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Growing-up Unfortunate: War and Human Capital in Ethiopia

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Summary. — It is well-documented that early-life outcomes can have lasting impacts during adulthood. This paper investigates two of the main potential channels—childhood health and schooling outcomes—through which the Eritrean–Ethiopian war may have long-term economic impacts. Using unique child-level panel data from Ethiopia, identification is based on a difference-in-difference approach, using two points in time at which older and younger children have the same average age and controlling for observable household and child-level time-variant characteristics. The paper contributes to an empirical literature that relies predominantly on cross-sectional comparisons of child cohorts born before and after the war in war-affected and unaffected regions. The results show that war-exposed children have a one-third of a standard deviation lower height-for-age z-score and a 12-percentage point higher incidence of childhood stunting. In addition, exposed children are less likely to be enrolled in school, complete fewer grades (given enrollment), and are more likely to exhibit reading problems (given enrollment). While analyzing the exact mechanisms is challenging, suggestive evidence indicates that child health reduces child education, in particular the probability of child enrollment at school. These are disconcerting findings, as early-life outcomes can have lasting impacts during adulthood. Future research that focuses on mechanisms through which war affects children may improve the design of appropriate policies that aim to target and support children confronted with war.
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1. INTRODUCTION

In addition to natural shocks, many countries—especially in Africa—are exposed to human induced shocks, such as armed conflict or war, which can have severe development implications (Gates, Hegre, Nygård, & Strand, 2012; World Bank, 2011). War may severely affect the human capital of children, leading to poor health (including malnutrition) and lower education. The young are usually vulnerable to adverse shocks, such as those resulting from war, because attachment to their parents could be disrupted (Santa Barbara, 2006). They are also at an early stage of growth and many human capital investments are age-specific (Justino, Leone, & Salardi, 2013). For instance, losing a parent can cause both emotional and physical harm, and increase vulnerability to future risk (see, e.g., Beegle, De Weerdt, & Dercon, 2006).

War can have a lasting impact through its effect on childhood human capital. A substantial literature documents that poor health, nutritional, and educational deficiency in early life can have lasting consequences during adulthood health, education, and labor market outcomes (Alderman, Hoddinott, & Kinsey, 2006; Currie, 2008; Currie & Vogl, 2012; Duflo, 2001; Lucas, 1998; Lucas, Fewtrell, & Cole, 1999; Martorell, 1999; Silventoinen, 2003). For instance, Grantham-McGregor *et al.* (2007) argue that disadvantaged children in developing countries who do not reach their developmental potential are less likely to be productive adults.

This study looks at the effect of the 1998–2000 Ethiopian–Eritrean war on child health and schooling outcomes in Ethiopia. Unlike the existing empirical literature, it exploits child panel data to compare outcomes for children born before (older cohort) and after (younger cohort) the war, in war-affected and unaffected areas, using two points in time at which the two cohorts have the same average age and controlling for time-variant characteristics. The approach requires panel data because I have to be able to track the younger cohort up to the age of the older cohort.

Using a difference-in-difference (DID) approach, I first replicate the results from the literature that is not restricted to cohorts of the same age using the entire (pooled) sample and cross-sectional sub-samples at each survey round.[1] In the former, estimates of the effect of the war ranges (depending on the specifications) from about −0.53 to −0.6 standard deviations in height-for age z-score, which corresponds to a 17- to 19-percentage point higher likelihood of being stunted. Then, controlling for time-variant characteristics, I restrict the analysis to cohorts that have exactly the same average age (I refer to this sample as the "restricted" sample). The effect declines by nearly 40% ranging from −0.30 to −0.38 standard deviations in height-for age z-score, which corresponds to a 12- to 15-percentage point higher likelihood of being stunted.

In addition to studying child health, this paper is the first to identify the causal effect of the Ethiopian–Eritrean war on a range of other childhood human capital indicators, such as school enrollment, grade completion, and reading proficiency. The analysis is based on a unique data set, the Young Lives

Survey, which includes a rich set of household- and child-level covariates that can be used to provide robust evidence. Findings from the education analysis show that war-exposed children are less likely to be enrolled in school. They are also more likely to complete fewer grades and exhibit reading problems, even conditional on being enrolled. An investigation of the underlying mechanisms suggests that child health partly operates as a channel through which child education is being reduced.

Despite the importance of the effects of war on economic welfare and human capital, there is only a small yet recently growing body of literature. Akresh, Bhalotra, Leone, and Osili (2012) study adults with and without exposure to the Nigerian civil war, which took place during a time when these adults were children and adolescents. They find that adults who were exposed to the war during childhood and adolescence (and who survived) exhibit reduced stature than unexposed adults 30–40 years later.[2]

Akresh, Verwimp, and Bundervoet (2011) look at the effect of civil war and crop failure on child stunting using cross-sectional household data from Rwanda. They find that the height-for-age z-score of children (both boys and girls) who were exposed to conflict is about one standard deviation lower. Similarly, Bundervoet, Verwimp, and Akresh (2009) find a 0.35 standard deviation (and a 0.047 standard deviation for each additional month of conflict exposure) lower height-for-age z-score for those exposed to civil war in rural Burundi. A study by Akresh, Lucchetti, and Thirumurthy (2012) that is closely related to this paper uses the 2002 cross-sectional Eritrean Development and Health Survey (DHS) to investigate the impact of the Ethiopian–Eritrean war on child height-for-age z-score, exploiting exogenous variation in geographic extent and timing of conflict. They find that exposure to war decreases child height-for-age z-score by about 0.45 standard deviations.

Studies that focus on child schooling outcomes show negative impacts. These include studies conducted in countries such as Burundi for boys (Verwimp & Van Bavel, 2013), Peru for all children (Leon, 2012), Guatemala for both disadvantaged rural Mayan males and females (Chamarbagwala & Moran, 2011), and Tajikistan for girls but not for boys (Shemyakina, 2011).

However, the effect of conflict on educational attainment of children seems to show mixed results. A recent study by Valente (2013) based on data from Nepal finds that conflict intensity is associated with an increase in female (although the abductions by Maoists have a negative effect) and male schooling attainment. A more recent study by Pivovarova and Swee (2015) concludes that there is no effect of war intensity on schooling attainment in Nepal. In addition, a study for Timor-Leste (Justino et al., 2013) based on two waves of cross-sectional survey data finds mixed short-term and negative long-term effects of exposure to conflict.

In sum, empirical evidence is typically based on cross-sectional data and involves a comparison of cohorts that were born before and after war/conflict, using a DID approach and exploiting temporal and spatial variation.[3] The key implicit assumption of these studies is that in the absence of war, changes in outcomes between those children born after (younger) and before (older) the war would have been the same for war-affected and unaffected areas. However, even if parallel trend assumption is satisfied, if poverty caused war or if war-affected areas tend to be economically poor or drought prone ex-ante, the key assumption may not hold as older cohorts may accumulate larger deficits than younger cohorts, and as a result the effect of the conflict may be over-estimated (Duflo, 2003; Martorell & Habicht, 1986). The opposite holds if war-affected areas tend to be economically rich or less drought prone ex-ante. However, I argue that the former holds in the Ethiopian context[4] and in most other circumstances because areas of civil war tend to be economically poor ex-ante, making it harder to identify causal effects (Blattman & Miguel, 2010).

The remainder of the paper is organized as follows. Section 2 describes the context by providing a brief history of the war. Section 3 presents the data and methods including detailed outlines of the identification strategy and sources of potential bias while Section 4 presents the results and provides a discussion of potential mechanisms. Section 5 provides further robustness checks followed by a final section, which concludes by inferring the predicted impact of the war on potential adult earnings.

2. THE HISTORY OF ERITREAN–ETHIOPIAN WAR

Eritrea was one of the regional states under the umbrella of Ethiopia and became an independent nation after a referendum in 1993 (Tronvoll, 1999). Five years later, a border conflict between Ethiopia and Eritrea led to a war lasting from May 1998 until June 2000 (Abbink, 1998). According to a review by Gebru Tareke (2001), the Eritrean–Ethiopian War began as a territorial dispute on May 6, 1988, at Badme (a district in Tigray region), a small village on the western side of the international border. Later on the war took place in two other locations, Tsorona-Zalambessa and Bure of the Tigray and Afar regions, respectively. Most of the battles took place in the Tigray region. Akresh, Lucchetti et al. (2012) argue that both countries claimed sovereignty over these three areas of war due to the confusion over the border demarcation between the two countries.

The war led to a significant loss of life and material damage for both nations. As documented in a report from Addis Ababa University (2012), both countries committed to large spending to mobilize military forces. It is estimated that the total cost of the conflict was about USD 280 million for Eritrea and USD 397 million for Ethiopia, in addition to nearly 50,000 Eritrean and 75,000 Ethiopian troops lost (Addis Ababa University, 2012). Furthermore, a large number of people were internally displaced. As documented in the Internally Displaced Persons (IDP) global database of the Norwegian Refugee Council, about 315,000 Ethiopians were displaced by December 1998 and this number grew to more than 360,000 on May 2000, of whom 90 percent were in the Tigray region and about 30,000 in the Afar region (Global IDP Project, 2004a; Global IDP Project, 2004b). The foregone GDP growth and the non-monetary human cost imply a significant impact on the overall economy of both nations.

Due to geographic exposure, it appears likely that children who reside close to the war-affected region were affected more than those in regions farther away from the battlefield. Moreover, after the war ended formally in June 2000, Ethiopia went through a relatively peaceful decade. As a result, children born after the war in both war-affected and unaffected regions were not directly exposed to the war. Consequently, causal effects can be identified by comparing changes in outcomes for children born before and after the war in war-affected and unaffected regions. This identification strategy relies on the assumption that the war is exogenous to child health and schooling outcomes in Ethiopia, which seems plausible, given that the war was the result of border dispute between the two countries.