Effects of Unemployment on Crime in selected Sub-Sahara African countries

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Abstract
The objective of this study is to assess the effect of unemployment on crime in Sub-Saharan Africa. The main contribution of this study is in the enrichment of the literature on this phenomenon which is common throughout the African continent. The study covers 40 SSA countries and is based on the two-stage Generalized Method of Moments (GMM) inspired by the empirical model of Raphael and Winter-Ebmer (2001) between 1990 and 2018. Youth unemployment rate is found to have a positive and significant effect on the rate of murder in SSA countries.

JEL Classification : C13. J6. K42.

Keywords : youth unemployment, crime, panel data, Generalised Method of Moments.

1. Introduction

The modern landscape of the world in general, and that of Africa in particular, shows that in recent decades, the "globe" has been faced with "whirlwinds of violence" caused by crises of insecurity of all kinds. It is likely that, in recent years, there has been a dramatic rise in "organized crime" in almost all the "States" of the world. According to statistics compiled by the United Nations, some 464.000 died in 2017 as a result of murder (UNODC, 2019). Though this figure provides less information, there are actually disparities between countries and even continents. While Asia, Europe and Oceania have low murder rates (2.3%, 3% and 2.8% respectively), Africa is the second continent with the highest murder rate after the United States of America. These rates are 35% and 37% respectively. Moreover, while it is appropriate to admit perverse effects in the Bourdieusian sense of the term "global insecurity", organized crime alone was responsible for 19% of all murder cases.

Crime can be defined as any action that puts an individual at risk of being sentenced (Becker, 1968). In other words, the concept refers to a combination of individual behaviour that warrants the actions of social agents towards illicit activities. However, the societal materialization of insecurity in Africa, as shown by border conflicts, civil wars, politico-military crises, terrorism, etc., constitutes a major challenge to development. It not only destroys social and human capital, but discourages investment and prevents countries from fostering development (World Bank, 2006).

In the crime's related literature, several variables have been used to explain it in econometric models. These include income, education, law enforcement structure, poverty, inequality, urbanization, unemployment (Adolfo et *al.,* 2009). These high crime rates are thus partly explained by the level of unemployment in countries. Unemployment can be considered a key factor of crime in Sub-Saharan African countries. Recent World Bank data (2019) show an overall average unemployment rate of 5.39%. However, it shows disparities across the different regions of the world. For example, while OECD countries show a rate of 5.17%, the Middle East and North Africa countries show a rate of 11.52%. Sub-Saharan Africa (SSA) has a rate slightly higher than the world average of 6.18%. Moreover, the International Labour Organization (ILO) estimates that unemployment in Africa mainly affects young people, who represent about 60% of the population.

These facts are in line with a body of studies that has attempted to highlight the relationship between unemployment and crime. On the theoretical level, there are many controversies and it emerges that crime is affected both positively and negatively. On the one hand, Becker's (1968) seminal model, the theory of the motivational effect of crime (Cantor and Land, 1985), rational choice theory (Becker, 1968), neo-classical and Marxist theory defend the idea of a positive relationship between unemployment and crime.

In fact, Becker (1968) highlights the trade-off between the costs and benefits expected from the commission of a crime. According to this model, a number of factors can determine the net benefits of committing a crime, including labour market conditions and opportunities. For example, countries with higher rates of unemployment may experience a higher crime rate. Cantor and Land (1985) believe that the relationship between unemployment and crime can be justified by the theory of the motivational effect of crime. All other things being equal, this theory states that, a high level of unemployment can lead to crime. According to these authors, unemployment limits access of unemployed people to the market for goods and services and can push them to commit crime, if it provides them with monetary benefits. Furthermore, rational choice theory (Becker, 1968) also reports that an unemployed person commits a crime if his or her expected utility exceeds his or her utility of not committing such a crime. This theory is consistent with the neoclassical and Marxist theory (Box, 1987).

On the other hand, the theory of opportunity effects or criminal opportunity effects developed by Cantor and Land (1985) shows a negative relationship between unemployment and crime (Cohen et *al.,* 1981). In line with this theory, the occurrence of a crime requires three conditions. First, the presence of motivated offenders; second, the existence of appropriate targets; and third, the absence of effective guardians. In this study, Becker's (1968) theory that declining market opportunities (shown by rising unemployment rates) worsen legal income opportunities and thus make crime more attractive is used to analyze the effect of unemployment on crime commission in Sub-Saharan Africa.

Empirically, three main results highlight the effects of unemployment on crime. The first group of studies concludes that there is a positive effect of unemployment on crime. Witt et *al.* (1999) found a positive

relationship between crime and male unemployment rate. Raphael and Winter-Ebner (2001) analyze U.S. data and their findings show that unemployment rate has a significantly positive effect on property crime, but not on crime. Lee and Holoviat (2006) use a co-integration approach to identify the long-term relationship between unemployment and a set of crime variables in three Asian and Pacific countries. They find a long-term relationship in particular between unemployment among young men and crime. Hamzah and Lau (2013) showed that violent crime is positively correlated with poverty and unemployment.

The second wave of research results in the existence of a negative effect of unemployment on crime. Greenberg (2001) uses time-series data, cointegration and error-correction models to assess the relationship between divorce rates and unemployment on theft and murder rates in the United States. He concludes that lagged values of unemployment and unemployment duration have a negative effect on theft and is thus consistent with the findings of Cantor and Land (1985).

A third category of results shows the mixed effect of the relationship between unemployment and crime. This pattern shows either a heterogeneous effect of unemployment on crime or no effect at all. Using Markov's autoregressive models, Fallahi and Rodriguez (2007) analyse the behaviour of four crime variables and the unemployment rate. They test the cyclical independence of the unemployment rate and crime variables using some non-parametric measures such as the concordance index (Harding and Pagan, 2002) and the independence of time series (Bodman and Crosby, 2005). The results show that there is no relationship between the unemployment rate and theft and crime. Sachsida et *al.* (2010) examine whether social factors, including unemployment and inequality or discrimination, can explain the onset of crime and provide heterogeneous findings. In a similar manner, Fanjnzylber, Lederman and Loayza (2002a, 2002b) show in the conclusion of their study that the unemployment rate does not have a statistically significant effect on crime rates. Imrohoroglu, Merlo and Rupert (2001) even show that the effect of unemployment on crime is negligible.

As a result, both theoretical and empirical results on the effects of unemployment on crime are inconclusive and ambiguous. Moreover, relative to Sub-Saharan Africa, there is a 60% young population, high poverty rates coupled with high inequality and an above-average unemployment. Thus, the research question that deserves to be asked is: *what is the effect of unemployment on crime in Sub-Saharan Africa?* The objective of this study is to assess the effects of unemployment on crime in Sub-Saharan Africa. Furthermore, as per our knowledge, there is very few studies have been on the effects of unemployment on crime in Sub-Saharan Africa. The contribution of our paper is in twofold. On the one hand, it contributes to the growing literature on the impact of unemployment on crime in Sub-Saharan Africa. On the other hand, it proposes economic policy recommendations aimed at mitigating the effects of unemployment on crime in Sub-Saharan Africa.

The rest of the study is structured as follows. Data and methodology are covered in "Data and methodology" section, while empirical results and disclosed in "Presentation and analysis of results" and finally the "Conclusion" concludes with some recommendations.

2. Data and Methodology

2.1. Data

The data are taken from the World Bank's *World Development Indicators* database (*WDI* 2018). The study covers 40 countries in Sub-Saharan Africa (table 1).

Table 1: List of countries

South Africa	Angola	Benin	Botswana
Burkina Faso	Burundi	Cameroon	Ivory Coast
Eritrea	Ethiopia	Gabon	The Gambia
Ghana	Guinea	Guinea Bissau	Equatorial Guinea
Kenya	Lesotho	Liberia	Malawi
Mali	Mauritania	Mozambique	Namibia
Niger	Nigeria	Uganda	DRC
Congo	RCA	Rwanda	Senegal
Sierra Leone	Somalia	Swaziland	Tanzania
Chad	Togo	Zambia	Zimbabwe

The study period is from 1990 to 2018. Table 2 gives a description of the different variables used in this work.

Table 2 : Description of variables

Variables	Description	Source
$Crime_{it}$	Intentional homicide rate per 100,000 at date t of country i.	World Development Indicators
$Literacy_{it}$	Adult literacy rate at date t of country i (15 years and over), in per cent	World Development Indicators
$HighEdu_{it}$	The enrolment rate in higher education at date t of country i	World Development Indicators
Pop_{it}	The population growth rate at date t of country i	World Development Indicators
$RGDP_{it}$	Real GDP growth rate at date t of country i	World Development Indicators
$Unemplo_{it}$	The unemployment rate at date t of country i.	World Development Indicators

Source: Authors based on World Development Indicators (2018)

2.2. Methodology

This study adopts an empirical strategy that is based on the two-step Generalized Method of Moments (GMM). The estimation approach is an extension of Arellano and Bover (1995) by Roodman (2009). This estimation approach has two main advantages. On the one hand, it restricts the proliferation of instruments or over-identification, and on the other hand, it controls the dependency of individuals (Baltagi, 2008). The

two basic conditions for the adoption of the GMM approach are satisfied because the number of cross-sections is higher than the number of time dimensions in the snapshots ($N(40) \succ T(28)$) and the dependent variable is persistent. This persistence is due to the fact that the correlation coefficient between the dependent variable and its lagged value is higher than the Thumb threshold rule of 0.800. (Table 3)

Table 3 : Persistence of the dependent variable

	Crime	Crime (-1)
Crime	1.0000	
Crime (-1)	0.9907	1.0000

The relationship between unemployment and crime in Sub-Saharan Africa is therefore examined by estimating the following empirical model based on the empirical model of Raphael and Winter-Ebner (2001) and it is written as follows :

$$Crime_{i,t} = \alpha_0 + \alpha_1 Crime_{it-1} + \gamma Unemplo_{it} + X_{it}\beta + \mu_i + \varepsilon_{it} \qquad (1)$$

Where $Crime_{i,t}$ represents the crime rate, $Crime_{it-1}$ represents the crime rate of the country in the i previous $t-1$ year, $Unemplo$ is the unemployment level of the country in i the year t. X_{it} a set of control variables, the μ_i country-specific effect and the random term ε_{it}.

The estimation procedure is based on the level (2) and difference (3) equations which is as follows :

$$Crime_{it} = \alpha_0 + \delta_1 Crime_{i,t-\tau} + \delta_2 Unemplo_{i,t} + \sum_{h=3}^{6} \delta_h X_{h,i,t-\tau} + \mu_i + \xi_t + \varepsilon_{i,t} \qquad (2)$$

$$Crime_{i,t} - Crime_{i,t} = \delta_0 + \delta_1(Crime_{i,t-\tau} - Crime_{i,t-2\tau}) + \delta_2(Unemplo_{i,t} - Unemplo_{i,t-\tau}) + \delta_3(HighEdu_{h,i,t} - HighEdu_{h,i,t-2\tau})$$
$$+ \delta_4(Pop_{h,i,t} - Pop_{h,i,t-2\tau}) + \delta_5(RGDP_{h,i,t} - RGDP_{h,i,t-\tau}) + \delta_6(Literacy_{h,i,t} - Literacy_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + \varepsilon_{i,t-\tau} \qquad (3)$$

The two-stage specification is therefore preferred to the one-stage procedure because it is consistent with heteroscedasticity.

3. Presentation and analysis of results

Table 4 displays descriptive statistics of the variables used in our study. These descriptive statistics show that Sub-Saharan Africa is characterized by a high level of crime and a high level of unemployment.

Table 4 : Descriptive Statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Crime	268	11.60448	13.06128	0.5	63.9
HighEdu	593	5.29331	4.899286	0.32069	30.23934
Pop	1153	2.571631	1.08249	6.766223	8.117929

RGDP	1111	4.2928	7.733118	50.24807	149.973
Literacy	162	57.36137	21.90329	10.89465	94.37054
Unemplo	1120	7.833804	7.784918	0.3	37.976

Source: Authors

Between 1990 and 2018 the average crime rate in Sub-Saharan Africa is 11.60448 and its standard deviation is 13.06128. The minimum value of the crime rate in Sub-Saharan Africa is 0.5, which corresponds to the value recorded by Burkina Faso in 2005 and 2006. The maximum value of the crime rate is 63.9, which corresponds to the value recorded by South Africa in 1995.

Relative to the unemployment rate, between 1990 and 2018, Sub-Saharan African countries recorded an average of 7.833804. The maximum associated value is 37.976 and corresponds to the level reached by Lesotho in 1996. The minimum 0.3 was observed in Niger in 2011.

In terms of the correlation between variables (table 5), it appears that the internal unemployment rate, youthful population, economic growth rate, education and unemployment within a country are positively correlated with the murder rate.

Table 5 Correlation matrix between variables

	Crime	HighEdu	Pop	RGDP	Literacy	Unemplo
Crime	1.0000					
HighEdu	0.8607	1.0000				
Pop	-0.7223	-0.7095	1.0000			
RGDP	-0.4410	-0.5237	0.4352	1.0000		
Literacy	0.7219	0.6208	-0.6393	-0.3989	1.0000	
Unemplo	0.8533	0.7241	-0.8977	-0.4656	0.5897	1.0000

Source: Authors

The results obtained present on one hand the results of the basic model and the global model on the other hand. These results are presented in Table 6.

Table 6: The Impact of Unemployment on Crime in Sub-Saharan Africa

	GMM System		Diff GMM	
	Basic Model A	**Global Model B**	**Basic model C**	**Global model D**
Cons	-0.3240789 (0.1988152)	-8.549296*** (2.981581)	-0.3112597 (0.291169)	-14.19204 *** **(4.474376)**
$Crime(-1)$	0.9400416*** (0.0127382)	**0.8436889*** (0.052441)**	**0.8894786*** (0.0243002)**	**0.9319226*** (0.108269)**

HighEdu	-	0.1012418*** (0.0839533)	-	-0.0191539 (0.1677333)
Pop	-	2.436233*** (0.8123703)	-	4.150542*** (1.390056)
RGDP	-	-0.1292662*** (0.0347348)	-	-0.1975194* (0.1128768)
Literacy	-	0.0270073*** (0.009703)	-	0.0349748 (0.0212826)
Unemplo	0.0726409*** (0.0113146)	0.2657676*** (0.0663125)	0.1243199*** (0.038402)	0.3737734*** (0.108806)
Wald Chi	5596.81*** (0.000)	7046.56*** (0.000)	4711.89*** 0.0000	13045.10*** (0.0000)
Sargan Test	225.995 (0.5361)	1493.64 (0.6215)	232.4593* (0.5471)	1565.53*** (0.7389)

Note: *, ** and *** indicate significance at 10%, 5% and 1% levels respectively. The figures in parenthesis represent the t-student

Source: Authors from Stata.

With respect to the basic model, the results of the basic equation estimated by the GMM method in system and difference are presented in columns (A) and (C) of table (1) and Wald's statistics show us that the model is globally significant at the 1% level.

The two columns (A and C), which highlight the results of the basic model, show that the unemployment rate is statistically significant and has the expected sign, i.e. the positive sign. Specifically, the coefficients on the unemployment variable are positive and statistically significant at the 1% threshold. All other things being equal, an increase of one (1) point in the youth unemployment rate increases the crime rate by 0.0726409 or 0.1243199 points, depending on the estimation method chosen. This result is in opposition the study by Fanjnzylber et al. (2002a, 2002b) but corroborates the work of Cerro and Meloni (2000), Martin A. (2000). Andresen (2012) and Nabeela Khan et *al.* (2015) that unemployment has a positive and statistically significant effect on crime.

The coefficients of the lagged dependent variable ($Crime_{it-1}$) for both regression methods are also positive.

Thus, the level of crime tends to increase as the previous level of crime increases. Sargan statistics validate the lagged variable used in this estimation.

For the global model, the global crime equation is also estimated by the difference and system GMM method. The results are presented in Table (6), specifically columns (B) and (D). Wald's statistics also show that the model is generally significant at the 1% level.

With respect to our variable of interest (unemployment) we get the same result as that obtained in the basic model estimates. System and difference Generalized Moment Method (GMM) regressions show that unemployment has a positive and statistically significant effect on crime in Sub-Saharan Africa. This result confirms the theory of the motivational effect of crime developed by Cantor and Land (1985). To them, unemployment can lead an individual to commit crime in order to obtain financial gain.

Economic growth, represented by real GDP, is appearing as a factor in reducing crime rates in Sub-Saharan Africa. This variable provides a negative and statistically significant coefficient. Specifically, columns (B)

and (D) show that, all other things being equal, a one-point increase in the GDP growth rate (real GDP) leads to a decrease in the crime rate of 0.1292662 and 0.1975194 points respectively. This result opposes the results found by Nabeela Khan et *al.* (2015) which show that economic growth leads to higher crime rates in the long run but lower rates in the short run, though in agreement with the work of Ricardo Rocha and Hermes Martinez (2003).

The education level variable, represented by the literacy rate (Literacy), has a significant and positive effect on crime. This positive effect indicates that an increase in the level of education leads to an increase in crime in Sub-Saharan Africa. This could be explained by the lack of employment opportunities in the labour market. For an educated and unemployed youth could become a criminal as to earn money to support himself or herself. This result confirms the study by Ehrlich (1976), which shows that an increase in the level of education leads to an increase in crime, though a different type of crime.

Conclusion

This article examined the effect of unemployment on crime in Sub-Saharan Africa with a view to contributing to the literature on the cause of crime. The study covered 40 SSA countries over the period 1990 to 2018. The methodology relied on the two-stage generalized system and difference method of moments to correct for heteroscedasticity based on the empirical model of Raphael and Winter-Ebner (2001).

The results show that unemployment has positive and significant effects on crime in Sub-Saharan Africa. Other things being equal, this means that the higher the unemployment rate, the higher the crime rate in Sub-Saharan Africa. The innovation originality of this study lies in the fact that it is one of the few to assess the effect of unemployment on crime in SSA.

Two main recommendations merge from this study. These are the introduction of active measures to combat youth unemployment and the improvement of the institutional framework. Relative to active policies to combat unemployment, it is the matter of putting in place investments of great potential such as large scale public works (for example restructuring projects), employment in the civil service, and strengthening the match-up between training and employment. The improvement of the institutional framework that promotes transparency in employment and the business environment can facilitate the setting up of job-creating companies. As a result this improvement of the institutional framework can promote self-employment in SSA countries.

Disclosure statement

No potential conflict of interest was reported by the authors.

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