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Effects of Primary, Secondary and Tertiary Education on Conflict Intensity in Africa*

Julius A. Agbor[†]

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Abstract

This study investigates the impact of different dimensions of schooling education (primary, secondary and tertiary enrolment) on the intensity of intra-state conflicts in Africa during 1989-2008. It uses fixed-effects regressions in a panel framework and annual data for 25 African countries. Parameter estimates provide clear evidence that schooling education (irrespective of the dimension considered) reduces the intensity of conflicts in Africa and the channels of transmission vary according to the education dimension considered. While primary schooling works mainly through urbanization; secondary and tertiary schooling reduces conflict through both the urbanization and youth bulge channels. These results suggest that in order to reduce conflict intensity in Africa, policy makers should facilitate the urbanization of a great number of African school leavers; while at the same time raising the number of African youths with secondary and tertiary education. However, the findings also suggest that secondary schooling potentially intensifies conflict intensity through the democratization channel implying that efforts to expand secondary education in Africa need to go in tandem with the rapid entrenchment of democratic institutions. Disaggregating the sample into “Conflict-prone” versus “less Conflict-prone” countries generally confirmed the core finding that all education dimensions are important in reducing conflict intensity in Africa but no insightful results were obtained on the likely channels of transmission. Further research should consider a more robust investigating of this issue while also differentiating the impacts of education dimensions on conflict in “high income” versus “low income” countries.

Keywords: School Education, Conflict, Economic Development, Africa

JEL Codes: 043, 015, 011

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1 Introduction

The role of education acquired through schooling on societal conflict has recently received immense attention in the development literature. Essentially, two broad schools of thought have emerged. One school sees education as a powerful weapon for peace by reducing the likelihood of violent societal conflict, enhancing social cohesion,¹ reducing inequalities, improving mutual understanding amongst people and the respect for diversity. The other opposing school instead defends the destabilizing power of education through rising political aspirations, enhanced fighting technology, increased number of belligerents, rising socio-economic inequalities, and growing extremism. The “civilizing” role of education in conflict has dominated thinking until recently, yet despite its undisputable importance, few empirical studies have probed into the education-conflict nexus, and much less into the channels of transmission.

In one of the pioneer attempts using Africa as case study, Agbor (2011), finds evidence in support of the claim that schooling education, as measured by the average schooling years in the population aged 15 and above, reduces the likelihood of societal conflicts. While certainly an important contribution, Agbor’s findings are less useful from a policy perspective. First, the likelihood of intra-state conflict arising is not be a real problem to worry about, given that every modernizing society is perpetually in conflict with itself, see notably, Huntington (1968) and Senghaas (1998). What therefore matters the most is the intensity of intra-state conflict and its cost to society in terms of human lives, lost potential and output. The present study attempts to fill this void by introducing a relatively new measure of conflict: the intensity of intra-state conflict, which is proxied here by the per capita number of intra-state battle-related deaths. On a second count, the reliance on the average years of schooling as proxy for school education in previous studies is un insightful in at least one respect: quality of education, which is the aspect stressed in the average years of schooling² measure tends to vary considerably even within the same country. Further, by giving the same importance to each year of schooling attained irrespective of the educational level, average schooling years as a measure of human capital clearly over-emphasizes primary education at the expense of secondary and tertiary education. Therefore the use of average years of schooling as explanatory variable in cross-country studies of conflict is problematic. The present study addresses this concern by separately investigating the effects of primary, secondary and tertiary schooling on conflict intensity in Africa, which is a dimension that has been overlooked by previous researchers in this area.

Looking at the effects of schooling education in a disaggregated way can be more insightful to policy makers than the average years of schooling measure

¹The World Bank has unequivocally stressed its faith in the key significance of education and lifelong learning in reinforcing social cohesion: "by improving people’s ability to function as members of their communities, education and training increase social cohesion, reduce crime and improve income distribution", World Bank (2002).

²This measure implicitly assumes that the longer pupils stay in school the more education they would have received.

traditionally used in the literature, because it helps identify the relevant dimension of education and the associated policies that could contribute to stability and economic prosperity in African countries. In another previous study pertaining to the present research topic, Francis (2009) finds that human capital significantly decreases the likelihood of militarized conflict between nations, suggesting that human capital promotion helps increase peace around the world. Obviously, Francis's (2009) focus is on the relationship between human capital and international conflict, and not on the relationship between human capital and intra-state conflict.

Yet another attempt by Groot & Brink (2010) examines the effects of education on crime in the Netherlands and finds that substantial savings on the social costs of crime can be obtained by investing in education. In particular, the study shows that the probability of committing crimes like shop lifting, vandalism, assault and injury tends to decrease with years of education, while the probability of committing tax fraud tends to increase with years of education and higher educated people have more permissive attitudes and social norms towards criminal behavior. Again, the focus of Groot & Brink (2010), like Buonanno & Leonida (2006), Lochner & Moretti (2004), Jacob & Lefgren (2003), Fajnzylber et al. (2002), Tauchen & Witte (1994), and Ehrlich (1975) is on crime and not intra-state conflicts. Thus, the importance of a study that focuses on the link between education and intra-state conflict can not be over-emphasized, especially within the African context where periods of socio-political conflicts have generally coincided with episodes of negative economic growth.³

This study utilizes the Uppsala Conflict Database of armed intra-state conflicts for 25 African countries during 1989-2008. The intensity of intra-state conflict for a given country in each year is proxied by the per capita number of intra-state battle-related deaths for that year. Typically, the Uppsala conflict database defines an active episode of intra-state conflict as one where there is a clearly stated goal of incompatibility between belligerents over a territory or government involving the use of armed force and which results in at least 25 battle-related deaths. Because the 25-deaths minimum threshold for conflict does not conveniently capture various conflict intensities, I focus directly on the per capita number of battle-related deaths in each year.

Using annual data and fixed effects regressions in a panel framework, and conditioning on urbanization, institutions, inequality, and macroeconomic and demographic conditions, the findings provide clear evidence in support of the thesis that education (irrespective of the dimension considered) reduces the intensity of conflicts in Africa and the channels of transmission vary according to the education dimension considered. For instance, while primary schooling works mainly through urbanization; secondary and tertiary schooling reduces conflict through both the urbanization and youth bulge channels. These results suggest that in order to reduce conflict intensity in Africa, policy makers should facilitate the urbanization of a great number of African school leavers; while at

³See Aryeetey & Fosu (2002:3). Blomberg et al. (2006) also provide evidence of conflict lowering growth and lower growth raising the likelihood of conflict.

the same time raising the number of African youths with secondary and tertiary education. However, the findings also suggest that secondary schooling potentially intensifies conflict intensity through the democratization channel implying that efforts to expand secondary education in Africa need to go in tandem with the rapid entrenchment of democratic institutions. Disaggregating the sample into “Conflict-prone” versus “less Conflict-prone” countries, as robustness check, generally confirmed the core finding that all education dimensions are important in reducing conflict intensity in Africa but no insightful results were obtained on the likely channels of transmission.

The rest of the paper is organized as follows: section two is the theoretical framework linking education to conflict while section three outlines the methodology of the study. Section four discusses the results and some robustness checks while section five concludes.

2 Why Education Matters for Conflict

Two main opposing schools of thought on the association between education and societal conflict can be identified in the literature, namely: the social stability and social destabilization schools. On the one hand, the social stability school, whose main proponent is Acemoglu & Robinson (2001), holds that resource transfers or redistribution from so-called elites to the disadvantaged represent an attempt at purchasing social stability which is a necessary condition for sustainable economic growth. According to this view, educating the poor is a way of raising their opportunity cost of conflict, suggesting that human capital transfers and conflict are inversely related. A central feature of the Acemoglu & Robinson (2001) model (henceforth, A & R Model) is the degree of income inequality which is positively correlated with political instability. The A & R Model also predicts that redistribution to the poor will be highest at more moderate levels of inequality, and lowest at higher or lower levels of inequality. According to the A & R framework, the rising episodes of conflicts in Africa postindependence would be attributable to rising levels of inequality and declining costs of repression.⁴

One variant of the social stability hypothesis argues that education lowers conflicts by changing time preferences of individuals from the short run to the long run, implying that less educated people have a higher time preference for current, as opposed to future consumption and consequently, are more likely to engage in criminality and violence as a way of satisfying their immediate needs.⁵ Another variant suggests that it is the perfectly excludable nature of human capital which minimizes the gains from international conflict, suggesting that, as a country’s economic resources shift from non-human assets to human capital,

⁴However, a closer look at the evidence suggests the contrary. Indeed, the broad social science literature agrees that most forms of horizontal inequalities have been minimised by successive African governments since independence, see for instance, Arnim et al (2007) and Langer (2007), implying paradoxically that conflicts should have reduced on the continent.

⁵Proponents of this view include Becker & Mulligan (1994), Becker (1996), and Arrow (1997).

the gains to international conflict decreases.⁶ Yet another variant, suggests that class conflict would be eliminated as a result of the transfer of human capital from the elite to the poor, because of the complementarity between physical and human capital.⁷

On the other hand, the social destabilization school of thought argues that education increases the likelihood of societal conflicts. Again, the approaches here are varied. In one tradition, it is the ability of education to raise the political aspirations of its recipients that contributes in lowering, not raising, the opportunity cost of conflicts, as postulated by the social stability proponents.⁸ In the tradition of Hirshleifer (1995) and Bates et al. (2007), education potentially raises the likelihood of conflicts through two ways: by enhancing the fighting technology of belligerent parties and by increasing the number of contestants in a conflict.⁹ In another tradition, education potentially compromises social peace through rising socio-economic inequalities and individualism.¹⁰ Yet another tradition holds that by exacerbating ethnic diversity, education ignites ethno-political conflicts,¹¹ while another tradition sees the mis-match between education and jobs as the primary mechanism through which education compromises social peace.¹² Lastly, some authors blame the inherently violent nature of certain type of educational curricula for promoting intolerance and extremism.¹³ A rather extreme view of the link between education and conflict holds that conflicts are an off-shoot of every modernisation process in society (see notably, Huntington (1968)¹⁴ and Senghaas (1998)¹⁵). According to this view, societies exposed to modernisation processes are ultimately in a permanent state of conflict with themselves.

In support of the social destabilization hypothesis of education, a number of social scientist, notably, Klaus (2004), Bush & Saltarelli (2000), Davies Lynn (2004) and Aguilar & Richmond (1998), have questioned the civilizing power of education. In a highly controversial paper, Bush & Saltarelli (2000:33) argue

⁶See notably Francis (2009), Brooks (1999, 2005), Gartzke (2007), Hegre (2000), and Rosacrance (1986).

⁷See Galor & Moav (2004).

⁸See notably Fedderke & Kularatne (2008), Bourguignon & Verdier (2005), and Huntington (1968). Apter (1955), Foster (1965), and McWilliam & Kwamena-Poh (1978) also provide evidence in support of this viewpoint.

⁹In Hirshleifer's model, more knowledge acquired from schooling means a better technology of fighting and an increasing number of unemployed graduates implies an increased number of potential belligerents.

¹⁰See notably, Davies (2004) and Vriens (2003).

¹¹See notably, Bush & Saltarelli (2000) and Smith & Vaux (2003).

¹²See notably, Boyden & Ryder (1996), Apter (1955), and Lange (2003).

¹³See notably, Davies (2004), and Sommers (2002).

¹⁴Huntington (1968:5), for instance, argues that: "Social and economic change. . . extends political consciousness, multiply political demands, broaden political participation. . . These changes undermine traditional sources of political authority and traditional political institutions. . . The result are political instability and disorder. . .".

¹⁵Senghaas (1998), also argues that education is capable of unleashing and multiplying conflicts: "Development (. . .) is inevitably conflictual, destabilizing and subversive because it challenges the established power structures that prevent individuals and groups from reaching their full potential"

that "in many conflicts around the world, education is part of the problem, not the solution". Aguilar & Richmond (1998) question the education received by the protagonists and the main perpetrators of the Rwandan genocide in 1994: "The role of well-educated persons in the conception, planning and execution of the genocide requires explanation any attempt at explanation must consider how it was possible that their education did not render genocide unthinkable. The active involvement of children and young people in carrying out acts of violence, sometimes against their teachers and fellow pupils, raises further questions about the kind of education they had received."

Davies Lynn (2004:3) has also alluded to the involvement of well-educated persons in some of the worst atrocities of modern times, referring to the generally outstanding education biographies of the assassins of the September 11th terrorist attacks and the key personalities within Al Qaeda movement.

The foregoing analysis points to the crucial importance of a study investigating the exact relationship between schooling education and societal conflict which is the goal of this paper. Whilst significant attempts have so far been made at understanding the drivers of conflicts¹⁶, and quite a number of other attempts have examined the theoretical arguments linking conflict to education,¹⁷ none of the previous studies, to the best of my knowledge, have expressly tested the effects of different dimensions of schooling education on conflict intensity, at least not in the context of Africa.

3 Methodology

This section describes the empirical model, the estimator, the estimation strategy and also presents the variables and datasets used in the study.

3.1 Empirical Model

This paper assesses the impact of different dimensions of education: primary, secondary and tertiary on the intensity of intra-state conflicts in Africa. It does this by specifying the following regression model:

$$CIVOT_{it} = \alpha EDUC_{it} + \beta X_{it} + \gamma INTERACT_{it} + \mu_{it} + \varepsilon_{it} \quad (1)$$

where

$CIVOT_{it}$ is a numerical variable measuring the intensity of conflicts and is proxied by the per capita number of intra-state battle-related deaths for each country in each particular year during 1989-2008.

$EDUC_{it}$ is the education explanatory variable, which in this case, is either gross primary, gross secondary or gross tertiary school enrolment.

¹⁶See notably the work of Collier et al (2006). Their empirical study reveals that societal conflict is driven by the following factors the level of per capita income, the presence of natural resources, population size, the degree of fractionalization, the fact that a country has been a French colony, youth bulges, and the proportion of the country that is mountainous.

¹⁷A few others more have investigated the repercussions of conflict on educational outcomes in conflict regions. See for instance, Sany (2010), and Keleher (2006).

X_{it} is the matrix of country-year control variables that are standard in the conflict literature, notably, macroeconomic conditions, the extent of political participation, a measure of income inequality, an indicator of labour market conditions, urbanization, and the proportion of young men aged between 15-24 in the total population (youth bulge).

$INTERACT_{it}$ is the matrix of interaction terms between the relevant education dimension and some of the controls considered as likely transmission channels.

α is a vector of slope coefficients that are common to all countries.

μ_{it} is a vector of individual country effects reflecting unobservable country heterogeneity and

ε_{it} is a vector of error terms.

Ideally, equation (1) above should have included the lagged dependent variable to control for the persistence of conflict intensity but after due consideration the variable was dropped from the model for two reasons. First, there is no observed correlation between this variable and any of the education dimensions considered, such that its omission in the model would overstate the impact of education on conflict intensity. Second, the lagged dependent variable entered most of the regressions with a statistically insignificant coefficient.

3.2 Choice of Estimator

This study utilizes the Uppsala Conflict Database of armed intra-state conflicts for 25 African countries during 1989-2008. The intensity of intra-state conflict for a given country in each year is proxied by the per capita number of intra-state battle-related deaths for that year. Typically, the Uppsala conflict database defines an active episode of intra-state conflict as one where there is a clearly stated goal of incompatibility between belligerents over a territory or government involving the use of armed force and which results in at least 25 battle-related deaths. However, because the 25-deaths minimum threshold for defining an active conflict does not conveniently capture various conflict intensities, I focus directly on the per capita number of battle-related deaths in each year. Noteworthy that the episodes of intra-state conflicts considered in this study ignore whether or not there was a foreign involvement in the domestic conflict.¹⁸

Accordingly, the dependent variable in the empirical model specified in equation (1) above (CIVTOT) is continuous. The ideal estimator for estimating such models is the panel fixed-effects model since it accommodates for country-specific unobserved effects. However, a number of econometric problems are associated with the estimation of equation (1) above. These relate mainly to

¹⁸Due to data unavailability, these episodes ignore any foreign involvement in the domestic conflict. Although, the specific aspect of the conflict investigated that is, its intensity, is likely to increase with foreign involvement, the influence of foreign involvement is likely to underestimate, rather than overestimate the impact of education on conflict intensity, assuming that in highly intense conflict situations educational outcomes are negatively affected.

possible endogeneity, simultaneity, heteroscedasticity of residuals, and the assumption of a uniform slope coefficient for the education variables.

The fixed-effects model best handles any likely problems of endogeneity arising from the fact that either some of the explanatory variables might be correlated with the un-observed country effects or some omitted variables might concurrently affect the dependent variable as well as some of the explanatory variables. To avoid reverse causality running from the dependent variable to the explanatory variables, and following the evidence suggested by Arellano & Carrasco (2003), I use instead the first lagged values of all potentially endogenous explanatory variables.

To capture the possibility of conflict in one country spilling over to a neighboring country, and in accordance with the empirical evidence by Murdoch & Sandler (2002) suggesting greater neighborhood spillover effects the more intense conflicts are, I cluster the countries in my sample in four cluster groups according to their respective regions: North Africa, Central Africa, West Africa and East Africa.

Because some conflicts are more persistent than others, the impact of education on conflict might vary from country to country and even for the same country from one period to another. I therefore disaggregate the sample of countries into two: the "conflict-prone" countries and the "less conflict-prone" countries. My classification is based on two criteria namely, the frequency and persistence in the number of battle-related deaths. Since the overall sample mean per capita number of battle-related deaths is around 32, I classify a country as "conflict-prone" if it recorded 32 or more battle-related deaths during three consecutive years. The "less conflict-prone" countries are those that did not record at least 32 battle-related deaths during three consecutive years. However, I did include in the conflict-prone category, two exceptional cases - Angola and Ethiopia which did not record 32 or more annual deaths per capita for three years consecutively but have nonetheless experienced a considerable number of years of conflict during the time period of analysis.

Furthermore, the impact of education on conflict might also vary depending on the level of development (or per capita income) of the country. To the extent that regions or countries with low per capita income are more conflict prone than those with high per capita income, the impact of education on conflict might also vary according to the per capita income level of the country. A dummy for high income countries should have taken care of this concern were it not for the fact that the fixed-effects model fails to provide parameter estimates for time-invariant variables. I leave this concern for future researcher to probe into¹⁹. To deal with heteroscedasticity of residuals, I use robust standard errors.

¹⁹One approach might consist of disaggregating the sample of countries into "high income" and "low income" countries to see whether the impacts of the different dimensions of education on conflict intensity vary.

3.3 Estimation Strategy

For each of the education dimensions (primary, secondary and tertiary), I run a set of models aimed at investigating (1) the likely impact of education on conflict intensity and (2) the likely channels through which education affects conflict intensity. Regarding the likely impact of education on conflict intensity, I run a baseline model in the first place, where the education variable alone explains conflict intensity. I then gradually extend the models to include firstly variables that show strong correlation with the relevant education dimension and then to the full set of conditioning variables. To investigate the likely channels through which education affects conflict intensity, I introduce interaction terms of the education variables and those variables found significant. Finally, and as an additional form of robustness check, I disaggregate my sample of countries into two: “Conflict-prone” versus “less Conflict-prone” and repeat the same exercise as above for each of the sub-samples.

3.4 Variables and Data

The analysis on the empirical model specified in equation (1) above is performed using a core dataset of twenty five (25) African countries during 1989-2008. The principal explanatory variable is gross school enrolments which take three different dimensions: primary, secondary and tertiary schooling. Unless otherwise mentioned, data for most variables used in the study are obtained from the African Development Indicators of the World Bank. Informed by the conflict literature, the study uses annualized data for a set of six conditioning variables, namely:

- Inflation (INFL) to capture macroeconomic conditions that might affect conflict. One of the frequent causes of urban uprising in Africa, as Bates (1981) argues, is rising inflation. During inflationary situations, the opportunity cost of conflict is lower. Hence, a positive sign is expected on the inflation variable.

- Youth bulge (YBULGE): is used to control for the propensity of conflict arising from a significant presence of "rascals", that is, young men between the ages of 15-24, in the total population. The data is obtained from Collier et al (2006) whose empirical results suggest a positive significant relationship between youth bulge and the propensity of conflict. This is explained by the fact that a great availability of potential recruits as rebel soldiers makes it easier and cheaper to start a rebellion.

- Urbanization (URBAN): to control for the effects of rising urbanization on the propensity of conflict. Bates (1981) has argued that rising urbanisation is a chief source of conflict in Africa, as it produces a pool of unemployed people who easily become rebel recruits.²⁰ However, Collier & Hoeffler (2004) find a positive link between urbanisation and political stability, working through enhanced productivity and growth. As such, the sign on this variable is imprecise.

²⁰ Auvinen (1997) and Annett (2001) also find a negative relationship between urbanisation and political stability.

- Growth in per capita GDP PPP (GROW): There is a consensus in the literature that faster growth in per capita incomes reduces the risks of conflict by tightening the labour market, thus making it more difficult for rebel militia organisations to recruit. GROW is utilized in the models as a proxy for labour market conditions. During periods of fast growth (assumed to be above the normal growth rate of the economy), it is expected that unemployment would be lower, and hence the lower the likelihood of unemployment-related conflicts. There is therefore an expectation of a negative sign on this variable.

- Income inequality (GINI): to capture the effects of income inequality on the likelihood of conflict escalating. The political economy literature recognizes the existence of vertical inequalities, notably, high and sustained differences in income and wealth between the rich and the poor, as a potential source of societal conflict, whence the need for redistributive policies as a way of purchasing social peace. The expectation thus, is that a higher gini coefficient increases the likelihood of conflicts.

- Institutionalized Democracy (DEMOC): This variable captures the extent to which non-elites are able to access institutional structures of political expression. Several authors, notably, Duffield (2001), have postulated that the prevalence of conflict today is related more to issues of political transformation and globalization than to persistent poverty. The lack of political space might raise frustrations amongst segments of the population leading to violent socio-political unrest, as observed recently in the Arab world. The expectation thus, is for a negative sign on the variable.

Table 1 below summarizes the variables included in the study, while Table 2 provides a list of countries included in the sample as well as their categorization into conflict-prone versus less conflict-prone countries. Table 3 provides summary descriptive statistics while Table 4 provides means by group classification. Table 5 presents the matrix of correlation coefficients for the full sample of countries.

3.5 Inferences from the Empirical Data

The empirical observation of the results by means presented in Table 4 enables the following inferences to be made: - consistent with prior theoretical expectations, the intensity of intra-state conflicts is on average significantly higher in the Conflict-prone countries as opposed to less Conflict-prone countries. Gross Primary enrolment rates are on average, comparatively higher in Conflict-prone countries as opposed to less Conflict-prone countries. This is a rather puzzling observation which contradicts the conventional wisdom that supposes that school enrolment levels should be comparatively lower in conflict-prone as opposed to less conflict-prone societies. To unravel this puzzle, I plotted a few graphs of primary school enrolment rates versus the conflict variable for a few conflict-prone countries in my sample (plots are available on request) and the evidence does not suggest any apparent correlation between years of high conflict and low school attendance at the primary level.

Notwithstanding this puzzling observation on primary schooling, secondary

and tertiary enrolments are on average comparatively higher in less conflict-prone, as opposed to conflict-prone environments. In the light of this empirical observation, an important question to ask is whether increasing enrolments in post-primary schooling could potentially reduce conflict intensity in the conflict-prone countries? The econometric results in the next section should throw more light into this important question.

Also consistent with conventional wisdom, inflation, urbanization rates and income inequality are on average comparatively higher in Conflict-prone countries as opposed to less Conflict-prone countries whereas institutionalized democracy is on average, comparatively worse in Conflict-prone countries as opposed to less Conflict-prone countries.

Table 5 presents pair-wise correlations of all the variables included in the model. It can be observed a strong correlation between all the education dimensions but virtually no correlation between either dimension of education and conflict intensity. This suggests that the relationship between schooling enrolments and conflict intensity, if any, might be indirect, whence the intuition to use interaction terms in the model specifications. Table 5 also informs that primary enrolment rates are strongly correlated with institutionalized democracy and youth bulge, while secondary enrolment rates are strongly correlated with urbanization, institutionalized democracy, income inequality and youth bulge. Tertiary enrolment rates are strongly correlated with inflation, urbanization, inequality and youth bulge. The key insight from Table 5 is that, in controlling for the effects of different dimensions of education on conflict intensity, a disproportionate choice of control variables is warranted, which is the object of Model 2 in all the regression panels.

4 Discussion of the Results

4.1 Results on Full Sample of Countries

Figures 1-3 present results from four different specifications on equation (1) above considering as the main explanatory variable; the primary, secondary and tertiary dimensions of education respectively.

In Figure 1 where primary schooling is the principal explanatory variable, the results in Model 1 does suggest a negative and statistically significant effect (at 1%) of primary schooling on intra-state conflict intensity in Africa. Primary schooling continues to matter even after controlling for variables that show a strong correlation with primary schooling: - that is, democracy and youth bulge (Model 2). However, the magnitude and statistical power of primary schooling on conflict drops significantly (to the 10% level) after controlling for all the standard determinants of conflict (Model 3). Model 3 also reveals that, conditioning on primary schooling; youth bulge and urbanization are the key drivers of conflict intensity in Africa, while democracy reduces it. It would therefore be quite interesting to see the effect of the interaction between primary schooling and these three variables, which is the object of Model 4. Only the

primary schooling interaction term with urbanization (PRI*URBAN) emerges statistically significant and at 5%²¹. The negative sign on PRI*URBAN suggests that the channel through which primary schooling works in reducing conflict intensity in Africa is through urbanization. This result could be interpreted as meaning that, the greater the proportion of African primary school leavers who reside in urban centers, the lower will be the intensity of intra-state conflicts. This result corroborates with Collier & Hoeffler (2004) finding of a positive relationship between urbanization and political stability.

Figure 2 considers secondary schooling as the principal explanatory variable for conflict intensity, and the results in Model 1 does suggest a negative statistically significant effect (at 5%) of secondary schooling on intra-state conflict intensity in Africa. However, secondary schooling does not seem to matter any longer both after controlling for variables that show a strong correlation with it: - that is, urbanization, democracy, inequality and youth bulge (Model 2) and after controlling for the full set of conditioning variables (Model 3). Consistent with the findings from the primary education models above, Model 3 also reveals that, conditioning on secondary schooling; youth bulge and urbanization are the key drivers of conflict intensity in Africa, while democracy reduces it. Model 4 thus probes into the effect of interacting secondary schooling with these three variables. Interestingly, all three interaction terms (SEC*YBULGE, SEC*URBAN & SEC*DEMOC) enter with statistically significant coefficients, albeit at different levels (5%, 5% & 10% respectively), suggesting that secondary schooling works to affect conflict intensity through these three channels namely, urbanization, youth bulge and democracy. The negative sign on SEC*YBULGE and SEC*URBAN suggests that secondary schooling reduces conflict through the urbanization and youth bulge channels while the positive sign on SEC*DEMOC is suggestive that secondary schooling intensifies conflicts in Africa through the democratization channel. One way of interpreting this result is that, the more secondary education that youths in Africa receive and the greater the proportion of African secondary school leavers who reside in urban centers, the lower will be the intensity of intra-state conflicts. The intuition behind the secondary education-democracy interaction term could be that secondary education raises the political aspirations of citizens in ways that might be destabilizing, especially in African societies where democratic institutions are not well entrenched.

Figure 3 considers tertiary schooling as the principal explanatory variable for conflict intensity, and the results in Model 1 does suggest a negative statistically significant effect (at 1%) of tertiary schooling on intra-state conflict intensity in Africa. However, tertiary schooling does not seem to matter any longer both after controlling for variables that show a strong correlation with it: - that is, inflation, urbanization, inequality and youth bulge (Model 2) and after controlling for the full set of conditioning variables (Model 3). Consistent with

²¹The seemingly odd and large coefficients of the interaction terms observed in Model 4 and in subsequent results are occurring despite the fact that all variables are logged to the base ten and in addition to the fact that CIVTOT has been scaled down by a million of the population of each country.

prior findings from above, Model 3 also reveals that, conditioning on tertiary schooling; youth bulge and urbanization are the key drivers of conflict intensity in Africa. Model 4 thus probes into the effect of interacting tertiary schooling with youth bulge and urbanization. Interestingly, all two interaction terms (TER*YBULGE & TER*URBAN) enter with negative statistically significant coefficients, albeit at different levels (5% & 10% respectively), suggesting that tertiary schooling reduces conflict through the urbanization and youth bulge channels. Also, these results could be interpreted as meaning that, the more tertiary education that youths in Africa receive and the greater the proportion of African tertiary school leavers who reside in urban centers, the lower will be the intensity of intra-state conflicts.

4.2 Robustness Checks

An additional way of checking the robustness of these results is by disaggregating the sample of countries into two: “Conflict-prone” versus “less Conflict-prone” countries to see whether the impact of education on conflict intensity varies in environments where conflicts are more pervasive²².

Figures 4 & 5 present results on the “Conflict-prone” and “less Conflict-prone” sub-samples respectively. Due to limitations imposed by a small sample size, not all controls variables were utilized in the “less Conflict-prone” sub-sample (inflation and democracy were dropped), however, in general, the findings are consistent with the fact that all dimensions of education matter in reducing conflict intensity in Africa, irrespective of the pervasiveness of the conflict environment. However, upon controlling for the determinants of conflict, the results become less insightful, due mainly to the absence of a consistent set of conditioning variables for both sub-samples. Further research should provide a more robust comparison of the impacts of different dimensions of education on conflict in “Conflict-prone” versus “less Conflict-prone” countries, while also differentiating the impacts in “high income” versus “low income” countries

5 Summary and Conclusion

The main endeavor of this study has been to investigate the impact of different dimensions of education (primary, secondary and tertiary), on the intensity of intra-state conflicts in Africa. To attain this objective, a regression model was specified to achieve two goals: - (1) that of ascertaining the likely impact of education dimensions on conflict intensity and (2) that of determining the likely channels of transmission between the relevant education dimension and conflict intensity. Annual data during 1989-2008 for 25 African countries was utilized as well as fixed-effects regressions in a panel data framework. The findings provide clear evidence in support of the thesis that education (irrespective of the

²²The introduction of a dummy variable would solve this problem, if not that the fixed-effects model does not provide parameter estimates for time-invariant variables.

dimension considered) reduces the intensity of conflicts in Africa. However, the channels of transmission vary according to the education dimension considered.

For instance, primary schooling works mainly through urbanization in reducing conflict intensity in Africa. This finding, which corroborates with Collier & Hoeffler (2004) finding of a positive relationship between urbanization and political stability, could be interpreted as meaning that, the greater the proportion of African primary school leavers who reside in urban centers, the lower will be the intensity of intra-state conflicts.

The findings also suggest that secondary schooling works in reducing conflict intensity mainly through the channels of urbanization and youth bulge, while secondary schooling potentially intensifies conflict intensity through the democratization channel. One way of interpreting this result is that, the more secondary education that African youths receive and the greater the proportion of African secondary school leavers who reside in urban centers, the lower will be the intensity of intra-state conflicts. The intuition behind the secondary education-democratization channel could be that secondary education raises the political aspirations of citizens in ways that might be destabilizing, especially in African societies where democratic institutions are not well entrenched.

Finally, the findings suggest that tertiary schooling reduces conflict through the urbanization and youth bulge channels. These results could be interpreted as meaning that, the more tertiary education that African youths receive and the greater the proportion of African tertiary school leavers who reside in urban centers, the lower will be the intensity of intra-state conflicts.

Disaggregating the sample into "Conflict-prone" versus "less Conflict-prone" countries generally confirmed the core finding that all education dimensions are important in reducing conflict intensity in Africa but no insightful results were obtained on the likely channels of transmission. Further research should consider a more robust investigating of this issue while also differentiating the impacts of education dimensions on conflict in "high income" versus "low income" countries.

The unique insight from this study is that, increasing all dimensions of schooling enrolment in African countries is good for the reduction of conflict intensity but this has to be accompanied by specific policies targeted at the youthful population, including in the area of urbanization.

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Table 1: Variable List and Sources

VARIABLE	SOURCE
Gross primary Enrolment (PRI)	ADI / World Bank
Intra-state Conflict Intensity (CIVITOT)	Author's construction using Uppsala Conflict Dataset
Gross Secondary Enrolment (SEC)	ADI / World Bank
Gross Tertiary Enrolment (TER)	ADI / World Bank
Youth Bulge, Proportion of young men aged 15-24 in total population (YBULGE)	Collier <i>et al</i> (2006)
Institutionalized Democracy (DEMOC)	ADI / World Bank
Urbanization (URBAN)	ADI / World Bank
Inflation (INFL)	ADI / World Bank
Per Capita GDP (purchasing power parity) growth (GROW)	ADI / World Bank
Income Inequality (GINI)	ADI / World Bank

Table 2: Classification of Countries by Conflict Intensity

Conflict-Prone (CIVTOT > 32 for at least 3 consecutive years)	Less Conflict-Prone (CIVTOT < 32 for at least 3 consecutive years)
Algeria	Central Africa Republic
Angola	Egypt
Burundi	Guinea
Chad	Guinea Bissau
Congo DRC	Ivory Coast
Ethiopia	Mali
Liberia	Morocco
Mozambique	Niger
Rwanda	Nigeria
Senegal	Togo
Sierra Leone	
Sudan	
Uganda	
Congo Republic	
Djibouti	

Table 3: Summary Descriptive Statistics for Full Sample

Variable	Obs.	Mean	Std. Dev.	Min	Max
CIVTOT**	207	2.947	1.796	-1.172	8.155
PRI	434	4.263	0.405	3.127	5.155
SEC	380	2.947	0.662	1.496	4.421
TER	336	0.851	1.132	-2.346	3.560
INFL	378	2.162	1.702	-3.207	10.076
URBAN	494	1.300	0.482	-1.605	2.996
DEMOC	242	1.017	0.785	0	2.079
GROW	306	1.003	1.077	-3.700	4.501
GINI	480	3.745	0.177	3.393	4.141
YBULGE	499	2.978	0.067	2.856	3.314

**These figures are in per million of the population of each country. All variables are logged to base ten. In addition, all variables excluding CIVTOT and GINI are lagged by one period (a year).

Table 4: Means by Group Category

	Full Sample	Conflict-Prone Sample	Less Conflict-Prone Sample
CIVTOT	2.95	3.10***	2.00
PRI	4.26	4.28***	4.23
SEC	2.96	2.88***	3.04
TER	0.85	0.67**	1.11
INFL	2.16	2.51**	1.63
URBAN	1.30	1.38***	1.17
DEMOC	1.02	0.99***	1.05
GROW	1.00	1.17	0.75
GINI	3.74	3.76***	3.72
YBULGE	2.98	2.97	2.98

NB: *** signifies 1% significance, ** 5% significance, * 10% significance

Table 5: Matrix of Correlation Coefficients

	CIVTOT	PRI	SEC	TER	INFL	URBAN	DEMOC	GROW	GINI	YBULGE
CIVTOT	1.00									
PRI	0.05	1.00								
SEC	-0.03	0.56*	1.00							
TER	-0.05	0.56*	0.83*	1.00						
INFL	0.10	-0.03	-0.07	-0.16*	1.00					
URBAN	-0.08	-0.08	-0.38*	-0.27*	0.28*	1.00				
DEMOC	-0.14	-0.21*	-0.24*	-0.14	-0.08	0.04	1.00			
GROW	-0.10	0.09	-0.01	0.04	0.08	0.15*	0.09	1.00		
GINI	0.32*	0.03	-0.25*	-0.22*	0.32*	0.02	0.20*	-0.03	1.00	
YBULGE	0.08	0.35*	0.44*	0.62*	-0.34*	0.00	-0.05	0.02	-0.13*	1.00

NB: *** signifies 1% significance, ** 5% significance and * 10% significance

Figure 1: Results of Primary Schooling

DEPENDENT VARIABLE: CIVTOT				
	Model 1	Model 2	Model 3	Model 4
PRI	-0.7760***	-1.0933***	-0.7059*	189.9936
	[23.88]	[6.75]	[2.43]	[1.96]
DEMOC		-0.6277*	-1.0163***	2.4906
		[2.37]	[11.80]	[0.65]
YBULGE		5.3634	19.0488*	263.382
		[1.20]	[3.10]	[1.86]
GROW			-0.0484	-0.2129*
			[0.35]	[2.56]
URBAN			3.4004**	60.9820**
			[3.19]	[4.34]
GINI			0.6468	0.4777
			[0.31]	[0.22]
INFL			0.048	0.175
			[0.71]	[1.86]
PRI*YBULGE				-57.8201
				[1.78]
PRI*URBAN				-13.1917**
				[4.11]
PRI*DEMOC				-0.7324
				[0.92]
Constant	6.0728***	-8.4306	-57.8129*	-865.2665
	[44.22]	[0.64]	[2.59]	[2.02]
Obs.	175	79	45	45
No. of Countries	24	19	15	15
R-squared	0.04	0.12	0.37	0.6
Robust t statistics in brackets				
* significant at 10%; ** significant at 5%; *** significant at 1%				
NB: All explanatory variables, except GINI, are lagged by one period, and in addition, all variables including the CIVTOT are logged to the base ten.				

Figure 2: Results of Secondary Schooling

DEPENDENT VARIABLE: CIVTOT				
	Model 1	Model 2	Model 3	Model 4
SEC	-0.3633**	0.8565	-0.2276	130.1077**
	[3.86]	[1.67]	[1.02]	[3.53]
URBAN		-3.0569	3.2652*	19.1217***
		[1.61]	[2.77]	[6.79]
GINI		4.466	2.6827	2.7893
		[0.95]	[0.94]	[0.88]
YBULGE		-8.9567	17.5216*	126.1434**
		[1.43]	[2.98]	[4.20]
DEMOC		-0.5035	-1.0167***	-2.1541**
		[0.78]	[8.71]	[3.64]
GROW			-0.0638	-0.0558
			[0.55]	[0.66]
INFL			0.0503	0.1524*
			[1.12]	[2.95]
SEC*YBULGE				-41.5117**
				[3.47]
SEC*URBAN				-5.8829**
				[5.37]
SEC*DEMOC				0.4449*
				[2.61]
Constant	3.8334***	14.5324	-62.9857*	-404.2018**
	[14.10]	[0.45]	[2.98]	[3.89]
No. Obs.	156	70	39	39
No. of Countries	24	18	14	14
R-squared	0.01	0.26	0.41	0.53
Robust t statistics in brackets				
* significant at 10%; ** significant at 5%; *** significant at 1%				
NB: All explanatory variables, except GINI, are lagged by one period, and in addition, all variables including CIVTOT are logged to the base ten.				

Figure 3: Results of Tertiary Schooling

DEPENDENT VARIABLE: CIVTOT				
	Model 1	Model 2	Model 3	Model 4
TER	-0.3379***	-0.1461	-0.1751	76.5931**
	[9.88]	[0.58]	[0.73]	[5.30]
URBAN		-0.3141**	4.1628**	3.7199**
		[3.37]	[4.19]	[3.82]
GINI		4.5463***	5.144	5.0671*
		[27.01]	[2.28]	[3.02]
YBULGE		-3.9639	20.7058**	26.7333**
		[0.59]	[3.89]	[4.78]
INFL		0.0335	0.0176	0.0345
		[0.38]	[0.14]	[0.23]
GROW			0.096	0.0762
			[0.68]	[1.10]
DEMOC			-0.5689	0.0018
			[1.69]	[0.02]
TER*YBULGE				-24.6030**
				[5.38]
TER*URBAN				-2.8859*
				[2.70]
Constant	3.0795***	-1.9063	-83.5276**	-99.6913***
	[117.00]	[0.10]	[3.41]	[7.86]
No. Obs.	132	96	39	39
No. of Countries	22	19	14	14
R-squared	0.04	0.21	0.43	0.6
Robust t statistics in brackets				
* significant at 10%; ** significant at 5%; *** significant at 1%				
NB: All explanatory variables, except GINI, are lagged by one period, and in addition, all variables including CIVTOT are lagged to the base ten.				

Figure 4: Results on Conflict-Prone Sub-Sample

HIGH CONFLICT SUB-SAMPLE												
	PRIMARY SCHOOLING				SECONDARY SCHOOLING				TERTIARY SCHOOLING			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
PRI	-0.8890***	-0.8991**	-0.7616	-1.7759								
	[10.56]	[3.59]	[1.59]	[0.26]								
GINI		2.6521*	1.9204	1.9217			4.2452*	35.3597**			3.1100***	2.0927
		[2.99]	[1.60]	[1.08]			[2.87]	[4.76]			[6.81]	[0.66]
YBULGE		1.4209	30.9863	25.891		-0.9508	45.8326	84.188		0.8554	42.2649**	48.4373***
		[1.24]	[1.38]	[0.96]		[0.56]	[2.13]	[2.28]		[0.24]	[3.47]	[7.29]
GROW			-0.1178	-0.1820*			-0.1653	-0.4619			0.0494	-0.0202
			[0.70]	[2.39]			[1.13]	[2.35]			[0.47]	[0.18]
TER									-0.4026***	-0.4212	-0.5999*	59.0893*
									[7.66]	[1.96]	[3.11]	[2.38]
URBAN			1.5609*	-5.1535		-0.4657	1.1584*	2.8258		-0.375	3.8562**	7.8903
			[2.85]	[0.24]		[1.96]	[2.75]	[0.36]		[1.87]	[4.33]	[1.00]
INFL			0.2318*	3.1015			0.3440**	-0.9107			0.1819*	0.0695
			[2.99]	[1.52]			[4.46]	[0.85]			[2.55]	[2.23]
DEMOC			-0.9796	-0.9718*			-0.9344*	-0.1942			-1.0497**	-2.1441
			[2.34]	[2.99]			[2.78]	[0.12]			[4.86]	[0.91]
TER*YBULGE												-19.7019*
												[2.50]
TER*URBAN												-3.3087
												[1.18]
TER*GINI												0.7691
												[0.23]
TER*INFL												-0.0251
												[0.51]
TER*DEMOC												0.6255
												[0.76]
SEC					-0.2689*	-0.3413	-1.0159*	34.2155**				
					[2.78]	[1.92]	[3.14]	[4.71]				
SEC*GINI								-9.9481**				
								[5.22]				
SEC*URBAN								-0.3485				
								[0.15]				
SEC*DEMOC								-0.2816				
								[0.97]				
SEC*INFL								0.3556				
								[1.09]				
PRI*INFL				-0.6507								
				[1.38]								
PRI*URBAN				1.5989								
				[0.31]								
Constant	6.7344***	-7.3570**	-95.6524	-76.2617	3.7139***	7.3809	-148.0718	-372.7849*	3.2075***	1.1682	-139.4703**	-157.6077***
	[18.83]	[3.30]	[1.34]	[0.92]	[13.17]	[1.58]	[2.14]	[2.68]	[79.21]	[0.11]	[3.60]	[7.39]
No. Obs.	149	133	40	40	134	132	35	35	116	114	32	32
No. Countries	15	14	11	11	15	15	11	11	15	15	10	10
R-squared	0.04	0.1	0.38	0.43	0.01	0.05	0.5	0.62	0.05	0.07	0.57	0.66

Robust t statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All explanatory variables, except GINI, are lagged by one period, and in addition, all variables including CIVTOT are logged to the base ten.

Figure 5: Results on Less Conflict-Prone Sub-Sample

LESS CONFLICT-PRONE SUB-SAMPLE									
	PRIMARY SCHOOLING				SECONDARY SCHOOLING			TERTIARY SCHOOLING	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
PRI	-0.7158***	7.4705	-1,039.4481***	-69.7188**					
	[6.40]	[1.57]	[163.88]	[4.66]					
GINI		-5.221	-35.2310***	2.8262		12.7475	3.2917		
		[0.76]	[132.80]	[1.08]		[1.32]	[0.70]		
YBULGE		-65.4474**	-1,982.8494***	-173.1275***		216.7951***			-124.5559***
		[4.09]	[175.36]	[21.44]		[6.82]			[7355.43]
URBAN		-39.2611*	-47.6965***	-343.0482***		-44.1871***	-40.8757***		-5.6443***
		[2.81]	[387.17]	[8.49]		[8.89]	[16.26]		[2440.35]
DEMOC		1.1387	-6.2466***	0.6031		-65.7587***	-61.4093***		-2.6776***
		[0.65]	[272.61]	[0.66]		[87.78]	[43.15]		[1347.74]
YBULGE			358.4890***						
			[166.62]						
TER								-0.2920**	5.7082***
								[4.32]	[8969.85]
SEC					-0.7501***	-8.1164	135.1667***		
					[21.18]	[2.24]	[9.89]		
SEC*YBULGE							43.4259***		
							[10.74]		
PRI*URBAN				66.9864***					
				[6.29]					
Constant	4.6868***	235.4881***	5,999.7755***	883.2028***	4.0504***	-512.4688***	151.9721**	2.1577***	382.2677***
	[10.30]	[10.22]	[174.90]	[9.82]	[39.65]	[12.31]	[5.60]	[59.17]	[8629.74]
No. Obs	27	14	14	14	24	13	13	14	11
No. Countries	9	7	7	7	9	7	7	7	6
R-squared	0.09	0.86	0.98	0.96	0.15	0.96	0.99	0.11	0.96

Robust t statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All explanatory variables, except GINI, are lagged by one period, and in addition, all variables including CIVTOT are logged to the base ten.