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RESILIENCE AMIDST CONFLICT?: THE EFFECT OF CIVIL WAR EXPOSURE ON SECONDARY EDUCATION

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I use education and conflict data from Nepal to examine the effect of exposure to violence on students at secondary schooling level and highlight patterns of recovery in the post-conflict period. This study extends our understanding of the effects of civil unrest on both *quantity* and *quality* of schooling by analyzing the effects during the periods of unrest and immediately following the end of the conflict. I find a substantial negative impact of exposure to violence on the secondary schooling. Some adverse effects rebounded 3-5 years after the conflict ended; however, notable gaps in academic performance between high-violence areas and low-violence areas has persisted and girls continue to dropout at higher rates. These results indicate that an armed conflict within a country has specific and far-reaching consequences for a warring state's young population and next generation, in addition to the well-established more immediate effects of violence.

Keywords: Conflict, Human Capital, Post-Conflict Recovery, Nepal

JEL Classification: I2, J1, O1

1. Introduction

Various forms of violent incidents plague our society. While actions like war and crime seem ubiquitous, the people of these affected areas carry on or resume their daily activities. Consider the prevalence of one of the most common forms of civil disruption: civil wars. In the mid-1990s, there were 44 civil wars in the world affecting about one quarter of the states in the international system (Fearon, 2004). Apart from the immediate impacts, like casualties and damage to infrastructure, civil wars also leave behind more indirect and prolonged consequences on the survivors. The remaining population now has to make the transition into the new post-conflict period. Recently, several micro-level studies have documented short-term and long-term consequences of direct and indirect exposure to violence on education attainment of children and youth.

Empirical evidence demonstrates that child soldiering is the worst form of child labor and a poor substitute for schooling (Blattman and Annan, 2010), while education attainment of children exposed to conflict in Peru (Leon, 2012), Rwanda (Arkresh and

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Walque, 2011), Bosnia and Herzegovina (Swee, 2011), Tajikistan (Shemyakina, 2011), Guatemala (Chamarbagwala and Moran, 2011), Colombia (Rodriguez and Sanchez, 2009), and the Punjab insurgency (a terrorist incident in a state of India; Singh and Shemyakina, 2014) was adversely affected by the conflict in these countries. Likewise, studies find that the short-term effects of exposure to violence on educational attainment to be greater than the long-term effects (Leon, 2012), indicating that some of the loss in human capital rebounds in the post-conflict period, as the affected children can now reenroll in schools. Additionally, the timing of exposure to violence also has an effect on educational attainment. Children who are exposed to violence early in their lives are more adversely affected by civil conflicts than the children who are much older during their encounter with violent incidents (Leon, 2012 and Arkresh and Walque, 2011)[1]. Finally, the factors that drive the negative effects of educational attainment include deteriorating health outcomes[2], the reduction in the availability of schools and teachers[3], falling demand for education due to a higher opportunity cost of attending schools[4], and loss of income and security concerns[5].

While the aforementioned studies analyze the short-term and long-term consequences of war exposure, several important questions remain unanswered. Specifically, how is education attainment affected during the time of war? Studies thus far have analyzed the effects of a civil war several years after the conflict ended, but how education attainment is affected during the episodes of fighting remains unknown[6]. Do students, on average, drop out of school in the midst of war and then return after a ceasefire (conflict delays education attainment)? Or, are they more likely to drop out during the most intense fighting and never finish their schooling again (conflict reduces overall education attainment)? Considering that the median duration of an internal war, the most prevalent type of war, is around 6 years, is it conceivable that children exposed to civil wars drop out during escalations of violence and then reenroll after the conflict subsides? Currently, no study has attempted to answer this question by examining school dropout and completion rates as a civil conflict is ongoing. Likewise, how does this pattern of dropout and completion rates compare to those in the post-conflict period soon after violence ceases?

More importantly, however, it is not known how conflict affects the *quality* of educational attainment for students who complete certain levels of schooling in a conflict environment. Aside from sparse literature that analyzes cognitive and other developmental effects of war (Hanushek and Woessmann, 2008), no study has investigated the impact of conflict on education beyond the years of schooling and school completion rates.

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[1]Swee (2011) and Valente (2013) are exceptions in that the former study finds no adverse effects on education attainment at primary schooling level, whereas the latter generally finds positive effects of the Nepalese Maoists insurgency on primary schooling completion rates.

[2]See Blattman and Annan (2010), Leon (2012), Camacho (2009); Hanushek and Woessmann(2008); Alderman, Hoddinott, and Kinsey (2006); and Bundervoet, Verwimp, and Akresh (2009).

[3]Leon (2012)

[4]Singh and Shemyakina (2015).

[5]Shemyakina (2011)

[6]Singh and Shemyakina (2015) is an exception in that the study analyzes spending behavior of farmers during the Punjab insurgency.

To answer these questions we need data on education attainment before the conflict, during the time of conflict, and in the post-war period. Unfortunately, many war-torn countries lack systematic and reliable dataset in both the pre-war and war periods. Additionally, we need information on temporal levels of violence, and there needs to be sufficient variation in war within the country and across multiple time periods. The Nepalese Maoists insurgency fits the latter requirement quite perfectly (see Silwal, 2013; Pivovarora and Swee, 2015; Valente 2014; Bohara et al, 2006 for similar arguments on temporal and geographical variation in conflict in Nepal). Likewise, given the relatively low intensity of war and numerous ceasefires during the second half of the insurgency, the education system and data collection remained functional[7] in Nepal. The administrative data used in this study is directly obtained from schools and aggregated at the district level by various government agencies. Since Nepal has always been heavily reliant on foreign assistance, particularly in areas of health and education, data gathering was systematic from the early 1990s (after the country went from absolute monarchy to constitutional monarchy) and continues to the present day. In fact, various agencies such as the World Bank and UNESCO utilize the same data sources for reporting the country's education statistics.

Using the case of the civil war in Nepal, this study contributes to the literature by estimating the effects of civil unrest on schooling outcomes during the war period and comparing those findings to outcomes 3–5 years after a conflict ended. Analyzing educational attainment before the war, during the war, and soon after the war, provides a sense of the immediate effects of war. In addition, the study helps understand post-conflict recovery in the immediate absence of violence. To do so, the data used is archived education data from 1989 (7 years before conflict) to 2011 (5 years after the end of conflict). An additional contribution of the study is the new way of examining the impact of war by investigating the distributional change in academic performance for those students who complete secondary schooling. Comparing academic performance before, during, and after war, I show how the conflict affected not just schooling completion rates (as previous studies have done), but also academic achievement of those students who completed schooling.

Likewise, the study also identifies whether the conflict simply delayed schooling or resulted in an overall decline in educational attainment in areas that were more adversely affected by conflict. Lastly, whereas past studies have relied primarily on survey data[8], the use of local level administrative data on students at the secondary level provides a new perspective. While the survey data helps conduct micro-level studies by allowing observations on individual characteristics and their relations to war and education outcomes, the advantage of the administrative data (data that is gathered directly from schools and aggregated at the district level) is that I am able to observe aggregate schooling outcomes for *all* schooling-age children enrolled in schools in the country. A disadvantage of this

[7]See Resilience Amidst Conflict: An Assessment of Poverty in Nepal (2006) for further support of this.

[8]The two most commonly used survey data are the Demographic and Health Survey (DHS) and World Bank's Living Standard Measurement Surveys (LSMS).

data is that I do not have individual-level information. The advantage, however, is that we information is available on all students enrolled in schools during particular stages of their educational attainment.

I show that if the effect discussed is the impact at the extensive margin (the completion of schooling), then the findings of this study confirm the findings of other studies in the related literature. Broadly speaking, the common key findings are the presence of some permanent loss in education attainment during a war period, with some recovery. For example, data from the conflict periods between 1996 and 2001 show substantial negative short-term effects. Difference-in-differences estimates indicate that one standard deviation increase in conflict-related deaths in a district (26 additional deaths) decreased the passing rate of the national examination at the end of the secondary schooling by 0.15 standard deviations, or by 0.67 percentage points. Alternatively, the exam's passing rate in conflict prone areas was 3.84 percentage points lower during the conflict period when compared to other low-violence districts. Approximately half of the drop in the passing rate was due to fewer students taking the exam. The effect was larger on the girl's examination passing rates (0.13 standard deviations decrease for boys versus 0.21 standard deviations decrease for girls). Conditional on completing secondary education, the students were also likely to score lower during the conflict period. The student's overall academic performance as measured in a national examination decreased due to exposure to violence.

The post-conflict data from 2009–2011 suggests that some loss in human capital seems to rebound. The districts that were highly affected by the conflict began to see similar examination passing and dropout rates experienced by those districts that were very minimally affected by violence. Recovery was particularly remarkable for boys, but girls from conflict-prone areas continued to dropout at higher rates during the post-conflict period. Even so, some negative outcomes persist. When compared to students from low-violence districts, the students from high-violence districts are just as likely to pass in the post-conflict period as they were in the pre-conflict period, while students from high-violence districts are more likely to pass at the margin. This means that while the gap in secondary schooling completion rate between high and low-violence districts narrowed during the post-conflict period, the difference in academic performance between the two increased over time. Thus, the study highlights the permanent loss in human capital of those students failing the examination during the conflict period and the resulting wider performance gap after the conflict. Such results could imply increased generational inequality and widen gender differences in education attainment. Furthermore, since differences in academic achievement relate to different returns to education, the conflict could have possible long-term consequences on further exacerbating regional inequality in the educational and labor market.

The root causes of wars are heterogeneous, and possibly in their effects on broader population as well. Some episodes of violence tend to be short-lived, but very brutal, such as the Rwandan genocide. Others, like the Peruvian civil war, last over a decade. The intensity, duration, goals, and means of violence should determine the magnitude and length of the impact the violence has on population at large. As research from different

countries emerges, it suggests a more systematic study of impacts of violence on broader populations.

The remainder of this paper is organized as follows. First, there is a historical context provided of the Nepalese Maoist insurgency presented in Section 2, followed by an overview of Data in Section 3. Section 4 describes the methodology and addresses potential identification issues; and the results are presented in Section 5. Section 6 examines the persistence of effects, while Section 7 offers conclusions.

2. Background: Nepal and the Maoist Insurgency (1996–2006)

Nepal is a landlocked country located in Southern Asia. It is bordered by India on the east, west, and south, and China to the north. The country has a population of approximately 30 million and total land area of 147.2 thousand square kilometers. There are 75 administrative units, called districts, which are grouped into 5 development regions. As statistics are consistently reported at the district level, these districts are used as the units of observation. A district is comparable to a county in the United States (Do and Iyer, 2010).

Nepal lags significantly behind her South Asian neighbors in terms of economic development. Agriculture is the largest sector of the economy with a GDP per capita (ppp) of 1,300 USD (Fiscal Year 2012, World Bank and CIA Factbook, 2016). Nepal's per capita GDP is behind that of neighboring India and Bangladesh, with GDPs of USD 3,900 and USD 2,000, respectively (CIA Factbook, 2016). Although Nepal is poorer in an absolute sense, the relative spending on primary education and the degree of educational attainment are still similar to other South Asian countries that boast larger GDPs than Nepal. Literacy rates, educational spending, and promotion of education in Nepal is equivalent to other South Asian countries like India and Bangladesh. For example, the adult literacy rate in Nepal is 60.3 percent, higher than that of Bangladesh at 56.8 percent (World Bank), and 13 points behind India at 73 percent. Per student expenditure on primary education (as a percentage of GDP/capita) in Nepal was a high 17.8 percent in 2009, compared to the relatively low 9 percent in India and 8.8 percent in Bangladesh. Similarly, the presence of female students who complete primary schooling (as a percentage of cohort) was 63.7 percent in Nepal in 2007, 65.3 percent in India, and 66.1 percent in Bangladesh (World Bank) [9].

The incidence of Maoist struggle in Nepal is in stark contrast to conflicts experienced by its neighbors, which began with small protests in 1996 and affected the entire nation by 2002. The official birth of the Maoists in Nepal is considered to be in 1995 after the Election Commission refused to recognize the communist party. Upon this denial, the party was renamed the Communist Party of Nepal, which eventually became known as the Maoist Party or more formally as CPN(M). Dr. Baburam Bhattarai, then vice-chairman of the CPN(M) who later became the Prime Minister of Nepal in 2011, approached then Prime Minister Sher Bahadur Deuba with a 40-point memorandum on February 4, 1996, warning

[9]Since these statistics are not consistently available for the same years, they pertain to different years for different countries. For example, per student expenditure in primary education in India is for 2006, while that of Nepalis for 2009.

the government of an armed revolt should the government fail to meet certain demands by February 17. Even with the threat, the deadline was not met and on February 13, 1996 the insurgency began when a series of attacks on government offices were launched in several parts of the country (Thapa and Sijapati, 2004).

In the years following the initial escalation of violence, the insurgency was relatively tame with only a few additional districts being affected each year. Figure 1 shows the temporal and geographical spread of violence from 1996–2006. As the figure shows, while the conflict spread across the country, it also grew in its intensity. Silwal (2013) models the spatial-temporal spread of violence and finds that the conflict spread through neighboring districts and escalated over the years. Then king of Nepal, who was also the commander-in-chief, was against mobilizing the army to counter the Maoists. As such, the Maoists had time to slowly expand their presence throughout the country, gather recruits, and spread violence while also acquiring arms and resources. The year 2001 represents a turning point for the Maoists, as well as for Nepal. With the Royal Family Massacre[10], the commander-in-chief of the army had now changed. The new king mobilized the national army for the first time to abate the insurgency, which added to the intensity of the ongoing conflict. From 2002 to 2006, there were several failed attempts of a ceasefire. Finally, when the monarchy was abolished in 2006, the political parties signed a Comprehensive Peace Agreement. It was agreed that the Maoists would keep their arms with UN-oversight and a constituent assembly election would be held to move towards a new constitution.

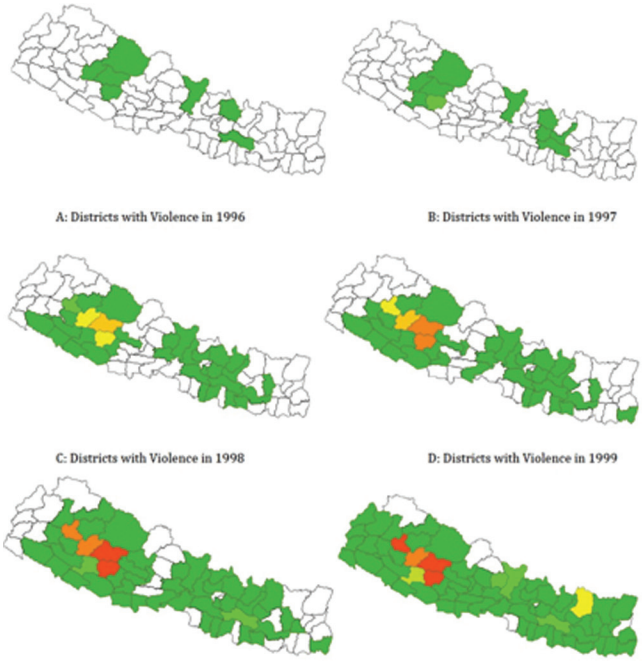

Figure1: Spread of Violence from 1996–2001

[10]In June1, 2001, Crown Prince Dipendra killed himself and nine other members of the Royal Family over a disagreement on his choice of life partner. The king, queen, and all other members of the Royal Family were killed in the incident.

The signing of the Comprehensive Peace Agreement marked the end of the decade-long insurgency. A transitory period for the country followed the ceasefire, in which an interim constitution was adapted in 2007, an election for constituent assembly occurred in 2008, and finally new constitution was implemented in 2015.

3. Data and Outcomes of Interest

All students in Nepal finishing their secondary schooling are required to take the standardized national test called the School Leaving Certificate (SLC) Examination. Students are required to pass this examination to mark the completion of their secondary schooling and to continue onto higher education. Passing the exam is also a minimum requirement for many government jobs. The exam, therefore, is a binding constraint for the students. Any negative impact at this level suggests a substantial loss in human capital because both higher education and employment prospects of students are thereby limited. The Office of the Controller of Examinations in Kathmandu, Nepal maintains the examination results. For this research purpose, examination results data from 1989–2011 were obtained[11].

The SLC examination data reports the total number of students who took the examination and the total number of students who passed, in each district. The numbers are also reported separately by gender. If students successfully pass the exam, information is available on the examination performances as well. Scores are categorized based on how well the students perform. Scores greater than 32 percent but less than 45 percent of the overall score are classified as a third division score. These are the students who pass at the margin, as a score below 32 percent constitutes failing the exam. Second division scores are scores greater than 44 percent and less than 60 percent. Lastly, first division scores are scores greater than 60 percent. The data lists the numbers of students with scores in each of the three scoring categories for all of the 75 districts from 1991–2011.

The number of students taking the exam (separately by gender), passing the exam (separately by gender), and scoring in each of the three divisions, weighted by eligible secondary-schooling age population, are the main outcomes of interest for this study. That is, the study examines secondary schooling attainment in two dimensions: the examination appearance and passing rates, which estimates the impact at the extensive margin; and examination scores conditional on passing the exam, which measures academic performance conditional on secondary school completion, or the impact at the intensive margin. The examination passing rate is analogous to secondary schooling completion rate, thereby allowing a comparison of the results to others studies in the related literature. Conversely, the examination appearance rate helps attribute the passing rate to increased dropout rates at the secondary level.

Information on the temporal levels of violence comes from the Informal Sector Service Center (INSEC). This includes numbers of killings, beatings, threats, and abductions by the Maoist rebels and the government from 1996–2006. Since only the killings data is available consistently throughout the years, the number of killings (both by the State and

[11]2006 data is missing.

the Maoists) weighted by the district population (of 1990) is used as a measure of the conflict's intensity.

The INSEC is a non-governmental human rights organization aimed at dissimilating information and increasing government accountability in human rights cases. It was established in the 1988 and has been gathering accounts of human rights violations in the country since then. Several studies, such as Pivovarora and Swee (2015), Silwal (2013), Valente (2014), Bohara et al (2006), Do and Iyer (2010), all employ the data from INSEC.

Similar to other studies, the identification strategy utilizes temporal and geographical variation in conflict intensity to estimate the effects of exposure to violence. Because after 2001, the entire country was affected by the conflict (which reduced variation in conflict intensity between districts), this study uses data from 1996–2001 only. The years following 2001 were marked by an escalation of violence mainly due to the government engaging in arbitrary counterinsurgency tactics. Following the change in army leadership (the king), the army was mobilized to engage the Maoists for the first time. As previously noted, this further increased the intensity of the violence. Thus, if the years after 2001 were to be included in the conflict period analysis, there would not be enough variation in violence intensity to isolate and identify the effects of the conflict[12].

Finally, schooling level data covering the years 1994–2006 was collected from the Ministry of Education in Nepal. The education statistics of Nepal data consists of annual information on student enrollment (grades 1 to 10), number of various school types (public or private), and the number of teachers available at each grade. This data is employed to examine whether the conflict reduced the availability of schools and teachers. It is to be noted that both the SLC exam and the schooling data are obtained from official records. World Bank, UNESCO Nepal, and several other national and multi-national agencies also produce education statistics based on the same official government records. As author, I conducted several interviews with the UNESCO office Nepal to gain further information on the methodology in the statistics. The World Bank and UNESCO have significantly improved data collection in developing countries over the years, especially where the emphasis is on capacity building at local and national level. They help local statistics division with the choice of variables, enumeration strategies for survey design, and provide other technical assistance. Therefore, these statistics can be productively used for research purposes. Table 1 provides a descriptive statistics of the outcomes of interest and the measure of conflict intensity.

4. Estimation Strategy and Identification

A differences-in-differences estimation with OLS is

$$y_{it} = \alpha + \beta * \text{Violence}_{it} + \gamma * \text{District} + \pi * \text{Year} + \varepsilon_{it} \tag{1}$$

[12]Data from 2001–2006 are included as robustness check. For brevity, the results are not reported here but are available upon request.

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Table 1: Summary Statistics

Outcome Variable	Gender	All	High Violence	Low Violence
Passing Rate	Male	8.625 (5.696)	7.448 (1.729)	9.756 (2.299)
	Female	2.929 (3.685)	1.776 (0.342)	3.8772 (0.832)
	Total	5.866 (4.634)	4.649 (1.040)	6.878 (1.610)
Appearance Rate	Male	22.123 (9.338)	20.951 (0.770)	22.883 (0.805)
	Female	9.759 (7.162)	6.420 (0.730)	11.294 (0.464)
	Total	16.282	13.721	17.318
Cummulative Violence		7.100 0.290 (1.111)	0.702 1.253 (1.452)	0.667 0.01 (0.013)

where y represents various educational outcomes of district i in year t. The educational outcomes employed are the overall passing rate on the national examination at secondary school level, including the passing rate of boys and girls, the examination appearance rate (also separately for boys and girls), and scores on the examination. *Violenc*e is the cumulative number of conflict-related deaths per 10,000 population[13], *Year* is a dummy variable for each year (1993–2001), and ε_{it} is the idiosyncratic error term.

Other measures of quality of education that effect student performance are controlled for, such as the teacher-to-student ratio and the percentage of private schools. But, they can themselves be impacted by the conflict, and so they are excluded from the analysis. The analysis only includes the measures of quality of education to test whether the mechanism by which the conflict affected student performance was through a reduction in the quality of education. The pre-conflict characteristics for each district, such as poverty and literacy rates, are another set of specific characteristics that could jointly affect the likelihood of violence and the educational attainment of students in that district. These pre-conflict indicators are available from the 1990 census, which means that there is no overtime variation in these indicators. A district-fixed effects is used to account for all the time-invariant unobservable characteristics of a district. Time invariant socioeconomic characteristics of a district need not be included in the analysis. The coefficient of interest is β, which captures the change in educational outcomes that can be attributed to per unit increase in cumulative violence.

An underlying assumption for the identification of β is that the conflict did not spread through areas of low (or high) schooling outcomes. If, for example, the Maoists targeted districts with low literacy rates to gain sympathizers, then we will overestimate the impact of exposure to violence. Furthermore, it is possible that the districts that experienced higher

[13]It is not evident whether yearly levels of violence should be used instead of cumulative violence. Since education is a cumulative process, it is more reasonable to use cumulative violence instead.

levels of violence were already experiencing lower educational attainment even in the absence of conflict. If this were the case, we would falsely attribute this trend in education attainment to the change in conflict environment. A way to check for this assumption is to classify districts as "high violence" and "low violence" based on total violence they experienced by the end of observation period. By doing so, we can check whether or not the districts that experienced high violence were headed on a different path of education attainment prior to experiencing any violence. This classification helps us analyze whether the difference in educational outcomes between high-violence and low-violence districts in the conflict period is solely due to the difference in violence between the two groups of districts. So districts having cumulative deaths (per 10,000 population) in the upper 25 percentile in 2001 are classified as "high violence" districts, while the districts with cumulative deaths in the lower 25 percentile in 2001 are classified as "low violence" districts. The remaining districts are not used in the analysis.

Figure 2 plots 1989–2011 trends in overall examination passing rate and the passing rate for boys and girls. Likewise, Figure 3 shows the same trends for the examination appearance rate. Lastly, Figure 4 plots the trends of students scoring first division (scores greater than 65 percentage), second division (scores between 45 percent to 64 percent), and third division scores (scores between 32 to 44 percent) from 1991–2001, respectively.

As can be seen from these graphs, trends in the examination passing rate, appearance rate, and scores are similar in the two groups of districts in years prior to the conflict's initiation in 1996. Upon the conflict's increased intensity, however, the gap in these measures between the two groups of districts increased. As such, the groups of districts are comparable in the pre-conflict period, and the increasing educational gap between them in the post conflict

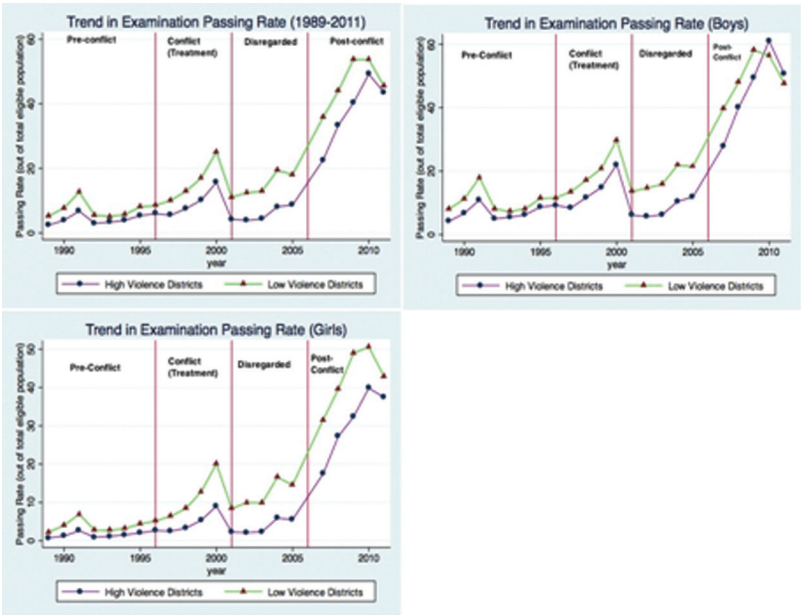

Figure 2: Examination Passing Rate (1989–2011)

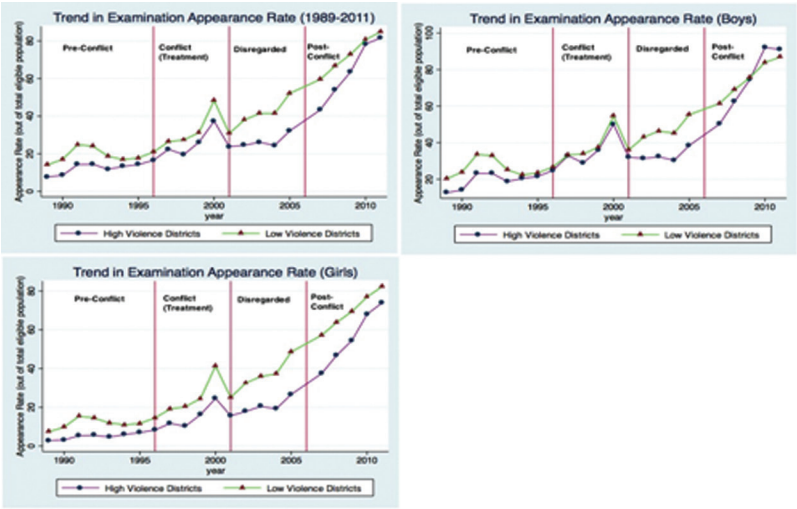

Figure 3: Examination Appearance Rate (1989–2011))

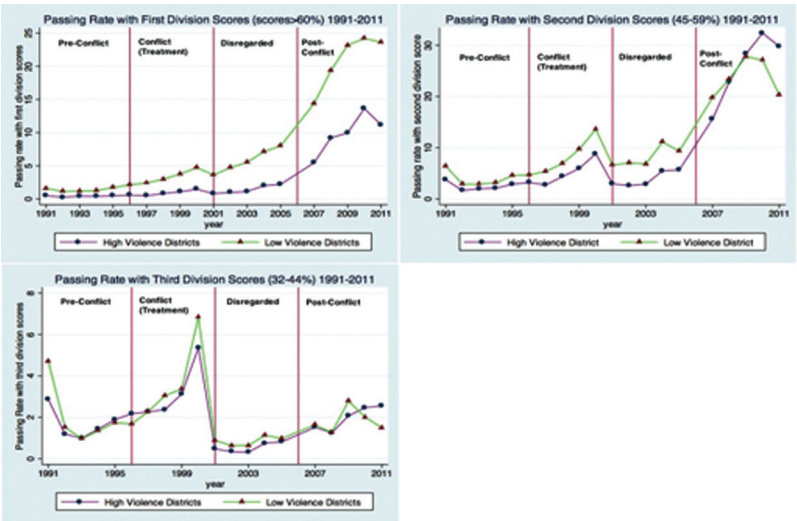

Figure 4: Examination Scores (1991–2011)

period may possibly be due to difference in the amount of violence the groups of districts experienced. Furthermore, Figure 5 plots the difference in the examination passing rate and violence between the high and low violence districts. The figure shows that the difference in educational attainment is fairly constant before the upsurge of violence. As violence grew over time, so did the difference in passing rate between these two groups of districts. The following equation quantifies the gap in educational outcomes that the figures suggest.

$$y_{it} = \alpha * \text{Post} + \beta * \text{High Violence} + \gamma * \text{Post} * \text{High Violence} + \varepsilon_{it} \qquad (2)$$

High Violence is a dummy if a district is classified with a high intensity of violence. *Post* is a dummy if the observations belong to the conflict period (1996–2001). β captures the average

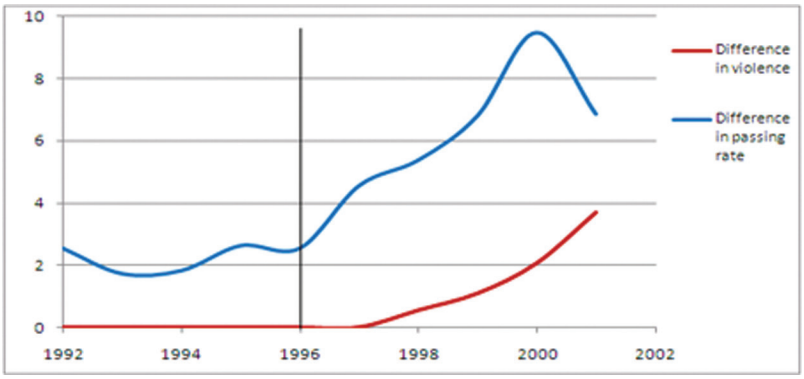

Figure 5: Difference in Examination Passing Rate and Violence

effect of being in the high-violence category, whereas γ captures the additional impact of being in the high-violence category during the conflict period. Again, for the identification of γ, the districts classified must be following the same trajectory in educational attainment such that any differences in the educational outcomes over time can be attributed to the difference in violence between the low-violence and high-violence groups.

An advantage of Equation 2 over Equation 1 is that by comparing high violence and low violence districts in the pre and post-conflict period, the study is able to examine the variation in conflict intensity. The archived educational data (dating back to 1989) allows for verification of if the conflict spread through areas of historically low educational attainment. Doing so, however, significantly reduces the number of observations and therefore results in a much higher standard deviation. Additionally, Equation 1 helps us understand the marginal impact of exposure to violence, whereas Equation 2 estimates the average difference between the two groups of districts in the conflict period, and the net of their pre-conflict differences.

There are many potential biases in estimating the impact of conflict on student performance. It is plausible that many students drop out of school as a result of the conflict. Failure to take this into account would lead to underestimation of the impact of the conflict on educational attainment. To account for this bias, passing rate is defined as the number of students passing the exam divided by the total secondary-school aged population of a district. As the conflict might affect the population size itself, the population aged 15 through 19 years in 1995 is employed as a "best guess" of the secondary-school aged population. The government-defined correct age of students in Grade 10 (the correct age is for students enrolled at 10th grade in secondary school) is 15 years old (Education Statistics of Nepal), which is one-fifth of the 15 to 19-year-old range. Thus, the passing rate is defined as the number of students passing the examination divided by one-fifth of the total number of students in the 15 to 19-year-old range in 1995. Similarly, examination appearance rate is the number of students appearing for the exam divided by the aforementioned estimate of the secondary-school aged population. Lastly, the percentage of students scoring in each of the three test categories is found by the number of students scoring in each of the three divisions divided by the estimated pool of secondary school students.

The initiation of the Maoist armed struggle was first witnessed in seven districts. It is possible that the unobservable characteristics of those districts that saw the emergence of war are also correlated with educational outcomes in those districts. For example, if the political atmosphere in the seven districts made them more prone to the insurgents and also lower educational attainment, then the study will overestimate the impact of the political unrest. Thus, the initial districts are excluded from the main analysis. A robustness check is carried out to determine whether including them in the analysis significantly changes the results.

Another major bias can come from systematic migration of students from high- violence districts to low-violence districts. If students most likely to pass the exam from a conflict-affected district move to a different district to take the exam, the compositional change in students taking the exam will cause the estimates to be biased upward. If the students who are likely to fail the test move from a high-violence district to a low-violence district, the estimates will still remain unbiased. This is so, because the definition of the examination-passing rate captures the effects of attrition of students by separately estimating the impact on examination appearance and passing rates. If, however, the students who are most likely to pass move from high-violence districts to low-violence districts, then we will overestimate the impact of the conflict.

Bohara-Mishra (2011) find that an individuals decision to migrate during the Maoist insurgency followed a non-linear pattern, where individuals were less likely to move when the level of conflict in their district of residence was too high or too low. Given this non-linear migration decision with respect to conflict and the fact that the time period under consideration pertains to relatively low levels of violence, it is not very clear if large-scale migration would have occurred by 2001 in response to the conflict. Likewise, Valente (2014) also finds that the effects the Maoist insurgency had on education attainment was not through selective migration.

Lastly, Pivovarora and Swee (2015) find that schooling-aged individuals in Nepal, especially those at the bottom of income distribution were most likely to be displaced and unlikely to continue their education. As mentioned earlier, the data is able to capture systematic dropout before taking the exam, as long as those displaced do not enroll in school causing any compositional changes in students appearing for the exam.

Moreover, 2001 national statistics indicate that only 4.9 percent of migrants had resided in their current destination for less than one year; two-thirds of migrants had resided in their current destination for more than six years and 56 percent for more than the last ten years (Central Bureau of Statistics, 2001). If people migrated in response to conflict, more people would have resided in the current district for fewer than six years (since the conflict started in 1996). Additionally, marriage was primarily the reason for female migration (42.13 percent migrated due to marriage), whereas males migrated for agriculture (22.84 percent), employment (21.13 percent), and other reasons (32.72). Overall, only 10.34 percent of migrants (14.69 percent of male migrants, 6.72 percent females) indicated study/training as the reason for migration. Furthermore, the majority of internal migration was rural-to-rural (68.2 percent; KC, 2004). If people moved during the unrest for security and

better education, we should see more rural-urban migration. Given the relatively low share of migrants moving away for education or training purposes, high rural-to-rural migration, and longer duration of stay of the migrant population, it is reasonable to argue that the migration pattern observed in 2001 was not a primary a response to conflict. Therefore, the estimation strategy is not subjected to compositional change bias due to migration.

A possible drawback of this argument is that parents could have sent their children away for school, while the parents remained in their district of residence. It would have been ideal to have information on 15-19 year olds migration patterns before and after the insurgency. While this information is not provided, there is further indirect evidence to support the possibility that significant compositional change due to migration would not have occurred by 2001. Nepal Living Standard Survey (NLSS) of 2003/2004, a household survey that follows the World Banks Living Standard Measurement Survey methodology, finds that about 5 percent of children under 15 years old were away from home at the time of survey[14], 36 percent of whom were away for study. Such a low share of children below15 years old leaving home (possibly for study) is further reassuring that a compositional change is unlikely to bias the estimate impact of exposure of violence. Lastly, students need to register for the examination through their school a few years prior to taking the exam. The students cannot simply take the exam from any district in a given year. If that were the case, it would be much more difficult to argue that the composition of students remained fairly constant during the conflict period.

The conflict, nevertheless, resulted in a vast number of internally displaced people. An estimated 50,000 people were internally displaced (The World Factbook, CIA). The conflict grew more intense after 2001, which resulted in the large number of internally displaced people and evidently migrants as well. Since the years after 2001 of the conflict period are not included in the analysis and to the extent that the internally displaced population is unlikely to either continue education or pass the examination, the estimates will remain unbiased.

5. Results

Table 2 reports the results from OLS and difference-in-differences estimation. The coefficient of -0.697 implies that increasing cumulative conflict-related deaths by one in 10,000 population decreases the passing rate by 0.697 percentage points. In other words, one standard deviation increase in conflict intensity decreases the examination passing rate by 0.15 standard deviations. Using the average population of a district, a one standard deviation increase in conflict intensity translates to 26 additional deaths.

The coefficient for girls is greater than the coefficient for boys, suggesting a greater negative impact of conflict on girls. The difference is statistically significant at a 90 percent confidence level. A one standard deviation increase in conflict intensity decreased

[14]As per the NLSS report, "children away from home are those: (a) who were family members before leaving home, (b) who are less than15 year old at the time of enumeration, (c) who left home for more than six months, (d) who are expected to return back again, (e) who are missing from the house hold, (f) who are living in hostels or boarding schools for study, and (g) who come back home occasionally."

Table 2: OLS and Difference-in-Differences Estimate

Outcome		**OLS (Cumulative Violence)**	**High vs Low Violence**
Passing Rate	All	–0.697**	–3.882*
		(0.285)	(2.278)
	Male	–0.673**	–3.526
		(0.331)	(2.574)
	Female	–0.713***	–4.175**
		(0.236)	(2.045)
Appearance Rate	All	–0.970***)	–1.842
		(0.303)	(3.562)
	Male	–.657**	0.530
		(0.291)	(3.724)
	Female	–1.229***	–4.017
		(0.301)	(3.593)
First Division		–0.184**	–1.440
		(0.078)	(0.925)
Second Division		–0.344*	–1.924
		(0.179)	(1.223)
Third Division		–0.168***	–0.473
		(0.061)	(0.683)
Obs		612	279
District FE		Y	Y
Year FE		Y	Y
Controls		N	N

standard errors are clustered at the district level.

boys passing rate by 0.13 standard deviations compared to that of girls by 0.21 standard deviations.

The conflict had a similar impact on the examination appearance rate. A one standard deviation increase in conflict intensity reduced the examination appearance rate by 0.13 standard deviations. The impact is greater on girls examination appearance rate (0.19 standard deviations decrease) than on that of boys (0.08 standard deviations decrease).

These results raise a question as to whether fewer students taking the exam explains the decline in passing rate. Pre-conflict passing and exam appearance rates can be used to analyze whether the decline in passing rate can be attributed to fewer students taking the exam. In the pre-conflict period, 5.86 percent of the total eligible students passed the exam[15]and 16.28 percent of the eligible population took the exam. If there were a total of 10,000 eligible students (hypothetically), 1628 students would take the exam and 586 students would pass the exam. Out of those who appear for the exam, about 35.99 percent of the students pass the exam. Assuming the passing rate would have remained the same (out of those who appear for the exam) and that the total drop in passing rate in the conflict period is 0.697 percentage points, about half of the drop in passing rate is due to fewer students taking the exam[16].

[15]The passing rate is out of total eligible population. Since not all students enroll in school, the calculated passing rate is much lower.

[16]Since per unit increase in conflict decreased examination appearance rate by 0.97 percentage points and examination appearance rate by 0.697 percentage points,1531students would appear for the exam and 516.3 students would pass the exam

Furthermore, the way the passing rate is measured, the conflict did not simply delay passing the exam, but it resulted in fewer students passing the exam (or completing secondary education). If the conflict had simply delayed the passing rate, we would see no impact on the passing rate. If students failing the exam in a given year simply retook the exam the following year, we would see a subsequent increase in exam appearance and passing rates in that year. The estimate would then indicate that the conflict did not reduce the overall passing rate. Since the impact is negative for the entire period of observation, the effect of exposure to violence is not just delay in passing the exam, but also a decline in the passing rate.

The outcomes thus far look at the impact of the conflict on the extensive margin (pass/fail examination and appear/do not appear for the exam). By analyzing the impact on the examination scores, we can also examine the impact of the conflict on the intensive margin. As Table 2 shows, scores of those students who pass the exam also declined across the observations. One standard deviation increase in conflict intensity reduced the firstdivision scores by 0.2 percentage points, second division scores by 0.38 percentage points, and third division scores by 0.18 percentage points. It is notable that the scores declined for all three groups. The third division scores may decrease due to more students failing the exam and/or more students scoring better in the exam. If the students were improving their scores, we would expect to see the share of second division scores increase at the same time. However, this is not the case. Hence, the decrease in third division scores is not due to improvement in student performance, but is a result of more students failing the exam. This is plausible because the students who pass with third division scores are at the margin of passing and failing the examination. If the conflict had any effect at all, we would expect the marginal student to be affected the most.

Likewise, the reduction in second division scores in conjunction with a decrease in first division scores suggests that the reduction in second division scores was not a result of improvement in scores from second division to first division. As expected, the impact on the second division is greater than the impact on first division. If it were hypothesized that the impact of conflict would be greater for more vulnerable students, we would expect those scoring in the top tier of ability for exam readiness to be less affected than those in the bottom tier. In summary, the negative impact on all three divisions indicates an overall reduction in examination scores.

When comparing the OLS results to the difference-in-differences estimate, the examination passing rate remains significant, whereas examination appearance rate and the scores do not. Since classifying districts in this way reduces a lot of variation in the data, there is a possibility that the standard errors are a lot higher. Figure 2 also suggests no clear evidence on the adverse impact on the examination appearance rate. So, it is

in the conflict period. If the passing rate of those taking the exam remained the same, 35.99 percent of 1531 students would pass the exam. That is, 551 would have passed the exam, which means 5.51percent of the total eligible students would pass the exam, and the decline in passing rate would be only 0.35 percentage points (5.86 percent-5.51 percent) in the conflict period. The decrease in passing rate calculated, assuming no change in passing rate out of the students taking the exam, is 50.2 percent of the total decline in passing rate (0.697 percentage points). Hence, half of the decline in passing rate is due to fewer students taking the exam.

plausible that the difference in examination appearance rate when districts are classified in this way is not statistically significant. The coefficient of -3.882 implies that compared to districts with low violence, the passing rate in the districts with high violence was lower by 3.882 percentage points during the conflict period. This difference translated into a difference in the passing rates of the two groups of districts in the conflict period of 0.84 standard deviations. This estimate is higher than OLS estimates. The difference in intensity of violence between the high and low violence districts was 3.714. If per unit increase in conflict intensity reduced the passing rate by 0.697 percentage points (OLS estimate), the difference in passing rates between high-and low-violence districts would be 2.589 percentage points, which is lower than the difference-in-differences estimate of 3.882 percentage points. The magnitude of effect from Equation 1 and Equation 2, nevertheless, is not directly comparable because Equation 1 estimates the marginal impact of exposure to violence, while Equation 2 pertains to the average difference between high and low violence districts during the conflict period.

It is possible that the negative impact of the violence was due to a reduction in the quality or the accessibility of schools. It is likely that students fail the exam or drop out of school because fewer schools remain open or because fewer teachers are available to teach during the conflict period. As such, various measures of quality and accessibility of schools are included in the analysis[17]. In addition to including these measures, the study examines them as separate outcomes of interest to test whether the conflict effected the educational attainment through a reduction in teacher and school availability.

Table 3 shows the results of including these measures of quality and accessibility of education as additional controls. The coefficients do not change once these measures are included in the analysis. For brevity, the results of estimating these controls as outcomes of interest are not reported[18]. Hence, the results suggest that the mechanism by which the conflict decreased educational attainment at the secondary schooling level is not primarily through the reduction in the availability of teachers or in the availability of schools[19].

Table 3:

Boys	**Passing Rate**		**Appearance Rate**		**Examination Scores**		
	Boys	**Girls**	**Boys**	**Girls**	**First Division**	**Second Division**	**Third Division**
High vs Low	–0.622	–9.333	–7.171	–16.737*	–8.057	2.867	–0.168
Violence Districts	7.908	8.083	8.264	8.922	6.736	3.799	0.622
Obs	229	229	229	229	291	291	291

standard errors are clustered at the district level.

[17]The measures of quality and accessibility of education are the share of private schools, teacher-to- student ratio, percentage of students enrolled in private schools, and schools per 100 population. All these measures are at secondary schooling level.

[18]As none of the measures were statistically significantly affected during the conflict period, the results are not reported. Results are available upon request.

[19]There are a few missing observations in the measures of quality and accessibility of education. Several tests were performed to test the sensitivity of the results to these missing observations. The results are not sensitive to either restricting the sample to non-missing observations, or accounting for the missing observations.

It is plausible that the lack of significance of the measures of quality and accessibility of schools is because the data on the number of schools and teachers are misreported. For example, a school could have remained closed during the conflict, but the school may not be permanently closed. In that case, the school could be incorrectly counted as being operational. My interview with personnel at the Ministry of Education provided support for this phenomenon. Therefore, it would have been ideal to have data on the length of school year, as the length of school year would have allowed an understanding of how much of the reduction in the education attainment was due to a disruption in the learning environment. While such data is not consistently available over the period of analysis, other studies have also found that the supply-side effects (such as access to school) were not the primary reason for a decline in educational attainment due to exposure to violence (Akresh et at, 2008; Leon, 2012). The studies find that the demand-side effects coming from direct and opportunity costs of education as well as difficulty transitioning to higher grades are the primary reasons for lower educational outcomes.

Although data does not allow me to directly test these alternative mechanisms, there is suggestive evidence that point to some of these factors as contributors for increased gender disparity in education and dropout rates. According to the Nepal Living Standard Survey of 2003/2004, 31.6 percent of the population of 6-24 year olds dropped out of school because of poor academic progress, while 26.8 percent did so because they had to help at home. Thus, it is possible that the disruption in academic environment and increased opportunity cost of education are a possible mechanism, although it is not possible to directly test for this without pre-conflict data. Furthermore, the top three reasons males aged 6 through 24 never attended school were due to high enrollment costs, not willing to attend, and parents not willing to fund schooling. For females of the same age group, however, the top three reasons for never attending school were parents' unwillingness, help at home, and the cost of schools. These statistics highlight the direct cost of schooling and willingness as the main hindrances for male schooling, whereas both direct and opportunity costs affect female schooling. Hence, boys and girls do not go to school for different reasons, which could also explain why the conflict affected them differently. If boys were more likely to be recruited to the rebel army, we would see greater effects on boys than on girls. Although that is certainly a possibility, it may also be the case that parents were more reluctant to send girls to school for fear of their security or for the need of domestic help at home.

While most of the other literature focus on different conflicts, Valente (2014) and Pivovarora and Swee (2015) specifically analyze the effects of the Nepalese Maoist insurgency on the educational attainment of boys and girls. Valente (2014) finds overall *positive* effects of the Maoist insurgency on primary schooling completion rates. Additionally, increases in the educational attainment of boys were greater than that of girls. The author attributes this result to the Maoist's pushing increase in accessibility of education as one of their goals.

Indeed, several policy reports in Nepal allude to this trend. A World Bank study (Resilience Amidst Conflict: An Assessment of Poverty in Nepal, 2006) notes the increasing trend of education enrollment at various districts around the country during the time of war, thus highlighting the resilience of the Nepalese people and the particularly

high value that was placed on educational attainment at the time. Additionally, while there have always been several aid programs targeted to make education accessible to the poor, particularly at the primary schooling level, the post-conflict Nepal witnessed several aggressive measures to increase education accessibility, emphasizing lower-secondary and secondary schooling completion as well. For example, the 2007 interim constitution of Nepal expanded mandatory education from the primary level (5 years of schooling) to the secondary level (10 years of schooling)[20]. The interim constitution also established several need-based aid programs at secondary level, with particular emphasis on girl's education. All of these efforts were limited to primary schooling in the pre-conflict period. Therefore, it is reasonable to view the Maoists struggle as a catalyst that bought these positive changes in education sector, as it is unclear what education policies would have been implemented in the absence of war. Nevertheless, these policies have made little practical difference on the ground, since the constitution-mandated aid to poor requires proof of income, identification, and other documents, all of which are difficult for poor families to procure.

Having acknowledged that, however, there are many differences between Valente (2014) and this study that render a direct comparison difficult. For example, the author uses DHS data from 2001 and 2006, whereas this study employs yearly data on student examination outcomes from 1989 to 2011. The data in this study is directly obtained from the Nepali Ministry of Education and the Office of the Comptroller of Examination. This data therefore has information on all students in the country, unlike the Valentine (2013) study that relies on survey data. Moreover, this analysis looks at secondary schooling, whereas Valentine (2013) discusses the effects at a primary schooling completion level. If this study were replicated at the primary level, it would be possible to directly compare the results from the two papers.

However, Pivovarora and Swee (2015) show that ignoring individual heterogeneity could lead to false conclusions. Using the Nepal Living Standard Survey data, the study shows that difference-in-differences estimation suggests positive effects of war on schooling attainment. Controlling for individual heterogeneity, Pivovarora and Swee (2015), as with this study, find significant negative effect of the Nepalese conflict on education attainment. Hence, this study supports the findings of Pivovarora and Swee (2015).

Lastly, I perform various tests to check the sensitivity of the results. Some of those checks include testing whether the results are sensitive to restricting the observation to year 2000, including district-specific linear time trends, and including districts that were initially affected by the civil war. The results are robust across various specifications. For brevity, the results are not reported, but they are available upon request.

6. Are the Effects Persistent?

Thus far the data suggest significant adverse impacts on secondary education, particularly on girls, during the conflict period. As it has been almost ten years since the signing of the peace agreement, we can estimate whether the effects persisted in the years after the

[20]See the 2007 interim constitution of Nepal (accessible at http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---ilo_aids/documents/legaldocument/wcms_126113.pdf)

conflict ended. Using the same difference-in-differences approach, I test whether the difference in educational attainment between high and low-violence districts in the post-conflict period is significantly greater than in the pre-conflict period. A caveat of this approach is that the country has changed fundamentally as a result of the conflict. A more than 200-year-old monarchy was abolished in 2006, an election for constituent assembly was held in 2008, opportunistic behavior is more prevalent, and periodically the country tends to be parallelized by strikes that result in a virtual shutdown of roads and businesses. Therefore, characterizing the years after 2006 as "peace years" is severely misleading. Nevertheless, the Maoists have given up their struggle and formally joined the mainstream government as the Communist Party of Nepal, Maoist or CPN(M). In the 2008 election for constituent assembly, the CPN(M) failed to gain an absolute majority, but the party was able to gather a significant number of votes. As such, a coalition government was formed, where the chairman of CPN(M) was elected Prime Minister. The assembly failed to draft a constitution and was eventually dissolved in 2012.

Despite ongoing political changes, civil disruptions, and opportunistic behavior that continue, the conflict is over nonetheless. In order to avoid any confounding effects of political instability that followed right after the peace agreement and before the constituent assembly was formed in 2008; I focus on 2009 through 2011 as the post-conflict years for my analysis. Similar to the main specification, 1994 and 1995 are pre-conflict years. A limitation to this approach is that almost the entire country was affected by the insurgency. This means the estimated difference in educational outcomes will be a lower bound estimate, which only captures the additional impact of violence on high-violence districts and does not estimate the effect on the low-violence districts.

The students who appear for SLC examination in 2009–2011 (grade 10) would have been affected by conflict during the earlier years of their schooling only (mostly primary education and 1 or 2 years of lower-secondary education). Their secondary education would have been completed in the post-conflict environment. As such, it will be important to analyze whether the effects of early-life exposure to violence continues years later. Table 3 reports the results of estimating Equation 2 with the post-conflict data. The conflict seems to have no long-term negative effects on examination passing rate, but there is a statistically significant impact on female students examination appearance rate. That is, while male students who were exposed to violence earlier in their life seem to catch up on their education attainment later, female students seem to consistently lag behind.

Figures 2-4 plot the trend in education outcomes from 1989–2011[21]. The figures confirm the results of Table 3. The difference in passing rates and examination appearance rates between high- and low-violence districts seems to have rebounded in the post- conflict years. While the difference in the share of boys appearing for the exam has converged in the post-conflict period, the same is not the case for the girls. Although girls examination appearance rate seems to be improving in the post-conflict period, the difference between girls appearance rate in the high and low-violence districts is significantly higher in the post-conflict period.

[21]2006 data is missing.

The post-conflict trends in examination scores reveal an interesting and undiscovered phenomenon. There is a reversal in the trend in second division and third division scores. The students from high-violence districts seem to be catching up not just at the margin (passing rate), but also in terms of performance. However, the difference in first division scores between the high and low-violence districts is widening further. It is possible that the reversal in the trend indicates a fundamental shift in the distribution of scores. For example, an increasing share of students from high-violence districts passing with third division scores could be because of both an increase in the passing rate of high-violence districts at the margin and/or because fewer students from high-violence districts now score in the third division instead of scoring at second division (shift from second division to third division). A similar argument applies for the reversed trend in second division scores: students from high-violence districts could be increasingly passing with second division scores (shift from third division to second division), or fewer students from high-violence districts could be passing with second division scores (shift from first division to second division). The widening gap in the first division scores suggests the latter to be a possibility. So, while there is an improvement in examination performance at the margin, there is also a distributional shift that indicates a widening gap between the top tier and remaining categories of students. To the extent that returns to education vary with academic performance, it is reasonable to suspect that this change in distribution of scores will have long-term consequences in the labor market and generational inequality.

7. Conclusion

Using unique nationwide statistics on schooling and insurgency in Nepal, the study finds significant immediate and short-term effects of conflict on secondary education. In the wake of conflict, students are less likely to complete their secondary education, partially due to increased dropout rates. The conflict did not just delay secondary school completion, but as a result of conflict fewer students overall were likely to complete secondary education. The effects were stronger on the educational attainment of girls. The reduction in educational attainment was not due to a decrease in the accessibility (available schools and teachers) and quality of education (private schools or share of students enrolled in private schools).

Some loss in educational attainment rebounded in the post-conflict period. 3–5 years after the conflict ended, the difference in secondary schooling completion rates in districts with high violence and districts with low violence were similar to their pre-conflict levels. As such, at the margin, the high-violence districts do not seem to permanently lag behind. Although the decline in secondary educational completion rates mostly rebounded, girls from high-violence areas continue to drop out at higher rates in the post-conflict period. Conversely, boys from high-violence areas do not drop out at higher rates than do boys from lower-violence areas in the post-conflict period. Hence, the patterns of post-conflict recovery suggest an overall convergence in educational attainment for areas that were adversely affected by conflict, while the adverse effects on girl's educational attainment persisted.

Moreover, the examination scores reveal a distributional shift in student performance. That is, students from high-violence areas, though they catch-up with low-violence areas in terms of schooling completion rates, tend to pass more at the margin. Unlike the high-violence areas, the low-violence areas continued performing better in the post-conflict period, thereby widening the gap in academic achievement between high-violence and low-violence areas in the post-conflict period. To the extent that returns to education vary with academic performance, it is reasonable to suspect that this change in distribution of scores will have long-term consequences in labor market, along with affecting gender parity and generational inequality in educational attainment.

The study contributes to a relatively small but growing body of research on the legacies of an armed struggle. Some countries experience short-lived but brutal episodes of violence, such as the genocide in Rwanda, whereas others, like Peru, experience political violence that spanned over a decade. People in these areas, nevertheless, continue making human capital and other long-term investments. By analyzing the effects of war as the conflict was ongoing and shortly after it ended, this paper highlights the effects of exposure to violence on the student population at large and on the pattern of post-conflict recovery in the immediate absence of violence. In addition to the effects put forward by other studies, this research employs a separate dataset to add to the knowledge of a war's impact on schooling attainment. Gathering information on different types of violence on different groups in a population and over different periods of time, we begin to understand the magnitude of effects and how heterogeneity in war affects survivors.

Given the widening gap in academic performance between high-violence and low-violence areas, post-conflict policies should be aimed at addressing this inequality in academic achievement. While previous studies have called for increased funding and support for children, particularly girls and younger children, this study documents loss in human capital of those students who go on to complete secondary schooling. Therefore, it recommends specific policies aimed at providing more resources to those students who complete schooling, but who are from high-violence area and may lag behind their peers in academic performance.

Anecdotal evidence supports the trend that students self-select into various fields of study based on their performance on this examination. To the extent that these scores then become basis for students to choose different areas of study, the test scores act as a decision-making point for youth and have significant implications for their field of study and labor market performance. Likewise, various high schools also use SLC scores as a selection mechanism for admission. For example, some schools set a minimum of first-division score for applicants. Passing at the margin, therefore, makes students less competitive for higher education and thereby limits their labor market options as well. It is possible that passing the examination, yet facing a lack of competitiveness due to poor academic performance, could contribute to grievances amongst the youth and become basis for future unrest in Nepal.

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