The Persistent Effect of Conflict on Human Capital Accumulation: Evidence from Ethiopia

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Abstract

This paper examines the persistent effect of the 1998–2000 Ethiopia–Eritrea conflict on human capital accumulation. The empirical findings indicate that exposure to conflict during *early* childhood increases the probability of grade repetition (for boys and girls) and school dropout (for boys only), and decreases student achievement in mathematics and language scores (mainly for girls) a decade later. Identification of the effect is based on a difference-in-difference approach that exploits temporal and regional variation of the conflict. These effects are robust when including region-specific trends, school, grade, class, and teacher level fixed effects, and other student and family characteristics. The paper provides the first estimates on the long-term effect of exposure to conflict at *early* (before school-age) childhood on test scores of primary school students.

Keywords: Conflict, Student achievement, Ethiopia

JEL codes: D74, I21, I25, I31

1 Introduction

Heckman (2006) argues that "life cycle skill formation is a dynamic process in which early inputs strongly affect the productivity of later inputs." It is well-documented that early-life health and education can have lasting impacts into adulthood (Alderman et al., 2006; Currie, 2008; Currie and Vogl, 2012; Duflo, 2001; Heckman et al., 2013) and poor childhood health and exposure to other risks before age five can have detrimental effects on cognitive, motor, and social-emotional development (Grantham-McGregor et al., 2007). However, there is evidence that suggests that some early-life damages can be remediated (Currie and Almond, 2011).

Despite strong and conclusive evidence on the causal effect of conflict on childhood health (Akresh et al., 2012, 2011; Bundervoet et al., 2009; Weldeegzie, 2017), little is known about the causal effect of conflict on the learning outcomes of children and the evidence to date is inconclusive (Pivovarova and Swee, 2015; Valente, 2014). Furthermore, most studies limit their analysis to enrollment and years of education (León, 2012; Shemyakina, 2011, 2015) or study exposure of conflict for those who were school-age children during times of conflict (Akresh and de Walque, 2010; Chamarbagwala and Morán, 2011; Shemyakina, 2011, 2015).

However, studies that focus on learning outcomes can complement an analysis that considers years of schooling as the latter measures educational

attainment only through years of completed education.[1] Increases in the number of years of schooling does not necessarily imply increases in learning and acquiring the required skills and knowledge. Hanushek and Woessmann (2007) conclude that "the cognitive skills of the population – rather than mere school attainment – are powerfully related to individual earnings, to the distribution of income, and to economic growth."

This study goes beyond the fairly common analysis of the effect of conflict on school enrollment or years of schooling and contributes to the literature by studying the effects on achievement in test scores and the probability of grade repetition and school dropout. I use unique school survey data from a sample of more than 10,000 children in 94 schools spread across seven regions in Ethiopia to examine the long-term causal effect of exposure to the 1998–2000 Ethiopia–Eritrea conflict on education outcomes. Identification of the effect is based on a difference-in-difference (DID) approach. The reduced DID model controls for region-specific time trends, and includes school, grade, class, and teacher level fixed effects as well as other student and household characteristics. Furthermore, I do not only compare the outcomes of those born $before$ and $after$ the conflict in conflict-affected and unaffected areas but also of those born $during$ and $after$ the conflict in conflict-affected and unaffected areas.

The empirical findings reveal that exposure to the conflict persists a

[1]Pritchett (2001) points out that increases in low quality schooling does not raise cognitive skills and productivity, which may explain why schooling does not increase growth in some countries.

decade later and is manifested through reduced achievement in mathematics and language scores by about 4 percentage points, on average. The effect is larger and statistically significant for girls in contrast to boys. In addition, exposure to the conflict increases the probability of repeating a grade and school dropout by about 10 and 6 percentage points respectively, but no statistically significant effect was detected on school dropout of boys. These effects are relatively large and consistently significant for younger children (born *during* the conflict) relative to older children (born $before$ the conflict). This is consistent with studies that suggest that childhood exposure to disadvantage matters more in *early* than in *late* childhood (León, 2012).

This paper contributes to the literature on the link between violent conflict and human welfare in several respects. First, I provide the first estimates of the long-term effects of exposure to conflict at *early* (before school-age) childhood on test scores of primary school students, showing that the effects of violence at *early* childhood is persistent in contrast to exposure at *late* childhood. Second, the analysis extends the effect of conflict on the likelihood of school dropout and grade repetition. Third, I use a high-quality large-scale dataset which permits the consideration of region-specific trends and student and family characteristics. Fourth, this is the first empirical evidence to explore these outcomes in the literature using a sample of children from Ethiopia. Finally, it contributes to the addition of empirical findings on the mixed evidence of the literature on the gender differential effect of exposure to the conflict.

The remainder of the paper is organized as follows. Section 2 reviews the literature. Section 3 presents the theoretical framework, empirical strategy, and outlines sources of potential bias. Section 4 describes the dataset and provides a preliminary analysis. Section 5 presents and discusses the results. Section 6 presents additional results from a set of sensitivity analysis. The final section concludes.

2 Related Literature

Theoretical predictions of the long-term effect of conflict on human capital accumulation are ambiguous (Bellows and Miguel, 2006). At a macroeconomic level, neoclassical economics predicts conflict–affected areas have the possibility of catching up to unaffected areas (Chen et al., 2008). However, Blattman and Miguel (2010) argue that war or violent conflict may still have detrimental consequence on health, education, and labour market outcomes of individuals and households at the microeconomic level even if economic growth converges at the aggregate level (Akbulut-Yuksel, 2014; Justino et al., 2014).

Empirical evidence varies considerably depending on the context of the analysis, ranging from a negative to a positive effect on education. Of the studies that find a negative effect of conflict on schooling outcomes of children, León (2012) documents a persistent effect of exposure to violence before school-age (in utero, early childhood, and pre-school age) in Peru. Children affected before school-age accumulated 0.31 fewer years of schooling upon

reaching adulthood in contrast to those exposed after starting school who fully catch up. Similarly, Akresh and de Walque (2010) find that children exposed to the Rwandan genocide accumulate 0.5 fewer years of primary education.

Verwimp and Van Bavel (2013) find that boys exposed to violent conflict in Burundi are less likely to complete primary schooling. Chamarbagwala and Morán (2011) also find that rural Mayan school-age males and females exposed to the three periods of civil war in Guatemala completed fewer years of schooling. Shemyakina (2011) exploits regional and temporal variation of the 1992–1998 armed conflict in Tajikistan and finds that exposure to the conflict decreases the probability of completing mandatory schooling of girls but does not affect boys, but surprisingly, young women exposed to the conflict had better labor market outcomes (Shemyakina, 2015). Kibris (2015) also finds a significant association between Turkish-Kurdish conflict and university entrance exam scores of Turkish students. However, this study does not control for region-specific time trends and therefore assumes that omitted time-varying effects are not correlated with conflict, as pointed out by Shemyakina (2011), making it difficult to isolate the effect of the conflict from the effect of other factors such as economic conditions.

In contrast, a recent study by Valente (2014), based on data from Nepal finds that conflict intensity is associated with an increase in schooling attainment especially for females (although the abductions by Maoists have a negative effect). This study is able to measure conflict intensity in great detail but it

does not control for region-specific time trends. A more recent study from the same country using individual fixed effects by Pivovarova and Swee (2015) concludes that there is no effect of war intensity on schooling attainment. The authors argue that "while the conventional difference-in-differences estimation yields a positive effect of war intensity on schooling attainment the effect diminishes completely when we augment difference-in-differences with individual fixed effects, suggesting that unobserved individual heterogeneity may play an important role."

In addition, Justino et al. (2014) use two waves of cross-sectional survey data from Timor-Leste and find a rapid recovery for girls and negative long-term effects of exposure to the conflict on primary school attendance and completion among boys. Furthermore, Arcand and Wouabe (2009) find that exposure to the 27-year-long Angolan civil conflict does not significantly affect household expenditures, increases school enrollment and decreases fertility and child health.

In summary, with the exception of León (2012), most of the literature focus on two of these exposure and outcome aspects – the effect of exposure to conflict on school-age children at times of conflict in contrast to before school-age children and outcomes such as enrollment and years of education. Thus, this paper particularly contributes to the evidence on the long-term effect of conflict on pre-school age children. In addition, in this paper, I focus on test score outcomes instead of enrollment and years of education.

3 Theoretical Framework and Empirical Strategy

Suppose a typical education production function model, in line with those discussed in Hanushek (1979) and following León (2012) , where the stock of education (S_t) of an individual at time t is a function of her endowments in each period ($E_1, ..., E_t$), the history of educational inputs to which she had access ($N_1, ..., N_t$), factors related to the (time-invariant) demographic characteristics (X), and community characteristics ($C_1, ..., C_t$) such as the availability of schools and teachers.

$$S_t = s(E_1, ..., E_t, N_1, ..., N_t, X, C_1, ..., C_t) \tag{1}$$

The endowment in each time period, $E_1, ..., E_t$, is determined by both demand and supply-side factors. From a demand side perspective, there are genetic factors (G), household's endowments (E_{h0}), and environmental experiences and conditions at the start of each period (U). The supply side factors are denoted by C_t.

$$E_t = g(G, E_{h0}, U_t, C_t) \tag{2}$$

The temporal and regional location of residence jointly determine the exposure to the conflict. I estimate a reduced form linear DID model that allows me to identify the effect of the conflict by estimating changes in education outcomes for cohorts born $before$ or $during$ and $after$ the conflict from conflict-affected

areas relative to the changes between these cohorts in unaffected areas. This setting provides exogenous variation induced by the time when the conflict started in a specific geographic location.

$$\begin{aligned} Y_{ij} = c + \sum R_j + \alpha * before_i + \beta * during_i + \pi * ExposedR_j \\ + \theta * before_i * ExposedR_j + \gamma * during_i * ExposedR_j + \\ \delta * Age_i * \sum R_j + X_i + FE + \epsilon_{ij} \end{aligned} \tag{3}$$

where Y_{ij} is the outcome of interest, c is a constant and $\sum R_j$ indicates a set of four region dummies, $before_i$ takes on the value 1 if a child is born $before$ the war (before 1998) and 0 otherwise while $during_i$ takes on the value 1 if a child is born $during$ the war (from 1998–2000 inclusive) and 0 otherwise. $ExposedR_j$ takes on the value 1 for children from the war-affected regions and 0 otherwise. $Age_i * \sum R_j$ is the interaction of region dummies by age of a child capturing region-specific time trends. X_i includes a vector of child and family level characteristics and FE includes school, grade, class, and teacher level fixed effects. ϵ_{ij} is the unobserved error term.

While α and β are the cohort effects for those born $before$ and $during$ the conflict respectively, π captures the selection effect. The relevant parameters of interest are θ and γ. θ is the DID coefficient on the effect of the war when comparing those cohorts born $before$ the war in war-affected and unaffected regions relative to those born $after$ the war in war-affected and unaffected regions. Similarly, γ denotes the effect of the conflict for those cohorts born $during$ the war relative to those born $after$ the war in

war-affected and unaffected regions. If exposure to conflict matters more during *early* childhood than *late* childhood, I expect γ to be larger than θ both in magnitude and statistical significance.

Exposure to conflict or war can affect both demand- and supply-side factors in different ways. I limit the discussion of such pathways relevant to this context and based on the findings of the study. From the demand side perspective, war can affect individual endowments through many channels. First, war can affect a member of the household, for example, by killing or wounding, affecting household endowments as it brings an income shock for the household. This can then be manifested in terms of reduction of food availability to the household. This is particularly severe in case of poor country households such as Ethiopia where there is binding income constraint and high incidence of vulnerability to malnutrition.

Second, the conflict can increase massive form of internal displacement (Global IDP, 2004a,b) that could eventually increase loss and disruption of agricultural harvests in the conflict–affected regions. Despite the difficulty of obtaining data for the war period to assess the extent of agricultural loss and disruption, an FAO press release at the time of the conflict mentions that "negative impacts of the Eritrea-Ethiopia conflict have begun to show up in agricultural and trade activities"(Weldeegzie, 2017).

This reduction of food availability could affect indirectly child's health through it's effect on maternal nutrition and mental health. Mulder et al.

(2002) conclude that maternal psychological factors may significantly contribute to pregnancy complications and unfavorable development of the (unborn) child. Such effects may for instance lead to a low birth weight (Camacho, 2008). In addition, a reduction in the availability of food could directly affect child health or malnutrition. There is a strong link between child health and cognitive development (Grantham-McGregor et al., 2007) .

Third, violence exposure could affect a child's mental health as a result of traumatic experiences, thereby psychologically affecting children exposed to conflict (Dyregrov et al., 2000; Papageorgiou et al., 2000), which will in turn affect cognitive ability (Currie and Stabile, 2006; Grimard and Laszlo, 2014) .

Violence can also affect the supply side factors by destroying a number of community educational resources and other relevant infrastructure directly. Furthermore it can limit the physical movement of people, including students and teachers. However, such effects seem negligible in this context as in this study (1) the effect of the conflict is not analyzed on school-age children during the conflict and (2) the effect is found on younger children instead of older children, suggesting that the above three pathways are more likely.

Using this DID model, it is possible to identify the causal effect of the conflict on education outcomes under certain assumptions. First, the key identification assumption for this model is the parallel trend assumption – in

the absence of the war, changes in education outcomes are the same across regions. However, if there are region-specific differentials over time with regard to the factors affecting child education, then θ and γ will be biased. Therefore, the extended DID model in equation three above controls for region-specific time trends which are captured by the age with region dummies.

Second, another source of potential bias could come from the systematic migration of people. It is more likely that people were displaced from their initial settlement as a consequence of the conflict. However, this is not a threat to the identification strategy because most of (more than 90 percent) such displacements took place within a region (Global IDP, 2004a,b). Furthermore, I conduct two placebo tests. Primarily, I use the younger cohorts only (those born $after$ the conflict) and conduct the same DID analysis. The hypothesis is that I should not find significant effects as these cohorts are control groups. Next, I use both older and younger cohorts in the remaining five regions (excluding the war-affected regions) and assign each region at a time to a treatment group and the rest to control groups, to test the sensitivity of the results. In most of these cases, statistically insignificant results should be expected as this is a falsification test (Section 6).

Third, systematic sample selection bias due to differences in mortality rates across regions over time as a result of the war could potentially lead to an underestimate of the true effect. For this reason, the estimated effect should be interpreted as an effect of the war on survivors, that may potentially underestimate the effect on the average cohorts.

While it is not possible to test the common trend assumption directly, the data set contains a rich set of information on child and household specific covariates, which help to control for several observables. Thus I control for school, grade, class, and teacher level fixed effects and a number of other child and family level characteristics. Controlling for these factors does not change the results qualitatively. In addition, results remain robust to the addition of the interaction of age by regional dummies, which at least partially controls for region specific time-trends. Finally, I show that the results pass several falsification tests.

4 Data and Preliminary Analysis

4.1 Data Description

I use cross-sectional schools survey data collected by the Young Lives team in Ethiopia and Oxford University. This is a separate dataset from the Young Lives longitudinal childhood poverty study, which tracks a sample of older and younger cohorts in four developing countries, including Ethiopia, Peru, Vietnam, and India. The school survey data consists of a sample of all pupils studying in grades 4 and 5 during the 2012/13 academic year in all schools located within the geographic boundaries of each of the 30 sentinel sites spread across seven regions in Ethiopia – Tigray, Afar, Somalia, Amhara, SNNP, Addis Ababa, and Oromia (Aurino et al., 2014).

I combine the student level data with teacher, class, and school level

information. This unique data set gives a wealth of information to construct birth-year and geographic exposure to the conflict. It also provides a number of student and family covariates such as age of starting school, attendance of pre-school, long-term health problems of a student as well as the number of family members, the extent of help a student receives with school work, parental education, the number of meals a child usually eats per day and so on.

Table 1: Summary Statistics

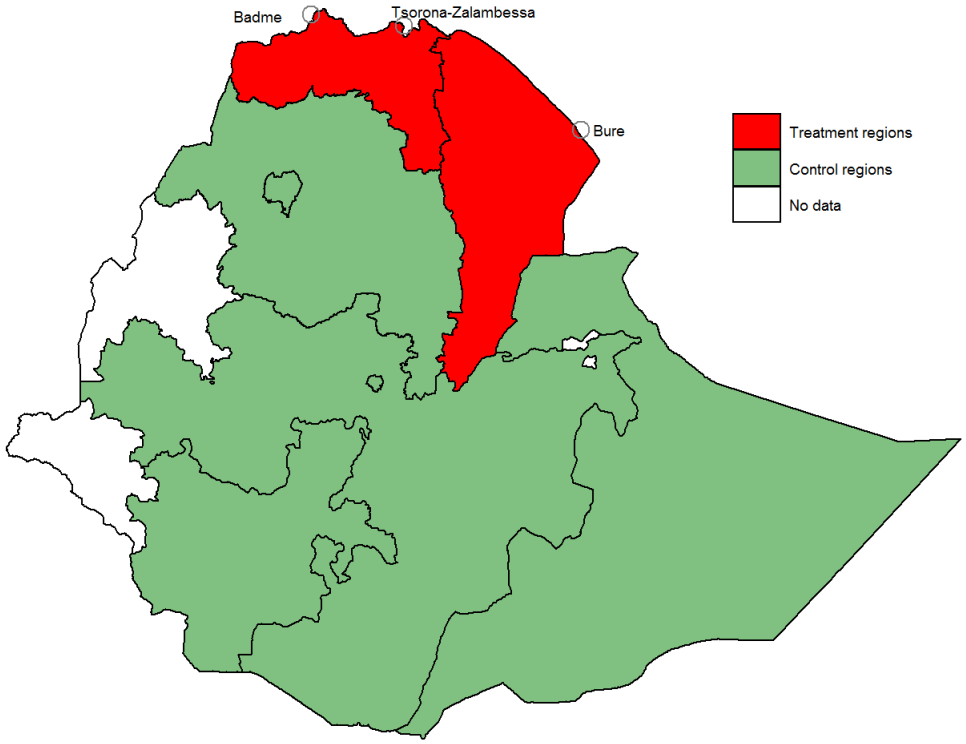
Variable	Mean	Std. Dev.	Min.	Max.	N
Maths grade	64.034	15.704	7	100	10616
Language grade	68.349	16.045	8	100	10616
Repeated grade	0.241	0.428	0	1	10616
Dropped out of school	0.168	0.374	0	1	10616
Region==Addis Ababa	0.194	0.395	0	1	10616
Region==Amhara	0.102	0.303	0	1	10616
Region==Oromiya	0.09	0.287	0	1	10616
Region==SNNP	0.238	0.426	0	1	10616
Region==Tigray	0.162	0.369	0	1	10616
Region==Somali	0.112	0.315	0	1	10616
Region==Afar	0.102	0.303	0	1	10616
Urban	0.719	0.45	0	1	10616
School identification	40.005	25.438	1	94	10616
Class identification	3.003	2.066	1	10	10616
Teacher identification	6.284	4.109	2	16	10616
Grade=4	0.514	0.5	0	1	10616
Sex=Boy	0.493	0.5	0	1	10616
Age in yrs	11.494	1.674	8	19	10616
Age starting school yrs	6.814	1.695	4	15	10616
Absence days since Oct 1	1.12	2.239	0	26	10616
Absence days since wave 1	5.91	7.761	0	72	10616
Attended pre-school	0.519	0.5	0	1	10616
Longterm health problem	0.223	0.416	0	1	10616
No of meals/day=1	0.044	0.204	0	1	10616
No of meals/day=2	0.145	0.352	0	1	10616
No of meals/day> =3	0.812	0.391	0	1	10616
No of other people	6.942	3.576	0	30	10616
Mother alive	0.937	0.242	0	1	10616
Father alive	0.830	0.376	0	1	10616
Mother read & write	0.483	0.5	0	1	10616
Father read & write	0.595	0.491	0	1	10616
No one read & write	0.068	0.252	0	1	10616
Help at home=never	0.18	0.384	0	1	10616
Help at home=always	0.462	0.499	0	1	10616
Help at home=sometimes	0.358	0.48	0	1	10616

Source: Young Lives school survey data from Ethiopia, 2012/13.

The summary statistics above show that the age of students in the sample ranges from 8–19 at the end of 2012. This gives ample variation in terms of year of birth (some born $before$, $during$ and $after$ the conflict). Nearly 72 percent of students are from urban areas. About 50 percent of the students in the sample are in grade four and 50 percent of these students are boys. On average, a student starts school at age seven. About 80 percent of students eat at least three times a day and more than half of the students get support with school work from family members. In addition, about 50 percent of parents can read and write.

Figure 1 shows the regions of the sentinel sites of the school survey. The geographic proximity to the conflict makes Tigray and Afar regions war-intense regions because the war was concentrated in the Northern and Northeastern part of the country: in Badme, Tsorona-Zalambessa of the Tigray and Bure of the Afar regions. The remaining regions serve as a control group. A more detail context of the conflict is available in Weldeegzie (2017).

Figure 1: Treatment and Control Regions and District of War Locations



Source: Author's own illustration based on Young Lives school survey data 2012/13, Ethiopia.

Because the war lasted from May 1998–June 2000, I call cohorts that belong to the pre-1998 birth year as the "before" [2] whereas those born between 1998 and 2000 (inclusive) as "during". Those who are born from 2001-2004 (inclusive) are "after" cohorts. The variations across birth year cohorts and geographic proximity permits a comparison of outcomes for those born before and after the conflict (and during and after the conflict) from conflict-affected and unaffected regions in a DID setting. Table 2 below shows the mean

[2]Note: the "before" cohorts include those born in 1993, 1994, 1995, 1996, and 1997 only so that the extreme outliers above 19 years of age at the time of the survey but still studying in year 4 and 5 are removed. As a result, 23 observations are deleted from the analysis.

differences between these cohorts by war-affected and unaffected regions for each gender.

Table 2: Mean Differences of Outcome Variables by Cohort and Region

Boys sample						
	War			Non-war		
	Before	After	Diff.	Before	After	Diff.
Maths grade (max.100)	64.88	66.68	-1.80	65.03	64.19	0.84
Language grade (max.100)	61.13	68.92	-7.80***	68.18	69.46	-1.28
Repeated grade (%)	0.35	0.18	0.17***	0.26	0.22	0.04
Dropped out of school (%)	0.34	0.11	0.22***	0.35	0.12	0.23***
N	104	939		253	1960	
	During	After	Diff.	During	After	Diff.
Maths grade (max.100)	63.14	66.68	-3.54***	62.86	64.19	-1.33*
Language grade (max.100)	62.06	68.92	-6.86***	67.43	69.46	-2.03***
Repeated grade (%)	0.44	0.18	0.26***	0.29	0.22	0.08***
Dropped out of school (%)	0.32	0.11	0.21***	0.22	0.12	0.09***
N	401	939		1578	1960	
Girls sample						
	Before	After	Diff.	Before	After	Diff.
Maths grade (max.100)	55.85	66.80	-10.95***	65.31	64.07	1.24
Language grade (max.100)	53.13	69.49	-16.36***	69.80	70.25	-0.45
Repeated grade (%)	0.37	0.16	0.21**	0.20	0.20	-0.01
Dropped out of school (%)	0.44	0.08	0.36***	0.37	0.10	0.27***
N	54	989		204	2191	
	During	After	Diff.	During	After	Diff.
Maths grade (max.100)	60.45	66.80	-6.35***	62.55	64.07	-1.53**
Language grade (max.100)	61.05	69.49	-8.44***	68.11	70.25	-2.14***
Repeated grade (%)	0.43	0.16	0.27***	0.27	0.20	0.06***
Dropped out of school (%)	0.27	0.08	0.19***	0.21	0.10	0.11***
N	319	989		1624	2191	

Note: War refers to Tigray and Afar regions, Non-war refers to the rest of regions. $*p < 0.10, **p < 0.05, ***p < 0.01$. Source: Author's descriptive analysis based on Young Lives data 2012/13, Ethiopia.

4.2 Preliminary Analysis

I begin by plotting mean scores of mathematics and language tests, grade repetition rates, and school dropout rates by birth year and region of exposure to the conflict. These provide a preliminary indication of the differences in schooling outcomes within each birth-year cohort between conflict-affected and unaffected regions.

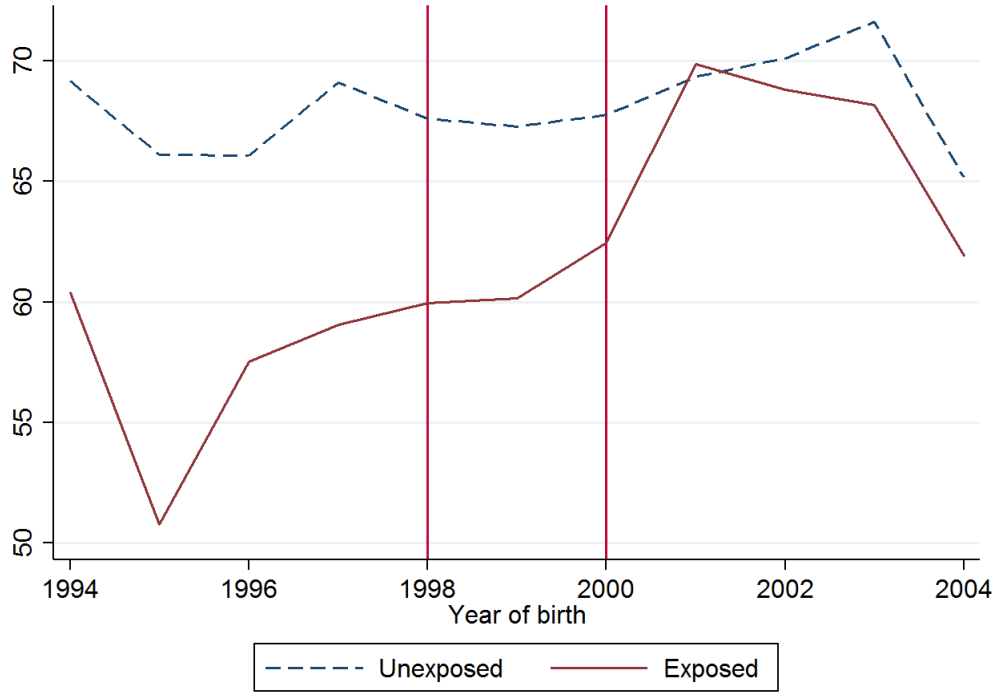
Figure 2: Mean Maths Score by Year of Birth and Regional Exposure

Source: Author's analysis based on Young Lives school survey data 2012/13, Ethiopia.

Figure 2 shows that children from war-affected regions who belong to the 1995-1999 birth cohorts have lower mathematics achievement, on average, compared to the same birth year cohorts from unaffected regions. This gap in education achievement between war-affected and unaffected children for

those cohorts born before and during the conflict is much more pronounced in language scores as shown in Figure 3. However, this is not the case for post-conflict cohorts.

Figure 3: Mean Language Score by Year of Birth and Regional Exposure



Source: Author's analysis based on Young Lives school survey data 2012/13, Ethiopia.

A similar trend is observed in grade repetition and school dropout rates (Figures 4 and 5).

Figure 4: Mean Grade Repetition Rate by Year of Birth and Regional Exposure

Source: Author's analysis based on Young Lives school survey data 2012/13, Ethiopia.

Figure 5: Mean School Dropout Rate by Year of Birth and Regional Exposure

Source: Author's analysis based on Young Lives school survey data 2012/13, Ethiopia.

In sum, Figures 2–5 show that, on average, the cohorts of children born either *before* or *during* the conflict (born in 2000 and earlier) from conflict-affected regions tend have lower mathematics and language scores and a higher grade repetition and school dropout rates compared to those that come from the unaffected regions. However, for those cohorts born after the conflict (from 2001 onwards), there is no significant difference in outcome measures between conflict-affected and unaffected regions, providing preliminary evidence of the effect of the conflict. But, these differences could also reflect regional differences during the pre-conflict period in other factors such as poverty and convergence of these regions during the post-conflict era.

5 Results and Discussion

The first and fourth columns of all the tables provides the estimates after controlling for region and cohort fixed effects only providing results from the basic DID model. From the simple DID model (Columns 1 and 4 of Table 3), results show that both cohorts born $before$ and $during$ the conflict have lower achievement in both mathematics and language scores.

Table 3: The Effect of Conflict on Human Capital Accumulation

VARIABLES	(1) Maths	(2) Maths	(3) Maths	(4) Language	(5) Language	(6) Language
Panel A: All sample						
Born before war#Exposed region	-5.898***	-2.008	-1.736	-9.959***	-3.287*	-3.002*
	(1.450)	(1.710)	(1.683)	(1.656)	(1.837)	(1.717)
Born during war#Exposed region	-3.370***	-1.939**	-1.529*	-5.765***	-2.833***	-2.410***
	(0.740)	(0.818)	(0.797)	(0.806)	(0.841)	(0.824)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.036	0.226	0.282	0.041	0.222	0.277
Panel B: Male sample						
Born before war#Exposed region	-2.852	-0.149	-0.335	-6.868***	-1.633	-1.958
	(1.939)	(2.460)	(2.381)	(2.245)	(2.608)	(2.442)
Born during war#Exposed region	-2.113**	-0.455	0.0719	-4.964***	-2.042*	-1.489
	(1.056)	(1.184)	(1.154)	(1.138)	(1.197)	(1.168)
Observations	5,235	5,235	5,235	5,235	5,235	5,235
R-squared	0.025	0.222	0.277	0.026	0.217	0.274
Panel C: Female sample						
Born before war#Exposed region	-11.22***	-4.896**	-3.023	-15.19***	-5.689**	-4.090*
	(1.896)	(2.226)	(2.309)	(2.170)	(2.498)	(2.377)
Born during war#Exposed region	-4.830***	-3.907***	-3.463***	-6.589***	-3.906***	-3.565***
	(1.029)	(1.116)	(1.087)	(1.137)	(1.195)	(1.177)
Observations	5,381	5,381	5,381	5,381	5,381	5,381
R-squared	0.056	0.267	0.324	0.061	0.263	0.313
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy (Panel A)	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: The dependent variable in Columns 1-3 is Semester I maths grade out of 100 while it is Semester I language grade in Columns 4-6. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Additional covariates include age at starting school, number of days absent from school, number of other people, and indicators for attendance of preschool, having long-term health problems, mother and father alive, mother and father can read and write, no one reads in the family, number of meals usually eaten per day, frequency of help with study. These same set of controls are included throughout all tables and so the same notes apply unless otherwise mentioned. Source: Author's analysis based on Young Lives school survey data from Ethiopia. See appendix Tables I and II for extended results.

However, the effect on mathematics achievement for those born *before* the conflict goes away once I control for region-specific time trends and other covariates. But the effect on language achievement remains significant. Looking at Columns 3 and 6 of Table 3 (in panel A) reveals that the effect of the conflict on maths and language scores for those born *during* the conflict is about 1.5 and 2.5 percentage points lower compared to those not exposed. This is a large effect given that it is a long-term effect, which persists 12 years after the event. Panels B and C reveal that the effect is large and highly significant for girls in both mathematics and language scores. The results indicate that girls are severely affected by the conflict, whereas the effect on boys is statistically insignificant. This could be due to household behavior at times of shocks that may result in favoring sons over daughters.

Looking at the literature, the impact of conflict on gender differentials in schooling appears to vary contextually (Buvinić et al., 2014). For instance, armed conflict reduces boys' educational attainment more than that of girls' in cases where boys participate in the military (Swee et al., 2009) or in contexts where boys are likely to work to compensate conflict-induced shocks (Justino et al., 2014; Rodriguez and Sanchez, 2012). In addition, in cases where girls are less likely to be in school during the pre-conflict period, boys' educational attainment may decline more than that of girls' because girls are already less educated (De Walque, 2006; Verwimp and Van Bavel, 2013).[3]

However, the effect of conflict on girls' schooling could be more severe

[3]See Figure I in the appendix for suggestive evidence in favor of this hypothesis.

than boys' if parents seek to protect their girls from rape and other threats (Shemyakina, 2011) or when households' resource allocation decisions favor boys over girls (Singh and Shemyakina, 2016). In Ethiopia, Hadley et al. (2008) find evidence that support their hypothesis that "where girls have historically experienced discrimination, buffering is preferentially aimed at boys, especially as the household experiences greater levels of food stress."

Table 4: The Effect of Conflict on Human Capital Accumulation (2)

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Dropout	(5) Dropout	(6) Dropout
Panel A: All sample						
Born before war#Exposed region	0.155***	-0.0626	-0.0848	0.0230	-0.109**	-0.0999*
	(0.0441)	(0.0535)	(0.0529)	(0.0453)	(0.0540)	(0.0537)
Born during war#Exposed region	0.182***	0.115***	0.102***	0.0957***	0.0468**	0.0477**
	(0.0227)	(0.0261)	(0.0256)	(0.0204)	(0.0230)	(0.0229)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.049	0.102	0.132	0.051	0.093	0.105
Panel B: Male sample						
Born before war#Exposed region	0.114**	-0.119	-0.132*	-0.00478	-0.0748	-0.0680
	(0.0563)	(0.0756)	(0.0737)	(0.0565)	(0.0718)	(0.0716)
Born during war#Exposed region	0.163***	0.0841**	0.0747**	0.111***	0.0768**	0.0731**
	(0.0314)	(0.0378)	(0.0371)	(0.0285)	(0.0329)	(0.0326)
Observations	5,235	5,235	5,235	5,235	5,235	5,235
R-squared	0.050	0.111	0.144	0.053	0.108	0.119
Panel C: Female sample						
Born before war#Exposed region	0.197***	-0.0316	-0.0600	0.0863	-0.106	-0.0942
	(0.0727)	(0.0821)	(0.0847)	(0.0764)	(0.0904)	(0.0898)
Born during war#Exposed region	0.198***	0.146***	0.131***	0.0767***	0.0150	0.0208
	(0.0331)	(0.0371)	(0.0365)	(0.0292)	(0.0329)	(0.0328)
Observations	5,381	5,381	5,381	5,381	5,381	5,381
R-squared	0.053	0.121	0.149	0.053	0.099	0.114
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy (Panel A)	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: The dependent variable in Columns 1-3 takes on the value 1 if a child has repeated a grade, and 0 otherwise while it takes the same value if a child has dropped out of school in columns 4-6. Results reported are from linear probability model but coefficients from the marginal effects of the probit model are very similar. See Table 3 for the remaining notes.

The estimates in Table 4 suggest that xposure to the conflict increases the likelihood of repeating a grade and school dropout, on average, by about 10 and 5 percentage points, respectively (Columns 3 and 6 of Table 4). Consistent with previous test score results, the effect of conflict on repeating a grade is larger for girls compared to boys, 13 and 7.5 percentage points, respectively. However, exposure to the conflict increases school dropout of boys only. This may be due to higher school dropout rates of girls during the pre-conflict period (De Walque, 2006; Verwimp and Van Bavel, 2013).

Similar to the test score analysis, this chapter also ascertains the effect on grade repetition and school dropout for cohorts born *during* the conflict (in contrast to those born $before$ the conflict) compared to those born $after$ the conflict. These effects are large in magnitude, given that the mean rate of grade repetition and school dropout across the entire sample is 24 and 17 percent, respectively. Surprisingly, older cohorts born in conflict-affected areas $before$ the conflict exhibit lower school dropout rates compared to younger cohorts born in conflict-unaffected areas $after$ the conflict (Columns 5 and 6, Panel A) and these numbers are driven by the male sample (Column 3, Panel B).

6 Further Sensitivity Analysis

While the previous results are robust to including region-specific time trends, a range of fixed effects and a number of other student and family level characteristics, I perform two additional falsification tests in this section.

First, I conduct a DID analysis based on sub-dividing the sample of cohorts of children born $after$ the war into two groups: older children (those born in 2002) and younger children (those born from 2003 onwards). The hypothesis tested here is that there is no effect if these cohorts constitute a suitable control group because these cohorts were born $after$ the war, and were not exposed to the conflict. The results are summarized in Table 5 below.

Indeed the results in Tables 5 support this hypothesis and all the parameters are statistically insignificant even at a 10 percent level of significance. This suggests that the younger cohorts constitute suitable counterfactual for the older cohorts after controlling for cohort and region fixed effects.

Table 5: Falsification Test: The Effect of Conflict on Human Capital Accumulation

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	Maths	Maths	Maths	Language	Language	Language
Older#Exposed region	2.043	-1.110	-0.769	0.845	-0.793	-0.315
	(1.486)	(1.676)	(1.614)	(1.571)	(1.635)	(1.566)
Observations	3,376	3,376	3,376	3,376	3,376	3,376
R-squared	0.053	0.303	0.350	0.051	0.309	0.362
Panel B	Repeat	Repeat	Repeat	Dropout	Dropout	Dropout
Older#Exposed region	-0.0458	0.0248	0.0238	-0.0302	-0.00730	-0.0138
	(0.0380)	(0.0458)	(0.0459)	(0.0315)	(0.0350)	(0.0352)
Observations	3,376	3,376	3,376	3,376	3,376	3,376
R-squared	0.013	0.119	0.137	0.003	0.081	0.090
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: In Panel A, the dependent variable in Columns 1-3 is Semester I maths grade out of 100 and the dependent variable in Columns 4-6 is Semester I language grade out of 100. In Panel B, the dependent variable in Columns 1-3 takes on a value 1 if a child has repeated a grade, and 0 otherwise and the dependent variable in Columns 4-6 takes on a value 1 if a child has dropped out of school, and 0 otherwise. Results reported are from linear probability model but coefficients from the marginal effects of the probit model are very similar. See notes to Table 2.

Second, I exclude the main war-affected regions (Tigray and Afar) and repeat the DID analysis using the remaining five regions as follows. I choose each region at a time and assign it to a treatment group while the remaining regions are being assigned to a control group. This approach allows me to use five alternative treatment/control groups to perform the DID analysis using only the Placebo regions. The resulting estimates are expected to be insignificant because the main war-affected regions are excluded from the analysis. That is, these regions are effectively control groups to the war-affected regions. I present a summary of the results obtained from these Placebo regions in Tables 6 and 7 below.

Table 6: Falsification Test II: The Effect of Conflict on Human Capital Accumulation

VARIABLES	(1) Maths	(2) Maths	(3) Maths	(4) Language	(5) Language	(6) Language
Born before war#Addis Ababa	-1.788	1.593	2.133	-0.342	-0.0203	0.278
	(2.032)	(3.358)	(3.197)	(1.849)	(3.219)	(3.079)
Born during war#Addis Ababa	-3.990***	-1.515	-1.345	-3.494***	-2.034	-1.880
	(0.900)	(1.408)	(1.358)	(0.823)	(1.326)	(1.276)
Born before war#Amhara	5.250*	-0.724	1.471	4.379*	0.336	2.019
	(3.058)	(4.698)	(4.181)	(2.658)	(4.523)	(4.062)
Born during war#Amhara	1.159	-2.143	-0.602	1.456	-1.376	0.118
	(1.192)	(1.911)	(1.748)	(1.125)	(1.860)	(1.746)
Born before war#Oromia	2.553	-6.308	-7.828*	3.561	2.455	1.207
	(2.390)	(4.346)	(4.063)	(2.559)	(4.930)	(4.615)
Born during war#Oromia	2.188*	-1.858	-2.563	1.109	0.379	-0.245
	(1.121)	(1.968)	(1.840)	(1.206)	(2.069)	(1.943)
Born before war#SNNP	-3.767**	-0.00412	0.0228	-2.439	-5.421*	-5.188*
	(1.663)	(2.859)	(2.719)	(1.710)	(3.022)	(2.880)
Born during war#SNNP	0.847	3.031**	2.674**	2.028***	0.822	0.468
	(0.766)	(1.268)	(1.213)	(0.766)	(1.306)	(1.258)
Born before war#Somalia	2.430	2.963	1.476	-1.786	6.816*	5.516
	(2.026)	(3.646)	(3.533)	(2.488)	(3.899)	(3.784)
Born during war#Somalia	1.425	0.370	-0.0819	-0.726	2.568	2.116
	(0.973)	(1.722)	(1.683)	(1.046)	(1.747)	(1.721)
Observations	7,810	7,810	7,810	7,810	7,810	7,810
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: The dependent variable in Columns 1-3 is Semester I maths grade out of 100. The dependent variable in Columns 4-6 is Semester I language grade out of 100. See notes for Table 3.

The results in Table 6 show that there is no effect in the five Placebo regions in terms of both mathematics and language achievement (except in mathematics achievement for SNNP and Oromia regions). The results in Table 7 show that, after controlling for all observables, there is usually no effect on grade repetition and school dropout (except in the Addis Ababa and Oromia regions) when the Placebo regions are being compared. Although I observe a few significant results, this does not mean that the former estimates of the effect of conflict are biased. That is, the identification strategy requires a parallel trend assumption of treatment and control regions on average but it does not necessarily require a parallel trend assumption of the treatment regions compared to each of the control regions.[4]

[4]Observing a few significant estimates should not be a serious concern. I repeat the main analysis after excluding these regions and the results remain largely unchanged. Complete results are reported in Appendix Tables III and IV.

Table 7: Falsification Test II: The Effect of Conflict on Human Capital Accumulation (2)

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Dropout	(5) Dropout	(6) Dropout
Born before war#Addis Ababa	-0.00690	-0.180**	-0.165*	0.119**	0.138	0.127
	(0.0464)	(0.0902)	(0.0883)	(0.0535)	(0.0887)	(0.0876)
Born during war#Addis Ababa	0.0595**	0.00359	0.00146	0.0224	0.0282	0.0203
	(0.0237)	(0.0412)	(0.0404)	(0.0202)	(0.0356)	(0.0355)
Born before war#Amhara	-0.0659	-0.177	-0.167	-0.0567	-0.222*	-0.210*
	(0.0662)	(0.132)	(0.129)	(0.0685)	(0.121)	(0.120)
Born during war#Amhara	0.0374	-0.0207	-0.0419	0.0351	-0.0399	-0.0458
	(0.0330)	(0.0600)	(0.0592)	(0.0282)	(0.0515)	(0.0509)
Born before war#Oromia	0.0265	0.138	0.149	0.0111	0.0890	0.0989
	(0.0572)	(0.107)	(0.104)	(0.0722)	(0.127)	(0.127)
Born during war#Oromia	-0.0455*	0.00126	0.0142	0.0721**	0.107**	0.109**
	(0.0253)	(0.0461)	(0.0452)	(0.0286)	(0.0534)	(0.0532)
Born before war#SNNP	0.0473	0.102	0.0769	0.0797	-0.00795	-0.0125
	(0.0461)	(0.0880)	(0.0869)	(0.0499)	(0.0845)	(0.0838)
Born during war#SNNP	0.0258	0.0328	0.0397	0.00608	-0.0280	-0.0249
	(0.0220)	(0.0400)	(0.0393)	(0.0189)	(0.0345)	(0.0343)
Born before war#Somalia	-0.0502	0.101	0.105	-0.260***	-0.0731	-0.0628
	(0.0466)	(0.0861)	(0.0846)	(0.0486)	(0.0854)	(0.0852)
Born during war#Somalia	-0.123***	-0.0428	-0.0445	-0.140***	-0.0521	-0.0411
	(0.0236)	(0.0431)	(0.0429)	(0.0208)	(0.0380)	(0.0379)
Observations	7,810	7,810	7,810	7,810	7,810	7,810
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: The dependent variable in Columns 1-3 takes on the value 1 if a child has repeated a grade, and 0 otherwise. The dependent variable in Columns 4-6 takes on the value 1 if a child has dropped out of school, and 0 otherwise. Results reported are from linear probability model but coefficients from the marginal effects of the probit model are very similar. See notes for Table 3.

7 Conclusion

This paper examines the long-term casual effect of the 1998–2000 Ethiopia–Eritrea conflict on human capital accumulation in Ethiopia. I find that, on average, exposure to the conflict during early childhood decreases girls' achievement in mathematics and language scores by about 3.5 percentage points 12 years later. One explanation for this result could be discriminatory behavior of households in ways that favor boys at times of conflict-induced shocks. In addition, exposure to the conflict increases the likelihood of grade repetition among both boys and girls. It also increases the likelihood of school dropout of boys. This finding may be due to initial higher school dropout rates among girls during the pre-conflict period. Given strong evidence of the effect of early-life education on outcomes during adulthood, these results highlight that the long-term consequences of the 1998–2000 Ethiopia–Eritrea conflict are far reaching.

This paper contributes to the literature by extending the fairly common analysis of the effect of conflict on school enrollment or the number of years of schooling to test scores and to grade repetition and school dropout. It also generates empirical evidence on gender differences in the effect of exposure to conflict. Interestingly, consistent with the medical science literature (Heckman, 2007; Lucas, 1998; Lucas et al., 1999; Martorell, 1999), the effect was observed only for those who were born *during* the conflict in contrast to those who were born *before* the conflict, suggesting that exposure to the conflict in *early* childhood has a persistent effect in contrast

to *late* childhood exposure. This evidence implies that, unlike young children, children who are exposed to the conflict at relatively older stages of their development have the possibility to catch up in terms of educational outcomes.

The evidence implies that interventions that target pregnant mothers and young children at the time of conflict can reduce negative long-term welfare effects at least in terms of educational outcomes. These may include, among others, physical protection or evacuation of mothers and young children from conflict areas and appropriate psychological interventions to treat post-war trauma.

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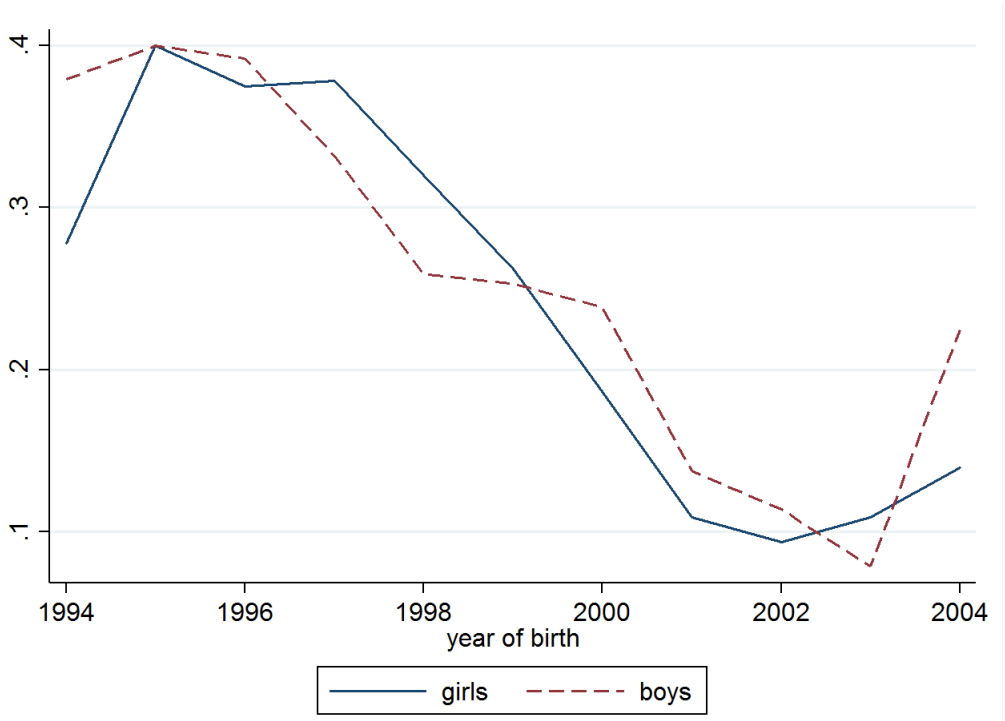
Appendix

Figure I: Mean School Dropout Rate by Year of Birth and Gender



Note: This figure shows mean school dropout rates for each birth-year cohort across the entire sample. Source: Author's own calculations based on Young Lives school survey data 2012/13, Ethiopia.

Table I: The Effect of Conflict on Human Capital Accumulation: Extended Results

VARIABLES	(1) Maths	(2) Maths	(3) Maths	(4) Language	(5) Language	(6) Language
Panel A: All sample						
Born before war = 1	0.952	1.429	1.832	-0.865	0.544	0.961
	(0.838)	(1.293)	(1.237)	(0.840)	(1.328)	(1.270)
Exposed region = 1	-0.458	1.432	2.040	-4.335***	-2.738	-2.096
	(0.513)	(2.191)	(2.142)	(0.505)	(2.404)	(2.301)
Born before war#Exposed region	-5.898***	-2.008	-1.736	-9.959***	-3.287*	-3.002*
	(1.450)	(1.710)	(1.683)	(1.656)	(1.837)	(1.717)
Born during war = 1	-1.421***	-0.164	0.127	-1.839***	-0.621	-0.264
	(0.374)	(0.564)	(0.544)	(0.369)	(0.567)	(0.548)
Born during war#Exposed region	-3.370***	-1.939**	-1.529*	-5.765***	-2.833***	-2.410***
	(0.740)	(0.818)	(0.797)	(0.806)	(0.841)	(0.824)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.036	0.226	0.282	0.041	0.222	0.277
Panel B: Male sample						
Born before war= 1	1.055	0.509	0.755	-0.932	1.304	1.574
	(1.153)	(1.872)	(1.772)	(1.187)	(1.926)	(1.844)
Exposed region = 1	1.097	6.602**	6.304**	-2.775***	3.923	3.271
	(0.766)	(3.035)	(2.826)	(0.749)	(3.245)	(3.106)
Born before war#Exposed region	-2.852	-0.149	-0.335	-6.868***	-1.633	-1.958
	(1.939)	(2.460)	(2.381)	(2.245)	(2.608)	(2.442)
Born during war = 1	-1.424***	-0.783	-0.611	-1.901***	-0.474	-0.213
	(0.547)	(0.820)	(0.790)	(0.533)	(0.818)	(0.794)
Born during war#Exposed region	-2.113**	-0.455	0.0719	-4.964***	-2.042*	-1.489
	(1.056)	(1.184)	(1.154)	(1.138)	(1.197)	(1.168)
Observations	5,235	5,235	5,235	5,235	5,235	5,235
R-squared	0.025	0.222	0.277	0.026	0.217	0.274
Panel C: Female sample						
Born before war = 1	0.265	2.034	2.573	-1.170	-0.377	0.183
	(1.203)	(1.779)	(1.721)	(1.172)	(1.845)	(1.769)
Exposed region = 1	-1.779***	-5.302*	-3.778	-5.597***	-10.79***	-9.273**
	(0.689)	(2.991)	(3.223)	(0.683)	(3.847)	(3.617)
Born before war#Exposed region	-11.22***	-4.896**	-3.023	-15.19***	-5.689**	-4.090*
	(1.896)	(2.226)	(2.309)	(2.170)	(2.498)	(2.377)
Born during war = 1	-1.519***	0.618	0.898	-1.855***	-0.587	-0.227
	(0.512)	(0.781)	(0.753)	(0.511)	(0.790)	(0.762)
Born during war#Exposed region	-4.830***	-3.907***	-3.463***	-6.589***	-3.906***	-3.565***
	(1.029)	(1.116)	(1.087)	(1.137)	(1.195)	(1.177)
Observations	5,381	5,381	5,381	5,381	5,381	5,381
R-squared	0.056	0.267	0.324	0.061	0.263	0.313
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: See notes to Table 3.

Table II: The Effect of Conflict on Human Capital Accumulation (2): Extended Results

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Dropout	(5) Dropout	(6) Dropout
Panel A: All sample						
Born before war = 1	0.0312	-0.0962***	-0.106***	0.253***	0.112***	0.105***
	(0.0205)	(0.0365)	(0.0358)	(0.0228)	(0.0364)	(0.0361)
Exposed region = 1	-0.0369***	0.264***	0.294***	-0.00299	-0.0636	-0.0626
	(0.0130)	(0.0780)	(0.0759)	(0.0103)	(0.0682)	(0.0672)
Born before war#Exposed region	0.155***	-0.0626	-0.0848	0.0230	-0.109**	-0.0999*
	(0.0441)	(0.0535)	(0.0529)	(0.0453)	(0.0540)	(0.0537)
Born during war = 1	0.0823***	0.0260	0.0159	0.105***	0.0543***	0.0510***
	(0.0101)	(0.0169)	(0.0166)	(0.00886)	(0.0150)	(0.0149)
Born during war#Exposed region	0.182***	0.115***	0.102***	0.0957***	0.0468**	0.0477**
	(0.0227)	(0.0261)	(0.0256)	(0.0204)	(0.0230)	(0.0229)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.049	0.102	0.132	0.051	0.093	0.105
Panel B: Male sample						
Born before war = 1	0.0513*	-0.0269	-0.0327	0.227***	0.0843	0.0776
	(0.0289)	(0.0534)	(0.0526)	(0.0306)	(0.0513)	(0.0509)
Exposed region = 1	-0.0773***	0.115	0.184*	0.00764	-0.122	-0.104
	(0.0199)	(0.106)	(0.103)	(0.0160)	(0.0832)	(0.0830)
Born before war#Exposed region	0.114**	-0.119	-0.132*	-0.00478	-0.0748	-0.0680
	(0.0563)	(0.0756)	(0.0737)	(0.0565)	(0.0718)	(0.0716)
Born during war = 1	0.0920***	0.0554**	0.0431*	0.0941***	0.0419*	0.0368*
	(0.0147)	(0.0242)	(0.0238)	(0.0128)	(0.0217)	(0.0216)
Born during war#Exposed region	0.163***	0.0841**	0.0747**	0.111***	0.0768**	0.0731**
	(0.0314)	(0.0378)	(0.0371)	(0.0285)	(0.0329)	(0.0326)
Observations	5,235	5,235	5,235	5,235	5,235	5,235
R-squared	0.050	0.111	0.144	0.053	0.108	0.119
Panel C: Female sample						
Born before war = 1	0.0169	-0.171***	-0.186***	0.276***	0.128**	0.122**
	(0.0287)	(0.0507)	(0.0499)	(0.0344)	(0.0524)	(0.0517)
Exposed region = 1	-0.00614	0.511***	0.510***	-0.0135	0.0630	0.0630
	(0.0170)	(0.102)	(0.100)	(0.0133)	(0.127)	(0.122)
Born before war#Exposed region	0.197***	-0.0316	-0.0600	0.0863	-0.106	-0.0942
	(0.0727)	(0.0821)	(0.0847)	(0.0764)	(0.0904)	(0.0898)
Born during war = 1	0.0749***	-0.00995	-0.0167	0.114***	0.0610***	0.0594***
	(0.0138)	(0.0238)	(0.0233)	(0.0123)	(0.0209)	(0.0208)
Born during war#Exposed region	0.198***	0.146***	0.131***	0.0767***	0.0150	0.0208
	(0.0331)	(0.0371)	(0.0365)	(0.0292)	(0.0329)	(0.0328)
Observations	5,381	5,381	5,381	5,381	5,381	5,381
R-squared	0.053	0.121	0.149	0.053	0.099	0.114
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: See notes to Table 4.

Table III: The Effect of Conflict on Human Capital Accumulation

VARIABLES	(1) Maths	(2) Maths	(3) Maths	(4) Language	(5) Language	(6) Language
Panel A: All sample						
Born before war#Exposed region	-7.102***	-2.815	-2.386	-10.74***	-4.321**	-3.780**
	(1.595)	(1.788)	(1.747)	(1.775)	(1.895)	(1.774)
Born during war #Exposed region	-3.082***	-1.247	-0.920	-5.087***	-2.205**	-1.852**
	(0.794)	(0.849)	(0.828)	(0.852)	(0.870)	(0.851)
Observations	8,092	8,092	8,092	8,092	8,092	8,092
R-squared	0.038	0.237	0.289	0.048	0.251	0.304
Panel B: Male sample						
Born before war#Exposed region	-4.037*	-0.324	-0.506	-6.931***	-1.892	-2.185
	(2.148)	(2.602)	(2.502)	(2.459)	(2.745)	(2.562)
Born during war#Exposed region	-2.226**	0.0457	0.498	-4.774***	-1.889	-1.386
	(1.129)	(1.232)	(1.199)	(1.205)	(1.242)	(1.210)
Observations	4,024	4,024	4,024	4,024	4,024	4,024
R-squared	0.025	0.224	0.278	0.030	0.242	0.300
Panel C: Female sample						
Born before war#Exposed region	-12.35***	-6.372***	-4.390*	-16.68***	-7.301***	-5.442**
	(2.117)	(2.299)	(2.366)	(2.297)	(2.531)	(2.436)
Born during war#Exposed region	-4.078***	-3.065***	-2.760**	-5.394***	-2.805**	-2.575**
	(1.110)	(1.166)	(1.140)	(1.200)	(1.227)	(1.212)
Observations	4,068	4,068	4,068	4,068	4,068	4,068
R-squared	0.062	0.286	0.338	0.075	0.295	0.343
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: This table presents results similar to those of Table 3 but the sample does not include Addis Ababa and Oromia. See notes to Table 3.

Table IV: The Effect of Conflict on Human Capital Accumulation (2)

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Dropout	(5) Dropout	(6) Dropout
Panel A: All sample						
Born before war#Exposed region	0.158***	0.137	0.138	0.0622	0.0127	0.0193
	(0.0473)	(0.0943)	(0.0928)	(0.0482)	(0.0865)	(0.0865)
Born during war#Exposed region	0.192***	0.209***	0.204***	0.116***	0.104***	0.102***
	(0.0242)	(0.0411)	(0.0405)	(0.0215)	(0.0358)	(0.0357)
Observations	7,598	7,598	7,598	7,598	7,598	7,598
R-squared	0.052	0.113	0.138	0.049	0.097	0.107
Panel B: Male sample						
Born before war#Exposed region	0.133**	0.270**	0.251**	0.0300	-0.123	-0.137
	(0.0596)	(0.128)	(0.126)	(0.0592)	(0.117)	(0.117)
Born during war#Exposed region	0.182***	0.253***	0.245***	0.123***	0.0544	0.0422
	(0.0334)	(0.0584)	(0.0578)	(0.0300)	(0.0507)	(0.0507)
Observations	3,851	3,851	3,851	3,851	3,851	3,851
R-squared	0.046	0.113	0.143	0.051	0.114	0.125
Panel C: Female sample						
Born before war#Exposed region	0.191**	-0.0182	0.0212	0.121	0.186	0.197
	(0.0785)	(0.147)	(0.146)	(0.0828)	(0.134)	(0.134)
Born during war#Exposed region	0.200***	0.163***	0.172***	0.104***	0.153***	0.160***
	(0.0352)	(0.0592)	(0.0581)	(0.0307)	(0.0504)	(0.0501)
Observations	3,747	3,747	3,747	3,747	3,747	3,747
R-squared	0.059	0.141	0.165	0.048	0.103	0.116
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: This table presents results similar to those of Table 4 but the sample does not include Addis Ababa and Oromia. See notes to Table 4.

Table V: The Effect of Conflict on Human Capital Accumulation

VARIABLES	(1) Maths	(2) Maths	(3) Maths	(4) Language	(5) Language	(6) Language
Panel A: All sample						
Born before war#Exposed region	-5.898***	-2.008	-1.736	-9.959***	-3.287***	-3.002**
	(1.044)	(1.180)	(1.441)	(0.970)	(0.880)	(1.027)
Born during war#Exposed region	-3.370***	-1.939**	-1.529	-5.765***	-2.833***	-2.410***
	(0.747)	(0.741)	(0.870)	(0.741)	(0.560)	(0.610)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.036	0.226	0.282	0.041	0.222	0.277
Panel B: Male sample						
Born before war#Exposed region	-2.852*	-0.149	-0.335	-6.868***	-1.633	-1.958
	(1.510)	(1.747)	(1.473)	(0.964)	(1.372)	(1.367)
Born during war#Exposed region	-2.113**	-0.455	0.0719	-4.964***	-2.042	-1.489
	(0.840)	(1.330)	(1.277)	(0.584)	(1.157)	(1.115)
Observations	5,235	5,235	5,235	5,235	5,235	5,235
R-squared	0.025	0.222	0.277	0.026	0.217	0.274
Panel C: Female sample						
Born before war#Exposed region	-11.22***	-4.896**	-3.023	-15.19***	-5.689***	-4.090***
	(2.887)	(2.186)	(1.956)	(1.959)	(1.066)	(0.698)
Born during war#Exposed region	-4.830***	-3.907***	-3.463***	-6.589***	-3.906***	-3.565***
	(1.111)	(0.326)	(0.471)	(1.384)	(0.531)	(0.361)
Observations	5,381	5,381	5,381	5,381	5,381	5,381
R-squared	0.056	0.267	0.324	0.061	0.263	0.313
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: This table presents results similar to those of Table 3 but the standard errors are classified at year of birth*region level. See notes to Table 3.

Table VI: The Effect of Conflict on Human Capital Accumulation (2)

	(1) Repeat	(2) Repeat	(3) Repeat	(4) Dropout	(5) Dropout	(6) Dropout
Panel A: All sample						
Born before war#Exposed region	0.155***	-0.0626	-0.0848	0.0230	-0.109**	-0.0999**
	(0.0346)	(0.0583)	(0.0558)	(0.0531)	(0.0430)	(0.0407)
Born during war#Exposed region	0.182***	0.115**	0.102*	0.0957***	0.0468***	0.0477***
	(0.0164)	(0.0481)	(0.0504)	(0.0311)	(0.0123)	(0.0102)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.049	0.102	0.132	0.051	0.093	0.105
Panel B: Male sample						
Born before war#Exposed region	0.114***	-0.119	-0.132	-0.00478	-0.0748*	-0.0680
	(0.0248)	(0.0952)	(0.0860)	(0.0399)	(0.0398)	(0.0430)
Born during war#Exposed region	0.163***	0.0841	0.0747	0.111***	0.0768***	0.0731***
	(0.0271)	(0.0714)	(0.0711)	(0.0264)	(0.0119)	(0.0127)
Observations	5,235	5,235	5,235	5,235	5,235	5,235
R-squared	0.050	0.111	0.144	0.053	0.108	0.119
Panel C: Female sample						
Born before war#Exposed region	0.197**	-0.0316	-0.0600	0.0863	-0.106	-0.0942
	(0.0673)	(0.0421)	(0.0416)	(0.0897)	(0.0948)	(0.0911)
Born during war#Exposed region	0.198***	0.146***	0.131***	0.0767*	0.0150	0.0208
	(0.0384)	(0.0275)	(0.0291)	(0.0404)	(0.0236)	(0.0193)
Observations	5,381	5,381	5,381	5,381	5,381	5,381
R-squared	0.053	0.121	0.149	0.053	0.099	0.114
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	N	Y	Y	N	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: Note: This table presents results similar to those of Table 4 but the standard errors are classified at year of birth*region level. See notes to Table 4.

Table VII: The Effect of Conflict on Human Capital Accumulation: gender differences

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:	Maths	Maths	Maths	Language	Language	Language
Born before war#Exposed region	-11.41***	-4.826**	-3.573*	-15.38***	-5.787**	-4.542**
	(1.898)	(2.076)	(2.123)	(2.171)	(2.352)	(2.238)
Born during war#Exposed region	-4.757***	-3.354***	-3.192***	-6.542***	-3.843***	-3.692***
	(1.028)	(1.046)	(1.008)	(1.136)	(1.117)	(1.093)
Male#Born before war#Exposed region	8.261***	3.879	2.634	8.256***	3.401	2.183
	(2.714)	(2.526)	(2.597)	(3.125)	(2.936)	(2.766)
Male#Born during war#1.Exposed region	2.463*	2.480*	3.009**	1.430	1.763	2.332*
	(1.471)	(1.350)	(1.315)	(1.607)	(1.435)	(1.408)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.037	0.227	0.282	0.042	0.222	0.277
Panel B:	Repeat	Repeat	Repeat	Dropout	Dropout	Dropout
Born before war#Exposed region	0.202***	-0.0421	-0.0653	0.0833	-0.0875	-0.0858
	(0.0727)	(0.0779)	(0.0801)	(0.0764)	(0.0854)	(0.0851)
Born during war#Exposed region	0.197***	0.130***	0.116***	0.0754***	0.0288	0.0305
	(0.0330)	(0.0345)	(0.0337)	(0.0291)	(0.0308)	(0.0305)
Male#Born before war#Exposed region	-0.0820	-0.0427	-0.0460	-0.0888	-0.0217	-0.0121
	(0.0920)	(0.0917)	(0.0925)	(0.0950)	(0.0984)	(0.0980)
Male#Born during war#Exposed region	-0.0297	-0.0297	-0.0307	0.0356	0.0355	0.0336
	(0.0455)	(0.0446)	(0.0437)	(0.0407)	(0.0398)	(0.0395)
Observations	10,616	10,616	10,616	10,616	10,616	10,616
R-squared	0.050	0.102	0.132	0.053	0.093	0.105
Region FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Gender dummy	Y	Y	Y	Y	Y	Y
Age in yrs	N	Y	Y	N	Y	Y
Age#Region dummies	N	Y	Y	N	Y	Y
Urban dummy	N	Y	Y	N	Y	Y
School FE	N	Y	Y	N	Y	Y
Grade FE	N	Y	Y	N	Y	Y
Class FE	N	Y	Y	N	Y	Y
Teacher FE	N	Y	Y	N	Y	Y
Add.controls	N	N	Y	N	N	Y

Note: In Panel A, the dependent variable in Columns 1-3 is Semester I maths grade out of 100 while it is Semester I language grade in Columns 4-6. In Panel B, the dependent variable in Columns 1-3 takes on the value 1 if a child has repeated a grade, and 0 otherwise while it takes the same value if a child has dropped out of school in columns 4-6. Results reported in Panel B are from linear probability model but coefficients from the marginal effects of the probit model are very similar. See Tables 3 and 4 for the remaining notes.