that witnessed conflict between 2011 till 2013 and not before. Any district that witnessed conflict before that time period is excluded from the estimation.

Our second treatment defines exposure to conflict as violence witnessed by a district only during primary, middle or secondary schooling from 2007 till 2011. This time period coincides with violence witnessed during the first phase of conflict which started in 2007 and ended in 2011. Since the militants' base of operation and training camps during the first phase of conflict were situated in Wana, conflict witnessed in Pakistan from 2007 till 2011 onwards was viewed as being controlled by militants in Wana. Hence, for the second treatment, we instrument the occurrence of conflict in each district during primary, middle or secondary schooling between 2007 and 2011 to be dependent on the geographical proximity of that distance from Wana. This means that our second treatment only includes districts that witnessed conflict between 2007 till 2011 and not after. Any district that witnessed conflict after that time period is excluded from the estimation.

While each instrument clearly capturing the impact of a different phase of conflict, it also restricts our sample size by omitting districts that do not fall under either treatments. As shown in Table 47, the major proportion of districts are excluded from our estimation for either treatments. This is because for either treatments we want a district to be only exposed to conflict in one phase of conflict and remain peaceful in the other phase of conflict. In that way we are able to measure the impact of the specific phase of conflict on enrolment rates only. However, most districts that witnessed conflict in Pakistan were those that continued to witness violence across the two phases of conflict. Hence, those districts are excluded from the estimation, leading to a substantial drop in the sample size. The omission of these districts could likely lead to the issue of selection bias, and may affect the reliability of the results. This is because the omission of districts that did not fall into the treatment group could introduce a bias in such a way that randomization is not achieved, thereby ensuring that the sample obtained is not a representative of the total sample intended to be analysed.

## 4.2 Possible mechanism for each treatment impacting degree choices

There are several possible mechanisms through which each of our treatment for exposure to conflict could have impacted degree choices related to mathematics at university level. These include decline in labour market prospects in districts that

witnessed violence along with increase in job market uncertainty, reduction in supply side factors such as number of teachers available to teach mathematics, decline in demand side factors such as students performing worse in mathematics in school and hence opting out from choosing mathematics as a subject at school, and migration of students away from districts exposed to violence. However, due to the limitation of the data, we are unable to test for all of these possible mechanisms and focus only on how conflict would have impacted student performance in mathematics during school years, which in return would have discouraged students from applying to university for degrees that required mathematics as a pre-requisite. For each of our treatment, we provide a distinct mechanism through which conflict could have impacted choice of degree at university level. We estimate:

$$CONFLICT_d = \alpha + \gamma_1 DISTANCE_d + YEAR\ F.E. + EDUTYPE\ F.E. + X' + \varepsilon_{i,d,t}$$

$$PERFORMANCE_{i,d,t} = \alpha + \delta_1 CONFLICT_d + YEAR\ F.E. + EDUTYPE\ F.E. + X' + \varepsilon_{i,d,t}$$

Using the same definitions to identify our two distinct conflict-affected treatments, $CONFLICT_d$, we find the impact of exposure to conflict on mathematics scores of students at entrance exam. Since we do not have data of student performance during school years, we use the normalized scores of students in the mathematics section of the entrance exam as a proxy for student's ability in mathematics at school level. Under the first treatment, violence witnessed during higher secondary schooling would have led to a poorer performance by students in subjects such as mathematics which in turn would have discourage students from applying to degrees that require mathematics as a pre-requisite. These students would have studied mathematics at higher secondary level and would be eligible to apply for MATHPREREQ degrees, but their low performance in mathematics would have discouraged them from applying to degrees that require mathematics as a pre-requisite. Hence, for the mechanism under the first treatment, we measure the impact of violence witnessed during the higher secondary schooling on performance of mathematics. Under the second treatment, conflict experienced during primary, middle or secondary school years during the first phase of conflict could have led to a lower performance in mathematics, thus discouraging students from taking mathematics at higher secondary level, which in return would not have allowed them to be eligible for university degrees that require mathematics as a pre-requisite. Or, even if students would have studied mathematics at higher

secondary level, the negative impact of violence during schooling would have resulted in students not choosing degrees that required mathematics as a pre-requisite. Hence, for the mechanism under the second treatment, we measure the impact of violence witnessed during the first phase of conflict on performance of mathematics. $PERFORMANCE_{i,d,t}$ is the outcome variable measuring the national-level normalized mathematics score of student i belonging to district d at time t, where t is between academic year 2014 till 2016.

# 5 Results

## 5.1 Results for impact of conflict on degree choices

We provide results for our first treatment that violence witnessed during higher secondary year of schooling would have affected the degree choices of students. By using a linear probability model and instrumenting for occurrence of violence to the geographical proximity of each district to the militant headquarters in Quetta, we estimate whether students belonging to conflict-affected districts relative to non-conflict-affected districts were less likely to apply to MATHPREREQ degrees compared to NONMATHPREREQ degrees. The results for the first treatment are presented below:

Table 49: Impact of Conflict during Higher Secondary Schooling on Degree Choices of all Students

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0003)** | **(0.0003)** |
| F-Test | 9.89 | 7.08 | 4.72 | 3.57 | 7.24 | 9.89 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.06** | **-0.07** | **-0.07** | **-0.07** | **-0.11** ** | **-0.10* ** |
| | **(0.06)** | **(0.06)** | **(0.06)** | **(0.06)** | **(0.05)** | **(0.05)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 374 | 374 | 374 | 372 | 372 | 372 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 49 above suggest that students living in conflict-affected districts were less likely to apply to MATHPREQ degrees compared to students living in non-conflict districts. Without any controls, column (1) of Table 49 above suggests that students who lived in conflict-affected districts were 6 per cent less likely to apply to MATHPREQ degrees compared to students who lived in non-conflict-affected districts. Once controlled for year and education-type fixed effects, and for age, normalized overall test scores and population growth of each district, column (6) shows that students who lived in conflict districts were 10 per cent less likely to apply to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to students who lived in non-conflict-affected districts. The results are significant at the 10 per cent level. Moreover, when we change our estimation specification from a linear probability model to a probit model, as shown in Table 61 of section 6.1, the magnitude and significance of the coefficients

remain the same. Lastly, we try to eliminate the possibilities that the impact of conflict on degree choices was due to factors other than schooling. Although we do not have data on district level characteristics, or on labour market outcomes, we provide an estimate of our results for a subsample of students who were above the age of 22 therefore applied to university not graduating recently from school. The results for our first treatment in Table 67 of robustness check 6.2 suggests that applicants who lived in conflict-affected districts and were above the age of 22 were only 2 per cent less likely to apply to MATHPREREQ degrees relative to NONMATHPREREQ degrees as below, compared to applicants who lived in non-conflict-affected districts, the results being insignificant. This suggest that degree choices of older applicants living in conflict-affected districts who did not recently graduate from higher secondary school and applied to university had similar degree preference to applicants living in non-conflict-affected districts. However, the low sample size of only 42 observations for this subsample could have resulted in the estimates being biased. We provide gender specific result of our first treatment of conflict on degree choices of boys below:

Table 50: Impact of Conflict during Higher Secondary Schooling on Degree Choices of Boys Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** |
| F-Test | 8.14 | 5.71 | 4.72 | 2.77 | 6.70 | 6.92 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.09** | **-0.10** | **-0.09** | **-0.08** | **-0.12** ** | **-0.12** ** |
| | **(0.06)** | **(0.07)** | **(0.06)** | **(0.06)** | **(0.06)** | **(0.06)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 312 | 312 | 312 | 310 | 310 | 310 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 50 above suggest that boys living in conflict-affected districts were less likely to apply to MATHPREQ degrees relative to NONMATHPREREQ degrees, compared to boys living in non-conflict-affected districts. Without any controls, column (1) of Table 50 above shows that boys who lived in conflict-affected districts were 9 per cent less likely to apply to MATHPREQ degrees compared to boys who lived in non-conflict-affected districts. Once controlled for year and education-type fixed effects, and for age, normalized overall test scores and population growth of each district, column (6) shows that boys who lived in conflict districts were 12 per cent less likely to apply to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to boys who lived in non-conflict-affected districts. The results are significant at the 5 per cent level. Moreover, when we change our estimation specification from a linear probability model to a probit model, as shown in Table 62 of section 6.1, the magnitude and significance

of the coefficients remain the same. We provide gender specific result of our first treatment of conflict on degree choices of girls below:

Table 51: Impact of Conflict during Higher Secondary Schooling on Degree Choices of Girls Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0005)** | **(0.0005)** | **(0.0004)** | **(0.0005)** | **(0.0003)** | **(0.0003)** |
| F-Test | 10.17 | 6.99 | 5.06 | 5.22 | 12.00 | 6.92 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.05** | **-0.06** | **-0.06** | **-0.09** | **-0.07** | **-0.06** |
| | **(0.14)** | **(0.14)** | **(0.14)** | **(0.13)** | **(0.14)** | **(0.14)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 62 | 62 | 62 | 62 | 62 | 62 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 51 above suggest that girls living in conflict-affected districts were less likely to apply to MATHPREQ degrees compared to girls living in non-conflict-affected districts, but the results are not significant. Once controlled for year and education-type fixed effects, and for age, normalized overall test scores and population growth of each district, column (6) shows that girls who lived in conflict districts were 6 per cent less likely to apply to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to girls who lived in non-conflict-affected districts. However, the results are not significant. This suggests a weak correlation between exposure to conflict in higher secondary schooling and degree choices for girls. Even when we change our estimation specification from a linear probability

model to a probit model, as shown in Table 63 of section 6.1, the magnitude and significance of the coefficients remain the same.

In summary, results for our estimation for the first treatment of conflict-affected districts suggest that students who lived in conflict-affected districts were 10 per cent less likely to apply to a MATHPREREQ degree relative to NONMATHPREREQ degree, compared to students who lived in non-conflict districts. A gender wise breakup shows that boys who lived in conflict-affected districts were 12 per cent less likely to apply to a MATHPREREQ degree relative to boys who lived in non-conflict districts, whereas no significant impact was found on degree choices of girls. The disproportional impact of conflict on degree choices of boys but not of girls could be attributed to the change in labour market prospects associated with each gender due to a violence. Although we do not have data on labour market outcomes to test our explanation, the theory is in line with the existing literature that suggests conflict often results in higher unemployment rates for men but not for women (Kondylis, 2007). In Pakistan, women work primarily in the home or on the farm, or stay at home after getting married at early ages. Their participation in work outside these areas, particularly in formal employment, is extremely low. Despite increases in recent years, female labour force participation in Pakistan, at 25 per cent is well below rates for countries with similar income levels and only around 25 per cent of women with a university degree seek employment in the formal sector (ADB, 2016). This suggests that girls seeking university education are motivated rather by the social returns of university education rather than economic returns. In such instances, conflict would not result in a change in future labour market prospects and might not alter the preference of degree at university level. However, the choice of degree chosen by boys might be correlated with the expectations of the labour market. Hence, violence could be deemed as a negative stimulus towards lucrative employment opportunities, and thus altering the choice of degree chosen at university level.

We now provide results for our second treatment that suggests that violence witnessed in the first phase of conflict during primary, middle or secondary schooling would have also affected the degree choices of students. By using a linear probability model and instrumenting for occurrence of violence to the geographical proximity of each district to the militant headquarters in Wana, we estimate whether students belonging to conflict-affected districts relative to non-conflict-affected districts were less likely to apply to MATHPREREQ degrees

compared to NONMATHPREREQ degrees. The results for the second treatment are presented below:

Table 52: Impact of Conflict from 2007-2011 during School Years on Degree Choices of all Students

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** |
| | **(0.0002)** | **(0.0002)** | **(0.0003)** | **(0.0003)** | **(0.0003)** | **(0.0003)** |
| F-Test | 9.89 | 4.97 | 3.33 | 2.56 | 2.41 | 5.55 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.21*** ** | **-0.20*** ** | **-0.31** ** | **-0.34** ** | **-0.35** ** | **-0.36** ** |
| | **(0.07)** | **(0.07)** | **(0.14)** | **(0.16)** | **(0.14)** | **(0.14)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 246 | 246 | 243 | 241 | 241 | 241 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 52 above suggest that students living in conflict-affected districts were less likely to apply to MATHPREQ degrees compared to students living in non-conflict districts. Without any controls, column (1) of Table 52 above shows that students who lived in conflict-affected districts were 21 per cent less likely to apply to MATHPREQ degrees compared to students who lived in non-conflict-affected districts. Once controlled for year and education-type fixed effects, and for age, normalized overall test scores and population growth of each district, column (6) shows that students who lived in conflict districts were 36 per cent less likely to apply to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to students who lived in non-conflict-affected districts. The results are significant at the 5 per cent level. Moreover, when we change our estimation

specification from a linear probability model to a probit model, as shown in Table 64 of section 6.1, the likelihood of students living in conflict-affected districts applying to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to students who live in non-conflict-affected districts, declines by 40 per cent. The results are significant at the 1 per cent level. Lastly, the results for our second treatment in Table 68 of robustness check 6.2 suggests that applicants who lived in conflict-affected districts and were above the age of 22 were 11 per cent less likely to apply to MATHPREREQ degrees relative to NONMATHPREREQ degrees, compared to applicants who lived in non-conflict-affected districts, but the results are not significant. The weak correlation could be due to the low sample size of only 23 observations leading to inconsistent estimates. We provide gender specific result of our second treatment of conflict on degree choices of boys below:

Table 53: Impact of Conflict from 2007-2011 during School Years on Degree Choices of Boys Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** |
| | **(0.0002)** | **(0.0002)** | **(0.0003)** | **(0.0003)** | **(0.0003)** | **(0.0003)** |
| F-Test | 9.18 | 4.89 | 3.33 | 2.57 | 2.49 | 3.51 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.18** ** | **-0.18** ** | **-0.30** ** | **-0.34** ** | **-0.36** ** | **-0.38** ** |
| | **(0.09)** | **(0.09)** | **(0.15)** | **(0.16)** | **(0.15)** | **(0.16)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 213 | 213 | 211 | 209 | 209 | 209 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 53 above suggest that boys living in conflict-affected districts were less likely to apply to MATHPREQ degrees relative to NONMATHPREREQ degrees, compared to boys living in non-conflict districts. Without any controls, column (1) of Table 53 above shows that boys who lived in conflict-affected districts were 18 per cent less likely to apply to MATHPREQ degrees compared to boys who lived in non-conflict-affected districts. Once controlled for year and education-type fixed effects, and for age, normalized overall test scores and population growth of each district, column (6) shows that boys who lived in conflict-affected districts were 38 per cent less likely to apply to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to boys who lived in non-conflict-affected districts. The results are significant at the 1 per cent level. Changing our estimation from a linear probability model to a probit model, as shown in Table 65 of section 6.1, the likelihood of boys who lived in conflict-affected districts applying to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to boys who lived in non-conflict-affected districts declined by 42 per cent. We provide gender specific result of our second treatment on degree choices of girls below:

Table 54: Impact of Conflict from 2007-2011 during School Years on Degree Choices of Girls Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.002*** ** | **-0.001** ** |
| | **(0.0003)** | **(0.0003)** | **(0.0004)** | **(0.0005)** | **(0.0004)** | **(0.0005)** |
| F-Test | 9.50 | 4.74 | 7.14 | 22.28 | 10.27 | 19.28 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.24*** | **-0.20** | **-0.11** | **-0.04** | **-0.06** | **-0.06** |
| | **(0.13)** | **(0.15)** | **(0.20)** | **(0.21)** | **(0.23)** | **(0.32)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 33 | 33 | 32 | 32 | 32 | 32 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 54 above suggest that girls living in conflict-affected districts were less likely to apply to MATHPREQ degrees compared to girls living in non-conflict-affected districts, the results being significant at 10 per cent level. However, once controlled for year and education-type fixed effects, and for age, normalized overall test scores and population growth of each district, column (6) shows that girls who lived in conflict-affected districts were 6 per cent less likely to apply to MATHPRERQ degrees relative to NONMATHPREREQ degrees, compared to girls who lived in non-conflict-affected districts. The results are no longer significant suggesting a weak correlation between exposure to conflict during school years and degree choices of girls. Moreover, when we change our estimation from a linear probability model to a probit model, as shown in Table 66 of section 6.1, the magnitude and significance of the coefficients remain the same.

In summary, results for our estimation for the second treatment of conflict-affected districts suggest that students who lived in conflict-affected districts were 36 per cent less likely to apply to a MATHPREREQ degree relative to NONMATHPREREQ degree, compared to students who lived in non-conflict-affected districts. A gender wise breakup shows that boys who lived in conflict-affected districts were 38 per cent less likely to apply to a MATHPREREQ degree compared to boys who lived in non-conflict-affected districts, whereas no significant impact was found on degree choices of girls. This again suggests a disproportionate impact of conflict on degree choices of boys, which could be attributed to the disproportional labour market prospects for boys and girls in Pakistan.

## 5.2 Results for mechanisms through which conflict impacts degree choices

We now provide results for the mechanism for our first treatment suggesting that violence during higher secondary schooling could have lowered student performance in mathematics, which in turn would have discouraged students from applying to degrees at university level that required mathematics as a pre-requisite. The results for the mechanism affecting first treatment are presented below:

Table 55: Impact of Conflict during Higher Secondary Schooling on Maths. Scores of all Students

| *OUTCOME VARIABLE= MATHS. SCORES* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** | **-0.001*** ** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.76** ** | **-0.77** ** | **-0.75** ** | **-0.58** ** | **-0.74*** ** | **-0.77*** ** |
| | **(0.36)** | **(0.35)** | **(0.36)** | **(0.29)** | **(0.27)** | **(0.27)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| ENG. SCORE | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| F-TEST | 9.99 | 6.91 | 4.60 | 3.51 | 8.68 | 9.90 |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 371 | 371 | 371 | 371 | 371 | 371 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The results in Table 55 above suggest that students who lived in conflict-affected districts scored 0.76 normalized marks lower in mathematics than students who lived in non-conflict-affected districts. The results are significant at the 5 per cent level. Once controlled for year and education-type fixed effects, and for age, normalized english scores as a base estimate, and population growth of each district, column (6) shows that students living in conflict-affected districts scored 0.77 normalized mathematics marks lower than students living in non-conflict-affected districts. The results are significant at a 1 per cent level. We provide gender specific result of the mechanism behind the first treatment of conflict on degree choices of boys below:

Table 56: Impact of Conflict during Higher Secondary Schooling on Maths. Scores of Boys Only

| *OUTCOME VARIABLE= SCORES* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** | **-0.001*** ** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.65*** | **-0.67*** | **-0.69*** | **-0.46** | **-0.62** ** | **-0.64** ** |
| **(OUTCOME=MATH)** | **(0.39)** | **(0.38)** | **(0.40)** | **(0.32)** | **(0.29)** | **(0.29)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| ENG SCORE | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| F-TEST | 8.04 | 5.54 | 3.68 | 2.79 | 7.25 | 7.05 |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 309 | 309 | 309 | 309 | 309 | 309 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Our results in Table 56 above suggest that boys who lived in conflict-affected districts scored 0.65 normalized marks lower in mathematics than boys who lived in non-conflict-affected districts. The results are significant at the 10 per cent level. Once controlled for year and education-type fixed effects, and for age, normalized english scores as a benchmark estimate, and population growth of each district, column (6) shows that boys living in conflict-affected districts scored 0.64 normalized mathematics marks lower than boys living in non-conflict-affected districts. The results are significant at a 5 per cent level. We provide gender specific result for the mechanism behind our first treatment of conflict on degree choices of girls below:

Table 57: Impact of Conflict during Higher Secondary Schooling on Maths. Scores of Girls Only

| *OUTCOME VARIABLE= SCORES* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0005)** | **(0.0005)** | **(0.0004)** | **(0.0004)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.80*** | **-0.83*** | **-0.76*** | **-0.76*** | **-1.19*** ** | **-1.24*** ** |
| **(OUTCOME=MATH)** | **(0.44)** | **(0.43)** | **(0.42)** | **(0.40)** | **(0.28)** | **(0.30)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| ENG SCORE | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| F-TEST | 10.17 | 6.99 | 5.06 | 3.69 | 12.51 | 11.44 |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 62 | 62 | 62 | 62 | 62 | 62 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Our results in Table 57 above suggest that girls who lived in conflict-affected districts scored 0.80 normalized marks lower in mathematics than girls who lived in non-conflict-affected districts. The results are significant at the 10 per cent level. Once controlled for year and education-type fixed effects, and for age, normalized english scores as a benchmark estimate, and population growth of each district, column (6) shows that girls living in conflict districts scored 1.24 normalized mathematics marks lower than girls living in non-conflict-affected districts. The results are significant at a 1 per cent level.

In conclusion, exposure to violence during higher secondary schooling lowered student performance in mathematics for both boys and girls. However, the decline in mathematics score for both boys and girls, in fact for girls more than boys, only resulted in a significant change in degree preference for MATHPREREQ for boys and not for girls. This suggest that although conflict did lead to a decline in

mathematics score, the change in preference of degree chosen at university level can only be partially explained through the fall in mathematics scores resulting in students being discouraged to apply for a mathematics pre-requisite degree.

We also provide results for the mechanism for our second treatment, suggesting that violence during the first phase of conflict i.e. during primary, middle or secondary schooling, could have also lowered student performance in mathematics, which in turn would have discouraged students from picking up mathematics as a subject at higher secondary level. Such students would not have been eligible to apply for a MATHPREREQ degree. Even if students would have chosen mathematics as a subject at higher secondary level, their performance in mathematics would tend to be worse than of students who did not belong to conflict-affected districts. The results for the mechanism affecting the second treatment are presented below:

Table 58: Impact of Conflict from 2007-2011 during School Years on Maths. Scores of all Students

| *OUTCOME VARIABLE= SCORES* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** | **-0.001*** ** |
| | **(0.0002)** | **(0.0002)** | **(0.0003)** | **(0.0003)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **0.72** | **0.71** ** | **0.74** ** | **0.26** | **0.08** | **0.14** |
| **(OUTCOME=MATH)** | **(0.33)** | **(0.34)** | **(0.35)** | **(0.38)** | **(0.36)** | **(0.38)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| ENG SCORE | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| F-TEST | 10.04 | 5.00 | 3.33 | 2.58 | 2.40 | 6.13 |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 243 | 243 | 240 | 240 | 240 | 240 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The insignificant results in Table 58 above suggest that although students who lived in conflict-affected districts scored 0.14 normalized marks higher in mathematics than students who lived in non-conflict-affected districts, there is a weak correlation between exposure to conflict during the first phase of conflict and mathematics scores in university entrance exam. This could be due to mathematics scores of entrance exam between 2014 till 2016 being a weak proxy of performance in mathematics during school years between 2007 till 2011. We provide gender specific result for the mechanism behind our second treatment of conflict on degree choices of boys below:

Table 59: Impact of Conflict from 2007-2011 during School Years on Maths. Scores of Boys Only

| *OUTCOME VARIABLE= SCORES* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** |
| | **(0.0002)** | **(0.0002)** | **(0.0003)** | **(0.0003)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **0.51** | **0.51** | **0.56** | **0.03** | **-0.05** | **-0.02** |
| **(OUTCOME=MATH)** | **(0.34)** | **(0.35)** | **(0.35)** | **(0.43)** | **(0.37)** | **(0.39)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| ENG SCORE | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| F-TEST | 9.35 | 4.88 | 3.31 | 2.59 | 2.45 | 3.86 |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 211 | 211 | 209 | 209 | 209 | 209 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The insignificant results in Table 59 above suggest that although boys who lived in conflict-affected districts scored 0.02 normalized marks lower in mathematics than boys who lived in non-conflict-affected districts, there is a weak correlation between exposure to conflict and mathematics scores. We provide gender specific result for

the mechanism behind our second treatment of conflict on degree choices of girls below:

Table 60: Impact of Conflict from 2007-2011 during School Years on Maths. Scores of Girls Only

| *OUTCOME VARIABLE= SCORES* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.002*** ** | **-0.001** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0006)** | **(0.0005)** | **(0.0007)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **1.32** | **1.31** | **1.15** | **0.97** | **0.30** | **1.05** |
| **(OUTCOME=MATH)** | **(0.91)** | **(0.91)** | **(0.91)** | **(1.04)** | **(0.82)** | **(1.67)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| ENG SCORE | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| F-TEST | 8.46 | 4.44 | 6.58 | 6.92 | 8.39 | 46.17 |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 32 | 32 | 31 | 31 | 31 | 31 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

The insignificant results in Table 60 above suggest that although girls who lived in conflict-affected districts scored 1.05 normalized marks higher in mathematics than girls who lived in non-conflict-affected districts, there is a weak correlation between exposure to conflict and mathematics scores. In conclusion there is weak evidence that suggests violence experienced during the first phase of conflict would have led to a decline in performance in mathematics, which in return would have impacted the choice of degree at university level.

# 6 Robustness check

## 6.1 Using a probit model and instrumenting for conflict

Results for our overall specification using the first treatment are presented below:

Table 61: Impact of Conflict during Higher Secondary Schooling on Degree Choices of all Students

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0005)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.29** | **-0.36** | **-0.34** | **-0.35** | **-0.49*** | **-0.48*** |
| **MATHPREREQ(=1)** | **(0.33)** | **(0.32)** | **(0.30)** | **(0.31)** | **(0.26)** | **(0.06)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 374 | 374 | 374 | 372 | 372 | 372 |
| **MARGINS** | **-0.06** | **-0.08** | **-0.07** | **-0.07** | **-0.10*** | **-0.10*** |
| **MATHPREREQ(=1)** | **(0.07)** | **(0.07)** | **(0.06)** | **(0.06)** | **(0.06)** | **(0.05)** |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for the first treatment on degree choices of boys are presented below:

Table 62: Impact of Conflict during Higher Secondary Schooling on Degree Choices of Boys Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.001*** ** |
| | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0004)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.46** | **-0.52** | **-0.47** | **-0.44** | **-0.57**** | **-0.56**** |
| **MATHPREREQ(=1)** | **(0.37)** | **(0.33)** | **(0.32)** | **(0.32)** | **(0.26)** | **(0.26)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 312 | 312 | 312 | 310 | 310 | 310 |
| **MARGINS** | **-0.09** | **-0.11** | **-0.10** | **-0.09** | **-0.12**** | **-0.12**** |
| **MATHPREREQ(=1)** | **(0.08)** | **(0.07)** | **(0.07)** | **(0.07)** | **(0.06)** | **(0.06)** |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for the first treatment on degree choices of girls are presented below:

Table 63: Impact of Conflict during Higher Secondary Schooling on Degree Choices of Girls Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.002*** ** | **-0.002*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.002*** ** |
| | **(0.0005)** | **(0.0005)** | **(0.0004)** | **(0.0005)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.06** | **-0.05** | **-0.05** | **-0.18** | **-0.23** | **-0.16** |
| **MATHPREREQ(=1)** | **(0.59)** | **(0.59)** | **(0.59)** | **(0.59)** | **(0.49)** | **(0.46)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 62 | 62 | 62 | 62 | 57 | 55 |
| **MARGINS** | **-0.01** | **-0.01** | **-0.02** | **-0.09** | **-0.06** | **-0.06** |
| **MATHPREREQ(=1)** | **(0.15)** | **(0.15)** | **(0.15)** | **(0.07)** | **(0.12)** | **(0.14)** |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results for our overall specification using the second treatment are presented below:

Table 64: Impact of Conflict from 2007-2011 during School Years on Degree Choices of all Students

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001*** ** | **-0.001*** ** |
| | **(0.0002)** | **(0.0002)** | **(0.0003)** | **(0.0003)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.83*** ** | **-0.82*** ** | **-1.33*** ** | **-1.42*** ** | **-1.46*** ** | **-1.49*** ** |
| **MATHPREREQ(=1)** | **(0.27)** | **(0.27)** | **(0.44)** | **(0.43)** | **(0.39)** | **(0.42)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 246 | 246 | 243 | 241 | 241 | 241 |
| **MARGINS** | **-0.20*** ** | **-0.20*** ** | **-0.35** ** | **-0.38*** ** | **-0.39*** ** | **-0.40*** ** |
| **MATHPREREQ(=1)** | **(0.07)** | **(0.07)** | **(0.14)** | **(0.14)** | **(0.13)** | **(0.14)** |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for the second treatment on degree choices of boys are presented below:

Table 65: Impact of Conflict from 2007-2011 during School Years on Degree Choices of Boys Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** | **-0.001** ** |
| | **(0.0002)** | **(0.0002)** | **(0.0003)** | **(0.0003)** | **(0.0003)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.78** ** | **-0.77** ** | **-1.36*** ** | **-1.50*** ** | **-1.56*** ** | **-1.61*** ** |
| **MATHPREREQ(=1)** | **(0.35)** | **(0.36)** | **(0.50)** | **(0.47)** | **(0.43)** | **(0.43)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 213 | 213 | 211 | 209 | 209 | 209 |
| **MARGINS** | **-0.18** ** | **-0.18** ** | **-0.36** ** | **-0.40*** ** | **-0.41*** ** | **-0.42*** ** |
| **MATHPREREQ(=1)** | **(0.09)** | **(0.09)** | **(0.15)** | **(0.15)** | **(0.14)** | **(0.14)** |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

A gender-wise breakup of results for the second treatment on degree choices of girls are presented below:

Table 66: Impact of Conflict from 2007-2011 during School Years on Degree Choices of Girls Only

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.001*** ** | **-0.001*** ** | **-0.001*** ** | **-0.002*** ** | **-0.002*** ** | **-0.001*** ** |
| | **(0.0003)** | **(0.0003)** | **(0.0004)** | **(0.0004)** | **(0.0004)** | **(0.0003)** |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.83** | **-0.74** | **-0.44** | **-0.16** | **-0.19** | **-0.20** |
| **MATHPREREQ(=1)** | **(0.51)** | **(0.58)** | **(0.78)** | **(0.74)** | **(0.83)** | **(0.91)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 33 | 33 | 32 | 32 | 32 | 32 |
| **MARGINS** | **-0.23*** | **-0.19** | **-0.12** | **-0.04** | **-0.06** | **-0.06** |
| **MATHPREREQ(=1)** | **(0.12)** | **(0.15)** | **(0.20)** | **(0.19)** | **(0.21)** | **(0.31)** |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## 6.2 Restricting the sample size above the age of 22

Results for the impact of violence on degree choices of all students above the age of 22, using the first treatment, are presented below:

Table 67: Impact of Conflict from 2011-2013 on Degree Choices of all Applicants above Age 22

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.002**** | **-0.002**** | **-0.002**** | **-0.002***** | **-0.002**** | **-0.002**** |
| | **(0.0008)** | **(0.0008)** | **(0.0008)** | **(0.0007)** | **(0.0007)** | **(0.0007)** |
| F-Test | 6.09 | 3.11 | 3.52 | 8.55 | 12.16 | 11.45 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.09** | **-0.08** | **-0.07** | **-0.07** | **-0.02** | **-0.02** |
| | **(0.19)** | **(0.20)** | **(0.18)** | **(0.17)** | **(0.17)** | **(0.17)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 42 | 42 | 42 | 42 | 42 | 42 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

Results for the impact of violence on degree choices of all students above the age of 22, using the second treatment, are presented below:

Table 68: Impact of Conflict from 2007-2011 on Degree Choices of all Applicants above Age 22

| *OUTCOME VARIABLE= DEGREE CHOICE* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| FIRST STAGE: | | | | | | |
| **DISTANCE** | **-0.002**** | **-0.002**** | **-0.002**** | **-0.002**** | **-0.002**** | **-0.002**** |
| | **(0.0008)** | **(0.0008)** | **(0.0008)** | **(0.0008)** | **(0.0008)** | **(0.0008)** |
| F-Test | 13.77 | 7.65 | 5.46 | 16.95 | 6.60 | 5.33 |
| SECOND STAGE: | | | | | | |
| **CONFLICT** | **-0.03** | **0.01** | **0.03** | **-0.01** | **-0.11** | **-0.11** |
| | **(0.08)** | **(0.31)** | **(0.33)** | **(0.30)** | **(0.28)** | **(0.28)** |
| AGE | NO | YES | YES | YES | YES | YES |
| POP. GROWTH | NO | NO | YES | YES | YES | YES |
| EXAM SCORES | NO | NO | NO | YES | YES | YES |
| YEAR F.E | NO | NO | NO | NO | YES | YES |
| EDU F.E | NO | NO | NO | NO | NO | YES |
| CLUSTER | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT | DISTRICT |
| OBSERVATIONS | 23 | 23 | 23 | 23 | 23 | 23 |

Standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

## 7 Conclusion

One of the highest stake decision an individual makes during schooling is to decide on what career to choose. Hence the choice of going to university and which degree to apply for plays a critical role in determining the career choice and the future earnings of any individual. Many factors impact the choice of degree chosen at university level, chief amongst them being the standard economic model of schooling decision that compares the returns to different majors with the costs associated with completing them (Arcidiacono, 2010). Individuals tend to typically focus on their expected returns from choosing a degree and compare them to

alternative careers or occupations. However, when comparing costs of schooling, the focus shifts towards a students' ability to complete years of schooling in the most efficient and effective manner. In this regard, access to schooling and the environment in which schooling is provided plays a critical role in determining which degree choice would be most productive for a student. One such factor that can impact the environment in which a student makes choices regarding degrees at university level, and hence therefore impacts future career and earning prospects, is exposure to violence.

This paper tries to estimate the impact of conflict on degree choices at university level. By using admission data from 2014 till 2016 from one of the largest universities of Pakistan, Institute of Business Administration (IBA), we estimate whether students who were exposed to conflict applied to university degrees differently compared to students who were not exposed to conflict. Since the degree choices at IBA are clearly categorized as those that require mathematics as a pre-requisite (MATHPREREQ) and those that do not require mathematics as a pre-requisite (NONMATHPREREQ), we divide our sample along those admission criteria to study the impact of conflict on degree choices. We use two distinct treatments to define a district's exposure to conflict, each treatment being unique in terms of the time in student's life the violence occurred, which in turn played a critical role in determining the choice of degree at university level. Our first treatment defines exposure to conflict as violence witnessed by a student only during advance years of schooling i.e. during higher secondary level. By using a linear probability model, and a probit model as a robustness check, we instrument the probability of each district witnessing conflict, and hence being part of the first treatment, to the travelling distance of each district to the militant headquarter in Quetta, and estimate whether students who lived in conflict-affected districts applied for degrees differently than students who lived in non-conflict-affected districts. We find that violence witnessed during higher secondary years of schooling led to a decline in the likelihood that a student applied to a MATHPREREQ degree compared to a NONMATHPREREQ degree. Students who lived in conflict-affected districts were 10 per cent less likely to apply to a MATHPREREQ degree relative to NONMATHPREREQ degree, compared to students who lived in non-conflict districts. A gender wise breakup shows that boys who lived in conflict-affected districts were 12 per cent less likely to apply to a MATHPREREQ degree relative to boys who lived

in non-conflict districts, whereas no significant impact was found on degree choices of girls.

We then define our second treatment for exposure to conflict as violence witnessed by a student only during the first stage of conflict in Pakistan between 2007 till 2011, at a time when all applicants for the university entrance exam would have been in their primary, middle or secondary year of schooling. By again using linear probability model, and a probit model as a robustness check, we instrument the probability of each district witnessing conflict during the first phase of conflict, and hence being part of the second treatment, to the travelling distance of each district to the militant headquarter in Wana, and estimate whether students who lived in conflict-affected districts applied for degrees differently than students who lived in non-conflict-affected districts. We find that violence witnessed during the first phase of conflict during primary, middle or secondary year of schooling led to a decline in the likelihood that a student applied to a MATHPREREQ degree compared to a NONMATHPREREQ degree. Students who lived in conflict-affected districts were 36 per cent less likely to apply to a MATHPREREQ degree relative to NONMATHPREREQ degree, compared to students who lived in non-conflict districts. A gender wise breakup shows that boys who lived in conflict-affected districts were 38 per cent less likely to apply to a MATHPREREQ degree relative to boys who lived in non-conflict districts, whereas no significant effect was found on girls.

This disproportional impact of conflict on degree choices of boys but not girls could be attributed to the change in labour market prospects associated with each gender due to a violence-prone environment unfavourable for employment opportunities. Although we do not have data on labour market outcomes to test this explanation, the theory is in line with the existing literature that suggests conflict often results in lower unemployment rates for men but not for women (Kondylis, 2007). In Pakistan, women work primarily in the home or on the farm, or stay at home after getting married at early ages. Their participation in work outside these areas, particularly in formal employment, is extremely low. Despite increases in recent years, female labour force participation in Pakistan, at 25 per cent is well below rates for countries with similar income levels and only around 25 per cent of women with a university degree seek employment in the formal sector (ADB, 2016). This suggests that girls seeking university education are not driven by labour market returns, or earnings. In such instances, conflict would not result in a change in future labour market prospects for girls and perhaps not alter the preference of

degree choice at university level. However, the choice of degree chosen for boys could be correlated with the expectations of the labour market, and hence any violence deemed as a negative stimulus to lucrative employment opportunities could alter the choice of degree chosen at university level for boys.

There are several possible mechanisms through which exposure to violence for either of our treatment could have impacted degree choices related to mathematics at university level. These include decline in labour market prospects in districts that witnessed violence along with increase in job market uncertainty, reduction in supply side factors such as number of teachers available to teach mathematics, decline in demand side factors such as students performing worse in mathematics in school and hence opting out from choosing mathematics as a subject at school, and migration of students away from districts exposed to violence. However, due to the limitation of the data, we are unable to test for all of these possible mechanisms and focus only whether conflict could have impacted student performance in mathematics during school years, which in return could have discouraged students from applying to university for degrees that required mathematics as a pre-requisite. For each of our treatment, we test whether exposure to violence resulted in lowering of performance in mathematics which in return discouraged students from choosing a degree that required mathematics as a prerequisite. Our results for this mechanism for the first treatment does suggest that students exposed to violence during their higher secondary schooling did perform much worse in mathematics compared to students who did not witness violence. A gender-wise breakup of results shows that normalized mathematics scores for both boys and girls living in districts that experienced violence were lower than those of boys and girls living in districts that did not witness violence. However, the lowering of scores not translating into change in degree preference for girls suggests that a decline in performance in mathematics could only partially explain the preference in degree choices. Our results for this mechanism for the second treatment does not suggest that students who lived in districts that witnessed conflict performed poorly in mathematics compared to students who lived in districts that did not witness conflict. This is probably due to the fact that using mathematics scores in entrance exam between 2014 till 2016 is a weak proxy of student performance in mathematics during school years in 2007 till 2011.

Factors that influence a student's choice of degree based on the cost-benefit analysis can be categorized into three broad classifications: (i) student's

preparation and achievement at pre-university levels of education; (ii) an individual's preferences for various courses of study, which may be encouraged by parental and societal expectations; and (iii) the labour market prospects associated with a given set of skills. This research is amongst the first that adds exposure to conflict as a potential factor that may affect choice of degree at university level. Till now no literature exists that links how conflict through its impact on test scores could potentially affect the degree choices made at university level. We connect the existing literature on impact of violence on test scores, and the factors the effect choice of degree at university level, to try and estimate the impact of conflict witnessed at school level on degree choices at university level. Secondly, although it may seem comforting to find evidence that points towards the direct impact of violence on test scores to be short-lived, this research shows that conflict can have an indirect lasting impact on human capital accumulation and on future earnings. This is because violence before crucial exam periods could impact test scores and be an important determinant of university admissions, the choice of degree chosen and the quality of university to which students have access to. Hence, it is reasonable to assume that by impacting test scores, violence may have an indirect long-term consequence for the education and labour market outcomes of affected students.

# Chapter 4: Conclusion

The aim of this research is to study the impact of conflict on educational outcomes in Pakistan, particularly pertaining to female education. Pakistan ranked 143 out of 144 countries in the gender inequality index in 2014, with only 47 per cent women in Pakistan being literate, while 53 per cent of girls not attending school at all ((World Economic Forum, 2016). Discriminatory cultural and social practices have impeded equal access to education for girls compared to boys, with parents finding it less economically productive to invest in girls' education. Violent conflicts have only tilted the misbalance of equal opportunities away from girls as parents remove girls from schools with a greater concern for security. This research is divided into three chapters, with each chapter focusing on a unique aspect of the conflict, shedding light on the impact it had on educational outcomes. The first chapter deals with the first phase of conflict witnessed between 2007 till 2011 and focuses on the impact of violence on gross enrolment rates (GER) for primary and middle school students. By using an instrument variable (IV) technique we suggest that conflict caused a drop in overall GERs at primary and middle level for districts that witnessed violence. Moreover, since the militants adopted a policy of banning female education above the age of 8, we also show, using a difference-in-difference (DD) technique, that the militants were successful in using violence as a tool to ban female schooling, as GERs for girls declined more than boys in districts that did witness violence. By using a difference-in-difference-in-difference (DDD) technique we confirm our results that the ban was in fact detrimental for GER's of girls more than boys.

The second chapter looks at the short-run and the medium-run impact of conflict by assessing the enrolment rates after the end of the first phase of conflict. By using a pooled cross-sectional data, we compare districts that witnessed conflict with those did not witness conflict, and find that GERs for both boys and girls decline at primary and middle level in the short-run. However, after the conflict was over, in the medium-run, GERs for girls belonging to districts that experienced conflict recovered at primary and middle level to match those of girls belonging to districts that remained peaceful, but GERs for boys at middle level belonging to districts that experienced conflict remained lower than those of boys belonging to districts that remained peaceful. This could be attributed to the permanent substitution of boys into the labour market, once dropping out of school, and

finding it harder to return to school once conflict is over.

The third chapter uses a unique dataset obtained from the admission process of a university based in Karachi, institute of Business Administration (IBA), and examines the impact of conflict on degree choices of students applying to university. By using an IV approach along with a linear probability model estimation, we show that students who lived in districts that witnessed conflict were less likely to apply to degrees that required mathematics as a pre-requisite compared to students who lived in districts that remained peaceful. The results are similar for two separate channels that individually identify exposure to conflict in either the first phase of conflict or the second phase. However, a gender-wise breakup of results suggests that the negative impact of conflict was only signficiant on degree choices of boys, and not girls. This heterogenous effect may be attributed to the change in labour market outcomes brought about due to conflict. Factors that influence a student's choice of degree based on the cost-benefit analysis can be categorized into three broad classifications: (i) student's preparation and achievement at pre-university levels of education; (ii) an individual's preferences for various courses of study, which may be encouraged by parental and societal expectations; and (iii) the labour market prospects associated with a given set of skills.

However, there are certain data restrictions that need to be addressed in this thesis. However, there are certain data restrictions that need to be addressed in this thesis. The data used for conflict in this thesis is obtained from the South Asian Terrorism Portal (SATP) which collects data based on news resources and official government documents. This could lead to measurement errors in recording and reporting the exact civilian casualties in the country, especially from cities and districts severely affected by conflict, and from where accessibility of information may be difficult. We try to minimize any discrepancies in reporting and using data, if any, by two ways. Firstly, the data is compared with another set of data, the Global Terrorism Data (GTD) which also records information on terrorist events across the world based on variety of open media sources. Comparison of information on terrorist attacks and civilian casualties from these two datasets are much in line with each other. Secondly, the methodology used in each of the three chapters only requires a binary differentiation in whether districts were exposed to conflict or not. Therefore, even if there are differences in the number of terrorist attacks or civilian casualties reported by the databases, we are only interested in whether a district

was exposed to conflict or not. This further minimizes the risk of any variation that may arise due to difference in reporting of information by these two datasets. Moreover, for future research purposes further refinements can be made to the conflict data in terms of measuring occurrence or intensity of conflict with respect to spatial variation within the district. However, this would require data on educational outcomes and student-specific characteristics on an individual level, as well as within district-level. Due to the limitation of or data-set such refinement to the conflict data is not possible at the moment.

This research contributes to the existing literature in several ways. First, the nature of conflict in Pakistan and its impact on educational outcomes is a unique story. At a time when efforts are being made at a global level to achieve certain universal goals, including access to and attainment of basic education, militants in Pakistan adopted a ban restricting girls from attaining any sort of education beyond primary school. In order to achieve their desired goals, the use of violence was used to cause severe loss of life and damage to infrastructure to ensure a reduction in overall demand for schooling. Second, there has been very little research that has come out from the war on terror against Pakistan. This research helps in understanding the extent of destruction caused by the war and its direct and indirect impact on educational outcomes. Third, the identification strategy used to measure the impact of the policy ban on enorlment rates is unique in tackling the research question. Although existing literature either uses an IV approach to instrument for the endogeneity of occurrence of violence ( Monteiro et al., 2013; Gershenson et al., 2015; Haugan, 2016; Vanegas, 2014; Rodriguéz et al, 2009) or uses a difference-in-difference estimation to study the differential impact of conflict on the conflict-affected cohort (Chamarbagwala et al., 2010; Akresh et al., 2011; Swee, 2009), we combine the two approaches to find the impact of conflict on districts that were exposed to conflict, instrumenting for conflict originating from the militants' headquarters. Fourth, this research provides key insights on the dynamics of the pace of recovery for the growth theory that suggests that after a shock human capital accumulation returns to steady state (Chen et al., 2008; Cerra et al., 2008; Miguel et al, 2011; Davis et al., 2002; Brakman et al, 2004). This thesis suggests that the same nature of conflict has heterogeneous effects on the short-run and medium-run GERs of boys and girls, along with a differing pace of recovery. Therefore, although on aggregate level, GERs may recover, certain subgroups within the aggregate level may not recover within the same time period,

at the same pace. Moreover, although the ban on schooling was implemented towards girls, it had an impact on the short-run and medium-run GERs for boys too. This suggests that although violence could be used as a tool to target a certain group, it may have spill-over effects on other groups, leading to amplification of the negative impact. Fifth, factors that influence a student's choice of degree based on the cost-benefit analysis can be categorized into three broad classifications: (i) student's preparation and achievement at pre-university levels of education; (ii) an individual's preferences for various courses of study, which may be encouraged by parental and societal expectations; and (iii) the labour market prospects associated with a given set of skills. This research is amongst the first that adds exposure to conflict as a potential factor that may affect choice of degree at university level. Till now no literature exists that links how conflict through its impact on test scores could potentially affect the degree choices made at university level. We connect the existing literature on impact of violence on test scores, and the factors the effect choice of degree at university level, to try and estimate the impact of conflict witnessed at school level on degree choices at university level.

There are several methodological issues that may arise in the specifications due to the limitation of data on school-level, university-level and household-level information. There is not enough data that is released from Pakistan in terms of research on schooling and educational outcomes, hence this may lead to certain limitations in measuring our hypothesis, and potential channels, using the specified econometric models. In the first chapter, although we use an IV with a DD to measure the impact of conflict on enrolment rates, we do not have enough district-level and school-level controls to ensure that the instrument is not correlated with the error term. However, using various robustness checks and placebo test we can still test the validity of the used instrument and provide a plausible understanding of how conflict was dependent on the distance of each district from the militant headquarters, which in turn affected enrolment rates. Similarly, in the second chapter we observe that the change in the nature of conflict between 2007 and 2014 poses a limitation on our identification strategy. Violence in the first phase of conflict from 2007 till 2011 was dependent on the geographical proximity of each district from the first militant headquarter in Wana, whereas violence in the second stage of conflict from 2011 onwards was dependent on the geographical proximity of each district to a second militant headquarter, Quetta. To measure the recovery rate of enrolment rates in 2013 and 2015, the control and

treatment group must be dependent on both the first and the second phase of conflict. Our identification would require an instrument that would account for the continuing occurrence of conflict through this transition of varying phases of conflict. This raises difficulty in creating an instrument that would account for the complex treatment of our identification strategy. Lastly, in the third chapter, while we are interested in measuring the impact of conflict on degree choices, we do not have any information on student's educational and personal backgrounds or on district-level characteristics to test for any plausible mechanisms through which conflict may be affecting choice of degree chosen at university level. Although we try to control for type-of-schooling and district fixed effects, the lack of information on student-specific and district-specific characteristics might be biasing the magnitude of our effects. Moreover, our identification strategy compares districts that were affected by conflict in either phases of conflict with those that were not affected by conflict, to examine the distinct impact of each phase of conflict. However, this leads to a significant drop in the sample size of our data as there were many districts that were affected by both the phases of the conflict and were hence omitted from our estimation.

There are several policy debates that are highlighted in this thesis and need attention. Firstly, the significant differential in enrolment rates for boys and girls suggests that discriminatory cultural and social practices have impeded equal access to education for girls compared to boys, with parents finding it less economically productive to invest in girls' education. While greater effort must be made to ensure that access to basic education is made for both boys and girls, extra incentives must be provided to ensure that girls are given an equal opportunity to go to school. Secondly, although conflicts around the world are becoming increasingly localized in nature, their impact could be as catastrophic as full-scale wars. Policies such as banning female education and the use of violence to implement them, as suggested by this thesis, could have lasting negative consequences and could have considerable spill-over effects in the long run. Thirdly, as suggested in the second and third chapter, much of the decisions around schooling and choice of degree at the university level may revolve around the dynamics and expectations of the labour market. Despite increases in recent years, female labour force participation in Pakistan, at 25%, is well below rates for countries with similar income levels (ADB, 2016). Even among women with high levels of education, labour force participation lags: only around 25% of women with

a university degree in Pakistan are working. Policymakers must pay immediate attention to the low rate of female participation in the labour market which might be leading to a substantial loss in human capital accumulation for girls. Lastly, lessons must be learnt from studying the impact of conflict in Pakistan on educational outcomes to understand how to tackle the negative effects of violence. Violence effects educational outcomes directly, and indirectly, through multiple channels that could be effecting the demand or supply of schooling. Therefore, it is important to pay close attention to every conflict, in order to understand the mechanism through which it affects schooling, and the repercussions it has in the long run, specifically in terms of choice of degree at university level and labour market outcomes.

# Bibliography

Akbulut-Yuksel, M., 2009. Children of War: The Long-Run Effects of Large-Scale Physical Destruction and Warfare on Children (HiCN Working Paper No. 62). Households in Conflict Network.

Akresh, R., Walque, D. de, 2008. Armed Conflict and Schooling: Evidence from the 1994 Rwandan Genocide (No. 47), HiCN Working Papers. Households in Conflict Network.

Akresh, R., Verwimp, P., Bundervoet, T., 2007. Civil war, crop failure, and child stunting in Rwanda (No. WPS4208). The World Bank.

Alderman, H., Behrman, J., Lavy, V., Menon, R., 2001. Child Health and School Enrollment: A Longitudinal Analysis. Journal of Human Resources 36, 185–205.

Alderman, H., Hoddinott, J., Kinsey, B., 2006. Long term consequences of early childhood malnutrition. Oxf Econ Pap 58, 450–474. https://doi.org/10.1093/oep/gpl008

Al Qaeda Finds Its Center of Gravity - The New York Times [WWW Document], n.d. URL http://www.nytimes.com/2006/09/10/weekinreview/10rohde.html (accessed 1.19.18)

Arcidiacono, P., Hotz, V.J., Kang, S., 2012a. Modeling college major choices using elicited measures of expectations and counterfactuals. Journal of Econometrics 166, 3–16.

Armed Conflict | Educate a Child [WWW Document], n.d. URL http://educateachild.org/explore/barriers-to-education/fragile-and-conflict-affected-situations/armed-conflict (accessed 1.19.18).

Attacks on Education | Human Rights Watch [WWW Document], n.d. URL https://www.hrw.org/topic/childrens-rights/attacks-education (accessed 1.19.18)

Avenue, H.R.W.| 350 F., York, 34th Floor | New, t 1.212.290.4700, N. 10118-3299 U.|, 2017. Dreams Turned into Nightmares | Attacks on Students, Teachers, and Schools in Pakistan [WWW Document]. Human Rights Watch. URL https://www.hrw.org/report/2017/03/27/dreams-turned-nightmares/attacks-students-teachers-and-schools-pakistan (accessed 1.19.18)

Bank, T.W., 2001. Peruvian education at a crossroads : challenges and opportunities for the 21st century (No. 22357). The World Bank.

Bellows, J., Miguel, E., 2006. War and Institutions: New Evidence from Sierra Leone. American Economic Review 96, 394–399. https://doi.org/10.1257/000282806777212323

Blattman, C., Annan, J., 2010. The Consequences of Child Soldiering. The Review of Economics and Statistics 92, 882–898. https://doi.org/10.1162/REST_a_00036

Blattman, C., Miguel, E., 2010. Civil War. Journal of Economic Literature 48, 3–57. https://doi.org/10.1257/jel.48.1.3

Brakman, S., Garretsen, H., Schramm, M., 2004. The strategic bombing of German cities during World War II and its impact on city growth. Journal of Economic Geography 4, 201–218.

Brener, N.D., Simon, T.R., Anderson, M., Barrios, L.C., Small, M.L., 2002. Effect of the incident at Columbine on students' violence- and suicide-related behaviors. Am J Prev Med 22, 146–150.

Buckner, J.C., Beardslee, W.R., Bassuk, E.L., 2004. Exposure to violence and low-income children's mental health: direct, moderated, and mediated relations. Am J Orthopsychiatry 74, 413–423. https://doi.org/10.1037/0002-9432.74.4.413

Bundervoet, T., Verwimp, P., Akresh, R., 2009. Health and Civil War in Rural Burundi. J. Human Resources 44, 536–563. https://doi.org/10.3368/jhr.44.2.536

Campa, P., Casarico, A., Profeta, P., 2009. Gender Culture and Gender Gap in Employment (No. 2738), CESifo Working Paper Series. CESifo Group Munich.

Canes, B.J., Rosen, H.S., 1995. Following in Her Footsteps? Faculty Gender Composition and Women's Choices of College Majors. ILR Review 48, 486–504. https://doi.org/10.1177/001979399504800308

Cascio, E.U., Staiger, D.O., 2012. Knowledge, Tests, and Fadeout in Educational Interventions (Working Paper No. 18038). National Bureau of Economic Research. https://doi.org/10.3386/w18038

Cerra, V., Saxena, S.C., 2008. Growth Dynamics: The Myth of Economic Recovery. American Economic Review 98, 439–457. https://doi.org/10.1257/aer.98.1.439

Chamarbagwala, R., Morán, H.E., 2011. The human capital consequences of civil war: Evidence from Guatemala. Journal of Development Economics 94, 41–61. https://doi.org/10.1016/j.jdeveco.2010.01.005

Chen, S.L., Norman V. Reynal-Querol, Marta, 2008. The Aftermath of Civil War. World Bank Economic Review 22, 63–85. https://doi.org/10.1093/wber/lhn001

Chevalier, A., 2007. Education, Occupation and Career Expectations: Determinants of the Gender Pay Gap for UK Graduates*. Oxford Bulletin of Economics and Statistics 69, 819–842. https://doi.org/10.1111/j.1468-0084.2007.00483.x

Currie, J., Thomas, D., 2001. Early test scores, school quality and SES: Longrun effects on wage and employment outcomes, in: Worker Wellbeing in a Changing Labor Market, Research in Labor Economics. Emerald Group Publishing Limited, pp. 103–132. https://doi.org/10.1016/S0147-9121(01)20039-9

Davis, D., Weinstein, D., 2002. Bones, Bombs, and Break Points: The Geography of Economic Activity. American Economic Review 92, 1269–1289.

Di Maio, M., Nandi, T.K., 2013. The effect of the Israeli–Palestinian conflict on child labor and school attendance in the West Bank. Journal of Development Economics 100, 107–116.

Documento CEDE No.48 2014: Exposición prenatal a la violencia y deserción escolar en el largo... | La Silla Vacía [WWW Document], n.d. URL http://lasillavacia.com/content/documento-cede-no48-2014-exposicion-prenatal-la-violencia-y-desercion-escolar-en-el-largo (accessed 1.19.18)

Duflo, E., 2001. Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment. American Economic Review 91, 795–813. https://doi.org/10.1257/aer.91.4.795

Dynan, K.E., Rouse, C.E., 1997. The Underrepresentation of Women in Economics: A Study of Undergraduate Economics Students. The Journal of Economic Education 28, 350–368. https://doi.org/10.1080/00220489709597939

Editor, E.F.A., 2012. Conflicts are one of the biggest barriers to Education for All. World Education Blog.

Escobal, J., Flores, E., 2009. Maternal Migration and Child Well-Being in Peru [WWW Document]. URL https://mpra.ub.uni-muenchen.de/56463/ (accessed 1.19.18)

Farrell, A.D., Bruce, S.E., 1997. Impact of exposure to community violence on violent behavior and emotional distress among urban adolescents. J Clin Child Psychol 26, 2–14. https://doi.org/10.1207/s15374424jccp2601_1

Fergusson, L., Ibáñez, A.M., Riaño, J.F., 2015. Conflict, Educational Attainment and Structural Transformation: La Violencia in Colombia (No. 013880), DOCUMENTOS CEDE. UNIVERSIDAD DE LOS ANDES-CEDE.

Figley, C.R., 2002. Compassion fatigue: psychotherapists' chronic lack of self care. J Clin Psychol 58, 1433–1441. https://doi.org/10.1002/jclp.10090

Galdo, J., 2013. The Long-Run Labor-Market Consequences of Civil War: Evidence from the Shining Path in Peru. Economic Development and Cultural Change 61, 789–823. https://doi.org/10.1086/670379

Galea, S., Nandi, A., Vlahov, D., 2005. The Epidemiology of Post-Traumatic Stress Disorder after Disasters. Epidemiol Rev 27, 78–91. https://doi.org/10.1093/epirev/mxi003

Gershenson, S., Tekin, E., 2015. The Effect of Community Traumatic Events on Student Achievement: Evidence from the Beltway Sniper Attacks (No. 21055), NBER Working Papers. National Bureau of Economic Research, Inc.

Goldin, C., Katz, L.F., Kuziemko, I., 2006. The Homecoming of American College Women: The Reversal of the College Gender Gap. Journal of Economic Perspectives 20, 133–156.

Grogger, J., 1997. Local Violence and Educational Attainment. Journal of Human Resources 32, 659–682.

Govt warned against US operation in Fata -DAWN - National; May 6, 2002 [WWW Document], 2013. . archive.is. URL http://archive.is/kqYQw (accessed 1.19.18).

Gross enrolment ratio [WWW Document], 2017. URL http://uis.unesco.org/en/glossary-term/gross-enrolment-ratio (accessed 1.19.18).

Guiso, L., Monte, F., Sapienza, P., Zingales, L., 2008. Culture, Gender, and Math. Science 320, 1164–1165. https://doi.org/10.1126/science.1154094

Gunderson, M., 1989. Male-Female Wage Differentials and Policy Responses. Journal of Economic Literature 27, 46–72.

Hanushek, E.A., 1979. Conceptual and Empirical Issues in the Estimation of Educational Production Functions. The Journal of Human Resources 14, 351–388. https://doi.org/10.2307/145575

Hanushek, E.A., Rivkin, S.G., 2010. Generalizations about Using Value-Added Measures of Teacher Quality. American Economic Review 100, 267–271. https://doi.org/10.1257/aer.100.2.267

Haravuori, H., Suomalainen, L., Turunen, T., Berg, N., Murtonen, K., Marttunen, M., 2012. Students exposed to the school shootings at Jokela and Kauhajoki – recovering and received support and care. Final report of a two-year follow-up study. National Institute of Health and Welfare. Report 4.

Haugan, G.L., 2016. The effect of urban violence on student achievement in Medellin, Colombia (No. 014326), DOCUMENTOS CEDE. UNIVERSIDAD DE LOS ANDES-CEDE.

Horowitz, M., Wilner, N., Alvarez, W., 1979. Impact of Event Scale: a measure of subjective stress. Psychosom Med 41, 209–218.

Inside Rebellion: The Politics of Insurgent Violence, 2009. Foreign Affairs.

Ichino, A., Winter-Ebmer, R., 2004. The Long-Run Educational Cost of World War II. Journal of Labor Economics 22, 57–86.

James, E., Nabeel-Alsalam, J.C.C., Duc-Le, T., 1989. College Quality and Future Earnings: Where Should You Send Your Child to College? American Economic Review 79(2), 247-252.

Justino, P., Leone, M., Salardi, P., 2013. Short, and long-term impact of violence on education : the case of Timor Leste. The World Bank economic review 28, 320–353.

Kahn, S.B., 1995. Women in the Economics Profession. Journal of Economic Perspectives 9, 193–206. https://doi.org/10.1257/jep.9.4.193

Kane, T.J., Staiger, D.O., 2008. Estimating Teacher Impacts on Student Achievement: An Experimental Evaluation (Working Paper No. 14607). National Bureau of Economic Research. https://doi.org/10.3386/w14607

Kondylis, F., 2007. Conflict-Induced Displacement and Labour Market Outcomes: Evidence from Post-War Bosnia and Herzegovina (No. dp0777), CEP Discussion Papers. Centre for Economic Performance, LSE.

Leon, G., 2012. Civil Conflict and Human Capital Accumulation The Long-term Effects of Political Violence in Perú. The Journal of Human Resources 47, 991–1022. https://doi.org/10.1353/jhr.2012.0036

Littleton, H.L., Grills-Taquechel, A.E., Axsom, D., Bye, K., Buck, K.S., 2012. Prior Sexual Trauma and Adjustment Following the Virginia Tech Campus Shootings: Examination of the Mediating Role of Schemas. Psychological trauma : theory, research, practice and policy 4, 579. https://doi.org/10.1037/a0025270

Lyytinen, N., 2010. Posttraumatic stress symptoms among school personnel after the Jokela school shootings: a longitudinal study of exposure, interventions, and symptom changes. A Master´s thesis. Helsinki, Finland. University of Helsinki.

Machin, S.J., Puhani, P.A., 2002. Subject of Degree and the Gender Wage Differential: Evidence from the UK and Germany (SSRN Scholarly Paper No. ID 327562). Social Science Research Network, Rochester, NY.

Maccini, S., Yang, D., 2009. Under the Weather: Health, Schooling, and Economic Consequences of Early-Life Rainfall. American Economic Review 99, 1006–1026. https://doi.org/10.1257/aer.99.3.1006

Miguel, E., Roland, G., 2011. The long-run impact of bombing Vietnam. Journal of Development Economics 96, 1–15. https://doi.org/10.1016/j.jdeveco.2010.07.004

Miller, R., Murnane, R., B. Willett, J., 2007. Do Teacher Absences Impact Student Achievement? Longitudinal Evidence From One Urban School District. National Bureau of Economic Research, Inc, NBER Working Papers 30. https://doi.org/10.3102/0162373708318019

Ministry of Justice, 2010. Kauhajoki School Shooting on 23 September 2008 – Report of the Investigation Commission. Ministry of Justice Publications, 39.

Monteiro, J., Rocha, R., 2016. Drug Battles and School Achievement: Evidence from Rio de Janeiro's Favelas. The Review of Economics and Statistics 99, 213–228. https://doi.org/10.1162/REST_a_00628

Malala Yousafzai - Nobel Lecture [WWW Document], n.d. URL https://www.nobelprize.org/nobel_prizes/peace/laureates/2014/yousafzai-lecture_en.html (accessed 1.19.18).

Marsh, S., 2015. School attacks around the world in data [WWW Document]. the Guardian. URL http://www.theguardian.com/teacher-network/datablog/2015/apr/30/terror-data-school-university-attackes-peshawar (accessed 1.19.18).

Osofsky, J.D., 1999. The impact of violence on children. Future Child 9, 33–49.

Pakistan Data Portal [WWW Document], n.d. URL http://data.org.pk/ (accessed 1.19.18).

Pakistan Social And Living Standards Measurement | Pakistan Bureau of Statistics [WWW Document], n.d. URL http://www.pbs.gov.pk/content/pakistan-social-and-living-standards-measurement (accessed 1.19.18).

Pynoos, R.S., Frederick, C., Nader, K., Arroyo, W., Steinberg, A., Eth, S., Nunez, F., Fairbanks, L., 1987. Life threat and posttraumatic stress in school-age children. JAMA psychiatry, JAMA psychiatry (Chicago, Ill.) 44, 1057–1063.

Quetta | Combating Terrorism Center at West Point, n.d.

Rodríguez, C., T, F.S., 2009. Armed Conflict Exposure, Human Capital Investments and Child Labor: Evidence from Colombia (No. 005400), DOCUMENTOS CEDE. UNIVERSIDAD DE LOS ANDES-CEDE.

Rothchild, B., Rand, M., 2006. Help for the helper. e Psychophysiology of Compassion Fatigue and Vicarious Trauma. New York, NY. W & W Norton & Company.

Roy, S., Singh, P., 2016. Gender bias in education during conflict: Evidence from Assam (No. 225), HiCN Working Papers. Households in Conflict Network

Scrimin, S., Axia, G., Capello, F., Moscardino, U., Steinberg, A.M., Pynoos, R.S., 2006. Posttraumatic reactions among injured children and their caregivers 3 months after the terrorist attack in Beslan. Psychiatry Research 141, 333–336. https://doi.org/10.1016/j.psychres.2005.11.004

Severnini, E., Firpo, S.P., 2010. The relationship between school violence and student proficiency (Working Paper).

Shemyakina, O., 2011. The effect of armed conflict on accumulation of schooling: Results from Tajikistan. Journal of Development Economics 95, 186–200.

Silwal, S., 2016. Resilience amidst conflict? The effect of civil war exposure on secondary education. International Journal of Development and Conflict 6, 97–120.

Suomalainen, L., Haravuori, H., Berg, N., Kiviruusu, O., Marttunen, M., 2011. A controlled follow-up study of adolescents exposed to a school shooting--psychological consequences after four months. Eur. Psychiatry 26, 490–497. https://doi.org/10.1016/j.eurpsy.2010.07.007

Swee, E.L., 2015. On war intensity and schooling attainment: The case of Bosnia and Herzegovina. European Journal of Political Economy 40, 158–172.

Taliban massacre children at school, 2014. . BBC News.

Terrorism | South Asia Terrorism Portal [WWW Document], n.d. URL http://www.satp.org/ (accessed 1.19.18).

The Afghan-Pakistan militant nexus, 2011. . BBC News.

The Taliban's 'alarmingly efficient' war on education | World news | The Guardian [WWW Document], n.d. URL https://www.theguardian.com/world/shortcuts/2014/dec/21/taliban-alarmingly-efficient-war-education-peshawar-attack (accessed 1.19.18).

Tonin, M., Wahba, J., 2015. The Sources of the Gender Gap in Economics Enrolment. CESifo Econ Stud 61, 72–94. https://doi.org/10.1093/cesifo/ifu033

Turner, S., Bowen, W.G., 1999. Choice of Major: The Changing (Unchanging) Gender Gap. ILR Review 52, 289–313.

Turunen, T., Haravuori, H., Pihlajamäki, J.J., Marttunen, M., Punamäki, R.-L., 2014. Framework of the outreach after a school shooting and the students perceptions of the provided support. Eur J Psychotraumatol 5. https://doi.org/10.3402/ejpt.v5.23079

Vanegas, V., 2014. Exposición prenatal a la violencia y deserción escolar en el largo plazo en Colombia. Documentos CEDE 48.

Waziristan accord signed -DAWN - Top Stories; September 06, 2006 [WWW Document], n.d. URL https://archive.is/20130702061347/http://archives.dawn.com/2006/09/06/top2.htm (accessed 1.19.18).

WEF_Global_Gender_Gap_Report_2016.pdf, n.d.

Yehuda, R., 1998. Resilience and vulnerability factors in the course of adaptation to trauma. Clinical Quarterly 8, 1–6.