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The Duration of Sub-Saharan African Civil Armed Conflict Episodes

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**The duration of sub-Saharan African civil armed
conflict episodes
1990-2014**

by Christian Ilunga-Matthiesen



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Abstract

The socio-economic question which this study intends to answer is one of global relevance. For quite some time now, civil wars on the African continent have been a major source of economic and social destruction resulting in excessive human suffering. The primary objective of this study will constitute the analysis of 32 armed conflict episodes across 17 countries between 1990 and 2014 throughout sub-Saharan Africa. Armed conflicts will be defined as the following: “a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths” (UCDP, 2015)v. This study provides an assessment of the various factors which contribute to the duration of sub-Saharan Africa’s many armed conflict episodes as well as an empirical investigation into excess youth and utility theory.

I. Introduction

The socio-economic question which this study intends to answer is one of global relevance. For quite some time now, civil wars on the African continent have been a major source of economic and social destruction, resulting in excessive human suffering. The former UN Secretary-General Kofi Annan notes in his 1998 report that in 1996 out of 53 armed conflicts in the world 14 were located on the African continent, accounting for over fifty percent of all war-related deaths worldwide, resulting in over 8 million refugees, returnees and internally displaced persons (IDPs) (1998). This is a trend which, based upon 59.5 million forcibly displaced people in 2014, has dramatically gotten worst (UNHCR, 2015). For the first time since WWII the number of worldwide refugees has topped fifty million people.

With Africa expected to house 4.3 billion people, 39% of the world's population by the year 2100 (UNESA, 2015), current conditions foreshadow a possible cataclysmic future. Analyzing various factors conducive to a climate of prolonged civil conflict will be necessary as part of the solution process. Only by defining primary factors that enhance the duration of civil conflict, can current negative trends be reversed. The primary objective of this study, thus, will constitute the analysis of 32 armed conflict episodes across 17 countries between 1990 and 2014 throughout sub-Saharan Africa. Armed conflicts will be defined as: "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths" (UCDP, 2015). An armed conflict can be further categorized as civil war, as they purely include extra-systemic, internal, and internationalized internal armed conflicts. Studying various social as well as economic structures will allow for an insight into the dynamics of armed conflicts throughout Sub-Saharan Africa. It is only after careful examination of various

factors, that wide ranging conclusions can be drawn.

This study provides an assessment of the various factors which contribute to the duration of sub-Saharan Africa's many armed conflicts, as well as an empirical investigation into excess youth and utility theory. The utilization of a simple model which relates conflict duration to economic factors is naïve. To fully comprehend sub-Saharan Africa's ongoing armed conflicts, one must account for the severity of armed conflict episodes, alongside factors which determent economic outlook and reflect a population's opportunity cost of conducting civil war. Such factors include GDP per capita, excess youth, exchange rate, as well as public and private debt repaid.

II. Reflection on previous work:

a. grievance vs. opportunity

The influential studies of Collier & Hoeffler (1998,2002a, 2002b, 2004), which have been wildly publicized in *The Financial Times*, *The Washington Post*, *The New York Times* and *The Economist*, have greatly guided and advanced many subsequent inquiries into economic factors and civil armed conflict (Nathan 2004). Utilizing utility theory, Collier and Hoeffler (1998) conclude that rebels will conduct civil war if the perceived benefits outweigh the costs. In light of Machiavelli's description of selfish human nature, Collier and Hoeffler's hypothesis seems plausible. Collier and Hoeffler's analytical framework provides a good starting point when studying economic factors and their influence on civil armed conflict. The utilization of per-capita income as a proxy for individuals/rebels willingness to go to war - ultimately the opportunity cost of labor -will be adopted in this study.

Applying Machiavelli's Theorem of greed, -whereby people are generally egotistic and

selfish in nature-, Collier & Hoeffler (2004) conclude, that “rebellions are motivated by greed, which is presumably sufficiently common that profitable opportunities for rebellion will not be passed on”(p. 589). While extending the greed motive from people to rebel groups seems plausible, it leads to the overemphasis of opportunity, defined as the feasibility of predation, as an overarching explanatory factor for rebellion/civil war (Nathan, 2008). This is the case, as Nathan notes, because it is illogical to argue that rebellion is primarily caused and sustained due to the feasibility of predation. Assuming that predation provides the primary financial means for rebellion, the feasibility of such predation may create the opportunity, but not the cause of rebellion (p. 272). Nathan states it adequately when he writes, “by way of analogy, if two states go to war, it would not make sense to say that the hostilities were caused by the feasibility of taxation and other means by which the belligerents raised revenue for their armies” (Nathan, 2008, p. 272). That is to say, the ability to raise taxes or other revenues for financing civil war do not constitute the origin of rebellion.

Unlike Collier & Hoeffler (2002: a;4) Nathan (2008:272) emphasizes objective circumstances of grievance over the feasibility of predation. If rebel groups manufacture a false sense of grievance, for the purpose of recruitment, mobilization and cohesion, as well as international support, (Collier, 2000a, pp. 4, 5 & 12), how can rebellion be unrelated to objective grievance? (Nathan, 2008).

Based on the controversy surrounding the “feasibility of predation” explanation of rebellion, it is plausible to merely utilize opportunity cost as a positive related variable, measured in unemployment rate, over opportunity, measured in feasibility of predation, as an explanatory variable for civil armed conflict. Nathan’s (2008) findings reveal Collier & Hoeffel’s methodology to be flawed and undermined by speculative explanations, based on conjecture

rather than evidence (p.270). However, while Nathan provides insights into the shortcomings of Collier & Hoeffler's work, he does not provide any alternative analytical methods/tools. Failing to provide alternative proxies nor any other concrete analytical revisions, Nathan's criticism, while warranted, falls short of being constructive. Building on Nathan's (2008) critique of Collier & Hoeffler (1998, 2000 a,b, 2004, 2006) this study will provide variables that combine utility theory/opportunity cost with excess youth theory, providing a new perspective on factors enhancing/mitigating the duration of sub-Saharan Africa civil armed conflicts.

b. population age structure & excess youth

Based on Staveteig's (2005) *excess youth hypothesis*, large differences in the number of young adults compared to the number of old adults -"relative cohort size"(p.1)-, as a result of demographic transition, enhance the predictability of armed conflict. Demographic transition, as defined by Cincotta, R. P., Engelman and Ansastasion (2003), constitutes the phases linked to the birth and death rates of a given country's population, and occurs in five phases, the pre-transient phase, early-transition, middle-transition, and post-transition phase (p. 32). Countries that were in the last transition phase between 1970 and 2000 were defined by evenly distributed age group ratios, with lower birth-rates and higher life expectancy. These countries of the last transition phase were found to be less susceptible to the outbreak of civil conflict. Cincotta's, et al. (2005, 2003) findings correspond with those of Staveteig's (2005) and provide further evidence for the *excess youth hypothesis*, as "countries in medium demographic transitions characterized by high birth rates and lower life expectancies resulted in high youth population as a proportion of total adult population and became more predisposed to the outbreak and sustenance of conflicts" (Cincotta et al. 2003, p.6).

The excess presence of young adults alone however, does not constitute a higher risk for

civil war (Staveteig, 2005). A youth bulge defined as a “irregular [demographic] swelling” (Abate, 1998), combined with contextual factors such as high degrees of alienation and marginalization, renders armed conflicts to be a more appealing option to frustrated youth (Staveteig, 2005). As stated by Staveteig (2005), “sparks can only trigger violent conflicts when contextual factors enable them” (P.5).

c. Government debt

The collapse of the Bretton Woods system of fixed exchange rates combined with the quadrupling of oil prices in 1973/74 resulted in the economic downturn of the early 70s. The consequences of the following global economic downturn hit developing economies especially hard, as many African countries incurred crushing debts (Aning, Atta-Asamoah, 2011, pp. 9, 10). According to data provided by the Correlates of War (COW) project, 10 armed conflicts -as defined as sustained combat involving organized armed forces, resulting in a minimum of 1,000 battle-related combatant fatalities within a twelve-month period- took place on the African continent between 1972-1979 (Sarkees, Reid, Wayman, 2010). Reflecting on the great number of African civil conflicts throughout a time period of growing government debt indicates a potential correlation between the likelihood of civil armed conflicts and Government debt. As further investigation revealed, however government debt turned out to be an insignificant variable, which the process of model estimation eliminated form the core analysis. In its place, log exchange rate provided a measurement of instantaneous inflation and ultimately economic stability.

I. Hypothesis

The duration of sub-Saharan civil conflict episodes between 1990 and 2014 is greatly

influenced by the 5 socio-economic variables subject to this study. Combining Staveteig's (2005) and Cincotta, R. P., Engelman and Ansastasion's (2003) excess youth theory - embodied by the mid-year population's percent of 15-24-year-old males, according to Colliers & Hoefflers (1998,2002a, 2002b, 2004) utility theory – signified by youth unemployment rate, unemployment rate and log exchange rate allows for an enhanced understanding of the duration (measured in days) of sub-Saharan African civil armed conflicts episodes.

II. Methodology:

Guided by the dominant literature in the field, this study provides an assessment of the various factors which contribute to the duration of sub-Saharan Africa's many armed conflict episodes as well as an empirical investigation into excess youth and utility theory. The utilization of a simple model which relates conflict duration to economic factors is naïve. To fully comprehend sub-Saharan Africa's ongoing armed conflicts, one must account for the severity of armed conflict episodes/death total, alongside factors which determent economic outlook and reflect a populations opportunity cost of conducting civil war. Such factors include youth population, youth unemployment rate, unemployment rate and exchange rate.

Model estimation throughout the research process was necessary, and led to the creation of an enriched data analysis. Data set reconfigurations were necessary in order to produce statistically significant findings while remaining over the statistically necessary threshold of 30 observations (Paul Newbold).

Focusing on *conflict episodes* throughout the last 24 years, as listed by the UPSALA University Department of Peace Conflict Research, *UCDP/PRIO Armed Conflict Dataset v.4-2015, 1946 – 2014* and *UCDP Battle-Related Deaths Dataset v.5-2015, 1989-2014*, allowed for

a more consistent analysis across all 8 variables. The combination of the above named datasets provides the primary bases of the dependent variable of this analysis.

The majority of contemporary sub-Saharan armed conflicts originated throughout the 1960s, at a time where 17 sub-Saharan African nations, including 14 French colonies, gained independence between January and December of 1960 alone (France 24). According to the *UCDP/PRIO Armed Conflict Dataset v.4-2015, 1946 – 2014*, 250 sub-Saharan African armed conflicts irrupted throughout the 1960s. The original start date -defined as date of conflict initiation marked by first battle-related death- of many contemporary sub-Saharan African armed conflicts can be traced back to that time period.

Due to the limited availability of 1960s data concerning the independent variables of this study, the analysis had to be limited to armed conflict episodes between 1990 and 2014, listed as *Startdate2* in the *UCDP/PRIO Armed Conflict Dataset*. *Startdate2* is defined as “*the date, as precise as possible, when a given episode of conflict activity reached 25 battle-related deaths in a year... An episode is defined as continuous conflict activity. Consequently, a new episode is coded whenever a conflict restarts after one or more year(s) of inactivity. The introduction of episodes within conflicts enables users to distinguish between different phases in the conflict and, potentially, code these as separate conflicts.*”

Of 80 conflict episodes which accrued between 1990 and 2014, 15 can be found with an original start date in the 60s, 7 with an original start date in the 70s and 10 with an original start date in the 80s, totaling 32 out of 80 conflicts with an original start date outside the set date parameter of this study.

The utilization of conflict episodes rather than original start dates allowed for a more detailed and comprehensive analysis of armed conflicts between 1960 and 2014 while

accounting for ongoing conflicts of previous decades. Focusing primarily on conflicts with an original start date between 1990 and 2014 would have not allowed the distinction of different phases in older ongoing conflicts, leading to the neglecting of major conflicts. Thus, utilizing conflict episodes allows for a more inclusive and ultimately more significant analysis.

Further maximizing the statistical significance of this analysis required an emphasis on conflict episodes between 1990 and 2014 with a minimum of 90 battle-related deaths, as listed by the *UCDP Battle-Related Deaths Dataset v.5-2015, 1989-2014*. While a limitation to a 100 death would have been more plausible, it would have led to a sample size of less than 30.

III. Variables

Utilizing a simple, multiple regression model, limited to conflict episodes between 1990 and 2014 with at least 90 battle-related deaths during the first year episode year, will provide the analytical framework of this study. The dependent variable: duration of an armed conflict episode, will be measured from episode start date until conflict end date, as defined by the UPSALA University Department of Peace Conflict Research. Considering the above revelations, the Contextual factors that contribute to any given population's economic outlook will be measured by three proxies. These variables will be made up of unemployment rate, total (% of total labor force) (modeled ILO estimate), youth unemployment rate (% of total labor force ages 15-24) (modeled ILO estimate), log exchange rate (log of Official exchange rate, LCU per US\$ period average). Unemployment is known to decrease young people's cost to engage in conflict, and increases the proclivity to engage in collective violence (Collier, 2003), consequently unemployment rate, as well as youth unemployment rate will serve as a proxy for the individual's opportunity cost of rebellion, while log exchange rate will provide the proxy for economic stability as indicator of instantaneous inflation. Excess youth theory will be tested with

the variables midyear total population and density (Persons Per Sq. Km.), as well as mid-year population by youth age group (15-24 years old) for both sexes and by youth age group (15-24 years old) for males.

Considering the two excess youth variable with the three mentioned contextual factor variables will allow for an in depth analysis. Combining excess youth theory with the notion of rebellion opportunity cost, as determined by any given population's economic outlook, allows for an enhanced understanding of factors that influence the duration of Sub-Saharan Africa's many armed conflicts.

IV. Model

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \epsilon_i$$

TABLE 1: Variable Descriptions

Variables	Short Description	Expected Sign
ϵ_i	This is the error term; it explains the total variability in conflict duration/days, holding all other variables at 0.	/
Y_i	civil conflict episode duration, with a minimum of 90 battle related death throughout the first conflict episode year (measured in days between 1990-2014)	/
X_1	youth unemployment rate (% of total labor force ages 15-24) (modeled ILO estimate)	+
X_2	unemployment rate, total (% of total labor force) (modeled ILO estimate)	+
X_3	mid-year percent of youth age groups 15-24 years' both sexes	+
X_4	mid-year percent of youth age groups 15-24 years' only males.	+
X_5	log exchange rate (log of Official exchange rate, LCU per US\$ period average)	+

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constitutes a combination of the UPSALA University Department of Peace Conflict Research, *UCDP/PRIO Armed Conflict Dataset v.4-2015, 1946 – 2014* and *UCDP Battle-Related Deaths*

Dataset v.5-2015, 1989-2014. The independent variables log exchange rate, youth unemployment rate and unemployment rate total were all collected from the 2015 World Development Indicators, The World Bank. Mid-year percent of youth age groups 15-24 years' both sexes, as well as mid-year percent of youth age groups 15-24 years' only males we accessed through the 2015 International Data Base, U.S Census Bureau, which incorporates a collection of various government agencies datasets.

V. Results

TABLE 2: Model SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.777 ^a	.604	.528	895.929

TABLE 3: Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1720.123	3940.833		.436	.666
yunemp	448.901	148.535	1.625	3.022	.006
unemp	-919.320	242.029	-2.029	-3.798	.001
1524age%	184003.190	52685.962	1.383	3.492	.002
1524male%	-350618.193	86225.641	-1.678	-4.066	.000
logxrate	-586.225	164.364	-.465	-3.567	.001

a. Dependent Variable: ddays

a. Interpretation of Regression Coefficients

$$\hat{y} = 1720.123 + 448.901x_{1i} - 919.320x_{2i} + 184003.190x_{3i} - 350618.193x_{4i} - 586.225x_{5i}$$

- 1) 1720.123 = Holding all other variables at 0, conflict duration/days is expected to be 1720.123. As conflict duration/days cannot take on a negative number b_0 is not a useful indicator.
- 2) 448.901 = Holding all other variables constant, a one percent increase in the youth unemployment rate (% of total labor force ages 15-24) (modeled ILO estimate) is expected to lead to a 448.901 day increase in conflict duration.
 - a. 919.320 = Holding all other variables constant, a one percent increase in the unemployment rate, total (% of total labor force) (modeled ILO estimate) is expected to lead to a 919.320 day decrease in conflict duration.
- 3) 184003.190 = Holding all other variables constant, a one percent increase in the mid-year percent of youth age groups 15-24 years' both sexes) is expected to lead to a 184003.190 day increase in conflict duration.
- 4) -350618.193 = Holding all other variables constant, a one percent increase in the mid-year percent of youth age groups 15-24 years' male) is expected to lead to a 350618.193 day decrease in conflict duration.
- 5) -586.225 = Holding all other variables constant, a one percent increase in log exchange rate (log of Official exchange rate, LCU per US\$ period average) is expected to lead to a 586.225 day decrease in conflict duration

Utilizing IBM SPSS the regression in Table 2 displaces, that a substantial 52.8 % of total variability conflict episode duration (measured in days between 1990-2014) can be explained by its linear dependency on , youth unemployment rate (% of total labor force ages 15-24) (modeled ILO estimate), unemployment rate, total (% of total labor force) (modeled ILO estimate), mid-

year percent of youth age groups 15-24 years' both sexes, mid-year percent of youth age groups 15-24 years' only males, and log exchange rate (log of Official exchange rate, LCU per US\$ period average), taking into account the number of independent variables.

a. Heteroscedasticity:

As $X^2_{cal} 11.552 > X^2_{crit} 12.12$ at $X^2_{1,0005}$, this study fails to reject H_0 : error terms have the same variance, and thus reject H_1 : variances of error terms depend on expected values of dependent variables. Based on sample evidence, the model does not have Heteroscedasticity, at an .05% significance level. At a statistically more commonly used 5% significance level however, the model does have Heteroscedasticity. The existence of heteroscedasticity has wide ranging implications was addressed in a follow-up model.

b. Model evaluation:

As $F_{cal} 7.91 > F_{crit} 5.80$ at $F_{5,32,001}$, this study reject $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$, and thus accept H_1 : at least one $\beta_j \neq 0$. Basis on sample evidence youth unemployment rate (% of total labor force ages 15-24) (modeled ILO estimate), unemployment rate, total (% of total labor force) (modeled ILO estimate), mid-year percent of youth age groups 15-24 years' both sexes, mid-year percent of youth age groups 15-24 years' only males, and log exchange rate (log of Official exchange rate, LCU per US\$ period average), taken together, do linearly influence civil conflict episode duration (measured in days between 1990-2014), at an .1% significance level.

VI. Conclusions

Considering the complexity of civil armed conflict episodes, this model successfully combines excess youth theory with utility theory, as 52.8% of total variability in civil conflict episode duration (measured in days between 1990-2014), and can be explained by its linear dependency on the independent variables taking into account the number of independent variables.

Excess youth has the most dramatic effect on duration of civil conflict episodes with a 1% increase in youth age group 15-24 years both sexes expected to extend the duration of civil armed conflict by 184003 days. It comes, however, as a surprise that the percentage of male youth (age 15-24) within a population negatively correlates with conflict duration. It is probable that such negative correlation originates from its very strong correlation with youth age groups 15-24 years' both sexes. The same correlation issue applies to youth unemployment. However, due to the great significance of these four variables, it is not justifiable to drop either one of them, despite their correlation.

When adjusting for Heteroscedasticity by dividing all variables by their expected future value, the new Heteroscedasticity adaptive regression renders two more variables insignificant and excludes a further one, leaving the model with only youth unemployment rate and unemployment rate. The issue of heteroscedasticity despite careful data selection and evaluation exemplifies the complexity surrounding the statistical evaluation of sub-Saharan African armed conflict.

a. Future Research

Elevating the issue of Heteroscedasticity, combining various data sets and adding more cases to the analysis will be necessary in order to enhance the explanatory power of this mode. An earlier version of the research model included 6 additional variables accounting for ethnic diversity, GDP per capita, population density as well as government debt rapid, unfortunately none of them significantly influenced civil conflict episode duration (Sig. levels ranged from 13.6%- 64.3%) . Further investigation into these various variables will be required in order to continuously enhance this model. Furthermore, considering the colonial history of sub-Saharan Africa,

variables accounting for foreign intervention will be utterly important when doing advanced research in this field.

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