ARMED CONFLICTS, CHILDREN'S EDUCATION AND MORTALITY : NEW EVIDENCE FROM IVORY COAST.

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Abstract. Among the sub-Saharan African countries, Ivory Coast was recently suffered more than ten years of political instability and absence of peace. Using nationally representative household surveys, I exploit temporal and geographical variations of the 1999–2011 Ivorian political instability to identify its causal effect on children's schooling and child mortality. I find that individuals who lived in conflict areas and who reached the official age to be enrolled in school within the period of the instability have a 10% lower probability of being enrolled in school. Students who spent their school years during the conflict and who lived in an affected area experienced a lag in schooling attainment of more than a year. Older students or those who were likely to be in high school during the conflict underwent a loss in schooling attainment of nearly two years. In addition, results show that the Ivorian armed conflict increased the mortality of children under five by at least 3%. My results also suggest that the deterioration of living conditions and the limitation of health service use during the conflict contribute to explain these adverse effects. Placebo tests suggest that the results are not driven by preexisting differences across conflict and non-conflict areas.

Keywords: Conflicts, Children, Education, Mortality, Ivory Coast, Sub-Saharan Africa

JEL subject classification: I1, I2, O12, O15, J13

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"Places of learning and places of healing should never be places of war", Ban Ki-Moon, UN Secretary General, July 2011. [1]

1. Introduction

Africa, the poorest continent in the world, is also the most affected by conflicts and political instabilities. According to the World Bank, among developing countries affected by conflicts, 46% are in Africa[2]. In recent decades, three quarters of African countries have been affected by armed conflicts (Gleditsch et al., 2002). These conflicts often erupt after the seizure of power by civil (Ivory Coast 2000, Central African Republic 2013, etc.) or military (Burkina Faso 1966, 1980, 1982, 1983, 1987; Ivory Coast 1999, 2011) factions following disputed elections or coups.

Armed conflicts have dramatic consequences on economic development by destroying private and public infrastructures. The destruction of schools and health infrastructures, along with housing, has a direct effect on schooling and health for exposed populations. Moreover, according to a World Bank report, the economic and social costs of conflict persist for years after the end of the conflict (World Bank, 2003).

In peacetime, it is generally accepted that children need special protection because they are considered the most vulnerable sub-population. If this is accepted to be true in peacetime, this should be all the more true during periods of conflict . Armed conflicts affect children's education and health in several ways. First, children are not immune to the killings and mutilations among exposed populations and orphans are more likely to leave school (Evans and Miguel, 2007; Kobiané, Calvès, and Marcoux, 2005). Second, it is not uncommon to see fighters forcibly recruit children for use as soldiers in conflicts (Honwana, 2006). In the same context, girls are often victims of rape and other forms of sexual violence. Under these conditions, even if schools are not officially closed, children may be discouraged from going to school because of personal insecurity. Third, during conflicts, schools and hospitals are often attacked, destroyed, or seized as headquarters by fighters. Children whose schools are destroyed might be forced to interrupt their education. Finally, conflicts have a negative effect on growth (Gupta, Clements, Bhattacharya, and Chakravarti, 2004) and therefore, negatively affect resources of exposed populations. The reduction of families' resources has negative effects on children's schooling and health (Jacoby and Skoufias, 1997, Thomas et al.,

[1]Security Council meeting on Children and Armed Conflict 12 Jul. 2011 (http://www.un.org/apps/news/story.asp?NewsID=39013#.VDrdMdTF-lp (last accessed April, 2014))

[2]http://go.worldbank.org/SQ4KUOKGP0 (last accessed April, 2014)

2004, Thomas, 1994). All these events can lead to a marked reduction in the level of schooling, and to an increase in the mortality rate among young children.

Ivory Coast was recently affected by more than ten years of political instability and absence of peace, beginning with a coup in 1999. This political instability continued until 2011 with civil war, armed militias and rebellions. In this paper, I examine temporal and geographical variations of Ivorian political instability between 1999 to 2011 to identify causal effects on children's outcomes as measured by schooling and mortality. I use two school outcomes, school enrolment and school attainment. The former is defined as the probability of being enrolled in school for school-age youth, while school attainment is defined by the number of years of schooling for children who have been enrolled in school. Child mortality is defined by the probability that a child dies before reaching the age of five.

Studies on the link between armed conflicts and children's education or health have been conducted at both the macro and the micro levels. Ichino and Winter-Ebmer (2004) analyzed the long-run educational cost of World War II. They found that Austrian and German individuals who were 10 years old during the conflict, or were more directly involved in the conflict through their parents, received less education than comparable individuals from Switzerland and Sweden who did not participate directly in the conflict. A recent paper, using repeated cross-sectional datasets for 43 countries in Africa, shows that conflict and especially civil war have a strong and negative effect on school attendance and secondary school enrolment (Poirier, 2012).

However, in macroeconomic studies, the impact of conflicts might be confused with the effects of other phenomena. Further, these studies can disguise some realities of the impact of conflict. Indeed, according to Akresh and De Walque (2008), while school enrolment trends suggest that the school system recovered quickly after the Rwandan genocide in 1994, a difference-in-difference analysis with micro-data shows that children exposed to the genocide experienced almost a half-year decline in schooling attainment and were 15 percentage points less likely to complete third or fourth grade. In a more recent study, Shemyakina (2011) examines Tajikistan's 1992–1998 armed conflict to show that school-age girls who lived in affected regions were less likely to be enrolled in school and to complete their mandatory schooling than girls of the same age who lived in the regions relatively unaffected by conflict. The impact of Ivorian conflict on children's education was previously explored by Andrew and Saumik (2012). In their study, they use individuals exposed to Ivorian conflict between 2002 and 2006 by distinguishing the young cohort from the older one

within the same survey. Their results indicate that the average number of years of education for a school-going age cohort is .94 of a year lower than an older cohort in war-affected regions.

The impact of armed conflict on health is addressed by Bundervoet, Verwimp, and Akresh (2009) in Burundi; Mansour and Rees (2012) in Palestine; Akresh, Verwimp, and Bundervoet (2009) in Rwanda; Akresh, Lucchetti, and Thirumurthy (2012) in Eritrea; and Minoiu and Shemyakina (2014) in Ivory Coast. All these studies use anthropometric measures, particularly child's height-for-age Z-scores or child's weight as health measures. Their results are qualitatively the same. Indeed, these studies arrive at the same conclusion, namely that conflict-exposed children have lower height-for-age Z-scores or lower weight compared to children not exposed to conflict.

In this study, I make several contributions to the literature. First, to the best of my knowledge, this is the first micro-econometric study focused on armed conflict and child mortality. If adult death due to armed conflict is most often directly linked to armed attacks, the deaths of young children, due to their fragility, can also be indirectly driven by the degradation of living conditions during conflicts and thus more difficult to measure. Household micro-data allow the researcher to take into account this indirect effect. Second, previous studies generally use household members' statements to identify individuals affected by the conflict, so their results are highly dependent on the quality of those statements. To avoid this concern, I use information on conflict events drawn from a separate dataset built through several sources (war zones, humanitarian agencies, and research publications). This dataset contains information on the number of conflict events at several administrative levels. Third, unlike previous studies on armed conflicts and children's education, my identification strategy takes into account the probable pre-existence of province-level trends in children's schooling. Not taking into account these probable trends, is to assume that changes between children exposed to the conflict period and those not exposed would have been the same in both conflict and non-conflict areas. This could be a strong assumption in the case of Ivory Coast, because conflict-affected areas are more likely to be urban. FinalIy, in addition to covering the entire period of the political disorder (from 1999 to 2011), the data used in this study allow me to perform a robustness check through a placebo test. Indeed, I use data from 1994 (four years before disorder), 1998–1999 (just before disorders) and 2011–2012 (just after the end of the conflict). While the two last data are used to estimate the effect of the instability, the first two data allow me to perform a placebo test.

My results show that Ivorian political instability had a strong negative impact on children's education and a positive effect on children's mortality. Indeed, the results show that children who spent at least one of their first five years during the period of instability and lived in affected areas

had a 3.5% higher chance of dying before reaching age five. Regarding children's education, children who reached the official age to be enrolled in school within the period of disorders and living in areas affected have a 10 percentage-point lower chance of being enrolled in school. School-age students during the conflict and who lived in affected areas experienced more than a years drop in average years of schooling. The impact was greater for older students, who experienced almost two years drop of average years of schooling. Regrading mechanisms, my results suggest that the deterioration of living conditions and the limitation of health service use during the conflict contribute to explain these adverse effects.

The remainder of the paper is organized as follows. Section 2 provides a brief historical overview of the 1999–2011 Ivorian political instability. In section 3, I present the data and the empirical estimation strategy. Section 4 presents results and some robustness checks. Section 5 discusses the results while section 6 concludes.

2. History of Conflict in Ivory Coast from 1999 to 2011

A country long considered one of the most stable in West Africa, Ivory Coast experienced political instability between 1999 and 2011marked by coups, civil war and a rebellion. In this study, I define the Ivorian conflict as the political instability that started with the 1999 coup, followed by the rebellion. I take into account all events involving military attacks, civil war, armed militias, and armed groups. Therefore, the Ivorian conflict can be summarized in three phases.

The first phase concerns the period 1999–2001 which was marked by military coups[3]. After the 1993 death of the country's first president, Félix Houphout-Boigny, Henri Konan Bédié succeeded him as president. Bédié was quickly accused of creating an ethnic division by curbing the political rights of Ivorian people from the north who were assimilated with some immigrants from neighboring countries; and promoting the concept of "ivoirité" or "ivoirity"[4]. The preparations for the 2000 presidential campaign thus took place in an ethnicized context, which caused tensions between people from the north and the south of Ivory Coast. A military mutiny on December 23 1999 became a coup the following day. General Robert Guei, promoted to president, announced the establishment of a national committee of public safety. After the seizure of power by Guei, the concept of Ivorian was further enhanced by the adoption of a new constitution which excluded the

[3]http://www.un.org/en/peacekeeping/missions/past/minuci/background.html (last accessed April, 2014).
[4]"ivoirité" was a concept which distinguishes indigenous people from migrants.

possible candidacy of Alassane Ouattara, a northern political leader. This gambit led to heavy fighting throughout the country between Ouattara partisans and those supporting the southerner Laurent Gbagbo. The 2000 presidential election opposed Robert Guei and Laurent Gbagbo. After the election, each candidate declared victory and proclaimed himself president. This led to violence, mainly in Abidjan. The army recognized Laurent Gbagbo as the winner of the election. After organizing legislative and municipal elections without Alassane Ouattaras political party, this first step of the crisis ended in 2001 by a forum for national reconciliation designed to end tensions.

The second phase covers 2002–2007 period, which was marked by rebellion in the north (UN, 2006a; UN, 2006b) . Despite the establishment of a Forum for National Reconciliation, questions of nationality and voting rights were not addressed and northerners felt forsaken by the government. In September 2002, a group of soldiers from the largely-Muslim north (mostly populated by Muslims), attempted to seize power in Abidjan. Several rebel attacks took place in Abidjan, but the coup failed and the rebels retreated to the north. The slums of the Ivorian capital, populated mostly by Muslims and immigrants from West Africa, were burned. Several months of fighting followed, and there was violence in several cities including Abidjan in the south, Bouaké in the center and Korhogo in the north of the country. Throughout the conflict period, Ivory Coast was divided in two; the northern part was administered by the rebels with Bouaké as its capital while the southern part remained under the control of the government[5]. Beginning in 2004, an intervention of the international community reduced the attacks from both camps. The country entered a period of neither peace and nor war in which several mediations were undertaken. In 2007, the protagonists signed in Ouagadougou (Burkina Faso) an agreement for the formation of a new government incorporating the main political actors in the country, including the rebels. This agreement also included the participation of all political actors in the next presidential elections. The agreement was intended to bring an end to the war and lead to free and fair elections.

The third phase concerns the 2008–2011 period or presidential election period. It was characterized by the coexistence of the protagonists in the same government with an eye to the 2010 presidential elections. Though country still remained divided in two, until 2010 there was a relatively peaceful climate throughout the country. In December 2010, the presidential election took place and Alassane Ouattara was announced the winner by the electoral commission, but the constitutional council rejected the results and declared Gbagbo the winner. After several failed mediations, the conflict between former rebels and government forces flared up again in the capital and several other

[5]http://www.onuci.org/pdf/CONTEXTE.pdf (last accessed April, 2014.)

cities. The United Nations recognized Alassane Ouattara as the legitimate winner[6]. Faced with the refusal of the former president to recognize his defeat, through a resolution, the United Nations authorized the intervention of international forces. Former President Laurent Gbagbo was arrested in April 2011 and in May 2011 Alassane Ouattara was sworn in as the new president of Ivory Coast, marking the official end of the conflict. According to the report of the National Commission of Inquiry, implemented after Ouattara's investiture, the post-election crisis claimed the lives of more than 3,000 citizens (National Commission of Inquiry, 2012).

The United States Institute of Peace reports that thousands of stakeholders including students and teachers were barred access to the education system during the conflict and that the education sector itself was seriously damaged (Sany, 2010). In 2005, it was estimated that between 800,000 and one million children were not receiving any education[7]. Even university students were not exempt from disruption, as universities were often looted or closed during the conflict (Sany, 2010).

3. Data and methods

3.1. **Data.** Two types of data are used in this study: household data from the Ivory Coast Demographic and Health Surveys (DHS), and conflict events data from the Armed Conflict Location Events Data (ACLED)[8].

To identify areas affected by conflicts, I use the ACLED dataset, which is a public collection of political violence data for developing states. These data contain information on dates and locations of violence, the event types, the groups involved, fatalities and changes in territorial control. Information is recorded on battles, killings, riots, and recruitment activities of rebels, governments, militias, armed groups, and protesters. The main sources of data are reports from war zones, humanitarian agencies, and research publications. I define areas affected by Ivorian conflict as those areas for which the ACLED data report at least one conflict event from December 1999 to May 2011. Unlike Minoiu and Shemyakina (2012), who used the same data to investigate the impact of the conflict on children's health, I use the small administrative level at which events occurred rather than the regional level. Using the small administrative level allows me to focus only on areas affected by events. Figures 1 and 2 show maps maps of Ivory Coast with areas affected by the conflict from December 1999 to May 2011 by small administrative and regional levels, respectively. Darker shades

[6]http://www.un.org/en/peacekeeping/missions/unoci/background.shtml (last accessed April, 2014).
[7]http://www.unicef.org/cote_divoire_summary2005.pdf (last accessed April, 2014).
[8]ACLED data are available on http://www.acleddata.com/

are the most affected areas in term of frequency of conflict events. As Figure 1 demonstrates, many areas in the country were impacted by violence, but the western, central, and to a lesser extent the southern parts of the country were most affected. As the maps make clear, employing the regional level for analysis is misleading because some unaffected areas are counted as affected areas when the administrative level becomes bigger.

The household data come from three surveys: the June-November 1994, September 1998–March 1999, and December 2011–May 2012 Ivory Coast Demographic and Health Surveys. These are cross-sectional surveys with representative data at the national level. The analysis of the impact of conflict is conducted with the 19981999 and 20112012 data, while the 1994 data is used for a robustness check. Information on education is collected for each individual aged 6-24 years old, and includes past and current school attendance, current grade if still in school, and the highest grade attained by those no longer in school. Information for children's mortality comes from the birth histories of women 15 to 49 years old. The birth history gives information for all of a womans children, including survival status and date of death if the child is deceased. Household data were merged with ACLED[9].

3.2. **Identification and econometric specification.** Identification is based on the use of temporal and geographical variations of the Ivorian conflict. For each outcome, It consists of comparing the difference between exposed and unexposed individuals in conflict-affected areas to the difference between exposed and unexposed individuals in unaffected areas. Exposed to the conflict or exposed to the conflict period means that the individual was susceptible to the event in terms of schooling or mortality under five during the conflict period. Thus, exposed individuals come from the post-conflict dataset (2011–2012 survey). Not exposed to the conflict or to the period of the conflict means that the individual was not susceptible to the event in terms of schooling or mortality under five during the period of conflict. These individuals come from the pre-conflict dataset (2008–2009 survey).

3.2.1. *Empirical strategy.* I estimate the following baseline specification with province and birth-cohort fixed effects:

$$Y_{ijt} = \alpha_j + \sigma_t + \beta_1 Conflict_j * Post_t + \epsilon_{ijt}. \quad (1)$$

[9]More information on data availability can be found at http://dhsprogram.com/Who-We-Are/About-Us.cfm (last accessed October 9, 2014).

Where Y_{ijt} is children's outcomes, subscripts on the dependent variable denote individual i residing in the area j and born in year t, $Post_t$ is a dummy variable indicating the post-conflict data, $Conflict_j$ is the dummy variable indicating conflict affected areas, α_j is an area fixed effects, σ_t is a cohort of birth fixed effects, and ϵ_{ijt} is a random errors term. When the dependent variable is the number of years of schooling, Y_{ijt} is a discrete variable. However, in the case of school enrolment and children's mortality, Y_{ijt} is a probability that measures the probability of being enrolled in school (for school enrolment) and the probability of death before age five (for children's mortality). For these two outcomes, equation (1) becomes a Linear Probability Model (LPM). These equations are estimated by OLS with robust standard errors[10].

In equation (1), the parameter of interest is β_1 which captures the impact on children's outcomes of being exposed to the period of the conflict and residing in an area affected by the conflict. This first specification assumes that changes in children's outcomes between pre-conflict and post-conflict groups in conflict-affected areas would have been the same as changes between pre-conflict and post-conflict groups in non-conflict areas. To account for probable differential time trends in children's outcomes across areas, following Akresh et al. (2012), and Minoiu et al. (2012), I add area-specific time trends into the previous equations. Further, I integrate individual and family characteristics which could differ between affected and unaffected areas. Therefore, I estimate the following equation:

$$Y_{ijt} = \alpha_j + \sigma_t + \gamma_{jt} + \beta_2 Conflict_j * Post_t + \beta_3 Conflict_j * Post_t * Female + \lambda X_i + \epsilon_{ijt} \quad (2)$$

Where γ_{jt} is an area*year effect that controls for pre-existing trends in children's outcomes and X_i is a vector of individual and family characteristics. In order to capture any possible gender gap in conflict impact I interact the variables of interest ($Conflict_j * Post_t$) with a female dummy variable. The identification is based on the common trend assumption meaning that both areas-affected and not affected would have the same trend in the case of non-conflict. This assumption can be assessed

[10]The Linear Probability Model has two main issues. First, fitted values can be outside the unit interval, although it should predict probabilities. Second, LPM implies that a ceteris paribus unit increase in the same covariate always changes the probability by the same amount. This would be not realistic, particularly with continuous covariates, but less problematic whenever covariates are discrete as in our case. Moreover, since my main purpose is to estimate the average effect of being exposed to the conflict and living in a conflict area on the probability that a child is enrolled in school and the probability that child dies before his fifth birthday, these two issues need not be a serious concern (Wooldridge, 2010). Further the results show that of the 17732 fitted probabilities for children's mortality, only 334 are outside the unit interval. According to children's school enrolment 1176 over 19962 predicted probabilities are outside the unit interval. So, I just used OLS with heteroscedasticity robust standard errors for estimation.

with a placebo test. Assume for example that we have two pre-conflict periods. In that case, I could suppose that actually the conflict happened earlier and then measure the outcome after the supposed but before the conflict actually happened. If I do not find any effect of this artificial conflict I could assume the common trend assumption to be verified. Therefore, because the conflict began in december 1999, I use 1994 and 1998–1999 Ivory Coast DHS data to perform a placebo test.

3.2.2. *Definition of the sample for each outcome.* I consider three different outcomes. In this section, I define the younger cohort to consider in the post-conflict data for each outcome.

To define conflict exposure for school enrolment, I consider all individuals likely to be enrolled in school throughout the conflict period. The official age to be enrolled in school is six. According to this definition, a sample of children aged between 6 and 18 years old in 2011 (at the end of the conflict) was used. Children from 6 to 18 years old in 2011 reached the age of six within the conflict period. Therefore, I compare school enrolment for individuals from 6 to 18 years old in 2011 from the 2011–2012 survey to individuals from 6 to 18 years old in 1998 from the 1998–1999 survey. Therefore, the post-conflict or exposed group is a subset of individuals from 6 to18 years old in 2011 from the 2011–2012 survey. The unexposed group is composed of individuals of the same age in 1998, according to the 1998–1999 survey. The identification strategy consists in linking these individuals to the presence of conflict in the areas where they lived.

To analyze the impact of armed conflict on the number of years of schooling for those children enrolled in school, I consider a sample of children who were of school age during the conflict and were enrolled in school. Therefore, from the 2011–2012 survey, individuals from 6 to 24 years old at the beginning of the conflict (1999) and who were enrolled in school are identified as individuals from post-conflict data or exposed to the conflict period. These individuals are thus between 18 and 36 years old in 2011. I bound ages to 24 years in 1999 to take into account all levels of education, including college and university. The subset of individuals from 18 to 36 years old in 1998 (from the 1998–1999 survey) is the unexposed group or pre-conflict group.

Regarding child mortality, the identification strategy consists in comparing the survival of children at least five years old or who would have been at least five years old if deceased and who lived at least one of their first five years in the conflict period, to the survival of children at least five years old or who would have been at least five years old if deceased and who did not spend any of their first five years in the period of the conflict. For example, a child who was five years old in 2011 would have been exposed to the conflict period during all five years, whereas children aged 16 in

2011 would have exposed to conflict for only one year of their first five years. So, individuals exposed to the period of the conflict or in the post-conflict group are a subset of children aged 5 to 16 in 2011 (from the 2011–2012 survey) or who would have been between 5 and 16 years in 2011 if deceased. The unexposed or pre-conflict group is, conversely, a subset of children from 5 to 16 years old or who would have been between 5 and 16 years old in 1998 (from the 1998–1999 survey).

3.3. **Descriptives statistics.** Figure 3 shows the evolution of the gross enrolment rate in the first grade of primary school from 1996 to 2009. Between 1999 and 2002, enrolment in the first grade decreased by nearly four percentage points for boys and remained almost constant for girls. After a reversal in the trend between 2002 and 2003, the enrolment rate decreased significantly after 2003, particularly for girls, for whom there is a decline of approximately seven percentage points. These declines in enrolment rate have occurred after the beginning of the first and second stages of the conflict, which led to a decrease in the overall primary school enrolment rate during the conflict (Figure 5). Using the 2011–2012 survey, I compute children's age at the beginning of the conflict (1999) and plot the 2011 probability to be enroll in school by age at the beginning of the conflict and conflict intensity. Figure 4 shows that individuals less than five years old at the beginning of the conflict and lived in conflict affected have less chance to be effectively enrolled in school. Furthermore, Figure 6 suggests that the armed conflict had a negative effect on the number of years of schooling for school-age children. It plots by age and intensity of conflict the difference in number of years of schooling between children exposed to conflict and those not exposed. These differences indicate the evolution of the number of years of schooling, because individuals exposed to the conflict come from the 2011–2012 survey and those not exposed come from the 1998–1999 survey. Figure 6 clearly indicates there was an effect in the areas affected by the conflict. The evolution of the number of years of schooling is higher in the areas unaffected by conflict. In affected areas, the number of years of schooling even decreased, mainly for individuals aged approximately 12 to 24 years when the conflict began. This finding suggests that conflict had a greater effect on older school-age individuals.

Table 1 shows descriptive statistics by intensity of conflict for each subsample. Conflict areas are defined as areas affected by the conflict. There are statistically significant differences in individuals and families' characteristics between conflict-affected areas and those not affected. Indeed, individuals from affected areas are more likely to be from urban areas and thus likely to be from families with higher standards of living and a head of household with more education. Additional characteristics

linked to children's mothers are used for the mortality analysis[11] and also show statistically significant differences between affected and unaffected areas. To perform a robustness check, I included these variables as controls in the regressions for school enrolment and children's mortality. I did not include family characteristics in the specification for the number of years of schooling. The surveys contain only information on the current household in a residence, and since I use older individuals for the analysis, current conditions might not accurately reflect conditions experienced by individuals during their school years.

Table 2 reports average values for each outcome by exposure to the conflict period and residence in conflict-affected areas. In general, for each outcome, as shown in the descriptive statistics, conflict areas have better indicators compared to those not affected by the conflict. Presumably, this reflects the fact that conflict areas are mainly urban areas. However, unaffected areas experienced an improvement. In affected areas, we observe a decrease in the average number of years of schooling and an increase of the proportion of children who die before reaching age five. Furthermore, the overall difference-in-difference suggests that individuals who reached age six during the conflict and lived in conflict-affected areas were 12 percent less likely to be enrolled in school. Those who were aged between 6 and 24 years old at the beginning of the conflict and were enrolled in school experienced an average drop of 1.42 years of schooling. Regarding mortality, the descriptive statistics indicate an increase of three percentage points in the probability that a child died before turning five.

4. Results

4.1. **Impact on school enrolment.** Table 3 presents OLS regression results for school enrolment for both equations (1) and (2). Each regression controls for child's age fixed effects and area fixed effects. All regressions show that the Ivorian conflict had a significant and negative effect on children's school enrolment. The coefficient of the interaction term between exposure to conflict and residence in conflict-affected areas is negative and statistically significant at the 1% level. Indeed, column [1], which does not include area-specific trends or child and family characteristics, indicates that children who reached six years old during the conflict period and lived in an affected area had 15 percent lower likelihood of being enrolled in school. The results remain the same area-specific trends are included in column [2]. Controlling for child's characteristics (gender, relation to head,

[11]Data for children's mortality come from the birth history module of DHS surveys. This module does not contain information about the childs relation to the head of household

type of residence such as rural or urban) and family characteristics (age of family head, gender, education, and family's standard of living), the coefficient of the interaction term declines from -0.15 to -0.10, which implies a reduction by 10 percent of being enrolled in school for children who reached the official age to be enrolled in school within the period of the to the conflict and living in affected areas. Finally, column [4] does not show a gender difference in the impact of the conflict. Indeed, the interaction between exposure to the conflict, residence in conflict areas, and the female dummy does not show a significant difference between girls and boys. So, the impact of the conflict is similar for boys and girls. Overall, these results confirm the assumption that conflicts increase non-enrolment in school.

4.2. **Impact on school attainment.** In Ivory Coast, school-age youth are defined as follows: 6-11 years old for primary or basic school, 12-18 years old for high school, and 19-24 years old for college and university level. The impact of the conflict on school attainment is presented in Tables 4 and 5 for individuals aged 6 to 24 and 12 to 24 years old, respectively, at the beginning of the conflict. Column [1] in Table 4 shows the baseline regression results without controlling for area-specific trends. This regression yields a coefficient of -1.14, which is statistically significant at the 1% level, suggesting that students from 6 to 24 years old at the beginning of the conflict who lived in conflict-affected areas experienced more than a one-year drop in average years of schooling. Column [2] in Table 4 includes area-specific trends and the type of place of residency. As with school enrolment, results do not show a gender difference Column [3]. Table 5 presents the results for youth from 12 to 24 years old at the beginning of the conflict. These students, because of their age, had the potential of being directly involved in the conflict. They are also more likely to leave school for the labor market due to deteriorating living conditions during the crisis; for these two reasons, the conflict might affect these school-age students more than all school-age students. As Table 5 makes clear, students from 12 to 24 years old at the beginning of the conflict who lived in affected areas experienced a drop in average years of schooling of almost two years. Controlling for area-specific trends, the interaction between exposure to the conflict and residence in the affected areas led to a coefficient of -1.81, which is statistically significant at the level of 1%. Again, this drop affected boys as well as girls.

4.3. **Impact on child mortality.** Studies on the effects of shocks on children's health are documented in both the public health and development economics literatures. Shocks such as famines, recessions, pandemics, and conflicts reduce childhood health and affect work productivity later in

life. Strauss and Thomas (2008), Victora et al. (2008), and Almond and Currie (2011) provide more detailed studies on the effects of shocks on children's health. In the specific case of conflicts, children's health is both directly and indirectly affected. In the presence of a conflict, the access to health care services such as vaccinations and other elements of prenatal care, is limited, despite its importance during pregnancy and after childbirth. Furthermore, the deterioration in family families' living conditions makes it difficult to supply nutrients essential for fetal development and early in the life of the child. Another channel through which conflict affects child's health is maternal stress during pregnancy (Camacho, 2008), which can reduce the gestation period. These factors make children exposed to conflicts, either in the womb or during infancy and earliest childhood, more vulnerable than those not exposed; they can result in higher mortality during the first years of life.

In this section, I estimate the impact of the Ivorian armed conflict on child mortality. The regression results are presented in Table 6. Child mortality is measured by the probability that a child died before reaching age five. Column [1] indicates that children who spent at least one year in the period of the conflict and lived in a conflict-affected area had a 3.5% higher chance of dying before reaching age five. The estimated coefficient increases to almost 4% and is statistically significant at the 5% level when controlled for area-specific time trends (column [2]). The regression in column [3] also controls for the child and family characteristics previously used in Table 3, but also integrates maternal characteristics such as mothers age, education, and total number of children ever born. Controlling for such characteristics leads to a coefficient of 3.3%, which is statistically significant only at the 10% level. Therefore, the Ivorian armed conflict led to an increase of at least 3% of under-five children's mortality. Column [4] suggests that girls and boys were not differently affected by the conflict in term of mortality.

4.4. **Mechanisms.**

4.4.1. *Deterioration in families' living conditions.* In addition to the general feeling of insecurity, the mechanism driving lower school enrolment and school attainment during the conflict could be linked to the deterioration in families' living conditions and the higher number of orphans in conflict-affected areas. In Table 7, I compare the standard of living of families in affected and non-affected areas between 1998–1999 and 2011–2012. The standard of living index is a combination of a number of socioeconomic resource factors such as housing characteristics and assets owned by the family. In contrast to non-affected areas, families' standard of living decreased in conflict areas. In fact, between 1998 and 2011, the proportion of families with low or very low standard of living increased

in conflict-affected areas, while the proportion of families with high or very high standard of living decreased. However, in areas not affected by the conflict, these proportions remained approximately the same. Regressions [1] and [2] in Table 8 shows the impact of the conflict on the probability that an individual from six to 18 years old belongs to a family with low standard of living. As the above statistics seemed to show, the conflict had a negative impact on conditions of living. Indeed, individual from 2011–2012 DHS survey (so, who were exposed to the period of the conflict) and lived in affected areas have 15% more chance to belong to a family with low standard of living compared to individual from the same age but not exposed to the period of the conflict or not lived in a area affected by the conflict. Family economic needs arise in research as a contributing factor to school dropout in general (Rumberger and Lim, 2008). The degradation of familial living conditions following the reduction of resources during conflicts negatively affects the demand for schooling. In addition to increasing the inability of households to pay school fees and other costs associated with education, the lack of resources is also associated with a higher opportunity cost of schooling for children. This opportunity cost becomes larger as children age, and increases the pressure for children to work and earn income for family needs.

4.4.2. *limitation of health service use.* The deterioration of family living conditions, mentioned above, could also explain the increase of children's mortality. To explore other mechanisms that drive higher mortality among children under five years old in conflict-affected areas, I employ information on prenatal visits during pregnancies and children's vaccinations, which reduce the risk of pregnancy complications and ensure the infants health and development. Good prenatal care is essential to both maternal and fetal health. A lack of prenatal visits is associated with low birth weight babies, premature births, and babies that do not survive (WHO, 2003). As noted, armed conflicts can negatively impact children's vaccination and prenatal care through the limitation of access to health care services and thus increase children's mortality. To determine if such effects occurred during the Ivorian conflict, I compare evolution of prenatal visits and children's vaccination between areas affected by the conflict and those not affected. Table 7 shows the evolution of prenatal visits and children's vaccination in both area types. The number of prenatal visits is defined the number of prenatal consultations during the womens most recent pregnancy. From 1998 to 2011, unlike in areas not affected by the conflict, the average number of prenatal visits decreases in affected areas by 0.75. With the slight increase of 0.09 in non-affected areas, this suggests a reduction of the number of prenatal visits by 0.84 during the conflict. The data also suggest that vaccination of children was is affected by conflict. The proportion of children under five who received their first vaccine (BCG)

decreased in conflict areas from 0.87 to 0.80. In areas not affected by the conflict, this proportion increased from 0.71 to 0.74, suggesting an overall decrease of 10% in BCG vaccinations during the conflict. Regressions [3] and [4] in Table 8 confirm the decrease in immunization of children under 5 against BCG. Indeed, children under five from 2011–2012 DHS survey (so exposed to the period of the conflict) and lived in conflict-affected area experienced a decline of at least 10% immunization against BCG.

4.4.3. *Other mechanisms.* According to Honwana, 2006 children are often use as soldiers in conflicts. This use of children as soldiers can oleo drive the negative effect on schooling. Since this phenomenon is typically for boys, the gender difference in the impact of the conflict can be used to check whether this phenomenon occurred in the case of Ivory Coast. Sections 4.1 and 4.2 do not show a gender difference in the impact of the conflict on school enrolment or school attainment. This suggests that the decreasing of schooling rate did not driven by the use of children as soldiers during the conflict.

Comparing the proportion of orphans from the 2011–2012 survey between affected and non-affected areas, we notice that 14% of children 6-16 years old were orphans in conflict-affected areas compared to 12% in unaffected areas[12]. Regression [5] in Table 8 shows the correlation between living in conflict-affected and the probability to be orphan for children under 18 years old. This regress confirm a positive correlation between living in conflict-affected area and being orphan. This is another factor which could contribute to a lower school enrolment and school attainment rate in conflict-affected areas.

4.5. **Robustness check: Migration.** The results presented so far could be biased by selective migration and so, not accurately capture the true causal effects of the conflict. For example, due to the conflict, if families with healthier children or families wishing to continue the education of their children migrated from conflict to non-conflict areas, my results would overestimate the impact of the conflict. On the other hand, if children from poorer families or from families with a low propensity of children's schooling fled the conflict and moved from conflict to non-conflict areas, my results would underestimate the impact of the conflict. In this section, I examine this probable selection issue and present evidence that the main results are unlikely to be influenced by migration. To do so, I estimate equation (2) for school enrolment and school attainment restricted to individuals at least 35 years old in both pre and post conflict datasets. Individuals at least 35 years old in 2011 was

[12]Results not included here, as the 1998–1999 survey does not contain information on parental survival.

likely to have children and thus moved to non conflict areas for better conditions for their children[13]. In Table 9 I compare pre and post conflict difference in the level of education for individual aged at least 35 years in conflict-affected areas to the pre and post conflict difference in unaffected areas. As we can see, Table 9 suggests that the difference of the level of adult education between conflict and non-conflict areas has not changed after the conflict. This means that it is unlikely that parent with high or low educational level moved to non-conflict areas during the conflict.

4.6. **Robustness check: distinguishing more and less affected areas.** The intensity of conflict varied widely across the country. Some regions were more affected than others in terms of occurrence of armed attacks. In this section, I estimate the impact of the political instability by distinguishing between more and less affected areas. Following the definition in Figure 1, areas more affected are those with at least five conflict events. They are represented in dark shading in Figure 1, while, the less affected areas are represented in gray shading. Taking into account this heterogeneity, Equation (2) can be rewritten as:

$$Y_{ijt} = \alpha_j + \sigma_t + \gamma_{jt} + \beta_{21}(Conflict_{1j} * Post_t) + \beta_{22}(Conflict_{2j} * Post_t) + \lambda X_i + \epsilon_{ijt} \quad (3)$$

Where $Conflict_{1j}$ and $Conflict_{2j}$ are dummy variables indicating whether an individual lived in a more or less affected area respectively. In terms of magnitude, for each outcome, I expect β_{21} to be greater than β_{22} (in absolute values).

Table 10 presents estimation results of Equation (3). As expected, the impact of the conflict appears to be more severe in the most affected areas. Indeed, even if the difference is not too large, in the most affected areas, individuals experienced a larger drop in average years of schooling, compared to those in less affected areas. The impact of the conflict on child mortality is mostly driven by children who lived in the more affected areas.

4.7. **Robustness check: using 2011–2012 survey only.** Using 2011–2012 survey only, I define the exposure to the conflict by the age at the beginning of the conflict (1999). Since the official age to be enrolled in school is six, each child less than seven years old at the beginning of the conflict is exposed to the conflict regarding school enrolment. Children at least seven years old were not officially concerned by school enrolment. If a child were not enrolled in school after seven years, I assume that this child will not be enrolled in school after[14]. Doing so, the identification strategy in

[13]Results do not change if I consider individuals aged at least 25 or 30 years old.
[14]I did a sensibility test by changing the threshold from six to seven, six to eight and six to nine and I find the same results.

equation (2) is to compare in both conflict affected and non-affected areas the 2011 school enrolment rate of children less than seven years at the beginning of the conflict to those aged seven years or more. I limited the upper bound to 14 years old. Table 11 Show the results of the regression of equation (2] using this new definition of conflict-exposure. Without controlling by household fixed effect the results suggest a decrease of school enrolment by 10%. Adding household fixed effect to compare sibling before and after the conflict, the coefficient falls to 0.6 but stay significant.

4.8. **Robustness check: placebo test.** Because political instability in Ivory Coast began in December 1999, using the 1994 and 1998–1999 DHS data allows me to perform a placebo test. The data collection process is similar for the three DHS datasets. Therefore, if there are no pre-existing differences in children's outcomes between conflict and non-conflict areas, using equation (2) with 1994 and 1998–1998 DHS data should not lead to a significant coefficient of β_2. which would then confirm that the results obtained above are driven by the conflict. Following the definition of exposure to the conflict in section 3, I define, for each outcome, a placebo exposure to the conflict period. For school enrolment, I consider the subset of individuals from 6 to18 years old in 1998 as those exposed to the conflict period (post-conflict group). These individuals come from the 1998–1999 survey. Individuals of the same age from the 1994 survey are likewise considered the unexposed group (pre-conflict group). For school attainment, from the 1998–1999 survey, individuals from 18 to 36 years old in 1998 and who were enrolled in school are considered individuals exposed to the period of the conflict (post-conflict group). The subset of individuals from 18 to 36 years in 1994 (from the 1994 survey) is the pre-conflict group. Similarly, for children's mortality, the post-conflict group is a subset of children from 5 to 16 years old in 1998, dead or alive (from the 1998–1999 survey), while the pre-conflict group is a subset of children in the same age range from the 1994 survey. To perform the test, I also consider the conflict-affected areas as placebo-conflict areas.

Table 12 presents the test results using these data. As we can see, in all cases, the coefficient of the interaction between exposure to conflict and residence in a conflict area is not significant. The results indicate that individuals who lived in placebo-conflict areas and exposed to the conflict period, according to the placebo-exposure definition, did not experience either lower school enrolment or less school attainment or more mortality. The placebo test suggests that the increase in children's mortality, and the decrease in school enrolment and school attainment, are not driven by preexisting differences across conflict and non-conflict areas.

5. Discussion

The empirical strategy is based on the difference-in-difference approach, combining the temporal and geographical variation of the conflict to identify its causal effect on children's schooling and children's mortality. The strength of the difference-in-difference strategy lies in the combination of regional and time-varying exposure to the conflict. The results suggest that the political instability between 1999 and 2011 in Ivory Coast had adverse effects on school enrolment, school attainment, and children's mortality.

The exposure to the conflict for school enrolment takes into account the official age for being enrolled in school. Therefore, all individuals who reached their sixth birthday during the conflict period were exposed to the conflict. According to this definition, the subset of individuals from 6 to 18 years old in 2011 are exposed. Among them, those who lived in conflict areas have a 10% lower likelihood of being enrolled in school. School enrolment is a specific event that takes place in a defined period each year, generally between August and October. The intensity of the conflict was not uniform throughout the conflict, so, if some children were not enrolled in school in a given year due to the occurrence of conflict events, they could be enrolled in succeeding years, if there were a lull in the fighting. The impact of the conflict on school enrolment would be higher in the short term, especially in the period following conflict events. Children may be enrolled in school when conflict events become comparatively rare. Similar results were found by Shemyakina (2011) for Tajikistans 1992-1998 armed conflict. Indeed, her results indicate that in 1999, girls from 7 to 15 were about 11 percentage points significantly less likely to be enrolled in school if their households dwelling was damaged during the war. In absolute terms, this adverse effect includes many children who need specific treatment. After the conflict, while younger children aged 6 to 8 could be enrolled in school, older children were less likely to still attend formal schooling. Therefore, the development and implementation of specific programs such as vocational and technical training becomes essential for them.

It is generally recognized that education is a powerful driver of development and one of the strongest instruments for reducing poverty and improving health. To consider education as an engine of development, requires a minimum level of education. According to UNESCO, formal secondary schooling is the most effective way to develop the skills needed to improved personal development (UNESCO, 2012). To identify the causal effect of Ivorian conflict on school attainment, I consider the exposed group to be the subset of individuals aged 6 to 24 at the beginning of the conflict. This

group corresponds to school-age people, including the post-secondary level. The results show that students exposed to the conflict who lived in conflict areas experienced more than a one year drop in average years of schooling. Older students, especially those who were supposed to be at high school at the beginning of the conflict (at least 12 years old in 1999), were the most acutely affected, with almost a two year drop. The regressions results can be viewed as a permanent effect of the conflict on education, because students aged 6 to 24 years in 1999 were 18 to 36 years old in 2011.

The last dependent variable used in my estimation is children's mortality. The results indicate that children who spent at least one year in the period of the conflict have at least a 3% greater chance of dying before reaching age five. Because of younger children's fragility, armed conflict can indirectly affect children's health through the deterioration of family resources. Limiting access to health care services during the conflict directly affects children's health. In the Ivorian conflict, the decrease in children's vaccination rate and the deterioration of families living condition might have contributed to the increase in children's mortality.

However, some limitations of this study must be noted. First, the data used in this study might suffer from selection bias due to the potential non-coverage of internally-displaced individuals, who were likely most affected by the conflict. Therefore, the results might underestimate the impact of the conflict. Moreover, the data do not include information on individuals who died during the conflict. If these individuals were less likely to be enrolled in school or more likely to leave school early, the results on schooling would be underestimated. The results on children's mortality might also be underestimated if among individuals who died, there were under five years old. In other words, the results only apply to individuals who stayed in the country after the conflict. The second limitation of this study is considering actual residence as the residence in which events occurred. My estimation strategy assumes that individuals have not migrated since the beginning of the conflict. So, selective migration of individuals affected by the conflict might bias the results. Individuals current location might differ from the ones where conflict events occurred. If enough households affected by the conflict moved to non-affected areas, then the estimated results underestimate the current impact of the conflict. Unfortunately, data used in this study do not contain information on individuals migration history. Therefore, the estimates should be considered the lower bound of the true parameters. Finally, data on children's mortality concerns only women from 15 to 49 years old, which could lead to selection bias. However, women over 49 years old and under 15 years old are substantially less likely to have children, so one can assume that this bias is not an important concern.

6. Conclusion

In this paper, I investigate the impact of the 1999-2011 Ivorian political instability on children's outcomes defined by schooling and children's mortality. I compare the differences between affected and non-affected individuals in children's schooling and children's mortality for exposed cohorts identified in one nationally representative cross-sectional survey conducted prior to the beginning of the instability (in 19981999), with the difference between those affected and non-affected for unexposed cohorts in another nationally representative cross-sectional survey conducted at the end of the conflict (in 20112012). The two surveys used the same methodology for data collection. Therefore, the empirical identification strategy uses both pre-conflict and post-conflict data to exploit geographical variation of the conflict.

I find that Ivorian political instability caused a decrease in schooling and an the increase of children's mortality under five years of age. Individuals who lived in conflict areas and who reached the official age for being enrolled in school within the period of the instability had a 10% lower chance of being enrolled in school. Students exposed to the conflict during their school-age years and who lived in an affected area experienced a decline in schooling attainment of more than one year (1.14). Older students or those who were likely to be in high school at the outset experienced a decline in schooling attainment of close to two years (1.81). With respect to children's mortality, the results show that Ivorian armed conflict increased under-five children's mortality by 3%.

To confirm that these results can be attributed to the conflict rather than other events occurring between 1999 and 2011, I performed a placebo test using another pre-conflict dataset. These data were collected in 1994 using the same methodology as the other data. To perform the test, I applied the previous empirical strategy to the two pre-conflict datasets by defining placebo-conflict areas and placebo-exposure to the conflict. The test results confirm that the adverse effects of the conflict were not driven by pre-existing differences across conflict and non-conflict areas. The degradation of family living conditions and the limitations on the use of health services during the conflict might explain these adverse effects. The reduction in school attainment might have negative welfare consequences by reducing future adult wages and productivity. The development and implementation of specific programs such as vocational and technical training are essential to mitigate this impact. This study also confirms the need for special protection of children during conflicts. However, my research also shows that the socioeconomic costs of political instability are likely to be underestimated because of the unavailability of migration history. Future research could

use variation in residency to define exposure to the conflict more fully and accurately and therefore identify conflict impacts better.

7. Tables

Table 1. Summary statistics

	School enrolment (6-18 years old)				Children's Mortality (5-16 years old)				Number of years of schooling (18-36 years old)			
Child's variables	OC (1)	IC (2)	Diff. (1) - (2)	N	OC (1)	IC (2)	Diff. (1) - (2)	N	NC (1)	IC (2)	Diff. (1) - (2)	N
Age	10.89	11.27	-0.38***	19962	10.28	10.33	-0.05	17732	27.03	26.84	0.19	11275
Child is a girl	0.49	0.50	-0.01	19962	0.50	0.49	0.01	17732	0.40	0.44	-0.04***	11275
Lives in a rural areas	0.77	0.49	0.28***	19962	0.82	0.59	0.23***	17732	0.66	0.32	0.34***	11275
Child of head	0.58	0.58	0.00	19962	-	-	-	-	-	-	-	-
Head of household												
Head's age	49.25	48.99	0.26	19962	47.53	47.23	0.3	17732	-	-	-	-
Head is a woman	0.10	0.18	-0.08***	19962	0.10	0.15	-0.05***	17732	-	-	-	-
Head's education												
Not educated	0.65	0.57	0.08***	19962	0.67	0.6	0.07***	17732	-	-	-	-
Primary level	0.17	0.18	-0.01	19962	0.21	0.20	0.01	17732	-	-	-	-
Secondary or more	0.18	0.25	-0.07***	19962	0.12	0.19	-0.07***	17732	-	-	-	-
Family's standard of living												
Very low	0.22	0.16	0.06***	19962	0.25	0.21	0.04***	17732	-	-	-	-
Low	0.27	0.17	0.10***	19962	0.26	0.19	0.07***	17732	-	-	-	-
Middle	0.26	0.19	0.07***	19962	0.28	0.21	0.07***	17732	-	-	-	-
High	0.15	0.23	-0.08***	19962	0.13	0.22	-0.09***	17732	-	-	-	-
Very high	0.10	0.25	-0.15***	19962	0.07	0.17	-0.10***	17732	-	-	-	-
Child's mother												
Age	-	-	-	-	34.85	35.23	-0.38***	17732	-	-	-	-
Total children ever born	-	-	-	-	5.47	5.61	-0.14***	17732	-	-	-	-
Not educated	-	-	-	-	0.78	0.70	0.08***	17732	-	-	-	-
Primary level	-	-	-	-	0.17	0.21	-0.04***	17732	-	-	-	-
Secondary or more	-	-	-	-	0.04	0.08	-0.04***	17732	-	-	-	-

OC Outside conflict areas; IC inside conflict areas; N number of individuals
***p<0.01 **p<0.05 *p<0.1

TABLE 2. Children's outcomes by exposure to conflict and conflict intensity

	Pre-conflict	Post-conflict	Diff.	Double Diff.
School enrolment				
In conflict areas	0.66	0.70	0.04	-0.12***
Outside conflict areas	0.47	0.63	0.16	
Observations	4482	15480		
Number of years of schooling				
In conflict areas	9.23	8.38	-0.85	-1.42***
Outside conflict areas	6.63	7.20	0.57	
Observations	2820	8455		
Children's mortality				
In conflict areas	0.14	0.15	0.01	0.03***
Outside conflict areas	0.15	0.13	-0.02	
Observations	3939	13793		

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

TABLE 3. Impact of the conflict on school enrolment

	[1]	[2]	[3]	[4]
Conflict area and Post-conflict	-0.15***	-0.15***	-0.10***	-0.11***
	[0.02]	[0.02]	[0.02]	[0.03]
Conflict area and Post-conflict and Female				0.03
				[0.04]
Child is female				-0.12***
				[0.04]
Child's age fixed effects	Yes	Yes	Yes	Yes
Area fixed effects	Yes	Yes	Yes	Yes
Area-specific trends	No	Yes	Yes	Yes
Child and families' characteristics	No	No	Yes	Yes
Observations	19962	19962	19962	19962

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1.
Conflict area and Post-conflict indicates a child living in an area affected by the conflict who reached his sixth year within the conflict period. Conflict area and Post-conflict and Female indicates a girl living in an area affected by the conflict and who reached his sixth year within the conflict period.
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys.

TABLE 4. Impact of the conflict on the number of years of schooling.

	[1]	[2]	[3]
Conflict areas and Post-conflict	-1.14***	-1.13***	-1.77***
	[0.39]	[0.39]	[0.59]
Conflict areas and Post-conflict and Female			1.18
			[0.75]
Child is female			-1.40***
			[0.43]
Child's age fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Region-specific trends	No	Yes	Yes
Observations	11275	11275	11275

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1.
Conflict area and Post-conflict indicates a child living in an area affected by the conflict who were of school age during the conflict period and were enrolled in school. Conflict area and Post-conflict and Female indicates a girl living in an area affected by the conflict who were of school age during the conflict period and were enrolled in school.
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys

TABLE 5. Impact of the conflict on the number of years of schooling for older students.

	[1]	[2]	[3]
Conflict areas and Post-conflict	-1.84***	-1.81***	-2.61***
	[0.56]	[0.56]	[0.82]
Conflict areas and Post-conflict and Female			1.55
			[1.05]
Child is female			-1.74***
			[0.54]
Child's age fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Region-specific trends	No	Yes	Yes
Observations	6977	6977	6977

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1.
Conflict area and Post-conflict indicates a child living in an area affected by the conflict who were of school age during the conflict period and were enrolled in school. Conflict area and Post-conflict and Female indicates a girl living in an area affected by the conflict who were of school age during the conflict period and were enrolled in school.
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys

TABLE 6. Impact of the conflict on children's mortality.

	[1]	[2]	[3]	[4]
Conflict area and Post-conflict	0.035*	0.039**	0.033*	0.021
	[0.018]	[0.018]	[0.018]	[0.027]
Conflict area and Post-conflict and Female				0.024
				[0.037]
Child is female				-0.01
				[0.031]
Child's age fixed effects	Yes	Yes	Yes	Yes
Area fixed effects	Yes	Yes	Yes	Yes
Area-specific trends	No	Yes	Yes	Yes
Child and families' characteristics	No	No	Yes	Yes
Observations	17732	17732	17732	17732

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1
Conflict area and Post-conflict indicates a child living in an area affected by the conflict who aged at least five years old or would be aged at least five years old (if deceased) and who spent at least one of their first five years during the conflict period. Conflict area and Post-conflict and Female indicates a girl living in an area affected by the conflict who aged at least five years old or would be aged at least five years old (if deceased) and who spent at least one of their first five years during the conflict period.
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys

TABLE 7. Evolution of family standard of living, prenatal visits, and children's vaccinations

	Pre-conflict (1998/1999)	Post-conflict (2011/2012)	Diff.	Double Diff.
Very low standard of living				
In conflict areas	0.09	0.22	0.13	0.06
Outside conflict areas	0.22	0.29	0.07	
Low standard of living				
In conflict areas	0.10	0.19	0.09	0.15
Outside conflict areas	0.32	0.26	-0.06	
Middle standard of living				
In conflict areas	0.17	0.21	0.04	0.01
Outside conflict areas	0.20	0.23	0.03	
High standard of living				
In conflict areas	0.32	0.20	-0.12	-0.09
Outside conflict areas	0.17	0.14	-0.03	
Very high standard of living				
In conflict areas	0.32	0.18	-0.14	-0.13
Outside conflict areas	0.09	0.08	-0.01	
Numuber of prenatal visits				
In conflict areas	4.94	4.19	-0.75	-0.84
Outside conflict areas	2.79	2.88	0.09	
Child has not health card				
In conflict areas	0.90	0.90	0.00	-0.07
Outside conflict areas	0.82	0.89	0.07	
Child received BCG vacine				
In conflict areas	0.87	0.80	-0.07	-0.10
Outside conflict areas	0.71	0.74	0.03	
Child received Polio1 vacine				
In conflict areas	0.85	0.86	0.01	-0.02
Outside conflict areas	0.78	0.81	0.03	
Child received Polio2 vacine				
In conflict areas	0.74	0.78	0.04	0.02
Outside conflict areas	0.68	0.70	0.02	
Child received Polio3 vacine				
In conflict areas	0.59	0.63	0.04	0.01
Outside conflict areas	0.51	0.54	0.03	

TABLE 8. Conflict, family condition of living and children vaccine

	Low standard of living		BCG		Orphan
	[1]	[2]	[3]	[4]	[5]
Conflict areas and Post-conflict	0.20***	0.15***	-0.13**	-0.10*	
	[0.03]	[0.02]	[0.06]	[0.06]	
Conflict region					0.007*
Child's age fixed effects	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Child and families characteristics	No	Yes	No	Yes	Yes
Observations	19962	19962	19962	19962	14668

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1.
Conflict area and Post-conflict indicates an individual from 2011–2012 DHS survey and lived in an area affected by the conflict. "Low standard of living" indicates the probability that an individual belongs to the quintile 1 or 2. "BCG" indicates the probability that a child under five were vaccinated agains BCG. "Orphan" indicates the probability that a child is a orphan.
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys.

TABLE 9. pre and post conflict education level for individual at least 35 years

	Ever enrolled in school		Number of years of schooling	
	[1]	[2]	[1]	[2]
Conflict areas and Post conflict	-0.002	-0.001	-0.15	-0.09
	[0.02]	[0.02]	[0.30]	[0.23]
Child and families characteristics	Yes	Yes	Yes	Yes
Cohort region fixed effect	No	Yes	No	Yes
Observations	2814	2814	2814	2814

Notes:
Robust standard errors in brackets.
Conflict area and Post-conflict indicates an individual from 2011–2012 DHS survey and lived in an area affected by the conflict.
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys.

TABLE 10. Impact by intensity of the conflict

	School enrolment (6-18 years)	School attainment (6-24 years in school)	School attainment (12-24 years in school)	Child's mortality
Most affected conflict area and Post-conflict	-0.104***	-1.300***	-1.982***	0.037**
	[0.023]	[0.421]	[0.611]	[0.018]
Less affected conflict area and Post-conflict	-0.095***	-1.033**	-1.689**	0.030
	[0.026]	[0.495]	[0.696]	[0.021]
Child's age fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Region-specific trends	Yes	Yes	Yes	Yes
Families characteristics	Yes	No	No	Yes
Observations	19962	11275	6977	17732

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1
Most affected area and Post-conflict indicates a child living in most affected area and who was exposed to the conflict period depending to the outcome. Less affected area and Post-conflict indicates a child living in less affected area and who was exposed to the conflict period depending to the outcome .
Source: 1998–1999 and 2011–2012 Ivory Coast Demographic and Health surveys

TABLE 11. Impact of the conflict on school enrolment using 2011–2012 survey only

	School enrolment	
	[1]	[2]
Conflict area and Post-conflict	-0.10***	-0.06**
	[0.03]	[0.03]
Child's age fixed effects	Yes	Yes
Region fixed effects	Yes	Yes
Child and families characteristics	Yes	Yes
household fixed effect	No	Yes
Observations	17898	

Notes:
Robust standard errors in brackets. ***p<0.01 **p<0.05 *p<0.1.
Conflict area and Post-conflict indicates a child living in a conflict-affected area who were less than 7 years in 1999 (beginning of the conflict).
Source: 2011–2012 Ivory Coast Demographic and Health surveys

TABLE 12. Placebo test

	School enrolment (6-18 years)	School attainment (6-24 years in school)	School attainment (12-24 years in school)	Child's mortality
Conflict area and Post-conflict	0.008	0.169	0.351	-0.005
	[0.022]	[0.842]	[1.466]	[0.019]
Child's age fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Region-specific trends	Yes	Yes	Yes	Yes
Families' characteristics	Yes	No	No	Yes
Observations	17809	8084	4584	17321

Notes:
Robust standard errors in brackets.
Conflict area and Post-conflict indicates a child living in conflict affected area and who was exposed to the conflict period depending to the outcome.
Source: 1994 and 1998–1999 Ivory Coast Demographic and Health surveys.

8. Figures

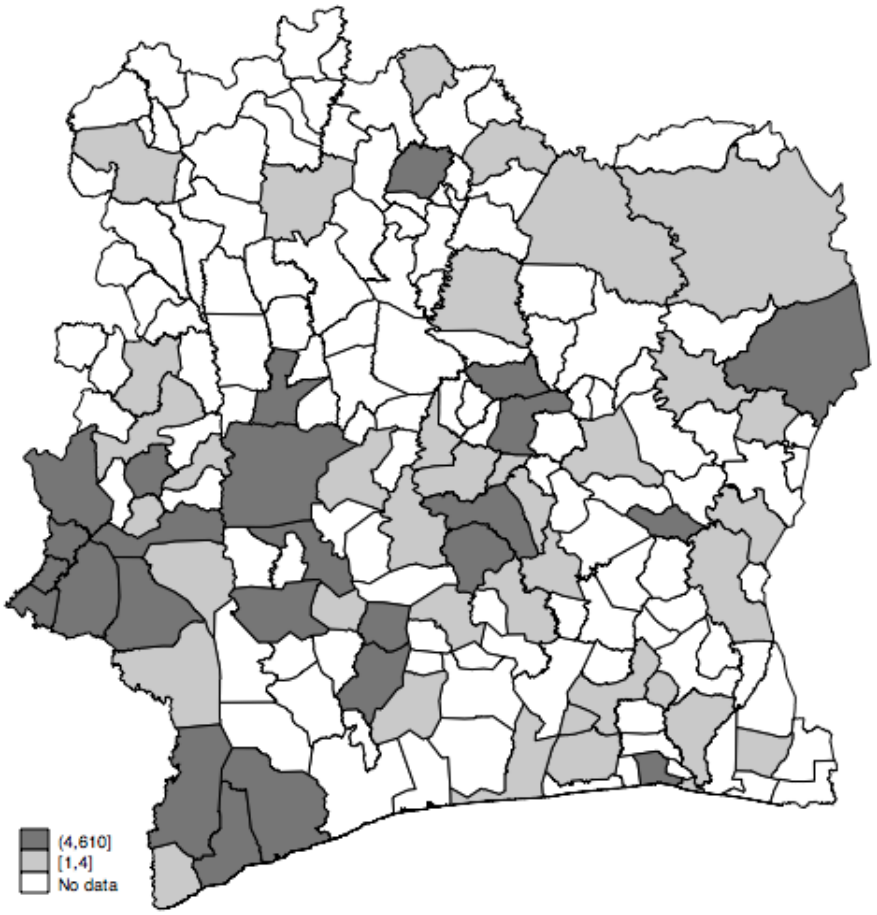

Figure 1. Map of conflict events from 1999 to 2011 in Ivory Coast (subregion level)

Source: Armed Conflict Location Events Data, 2013

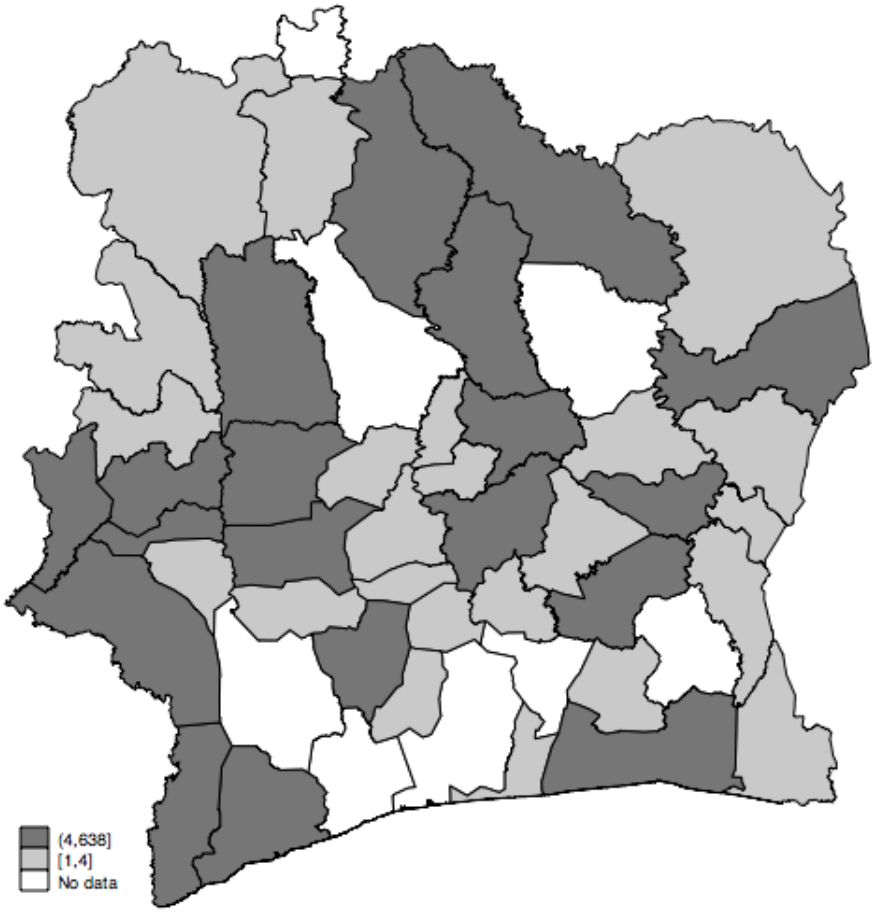

FIGURE 2. Map of Conflict events from 1999 to 2011 in Ivory Coast (region level)

Source: Armed Conflict Location Events Data, 2013

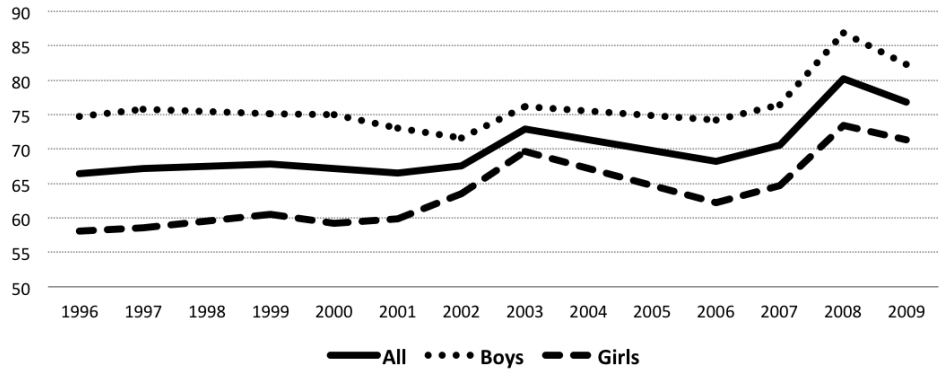

FIGURE 3. Evolution of first-grade enrolment rate
Source: UN data, 2012 (http://data.un.org/Default.aspx)

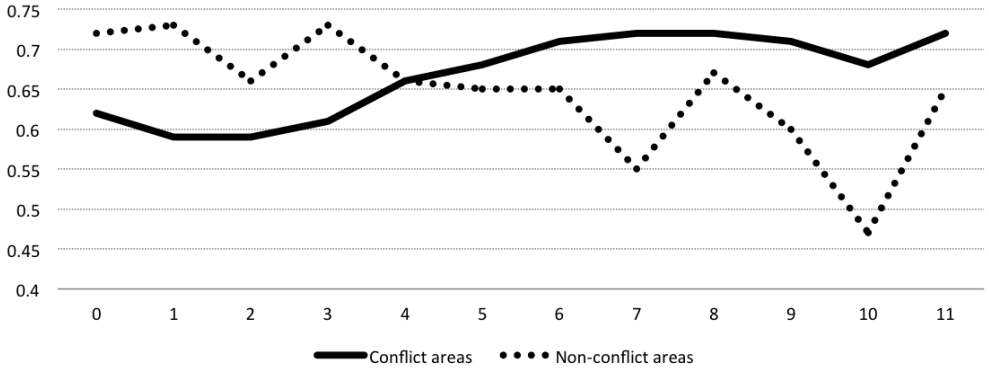

FIGURE 4. Enrolment in school and age at the beginning of the conflict in each area
Source: Ivory Coast DHS 2011–2012

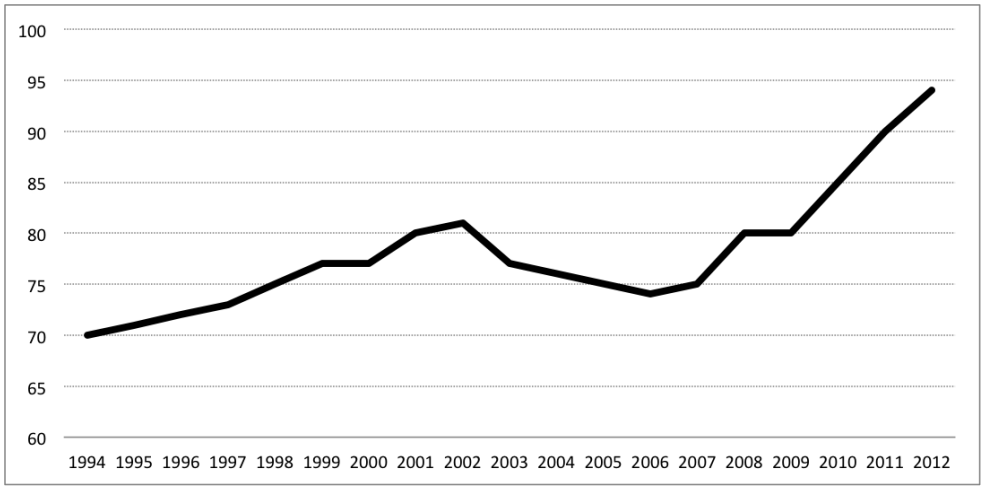

FIGURE 5. Primary school enrolment rate
Source: UN data, 2012 (http://data.un.org/Default.aspx)

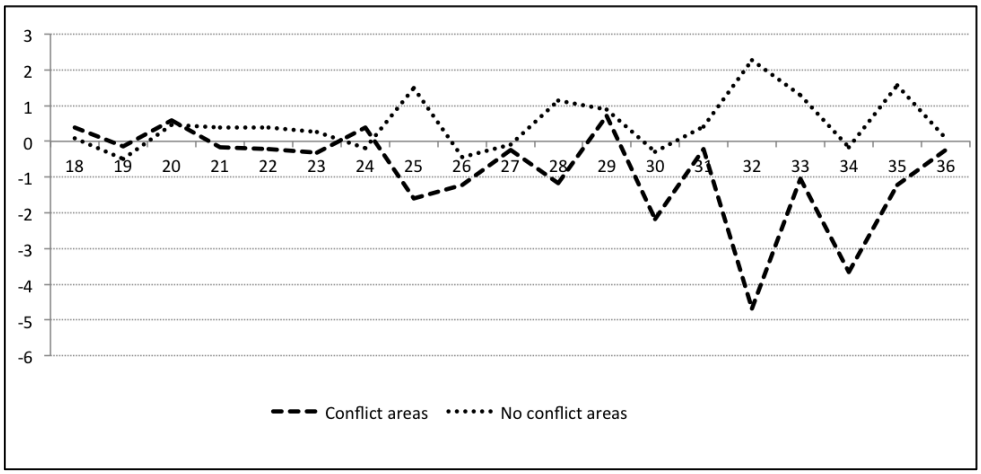

FIGURE 6. Difference in number of years of schooling between Post-conflict and Pre-conflict by conflict areas and age
Source: Ivory Coast DHS 1998–1999 and 2011–2012