War and Schooling in South Sudan, 2013-2016

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Abstract

South Sudan has been embroiled in a civil war since 2013, with tens of thousands killed and millions displaced. The economy has nearly collapsed, severely reducing the nation's output and causing inflation to soar. While prior research on the immediate humanitarian consequences has focused on forced displacement and food insecurity, little knowledge exists about the long-term impact of war on human capital accumulation in this context. This analysis exploits spatial variation in exposure to violence to estimate the causal impact of the recent South Sudanese civil war on primary school enrollment as a measure of human capital accumulation. Results based on the difference-in-differences (DD) methodology indicate a statistically significant relationship between enrollment and the war. Generally, the study shows that schools located in the war zones lost on average 85 children per year, which represents 18.5 percent of total enrollment. The diminishing trends in girls' enrollment are unrelated to the war. This is unsurprising, as social barriers, including gendered domestic roles, early marriage, and out of wedlock pregnancies have long impeded female educational opportunities in South Sudan. These effects are robust to a number of specifications, including holding constant school-level fixed-effects and adjusting for the standard errors. Implications for policy, including investing in girls' education, labor market and educational policies, and compulsory primary education for all children regardless of gender, both locally and internationally, are discussed.

Keywords: Human capital, war, gender, South Sudan, school enrollment.

1   Introduction

In December 2013, just a little over two years following independence, a civil war broke out in South Sudan. The ensuing violence quickly elevated in intensity and geographical coverage, threatening what little progress the country had made during a wobbly transition. The resultant humanitarian situation has been considered catastrophic, with millions of people displaced over the past several years and nearly half the nation's population facing severe food shortages (IPC 2017). Consistent with experiences elsewhere, destruction of physical capital stock in recent years has thwarted fundamental development processes in South Sudan, with basic services gravely affected (Mayai & Hammond 2014; Addison et al 2015; Lai & Thyne 2007; Burde et al 2017). In the education sector alone, state institutions struggle to perform their basic duties, with learning facilities either becoming homes for armed groups, destroyed, or closed down, consequently forcing as many as 400,000 children to drop out of school in former Upper Nile, Unity, and Jonglei states alone (Hodgkin & Thomas 2016; Lai & Thyne 2007).

Similarly, drastic disruptions to economic activity ensued. For example, Frontier Economics (2014) estimated that South Sudan, mainly via declines in oil production and trade, could lose up to $28b if the war was not terminated within 5 years. This suggests that direct losses in economic productivity in the short and medium terms could be grave. Indeed, following the war, South Sudan's monthly income went from

hundreds of millions down to 20 million United States dollars (Ministry of Finance 2017).

While the current humanitarian and economic situation in the short-term is evidently disturbing, the future socioeconomic consequences of this war could prove troubling. Notably, the war has significantly threatened human capital investments and, by extension, poses a major risk for the country's future socioeconomic development. Ordinarily, investment in education, training, and health in South Sudan has always been modest. Now, partly due to the war, investment in these areas has been nearly crowded out by spending on defense or security sector (Mayai & Hammond 2014; Poirier 2012). This redirecting of resources weakens prospects for skills and economic growth, as investment in education and training forms the most significant input for any country's economic development (Schultz 1980; Becker 1994; Barro 1999). Thus, current losses in skill generating opportunities deprive post-conflict South Sudan of productive capacities to adequately manage long-term developmental needs and economic aspirations. Therefore, the prevailing deficits in schooling, no matter the level, have important implications for the country's human capital formation. Becker (1994) describes human capital in terms of investments in education, health, and other skill trainings. Human capital, particularly education, essentially an investment in man, is critical for development due to its importance to labor output and generation of economically stimulating ideas (Schultz 1960, 1980).

There has been marked interest, both locally and internationally, in understanding how to respond to the tragic humanitarian crisis and its immediate economic upheavals that the South Sudanese war has generated, particularly the

alarming food insecurity and its other far-reaching socioeconomic consequences for the entire country (Mayai et al 2017; IPC 2016, 2017). Research endeavors, which are often commissioned for operational purposes in response to an ongoing emergency situation in the country, have largely focused on the adverse, short-term effects of the war-induced shocks, advocating for expansion in relief efforts in order to save lives (UNOCHA 2016, 2017; IPC 2017). This kind of humanitarian-driven research agendum lends limited insights into the long-term human capacity and skill deficits the country must confront when stability returns (Brown 2006). Another strand of research has mainly focused on the correlation between schooling and political stability, particularly citing how exclusive educational policies excite or perpetuate grievances (Burde et al 2017; Burde et al. n.d). Nevertheless, little remains understood about the extent to which the current South Sudanese civil war has impacted human capital formation and accumulation, especially as concerns spatial (i.e., states) and gender distribution of such effect.

Luckily, recent data by the Assessment Capacities Project (ACAPS) are useful for filling this gap, as they retrospectively track primary school enrollment in the country to 2013, when the country was relatively stable. Using these data, supplemented with conflict intensity data (ACLED), this study explores the nexus between primary school enrollment as a measure of human capital formation and the civil war in South Sudan. The analysis seeks insights into two main research questions: *To what extent has the recent South Sudanese civil war affected primary school enrollment? And is the outcome gender differentiated?* Thus, human capital is measured as the average number of children enrolled annually in primary school. Primary educational attainment is not

often used as a predictor of socioeconomic outcomes, particularly income, but primary education is an important point of departure into higher education, which is associated with significant economic gains, especially in relation to aggregate productivity and personal earnings (Schultz 1988; Card 1994). However, in developing countries, primary education has a sizable influence on earnings. For example, research shows that an additional year of primary education in such contexts accounts for 10 percent rise in wages (Klenow & Rodriguez-Clare 1997; Mincer 1974). In this respect, primary education is as significant an economic enabler for settings where literacy rates are generally lower as is secondary or higher education for developed settings, making it an imperative human capital constituent. In addition, the choice of primary school enrollment, as opposed to the usual secondary school or higher level of education, was a result of newly available, more reliable data.

Two hypotheses pertaining to the war and its human capital consequences in South Sudan are assessed. First, school enrollment is expected to decline in locations directly exposed to the recent war. Second, the impact of war on school enrollment is likely to be more pronounced for male than for female children due to the general political economy of war and sociocultural factors (Burde et al 2017; Kirk & Winthrop 2007; Lai & Thyne 2007). In relation to these two hypotheses, there are decisive pathways through which the war can undermine educational processes ((Akbulut-Yuksel 2009; Leon 2012). First, due to a threat of violence, schools in the war zones are likely to be closed or destroyed (Guariso & Verpoorten 2013). Second, outmigration often occurs as parents are likely to pull their children out of affected schools and move them to safer locations, whether these new locations are equipped with schools or not.

Third, displacement has resulted in lost wages and such loss has deleterious effects on families' ability to pay for children's education. In short, substantial declines in enrollment are expected, given the high levels of forced displacement currently underway. Additionally, youth recruitment into armed forces is ubiquitous in such contexts, particularly in much of politically-troubled Africa (Wessells 2002; Lai and Thyne 2007). The use of children as combatants increases the number of out-of-school children and undoubtedly reduces schooling (Leon 2012; Wessells 2002; Guariso & Verpoorten 2013).

Our identification strategy relies on the following assumptions. First, exposure to political violence varies by geography, which is represented by an individual state in this context. This model stratifies schools into conflict and non-conflict affected locations (states). Second, exploiting location-specific exposure to war permits the use of the difference-in-differences (DD) approach to estimate an exogenous variation in enrollment between two groups of schools (1 if exposed to war, 0 otherwise). Third, South Sudan—with its unique sociocultural values—is an instructive context for studying a gender difference with respect to the influence of war on school enrollment. Finally, the country is undergoing a variety of political transformations, making it a suitable context in which to study the impact of political violence on human capital formation and accumulation in the 21st century. Given this unique moment in the country's history, lessons from South Sudan could be used to promote the Sustainable Development Goals, which advocate for substantial increases in the number of skilled and knowledgeable young adults to meet the century's economic demands (UN Economic & Social Council 2017).

The study provides instructive insights into educational returns to political violence in South Sudan and complements prevailing literature on educational processes in emergencies. Specifically, analysis into education in emergency contexts is essential for detecting conditions for future socioeconomic development and political stability, given the interplay between education and conflict (Burde et al 2017.; Lloyd et al 2010). On socioeconomic development front, education is an equalizer, as it enables individuals to build societies and improve their wellbeing (Haveman & Smeeding 2006). In terms of stability, education conditions the way in which societies deal with violence, with research showing appreciable declines in violence as the number of educated people increases (Gillis 1994). This means that minimizing inequalities in education partly reduces group grievances and eases resulting tensions, hence possibly engendering a more stable state (Burde et al 2017). The analysis, therefore, presents empirical evidence to enhance local and international policy programming on educational processes in emergency situations, with a focus on addressing present and future socioeconomic challenges the exposed contexts are likely to grapple with during and after instability.

This work adds to existing research in three important ways. First, by using impact evaluation techniques to estimate the causal impact of war on schooling in South Sudan, this study contributes to a growing literature on educational processes in emergencies (EIE). Second, this study is the first of its kind, in that it exploits school-level panel data to estimate the average treatment impact of war on primary school enrollment in the Eastern African region. Lastly, the study assesses the causal impact of

political violence on school enrollment in a context where prior research of this kind is incredibly scarce.

The present analysis shows that although, on average, there has been a surge in primary school enrollment since 2015, the South Sudanese war is associated with considerably reduced enrollment overall, with each school losing on average over 80 children or 18.5 percent of total enrollment annually. With 70 percent of the former 10 states directly affected, the overall long-term effect of war on schooling in the country could be overwhelming.

Against the backdrop of the above overview, the remainder of this study proceeds as follows: Section 2 summarizes the experience of a civil war in South Sudan; Section 3 reviews the literature; Section 4 presents materials and analytical strategies; Section 5 presents results; and Section 6 discusses these results.

2   Legacies of Civil War in South Sudan

South Sudan is in the process of establishing itself as a newly-formed state since gaining independence in 2011. Its institutions are overshadowed by personalized politics, with political elites often mired in power squabbles. Such infighting has resulted in these elites overtly ignoring the conventional instruments of governance, such as the constitution, in running state affairs (Awolich & Akol 2013). The result has been the eruption of violent conflicts of varying magnitude throughout the country. For instance, a poorly managed disagreement among leaders in the governing political party, the Sudan People's Liberation Movement (SPLM), sparked deadly violence in December 2013 in the nation's capital. In a short span, the war extended to at least four more states, with masses killed or forced to flee to internationally protected encampments. Those

impacted include both combatants and members of the civil population. Although the degree of destruction varies—both across and within the affected states—basic infrastructure, such as schools, government buildings, health facilities, and essential economic systems have been severely damaged. In the education sector alone, the conflict has caused 70 percent of the schools to close in Jonglei, Upper Nile, and Unity states, with as many as 400,000 children dropping out of school (Hodgkin & Thomas 2016). The traditional livelihoods in those states have also been significantly disrupted.

Additionally, the impact of war on the country's macro-economy has been overwhelming. Oil production has plummeted; foreign investors have fled; and millions of citizens have lost their basic livelihoods as they entered camps as refugees or internally displaced persons. The widespread insecurity has resulted in low economic activity, even at the subsistence level. The World Bank projected that South Sudan's real GDP could shrink by 10.5 percent in 2017. Prices of goods have skyrocketed, but wages have not adjusted accordingly and, as a result, the number of people living below the poverty line has increased while purchasing power has diminished (Mayai 2016). As of late 2017, the country's consumer price index stood at 272 percent, with 267 percent representative of food cost alone (NBS 2017). High inflation is caused chiefly by the shocks in the commodity market due to the ongoing war. The conflict has constrained trade between South Sudan and neighboring states, particularly Uganda (Mayer & Thoenig 2016). This has proved tragic for a country which largely depends on imports for essentially all consumable goods and services.

In part due to its civil war, South Sudan has struggled to raise sufficient revenue to meet its fiscal obligations, especially in the realm of basic services. As oil production

has fallen, the country has turned to its meager foreign reserves and depleted them on defense and security spending, sparing limited funds for food, medical, and energy imports. In addition, South Sudan no longer receives development aid, which compounds the country's fiscal burden.

United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) estimates that 70 percent of the South Sudanese population needs humanitarian assistance. Since the civil war broke out, 2 million South Sudanese have been internally displaced; 1.9 million have been forced into refuge in the neighboring countries; and, in 2017, an estimated 5.5 million faced critical food shortages. In 2017, the UN declared famine in parts of the former Upper Nile region. Hundreds of thousands of citizens in the northern territory, especially in the former Northern Bahr el Ghazal state, are suspected to have migrated to North Sudan in search of better security and economic prospects in the last few years.

A political settlement—the Agreement on the Resolution of Conflict in South Sudan (ARCISS)—was signed in August 2015 in Addis Ababa and established a unity government made up mostly of members from the SPLM-In Government (SPLM-IG) and SPLM-In Opposition (SPLM-IO). Although the implementation of this agreement commenced in April 2016, there has been little political capital or sufficient trust between the parties to make it hold. Deadly events, including shootouts at the State House ensued soon after, as many predicted might happen. Dr. Riek Machar, a principal signatory to the agreement who represented the SPLM-IO, was militarily dislodged out of Juba and pursued into the Democratic Republic of the Congo (DRC) by the SPLM-IG security loyalists. The SPLM-IO subsequently split, with Machar's former chief

negotiator, Gen. Taban Deng Gai, replacing him as the SPLM-IO's lead implementer of the agreement in the Transitional Government of National Unity (TGoNU). These events reignited the violence countrywide and placed the TGoNU in a coma. The new bout of war has inflicted humanitarian and economic harm upon the civil population. The regional economic and security bloc, the Intergovernmental Authority on Development (IGAD), is now attempting to revitalize the ARCISS. There is, however, general skepticism regarding IGAD's credibility to restore peace in South Sudan.

The war-engineered shocks in the economy and human settlement present adverse consequences for current and future economic outcomes. This is especially disturbing for a country whose average spending on education before the war was already low, at 5.8 percent of the annual total budget (Mayai 2015). The country's historically paltry investment in education reflects how its leaders have placed a low priority on this essential constituent of economic development. The current number of people with basic education in South Sudan, estimated at 27 percent in 2008, remains the lowest in the world. The war exacerbates this appalling situation and poses both short- and long-term risks of under-development in the country. Hundreds of schools have closed and thousands of children have dropped out of schools since the war broke out. In light of the seriousness of this attendant reality, evidence explaining the penalties of war on human capital accumulation is critical, particularly in a country that has seen some of the most limited development in the history of mankind. Improved understanding will allow for informed, resilient policymaking during and after the conflict in South Sudan and beyond.

3   Literature

There is ample (though mixed) research on the economic costs of political violence. At the population level, numerous studies show that political instability significantly reduces economic growth as measured in drops in the annual rate of change in gross domestic product (GDP) and retards state's capacity to deliver basic services (Abadie & Gardeazabal; 2013; Alesina et al 1996; Lai & Thyne 2007; Shields & Paulson 2014). Addison et al (2015) find that political violence threatens both human and social capital and weakens institutions. While examining changes in education spending and enrollment over an 18-year period (1980-1997) (Lai & Thyne 2007) find that political instability diminishes resource inputs into education and undermines state's capability to perform its basic functions, such as provision of basic services. Looking at the relationship between conflict and schooling in Sub-Saharan Africa, Poirier (2012) finds that increasing schooling expenditure by a percent of the GDP boosts enrollment and completion rates. He also finds that an increase in military spending, which often occurs in conflict settings, reduces schooling.

At an individual level, Weldeegzie (2017) examines the impact of the Ethiopian–Eritrean war on a range of childhood outcomes, including schooling. He finds that children exposed to war are likely to drop out of school, struggle with reading, and have a relatively lower educational attainment overall. Leon (2012) finds stronger, long-term effects of political instability on educational attainment in Peru, with those exposed to war during childhood losing an average of 0.31 years of schooling as adults. Akresh & De Walque (2008) examine the effect of the 1994 Rwandan genocide on schooling and find that exposure to war reduced children's education by half of a year.

Assessing the impact of WWII on educational attainment in Germany, Akbulut-Yuksel (2009) finds that children exposed to war lost on average 0.4 years of schooling as adult, but those who lived in the hardest hit locations lost on average 1.2 years of schooling. The same study indicates that children exposed to war earned 6 percent less as adults than their counterparts. Akresh et al (2017), in their analysis of intergenerational effects of political violence, find that individuals exposed to the Biafra war in Nigeria suffered reduced educational achievements. Finally, according to Guariso & Verpoorten (2013) the Rwandan children exposed to war had 18.5 percent reduction in schooling.

The long-term effect of political violence on educational attainment also varies by sex (Buvinic´ et al 2013; Chamarbagwala & Morán 2011). While conflict more generally diminishes schooling for everyone, it has a differentiating effect for boys and girls (Burde et al 2017; Diwakar 2015). Justino et al (2014), in their study of the short- and long-term effects of violence on education in Timor Leste, find that the decline in human capital due to war is more pronounced among boys than girls. Two aspects presumably explain this difference. First, the use of male children as combatants is common in a range of developing contexts (Achvarina & Reich 2006). Lai & Thyne (2007) find that the education of boys suffers more during the civil war because boys are likely to be conscripted into the army. Kirk & Winthrop (2007) study gender differences in schooling in Afghanistan and find that school distance affects girls' attendance than boys. Similarly, they find that due to mistrust, parents are less likely to send their daughters to schools largely dominated by men or outsiders as teaching staff. Attitudes and cultural constructs also tend to be less supportive of girl's schooling, favoring boys instead (Kirk & Winthrop 2007; Burde et al 2017). Østby et al (2016)

note that as the quality of schooling declines as a result of war, girls' enrollment becomes significantly reduced. Finally, the economic shocks of political violence are likely to alter boys' roles, with some becoming providers for their families (Buvinic´ et al 2013).

These studies provide some understanding as to the impact of political instability on human capital development. However, the question remains: How do such impacts translate to socioeconomic development outcomes, both at the macro and micro scales? Most economists agree on the following channels: Generally, economic growth is positively and strongly associated with average years of schooling (Barro 1998) and one of the essential paths through which human capital development accelerates economic growth is through the adoption of improved technology (Barro 2001). Accordingly, substantial reductions in schooling weaken a population's capacity to absorb new technologies. Secondly, in developing countries (as it is in developed countries), increasing one's years of education leads to higher personal incomes. In developing countries, for example, an additional year of primary education increases wages by 10 percent (Klenow & Rodriguez-Clare 1997; Mincer 1974). In the United States (one example of a developed country), both secondary and college education are associated with significantly improved personal earnings (Becker 1994). As average human capital declines, whether due to conflict or related other factors, so do average personal incomes. Perhaps most worrisome is that negative consequences of war are likely to be transmitted inter-generationally, impeding the economic prospects of future generations and perpetuating political instability (Akresh et al 2017; Bricker & Foley 2013).

Although prior research is instructive in explaining the penalties of political

violence on socioeconomic outcomes of individuals and countries, it does not present evidence of such outcomes at an institutional level, such as a school. This study fills the gap by exploiting space variation in exposure to violence and estimating the impact of the war on primary school enrollment, a measure of human capital accumulation. This objective is accomplished by using the sampled schools as the primary units of analysis, with enrollment measured as the average number of children enrolled in each school over a period of four years (2013-2016).

4   Data and Methods

4.1   Description of Data

The study uses two secondary data sources, namely the Assessment Capacities Project (ACAPS) and Armed Conflict Location Event Data (ACLED). ACAPS covers enrollment and school backgrounds, while the ACLED dataset documents conflict intensity over time and across the former ten states. Each dataset is further detailed as follows.

   A. The ACAPS Dataset

Late in 2016, the Assessment Capacities Project (ACAPS), with support from UNICEF-South Sudan, surveyed 393 out of an initial sample of 400 schools in South Sudan. The study is an institutional analysis focusing on primary schools nationwide and covered functional and non-functional schools. The present sample includes both public (i.e., run by community and government) and private primary schools. The survey was designed to educate policy-makers on humanitarian interventions to make primary education safe and sustainable, even as the war prevails. The materials were equally

intended to assess how an ongoing political instability and its proximate consequences—such as displacement and macroeconomic shocks—have influenced children's education in the country. The dataset comes from a pool of randomly selected schools clustered within the country's former regions and ten states[1], with enrollment information generated retrospectively, especially for the 2013-2015 periods.

The sampling strategy adopted is as follows. The study commenced with key informant interviews conducted with education officials at the county level to inform a structured survey. Similarly, the survey was preceded by team's visits to some schools, the list of which was reconciled with the Education Management Information System (EMIS) school records. Subsequently, a nationally representative sample of 400 schools was randomly drawn from over 5,000 primary schools found in the EMIS database, a 7.3% representation. To draw this sample, the study team used a multi-stage clustering/stratification strategy. The first stage comprises three major regions of South Sudan, including Equatoria, Bahr el Ghazal, and Upper Nile. The second stage involved urban and rural areas. At the regional level, twenty counties were selected, with at least 30% of the sample or two of these counties allocated to the urban segment of each region. The rest of the counties were then distributed across rural settings, allocated in accordance with the total number of rural counties each region contains. The sample targeted schools that were listed in the EMIS 2013-2015 database. This restriction induced a downward bias in enrollment, as it excludes schools that opened after this period.

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[1] In 2015, a presidential decree created 28 states out of the original 10 states.

Owing to widespread insecurity, some schools could not be reached. Thus, the data collection team devised a replacement strategy for inaccessible schools. When this occurred, a school from the regionally and county stratified list was randomly selected to replace the inaccessible school. In total, 105 (amounting to 26% of the sample) schools were replaced, with the final dataset adjusted for representativeness. Out of the initial sample of 400, the data collection team surveyed 393 primary schools, representing a response rate of over 98%.

Key information was gathered about the school's basic infrastructure, ownership, and whether it was functioning or opened. The survey also documented each school's establishment date, primary reason for closure (if the school was no longer operational), and any institutional and governance support the school was receiving from partners (mostly international), such as DFID's girl-child education fund. Finally, the survey recorded information on enrollment at the start of each school year, the number of children dropping out of school over the years, the number of internally displaced and refugee children attending the school, the main reasons for dropping out of school (documented by the child's sex), exposure to violent attacks or school occupation by armed groups, and the size of teaching staff, measured as the number of teachers available at the start of the most recent school year.

Table 1 describes the sample under analysis. The sample size is presented as school-years (n=393 * 4). As noted, one of the principal objectives of the ACAPS survey was to document how the civil war has influenced primary educational processes in the country by looking at several indicators. Panel A reports on school functionality and its key determinants, with conflict featuring prominently. Of the 393 sampled schools, over

76 percent of them were operating during the data collection exercise. A vast majority of the schools which were no longer operating had suffered the disruptive consequences of war. Indeed, nearly 63 percent not operational at the time of the survey had closed primarily due to political instability.

Panels B and C present information on school ownership and infrastructure. These variables are included in the analysis as correlates of functionality and enrollment. The present analysis indicates that community and government-owned schools have the higher rates of closure (37% and 23%, respectively) than private schools (15%) (Table of results not included.) That said, government-owned schools constitute the majority (65.8%), compared to those which are community and privately owned (11% and 23%, respectively). In addition to ownership, infrastructure also plays a statistically significant role on school functionality (analysis of variance table of results not reported). Compared to open air schools (i.e., those operated under trees or in mobile structures), schools operating in permanent and semi-permanent structures are 5 and 2 times more likely to be functional. The schools are nearly evenly distributed across infrastructure categories. Panel C shows that 37.6% of the schools operate in permanent structures, compared to 38% and 23.4% of those that operate in semi-permanent and open-air facilities.

The results indicate that the average sampled school has 9 teachers and 23.4 IDP and refugee children enrolled annually (see Panel D). The size of the teaching staff (we do not account for teacher quality in this analysis), as well as the number of IDP and refugee children at the school are both important factors in understanding enrollment. As will be demonstrated, a unit increase in either variable is positively associated with

changes in enrollment. All else held constant, the positive relationship between enrollment and the size of teaching faculty remains. Although this might signify a possibility of reverse causality more generally, there is little to believe that this is the case in the South Sudanese context. In fact, a recent review of school enrollment nationwide showed a falling rate of faculty size as the rate of enrollment increased. This result calls for increased investments in recruiting and retaining more teachers during the crisis.

Panels E, F, and G summarize enrollment. For the period under investigation, primary school enrollment averaged 464.5 children annually, or nearly 267 boys and 196 girls, respectively. In 2013, the average school enrolled 460 children and in 2016, the average school enrolled about 466 children. Schools not directly exposed to political instability enrolled on average 500 students a year, compared to an average of 460 for schools in conflict zones. Similarly, 35.3 of every 100 boys dropped out of school each year during this period, in contrast to 31 of every 100 girls leaving school during this time. Panel G shows that 28.7% of the boys discontinued schooling because of the war. The girls report a relatively lower war-related dropout rate, estimated at 22.9%. Overall, political instability accounts for 25.8% of the number of children dropping out of school between 2013 and 2016.

Table 1. Sample characteristics

Variable	Mean	N
Panel A: Functional		
Yes	76.79	1204
No	23.21	364
Primary reason for not functioning		
Conflict related	62.64	228
Other reasons	37.4	136
Panel B: Ownership		

	Mean	N
Community	10.97	172
Government	65.82	1032
Private	23.21	364
Panel C: Infrastructure		
Open air	24.35	376
Permanent	37.56	580
Semi-permanent	38.08	588
Panel D: Teachers, IDPs & refugees presence		
Number of teachers	9.01	1196
Number of IDPs and refugees	23.43	1568
Panel E: Enrollment		
Total	464.47	963
Boys	266.85	951
Boys [2013]	267.79	200
Boys [2016]	300.16	294
Girls	195.95	952
Girls [2013]	183.60	197
Girls [2016]	228.97	297
Not exposed to war	495.06	175
Exposed to war	457.68	788
2013	459.91	199
2016	465.66	764
Panel F: Dropout rates		
Boys	35.29	1056
Girls	31.02	1044
Panel G: Reasons for dropping out by sex		
Boys		
Conflict related	28.74	300
Others	71.26	744
Girls		
Conflict related	22.88	248
Others	77.12	836

Mean represents proportions and averages; N represents school-years.
Author's calculations based on ACAPS data, 2016.

Tables 2A and 2B summarize unadjusted changes in enrollment over the same four-year period. Both tables exploit spatial discontinuity in exposure to the conflict to estimate the average enrollment using the difference-in-differences (DD) framework. The before estimates refer to the 2013 period (peace time) whereas the after estimates refer to the 2014-2016 period (war time). Notably, the war has had substantial effects on early education in this context. For schools in war zones, defined as those in the states where the opposition and the government forces clashed over state control following

the 2013 civil war, enrollment generally declined, except for the girls whose average

registration gained about 11 points per year. Schools the civil war zones, according to

the pooled sample, each lost on average 6 children a year. This equates to losing roughly

10 boys per school annually. However, by treating schools not exposed to war as

counterfactuals, it can be seen that overall average enrollment for schools in war zones

decreased by nearly 65 children annually (see Table 2). Table 3 further demonstrates

that the impact of war on schooling is greater for the boys than for the girls. In particular,

average enrollment for the boys reduced markedly over the years—48 compared to 22

girls. This is to be expected given that the effect of political violence is usually more

pronounced for male than for female children.

Table 2A. Summary statistics for enrollment by treatment

	Not exposed to war			Exposed to war			
	Before	After	Diff.	Before	After	Diff.	DD
Enrollment	450.0	508.8	58.8	462.5	456.5	-6.0	-64.7
	[N=41]	[N=134]		[N=158]	[N=630]		

Average enrollment rates and differences across periods and groups. DD stands for difference-in-differences, a final difference between the two groups; sample size (N) in bracket. Author's calculations based on ACAPS data.

Table 2B. Summary statistics for enrollment by sex and treatment

	Not exposed to war			Exposed to war			
Sex	Before	After	Diff.	Before	After	Diff.	DD
Boys	278.9	317.6	38.7	265.0	255.5	-9.5	-48.2
	[N=40]	[N=134]		[N=160]	[N=617]		
Girls	158.1	191.3	33.2	190.1	200.9	10.8	-22.4
	[N=40]	[N=134]		[N=157]	[N=621)		

Average enrollment rates and differences across periods and groups. DD stands for difference-in-differences, a final difference between the two groups; sample size (N) in bracket. Author's calculations based on ACAPS data.

B. Armed Conflict Location Event Data (ACLED)

Table 3 summarizes conflict intensity by treatment region over time using Armed

Conflict Location and Event Data (ACLED). The ACLED dataset details violent

events, including date, actor, nature of violence, location, and deaths associated with these events. The ACLED data are matched with school level data by using state and period as identifiers. Then, analysis into the combined dataset helps assess the robustness of the regression estimates offered in Table 5.

Table 3A. Conflict intensity by treatment

Year	Not exposed to war		Exposed to war	
	Mean	SD	Mean	SD
2013	13.00	1.62	54.92	37.72
2014	25.71	7.35	133.15	75.40
2015	27.26	7.06	109.58	46.51
2016	49.97	29.25	151.82	99.92
N	248		1,320	

Notes: Mean represents average conflict events and SD stands for standard deviation.

Table 3B. Conflict related fatalities by treatment

Year	Not exposed to war		Exposed to war	
	Mean	SD	Mean	SD
2013	90.29	67.38	871.24	872.38
2014	165.94	148.17	761.07	709.98
2015	112.74	80.80	445.10	342.21
2016	178.45	154.18	572.52	410.26
N	248		1,320	

Notes: Mean represents average conflict events and SD stands for standard deviation.

As Tables 3A and 3B above clearly demonstrate South Sudan's human security has gotten more fragile with time, exacerbated by the country's rapidly changing political climate. On average, the number of conflicts rose over four-fold between 2013 and 2016, confirming the country's deteriorating security situation following the civil war. During the earlier periods, however, sporadic yet relatively small-scale communal conflicts were observed. This scale worsened with the emergence of the civil war in December 2013. Taken as such, the regions which did not directly experience the civil war averaged 13 conflicts in 2013, an estimate that rose significantly in 2016. For the

regions directly exposed to the civil war, on the other hand, the average number of conflicts went from 54.9 in 2013 to 151.8 in 2016, three times as high as the base estimate. Notably, regions located in the war zones experienced a more volatile security environment prior to the current war than did their counterparts, undoubtedly signaling the existence of spatial heterogeneity in localized violence. Gladly, this spatial heterogeneity in local conflicts at baseline does not seem to drive differential effects on schooling as our parallel assumption assessment results indicate. What is more is that, besides violence-inducing local grievances, most states (regions) in Greater Upper Nile and Equatoria suffered major bouts of politically-aggravated insecurity following the war. Overall, for the assessed 4-year period, the politically volatile regions experienced on average 112.37 conflict episodes. This compares to only 28.98 conflicts in the comparable regions.

The average number of fatalities, as reported in Table 3B, has rather fluctuated over time; it does not seem to depend on how many conflicts a region has endured. Nationally, a single conflict caused 7 deaths per 100 population. Presenting this according to conflict exposure, a single conflict then accounted for 11 deaths per 100 population in non-conflict regions, and 6 deaths per 100 population in conflict regions (Table not presented). These findings indicate that the frequency of the conflict can generally invoke fear, the ensuing number of fatalities is likely to depend on the destructive nature of such conflict.

Connecting these results to educational processes once again, we show that conflict is intimately associated with school closure. Of nonfunctioning schools in 2016, 62.64% of these closed due to the conflict. Two periods, 2014 and 2016, stand out—

they experienced more conflicts than 2015, when the peace agreement was signed. This finding is consistent with the direction of our point estimates presented in Table 5, which point to over 15 percent reduction in enrollment in 2014 alone.

4.2   Description of Control Variables

Although the principal emphasis of this analysis is to complement existing knowledge on the adverse effects of political instability on socioeconomic outcomes of individuals and societies, recognizing the role of other factors in order to calibrate such evidence is imperative (Connelly & Zheng 2003; Tansel 2002). Deolalikar (1997), for example, highlights the significance of infrastructure and other community-level constraints on school enrollment. In the present context, school-level or background factors such as the size of teaching staff, school's infrastructure, ownership as a proxy for investment (e.g., spending on school), shifts in population owing to either conflict or environmental shocks or both, and secular, fixed conditions, are considered. To ensure the causal link between enrollment and war is adequately isolated, a series of robustness checks is conducted prior to the estimation of the final, empirical model. More specifically, the role of the size of teaching staff, infrastructure, and school ownership on enrollment is assessed, as these variables significantly relate to school's functionality. In addition, the number of IDP and refugee children attending a school factors into overall enrollment. However, changes in enrollment may also be a function of other invariant, unobserved conditions, which this analysis captures by using period and omitted fixed effects.

Without controlling for other variables, violence appears to be insignificantly related to enrollment, save for the boys' subsample. Still, when other variables are not controlled for, the effect of political violence on enrollment in the boys' sample is

attenuated by 35%, however the statistical relationship still holds at less than 1% confidence level. This result indicates that controlling for other factors does not necessarily matter—war continues to play a fundamental role on the educational attainment of male children. This suggests the relative vulnerability of male children in situations of political instability.

A number of measurement concerns are worth noting. The war has caused extensive social and economic troubles in the country, drastically reducing national and personal incomes. The fear of violent attacks and substantial cuts in economic resources are likely to have forced parents to pull their children out of school. However, the sample has no information on the economic determinants of enrollment. This proves challenging when attempting to accurately estimate the impact of war on enrollment, as children who have not been directly exposed to conflict could still drop out of school due to war-related economic consequences (e.g. marked losses in household or family earnings). In other words, the influence of rapidly deteriorating economy on household-level decisions about enrollment cannot be entirely ruled out. In addition, schools that closed because of the war are not included in the sample. If these schools stopped operating due to political insecurity, then the impact of war on enrollment is undoubtedly underestimated in this study.

4.3   Identification Strategy

As already relayed, the civil war erupted in Juba mid-December 2013 and spread very quickly, especially to the Upper Nile region. Over the last five years, the war has directly affected seven out of the country's former ten states, inducing widespread economic and physical insecurity amongst the population (map of South Sudan here). The seven

states struck by the war include Western Bahr el Ghazal, Unity, Central Equatoria, Western Equatoria, Jonglei, Lakes, and Upper Nile. Lakes and Jonglei have also suffered communal violence for nearly a decade, which has been equally disruptive. The present analysis uses this spatial distribution of violence as the basis for its identification strategy.

First, it should be noted that geography matters. The location of a school determines its exposure to the conflict. As such, primary schools situated in the seven directly affected states constitute the treatment group. Those located in the other three states represent the control group. In other words, the current analysis stratifies the sampled schools into political conflict and non-political conflict exposed locations. If the school is located in a political war zone, it is represented by 1 and 0 if not. Exploiting geography to determine exposure to war engenders the use of a difference-in-differences (DD) approach to estimate the exogenous variation between enrollment and war.

The DD methodology is particularly valuable in netting out time-invariant group differences. An additional strength of this estimation strategy is the assumption of no difference between the two groups prior to the introduction of a policy or occurrence of an event. In Table 4, the hypothesis that the two groups of schools do not differ at baseline (2013) is evaluated. This is performed by interacting two variables: period (year) and treatment (exposure to war). Enrollment—dependent variable—is then evaluated as a function of such an interaction term. Whether the difference between these groups truly exists is established if the interaction term involving 2013 (pre-war) and the war exposure on enrollment is statistically significant. As the results show, there is no evidence to suggest the two groups differed before the emergence of a civil war.

A t-test at baseline also confirms the same story (a table of results not reported). Based on this evidence, no time-varying differences are observed between the two groups of schools. Therefore, any parallel trends observed following the eruption of the political conflict can be attributed to the war itself (see Figures 2, 2A, & 2B).

Table 4. Parallel trends assumption test

Variable	(1) Full sample	(2) Boys	(3) Girls
Exposed to war	-27.61	-47.98	24.71
	(53.39)	(34.58)	(27.74)
2016*War (base)	-	-	-
2013*War	40.00	34.12	7.29
	(79.12)	(51.43)	(41.33)
2014*War	-66.91	-43.05	-30.06
	(78.08)	(50.57)	(40.59)
2015*War	-35.36	-15.64	-28.41
	(76.45)	(49.53)	(39.74)
Observations	963	951	952

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

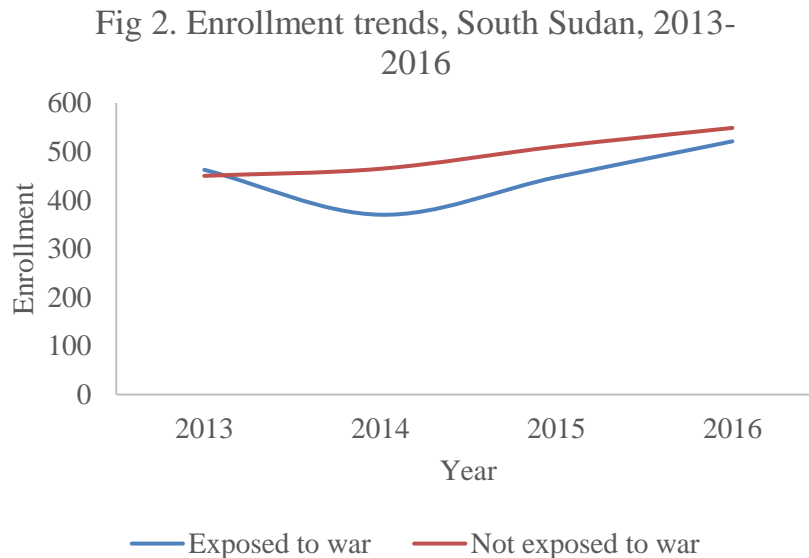Fig 2. Enrollment trends, South Sudan, 2013-2016

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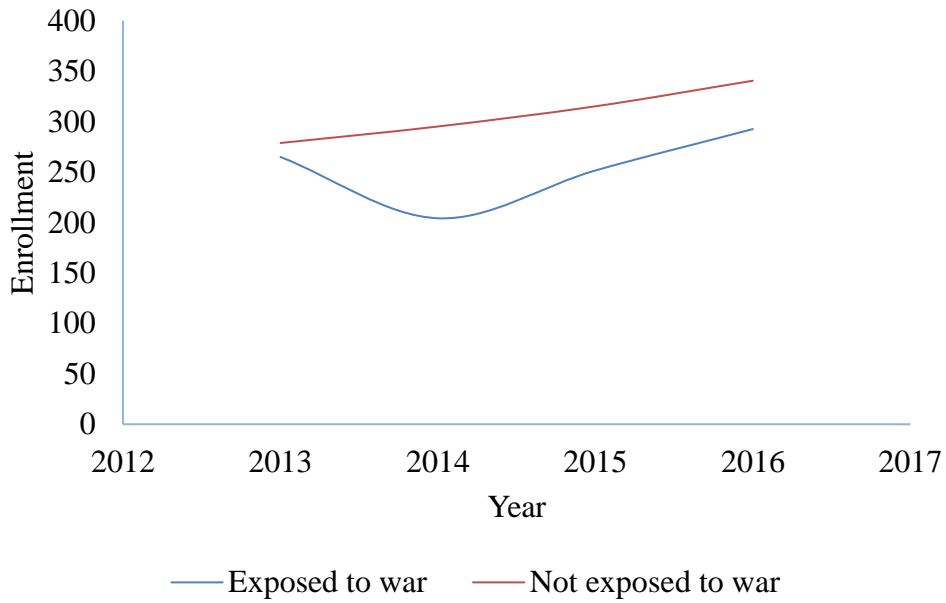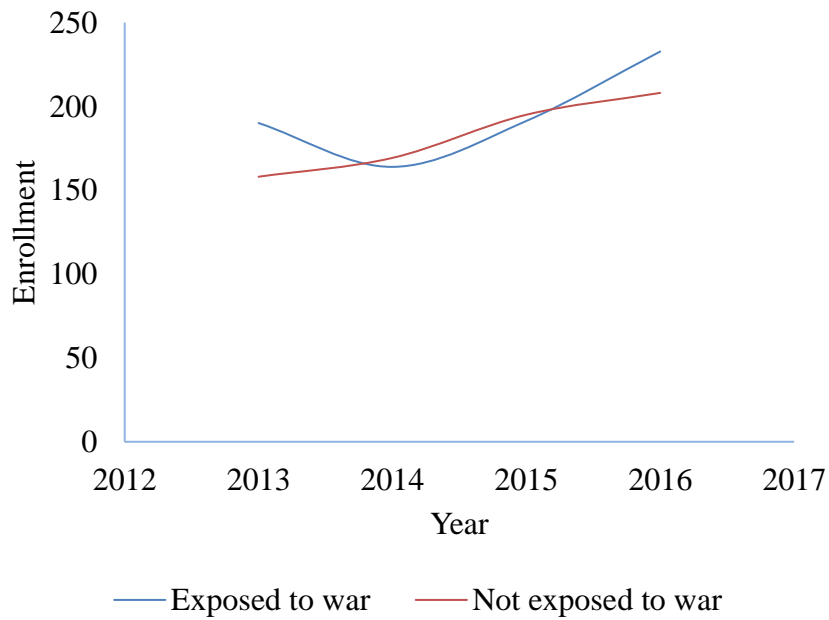Figure 2A. Enrollment trends for boys, 2013-2016

Figure 2B. Enrollment trends for girls, 2013-2016

Similarly, using the ACLED data, we test how school enrollment responds to conflict intensity, measured as a number of conflict events and associated fatalities at a particular location over time. Although the relationship is not statistically significant,

we find a negative association between conflict and enrollment, with each unit of conflict events reducing enrollment by 0.20 for the entire sample, 0.15 for the boys, and 0.02 for the girls. Finally, a unit increase in fatalities results in a reduction of 0.03 for the overall sample, 0.02 for the boys, and 0.01 for the girls (see appendix for these results, Tables 5A & 5B).

Let E be a continuous measure of schooling or enrollment for school i and δ as the average causal impact of violence on schooling. Then, let us evaluate the impact (δ) of war on such measure using the below linear, difference-in-differences equation. This is an ordinary least squares (OLS) procedure with enrollment specified as a linear function of war, net of background characteristics and school-level and period fixed effects. The fixed effects component accounts for both measured and omitted invariant variables and accounting for these variables results in more reliable estimates. We estimate the models by first constructing a dummy variable representing two groups of schools, denoted by D. D equals 1 if the school is located in a state directly exposed to the war, 0 otherwise. Then, the average causal effect of war on schooling becomes:

$$\delta = \frac{1}{n}\sum_{i=1}^{n}[E_{it}|D = 1 - E_{it}|D = 0] \qquad\qquad 1,$$

with the $\sum$ sign representing the summation of enrollment over the entire sample for the duration of the conflict this analysis is evaluating. Transforming equation 1 into a linear regression model that nets out the influence of other factors produces:

$$E_{ist-1} = \alpha_i + \beta(X_{is}) + \delta(War\ exposure) + \gamma_t + \varepsilon_{it} \qquad\qquad 2,$$

where *X* represents a set of background variables that do not vary over time, but whose values vary across schools. War exposure is an indicator of whether the school is located in a war affected state (treatment status), and year represents the periods over which the enrollment is being investigated. Because the DD methodology allows individual sample points to act as their own controls, α denotes the school level fixed effects (Allison 2009). β represents the coefficients of background variables and δ is the causal impact of war on enrollment, which is represented by E as noted above. The δ is considered to be additive and constant (Angrist & Pischke 2009). γ estimates the year fixed effects, and ε accounts for random disturbances or unobserved characteristics of individual schools (Imbens & Woolridge 2009). Enrollment is not only a continuous measure on time dimension, it also varies across schools and it is measured as the number of children enrolled in a school at the beginning of each school year. Thus, holding other factors constant, including time-invariant omitted variables, the impact of war on enrollment is estimated for school *i* in state *s* at time *t,* respectively. Using 2013 as base period, the average enrollment is estimated for the last period, which is 2016.

Background variables include a school's infrastructure, ownership, size of the faculty, and the presence of IDP and refugee children. Infrastructure is defined as open air, permanent, and semi-permanent. School ownership is defined as community, government, and private. Faculty size is defined as the average number of teaching staff available at the start of a school year. IDPs and refugees are defined as the number of IDP and refugee children attending the school during the school year. The information on faculty size and the number of IDPs and refugees is taken from the most recent period

and, as such, the impact of those variables on enrollment is assumed to be constant over time.

The National Bureau of Statistics (NBS) of South Sudan uses neighborhood-based census tracts (clusters) to generate data for population-based studies. The ten states make up some of the clusters the NBS has defined and utilized for generating spatially representative samples. The present sample was drawn using these state distributed tracts. To adjust for the standard errors, we take into account the clustering effects by treating individual states as independent groups within which schools are located. Although the clusters are considered to be independent, schools within them are likely to share similar experiences, leading to a local dependence that could influence the statistical tests of significance.

Lastly, a reference to some methodological flaws is in order. In particular, this work does not take into account the household determinants of enrollment, as the necessary data are absent. For this reason, we are unable to isolate the impact of war from other essential factors in determining enrollment. For example, an economic downturn associated with political instability is likely to have a consequential bearing on a household's decision to continue educating the children, especially the boys (Justino et al 2014). Furthermore, late payment of civil servants' salaries has been exacerbated since the war broke out, with those serving in the police and education sectors waiting for as long as eight months for salary payments (Mayai et al 2017). This situation certainly impacts these particular households' ability to keep their children in school. Second, since the current analysis is at an individual school level, students' fixed-effects could not be measured. Third, communal conflicts, which permeate a

majority of the South Sudanese society, would likely have comparable effects to national conflict on educational processes and general stability. Lack of relevant data on communal conflict hinders our ability to discriminate between the impact of communal violence and violence which is politically motivated. Inaccessible schools are not included in the sample, resulting in an additional bias. Finally, enrollment statistics are not a strong measure of the quality of schooling. Even when a school remains operational, the children in conflict-affected areas are likely to receive poor quality instruction, given that quality teachers often flee due to insecurity or seek jobs elsewhere in response to reductions in educational resources. Likewise, students may not regularly attend classes due to insecurity, appearing on a school roster as enrolled but are not actually attending.

5 Results

In this section, the impact of political violence on primary school enrollment is estimated. The treatment effect of the war on schooling is estimated using three separate models: full sample, boys, and girls. This stratification is necessary, as there is a proven gender dimension to the influence of war on socioeconomic outcomes, particularly education. We use the full sample to estimate the universal causal impact of war on schooling, producing results that are ideally generalizable at the population level. This is in accordance with the assumption that the effects of war are often far-reaching. Gender stratified evidence is desired, as it could be used to support targeted policies. South Sudan National Gender Policy (sec. 3.2) advances the importance of education in the empowerment of both men and women for sustainable socio-economic development

(MGCSW 2012). Net of school background characteristics, individual fixed-effects, and period fixed-effects, Table 5 reveals instructive results. It shows that primary schools exposed to the war suffered substantial declines in enrollment. The impact is particularly pronounced for male relative to female children. These results are in the direction of our key hypotheses: School enrollment is expected to decline in locations directly exposed to war and such an impact is likely to be more pronounced for male than for female children due to the gendered political economy of war and sociocultural factors of South Sudan. While some universal aspects of the influence of war are expected, young boys suffer more in the South Sudanese context for reasons previously discussed.

The effect of war on enrollment for the schools caught in the war is especially notable and statistically significant for the first two models. For the full sample, we find that schools exposed to war lost 85 children annually on average. Considering that the threats of war have been constant for four years, the overall impact amounts to a loss of 340 (73.9% of enrollment) children per school during the conflict window and represents a vast proportion of average enrollment.

Table 5. Primary school enrollment and political violence

Predictor variable	(1) Full sample	(2) Boys	(3) Girls
Exposed to violence	-85.18*	-80.53***	-8.83
	(40.96)	(21.23)	(27.80)
School ownership [ref=community]			
Government	92.73***	63.79***	24.89
	(23.36)	(13.43)	(20.57)
Private	-24.31	-17.65	-1.46
	(13.56)	(14.76)	(19.26)
Infrastructure [ref=open air]			
Permanent	84.70**	55.34**	35.72*
	(33.24)	(22.43)	(17.53)
Semi-permanent	41.52	29.72*	16.15

	(26.70)	(16.11)	(15.04)
No. of teachers	27.38***	10.41***	14.93***
	(1.28)	(2.68)	(1.42)
No. IDPs & refugees	1.21***	1.05***	0.23
Year (ref=2013)			
2014	-72.26	-47.90	-20.23
	(62.79)	(38.29)	(26.52)
2015	0.85	-3.48	9.68
	(59.61)	(37.14)	(24.66)
2016	72.82	37.74	46.82
	(48.32)	(28.33)	(26.71)
Observations	945	933	934

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

There is a statistically significant relationship between the number of boys dropping out of primary school and war. For this group, the average enrollment per year decreases by 80.5 children or 30% of group's total enrollment. For girls, however, the impact is rather modest and insignificantly related to war at all conventional significance levels. Girls' enrollment decreased by 8.8 per year. There are several possible reasons for this gender disparity. One explanation is that boys are often conscripted into the army (Lai & Thyne 2007). Child soldiering typically affects a vast majority of young boys in South Sudan (Fegley 2008). Secondly, boys are sent to safe locations both for safety and educational opportunities; Lai & Thyne (2007) note the experience of the Sudanese Lost Boys who were sent to various Eastern African countries to get an education. Since the conflict erupted, at least one-third of the South Sudanese population has been displaced, a vast majority children and women (IPC 2017). Most refugee and the internally displaced settings offer educational opportunities these days. This is great news for South Sudan, as such minimizes lost opportunities. Thirdly, per traditional norms, girls are rarely exploited as human resources for waging war in the South Sudanese context. Girls are seen among the most vulnerable members of society, along

with adult females, young children, and the elderly. Owing to the cultural expectations in the society to protect these vulnerable members from violence, girls are more likely to be relocated to safer places where they might continue their schooling. However, with or without the presence of conflict, girls drop out of school in higher numbers due to various factors. Distance to school plays an important role. In Afghanistan, for example, school distance influences girls' attendance more than it does for the boys (Kirk & Winthrop 2007). Kirk and Winthrop (2007) also note that sociocultural factors, such as early marriage and domestic obligations, also play a role. The most common roles to which young girls are relegated are housekeeping and child care. Ordinarily, war is an extra burden for female children and should compound these prevailing adverse effects of the South Sudanese sociocultural factors on their schooling. The fact that this is not the case is somewhat puzzling.

6   Discussion

This analysis has explored the role of civil war on primary school enrollment as a measure of human capital formation and accumulation in South Sudan. The civil war in the world's newest country has led to significant shocks in the economy, placing the state in the worst humanitarian conditions in its history. Since the conflict broke out, tens of thousands have been killed, millions have been displaced, food insecurity has impacted nearly half of the population, the state's capacity to deliver basic services has been significantly weakened, the economy has deteriorated, and primary school enrollment has experienced considerable reductions in the last four years. This damaging nature of war, especially on the economy, calls for improved policy regimes. Specifically, addressing the long-term ramifications of war on the younger generations

is imperative. Using quasi-experimental frameworks by exploiting space-specific exposure to violence, we find a strong relationship between primary school enrollment and political instability in South Sudan, with schools caught in conflict zones losing, on average, nearly one hundred children per year. This adverse effect is particularly pertinent for boys as compared to girls, with significant reductions in the enrollment of male children recorded. The decrease in enrollment by female children is not necessarily tied to political violence exposure. This finding suggests that gender differentiated enrollment could be associated with a host of other forces, social or otherwise. First, conscription of young boys into the army is an enduring problem in South Sudan (Burde et al 2017; Lai & Thyne 2007). Secondly, in these kinds of settings girls' enrollment is generally lower compared to boys, with sociocultural barriers accounting for part of this disparity (Kirk & Winthrop 2007). Our analysis indicates that the role of sociocultural circumstances, including gendered domestic functions, poverty, early marriage, and pregnancy, are all highly consequential in negatively impacting female children's education. As such, external interventions can give girls an advantage by potentially reducing the impact of war on their learning activities and simultaneously addressing these other sociocultural barriers. Growing investment from donors and NGOs in girls' education, such as the UKAID-funded Girls Education South Sudan (GESS), is important in enabling such an advantage.

This research is important due to its unique approach of examining the impact of war on enrollment at the school level in a new context. Given the complex paths through which war manifests, evidence of its impact at an institutional level is needed for institutionally-targeted policies. By applying the DD framework, the paper evaluates

educational processes in emergencies and shows that schools in the conflict-battered states of South Sudan lost on average 85 children annually, which constitutes 18.5% of average enrollment. Before the war, the average enrollment per school in South Sudan stood at 460 children. If the conditions of war held over the data collection window, then we would expect schools in the conflict zones to have each lost a total of 340 children by 2016, an estimate that represents 74% of the overall enrollment. A continuation of the war means that a vast majority of young people exposed to the conflict will have limited capacities for a rapidly evolving labor market when the stability returns. This analysis presents a causal impact of political violence on education for a relatively new context, South Sudan. Policy makers and political leaders may use this evidence for improved or properly regimented planning on education during emergencies.

Although community safety as a whole is paramount during emergencies, the present findings suggest that increased efforts to secure primary education enrollment and attendance during times of conflict could lower the short- and long-term socioeconomic costs of political instability. Guaranteeing safe learning facilities should be made an integral part of the local, regional, and international relief agenda. For example, by increasing funding for education for displaced South Sudanese children (both in foreign countries and internally) the nation's future capacity is strengthened. Evidence from South Sudan School Attendance Management System (SSSAMS) shows that GESS' grants (capitation and cash transfers) to primary schools are associated with 401% growth in enrollment, even as the war prevails. Preventing schools from being destroyed or occupied and keeping teachers and children safe should become one of the

main priorities of any kind of intervention (Guariso & Verpoorten 2013; Akbulut-Yuksel 2009). In particular, policies guaranteeing the safety of young boys, who are most susceptible to the exploitation of the warring parties, ought to be established and enforced. There is a pressing need to strengthen and enforce local and international child labor laws to address the problem of child soldiering.

In states grappling with violent conflict, policy makers and political leaders have scrambled for political settlements as a mechanism for terminating instability and setting a point of departure for reconstruction (Kreutz 2009; Mason et al 2011; Högbladh 2011). A return to stability, important as it may be according to conflict resolution and recovery literature, demands distinct policy options in order to foster an encompassing reconstruction process. Though nearly every aspect of rebuilding is considered a priority in a post-conflict environment, policymakers need to target investment programs with an eye towards long-term development. An inclusive, predictable economic recovery program must include the timely re-enrollment and return of children to school (Albertyn et al 2003). Moreover, with or without war, gender gaps in schooling continue to be considerably wide in South Sudan. Compared to boys, the number of girls completing high levels of education remains mortifyingly low. Targeted educational programs, such as increased investments in female education, could begin to bridge gender gaps and ultimately lead to national economic development (Kirk & Winthrop 2007). Finally, availability of educational opportunities for a greater number of children is not sufficient for sustained growth and political stability (Bricker & Foley 2013; NBS 2010; Urdal 2006). The youth represent over 70 percent of the South Sudanese population, and face relatively higher odds of unemployment, both a

risk factor for political instability (Bricker & Foley 2013; NBS 2010; Urdal 2006). The educated youth must be presented with gainful employment. In addition to increasing school enrollment, there must be an integrated policy on labor market and education, with greater access to education aligned with improved youth employment prospects (Barakat & Urdal 2009; Bricker & Foley 2013). Otherwise, the country ends up breeding another injustice that results in families withdrawing investment in education, economic migration, brain-drain, and a legion of very educated rebels (LaGraffe 2012; Hoffman & Jamal 2012; Steer et al 2014; Bricker & Foley 2013; Hilker 2011).

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Conflict of interest statement

The author declares no conflicts of interest.

References

Addison, T., Gisselquist, R., Niño-Zarazúa, M., & Singhal, S. (2015). Needs vs expediency: Poverty reduction and social development in post-conflict countries (No. 2015/063). *WIDER Working Paper*.

Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the Basque Country. *The American Economic Review*, *93*(1), 113-132.

Achvarina, V., & Reich, S. F. (2006). No place to hide: Refugees, displaced persons, and the recruitment of child soldiers. *International Security*, *31*(1), 127-164.

Akbulut-Yuksel, M. (2014). Children of War: The Long-Run Effects of Large-Scale

Physical Destruction and Warfare on Children. *Journal of Human resources*, *49*(3), 634-662.

Akresh, R., Bhalotra, S., Leone, M., & Osili, U. O. (2017). First and Second Generation Impacts of the Biafran War. *NBER Working Paper No. 23721*. http://www.nber.org/papers/w23721

Akresh, R. & De Walque, D. (2008). Armed Conflict and Schooling: Evidence from the 1994 Rwandan Genocide. *World Bank Policy Research Working Paper Series No. 4606.*

Albertyn, R., Bickler, S. W., Van As, A. B., Millar, A. J. W., & Rode, H. (2003). The effects of war on children in Africa. *Pediatric surgery international*, *19*(4), 227-232.

Alesina, A., Özler, S., Roubini, N., & Swagel, P. (1996). Political instability and economic growth. *Journal of Economic growth*, *1*(2), 189-211.

Allison, P. D. (2009). *Fixed effects regression models* (Vol. 160). *SAGE publications*.

Angrist, J. D., & Pischke, J. S. (2009). Mostly harmless econometrics: An empiricist's companion. *Princeton University Press*.

Awolich, A., & Akol, Z. (2013). The SPLM Leadership Contest: An Opportunity for Change or a Crisis of Governance. *Policy Brief*. *The Sudd Institute.*

Barakat, B., & Urdal, H. (2009). Breaking the waves? Does education mediate the relationship between youth bulges and political violence? *The World Bank*.

Barro, R. J. (2001). Human capital and growth. *The American Economic Review*, *91*(2), 12-17.

Barro, R. J. (1999). Human capital and growth in cross-country growth regressions. *Swedish Economic Policy Review*, *6*(2).

Becker, G. S. (1994). Human capital revisited. In Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education *(3rd Edition)* (pp. 15-28). *The University of Chicago Press.*

Bricker, N. Q., & Foley, M. C. (2013). The effect of youth demographics on violence: the importance of the labor market. *International Journal of Conflict and Violence (IJCV)*, *7*(1), 179-194

Brown, T. (2006). South Sudan education emergency. *Forced Migration Review*, *25*, 20-21.

Brück, T., Justino, P., Verwimp, P., Avdeenko, A., & Tedesco, A. (2015). Measuring violent conflict in micro-level surveys: current practices and methodological challenges. *The World Bank Research Observer*, *31*(1), 29-58.

Burde, D., Kapit, A., Wahl, R. L., Guven, O., & Skarpeteig, M. I. (2017). Education in emergencies: A review of theory and research. *Review of Educational Research*, *87*(3), 619-658.

Buvinić, M., Das Gupta, M., & Shemyakina, O. N. (2013). Armed Conflict, Gender, and Schooling. *The World Bank Economic Review*, *28*(2), 311-319.

Chamarbagwala, R., & Morán, H. E. (2011). The human capital consequences of civil war: Evidence from Guatemala. *Journal of Development Economics*, *94*(1), 41-61.

Cervantes-Duarte, L., & Fernández-Cano, A. (2016). Impact of Armed Conflicts on Education and Educational Agents: A Multi-vocal Review. *Revista Electrónica Educare*, *20*(3), 238-261.

Connelly, R., & Zheng, Z. (2003). Determinants of school enrollment and completion of 10 to 18 year olds in China. *Economics of education review*, *22*(4), 379-388.

Deolalikar, A. B. (1997). *The Determinants of Primary School Enrollment and Household Schooling Expenditures in Kenya: Do they Vary by Income?* Seattle Population Research Center.

Diwakar, V. (2015). The effect of armed conflict on education: evidence from Iraq. *The Journal of Development Studies*, *51*(12), 1702-1718.

Economics, F. (2014). South Sudan: The Cost of War—An Estimation of the Economic and Financial Costs of ongoing Conflict. *Frontier Economics*.

Education, C. (2013). Impact Evaluation Report of the South Sudan. http://educationcluster.net/?get=000803|2014/01/south-sudan-eie-impact-report-final.pdf

Fegley, R. (2008). Comparative Perspectives on the Rehabilitation of Ex-Slaves and Former Child Soldiers with Special Reference to Sudan. *African Studies Quarterly*, *10*(1).

Guariso, A., & Verpoorten, M. (2013). Armed conflict and schooling in Rwanda: Digging deeper (No. 343). *LICOS Discussion Paper Series*.

Gillis, A. R. (1994, September). Literacy and the civilization of violence in 19th-

century France. In *Sociological Forum* (Vol. 9, No. 3, pp. 371-401). Springer
Netherlands.

Haveman, R., & Smeeding, T. (2006). The role of higher education in social
mobility. *The Future of children*, 125-150.

Heckman, J., & Carneiro, P. (2003). Human capital policy (No. w9495). *National
Bureau of Economic Research.*

Hilker, L. M. (2011). The role of education in driving conflict and building peace: The
case of Rwanda. *Prospects*, *41*(2), 267-282.

Hodgkin, E. & Thomas, E. (2016). Education and conflict in South Sudan.
Humanitarian Practice Network.
http://odihpn.org/blog/education-and-conflict-in-south-sudan/

Högbladh, S. (2011). Peace Agreements 1975-2011-Updating the UCDP Peace
Agreement Dataset. *States in armed conflict*, *39*.

Hoffman, M., & Jamal, A. (2012). The youth and the Arab spring: cohort differences
and similarities. *Middle East Law and Governance*, *4*(1), 168-188.

Imbens, G. W., & Wooldridge, J. M. (2009). Recent developments in the econometrics
of program evaluation. *Journal of economic literature*, *47*(1), 5-86.

IPC. (2017). IPC in South Sudan: Food Insecurity Situation Still Dire and
Widespread.
https://static1.squarespace.com/static/593ab6ab03596e89ea1d9db0/t/594a274
db29d64bd0e401a5/1498031953928/IPC_Alert_8_SouthSudan_May2017.pdf

Justino, P., Leone, M., & Salardi, P. (2013). Short-and long-term impact of violence
on education: The case of Timor Leste. *The World Bank Economic
Review*, *28*(2), 320-353.

Kirk, J., & Winthrop, R. (2007). Home-based schools: A transitional educational
model in Afghanistan. In F. Leach & M. Dunne (Eds.), Education, conflict and
reconciliation: *International perspectives* (pp. 99–114). New York, NY: Peter
Lang.

Klenow, P. J., & Rodriguez-Clare, A. (1997). The neoclassical revival in growth
economics: Has it gone too far? *NBER macroeconomics annual*, *12*, 73-103.

Kreutz, J. (2010). How and when armed conflicts end: Introducing the UCDP Conflict
Termination dataset. *Journal of Peace Research*, *47*(2), 243-250.

Lai, B., & Thyne, C. (2007). The effect of civil war on education, 1980–97. Journal of
Peace Research, 44, 277–292. doi:10.1177/0022343307076631

LaGraffe, D. (2012). The youth bulge in Egypt: An intersection of demographics,
security, and the Arab Spring. Journal of Strategic Security, 5(2), 65.

Leon, G. (2012). Civil conflict and human capital accumulation the long-term
effects of political violence in Perú. *Journal of Human Resources*, 47(4), 991-
1022.

Lloyd, C. B., El-Kogali, S., Robinson, J. P., Rankin, J., & Rashed, A. (2010).
Schooling and Conflict in Darfur: A snapshot of basic education services for
displaced children. *Population Council and Women's Refugee Commission.*

Mason, D. T., Gurses, M., Brandt, P. T., & Michael Quinn, J. (2011). When civil wars
recur: Conditions for durable peace after civil wars. *International Studies
Perspectives*, *12*(2), 171-189.

Mayai, A. T. & Hammond, H. (2014). The Impacts of Violence on Education in
South Sudan. *The Sudd Institute.*

Mayai, A. T. (2015). Assessing Anti-Corruption, Accountability, and Transparency
Measures in South Sudan. *The Sudd Institute*.

Mayai et al. (2017). Food Security and Nutrition Vulnerability and Risk Analysis in
Former Warrap and Northern Bahr el Ghazal States. Unpublished. *The Sudd
Institute*.

Mayer, T., & Thoenig, M. (2016). Regional trade agreements and the pacification of
Eastern Africa. *International Growth Centre, Working paper*.

MGCSW. (2012). National Gender Policy. *Government of South Sudan*.
http://mgcswss.org/wp-content/uploads/National-Gender-Policy.pdf

Mincer, J. A. (1974). Schooling and earnings. In *Schooling, experience, and
earnings* (pp. 41-63). *NBER*.

NBS. (2010). Southern Sudan Counts: Tables from the 5th Sudan Population and
Housing Census, 2008
http://www.ssnbss.org/home/documents/census-and-survey/south-sudan-
counts-2008

Omoeva, C., Hatch, R., & Moussa, W. (2016). The Effects of Armed Conflict on

Educational Attainment and Inequality. Education Policy and Data Center, FHI 360.

Poirier, T. (2012). The effects of armed conflict on schooling in Sub-Saharan Africa. *International Journal of Educational Development*, *32*(2), 341-351.

Rich, S. (2016). Education Cluster Assessment: South Sudan. *UNICEF*.

Schultz, T. W. (1960). Capital formation by education. *Journal of political economy*, *68*(6), 571-583.

Schultz, T. W. (1980). Nobel lecture: the economics of being poor. *Journal of political Economy*, *88*(4), 639-651.

Schultz, T. P. (1988). Education investments and returns. *Handbook of development economics*, *1*, 543-630.

Shields, R., & Paulson, J. (2015). 'Development in reverse'? A longitudinal analysis of armed conflict, fragility and school enrolment. *Comparative Education*, *51*(2), 212-230. https://doi.org/10.1080/03050068.2014.953314.

Shimeles, A., & Verdier-Chouchane, A. (2016). The Key Role of Education in Reducing Poverty in South Sudan. *African Development Review*, *28*(S2), 162-176.

Steer, L., Ghanem, H., Jalbout, M., Parker, H., & Smith, K. (2014). Arab youth: Missing educational foundations for a productive life. *The Center for Education at the Brookings Institution, Washington, DC*, 16.

Talbot, C. (2013). Education in Conflict Emergencies in Light of the post-2015 MDGs and EFA Agendas. *Network for international policies and cooperation in education and training (NORRAG) Working Paper*, *3*.

Tansel, A. (2002). Determinants of school attainment of boys and girls in Turkey: individual, household and community factors. *Economics of education review*, *21*(5), 455-470.

Urdal, H. (2006). A clash of generations? Youth bulges and political violence. *International studies quarterly*, *50*(3), 607-629.

Weldeegzie, S. G. (2017). Growing-up Unfortunate: War and Human Capital in Ethiopia. *World Development*, (96), 474-489.

Wessells, M. (2002). Recruitment of children as soldiers in sub-Saharan Africa: An ecological analysis. In *The comparative study of conscription in the armed forces* (pp. 237-254). Emerald Group Publishing Limited.

UNICEF. (nd). Fact Sheet. *https://www.unicef.org/wcaro/FactSheet100601Final_E_100603_.pdf*

UNOCHA. (2016). 2016 South Sudan Humanitarian Needs Overview
http://reliefweb.int/report/south-sudan/2016-south-sudan-humanitarian-needs-overview

UNOCHA. (2017). (2017). 2017 South Sudan Humanitarian Needs Overview
http://reliefweb.int/report/south-sudan/2017-south-sudan-humanitarian-needs-overview

UN Economic & Social Council. (2017). Progress towards the Sustainable
Development Goals: Report of the Secretary-General.
http://www.un.org/ga/search/view_doc.asp?symbol=E/2017/66&Lang=E

Appendix

Table 5A. Regression results (conflict episodes)

Variables	(1) Full sample	(2) Boys	(3) Girls
Conflict event	-0.20	-0.15	-0.02
	(0.16)	(0.11)	(0.08)
State controls	Yes	Yes	Yes
Year controls	Yes	Yes	Yes
School level controls	Yes	Yes	Yes
IDPs	Yes	Yes	Yes
Observations	945	933	934
R-squared	0.36	0.27	0.33

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5B. Regression results (fatalities)

Variables	(1) Full sample	(2) Boys	(3) Girls
Fatalities	-0.03	-0.02	-0.01
	(0.02)	(0.01)	(0.01)
State controls	Yes	Yes	Yes
Year controls	Yes	Yes	Yes
School level controls	Yes	Yes	Yes
IDPs	Yes	Yes	Yes
Observations	945	933	934
R-squared	0.37	0.27	0.33

Standard errors in parentheses

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