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ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTER OF SCIENCE IN ECONOMICS

**THE EFFECT OF POLITICAL INSTABILITY ON ECONOMIC
GROWTH IN SUB-SAHARAN AFRICAN COUNTRIES:
A DYNAMIC SIMULTANEOUS EQUATIONS MODELING
APPROACH**

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THE EFFECT OF POLITICAL INSTABILITY ON ECONOMIC GROWTH IN SUB-SAHARAN AFRICAN COUNTRIES

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ABSTRACT

In this study, the relationships between political instability and economic growth in Sub Saharan African countries are deeply explored. Six individual political instability indicators from the World Bank's world governance indicators database were used and aggregated into a single and more comprehensive political instability index by employing the techniques of principal component analysis. Then the impact of the composite political instability index on economic growth along with other economic variables are modeled by employing three simultaneous equations and estimated by dynamic panel GMM estimation approach which accounts for the endogeneity issues. The results from the GMM estimations reveal that political instability significantly hampers economic growth in SSA through its direct transmission mechanism by disrupting the available resources a country has at its disposal. The hypothesized indirect channel through which political instability negatively affects economic growth through FDI is found to be statistically insignificant. Panel causality tests along with the corresponding forecast error variance decompositions (FEVDs) and impulse response functions (IRFs) are performed to reinforce the results obtained from the GMM estimations. The results show that political instability and foreign direct investment (FDI) Granger-cause economic growth, while the reverse is not true. While it's found that economic growth is the most endogenous of the main three target variables, FDI is the most exogenous one which is unresponsive to shocks of variables other than its own. The governments and policy makers of Sub Saharan African countries should target political instability as their policy variable since variations in the economic growth other than its own shocks are also explained by the shocks from political instability. Countries in SSA should not ignore factors leading to political instability and policies aimed at decreasing political instability should be pursued by these countries in order to maintain a stable economic growth.

Key words: Economic growth, political instability, foreign direct investment, SSA countries, FOD and System GMM

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This is to certify that the Thesis prepared by Tsegayehu Agmasie entitled “**The Effect of Political Instability on Economic Growth in Sub-Saharan African Countries**” and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Economics (Economic Policy Analysis) is an original work and complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Examiner _____ Signature _____ Date _____

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Supervisor _____ Signature _____ Date _____

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LIST OF ACRONYMS

AIC	Akaike information criterion
BIC	Bayesian information criterion
FDI	Foreign direct investment
FEVD	Forecast error variance decomposition
FOD	Forward orthogonal deviations
GDP	Gross domestic product
GDPPC	Gross domestic product per capita
GFCF	Gross fixed capital formation
GMM	General method of moments
GS	Government spending
HQIC	Hanan-Quinn information criteria
INF	Inflation rate
IRF	Impulse response function
OLS	Ordinary least square
PCA	Principal Component Analysis
POLINST	Political instability
SSA	Sub Saharan Africa
TO	Trade openness
UNEMP	Unemployment rate
VAR	Vector Auto Regressive
WB	World Bank
WDI	World Development Indicators
WGI	World Governance Indicators
WIID	World Income Inequality Database

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The issue of economic growth is at the heart of every country's policy agenda, and remains a major source of headache for policymakers in many developing countries(Kwon,1997). Tobin (1964) described economic growth as “an age-old issue, one which has always intrigued and preoccupied economists”. Since economic growth is regarded as a primary sign of economic development that gauges the welfare of a country's citizens, economists and policymakers continue to lose sleep over it in an attempt to devise the best policy combinations just to achieve the desired level of economic growth (Araee, 2016). Economic growth is multifaceted in nature and must be addressed from economic, social, and political perspectives. To that end, many economists have been pursuing potential economic and non-economic factors that influence economic growth for many years and the politics of economic growth has emerged as the new research area (Ibid).

Many researchers regard political instability as a disease that causes serious harm to a country's economy. They argue that economic growth and political instability are inextricably linked, and that the uncertainty associated with political instability follows different transmission mechanisms on its impact of economic growth (Alesina et al.,1992; Aisen and Veiga(2011);Nazeer and Mansur,2017; Daylop,2019 and Gupta,1990) . It has been argued by many researchers such as Jong-A-Pin (2009) and Aisen and Veiga (2013) that political risk directly affects economic growth by negatively influencing the productivity of the existing factor inputs through the disruption of market and economic operations. Many researchers such as Alesina et al,(1992), Chawdhury,(2016) and Ayessa & Hakizimana, (2021) also show the indirect effects of political instability on economic performance. It has been indicated in these researchers' works that political instabilities spoil the economic climate in which foreign direct investments operate, and as a result foreign company investors shy away from their initial investment plan in the host country, thereby slowing the economic growth. High level of inflation causing a slow economic growth is also the indirect effect of political instability on

growth. Political instability, as shown by Edwards & Tabellini (1991), affect policy makers to pursue a myopic suboptimal macroeconomic policy alternatives in an attempt to maintain their political status quo, thereby impacting the long run economic growth negatively.

Sub-Saharan Africa (SSA) is one of the least developed regions in the world with the 48 countries of Africa's 54 countries and a total population of over 1.107 billion as of 2019. The population is expected to more than double by 2050, which accounts for over half of global population growth by then. The world's youngest population is found in Sub-Saharan Africa which, in 2019, those under the age of 25 accounted for 62% of the total population, and in 2050 the figure is expected to be around 52% (Swiss Federal Department of Foreign Affairs, 2021). According to World Bank (2019), SSA is one of the poorest and most poverty-ridden regions in the world with economic growth of 2.6% and GDP per capita growth at -0.08% as of 2019.

This region has also been prone to political instabilities and has become the arena for intra- and inter-state armed conflicts which have come to hinder development efforts. Weak government institutions, Corruption, scramble for natural resources, inequality, ethnic and religious tensions and extremism are often the main causes that inflict conflicts in SSA countries (Swiss Federal Department of Foreign Affairs, 2021). According to African Leadership Change (2021) 90 coup d'états have occurred on Sub-Saharan Africa since most African countries gained independence from European domination in the 1960s. Despite having a plethora of economic resources that could be transformed into beneficial economic outcomes, many Sub-Saharan African countries have experienced mediocre economic growths and poverty continues to be still a major issue in this region (Dalyop, 2019). As Mbaku (1992) points out, political instability is a major contributor to the crippling poverty and the accompanying slow economic growth in this part of the world. These political volatilities and uncertainties have played a key role in the economic stagnations of generally the continent, and particularly the SSA region.

At this juncture, Gyimah-Brempong, (1999) noted that in the face of these predominant political instabilities and volatilities in developing countries and the fact that many theoretical frameworks, such as endogenous growth theories, argue in support of institutional factors other than economic factors to explain the slow economic growth, empirical studies conducted on

economic growth have generally not included institutional factors such as political instability in their models. Many empirical studies of economic growth conducted in developing countries without the inclusion of these institutional factors may have generally resulted in biased estimates which may have again resulted in wrong policy formulations. Therefore, as far as SSA is concerned, incorporating political instability as a main variable along with other economic variables into the economic growth models is vital as it may be the missing piece of the puzzle in the ongoing effort to capture the main factors impacting economic growth.

1.2. Statement of the Problem

Generally, there are different schools of thought as to why there are differences in economic growth across countries. Assuming that the institutional framework is given, neoclassical economists emphasize on factors of production such as labor and capital to be the causes of growth differentials across countries (Willis, 1990). Institutionalists, on the other hand, give emphasis to the availability of effective social, economic and political institutional frameworks other than the mere production inputs. Authors of this school of thought such as Reynolds (1983) even claim that “political instability is the single most important factor that explains differences in the long term economic growth among nations”. There is also a dependency school of thought which rationalizes the growth differences across nations to the unequal and unfair relationships between the developed and developing nations. Though different schools of thought emphasize on different factors for growth differentials across nations, it’s evident that no long run economic growth can be achieved without the proper institutional frameworks in place for smooth production, consumption and exchange of goods (Acemoglu and Robinson, 2012).

The impacts of political instability on economic growth are still controversial in the economics literature, both in theory and empirical studies. On a theoretical level, while authors generally agree that political instability has negative effects on economic growth, there are differences in the transmission mechanisms of effects of political instability on economic growth. Two schools of thought can be identified at this level. The first analyzes uncertainty as a factor influencing economic growth as a result of political instability. Authors in the second group, on the other hand, argue that in times of political instability, productive expenditures (investment expenditures) that may boost economic growth are diverted away from their goals and channeled

toward wasteful military expenditures, thereby affecting economic growth negatively (Ayessa & Hakizimana, 2021).

Depending on the types of models used and treatments of political instability as exogenous or endogenous variable, two schools of thought can also be identified in the literature. Authors in the first group employ single line equation models and treat political instability as exogenous variable affecting economic growth negatively. The second group views political instability as endogenous variable which affects economic growth negatively. Mostly, while economists use political instability to explain economic growth, political scientists use economic growth to explain political instability (Gyimah-Brepong & Dapaah, 1996; Gyimah-Brepong & Traynor, 1999; Araee, 2016).

Sub-Saharan Africa (SSA) being one of the least developed regions in the world is featured by decades of declining GDP per capita, severe hunger and extreme environmental degradation. SSA's economic crisis is manifested by low level agricultural productivity, incompetent industries, increasing debt and weak institutional frameworks. Food production couldn't cope with the increasing population growth (WB, 1989). Sub-Saharan African countries, with a few exceptions, have been unable to secure stable macroeconomic performances, and economic growth has been sluggish since most of the region's countries gained independence from European colonialism in 1960s. These overall economic misfortunes are there despite the fact that the region is blessed with abundant human and natural resources endowments which could be tapped into positive economic outputs (Jaunky, 2013; Dalyop, 2019). Internal armed conflicts, cross-border conflicts, internal violence, coups, fragile democracy, resource curse, divisions along ethnic and religious lines, 'the youth bulge' and unemployment, and corruption are the most common features of SSA countries (Dimitru & Hayat, 2015).

The extent of Sub-Saharan African countries' poor growth performance is widely acknowledged, but the causes are hotly debated. One school of thought holds that external forces (such as declining terms of trade, high global real interest rates, and sluggish global demand for African commodities) have slowed economic growth in the region. However, both better performance in SSA in previous periods (with similar external forces) and faster growth in Asia, which has faced

similar external conditions, have led to another school of thought that considers the role of domestic policies in explaining the slowdown in growth. This school of thought argues that the region's slow economic performance and its incompetence in the global market are results of the over-evaluation of the real exchange rate driven by domestic policy measures in response to changing external measures (Ghura, 1995). According to Mbaku (1992), economic policies of developed countries and the foreign currency exchange system are external factors of the region's economic malady. He notes that internal obstacles such as the presence of the government's hand in the economic activities, corruption in the public sector, and political violence are the internal factors which damage the economic performance in SSA. Researchers often explain economic growth as a function of the quantity and quality of production inputs. Institutional factors were considered as given in most of the growth studies and often discarded to the error term. If the institutional factors significantly affect economic growth, the error-term will be systematic and the estimations may be inconsistent and/or biased (Fosu, 1992).

Recently, there is a growing consensus that institutional factors such as, political instability, are also important factors of economic growth. Authors from this school of thought argue that in addition to economic factors, institutional factors such as, political instability are equally at the core of SSA's poor economic performances (Fosu, 2002, Ghura & Hadjimichael, 1996). For developing countries such as, SSA whose future growth depends upon successful participation in the world economy, it is of vital importance that they understand what the role of institutional factors would be in contributing to their economic growth and development. Recently, it has come to every economist's attention that political instability is a harmful disease which renders damage to economic growth. Many economists were drawn to the study of economic growth and foreign direct investment across countries in light of widespread occurrence of political instability (Nazeer & Masih, 2017)

Generally, the empirical findings are still divergent in terms of the effects of political instability on economic growth. Some studies found an adverse association between economic growth and political instability while others found that political instability has a beneficial impact on economic growth. Jong-A-Pin, (2009) has conducted a research on sample of 98 countries in the period 1984-2003 and arrived at a conclusion that different dimensions of political instability

have different effects on economic growth. Conducting a study on the causal links between political instability and economic growth in Nigeria, Afolabi & Bakar ,(2016) have found that there is a one way negative causality going from political instability to economic growth. Fosu, (1992) has found a negative relationship between the two variables during his conduction of a research on 31 sub-Saharan African countries. Alesina et al. (1996) used a dataset of 113 nations to investigate the impact of political instability on economic development and arrived at a result that economic development was slowed due to political instability in these countries. Other researchers such as Gyimah-Brempong & Traynor,(1999), Willis(1990), Omofeso & Mobolaji,(2014) Karana & Quinn,(2017), Daylop(2017), Kaplan & Akçoraoğlu,(2017), Grochová & Kouba, (2014),Mbaku(1980) and Fosu,(2002) have all reached at the same conclusion that political instability has a deleterious effect on economic growth.

Pasha, (2020) has done a research on the nexus between different proxies of political instability and economic growth in Guyana using time-series data covering the period 1961 – 2018 and GARCH (1,1) models. The findings reveal that changes in the Head of State (HOS) have a positive and significant effect on real GDP growth rates. Employing the Granger causality test for the 1996-2012 periods on ECOWAS countries, Abu et al, (2014) found that there is a positive unidirectional Granger causality going from political instability to economic development in the short term. Fosu(2001) and Feng(1997) have both arrived at the same conclusion that political instability enhances economic growth.

Pasha (2020) has also arrived at a conclusion that other proxies of political instability, such as political killings, riots, insurgency, and terrorism, are not strongly related to real GDP growth. Kirmanoglu (2003), Goldsmith (1987), Barro and Lee (1994) and Campos and Nugent (2000) have conducted their respective studies on the relationship between political instability and economic growth and found no statistically significant relationship between the two variables. Generally speaking, there is still inconsistency in results in empirical literatures for the political instability-economic growth nexus which allows room for further researches. The inconsistencies may be due to the different methodologies used, the differences in country to country context, and irrelevance of different political indices to different countries etc.

Most of the studies in the past concerning the relationship between political instability and economic growth lack robust empirical evidence. Many previous studies on the relationship between political instability and economic growth have overlooked the issue of endogeneity among the regressors. They use single line equations and OLS, fixed effects or random effect estimation techniques which could not address the endogeneity problem that comes with dynamic nature of the dependent variable and the endogeneity of explanatory variables with the error term. Little has been said in the previous studies about whether or not the variables in political economy growth models are exogenous or endogenous. These studies lacked appropriate econometric methods that took simultaneity, causality, and robustness analysis into account. The OLS estimation method was used in the majority of studies, which does not account for the correlation and endogeneity of the independent variables, resulting in inconsistent and biased estimates. Even though the use of simultaneous equations in previous studies may have aided in determining the direction of causality, no statistical test has been established to determine the validity of the appropriate instrumental variables (Adam & Dercon 2009). This study contributes to the literature by employing a dynamic panel estimation technique to account for the problems of endogeneity among the regressors and the past values of the dependent variable with the error term. The direct and indirect impacts of political instability on economic growth through its transmission mechanisms are accounted for by taking care of the endogeneity problem. This helps to avoid the biased effects of political instability on economic growth.

Moreover, most of the previous studies on the relationship between political instability and economic growth in developing countries in general and in SSA countries in particular used a single indicator as proxy for political instability and fail to account for different dimensions of political instability that may have too much information loss in explaining economic growth. In this research, this gap is filled by using a more comprehensive measure of political instability.

1.3. Objective of the Study

The general objective of the research is to examine the effect political instability has on the interaction between foreign direct investment and growth in Sub Saharan African countries.

1.3.1 The Specific Objectives are to :

1. Examine whether or not political instability has a significant effect on economic growth in SSA through its direct and indirect transmission mechanisms.
2. Determine if there is causation between political instability and economic growth and the direction of the causality.

1.4. Hypothesis of the Study

In this study, we hypothesize that Political instability has a significant negative impact on economic growth via its direct and indirect transmission channels.

1.5. Justifications and Significance of the study

Identifying the major economic and non-economic factors of economic growth is vital for policy making in developing countries. In recent years, researchers have shown tremendous inclination towards incorporating institutional factors to explain growth other than the economic factors that are often considered. Currently, a comprehensive and in-depth research analysis on the relationship between political instability and economic growth generally in developing countries and specifically in SSA is lacking. Therefore, it is of great importance to contribute to the stock of knowledge of the literature on political instability and economic growth in light of Sub-Saharan African countries' political economy framework. Governments and Policy makers of developing countries will benefit from consulting this research paper as it highlights whether or not there is a significant impact of political instability on economic growth. Other researchers will also find this research very resourceful to further their studies on this given matter.

1.6. Organization of the Study

This paper is organized into five chapters. Chapter one is about introduction of the paper. The next chapter reviews relevant theoretical and empirical literatures related to the study. Chapter three is devoted to model specification, data source and type, and the analysis of the study by using the appropriate econometric models. Chapter four forwards a discussion on the empirical analysis and findings of the study. The final section, chapter five concludes the paper and gives some policy implications generated from the study.

CHAPTER 2: LITERATURE REVIEW

2.1. Theoretical Literatures

2.1.1. Major Theories of Economic Growth

Economists often define economic growth as the annual change in the production of goods and services as measured by the growth rate of GDP or national income (Ivic, 2015). Economic growth, according to Kuznets (1973), is a long-term capacity build-up in which the country's population is supplied with a broader range of economic goods as a result of advancing technology and the institutional and ideological changes that it needs.

It remains unsolved mystery to economics science as to why some nations grow and others do not or why developing nations couldn't catch up to the developed countries in terms of economic growth. One of the central agendas among economists and theoretical and empirical growth researchers has been the investigation of the factors that promote or impede economic growth (Andolfatto, 2005); Chirwa & Odhiambo, 2016; Acemoglu, 2007). There are various schools of thought that theorize the various factors that contribute to the increase or decrease in economic growth.

2.1.2. The Early Theories of Economic Growth

The study of economic growth dates back to the 15th century mercantilists, a school of thought pioneered by a French economist named Antoine de Montchrestien. Mercantilists believed that economic growth is attained from accumulation of precious metals (such as gold and silver) and from trade surplus (Sharipov, 2015). While mercantilists advocated for import restriction, they encouraged exports of goods to other nations as a source of metal money inflow resulting in trade surplus which, in turn, they believed would guarantee economic growth. It was believed by the mercantilists at the time that accumulating metal coins and maintaining a trade surplus were the best policies that could lead to a powerful and wealthy nation (Osipian, 2007; Landreth et al, 2002). Pioneers of the physiocracy school of thought who emerged in the second half of the 18th century, on the other hand, believed that the 'law of nature' would govern the operations of economy. Physiocrats advocated for the principle of laissez-faire and noninterventionist economic system and an establishment of "natural order" where they saw economic life as a

natural process that has its own internal laws to govern the operations of the economy. Physiocrats strongly believed that the value of “land agriculture” is the sole driver of economic wealth of nations and that the value of agricultural products should be higher. Other forms of labour such as “industrial” and non-agricultural labor were thought valueless and only agricultural labour was seen as valuable by physiocrats (Shapiro,2015). Another school of thought is the classical school of thought which is marked by Adam Smith's “The Wealth of Nations” (1776). Adam Smith, David Ricardo, Thomas Malthus, Karl Marx, John Stuart Mill, Jean-Baptiste Say are among the most outstanding economists who contributed to the classical school of thought. The central themes of the classical economists were the macro issues of growth, and the distribution of income between wages and profits and the nature of the economy is generally characterized by a laissez faire (Ibid) .

2.1.3. The Harrod-Domar Model

The Harrod-Domar model is a Keynesian economic growth model which tries to explain that economic growth depends on the total saving rate and the relationship between capital and output (Thong& Hao,2019). According to the Harrod-Domar model, output is solely a function of capital stock. It's assumed that there are constant returns to scale, and the marginal product of capital does not change over time, implying that the marginal and average capital products are equal. Saving is defined as a fixed percentage of income equal to the level of investment. The change in capital stock is the result of some investment minus the rate of depreciation.

The assumptions underpinning the Harrod-Domar model,

1. $Y = f(K)$
2. $\frac{\Delta Y}{\Delta K} = \frac{Y}{K} = cY = S = I$
3. $\Delta K = I - \delta K$

Where c is marginal product of capital, s is saving rate and S is total saving.

In light of the above assumptions we can derive the output growth rate as follows:

$$c = \frac{dY}{dK} = \frac{Y_t - Y_{t-1}}{I - \delta K_t} = \frac{Y_t - Y_{t-1}}{sY_t - \delta K_t}, \text{ but from assumption 2, } K_t = \frac{dK_t}{dY_t} Y_t$$

Then

$$\begin{aligned}
c &= \frac{dY}{dK} = \frac{Y_t - Y_{t-1}}{I - \delta K_t} = \frac{Y_t - Y_{t-1}}{sY_t - \delta K_t} = \frac{Y_t - Y_{t-1}}{sY_t - \delta \frac{dK_t}{dY_t} Y_t} \\
c \left(sY_t - \delta \frac{dK_t}{dY_t} Y_t \right) &= Y_t - Y_{t-1} \\
cY_t \left(s - \delta \frac{dK_t}{dY_t} \right) &= Y_t - Y_{t-1} \\
c s - c \delta \frac{dK_t}{dY_t} &= \frac{Y_t - Y_{t-1}}{Y_t} \\
s \frac{dY_t}{dK_t} - \delta \frac{dY_t}{dK_t} \frac{dK_t}{dY_t} &= \frac{Y_t - Y_{t-1}}{Y_t} \\
s c - \delta &= \frac{Y_t - Y_{t-1}}{Y_t} \\
s c - \delta &= \frac{\Delta Y}{Y} = g \dots\dots\dots(2.1)
\end{aligned}$$

This result implies that economic growth is affected by savings rate which replenishes the capital stock.

2.1.4. Neoclassical Economic Growth Theories

Among the shortcomings of the Harrod-Domar model are the assumptions that capital is the only factor of production and that capital's marginal product is constant. These assumptions are relaxed in neoclassical economic growth models, which, in addition to capital, include labor and technology as factors of production, and the capital output ratio is no longer assumed to be fixed. The Neoclassical economic growth theory is based on the belief that three economic forces, namely labor, capital, and technology, interact to produce long-term economic growth (Corporate Finance Institute, 2015). In the 1950s, Solow pioneered the neoclassical growth model which is based on a well-behaved production function with constant returns to scale and no technological advancement. The model assumes that capital stock can be adapted to more or less capital intensive production techniques. The model predicts a convergence of rich and poor

economies as a result of capital's diminishing marginal product, and rejects the notion that developing countries face structural constraints that free market operations cannot overcome. Unlike the Harrod-Domar model, where capital is the only productive factor, capital and labor can both be used to produce output in the Solow model.

The neoclassical Solow model emphasizes on the role of capital accumulation in raising the economy's growth rate through induced saving. However this model also asserts that this raise in economic growth cannot last indefinitely through capital accumulation due to the diminishing marginal productivity. Rather, the long run growth will resort only to the rate of technological progress which is assumed exogenous or outside the operations of the economic forces (Aghion & Howitt,2009). The basic framework and assumptions of the neoclassical model are laid down by Solow(1956),Swan(1956), Cass(1965) and Koopmans(1965). The neoclassicists assume that the economy is characterized by a constant-returns-to- scale, diminishing marginal returns of factor inputs, a competitive market place where firms are price-takers and no monopoly of market power, exogenous technology which is freely available to every country(Díaz-Bautista& González-Andrade,2014). Given this framework, neoclassicalists believe that sustained increases in per-capita income are only possible if total factor productivity rises. Output per worker can only increase in this model if the capital-to-worker ratio or total factor productivity increases. Because this model assumes diminishing returns on capital, capital accumulation can only increase output per capita as much, and in the long run, the only way to increase output per worker is to sustain productivity growth (Durlauf &Blume,2010).

The neoclassical economic growth theory is based on Solow-Swan(1956) model which uses a Cobb-Douglas production function and capital accumulation equation where output Y is considered to be a function of three factors that is, capital K, Labor L and Knowledge or effectiveness of labor A.

$$Y_t = F(K_t, A_t, L_t).....(2.2)$$

By the assumptions mentioned above knowledge or technology is exogenously determined and independent of capital and labor inputs, but appears as labor-augmenting (making labor more effective). The relative contributions of the two inputs (i.e capital and effective labor) are measured by the exponents

α and $1 - \alpha$. The summation of the exponents yields unity which underlines the assumption of constant returns-to-scale.

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha} \quad \text{where, } 0 < \alpha < 1 \dots \dots \dots (2.3)$$

$$\dot{K} = sY - \delta K \dots \dots \dots (2.4)$$

Where, s denotes aggregate savings rate and δ denotes depreciation rate of capital.

Just to save on notation we write without the time subscript 't'.

Using the capital accumulation equation which is given by $\dot{K} = sY - \delta K$, then dividing both sides by K will give:

$$\frac{\dot{K}}{K} = \frac{sY}{K} - \delta = s \frac{\frac{Y}{AL}}{\frac{K}{AL}} - \delta = s \frac{\tilde{y}}{\tilde{K}} - \delta \dots \dots \dots (2.5)$$

Where $\frac{\dot{K}}{K}$ is capital growth rate.

$$\text{But } \frac{\dot{\tilde{K}}}{\tilde{K}} = \frac{\dot{K}}{K} - \left(\frac{\dot{A}}{A} + \frac{\dot{L}}{L} \right) = \frac{\dot{K}}{K} - (g + n) \Rightarrow \frac{\dot{K}}{K} = \left(\frac{\dot{\tilde{K}}}{\tilde{K}} + g + n \right) \dots \dots \dots (2.6)$$

Where, \tilde{K} is capital per effective worker and $\frac{\dot{\tilde{K}}}{\tilde{K}}$ is capital per effective worker growth rate.

Equating equations 2.5 and 2.6, we have

$$\frac{\dot{\tilde{K}}}{\tilde{K}} + g + n = s \frac{\tilde{y}}{\tilde{K}} - \delta \Rightarrow \dot{\tilde{K}} = s\tilde{y} - (\delta + g + n)\tilde{K} \dots \dots \dots (2.7)$$

$$\dot{\tilde{K}} = s\tilde{y} - (\delta + g + n)\tilde{K} \Rightarrow \dot{\tilde{K}} = s\tilde{K}^\alpha - (\delta + g + n)\tilde{K} \dots \dots \dots (2.8)$$

At steady state change in capital per effective worker, $\dot{\tilde{K}} = 0$, solving for steady state capital per effective worker,

$$0 = s\tilde{K}^{*\alpha} - (\delta + g + n)\tilde{K}^{*\alpha} \Rightarrow \tilde{K}^* = \left(\frac{s}{\delta + g + n} \right)^{\frac{1}{1-\alpha}} \dots \dots \dots (2.9)$$

And the steady state output per effective worker will be,

$$\tilde{y}^* = \left(\frac{s}{\delta + g + n} \right)^{\frac{\alpha}{1-\alpha}} \dots \dots \dots (2.10)$$

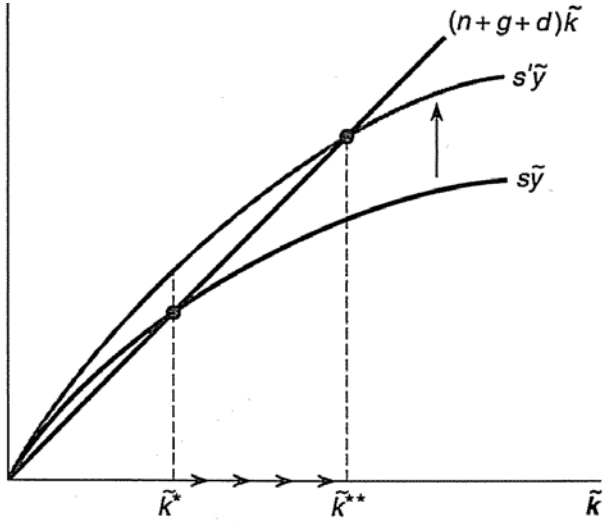


Figure. 2.1. Capital accumulation graph; Source: Jones, (1998)

The important implications derived from these results are that savings rate s , the population growth n , and the rate of technological change g , are very determinantal to steady-state level of per capita output and the corresponding steady-state capital-labor ratio. Capital accumulation alone cannot bring a long run growth because any temporary surge in growth that exceeds growth rate of effective labor productivity is offset by the diminishing marginal product of capital. While technological change is the one factor that guarantees a sustained per capita output rate, policy changes and other temporary shocks can result in temporary economic growth changes just until a new steady-state level is attained (Durlauf & Blume, 2010; Jones, 1997).

Another implication of the analysis is that rate of capital accumulation and per capita output grow faster when the initial capital stock is far below the steady state. Per capita output grows with slower rate as the rate of capital accumulation approaches the steady-state level where growth finally stops. This implies the convergence hypothesis of the neoclassical model which states that developing countries with low level of capital and output have the potential to grow faster than rich countries and catch up with them eventually (Barro, 1996). The question of whether poor economies are likely to catch up with rich ones is given a definite yes in neoclassical growth model. As the model argues cross country convergence in economic growth is possible if countries share the same technology and the fundamental determinants of capital

accumulation such as savings rate, depreciation and population growth are similar across countries (Aghion & Howitt, 2009).

The main conclusion derived from the neoclassical model is that in the long-run, economic growth is a function of only technological progress without which economic growth can grow temporarily through the accumulated capital but eventually be terminated by the diminishing marginal return of capital. Although the Solow model has limitations in that it fails to account for the endogenous economic factors of technological change by which long run economic growth is derived, and it also fails to offer plausible economic explanations for cross-country growth disparities, it remains a remarkable intellectual breakthrough in its simple and abstract modeling of a complex economy and acts as a bench mark for advanced growth models (Acemoglu, 2008; Aghion & Howitt, 2009).

2.1.5. Endogenous Economic Growth Theories

Although it's established in the neoclassical Solow model that long-run economic growth rate is dependent upon the rate of total factor productivity, which, in turn, is a function of the rate of technical change, it assumes that technological progress is exogenously determined outside of the economic system. This assumption fails to account for internal economic factors that determine the rate of technological change which is responsible for long run economic growth and due to this, the economic growth differences across countries remained unexplained in the model. In endogenous economic growth theory, however, technological advancement which is held responsible for long-run economic growth is endogenously determined by economic forces within the economic system. These economic factors that determine technological progress are forces having to do with expenditures on R&D for innovations and incentives to create technological knowledge, economic policies which create conducive economic environment for trade, competition, education and security for intellectual property rights (Díaz-Bautista & González-Andrade, 2014; Jones,1998).

According to the endogenous growth theory, technological advancement is not the only possible long-term factor causing the economy to grow. Rather the quality of human capital, which is determined by investments in human development (education, health); creation of

the necessary conditions and prerequisites for the protection of intellectual property rights in the face of imperfect competition; the level of funding for the advancement of science and technology; the government's role in creating a favorable investment climate and attracting new technologies all equate into the long-run economic growth(Shapiro,2015)

2.1.5.1. AK theory

AK theory, the first endogenous growth theory, endogenizes technological progress by lumping it together with physical and human capital. Some of the capital accumulated by firms is derived from the intellectual capital which leads to a technological progress. This technological change will have an offsetting effect on the tendency of diminishing marginal product of capital, and long-run economic growth will be achieved as a result of the saving rate (Durlauf &Blume,2010; Aghion & Howitt,2009).

Given the aggregate output with constant marginal product of capital Harrod-Domar model, $Y=AK$ and the rate of investment, $\dot{K} = sY - \delta K$,

$$\text{Then } \dot{K} = sAK - \delta K \Rightarrow g = \frac{\dot{K}}{K} = sA - \delta$$

The implication is that since output is strictly proportional to capital, the rate of output growth and the rate of growth of capital accumulation are equal, there by indicating the long run output growth is determined by the saving rate.

2.5.1.2. Innovation-based theory

Unlike AK theory which lumps intellectual capital with physical and human capital, innovation-based theory makes a distinct line between intellectual capital and physical and human capital. While physical and human capital accumulations are results of saving and schooling respectively, intellectual capital is accumulated through innovation. One version of innovation based theory which was introduced by Romer(1990) assumes product variety increases the aggregate productivity there by sustaining the long run economic growth(Aghion&Howitt,2009; Jones, 1998)

The Romer model which endogenizes technological progress tries to explain why there are economic growth differences across countries. As in the case of the neoclassical Solow model,

Romer's model of endogenous technology is constructed from two main elements. The first equation captures the production function and how factor inputs grow over time is captured by other set of equations.

The production function is given by $Y=f(K,L_Y,A)$, where Y is aggregate output, K the capital stock, L_Y the labor force engaged in output production and A is the stock of new ideas. If the total labor force is L , and if we denote some part of the labor force engaged in output production by L_Y and the other part who are engaged in research and discovery of new ideas by L_A , then $L_Y = L - L_A$.

The production function is given by

$$Y_t = K^\alpha (AL_Y)^{1-\alpha} \dots\dots\dots(2.11)$$

Where $0 < \alpha < 1$

Also the rate of growth of discovery of new ideas is given by

$$\frac{dA}{dt} = \mu L_A \dots\dots\dots(2.12)$$

Where, μ is the rate at which those people engaged in a research succeed in discovering new ideas.

The rate of discovery of new ideas by researchers can depend on the available stock of knowledge where it is an increasing function of A . On the other hand, the rate can be decreasing function of A where some ideas are discovered easily at first and it is difficult for some ideas to be discovered easily and may take long time in which case the rate is a decreasing function of A .

These possibilities of rate of discovering new ideas are modeled as follows:

$$\mu = \delta A^\phi \dots\dots\dots(2.13)$$

where δ and ϕ are constants. If $\phi > 0$, it indicates that the stock of ideas are increased by the productivity of the research. $\phi < 0$ indicates that discovery of new ideas are difficult. $\phi=0$ implies the productivity of research does not depend on the available stock of knowledge.

There is a possibility that the average rate at which new ideas are discovered depends at any point in time and it's wise to account for duplication of efforts by letting this possibility L_A^λ , with λ assumed to be less than 1.

Combining equations (2.12) and (2.13), we have:

$$\frac{dA}{dt} = \delta L_A^\lambda A^\phi \dots\dots\dots (2.14)$$

Dividing both sides by A will give:

$$\frac{\frac{dA}{dt}}{A} = \frac{\delta L_A^\lambda}{A^{1-\phi}} \dots\dots\dots (2.15)$$

Along a balanced path, the left hand side of the equation is a constant growth rate g_A and this is so only if the numerator and denominator are equal. After taking logs of both sides, we have:

$$0 = \ln \delta + \lambda \ln L_A - (1 - \phi) \ln A, \dots\dots\dots (2.16)$$

Replacing $\ln L_A = \frac{L_A}{L_A}$ and $\ln A = \frac{A}{A}$ will give:

$$0 = \ln \delta + \lambda \frac{L_A}{L_A} - (1 - \phi) \frac{A}{A} \dots\dots\dots (2.17)$$

Taking the derivatives and denoting the growth rate of L_A by the population growth rate n , we have:

$$g_A = \frac{\lambda n}{1 - \phi} \dots\dots\dots (2.18)$$

The implication is that long run economic growth is derived from the growth rate of researchers and the parameters of production function for ideas (Jones, 1998).

Although endogenous growth theories provide explanations that neoclassical growth theories did not, they are not without flaws. Among other things, they offer no explanation for the convergence hypothesis or its prediction. In this regard, neoclassical growth theories

outperform. Even if the assumptions of neoclassical models are being called into question by the wave of new growth theories, there is still good reason to use them for growth analyses. The proximate causes of growth are used by both the neoclassical and new growth models to explain differences in living standards and economic growth across countries (such as labor force, population growth rate, capital accumulation, saving rate, human capital and technological progress). To comprehend these distinctions, we must look beyond the immediate causes and seek fundamental sources of growth. Greater emphasis should be placed on deeper determinants of growth such as geography, openness, and institutional qualities to answer questions such as why some countries accumulate more human and physical capital than others, why technology differences occur across nations, and why some countries are more effective and productive than others. This thesis is based on this growth framework, with some extensions to include other factors such as political instability and the level of openness to international trade in addition to the immediate causes of growth that were given more emphasis in both neoclassical and new growth theories.

2.1.6. The Political Economy of Growth

The pure economic theories discussed so far gave so much of the explaining of long run economic growth and growth differences across countries solely to the economic factors such as quantity and quality of production inputs assuming that the institutional framework is given (Fosu,1992). This, however, is not the case in developing countries where the institutional frameworks are weak and fragile. The basic economic theories discussed so far could not capture the slow growth and the back breaking poverty prevalent today in the developing countries despite the abundance of natural resources in these countries. Therefore the institutional framework should be accounted for along with the pure economic factors when trying to analyze economic growth in developing countries.

One of the themes of political economy of growth is the relationship between political instability and economic growth (Feng, 1997). There is generally a consensus in views that political instability affects economic growth negatively through its disruption of the

production and market activities of the economy thereby undermining the incentives for the capital accumulation (Compos&Nuguet, 2002; Giskemo,2012;Fosu,1992).

2.1.6.1.Addressing Conceptual and Measurement Issues of Political Instability

In the field of political economy, dealing with conceptual issues of political instability proves to be a difficult job. Despite the fact that different measures of political instability have been employed widely in economic growth analysis, the employment of political instability as a variable to model growth suffers from conceptual and measurement issues. The conceptualization of political instability is different in economics and political science fields. While political instability is defined in politics as a deviation from the regularity of political exchange streams, economics is unconcerned with the type of regime (democracy or dictatorship) other than how long one regime remains in power (Araee, 2016).

In previous investigations, researchers found that there is no universal agreement in the literature on how to define, characterize and quantify political instability in a form that can be used in economic analysis. Because political instability is a composite concept that is difficult to define and quantify (Burger et al, 2016), the measurement of political instability in economic literature is linked to political problems and changes in political power through violence, as well as changes in legal forms (Alesina et al, 1996; Fosu, 1992; Barro,1991). A change of government is seen by Miljkovic and Rimal (2008) as an indication of political instability. Political instability, according to this definition, is the inability to maintain a system of government, regardless of the style of governance. Political instability is described by Alesina et al. (1992) as “the propensity of government collapse”. Asteriou,(2000) and Fosu, (1992) describe political instability as the volatility of a country's administrations, regimes, and communities which, in an extreme scenario, could go as far as the aggressive overthrow of existing authority, or a substantial chance of involuntary removal. Gupta, (1991) tried to categorize political instability in a broad sense as (I) Elite or executive instability, which includes coups, government changes, and crises; (II) mass instability, which includes social movements such as strikes, demonstrations, and riots; and (III) armed instability, which includes civil and guerrilla wars, as well as all violent political actions.

Though political instability is thought to be a key variable in modeling economic growth in a country and explaining growth differences across countries, the framework in which political instability and economic growth are studied has recently come under scrutiny (Jong-A-Pin,2008). According to De Haan (2007), political instability used in empirical analyses of economic growth is measured with error which, if that is the case, has a significant impact on the reliability of the estimates obtained in the literature.

According to Alesnia(1994), studies between political instability and economic growth should answer two major questions. The first one is the way they define and characterize political instability. The second is taking into account the issue of the joint endogeneity between political instability and economic growth. In doing so, researchers have often followed two ways in defining and measuring political instability. While the first way is to take the count of government collapses and executive changes as political instability variables, the second approach is to construct a sociopolitical aggregate index from multitude of indicators of more or less violent forms of political and social unrest.

Authors who have modeled political instability based on the number of government collapses and executive turnover have used probit regressions to estimate the probability or propensity of government change. A high estimate in the propensity to a government collapse is considered as an indication of political instability (Alesnia, 1994)

Different authors who have tried to alleviate the problem of conceptualization and measurement errors of political instability by constructing a single index from a multitude of multi-dimensional political instability variables employ the method of principal component analysis (PCA). That way, a more comprehensive political instability index which captures the majority of the information from all the dimensions of the political variable is created. The employment of principal component analysis (PCA) helps in avoiding the possible problems of multicollinearity among the different dimensions of the political instability variable (Gakpa, 2020; Gymah-Brempong&Traynor, 1999;Compos&Nuguet,2000). This method of constructing a comprehensive political instability index proves to be powerful in the the analysis of economic growth especially indeveloping countries(Alesnia, 1994).

2.1.6.2. Theories of Political Instability and Economic Growth

Using the existing economic growth theories, the growth literature examines economic factors which are more important in determining growth and growth differences across countries. Political-economic literature, however, asserts that economics alone cannot account for the enormous variation in growth, economic outcomes and policy choices across countries. Therefore it's mandatory for The researchers and policy advisers that they make sure they understand the role of politics in economic policymaking (Alesina & Perotti,1994).

In economic research, a more universal consensus has emerged that political instability is linked to low economic growth performance (Chen and Feng, 1996; Jong-a-Pin, 2009). Political instability, according to Odedokun and Round (2004), is one of the ways that inequality slows progress. When discussing the problem, Collier et al (2003) state that civil war reduces national production through destroying infrastructure and physical capital, as well as redirecting resources to unproductive areas such as military spending. Economists generally consider political instability as a disease that has serious consequences on economic outcomes of a given country. Political instability may force policy makers to engage in sub optimal and frequent switch of policy making decisions which creates uncertainty and volatile economic environment there by affecting economic outcomes negatively (Aisen & Veiga, 2012).

According to Fosu(1992), the impact of political instability on economic growth often has two transmission mechanisms. Political instability affects economic growth negatively from its direct adverse effect on productivity due to the disruption of market activities and labor relations. It also has an indirect negative effect on growth through the reduction of investment. He emphasizes that when there is political instability in a country, the availability of factors of production such as the investment on physical capital will reduce. This is due to the reason that during political instability the political and economic environment which governs investment operations has the tendency to change with changes in political regimes, increasing the uncertainty of future net returns from investment projects. Political uncertainty raises the cost of capital as domestic saving and imported capital is discouraged. Also, there may be outflows of capital, brain drain of skilled laborers from the politically spoiled environments which would translate into output reduction

According to Khafaga & Albagoury(2022), the relationship between political instability and economic growth follows two paths. The first path follows the avenue of impact of economic growth on political instability where slow economic growth, poverty, income inequality and other economic problems lead to political instability of a given country. The other avenue on the relationship between political instability and economic growth is the one that holds political instability responsible for hindering economic growth and development through its direct and indirect impact on economic variables. That is, political instability affects economic growth drastically via its dynamic distorting effects on foreign direct investment, financial markets, human capital, and income distribution.

2.2. Empirical Literature

Several empirical studies were conducted on the relationship between political instability and economic growth. When we see the empirical findings, it shows that there is a divergence in terms of the effects of political instability on economic growth. While some studies have successfully indicated that there is a drastic negative association between political instability and economic growth, others were unable to do so.

A number of these studies have shown a negative significant association between political instability including the study conducted by Aisen & Veiga (2010) by using a system GMM estimator on a panel data of 169 countries for the years 1960 to 2004. The results indicated that higher levels of political risk are linked to lower GDP per capita growth rates. In terms of transmission channels, they found that political unrest has a negative impact on growth by slowing productivity growth and, to a lesser extent, physical and human capital accumulation. Additionally, they argued that while economic freedom and ethnic homogeneity are conducive to growth, democracy may have a minor negative impact on growth.

Malik and Mansur (2017) employed an auto regressive distributed lag (ARDL) approach to conduct the impact of the dynamic interactions of political instability and FDI on economic growth in Malaysia for 30 years from 1984 to 2013. The results show that there are both long and short run relationships between the political and the economic variables. It's found from the ARDL bounds test that political instability is co-integrated with economic growth and FDI. This empirical study through variance decomposition has further revealed that GDP is the most

exogenous variable, followed by FDI, while the most endogenous variable is political instability, implying that GDP reacts less to variations in FDI and political uncertainty.

In an attempt to capture the relationship between Jong-A-Pin, (2009) has conducted a research on sample of 98 countries in the period 1984-2003 employing a maximum likelihood estimation technique and arrived at a conclusion that different dimensions of political instability have different effects on economic growth. After identifying four dimensions of political instability (i.e mass civil protest, politically motivated aggression, instability within political regime and instability of the political regime) through an exploratory factor analysis (EFA), the empirical results show that that these dimensions of political instability are associated with different effects on long run economic growth. Only political regime instability and civil protest are found to be significantly related to long run economic growth, with a 100% increase in these dimensions associated with a 2% and 1% real per capita growth rate, respectively.

Conducting a study on the causal links between political instability and other economic variables (such as economic growth, Trade and FDI) in Nigeria within the period of 1981 to 2012 by using VECM approach, Afolabi and Bakar (2016) have found that there is a one way negative causality going from political instability to economic growth, trade balance and FDI. They found that political instability is a far more determinant of political instability which, according to their assertion, corresponds to the findings of (Chan & Gemayel 2004; Lucas, 1990). As evidenced in the few existing literatures, their findings reassured that the degree of political instability or threat has an effect on foreign direct investment inflows because of the threat and unstable environment that exists in the Middle East and East Africa.

Fosu, (1992) has found a negative relationship between the two variables during his conduction of a research on 31 sub-Saharan African countries over the 1956-85 periods by using OLS estimation technique. Using an augmented production-function framework with labor, capital, and exports as functional arguments, as well as a dichotomous dummy variable measuring political instability, the author's empirical results support the basic hypothesis that PI has a negative impact on economic growth on average. Taking capital, labor, and exports into account, the author estimated that being a high-PI country in Sub-Saharan Africa corresponded with in a

1.1 percentage point decrease in annual GDP growth. The direct effect is also found to be primarily caused by decreases in capital and export marginal productivities. The decreases in the marginal productivities of capital and exports are found to be the primary direct effects of political instability on growth. While the negative indirect effect of political instability on GDP growth is manifested through its negative effects on capital, labor, and exports.

(Gyimah-Brempong, 1999) analyzed the relationship between political instability and economic growth on Sub-Saharan countries by employing a dynamic panel estimation technique in combination with simultaneous equations and found that, in addition to the direct effect on economic growth, political instability has an indirect negative effect on growth through the reduction of long run capital accumulation. The author used principal component analysis to construct a political instability index that better captures the information from different individual measurements of the political instability. The empirical research revealed that from the estimated system of equations that there is a joint endogeneity between political instability and economic growth.

Another empirical research is one that was conducted by Alesina et al. (1996). The authors used a dataset of 113 nations to investigate the impact of political instability on economic development by using Amemiya's Generalized Least Square approach to quantify economic development and political instability and arrived at a result that economic development was slowed due to political instability in these countries. Other researchers such as Ayessa and Hakizimana(2021), Dalyop(2017) and Gakpa(2020) all have reached at the same conclusion that political instability is the main hindrance in the path way to economic growth.

From different coups d'état events in Sub-Saharan African countries, Fosu(2001) conducted a research on the nature of the association between political instability and economic growth from the years 1960-1986 using OLS estimation method. By using a principal component index constructed from separate coup events and augmented production function framework, the author concluded that only the indirect effect of political instability on growth is negatively and statistically significant and the direct effect of political instability turned out to have a positive impact. Pasha, (2020) has done a research on the nexus between different proxies of political

instability and economic growth in Guyana using time-series data covering the period 1961 – 2018 and GARCH (1,1) models. The findings reveal that changes in the Head of State (HOS) have a positive and significant effect on real GDP growth rates, whereas strikes have the reverse effect. Other proxies of political instability, such as political killings, riots, insurgency, and terrorism, are not strongly related to real GDP growth. Employing the Granger causality test within a multivariate co-integration and error-correction estimation techniques for the 1996-2012 periods on ECOWAS, Abu et al, (2014) found that there is a positive unidirectional Granger causality going from political instability to economic development in the short term. (Ali, 2001), Campos & Nugent,(2002), Zouhaier and KEFI ,(2012) are some other authors who found no significant relationships between political instability and economic growth.

2.3. Conceptual Framework of the Study

Given the existing theoretical and empirical literatures on the nature of the relationships between political instability and economic growth, the following conceptual framework is designed.

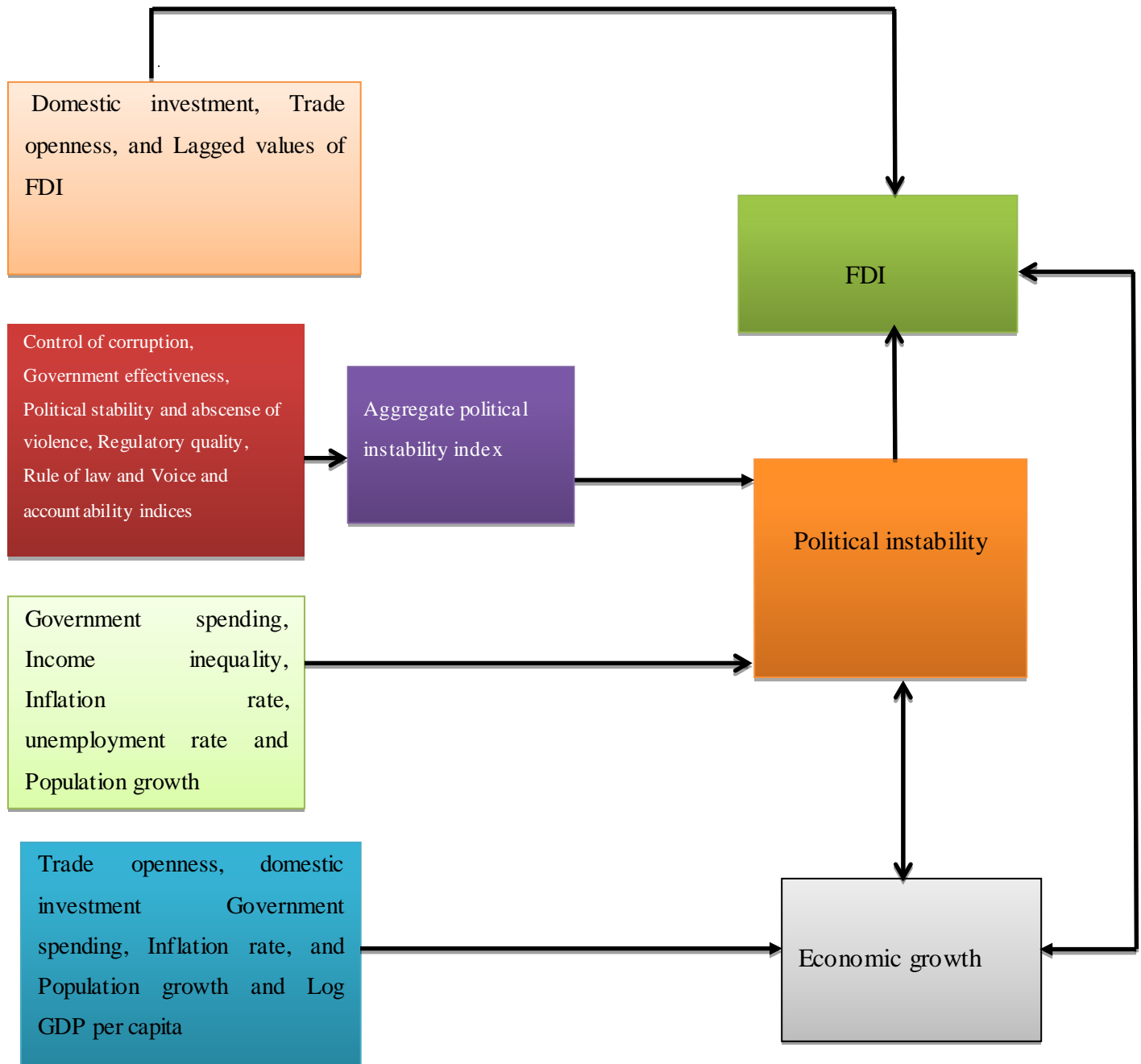


Figure. 2.3. Conceptual framework; Source: Author's own construction

Chapter 3: RESEARCH METHODOLOGY

This chapter deals with the research estimation techniques and the underlying assumptions. In this section of the research the type and sources of data, the operational definitions of variables to be used in the research, the model specification and the method of estimation are presented along with some discussions.

3.1. Data sources, Definition and Measurement of Variables

This research used annual panel data from 2000 to 2019 for 48 Sub-Saharan countries. The selection of the countries and the time span is subject to the availability of data. The data were sourced from different data sources. All economic variables used in this study except income inequality were obtained from the open source of WB's world development indicators. The Gini coefficient which is a proxy for income inequality is extracted from World Income Inequality Database (WIID) data source. The aggregate political instability index which is our variable of interest was constructed from six individual political instability indices obtained from the world governance indicators (WGI) of the World Bank database.

The political instability indices making up of our aggregate political index are Control of corruption, Government effectiveness, Political stability and absence of violence/terrorism, Regulatory quality, Rule of law and Voice and accountability. The indicators range from -2.5 to 2.5 with higher values corresponding to good governance and low political instability. The need for construction of a single weighted index arises from the fact that employing these six indices individually in a regression all at once may result in multicollinearity among the indices. We used principal component analysis to construct the aggregate weighted index which maximizes the correlation between the constructed aggregate weighted index and the individual political instability indices. The individual political instability indices were first normalized before any aggregation was made so that the constructed principal component stands as a deviation from its mean. For ease of interpretation and avoiding confusion in the interpretations, the aggregate index is then reverse coded in such a way that higher values of the indicator indicate higher political risk.

All the definitions and sources of the variables used in this research are presented in table 1 as follows.

Table 2.1: definitions, measurements and sources of variables

Economic Variables	Description	Source
Log real GDP per capita	It is real GDP per capita annual percentage growth rate in constant local currency. GDP per capita is calculated by dividing gross domestic product by the midyear population. GDP at purchaser's prices equals the sum of the gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the product value. It is computed without regard for depreciation of manufactured assets or depletion and degradation of natural resources.	WDI
FDI	Foreign direct investment is defined as net inflows of investment to acquire a long-term management stake (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, earnings reinvestment, other long-term capital, and short-term capital as shown in the balance of payments. This series displays net inflows (new investment inflows less disinvestment) from foreign investors in the reporting economy and is measured as percent of GDP.	

Unemployment	Unemployment is defined as the proportion of the labor force that is willing but unable to find work at a given time and wage rate. The proportion of the labor force that is unemployed but available for and seeking work is referred to as unemployment. It is expressed as a percentage of the total labor force (modeled ILO estimate).	WDI
Inflation	Inflation is defined as a significant increase in the overall price level of goods and services in an economy over time. Each unit of currency buys fewer goods and services as the price level rises. As a result, inflation reflects a decrease in purchasing power per unit of money. The consumer price index measures inflation as the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that can be fixed or changed at predetermined intervals, such as yearly.	
POP growth	The annual population growth rate for year t is expressed as a percentage of the exponential midyear population growth rate from year t-1 to year t. The population is calculated using the de facto definition, which includes all residents, regardless of legal status or citizenship.	WDI
Trade Openness	The sum of goods and services exports and imports expressed as a percentage of GDP is referred to as trade openness.	WDI
Gross capital formation (%GDP)	Gross capital formation (gross domestic investment) is the sum of expenditures on fixed asset additions plus net changes in inventory levels. The annual growth rate of gross capital formation is based on constant local currency. The aggregates are	WDI

	computed using constant 2015 prices in US dollars.	
Income inequality	Income inequality refers to the unequal distribution of income across a population. The Gini coefficient is often used to measure the level of income inequality in a population.	WIID
Government spending	government spending is all the current expenditures by governments on goods and services, national defense and security expenditures other than the military expenditures which are part of the capital expenditures	WDI
Political instability variables	Description	Source
Control of corruption	It's the extent of perceptions of the society that public power is used for private gain including both petty and grand corruption, as well as "state takeover" by elites and private interests. Estimate is the country's score on the aggregate indicator in standard normal distribution units, i.e. between -2.5 and 2.5.	WB
Government effectiveness	It measures how effective governments are in delivering quality government and civil services which are independent of political influences. It measures the level of quality of policy formulations and implementations and the government's credibility in keeping its promises. The estimate is the country's score on the aggregate indicator in standard normal distribution units, i.e. between -2.5 and 2.5.	WB
Political stability and absence of violence/terrorism	It is a survey that asks people about their fears of political instability and/or politically motivated violence, such as terrorism. Estimate is the country's score on the aggregate indicator, expressed in standard normal distribution units (i.e., ranging from -2.5 to 2.5).	WB
Regulatory quality	It shows the perceptions of the government's ability to establish and enforce solid policies and regulations that allow and support private sector development. Estimate is the country's score on the aggregate indicator, expressed in standard normal distribution units (i.e., ranging from -2.5 to 2.5).	WB
Rule of law	It refers to a gent's perceptions of how much they trust and follow society's laws,	WB

	including the quality of contract enforcement, property rights, the police, and the courts, as well as the possibility of crime and violence. Estimate is the country's score on the aggregate indicator, expressed in standard normal distribution units (i.e., ranging from -2.5 to 2.5)..	
Voice and accountability	It refers to the degree of perceptions of citizens ability in exercising their democratic rights such as electing their government, freedom of expression, having associations, media etc. Estimate is the country's score on the aggregate indicator in standard normal distribution units, i.e. between -2.5 and 2.5.	WB

3.2. Model Specification

Political instability and economic growth are argued to be mutually destructive in the literatures of political science and economics. That is, economists argue that political instability harms economic growth, whereas political scientists believe that slow economic growth is a major cause of political instability. These arguments pave the way for testing the hypothesis by modeling the relationship between political instability and economic growth as a jointly endogenous relationship. As a result, we present models in which both economic growth and political instability are treated as endogenous variables.

The augmented production function of the neoclassical model is used as a basis for modeling the effect of political instability on economic growth. In the neoclassical economic growth model, economic growth is mainly a function of the growth rates of the capital stock and labor while technology is given. Political instability is augmented as additional growth determining variable in this model as it is argued by many economists that political instability causes direct and indirect effects on economic growth.

The general augmented production function is given by:

$$Y=F (A, K, L, PI, X).....(3.1)$$

Where Y is output variable, A the given technology, K is the level of capital stock, L is the available labor input, PI is the political instability index and X is all other control variables.

In this study, we adopted the methods by Gyimah-Brempong and Traynor (1999) and Gakpa(2020) who combined the political science and economics strands of literature to model the relationship between political instability and economic growth. In doing so, political instability and economic growth are treated to be jointly endogenous variables.

The growth equation to be estimated is given by:

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 FDI_{it} + \alpha_3 PI_{it} + \alpha_4 POP_{it} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots\dots\dots(3.2)$$

Where the dependent variable Y_{it} , is the log real gross domestic product (GDP) per capita and is as a proxy variable for economic growth. The rationale behind this is that real Gross Domestic Product (GDP) per capita is a proxy for the average standard of living of residents in a country or area. A positive percentage change in annual real GDP per capita can be interpreted as an increase in the average standard of living of the residents in a country or area. This in turn gives way to capture the level of grievances of citizens which is manifested by political instability. Y_{it-1} is the log lagged real gross domestic product (GDP) per capital, and is expected to have a positive impact on the dependent variable, FDI_{it} is the inflow of foreign direct investment measured as percent of GDP and is expected to have a positive coefficient. PI_{it} is an aggregate index of political instability which is constructed from the six WGI political instability indices and is expected to have a negative effect on economic growth. POP_{it} is the growth rate of population. Since population growth and per capita income growth are negatively related, a negative coefficient of population growth is expected. X_{it} is a vector of other control variables that affect economic growth (such as trade openness(% GDP), inflation rate, gross fixed capital formation (% GDP), government spending(%GDP, the second lag of log of GDP per capita), i and t indicate the individual country and time respectively. α_0 , α_1 , α_2 , α_3 , and γ are all expressed as elasticities, μ_t is a time specific effect, ω_i is an unobserved country-specific fixed effect, ε_{it} is the error term.

Political instability has been argued in the literature to have two transmission channels on growth: the direct effect, in which political instability reduces economic output by disrupting the operation of existing resources, and the indirect effect, in which growth is affected by a reduction

in the availability of factor inputs such as capital. Political instability affects the level of capital investment as it poses uncertainty for investors to come to the host country. The looming clouds of uncertainty in the host country's political atmosphere, as well as a loss of confidence in the host country's ability to guarantee property rights, will keep investors away from the host country, and as a result, economic growth will be harmed indirectly as a result of the interaction between political instability and foreign direct investment.

Therefore, we model the interaction of political instability and foreign direct investment as follows.

$$FDI_{it} = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 Y_{it} + \beta_3 PI_{it} + \beta_4 PI_{it-1} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots\dots\dots 3.3$$

Where, FDI represents the foreign direct investment inflow (%GDP) into the host country. The lagged value of FDI accounts for the lagged effect of explanatory variables and the dynamic aspect of FDI. Log of GDP per capita is also there as one of the explanatory variables. Both current and previous year levels of political instability are included in the equation out of the belief that they have a modulating impact on the inflow FDI to the host country. X is a vector of control variables (such as trade openness, gross fixed capital formation, the second lag of FDI) potentially affecting FDI inflows into the host countries of Sub-Saharan Africa.

In accordance with the political science literature, we specify the following model in order to capture the relationship and reverse causality between political instability and economic growth.

$$PI_{it} = \gamma_0 + \gamma_1 PI_{it-1} + \gamma_2 Y_{it} + \gamma_3 X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots\dots\dots(3.4)$$

Where PI denotes the aggregate index of political instability derived from six WGI political instability indicators (i.e, control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law and voice and accountability). The hypothesis that once a country experiences political instability, it develops an inter-temporal culture of political instability (Gyimah-Brempong & Traynor, 1999) is captured by the lagged value of political instability. As a result, if this assumption holds, we can expect the coefficient of the lagged value of PI to be positive. Y is the log real GDP per capita, which is a proxy for the economic growth variable. In general, faster economic growth is thought to contribute

significantly to a country's political stability. As a result, the Y coefficient is expected to be negative on PI. X is a vector of control variables (such as inflation rate, income inequality, population growth, unemployment and government spending) thought to influence political instability. $\gamma_0, \gamma_1, \gamma_2, \gamma_3$ are the corresponding coefficients, μ_t is a time specific effect, ω_i is an unobserved country-specific fixed effect, ε_{it} is the error term.

3.3. The Model

Therefore, our main model is comprised of the three simultaneous dynamic equations.

$$\left\{ \begin{array}{l} Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 PI_{it} + \alpha_3 FDI_{it} + \alpha_4 POP_{it} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad (1) \\ FDI_{it} = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 Y_{it} + \beta_3 PI_{it} + \beta_4 PI_{it-1} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad (2) \\ PI_{it} = \gamma_0 + \gamma_1 PI_{it-1} + \gamma_2 Y_{it} + \gamma_3 X_{it} + \mu_t + \omega_i + \varepsilon_{it} \quad (3) \end{array} \right.$$

Where, all the variables are as defined above.

This system of equations can be written in compact matrix format as:

$$\Gamma \mathbf{y} + \mathbf{X}'\Phi + \varepsilon = \mathbf{0} \quad \dots\dots\dots (3.5)$$

Where \mathbf{y} is the vector of endogenous variables, \mathbf{X} is the vector of exogenous variables, Φ is the vector of corresponding coefficients and ε is the vector of stochastic terms consisting of country-specific component, a time component and white noise. Formally written as:

$$\varepsilon_{it} = \alpha_i + \lambda_t + v_{it} \quad \dots\dots\dots (3.6)$$

The overall effect of current year political instability on economic growth $\frac{\partial Y}{\partial PI}$ can be derived from the direct and indirect effects of political instability on growth.

3.3.1. Deriving the Direct and Indirect Effects of Political Instability on Economic Growth:

Since the three equations are simultaneous equations and implicit in nature, and Y_{it} , PI_{it} and FDI_{it} are endogenously determined from the interactions of the three simultaneous equations, we have to do some mathematical rearrangements before making partial differentiations in order to find the direct and indirect effects of the political instability variable on economic growth.

First we substitute the FDI equation in model 2 into the FDI variable in the growth model which is given by model 1 as follows.

Then after substitution we collect the term Y_{it} on the right side to the term on the left side. Then we solve for Y_{it} .

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 PI_{it} + \alpha_3 (\beta_0 + \beta_1 FDI_{it-1} + \beta_2 Y_{it} + \beta_3 PI_{it} + \beta_4 PI_{it-1} + X_{it} + \mu_t + \omega_i + \varepsilon_{it}) + \alpha_4 POP_{it} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots\dots\dots(3.7)$$

Then collecting the term Y_{it} on the right hand side to the left side, we get:

$$(1 - \alpha_3 \beta_2) Y_{it} = \alpha_0 + \alpha_3 \beta_0 + \alpha_1 Y_{it-1} + \alpha_2 PI_{it} + \alpha_3 \beta_1 FDI_{it-1} + \alpha_3 \beta_3 PI_{it} + \alpha_3 \beta_4 PI_{it-1} + \alpha_3 (X_{it} + \mu_t + \omega_i + \varepsilon_{it}) + \alpha_4 POP_{it} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots(3.8)$$

Solving for Y_{it} we have

$$Y_{it} = \frac{\alpha_0 + \alpha_3 \beta_0 + \alpha_1 Y_{it-1} + \alpha_2 PI_{it} + \alpha_3 \beta_1 FDI_{it-1} + \alpha_3 \beta_3 PI_{it} + \alpha_3 \beta_4 PI_{it-1} + \alpha_4 POP_{it} + (1 + \alpha_3)(X_{it} + \mu_t + \omega_i + \varepsilon_{it})}{1 - \alpha_3 \beta_2} \dots\dots\dots(3.9)$$

Differentiating with respect to PI, we get,

$$\frac{\partial Y}{\partial PI} = \frac{\alpha_2}{1 - \alpha_3 \beta_2} + \frac{\alpha_3 \beta_3}{1 - \alpha_3 \beta_2} \dots\dots\dots(3.10)$$

Where $\frac{\alpha_2}{1-\alpha_3\beta_2}$ is the direct effect and $\frac{\alpha_3\beta_3}{1-\alpha_3\beta_2}$ the indirect effect of political instability on growth.

Again to find the overall inter-temporal effect of previous year political instability on economic growth, $\frac{\partial Y}{\partial PI_{it-1}}$ and its corresponding direct and indirect effects, we follow the same procedure as we did above.

By the same fashion, substituting the **PI** equation given by model 3 into the **PI** variable in equation 1, we have,

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2(\gamma_0 + \gamma_1 PI_{it-1} + \gamma_2 Y_{it} + \gamma_3 X_{it} + \mu_t + \omega_i + \varepsilon_{it}) + \alpha_3(\beta_0 + \beta_1 FDI_{it-1} + \beta_2 Y_{it} + \beta_3 PI_{it} + \beta_4 PI_{it-1} + X_{it} + \mu_t + \omega_i + \varepsilon_{it}) + \alpha_4 P_{it} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots\dots\dots(3.11)$$

Bringing the Y_{it} term on the right hand side to the left side, we get the following.

$$(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)Y_{it} = \alpha_0 + \alpha_2\gamma_0 + \alpha_3\beta_0 + \alpha_1 Y_{it-1} + (\alpha_2\gamma_1 + \alpha_3\beta_4)PI_{it-1} + \alpha_3\beta_1 FDI_{it-1} + \alpha_3\beta_3 PI_{it} + \alpha_4 POP_{it} + X_{it} + \mu_t + \omega_i + \varepsilon_{it} \dots\dots\dots (3.12)$$

And solving for Y_{it} , we end up with the following equation.

$$Y_{it} = \frac{\alpha_0 + \alpha_2\gamma_0 + \alpha_3\beta_0 + \alpha_1 Y_{it-1} + (\alpha_2\gamma_1 + \alpha_3\beta_4)PI_{it-1} + \alpha_3\beta_1 FDI_{it-1} + \alpha_3\beta_3 PI_{it} + \alpha_4 POP_{it} + (1 + \alpha_3)(X_{it} + \mu_t + \omega_i + \varepsilon_{it})}{(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)} \dots\dots\dots (3.13)$$

Differentiating with respect to PI_{it-1} , we get

$$\frac{\partial Y}{\partial PI_{it-1}} = \frac{(\alpha_2\gamma_1 + \alpha_3\beta_4)}{(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)} \dots\dots\dots(3.14)$$

Where the term $\frac{(\alpha_2\gamma_1)}{(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)}$ implies the direct effect of the inter-temporal effect of previous year political instability on economic growth and $\frac{\alpha_3\beta_4}{(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)}$ captures the indirect effect. And the overall inter-temporal effect is the sum of its direct and indirect effects which is given by $\frac{(\alpha_2\gamma_1 + \alpha_3\beta_4)}{(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)}$

3.4. Method of Data Analysis and Estimation Technique

3.4.1. A Dynamic GMM Estimator

The interactions between many economic variables are dynamic in nature. That is, they are distinguished by the presence of the lagged dependent variable among the right hand side regressors, indicating that the effect of the dependent variable's previous periods tends to persist in the current period dependent variable. Autocorrelation issues arise in dynamic panel variable regressions due to the presence of a lagged dependent variable among the regressors, as well as the problem of individual effects arising from individual heterogeneity (Baltag, 2005).

Since the dependent variable is a function of the error term, it then follows that the lagged dependent is a function of the error term. As a result, the inclusion of the lagged dependent variable causes an endogeneity problem which automatically renders the pooled OLS estimator biased and inconsistent as this estimator assumes orthogonality (or strict exogeneity) between the regressors and the error term(Roodman,2009). Baltagi(2005) also points out that Fixed effects estimator assumes that unobservable individual-specific effect is fixed and not correlated with the error term which in regressions of dynamic nature this assumption is violated. Also, for a large N and small T of panel data, the Within estimator becomes biased and inconsistent (Nickell, 1981).

In contrast to FE, Random Effect assumes that specific individual heterogeneity is uncorrelated with the regressors. However, if the model includes a lag dependent variable as a regressor, RE encounters an endogeneity issue. As a result, it is difficult to apply RE to a dynamic panel model. However, if the time period is too long, the bias can be reduced using FE and RE asymptotic estimators. The problem is that this study only has a few years to overcome the bias, making both estimation techniques difficult to use (Roodman,2009). Another estimation technique is the Generalized Least Squares (GLS) estimator. This method was developed to deal with the problem of heteroscedasticity. However, it has the same flaw as the preceding model estimation methods in that it fails to address the problem of endogeneity.

In general, the standard estimation techniques of panel data models such as pooled OLS, fixed effects, Within estimator, random effects, and generalized least squares etc. are inefficient in dynamic panel datasets because they fail to account for estimated equation endogeneity and

individual-specific effects (Baltagi ,2008), Using these standard estimation techniques on equations with a lagged dependent variable on the right side of the equations will result in biased and inconsistent estimates. Roodman (2009) also points out that because these estimation techniques are primarily designed for static models, using these estimation techniques on dynamic models results in dynamic panel bias.

To address the issue of endogeneity of the lagged dependent variable in a dynamic model, that is, when there is a correlation between the explanatory variable and the error term, Arrelano and Bond(1991) proposed a dynamic panel estimator called the Generalised Method of Moments (GMM), which additionally control for unobserved panel heterogeneity, autocorrelation, omitted variable bias and measurement errors in general. It uses explanatory variables that are orthogonal to the error term but highly correlated with the regressors to address the issue of endogeneity. GMM is also intended for a large group and a short period of time. It is also intended to manage arbitrary distributed fixed effects.

There are several arguments in favor of using this estimation technique. The first reason is that it avoids endogeneity issues by accounting for causality, which can run from the independent variable to the dependent variable and vice versa and may be correlated with the error term. Second, GMM accounts for the correlation between time-invariant individual specific fixed effects contained in the error term and the explanatory variables. Another reason is that it accounts for the presence of a lagged dependent variable on the right-hand side of the equation, which may cause autocorrelation. GMM is also useful for panel data with large N and short T. (Mileva, 2007).

Assuming that we have a linear regression model with an endogenous regressor:

$$y = X'\beta + \epsilon$$

where y and ϵ are $N \times 1$ vectors; β is a $K \times 1$ vector of unknown parameters; X is $N \times K$ matrix of explanatory variables.

We assume an $N \times L$ Z -matrix that is correlated with X (explanatory variables) but orthogonal to the error term due to the assumption of endogeneity. In this case, orthogonality means that the variables in the Z matrix are unrelated to the error term ϵ (i.e a set of valid instruments).

Some GMM specifics:

- I. N (number of cross-sections or groups) must be greater than T (time span)
- II. GMM uses instrumental variable (IV) estimation. The instruments must be exogenous. That is $E(\mathbf{Z}'\epsilon) = 0$
- III. The number of instruments must be lower than or equal to the number of groups(i.e. $Z \leq N$)

GMM is designed for situations where dynamic panel models are involved; there are small T and large N , there are independent variables that are not strictly exogenous, meaning they are correlated with past and possibly current realizations of the error term (endogeneity issue). It's also useful when there are arbitrarily distributed fixed effects, heteroscedasticity, and autocorrelation within groups.

The difference GMM approach proposed by Arellano & Bond (1991) corrects endogeneity by transforming all regressors through differencing thereby removing the fixed effects. However, this transformation of regressors through differencing has its own weakness in that it subtracts the previous observation from the contemporaneous one thereby magnifying gaps in an unbalanced panel. This is synonymous to saying if we are having an unbalanced panel, applying difference GMM may weaken our results.

The System GMM approach proposed by Arellano & Bover(1995) and Blundell & Bond(1998), on the other hand corrects endogeneity by introducing more instruments to improve efficiency and transforming the instruments to make them uncorrelated(exogenous) with the fixed effects. System GMM uses a system of equations with the original equation and the transformed one. It uses orthogonal deviations where instead of subtracting the previous observation from the contemporaneous one thereby minimizing data loss.

3.4.2. GMM model Specifications

1. Difference GMM:

$$\text{Initial model } \ln Y_{it} = \alpha \ln Y_{it-1} + \beta X'_{it} + (\eta_i + \varepsilon_{it}) \quad (1)$$

$$\text{Transformed model: } \Delta \ln Y_{it} = \Delta \ln Y_{it-1} + \beta \Delta X'_{it} + \Delta \varepsilon_{it} \quad (2)$$

Though the fixed effect is removed by transforming the regressors through first differencing, the problem of endogeneity remains still an issue due to the fact that the lagged dependent variable may be correlated with the error term. Unobserved fixed effects (i.e. η_i) are no longer incorporated in the transformed equation as they are by assumption constant between periods (Blundell & Bond, 1998; Bond, 2001). The first-differenced lagged dependent variable is instrumented with its past levels and thus changes in the dependent variable are represented in equation (2).

2. System GMM:

Still using the above given initial model, $\ln Y_{it} = \alpha \ln Y_{it-1} + \beta X'_{it} + (\eta_i + \varepsilon_{it})$, with the assumption that the equation is a random walk model and Y is persistent, applying the difference GMM will yield both a biased and inefficient estimate of α in finite samples, especially when T is short.

According to Blundell & Bond (1998), poor performance of the difference GMM estimator in such circumstances is attributed to the use of weak instruments. So, this is when the system GMM comes handy. The system GMM is applicable because it will express one equation in levels form with first differences as instruments, and the second equation is expressed in first differenced form with levels as instruments. The system GMM approach involves use of a greater number of moment conditions (instruments) but Monte Carlo evidence suggests that when T is short and the dependent variable is persistent, there are gains in precision and the small sample bias is reduced. Also in the presence of heteroscedasticity and serial correlation a two-step GMM should be used exploiting a weighting matrix using residuals from the first step.

3.4.3. How to Decide between Difference and System GMM Specifications:

Given the initial model, $\ln Y_{it} = \alpha \ln Y_{it-1} + \beta X'_{it} + (\eta_i + \varepsilon_{it})$

The Rule-of-Thumb proposed by Bond (2001) to decide between the Difference and System GMM specifications follows the following steps:

1. First we estimate the dynamic model by pooled OLS and LSDV approach (i.e. using the Within or FE approach)
2. We consider the pooled OLS estimate for α as an upper-bound estimate, while considering the corresponding FE estimate of α as a lower-bound estimate.
3. If the Difference GMM estimate obtained is close to or below the FE estimate for α , this suggests that the Difference GMM estimate is downward biased because of weak instrumentation and a System GMM estimator should be used instead.
4. It's also advisable to use a System GMM if the model exhibits a random walk (persistent) behavior.

There are some GMM diagnostics that a researcher needs to be aware of before concluding that his/her estimation results are sound. In order for GMM estimations to be reliable, the instruments validity test must be checked through Hansen (1982) J test and Sargan (1985) test of over-identifying restrictions. These tests are performed to test the null hypothesis of the overall instruments used. Failing to reject the null hypothesis will give support to the choice of instruments. Another diagnostics checking is the test for autocorrelation/serial correlation of the error term. It tests the null hypothesis that the differenced error term first and second order serially correlated. Failure to reject the null hypothesis of no second-order serial correlation implies that the original error term is serially uncorrelated and the moment conditions (instruments) are correctly specified (Arellano & Bond, 1991).

CHAPTER 4: RESULT AND DISCUSSION

This part of the thesis deeply presents different analyses on the relationships of political instability, FDI and economic growth by applying different econometric estimations. The first section (section 4.1) presents the descriptive statistics and thoroughly investigates the scenes of real GDP per capita, political instability and foreign direct investment and their trends across the selected Sub-Saharan African countries over the sample periods. Summary statistics, line graphs and charts are used to make a general sense of the variables behaviors and patterns across the sample Sub-Saharan countries over the given sample periods.

The second portion (section 4.2) presents estimation and econometric results and focuses on the econometric simulation of the three models specified in chapter three. In this section of the paper, presentations and interpretations of the results are done in accordance with the results generated from Stata simulation of the models. In section 4.3, we tried to make sense of the results we arrived at. These results are justified with the available basic economic theories and empirical literatures by many other authors.

Section 4.4 tries to capture the causal relationships among our variables of interest (i.e economic growth, political instability and FDI) which we assumed are endogenous. Panel unit root tests to test their stationarity, Forecast error variance decomposition(FEVD) and Impulse response functions(IRFs) are also simulated to determine the relative endogeneity/ exogeneity of these variables. The findings and the analyses were made on the data obtained from World Bank Development Indicators (WDI) for the economic variables and its World Governance Indicators (WGI) for the political variables. We have also extracted the Gini coefficient as a proxy for income inequality variable from World Income Inequality Database (WIID).

4.1. Descriptive Statistics

Beginning by exploring the basic statistics of the dependent variable real GDP per capita and the explanatory variables (Political instability and FDI) and the other control variables we can see in table 4.1(a) of the summary statistics that we do not have the same number of observations. This shows that the panel data used for the main model variables is unbalanced. With the period under consideration (i. e 2000 to 2019), real GDP per capita growth averages out to be 6.95% .This is not actually within the range of the World Bank's estimate for 48 Sub-Saharan African countries.

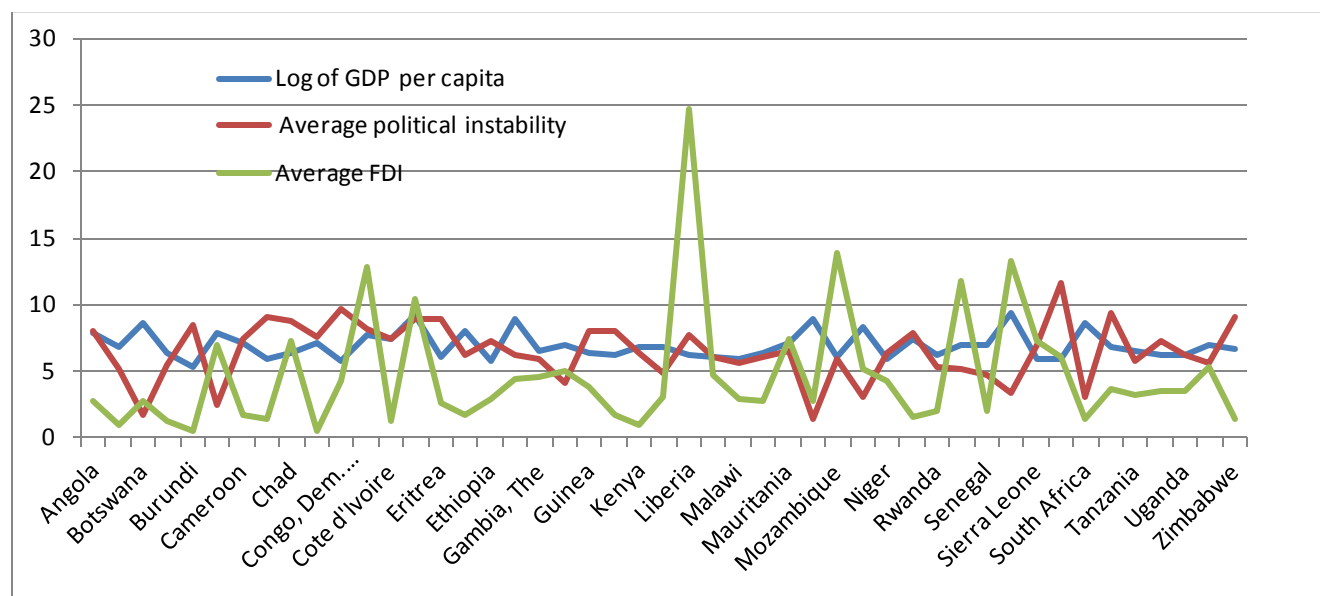
The somewhat variation may be due to the number of countries sampled and the periods covered in this research paper. While the World Bank averages out GDP per capita since 1961 our sample starts at the period 2000. When we see the average inflows of foreign direct investment into Sub-Saharan African countries, it has a minimum 4.68 percent share of the average GDP and in these countries. This is just a little higher than the 3.91 percent FDI inflow which is the highest average FDI inflow (%GDP) to have ever been registered in the year 2001 in SSA countries according to WB (2022) when averaged out since the 1970s. The variation is due to the sample and the period coverage.

Moreover, table 4.1(a) shows that the average standard deviation of political instability for the sampled Sub-Saharan African countries over the sample period is at 6.17. Looking at the other control variables used in this model, we see that the average degree of openness to trade in these countries is at 69.67 percent share of GDP. Average inflation rate is at 9%, population grows in these countries at average rate of 2.48%, the average government spending and gross fixed capital formation in the sample countries is at 14.8 and 21.8 percent of share of GDP.

Table 4.1 (a) Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lnGDPPC	918	6.952898	1.087106	4.717849	10.04075
L1.	872	6.936639	1.091012	4.717849	10.04075
L2.	826	6.917742	1.093925	4.717849	10.04075
POLINST	940	6.477671	2.218045	1	12.65539
FDI	918	4.685704	8.32198	-11.199	103.3374
TO	836	69.97547	34.94525	1.218845	225.0231
GFCF	805	21.83421	9.207253	1.09681	81.02102
GS	801	14.79112	6.906404	0.951747	54.79677
INF	856	8.993571	27.09132	-9.61615	513.9068
POPG	932	2.484116	0.927644	-2.62866	5.604992

Figure 4.1(a): Average values log of GDP per capita, Political instability index and FDI(%GDP) in SSA (country-wise)



Source: Author's own construction based on data from World Bank

As can be seen from figure 4.1(a), seeing the general pattern, it can be observed that while log of GDP per capita and foreign direct investment follow an opposite pattern in SSA for the given period, the political instability also follows a path opposite to these variables as can be expected. This goes hand in hand with our presumption that political instability has a negative effect on economic growth and foreign direct investment by disrupting the operations of the existing resources and creating unfavorable conditions for investment attractions by foreign investors.

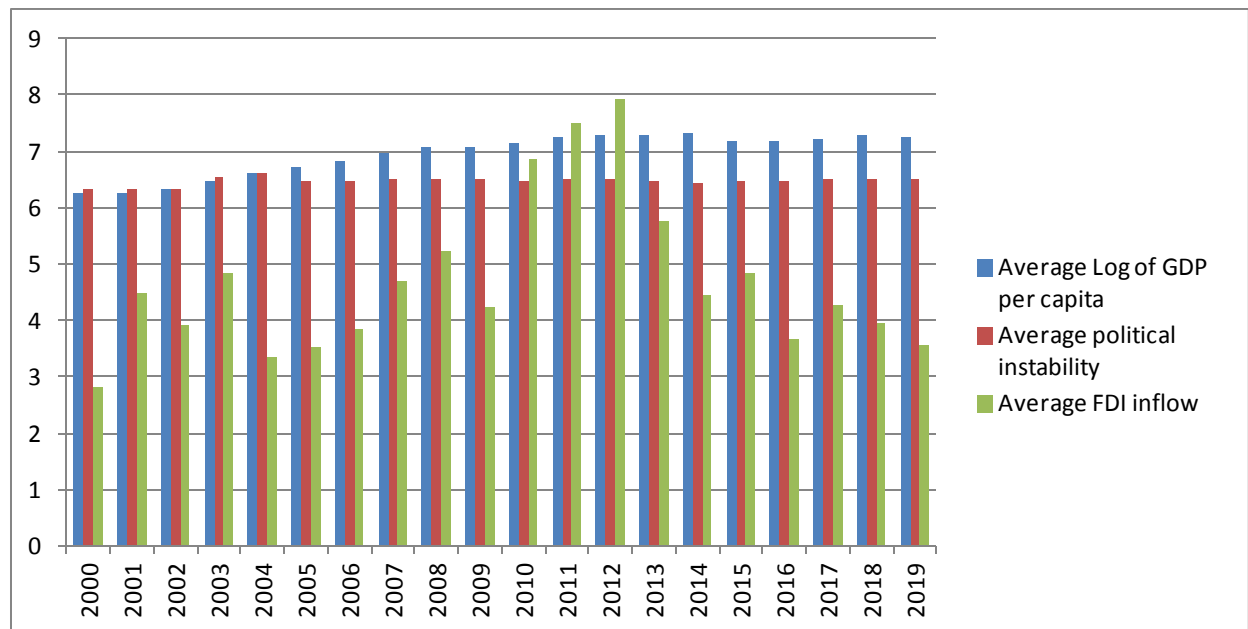
Notably, for the given sample of SSA countries in the given period, Seychelles has registered the largest average GDP per capita growth at 9.37%. The country which has the next largest average GDP per capita growth is Equatorial Guinea 9.18%. At third place is Mauritius with 8.88% of average GDP per capita growth. Burundi has the lowest average GDP per capita growth which is 5.28% for the given sample period.

Looking at the foreign direct investment path, we can see that Liberia has managed to draw the largest average foreign direct investment inflow at 24.8 percent of its GDP for the given period and given sample of SSA countries. Mozambique takes the second place in attracting FDI expressed as percent share of its GDP with 13.92% on an average. At third place is Seychelles

with 13.34 % share of its GDP. The country that performed little in attracting FDI among the sample of SSA countries for the given period is Comoros at merely 0.54% of its GDP.

It's also seen from the graph above in 4.1(a) that generally the average level of political instability is negatively associated with the average levels of GDP per capita and FDI. From the given sampled SAA countries, Somalia is on an average at the highest risk of political instability with average standard deviation risk level of 11.7. This political risk is associated with 5.95% GDP per capita growth and 6.13% share of FDI attraction in relation to its GDP. At second place of political risk is Congo Democratic republic with the average standard deviation level of political instability at 9.74. This level of political instability is accompanied with 5.8% GDP per capita growth and FDI at 4.3% its of its GDP. Sudan is at the third place on the level of political instability with 9.4 standard deviation political risk level which is associated with 3.71% FDI (%GDP) attraction and 6.83 % average GDP per capita growth.

Figure 4.1(b): Average values of log of GDP per capital , Political instability index and FDI(%GDP)) in SSA for the period 2000 – 2019



Source: Author's own construction based on data from World Bank

Analyzing the data from the perspective of the time period included in the sample for the given SSA countries, we can see that the highest level of average GDP per capita growth which is 7.13% is evidenced at the year 2014 while the lowest average GDP per capita growth is registered to be 6.26% at the year 2001. The average foreign direct investment reached its peak in 2011 which is 7.5% share of the total GDP of this fiscal year. The lowest FDI inflow was registered in the year 2000 to be 2.8% of the total GDP of the same fiscal year for the countries included in the sample. Looking for the year that is accompanied with the highest average level of political instability, it's found to be the year 2004 which is evidenced with 6.63 degree level of political instability. The year in which the lowest average level of political risk is registered is the year 2001 with the average degree of political instability being 6.33. Generally, the bar graph in figure 4.1(b) shows the levels of degree of instability is in line with the assumptions that political instability drastically damages a country's economic growth and the level of FDI inflow into the host country.

4.2. Estimation and Econometric Results

This section discusses the estimation results of our models specified in chapter three. We came up with the empirical results showing the relationships among economic growth, political instability and foreign direct investment by employing a System GMM and Forward orthogonal Deviation (FOD) GMM estimation approaches.

As already stated in the literature review in chapter two of this research paper, we'll try to see if political instability follows a direct and indirect transmission channels in affecting economic growth in SSA countries. Hence, we first estimate model one that explores the association between economic growth and political instability and foreign direct investment inflow into SSA countries. The second job is to estimate model two which links foreign direct investment and political instability along with other main determinants of FDI. Thirdly, we estimate model three which is about the main factors affecting political instability. Based on the estimations of these three models, we try to conclude as to how the relationship between economic growth and political instability in SSA looks like.

While estimating these three models, we tried to employ most of the estimation techniques applicable to dynamic panel model estimations in order to arrive at a sound result. Along the way, we have used One-Step/Two Step Difference GMM, One-Step/Two Step System GMM,

and Forward Orthogonal Deviation GMM (FOD) estimation approaches to run a number of estimations in STATA. However, One Step GMM and Forward Orthogonal Deviation GMM models are the only estimation techniques which are found to fulfill the relevant tests while the other dynamic estimation techniques failed to pass the tests that are relevant to the simulation. Therefore the One-Step GMM and Forward Orthogonal Deviation GMM models are found to be the best models that best fit the estimation of the relationships between our variables of interest in our study.

Since we employed an unbalanced panel data of 48 Sub-Saharan African countries, we employed FOD GMM in our regression which increases efficiency for unbalanced data. According to Roodman(2009), using the first-differenced transformation as an instrument has weaknesses as it magnifies gaps in the unbalanced panel. Using “forward orthogonal deviations” or “orthogonal deviations” in place of first difference transformation is the second best way to increase efficiency in the estimation. Unlike the difference transformation, the forward orthogonal deviation (FOD) transformation subtracts the average of all future available observations of a variable instead of subtracting the previous observation from the contemporaneous one. No matter how many gaps, it is computable for all observations except the last for each individual, so it minimizes data loss. And because lagged observations do not enter the formula, they are valid as instruments.

In the table below, the results of the economic growth model with the relevant tests such as Arellano and Bond test for second order autocorrelation (AR (2)) and the Hansen’s J statistics, for instrumental validity and efficiency test or for over-identifying restrictions are presented. The Hansen J test is used to determine the validity of instruments. It examines the null hypothesis that the overall instruments are valid (Roodman, 2009). Failure to reject the null hypotheses validates the choice of the instruments. Another diagnostics checking is the test for autocorrelation/serial correlation of the error term. It tests the null hypothesis that the differenced error term is first and second order serially correlated. Failure to reject the null hypothesis of no second-order serial correlation implies that the original error term is serially uncorrelated and the moment conditions (instruments) are correctly specified (Arellano & Bond, 1991).

Table 4.2(a): Model 1: The Growth model estimation results

VARIABLES	(1) SYSTEM-GMM	(2) FOD-GMM
L.lnGDPPC	1.183*** (0.103)	1.373*** (0.101)
L2.lnGDPPC	-0.230** (0.0979)	-0.419*** (0.0982)
POLINST	-0.0114*** (0.00370)	-0.00959*** (0.00279)
FDI	-0.00382*** (0.00115)	-0.00321*** (0.000857)
TO	0.00138*** (0.000422)	0.00111*** (0.000317)
GFCF	0.000399 (0.00138)	0.00113 (0.000829)
GS	-0.00614*** (0.00107)	-0.00466*** (0.000853)
INF	0.000563 (0.000558)	0.000610 (0.000543)
POPG	-0.00256 (0.00896)	-0.00497 (0.00741)
Constant	0.444*** (0.0569)	0.394*** (0.0451)
Observations	648	648
Number of Groups	41	41
AR(1)	0.000	0.001
AR(2)	0.065	0.227
Joint P-value	0.000	0.000
Hansen's J statistics	0.241	0.083
Number of Instruments	30	30

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

Table 4.2(a) displays the simulation results of Model 1 using One-Step System GMM and Forward Orthogonal Deviation (FOD) estimation techniques. When we see the diagnostic test results we can see that the Wald test shows that all the variables are jointly significant. This shows that the variables included in the model are valid implying that the model is well specified. Roodman (2009) states that the rule of thumb for selection of Hansen's J statistics which validates the overall selected instruments and over identification restrictions is to choose in between the range (0.1-0.25). When we see the Hansen's J statistics in Table 4.2(a) it is 0.241 for System GMM which lies within the range Roodman(2009) specifies. However the Hansen's J statistics in the FOD GMM is 0.083 which deviates a little from the range specified by Roodman(2009). This, however, is relatively safer compared to many other published articles with a 1 Hansen's J statistics. Moreover the Arellano-Bond AR(2) test of second-order autocorrelation in residuals implies that there is no second-order autocorrelation with AR(2) for system GMM and FOD GMM being 0.065 and 0.227 respectively complying with $P > 0.05$. It's also seen in Table 4.2(a) that the numbers of instruments are less than the number of groups which fulfills the criterion that the number of instruments should be less than or equal to the number groups for identification. All the fulfillments of these specifications show that the model is adequately specified.

As our estimation result of System GMM and FOD-GMM show in Table 4.2(a), the dependent variable, log of GDP per capita, is affected significantly by its first and second period lags. In both estimators, it can be seen that the first previous period lag value of the dependent variable is positively associated with the dependent variable Log GDP per capita at 1% significance level. Its second lag, however, has a negative impact on the current period log GDP per capita. All other things remaining the same, while the System GMM estimation shows that a 1 percent increment in the previous year value of GDP per capita may have increased the current period GDP per capita by 1.18%, the FOD-GMM estimates it to be 1.40% increase which shows that there is no exaggerated difference between the two estimations.

Our variable of interest political instability has a highly significant direct negative effect on economic growth as can be seen from the two estimations in the above table. This is in line with our hypothesis that political instability has a direct negative effect on economic growth. The simulation result from System GMM shows that with all other things remaining constant, a one standard deviation increase in political instability decreases economic growth by 0.011 % at 1% level of significance. On the other hand, a unit increase in the standard deviation of political instability decreases economic growth in FOD-GMM estimation by 0.01 % at 1% significance level, ceteris paribus which shows that the two GMM estimators have the same results.

On the other hand, FDI is found to have a highly significant negative effect on economic growth in both of the estimation techniques at 1% significance level. This is in line with the dependency economic theory that FDI crowds out domestic firms (Bornschieer & Chase-Dunn ,1985). The results from System GMM and FOD GMM respectively show that, all other things remaining the same, a 1 unit change in FDI(%GDP) is associated with a 0.004% and 0.003% decrease in economic growth in the short run at 1% significance level. While trade openness has a highly significant positive effect on economic in both of the GMM estimators, government spending is found to have a statistically highly significant negative effect on growth as can be seen in Table 4.2(a). The regression results show that, ceteris paribus, a one unit increase in trade openness (%GDP) will have a 0.001 % increase in the economic growth at 1% significance level, as can be seen from System GMM regression analysis. The FOD-GMM reveals almost the same result with that of System GMM regression at 1% level of significance. All other control variables such as gross fixed capital formation which is a proxy for investment, inflation rate and population growth rate, though they have the expected, they are statistically insignificant in affecting economic growth.

Table 4.2(b): Model 2: The FDI model estimation results

VARIABLES	(1) SYS-GMM	(2) FOD-GMM
L.FDI	0.314*** (0.110)	0.414*** (0.0957)
L2.FDI	0.0343 (0.0986)	0.106 (0.113)

POLINST	-0.146 (0.610)	-0.294 (0.613)
L.POLINST	-0.348 (0.608)	-0.143 (0.581)
lnGDPPC	-3.478*** (1.040)	-2.850*** (0.850)
TO	0.0784*** (0.0274)	0.0615*** (0.0225)
GFCF	0.190*** (0.0431)	0.149*** (0.0373)
Constant	20.79*** (7.443)	17.40*** (5.708)
Observations	727	727
Number of Groups	44	44
AR(1)	0.014	0.011
AR(2)	0.661	0.910
Joint P-value	0.000	0.000
Hansen's J statistics	0.105	0.058
Number of Instruments	16	16

Robust standard errors in parentheses

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

Again Model 2 in Table 4.2(b) displays the System GMM and FOD GMM regression results of the foreign direct investment model which was specified in chapter three of this study. The Hansen's J statistics for instrument validity and over identification restrictions is within the acceptable range proposed by Roodman(2009) in the System GMM estimator while it deviates a little in FOD-GMM. Arellano and Bond test for second order autocorrelation AR (2) is also not statistically significant rejecting the null hypothesis of availability of second order autocorrelation in the model. The requirement that number of instruments should be less than or equal to the number of groups as stated in Roodman(2009) is also valid as the number of

instruments is less than the number of panels in the model in both System GMM and FOD GMM estimations. Therefore, with the statistical tests fulfilled, let us see the estimation results of the model.

As can be seen from the System GMM and FOD GMM simulation results in Table 4.2(b), the first past realization of the dependent variable FDI has a significant positive effect on its current year value with 1% significance level in both estimations. Whereas, the second lag on FDI is found to be statistically insignificant in both System GMM and FOD GMM estimations. All other things remaining the same, a 1 unit increase in the previous year of FDI (%GDP) results in 0.3 units increase in the current period FDI(%GDP) at 1% significance level when estimated using System GMM, whereas, the FOD GMM simulation shows a 0.4 unit increase in the current year FDI(%GDP) at 1% level of significance. The log of GDP per capita is found to be significantly and negatively related with FDI. The coefficients of political instability in the first and second lags are statistically insignificant implying there is no association between FDI and political instability in Sub-Saharan African countries.

The two estimations reveal that log of GDP per capita and FDI are significantly and negatively associated. *Ceteris paribus*, a 1% increase in the log of GDP per capita is respectively associated with a 3.5 and a 2.9 units of FDI(%GDP) reduction at 1% significance level in both the System GMM and FOD GMM estimations. The log of domestic investment proxied by gross fixed capital formation is found statistically significant in affecting FDI inflow at 1% significance level in both of the estimations. It implies that a 1 percent increase in the domestic investment growth will result in 0.19 and 0.15 units increase in FDI(%GDP) inflow as simulated by System GMM and FOD GMM estimators respectively. Trade openness in both of the estimations is found to significantly affect the flow of FDI into Sub-Saharan African countries. With other things held constant, a 1 unit increase openness to trade(%GDP) is associated with respectively a 0.08 and a 0.06 unit increases in the inflow of FDI(%GDP) in System GMM and FOD GMM estimations.

Table 4.2(c): Model 3: The political instability model estimation results

VARIABLES	(1) SYS-GMM	(2) FOD-GMM
LPOLINST	0.962*** (0.0126)	0.956*** (0.0136)
lnGDPPC	-0.0570*** (0.0204)	-0.0595*** (0.0219)
UNEMP	0.00853*** (0.00262)	0.00786*** (0.00271)
INC_INEQ	-0.00207 (0.00186)	-0.00141 (0.00196)
INF	-0.00235*** (0.000831)	-0.00162* (0.000914)
GS	-0.00555** (0.00233)	-0.00492** (0.00232)
POPG	0.0492** (0.0249)	0.0546** (0.0267)
Year	0.00386* (0.00215)	0.00432** (0.00217)
Constant	-7.092* (4.216)	-8.018* (4.239)
Observations	678	678
Number of Groups	40	40
AR(1)	0.000	0.000
AR(2)	0.596	0.653
Joint P-value	0.000	0.000
Hansen's J statistics	0.119	0.112
Number of Instruments	35	35

Robust standard errors in parentheses

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

Table 4.2(c) presents the estimation results of the political instability model in both System GMM and FOD GMM estimation techniques. As displayed in the table, the dependent variable political instability is significantly affected by its previous year value. While the log of GDP per capita, government spending and inflation have significant negative effects, population growth and the level of unemployment aggravate the level of political instability with its positive effect as can be expected.

Ceteris paribus, a one standard deviation increase in the past realization of political instability variable, fuels political instability by a 0.96 standard deviation at 1% significance level in both the System GMM and FOD GMM estimations. As evidenced from the two estimations in the above Table 4.2(c), a 1 percent increase in the economic growth will ease the political instability by 0.06 standard deviations at 1% significance level, with other things remaining constant. Whereas a unit change in the unemployment rate will fuel the political instability by 0.009 and 0.008 standard deviations respectively in System GMM and FOD GMM estimations. A unit increase in the inflation rate is associated with a 0.001 standard deviation decrease in the level of political instability in the two GMM estimations assuming all other factors are constant. On an average, a unit increase in government spending is associated with a 0.006 and 0.005 respective standard deviations decrease in the two GMM estimations, ceteris paribus. A unit change in population growth on the other hand, aggravates the level of political instability by standard deviations of 0.049 and 0.055 as can be evidenced from the respective System GMM and FOD GMM estimations.

The three estimations above used collapsing and restricting the number of lags for the selection of internal instruments in order to be abide by the condition Roodman(2009) suggested for Hansen-J statistics to be within the range 0.1-0.25. A series of attempts have been made to arrive at the outputs in the three tables in an effort to make Hansen-J statistic to within the range recommended by Roodman(2009) and to bring to the acceptable range the p-values of AR (1) and AR (2) tests for second order autocorrelation. Therefore, with these assumptions valid, the estimation results obtained from the system GMM and FOD GMM estimators are valid.

Generally speaking, the simulation results given in Tables 4.2(a), 4.2(b) and 4.2(c) indicate that political instability and economic growth in Sub-Saharan African countries are negatively related through the direct and indirect transmission mechanisms. That is political instability affects

economic growth through two slow transmission channels. First political instability has a direct negative effect in economic growth by disrupting market operations and employment of the existing resources as argued in many of the literatures in chapter two of this paper. The other way political instability exerts a negative impact on the level of economic growth is by the indirect path through affecting foreign direct investment as can be seen in Table 4.2(b). While the direct and indirect effect of political instability is given by $\frac{\alpha_2}{1-\alpha_3\beta_2}$ and $\frac{\alpha_3\beta_3}{1-\alpha_3\beta_2}$ respectively, the overall effect of political instability on economic growth is equal to $\frac{\partial Y}{\partial PI} = \frac{\alpha_2}{1-\alpha_3\beta_2} + \frac{\alpha_3\beta_3}{1-\alpha_3\beta_2}$ as derived in chapter 3.

Computing the results we get the direct effect to be -0.23. Since the political instability on FDI through which it's supposed to affect economic growth is insignificant, the indirect effect is zero. The overall effect is also -0.23. This implies that political instability only affects economic growth directly through disruptions of the available resources and not through FDI.

Furthermore, the overall inter-temporal direct and indirect effect of political instability is derived and given by equation (3.14) in chapter three of this study.

$$\frac{\partial Y}{\partial PI_{it-1}} = \frac{(\alpha_2\gamma_1 + \alpha_3\beta_4)}{(1 - \alpha_2\gamma_2 - \alpha_3\beta_2)}$$

Where the term $\frac{(\alpha_2\gamma_1)}{(1-\alpha_2\gamma_2-\alpha_3\beta_2)}$ implies the direct effect of the inter-temporal effect of previous year political instability on economic growth and $\frac{\alpha_3\beta_4}{(1-\alpha_2\gamma_2-\alpha_3\beta_2)}$ captures the indirect effect.

Computing the direct and indirect effects from the coefficients of the variables in the regression models, we get the inter-temporal direct effect of political instability to be -0.22. whereas, the indirect effect is 0, since the effect of past value of the political instability variable is found statistically insignificant in the regression. The direct effect is also the overall effect in this case too. The implication is that political instability affects economic growth only through its direct path in both its past realization and contemporaneous values. The indirect path hypothesized

earlier in this paper through which political instability would affect economic growth in Sub-Saharan countries via the FDI transmission channel is rejected based on the findings of this study.

4.3. Making Sense of the Results

The empirical findings from Tables 4.2(a-c) show that other than the direct negative effect political instability has on economic growth, political instability and foreign direct investment do not make interactions that affects the level of growth in Sub-Saharan countries. This section therefore tries to compare the results of our estimations to those of the existing theoretical and empirical literatures and make sense of the findings in our study.

To understand the interactions of political instability and economic growth let us look at the general theory and empirical evidences in the literature world. The impacts of political instability on economic growth are still controversial in the economics literature, both in theory and empirical studies. On a theoretical level, authors generally agree that political instability has an adverse and deleterious effect on economic growth of a country. Political instability directly affects economic growth by disrupting the efficient employment of the existing resources. For example, in times of political instability, productive expenditures (investment expenditures) that may boost economic growth are also diverted away from their goals and channeled toward wasteful military expenditures, thereby affecting economic growth negatively (Bakaboukila Ayessa & Hakizimana, 2021). In addition to the direct negative effect political instability has on a country's economic growth, it also affects economic growth negatively through its negative effect on foreign direct investment.

Looking at our findings in Table 4.2(a), we can see that political instability has a negative impact on economic growth which is the expected hypothesis and in line with many authors such as Fossu (1992), Aisen & Veiga (2010), Malik & Mansur (2017), Afolabi & Bakar (2016) and many others who found a negative relationship between political instability and economic growth.

From the theoretical aspect, economists from the dependency school of thought argue that foreign direct investment will lead to dependency and thereby affects economic growth negatively in developing countries. Bornschieer & Chase-Dunn (1985) stated that FDI dominates and monopolizes the industrial structure of a country thereby leading to underutilization of productive forces. This school of thought asserts that the growth from FDI dominated country is not an organic growth but a disarticulated one (Amin, 1974). Foreign direct investment also negatively affects the economic growth of the host country due to the fact that it decreases the

balance of payments due to repatriated profits, has no healthy linkage with local businesses, and crowding out domestic firms out of business (Kumar, 1990).

So far, empirical researches conducted in Sub-Saharan Africa on the relationships of FDI and economic growth are not conclusive. Some have found positive relationships while others have negative or insignificant associations between the two variables. While studies conducted by Ndikumana and Verick (2008), Gohou and Soumaré (2012), Asiedu and Gyimah-Brempong (2008), Esso (2010) and Otchere et al (2016) have found positive relationships, De Mello (1999), Akinlo (2004), Ahmed et al (2007), Kose et al (2009), Hermes and Lensink (2003), (Kamara, 2013) and Anyanwu (2014) have found negative relationships between FDI and economic growth. In our regression we found that FDI has a negative impact on economic growth in Sub Saharan countries which is in line with the results of these authors.

According to Gakpa(2020), features that are specific to Sub-Saharan African countries are the main factors that impeded the paths of the positive effects of FDI on growth. Taking into account the domestic characteristics helps in having a better understanding of the relationships of the two variables. Though, generally it's accepted that FDI helps boost economic growth in host countries, it's argued that this contribution of FDI to economic growth strongly depends on circumstances inside the host country. These circumstances are the availability of human capital and the export- orientedness of the FDI recipient countries. These factors are found to be important preconditions for FDI to have a significant positive effect on growth. The level of the financial system is also another precondition that needs to be in place in host countries in order for FDI to affect economic growth positively (Hermes and Lensink, 2003).

The empirical findings of the relationships between political instability and FDI are also inconclusive. While researchers such as Busse and Hefeker (2007), Daude and Stein (2007), Alfaro et al (2008), and Anyanwu and Yameogo (2015) found that there is a negative relationship between political instability and FDI, studies conducted by Wheeler and Mody, (1992); Noorbakhsh et al, (2001); and Blonigen and Piger, (2014) found no statistically significant relationship between political instability and FDI. Others such as (Campos and Nugent, 2003) have also found positive associations between the two variables.

Though our empirical finding on the relationship between political instability and FDI coincides with many economic authors, to our dismay, the relationship between political instability and foreign direct investment is insignificant, thereby eliminating the indirect path. The statistically insignificant relationship between political instability and foreign direct investment stands obstacle to the hypothesis we made earlier in chapter one that political instability hinders economic growth through the indirect path of FDI. The justification for this is that, even though the general understanding is that the flow FDI will be disrupted by political instability, the level of political risk has not reached to the point where foreign investors are discouraged to invest in SSA countries for the fact that investors often compare the probability of losses to that of the gains as also noted by Appiah-Kubi et al (2020). Kevin Williams (2010) also noted that even though the Sub-Saharan Africa region is less attractive for FDI inflows due to its unstable political economy, the returns on resource-seeking FDI in SSA dwarf the cost of political instability and this partly explains why FDI still flows to the region despite the unstable political economy. Gosse(2017) further reasons out that FDI is significantly affected by the long-run accumulation of political instabilities compared to the short run dynamics in political variables.

Though the relationship between trade openness and economic growth is still a debatable issue and no consensus has been reached as to whether or not trade openness stimulates economic growth, there are different theories in support of the positive relationship between the two variables. The theorists of comparative advantage claim that countries which trade amongst each other will engage in producing goods on which they have a comparative advantage. They will specialize in the production of goods for which they have better factor endowments, thereby increasing their productivity and exports of goods they produce. This in turn, will increase the economic growth of that country. Endogenous growth theories also assert that trade openness enhances growth as there will be a diffusion of advanced technologies between the trading countries (Keho et al, 2017). Our empirical finding ensures that there exists a positive relationship between trade openness and economic growth in SSA countries which is in line with the findings of Oumarou et al,(2020); Keho et al, (2017); Markus Brueckner and Daniel Lederman,(2015).

Furthermore, in our estimation results government spending shows as having a negative effect on economic growth of Sub-Saharan African countries which is supported in many theoretical and

empirical works. On a theoretical basis neoclassical school of thought asserts that government spending negatively affects growth as it crowds-out the private sector through increasing domestic interest rates and tax rates thereby resulting in distortions on the allocation of resources (Alqadi M, et al.,2019; Mitchell,2005). The next chapter discusses the findings from our empirical work and the corresponding policy implications drawn from our results.

4.4. Panel Unit Root Tests and Causality

4.4.1. Panel Unit Root Tests

Determining the direction of causality among our main variables of interest such as economic growth, political instability and FDI is important as this procedure would help governments and policy makers of SSA in identifying the variable that should be target first. When thinking about determining the short run and long run relationships among the variables of interest (ie economic growth, political instability and foreign direct investment) , one must first perform A panel unit root test before going any further. In our case, we did so to determine the stationarity of these three variables. A stationary series is mean reverting and has a finite variance and the associated shocks are only transitory.

We employed Im-Pesaran-Shin and Fisher panel unit root tests which are able to test the stationarity test of unbalanced data. The unitroot test results are given in the table below

Table 4.4(a): ADF test based on Im-Pesaran-Shin and Fisher panel unit root tests

Variables	Stationarity level	Im-Pesaran-Shin		Fisher	
		Statistic	p-value		
lnGGPC	I(0)	-3.3356	0.0004	-3.7827	0.0001
POLINST	I(0)	-2.0656	0.0194	-2.2748	0.0115
FDI	I(0)	-4.6075	0.0000	-5.1993	0.0000

As can be seen from the above table all the three variables are found to be stationary at level in both Im-Pesaran-Shin and Fisher unit root tests. The fact that

these variables are I(0) enables us in advance to know that they have only short run dynamics and no long run relationships among the variables. Since there are no long run relationships among these variables of interests no co-integration test is performed. We can run some causality tests to determine if there is causation among and between the variables and which way is the direction. Since the three variables are all stationary at level, we used panel var model and the corresponding granger causality tests on the variables. Granger(1969) says that a variable X is said to Granger-cause another variable Y if and only if past values of variable X better predict Y than the past values of Y itself.. That is if the current values of the dependent variable Y can be forecasted by using the past values of the explanatory variable X, we say X Granger-causes Y.

Granger(1969) introduced the Granger test within time series framework to analyze the causalities between variables. If we assume that the variables X_{it} and Y_{it} are stationary series, then the model is given by

$$Y_t = \alpha + \sum_1^k \beta_k Y_{t-k} + \sum_1^k \phi_k X_{t-k} + \varepsilon_t, \text{ where, } t=1, \dots, T$$

This model is extended by Dumitrescu and Hurlin (2012) to test the causality within panel data frameworks. The extension made by Dumitrescu and Hurlin (2012) is given by

$$Y_{it} = \alpha_i + \sum_1^k \beta_{ik} Y_{it-k} + \sum_1^k \phi_{ik} X_{it-k} + \varepsilon_t, \text{ where, } t=1, \dots, T \text{ and } i=1, \dots, N$$

This model tests the whether or not past values of X have certain causality on the present value of Y.

And the null hypothesis is given by :

$$H_0: \phi_{i1} = \dots = \phi_{ik} = 0 \quad \forall i = 1 \dots N$$

Holtz-Eakin, Newey and Rosen, (1988) introduced the panel VAR model in order to deal with multivariate simultaneous equation models which are endogenous. Even though panel VAR models are used to estimate simultaneous equations which are endogenous in nature like those of dynamic GMM estimators, our main concern is not estimating the coefficients as we already did

so with a System GMM estimator. Rather we are employing panel VAR here to test whether or not there is a causality between the three variables of interest that are considered endogenous in a GMM framework of our earlier estimations. Therefore we employ panel VAR for model selection criterion; panel causality tests along with the corresponding variance decomposition and impulse response.

4.4.2. Model Selection for Panel VAR

The optimal lag for Panel VAR is selected by using the optimal lag selection criteria called moment and model selection criteria (MMSC) proposed by Andrews and Lu (2001). This optimal lag selection criterion is based on GMM models Hansen's (1982) statistic of over-identifying restrictions. The MMSC is analogous to Akaike information criteria (AIC), the Bayesian information criteria (BIC), and the Hannan-Quinn information criteria (HQIC) which are commonly used in maximum-likelihood models (Michael R.M. Abrigo & Inessa Love, 2015).

Therefore after running the Panel VAR regression on our three variables of interest (namely, economic growth, political instability and FDI variables), the three model selection criteria of Andrews and Lu (2001) show that the optimal lag is 1 since the first lag has the smallest MBIC, MAIC and MQIC.

After running the Panel VAR model with the optimal lag 1 and the Panel Granger causality test, we see that political instability and FDI Granger-cause economic growth while there is no reverse causality going from economic growth to both political instability and FDI. One can also see that political instability and FDI do not Granger-cause each other.

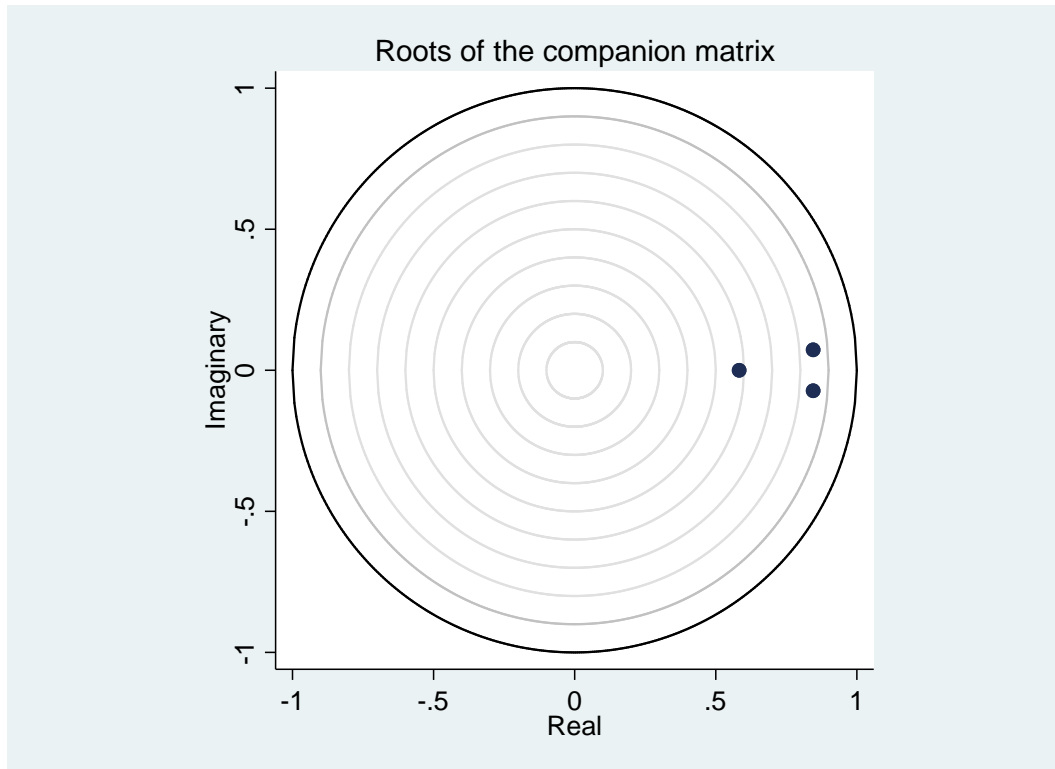
Table 4.4(b): Panel Granger causality test results

Dependent	Independent	chi2	Df	Prob> chi2
lnGDPPC	POLINST	5.688	1	0.017
	FDI	8.104	1	0.004
	ALL	12.994	2	0.002
POLINST	lnGDPPC	2.19	1	0.139
	FDI	1.918	1	0.166
	ALL	5.577	2	0.062
FDI				

	InGDPPC	0.962	1	0.327
	POLINST	0.001	1	0.971
	ALL	1.251	2	0.535

Once we tested the direction of causality, we are interested in knowing the effect of the relative exogenous shocks in the system. Impulse-response functions (IRF) and forecast-error variance decompositions (FEVD) are the methods with which we can identify the effects of shocks in endogenous variable system. Before estimating the IRF and the FEVD, we have to first check the model stability which depends upon the eigenvalues of the Panel VAR model lying inside a unit circle. The underlying graph shows that the eigenvalues lie in the unit circle thereby ensuring the model is stable. The results of Dumitrescu-Hurlin(2012) panel causality tests in Table 4.4 reveal that there is a one way causality going from political instability and FDI to economic growth in the short run.

Figure 4.4(a): Model Stability condition



Source: Author's own simulation based on the data from World Bank

4.4.3. The Forecast Error Variance Decomposition (FEVD)

The Forecast Error Variance Decomposition (FEVD) displays the percentage of the error made forecasting a variable overtime due to a specific shock. That is, it shows how much of the variation in the dependent variable is explained by its own shocks and the shocks in the other variables in the system. It also indicates the relative impact of a variable on another one.

The proportions of the fluctuations of a variable explained by its own past realizations can indicate the relative exogeneity or endogeneity of that variable (Domingos, 2000). The variable which is most explained by the innovations of its own past realizations compared to the other variables is considered to be the most exogenous variable of all.

Table 4.4(c): Results of Forecast error variance decomposition (FEVD)

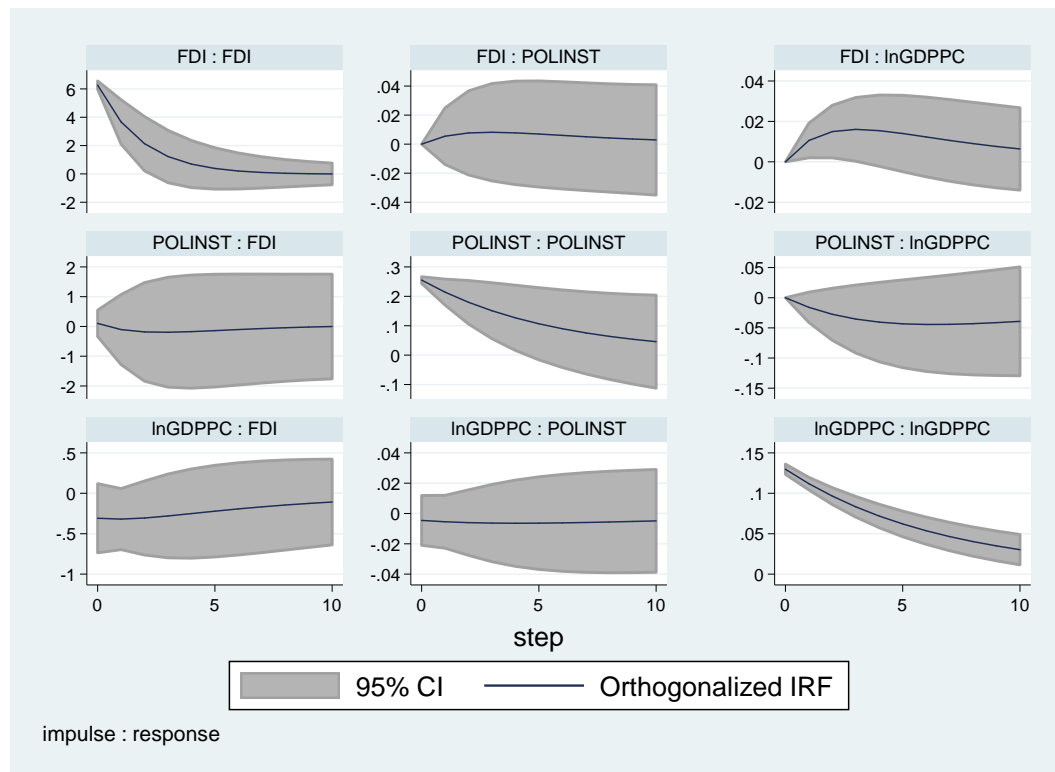
Reponse Variable/Forecast Horizon	Impulse Variable		
	lnGDPPC	POLINST	FDI
lnGDPPC			
0	0	0	0
1	1	0	0
2	0.963089	0.028029	0.008882
3	0.902984	0.075971	0.021045
4	0.838174	0.129653	0.032174
5	0.777855	0.181142	0.041004
Reponse Variable/Forecast Horizon	Impulse Variable		
	lnGDPPC	POLINST	FDI
POLINST			
0	0	0	0
1	0.000205	0.999795	0
2	0.001067	0.997862	0.001071
3	0.002413	0.995288	0.002299
4	0.00412	0.992653	0.003227
5	0.006054	0.990151	0.003795
Reponse Variable/Forecast Horizon	Impulse Variable		
	lnGGDPPC	POLINST	FDI
FDI			
0	0	0	0
1	0.00027	0.000419	0.999311

2	0.000644	0.000384	0.998972
3	0.0011	0.000355	0.998545
4	0.001563	0.000377	0.99806
5	0.001982	0.000473	0.997545

As can be inferred from Table 4.5 above, in the short run looking at year 1, a 100% forecast in the error variance in log of real GDP per capita is explained by the variable itself. That means other variables in the model do not have any influence on log of real GDP per capita which implies that political instability and FDI have strong exogenous impact, or that they do not influence log of real GDP per capita at all. Whereas looking at year 5 in the long run, still the log of real GDP per capita explains the forecast error variance by 77.8% while political instability explains the forecast error variance by 18%. FDI's contribution in explaining the forecast error variance of the log real GDP is almost insignificant implying that FDI is highly exogenous variable.

By the same token, most of the forecast error variances in political instability and FDI variables are explained by their own respective variations in the system. Comparing the variables log of GDP per capita, Political instability and FDI in the system, we can see that in year 1 (in the short run) political instability is the most exogenous of all the three variables with 99.97% of all the forecast error variances explained by its own variations. On the other hand starting from the second year onwards, FDI stands as the most exogenous of all the three variables as the percentages of variations of FDI which explain the forecast error variances are the greatest over the years. Log of GDP per capita is relatively the most endogenous variable of all the three.

Figure 4.4(b): Impulse response functions



Source: generated by Author using STATA from the source data

When we look at the impulse response functions of the variables, we can see in figure 4.4(b) that a standard deviation shocks of a variable on itself at the initial point shows a quick jump and slows down over time. An impulse to FDI on itself has a positive impact that gradually decreases over time but stays positive up until around the 8th quarter. After that it converges to zero. A standard deviation shock of political stability on itself returns a quick incremental response initially and decreases also over time. It stays positive until around 8th or 9th period and finally converges to zero at period 10. In a similar way the log of GDP per capita initially shoots up to its own standard deviation impulse and positively decreases until the last period in the horizon and comes down to equilibrium in the latter periods. From this we can see that most of the variations in the dependent variable are from its own shocks.

On the other hand, economic growth and political instability generally decrease over time to a standard deviation shock of FDI, even though at first there is a small increase which may be due to some other factors. But the shock of FDI on these variables influences and bends them to a

smoothly and slowly decreasing positive path even after the 10th period. FDI is almost unresponsive to a standard deviation shock of political instability even at the initial stage. The shock of the log of GDP per capita on FDI results in a slight deviation from the equilibrium point and immediately follows a smooth positive path back to equilibrium. The response is almost insignificant. Finally, the response on political instability due to a shock of the log of GDP shows a decrease from its equilibrium position of zero period until the 5th period after which it embarks on an increasing path. From the initial point until the last horizon, it stays negative even though at the 5th period it changes direction to equilibrium.

Among the three focus variables, log of GDP per capita is the most endogenous one which is affected by impulses from itself, political instability and FDI in a descending order of influence. Whereas, FDI is the most exogenous variable which the least responsive is to shocks other than its own. Therefore, from the FEVDS and IRFs and the causality tests, one can conclude that most of the variations in the forecast error variances of both FDI and political instability are due to their own respective shocks and not by other external variables. This makes them highly exogenous not much responsive to variations in the economic growth. On the other hand, economic growth which is proxied by log of GDP per capita is the most endogenous variable which is prone to shocks in other variables (i.e political instability and FDI) in addition to its own innovations.

We have already seen from the IRF graph that when log of GDP per capita is shocked by FDI and political instability, the response of log of GDP per capita is large and it takes longer periods than the horizon to resort back to equilibrium. Where as a shock on FDI due to the innovations of economic growth and political instability is short lived and it doesn't take much time to converge to a steady state level in either case. The response of political instability due to an impulse from economic growth is larger compared to that of the FDI. This makes political instability the second most endogenous variable among the three variables. All in all the FEVD and IRF test results coincide with each other and are in line with the results of the causality tests and the GMM results. Given the relative exogeneities/endo geneities of these three variables, it is of great importance for policy makers that they make strategies to manipulate the relatively most exogenous variables (political instability and FDI) which are prone to external variable shocks in order to increase an economic growth in Sub-Saharan African countries.

CHAPTER 5: CONCLUSION AND POLICY IMPLICATIONS

In this chapter some conclusions and policy implications are presented based on the results obtained from the estimations of our models. Therefore, section 5.1 of this paper presents the conclusions followed by section 5.2 which presents the policy implications.

5.1. Conclusions

The study of political economy is a recent phenomenon, and despite many researches have been made trying to uncover the relationship between political instability and economic growth, the issue is still controversial and remains inconclusive to date. Over the last three decades, economists have paid close attention to the relationship between political instability, FDI, and economic growth. Even though many empirical researches have been made on the issue, it still remains inconclusive. In this study the relationship between political instability, foreign direct investment and economic growth proxied by log of real GDP per capita is investigated. The study covers 48 Sub-Saharan African countries over 20 years (2000-2019) and uses a dynamic system GMM (One-step system GMM) and a Forward Orthogonal Deviation (FOD) GMM estimation techniques

While the data on income inequality was obtained from World Income Inequality Database (WIID), the other remaining variables were obtained from the open source of World Bank's World Development Indicators (WDI) and World Governance indicators (WGI) data bases.

The empirical results from this study show that political instability has a direct significant negative effect on economic growth in Sub-Saharan African countries. On the other hand, since the effect of political instability on FDI is found to be statistically insignificant, political instability has no effect on economic growth through the FDI channel. That is, political instability affects economic growth only through its direct channel but not through the indirect one. While other economic factors such as lagged real GDP per capita and trade openness have a significant and positive effect on economic growth, government spending has significant negative effect on growth in SSA.

From the results of the FDI model in Table 4.2(b) of our system GMM estimation, it's seen that FDI is positively and significantly affected by both its first and second lags. Political instability along with its first lag is also found to have no significant effect on FDI in Sub-Saharan African

countries. The third model which is the political instability model presented in Table 4.2(c) of our study is incorporated to test the reverse causality between political instability and economic growth. As can be seen from the results, the level of economic growth, inflation rate and government spending have significant negative effects on political instability while the lagged value of political instability worsens the contemporaneous state of political instability. Additionally, unemployment rate and population growth fuels the level of political instability as the two variables have highly significant positive effects on political instability.

Panel unit root tests were performed on the three main variables (i.e economic growth, political instability and FDI) to determine their level of stationarity before proceeding to test for their causal relationships. Both the Im-Pesaran-Shin and Fisher unit root tests show that all the three variables were stationary at level. After running a panel granger causality test, it was found that the causation goes only from political instability to economic growth and FDI to economic growth and not the other way around. It's also noted in the results that there is no causality between political instability and FDI.

To reinforce the results obtained from the causality tests, we have run forecast error variance decompositions (FEVD) and impulse response functions (IRFs) on the three main variables. The results show that economic growth responds to shocks from the other variables other than its own innovations. Whereas the other two variables, political instability and FDI are not that much responsive to shocks other their own. While it's found that economic growth is the most endogenous variable of all the three variables, FDI is the most exogenous of all. Political instability is highly exogenous when compared to economic growth and relatively endogenous when the comparison is with FDI.

5.2. Policy Implications

Various policy implications based on our findings in Sub-Saharan African countries could be provided. The results show that the governments and policy makers of these countries should target political instability as their policy variable since variations in the economic growth other than its own shocks are also explained by the shocks from political instability. Countries in SSA should not ignore factors leading to political instability and policies aimed at decreasing political instability should be pursued by these countries in order to maintain a stable economic growth. It should be the primary goal of Sub-Saharan African countries to account for political instability

variables in their policy alternatives when they are planning and setting a certain goal to achieving economic growth.

Factors leading to political instability in SSA such as corruption, internal violence and external conflicts, divisions along ethnic and religious lines etc. should be mitigated and resolved in advance. The governments must work on the factors that build citizens' confidence in the government system where they are served irrespective of their cultural, religious, political, economic etc. differences and backgrounds. The countries in SSA must have strong institutions that entertain citizens' freedom of speech, guarantee rights to properties, build democratic frameworks within which democratic rights are exercised thereby decreasing the aggressions of citizens and their tendency to outburst their desperations on the system which leads to political instability, and eventually hampers economic growth. Generally, implementing various macroeconomic policy reforms in an effort to boost the economic growth would not succeed if the factors leading to political instability in a country are not properly accounted for and given central place. The governments of Sub Saharan countries should also open up to trade and minimize their excess government expenditures among other macroeconomic policy measures they persue.

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APPENDIX

Appendix A: List of countries included in the sample

Angola	Ethiopia	Nigeria
Benin	Gabon	Rwanda
Botswana	Gambia, The	Sao Tome and
Burkina Faso	Ghana	Principe
Burundi	Guinea	Senegal
Cabo Verde	Guinea-Bissau	Seychelles
Cameroon	Kenya	Sierra Leone
Central African	Lesotho	Somalia
Republic	Libe ria	South Africa
Chad	Madagascar	Suda n
Comoros	Malawi	Tanzania
Congo, Dem. Rep.	Mali	Togo
Congo, Rep.	Mauritania	Uganda
Cote d'Ivoire	Mauritius	Zambia
Equatorial Guinea	Mozambique	Zimbabwe
Eritrea	Namibia	
Eswatini	Niger	

Appendix B: One-step system GMM result for growth model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_id	Number of obs	=	648
Time variable : Year	Number of groups	=	41
Number of instruments = 30	Obs per group: min	=	0
Wald chi2(9) = 3.34e+06	avg	=	15.80
Prob > chi2 = 0.000	max	=	18

lnGDPPC	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
lnGDPPC						
L1.	1.182746	.1031831	11.46	0.000	.9805105	1.384981
L2.	-.2296453	.0978713	-2.35	0.019	-.4214696	-.0378211
POLINST	-.0113975	.0037	-3.08	0.002	-.0186494	-.0041457
FDI	-.003822	.0011473	-3.33	0.001	-.0060706	-.0015733
TO	.0013811	.0004218	3.27	0.001	.0005544	.0022078
GFCF	.0003991	.0013808	0.29	0.773	-.0023071	.0031053
GS	-.0061357	.0010679	-5.75	0.000	-.0082288	-.0040427
INF	.0005633	.0005582	1.01	0.313	-.0005307	.0016573
POPG	-.0025602	.0089646	-0.29	0.775	-.0201305	.0150102
_cons	.4441358	.0568817	7.81	0.000	.3326498	.5556219

Arellano-Bond test for AR(1) in first differences: z = -3.42 Pr > z = 0.001
 Arellano-Bond test for AR(2) in first differences: z = -1.84 Pr > z = 0.065

Sargan test of overid. restrictions: chi2(20) = 83.70 Prob > chi2 = 0.000
 (Not robust, but not weakened by many instruments.)
 Hansen test of overid. restrictions: chi2(20) = 24.04 Prob > chi2 = 0.241
 (Robust, but weakened by many instruments.)

Appendix C: FOD GMM result for growth model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_id	Number of obs	=	648
Time variable : Year	Number of groups	=	41
Number of instruments = 30	Obs per group: min	=	0
Wald chi2(9) = 3.67e+06	avg	=	15.80
Prob > chi2 = 0.000	max	=	18

lnGDPPC	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
lnGDPPC						
L1.	1.37342	.1014763	13.53	0.000	1.17453	1.57231
L2.	-.4186185	.0981595	-4.26	0.000	-.6110075	-.2262295
POLINST						
FDI	-.0032052	.0008572	-3.74	0.000	-.0048853	-.0015251
TO	.001114	.0003169	3.52	0.000	.0004928	.0017351
GFCF	.0011346	.0008286	1.37	0.171	-.0004894	.0027586
GS	-.0046631	.0008535	-5.46	0.000	-.0063358	-.0029903
INF	.0006104	.000543	1.12	0.261	-.000454	.0016747
POPG	-.0049659	.0074077	-0.67	0.503	-.0194848	.009553
_cons	.3938606	.0450941	8.73	0.000	.3054777	.4822435

Arellano-Bond test for AR(1) in first differences: z = -3.69 Pr > z = 0.000

Arellano-Bond test for AR(2) in first differences: z = -1.21 Pr > z = 0.227

Sargan test of overid. restrictions: chi2(20) = 53.70 Prob > chi2 = 0.000
(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(20) = 29.26 Prob > chi2 = 0.083
(Robust, but weakened by many instruments.)

Appendix D: One-step system GMM result for FDI model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_id	Number of obs	=	727
Time variable : Year	Number of groups	=	44
Number of instruments = 16	Obs per group: min	=	5
Wald chi2(7) = 223.39	avg	=	16.52
Prob > chi2 = 0.000	max	=	18

FDI	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
FDI						
L1.	.3136949	.1098873	2.85	0.004	.0983198	.52907
L2.	.0343487	.0986269	0.35	0.728	-.1589565	.227654
POLINST						
--.	-.1457823	.6096468	-0.24	0.811	-1.340668	1.049104
L1.	-.3483144	.6076458	-0.57	0.566	-1.539278	.8426495
lnGDPPC						
TO	-.3478379	1.040376	-3.34	0.001	-5.517478	-1.43928
GFCF	.0784024	.0274332	2.86	0.004	.0246343	.1321705
_cons	.1895852	.0431175	4.40	0.000	.1050764	.274094
_cons	20.78994	7.442798	2.79	0.005	6.202321	35.37755

Arellano-Bond test for AR(1) in first differences: z = -2.46 Pr > z = 0.014
 Arellano-Bond test for AR(2) in first differences: z = 0.44 Pr > z = 0.661

Sargan test of overid. restrictions: chi2(8) = 552.85 Prob > chi2 = 0.000
 (Not robust, but not weakened by many instruments.)
 Hansen test of overid. restrictions: chi2(8) = 13.21 Prob > chi2 = 0.105
 (Robust, but weakened by many instruments.)

Appendix E: FOD GMM result for FDI model

Group variable: c_id Number of obs = 727
 Time variable : Year Number of groups = 44
 Number of instruments = 16 Obs per group: min = 5
 Wald chi2(7) = 371.80 avg = 16.52
 Prob > chi2 = 0.000 max = 18

FDI	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
FDI						
L1.	.4140408	.0956501	4.33	0.000	.22657	.6015115
L2.	.1058718	.1130859	0.94	0.349	-.1157726	.3275161
POLINST						
--.	-.2940504	.6129902	-0.48	0.631	-1.495489	.9073883
L1.	-.1429463	.5813105	-0.25	0.806	-1.282294	.9964014
lnGDPPC	-2.849904	.8503238	-3.35	0.001	-4.516508	-1.1833
TO	.061501	.0224879	2.73	0.006	.0174255	.1055766
GFCF	.1486618	.0373077	3.98	0.000	.0755401	.2217836
_cons	17.40115	5.707624	3.05	0.002	6.214412	28.58789

Arellano-Bond test for AR(1) in first differences: z = -2.53 Pr > z = 0.011
 Arellano-Bond test for AR(2) in first differences: z = -0.11 Pr > z = 0.910

Sargan test of overid. restrictions: chi2(8) = 557.57 Prob > chi2 = 0.000
 (Not robust, but not weakened by many instruments.)
 Hansen test of overid. restrictions: chi2(8) = 15.06 Prob > chi2 = 0.058
 (Robust, but weakened by many instruments.)

Appendix F: One-step system GMM result for Political instability model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_id	Number of obs	=	678
Time variable : Year	Number of groups	=	40
Number of instruments = 35	Obs per group: min	=	0
Wald chi2(8) = 531306.98	avg	=	16.95
Prob > chi2 = 0.000	max	=	19

POLINST	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
POLINST L1.	.9619499	.0125931	76.39	0.000	.937268	.9866319
lnGDPPC	-.0570065	.0204274	-2.79	0.005	-.0970434	-.0169696
UNEMP	.0085258	.002619	3.26	0.001	.0033927	.013659
INC_INEQ	-.0020739	.0018588	-1.12	0.265	-.0057171	.0015692
INF	-.0023481	.0008313	-2.82	0.005	-.0039773	-.0007188
GS	-.0055509	.002331	-2.38	0.017	-.0101195	-.0009823
POPG	.0491584	.0249228	1.97	0.049	.0003106	.0980063
Year	.0038624	.002153	1.79	0.073	-.0003573	.0080822
_cons	-7.092125	4.216199	-1.68	0.093	-15.35572	1.171473

Arellano-Bond test for AR(1) in first differences: z = -4.60 Pr > z = 0.000

Arellano-Bond test for AR(2) in first differences: z = 0.53 Pr > z = 0.596

Sargan test of overid. restrictions: chi2(26) = 630.94 Prob > chi2 = 0.000

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(26) = 34.67 Prob > chi2 = 0.119

(Robust, but weakened by many instruments.)

Appendix G: FOD GMM result for political instability model

Dynamic panel-data estimation, one-step system GMM

Group variable: c_id	Number of obs	=	678
Time variable : Year	Number of groups	=	40
Number of instruments = 35	Obs per group: min	=	0
Wald chi2(8) = 363469.31	avg	=	16.95
Prob > chi2 = 0.000	max	=	19

POLINST	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
POLINST L1.	.9558554	.013564	70.47	0.000	.9292706	.9824403
lnGDPPC	-.0595136	.0219195	-2.72	0.007	-.1024751	-.0165521
UNEMP	.0078594	.0027138	2.90	0.004	.0025404	.0131783
INC_INEQ	-.0014137	.0019606	-0.72	0.471	-.0052564	.0024291
INF	-.0016238	.000914	-1.78	0.076	-.0034151	.0001676
GS	-.0049209	.002316	-2.12	0.034	-.0094601	-.0003817
POPG	.054597	.0266546	2.05	0.041	.0023549	.1068391
Year	.0043208	.0021689	1.99	0.046	.0000697	.0085718
_cons	-8.017916	4.238744	-1.89	0.059	-16.3257	.2898703

Arellano-Bond test for AR(1) in first differences: z = -4.65 Pr > z = 0.000

Arellano-Bond test for AR(2) in first differences: z = 0.45 Pr > z = 0.653

Sargan test of overid. restrictions: chi2(26) = 585.55 Prob > chi2 = 0.000

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(26) = 34.97 Prob > chi2 = 0.112

(Robust, but weakened by many instruments.)

Appendix H: Granger causality test results

. pvargranger

panel VAR-Granger causality Wald test

Ho: Excluded variable does not Granger-cause Equation variable

Ha: Excluded variable Granger-causes Equation variable

Equation \ Excluded		chi2	df	Prob > chi2
lnGDPPC	POLINST	5.688	1	0.017
	FDI	8.104	1	0.004
	ALL	12.994	2	0.002
POLINST	lnGDPPC	2.190	1	0.139
	FDI	1.918	1	0.166
	ALL	5.577	2	0.062
FDI	lnGDPPC	0.962	1	0.327
	POLINST	0.001	1	0.971
	ALL	1.251	2	0.535

Appendix I: principal component analysis

. pca ZCC ZGE ZPSAV ZRQ ZRL ZVA

Principal components/correlation

Number of obs = 940

Number of comp. = 6

Trace = 6

Rotation: (unrotated = principal)

Rho = 1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.91972	4.50005	0.8200	0.8200
Comp2	.419671	.123121	0.0699	0.8899
Comp3	.296549	.0741193	0.0494	0.9393
Comp4	.22243	.142861	0.0371	0.9764
Comp5	.0795687	.017511	0.0133	0.9897
Comp6	.0620577	.	0.0103	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
ZCC	0.4113	-0.0157	-0.3945	-0.6929	0.3848	0.2163	0
ZGE	0.4255	-0.2587	-0.3109	0.1179	-0.7418	0.3020	0
ZPSAV	0.3657	0.8817	-0.0074	0.2545	0.0089	0.1550	0
ZRQ	0.4117	-0.3838	0.0334	0.5951	0.5344	0.2059	0
ZRL	0.4385	-0.0343	-0.1201	0.0279	-0.0435	-0.8885	0
ZVA	0.3928	-0.0835	0.8556	-0.2938	-0.1191	0.0781	0

Declaration

I, Tsegayehu Agmasie, hereby declare that the Thesis entitled “**The Effect of Political Instability on Economic Growth in Sub-Saharan African Countries**” and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Economics (Economic Policy Analysis) is my original work and complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Name

Signature

Addis Ababa University, Addis Ababa, Ethiopia

June 2022